



**Mary River Project 2020  
Core Receiving Environment Monitoring  
Program Report**

**Part 2 of 3  
(Appendices A to D)**

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**APPENDIX A**  
**DATA QUALITY REVIEW**

## APPENDIX A DATA QUALITY REVIEW

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## A1 INTRODUCTION

Data Quality Review (DQR) was conducted on data collected as part of the Mary River Project 2020 CREMP to define the overall quality of the data collected for the program, and by extension, the confidence with which the data could be used to derive conclusions. 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 the magnitude of these influences, inaccuracy or imprecision have the potential to affect the reliability of conclusions drawn from the available data. Therefore, it is important to ensure that programs incorporate appropriate steps to control the non-natural sources of data variability (i.e., minimize the variability that does not reflect natural spatial and temporal variability in the environment) and thus assure the quality of the data.

The Mary River Project 2020 CREMP DQR involved comparison of field performance to generic environmental study data quality objectives (DQO) for the evaluation of sample blanks, data precision, and data accuracy. DQO were established *a priori* to reflect reasonable and achievable performance expectations. Overall, the intent of comparing data to DQO was not to reject any measurement that did not meet the DQO, but rather to evaluate whether, based on the available data and using a weight-of-evidence approach, the field and/or analytical sample data adequately reflected actual conditions and thus could be used with confidence to derive study conclusions. Using this approach, questionable data received more scrutiny to determine what effect, if any, this had on interpretation of results within the context of this project. Quality Control (QC) samples assessed for the Mary River Project CREMP included water sample trip blanks, field blanks, equipment blanks, and field duplicates, and verification of the accuracy of sub-sampling and organism recovery for the benthic invertebrate component, defined as follows:

- **Blanks** (water quality samples) are samples of deionized water and/or appropriate reagent(s) that are handled and analyzed the same way as regular samples. Blank 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 reportable detection limit (RDL) 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** (water quality samples) 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.
- **Sub-Sampling Checks** (benthic invertebrate community samples) are used when excessive sample volume and/or organism density results in only a fraction of the original sample being analyzed. By comparing the numbers of benthic invertebrates recovered between at least two sub-samples, this measure provides an evaluation of how effective the sub-sampling method was in evenly dividing the original sample during processing in the laboratory. Therefore, sub-sampling error provides a measure of analytical precision. The processing of entire samples in representative sample fractions also allows an evaluation of sub-sampling accuracy.
- **Organism Recovery Checks** (benthic invertebrate community samples) involve the re-processing of previously sorted material from a randomly selected sample to determine the number of invertebrates that were not recovered during the original sample processing. The reprocessing is conducted by an analyst not involved during the original processing to reduce bias. This check allows the determination of accuracy through assessment of recovery efficiency.



## A2 RESULTS

### A2.1 Water Quality

#### A2.1.1 Sample Blanks

Trip blank samples were taken on field sampling campaigns a total of nine times during the 2020 CREMP, including two during the winter lake monitoring event (April), one during the spring stream monitoring event (early July), three during the summer lake/stream monitoring event (late July/early August), and three during the fall lake/stream monitoring event (late August). Of the 755 total analyses conducted on the trip blank samples, only 11 (1.5%) resulted in analyte detection above the trip blank DQO of less than five-times the laboratory reporting limit (LRL; Appendix Table A.1). No parameters showed concentrations that were consistently elevated above the trip blank DQO among sampling events, or between total and dissolved sample fractions (metals only; Appendix Table A.1), suggesting no widespread contamination from the bottle, bottle caps, or preservative or through the transport of the samples.

Field blank samples were assessed a total of eight times during the 2020 CREMP, including two during the winter lake monitoring event, one during the spring stream monitoring event, two during the summer lake/stream monitoring event, and three during the fall lake/stream monitoring event. Of the 678 determinations made, 32 (4.7%) resulted in analyte detections above the DQO of less than five-times the laboratory LRL (Appendix Table A.2). The majority of these exceedances were from a single sample collected during the fall lake/stream monitoring event (JLO-01-S02), which had 26 of the 32 detections above the DQO (Appendix Table A.2). Overall, with the exception of the fall lake/stream sample (JLO-01-S02), frequency of detected parameter concentrations in field blanks was low, no pervasive contamination of samples resulting from the handling technique or through exposure to the atmosphere was suggested by the field blank analyses.

Equipment blank samples were collected a total of six times during the 2020 CREMP, including two during the winter lake monitoring event, two during the summer lake monitoring event, and three during the fall lake monitoring event. Of the 503 determinations conducted, 3 (0.60%) resulted in analyte detection above the DQO of less than five-times the laboratory LRL (Appendix Table A.3). Due to the infrequency of detected parameter concentrations in field equipment blanks, minimal cross contamination of samples likely occurred in the field due to the use of the sampling device itself and/or the field sampling procedures.



Table A.1: Water Sample Trip Blank Results with Reference to Data Quality Objectives, Mary River CREMP, 2020

Client Sample ID		Lowest LRL <sup>a</sup>	DL0-02-04-S03	DL0-01-02-S03	G0-09-A03	BLO-01-A-B03	REF3-02-S03	GO-0303	BLO-05-B-B03	REF3-01-B03	E0-2103
Date Sampled			14-Apr-2020	17-Apr-2020	4-Jul-2020	30-Jul-2020	2-Aug-2020	2-Aug-2020	28-Aug-2020	29-Aug-2020	28-Aug-2020
Time Sampled			13:40	10:15	11:35	11:00	10:00	10:15	14:20	10:05	11:28
ALS Sample ID			L2436713-2	L2438141-2	L2470180-26	L2482114-7	L2482822-8	L2482823-2	L2496051-11	L2496136-7	L2496071-15
	Units										
Physical Tests											
Conductivity	umhos/cm	3	<3.0	<3.0	<3.0	7.2	7.9	<3.0	<3.0	<3.0	<3.0
Hardness (as CaCO <sub>3</sub> )	mg/L	0.500	<0.50	<0.50	<0.50	1.58	1.48	<0.50	<0.50	<0.50	<0.50
Total Suspended Solids	mg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Dissolved Solids	mg/L	10.0	<10	13	74	18	<10	<10	<10	11	<10
Turbidity	NTU	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10.0	<10	<10	<10	2.9	<10	<10	<10	<10	<10
Ammonia, Total (as N)	mg/L	0.0100	<0.010	<0.010	0.012	<0.0050	<0.010	<0.010	<0.010	0.026	0.014
Bromide (Br)	mg/L	0.100	<0.10	<0.10	<0.10	<0.050	<0.10	<0.10	<0.10	<0.10	<0.10
Chloride (Cl)	mg/L	0.500	<0.50	<0.50	<0.50	0.64	0.68	<0.50	<0.50	<0.50	<0.50
Nitrate and Nitrite as N	mg/L	0.0210	<0.021	<0.021	<0.021		0.03	<0.021	<0.021	<0.021	<0.021
Nitrate (as N)	mg/L	0.0200	<0.020	<0.020	<0.020	0.0319	0.030	<0.020	<0.020	<0.020	<0.020
Nitrite (as N)	mg/L	0.00500	<0.0050	<0.0050	<0.0050	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.150	<0.15	<0.15	<0.15	<0.050	<0.15	<0.15	<0.15	<0.15	<0.15
Phosphorus, Total	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0020	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Sulfate (SO <sub>4</sub> )	mg/L	0.300	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.500	1.62	1.24	0.68	<0.50	<0.50	1.00	<0.50	0.54	0.95
Total Organic Carbon	mg/L	0.500	1.18	2.98	1.46	<0.50	1.55	1.61	1.00	1.01	1.07
Total Metals (Water)											
Aluminum (Al)	mg/L	0.00300	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000500	0.000156	<0.000050	<0.000050	0.00015	0.000155	0.000086	<0.000050	<0.000050	<0.000050
Beryllium (Be)	mg/L	0.000100	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.0500	0.105	<0.050	<0.050	0.308	0.305	<0.050	<0.050	<0.050	<0.050
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)	mg/L	0.0300	<0.030	<0.030	<0.030	<0.010	<0.030	<0.030	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)	mg/L	0.0500	<0.050	<0.050	<0.050	0.199	0.187	<0.050	<0.050	<0.050	<0.050
Manganese (Mn)	mg/L	0.0000700	0.000120	<0.000070	<0.000070	<0.00010	<0.000070	<0.000070	<0.000070	<0.000070	<0.000070
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)	mg/L	0.0000500	0.000139	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)	mg/L	0.0500	<0.20	<0.20	<0.20	0.199	<0.20	<0.20	<0.20	<0.20	<0.20
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)	mg/L	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	0.0500	<0.050	<0.050	<0.050	0.857	0.752	<0.050	<0.050	<0.050	<0.050
Strontium (Sr)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	0.00028	0.00026	<0.00010	<0.00010	<0.00010	<0.00010
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000011
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.00300	<0.0030	<0.0030	<0.0030	0.0011	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	0.00016	0.000142	<0.000050	0.000079	<0.000050	<0.000050
Beryllium (Be)	mg/L	0.000100	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010		



Table A.2: Water Sample Field Blank Results with Reference to Data Quality Objectives, Mary River CREMP, 2020

Parameter		Lowest LRL <sup>a</sup>	DL0-02-03-S02	BL0-01-S02	L1-08-02	JLO-02-S02	DLO-02-08-S02	JLO-01-S02	DLO-01-04-S02	L1-0902
			15-Apr-2020	19-Apr-2020	4-Jul-2020	29-Jul-2020	28-Jul-2020	30-Aug-2020	27-Aug-2020	30-Aug-2020
			9:45	10:20	9:45	13:30	11:40	9:30	10:00	8:25
			L2437255-2	L2438194-2	L2470180-22	L2481531-2	L2480819-19	L2496168-1	L2495475-5	L2496202-3
Physical Tests	Units									
Conductivity	umhos/cm	3	<3.0	<3.0	<3.0	5.5	<2.0	155	<3.0	<3.0
Hardness (as CaCO <sub>3</sub> )	mg/L	10.0	<0.50	<0.50	<0.50	1.43	0.83	78.7	<0.50	<0.50
pH	pH units	-	6.67	5.91	6.75	6.55	6.59	8.09	6.06	6.38
Total Suspended Solids	mg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Dissolved Solids	mg/L	20.0	20	13	43	12	<10	171	<10	74
Turbidity	NTU	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	0.27	<0.10	<0.10
Anions and Nutrients (Water)										
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10.0	<10	<10	<10	2.7	1.4	70	<10	<10
Ammonia, Total (as N)	mg/L	0.0200	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.010	<0.010	<0.010
Bromide (Br)	mg/L	0.100	<0.10	<0.10	<0.10	<0.050	<0.050	<0.10	<0.10	<0.10
Chloride (Cl)	mg/L	0.500	<0.50	<0.50	<0.50	<0.50	<0.50	4.87	<0.50	<0.50
Nitrate and Nitrite as N	mg/L	0.0210	<0.021	<0.021	<0.021			0.032	<0.021	<0.021
Nitrate (as N)	mg/L	0.0200	<0.020	<0.020	<0.020	0.0226	<0.0050	0.032	<0.020	<0.020
Nitrite (as N)	mg/L	0.00500	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.150	<0.15	<0.15	<0.15	<0.050	<0.050	<0.15	<0.15	<0.15
Phosphorus, Total	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0020	<0.0020	<0.0030	<0.0030	<0.0030
Sulfate (SO <sub>4</sub> )	mg/L	0.300	<0.30	<0.30	<0.30	<0.30	<0.30	4.76	<0.30	<0.30
Organic / Inorganic Carbon (Water)										
Dissolved Organic Carbon	mg/L	0.500	0.88	1.23	<0.50	<0.50	<0.50	2.5	<0.50	0.89
Total Organic Carbon	mg/L	0.500	1.06	2.69	1.30	0.57	<0.50	3.23	0.89	1.09
Total Metals (Water)										
Aluminum (Al)	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0049	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	0.00015	0.00017	0.00742	0.000103	<0.000050
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.0500	<0.050	<0.050	<0.050	0.286	0.207	15.3	<0.050	<0.050
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00088	<0.00050	<0.00050
Iron (Fe)	mg/L	0.0300	<0.030	<0.030	<0.030	<0.010	<0.010	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010
Magnesium (Mg)	mg/L	0.0500	<0.050	<0.050	<0.050	0.172	0.0904	9.45	<0.050	<0.050
Manganese (Mn)	mg/L	0.0000700	<0.000070	<0.000070	<0.000070	<0.00010	<0.00010	0.00121	<0.000070	<0.000070
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000397	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00059	<0.00050	<0.00050
Potassium (K)	mg/L	0.200	<0.20	<0.20	<0.20	0.125	<0.050	1.31	<0.20	<0.20
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010
Silicon (Si)	mg/L	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	0.35	<0.10	<0.10
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	0.0500	<0.050	<0.050	<0.050	0.553	0.096	2.11	<0.050	<0.050
Strontium (Sr)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	0.00024	<0.00020	0.0111	<0.00010	<0.00010
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.00030	<0.00030	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.00133	<0.000010	0.000013
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals (Water)										
Aluminum (Al)	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0010	<0.0010	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	0.00015	<0.00010	0.00763	0.000093	<0.000050
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.0500	<0.050	<0.050	<0.050	0.294	0.185	15.5	<0.050	0.108
Ch										



Table A.3: Water Sample Equipment Blank Results with Reference to Data Quality Objectives, Mary River CREMP, 2020

Client Sample ID		Lowest LRL <sup>a</sup>	JL0-0204	BL0-05-A04	DD-HAB9-STN-1-S04	REF3-03-B04	JLO-02-B04	DLO-02-04-S04
Date Sampled			12-Apr-2020	21-Apr-2020	28-Jul-2020	2-Aug-2020	30-Aug-2020	26-Aug-2020
ALS Sample ID			L2436314-1	L2439027-7	L2480819-14	L2482822-7	L2496168-12	L2494774-12
	Units							
Physical Tests								
Conductivity	umhos/cm	3	<3.0	<3.0	<2.0	<3.0	<3.0	<3.0
Hardness (as CaCO <sub>3</sub> )	mg/L	10.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Suspended Solids	mg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Dissolved Solids	mg/L	20.0	<10	25	<10	<10	81	<10
Turbidity	NTU	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anions and Nutrients (Water)								
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10.0	<10	<10	<1.0	<10	<10	<10
Ammonia, Total (as N)	mg/L	0.0200	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010
Bromide (Br)	mg/L	0.100	<0.10	<0.10	<0.050	<0.10	<0.10	<0.10
Chloride (Cl)	mg/L	0.500	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate and Nitrite as N	mg/L	0.0210	<0.021	<0.021		<0.021	<0.021	0.099
Nitrate (as N)	mg/L	0.0200	<0.020	<0.020	<0.0050	<0.020	<0.020	0.099
Nitrite (as N)	mg/L	0.00500	<0.0050	<0.0050	<0.0010	<0.0050	<0.0050	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.150	<0.15	<0.15	<0.050	<0.15	<0.15	<0.15
Phosphorus, Total	mg/L	0.00300	<0.0030	<0.0030	<0.0020	<0.0030	0.004	0.003
Sulfate (SO <sub>4</sub> )	mg/L	0.300	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Organic / Inorganic Carbon (Water)								
Dissolved Organic Carbon	mg/L	0.500	<0.50	1.25	<0.50	0.54	0.50	0.56
Total Organic Carbon	mg/L	0.500	<0.50	2.49	<0.50	2.16	1.22	0.92
Total Metals (Water)								
Aluminum (Al)	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000500	<0.000050	<0.000050	<0.00010	<0.000050	0.000062	0.00164
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.0500	<0.050	<0.050	<0.050	<0.050	0.076	<0.050
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)	mg/L	0.0300	<0.030	<0.030	<0.010	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)	mg/L	0.0500	<0.050	<0.050	<0.0050	<0.050	<0.050	<0.050
Manganese (Mn)	mg/L	0.0000700	<0.000070	<0.000070	<0.00010	<0.000070	<0.000070	0.000113
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)	mg/L	0.200	<0.20	<0.20	<0.050	<0.20	<0.20	<0.20
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010
Silicon (Si)	mg/L	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	0.0500	<0.050	<0.050	<0.050	<0.050	0.117	0.109
Strontium (Sr)	mg/L	0.000100	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	0.00011
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	<0.000010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	<0.00030	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.00300	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals (Water)								
Aluminum (Al)	mg/L	0.00300	<0.0030	0.0031	<0.0010	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000500	<0.000050	0.0000950	<0.00010	0.000051	0.000070	0.000078
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0100	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.0500	<0.050	<0.050	<0.050	0.061	0.067	0.051
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	0.000500	<0.00050	<0.00050	<0.00020	<0.00050	<0.00050	<0.00050
Iron (Fe)	mg/L	0.0300	<0.030	<0.030	<0.010	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Magnesium (Mg)	mg/L	0.0500	<0.050	<0.050	<0.0050	<0.050	<0.050	<0.050
Manganese (Mn)	mg/L	0.0000700	<0.000070	0.000074	<0.00010	<0.000070	<0.000070	0.000106
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000500	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Potassium (K)	mg/L	0.200	<0.20	<0.20	<0.050	<0.20	<0.20	<0.20
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010
Silicon (Si)	mg/L	0.100	<0.10	<0.10	<0.050	<0.10	<0.10	<0.10
Silver (Ag)	mg/L	0.0000100	<0.000010	0.000019	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	0.0500	<0.050	0.061	<0.050	<0.050	0.124	0.110
Strontium (Sr)	mg/L	0.000100	<0.00010	<0.00010	<0.00020	<0.00010	<0.00010	<0.00010
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	<0.000010	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	<0.00030	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.0000100	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.00300	<0.0030	<0.0030	<0.0010	<0.0030	<0.0030	<0.0030
Aggregate Organics (Water)								
Phenols (4AAP)	mg/L	0.00100	<0.0010	0.0023	0.0018	0.0012	<0.0010	<0.0010
Plant Pigments (Water)								
Chlorophyll a	µg/L	0.100	<0.10	<0.10	1.72	0.23	<0.10	<0.10
Phaeophytin a	µg/L	0.200	0.14	0.31	1.15	0.99	0.26	0.22

Parameter did not meet the data quality objective of ≤ 5x the RDL.  
Note: LDL = Laboratory Reporting Limit.  
<sup>a</sup> For some analytes, a range of LRLs were achieved in different laboratory reports. Each blank was compared to the LRL applicable to that sample.

### **A2.1.2 Precision – Field Duplicates**

In total, eight field duplicates were collected over the course of the 2020 CREMP water quality monitoring, including two during the winter lake monitoring event, one during the spring stream monitoring event, three during the summer stream/lake monitoring event, and two during the fall stream/lake monitoring event. In general, close agreement in parameter concentrations was observed between duplicate samples, with 94% of field duplicate analyte pairs meeting the water quality field duplicate DQO of  $\leq 25\%$  Relative Percent Difference (RPD) in parameter concentrations of the 608 duplicate analyses conducted (Appendix Table A.4). Total phosphorus, total lead, dissolved aluminum, and chlorophyll a were the key parameters that most frequently did not meet the DQO between duplicate samples (Appendix Table A.4). In some cases in which DQO were not met, 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. 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 the majority of cases, and for key parameters of concern, the RPD in analyte concentrations was sufficiently low as to not affect interpretation of the data.

## **A2.2 Benthic Invertebrate Community Samples**

### **A2.2.1 Subsampling Accuracy**

Sub-sampling of benthic invertebrate community samples was conducted on 25 of 63 stream samples (40%) and 50 of 50 lake samples (100%; total of 66% for the 2020 project). The sorted fraction for these samples was mainly 100% (whole; 77% of all samples) and 50% (half; 23% of all samples) of the sample material evaluated (average of 89%; Appendix Table A.5a,b). Sub-sampling error estimates indicated that, on average, precision and accuracy of the sub-sampled benthic invertebrate community samples met the DQO of  $\leq 20\%$  (Appendix Table A.6a,b). This indicated that precision and accuracy for sub-sampling of the benthic invertebrate community samples was acceptable.

### **A2.2.2 Organism Recovery**

Sorting efficiency (i.e., percent recovery) of benthic invertebrate samples was high, averaging 97% for lotic samples (6 samples) and 99% for lentic samples (5 samples; Appendix Tables A.7a,b). Sorting efficiency for these samples achieved the DQO of  $\geq 90\%$  recovery, and therefore the benthic invertebrate community sample recovery was considered acceptable.



Figure A.4: Water Sample Field Duplicate Results with Reference to the Data Quality Objective, Mary River CREMP, 2020

Sample ID	Units	LRL	JL0-07-S	JL0-07-S01	RPD	JL0-02-S	JL0-02-S01	RPD	F0-01	F0-0101	RPD
Date Sampled			13-Apr-2020	13-Apr-2020		12-Apr-2020	12-Apr-2020		3-Jul-2020	3-Jul-2020	
ALS Sample ID			L2436315-5	L2436315-6		L2436314-2	L2436314-3		L2470180-16	L2470180-17	
Conductivity	umhos/cm	3	176	176	0	186	188	1.1	108	107	0.93
Hardness (as CaCO <sub>3</sub> )	mg/L	10.0	96	96.3	0.31	102	103	1.0	49.9	48.2	3.5
pH	pH units	0.100	7.82	7.82	0	7.90	7.91	0	7.89	7.95	0.76
Total Suspended Solids	mg/L	2	<2.0	<2.0	-	<2.0	<2.0	-	9.8	9.7	1.0
Total Dissolved Solids	mg/L	20.0	128	113	12	93	81	14	90	99	10
Turbidity	NTU	0.100	0.14	0.12	15	0.13	0.19	38	2.19	2.49	13
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10.0	79	80	1.3	84	84	0	39	39	0
Ammonia, Total (as N)	mg/L	0.0200	0.020	0.021	4.9	0.042	0.020	71	<0.010	<0.010	-
Bromide (Br)	mg/L	0.100	<0.10	<0.10	-	<0.10	<0.10	-	<0.10	<0.10	-
Chloride (Cl)	mg/L	0.500	5.39	5.51	2.2	5.73	5.72	0.17	1.34	1.47	9.3
Nitrate and Nitrite as N	mg/L	0.0210	0.031	0.034	9.2	0.096	0.03	105	0.187	0.285	42
Nitrate (as N)	mg/L	0.0200	0.031	0.034	9.2	0.096	0.030	105	0.187	0.285	42
Nitrite (as N)	mg/L	0.00500	<0.0050	<0.0050	-	<0.0050	<0.0050	-	<0.0050	<0.0050	-
Total Kjeldahl Nitrogen	mg/L	0.150	0.17	0.27	45	<0.15	<0.15	-	<0.15	<0.15	-
Phosphorus, Total	mg/L	0.00300	0.0043	0.0035	21	0.0092	0.0036	88	0.0377	0.0261	36
Sulfate (SO <sub>4</sub> )	mg/L	0.300	5.01	5.02	0	5.53	5.31	4.1	11.8	11.7	1
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.500	2.24	2.20	1.8	2.20	2.61	17	2.12	1.90	11
Total Organic Carbon	mg/L	0.500	2.64	2.66	0.75	3.00	2.77	8.0	2.94	2.72	7.8
Total Metals (Water)											
Aluminum (Al)	mg/L	0.00300	0.0539	0.0060	160	0.0183	0.0157	15	0.170	0.168	1.2
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Barium (Ba)	mg/L	0.0000500	0.00904	0.00906	0.22	0.00918	0.00890	3.1	0.00544	0.00556	2.2
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Boron (B)	mg/L	0.0100	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium (Cd)	mg/L	0.0000100	0.000016	<0.000010	46	0.000017	<0.000010	52	<0.000010	<0.000010	-
Calcium (Ca)	mg/L	0.0500	19.1	18.4	3.7	19.7	19.3	2.1	9.35	9.13	2.4
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	0.00016	0.00014	13
Copper (Cu)	mg/L	0.000500	0.00195	0.00113	53	0.00142	0.00118	18	0.00051	0.00052	1.9
Iron (Fe)	mg/L	0.0300	<0.030	<0.030	-	<0.030	<0.030	-	0.202	0.202	0
Lead (Pb)	mg/L	0.0000500	0.000091	<0.000050	58	0.000108	0.000053	68	0.000212	0.000159	29
Lithium (Li)	mg/L	0.00100	0.0019	0.0016	17	0.0016	0.0016	0	<0.0010	<0.0010	-
Magnesium (Mg)	mg/L	0.0500	11.8	11.9	0.84	12.4	12.2	2	6.67	6.59	1.2
Manganese (Mn)	mg/L	0.0000700	0.00123	0.000262	130	0.000479	0.000304	45	0.00905	0.00911	0.66
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)	mg/L	0.0000500	0.000584	0.000459	24	0.000505	0.000476	5.9	0.000099	0.000110	11
Nickel (Ni)	mg/L	0.000500	0.00098	0.00078	23	0.00087	0.00081	7.1	<0.00050	<0.00050	-
Potassium (K)	mg/L	0.200	1.57	1.53	2.6	1.61	1.57	2.5	0.65	0.64	1.6
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Silicon (Si)	mg/L	0.100	0.43	0.40	7.2	0.42	0.42	0	0.64	0.66	3.1
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium (Na)	mg/L	0.0500	2.64	2.47	6.7	2.56	2.53	1.2	0.439	0.419	4.7
Strontium (Sr)	mg/L	0.000100	0.0153	0.0147	4.0	0.0156	0.0153	1.9	0.00994	0.00933	6.3
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Tin (Sn)	mg/L	0.000100	0.00014	<0.00010	33	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	-	<0.010	<0.010	-	0.011	0.011	0
Uranium (U)	mg/L	0.0000100	0.00132	0.00129	2.3	0.00134	0.00133	0.7	0.000349	0.000331	5.3
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Zinc (Zn)	mg/L	0.00300	0.0304	<0.0030	164	0.0032	<0.0030	6.5	<0.0030	<0.0030	-
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.00300	<0.0030	0.0048	46	0.0033	0.0031	6	0.0099	0.0088	12
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Barium (Ba)	mg/L	0.0000500	0.00879	0.00883	0.45	0.00931	0.00941	1.1	0.00405	0.00391	3.5
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Boron (B)	mg/L	0.0100	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Calcium (Ca)	mg/L	0.0500	18.4	19.1	3.7	19.7	20.1	2.0	9.23	8.95	3.1
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Copper (Cu)	mg/L	0.000500	0.00108	0.00115	6.3	0.00117	0.00109	7.1	<0.00050	<0.00050	-
Iron (Fe)	mg/L	0.0300	<0.030	<0.030	-	<0.030	<0.030	-	<0.030	<0.030	-
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Lithium (Li)	mg/L	0.00100	0.0019	0.0019	0	0.0018	0.0019	5.4	<0.0010	<0.0010	-
Magnesium (Mg)	mg/L	0.0500	12.1	11.8	2.5	12.8	12.9	0.78	6.51	6.27	3.8
Manganese (Mn)	mg/L	0.0000700	0.000143	0.000175	20	0.000222	0.000206	7.5	0.00240	0.00242	0.83
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)	mg/L	0.0000500	0.000474	0.000497	4.7	0.000478	0.000487	1.9	0.000111	0.000118	6.1
Nickel (Ni)	mg/L	0.000500	0.00072	0.00077	6.7	0.00082	0.00079	3.7	<0.00050	<0.00050	-
Potassium (K)	mg/L	0.200	1.54	1.54	0	1.65	1.64	0.61	0.57	0.55	3.6
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Silicon (Si)	mg/L	0.100	0.42	0.42	0	0.43	0.44	2.3	0.420	0.400	4.9
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium (Na)	mg/L	0.0500	2.43	2.50	2.8	2.60	2.62	0.8	0.433	0.412	5.0
Strontium (Sr)	mg/L	0.000100	0.0150	0.0149	0.67	0.0154	0.0157	1.9	0.00971	0.00910	6.5
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Uranium (U)	mg/L	0.0000100	0.00130	0.00129	0.77	0.00140	0.00141	0.7	0.000309	0.000306	1.0
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Zinc (Zn)	mg/L	0.00300	<0.0030	0.0035	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-
Aggregate Organics (Water)											
Phenols (4AAP)	mg/L	0.00100	<0.0010	<0.0010	-	0.0115	<0.0010	-	<0.0010	<0.0010	-
Plant Pigments (Water)											
Chlorophyll a	µg/L	0.100	0.59	0.55	7.0	1.37	1.99	37	0.29	0.32	9.8
Phaeophytin a	µg/L	0.100	0.54	0.49	9.7	0.68	0.94	32	0.34	0.35	2.9

Values exceeding the DQO of ≤ 25% RPD.

Notes: The RPD was calculated using <LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. LDL = Laboratory Detection Limit, RPD = Relative Percent Difference, DQO = Data Quality Objective.

Figure A.4: Water Sample Field Duplicate Results with Reference to the Data Quality Objective, Mary River CREMP, 2020

Sample ID	Units	LRL	DLO-02-03-S	DLO-02-03-S01	RPD	BLO-03-S	BLO-03-S01	RPD	FO-01	FO-0101	RPD
Date Sampled			28-Jul-2020	28-Jul-2020		31-Jul-2020	31-Jul-2020		1-Aug-2020	1-Aug-2020	
ALS Sample ID			L2480819-5	L2480819-3		L2482716-1	L2482716-2		L2482803-5	L2482803-6	
Conductivity	umhos/cm	3	131	132	0.76	78.0	77.7	0.39	345	347	0.58
Hardness (as CaCO <sub>3</sub> )	mg/L	10.0	63.1	63.1	0	35.3	33.9	4.0	166	164	1.2
pH	pH units	0.100	8.24	8.21	0	7.89	7.82	0.89	8.30	8.30	0
Total Suspended Solids	mg/L	2	<2.0	<2.0	-	<2.0	<2.0	-	<2.0	<2.0	-
Total Dissolved Solids	mg/L	20.0	69	76	10	46	43	6.7	190	195	2.6
Turbidity	NTU	0.100	0.72	0.81	12	1.13	1.15	1.8	0.41	0.40	2.5
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10.0	50.6	49.7	1.8	44	43	2.3	122	121	0.82
Ammonia, Total (as N)	mg/L	0.0200	<0.0050	<0.0050	-	<0.010	<0.010	-	<0.010	<0.010	-
Bromide (Br)	mg/L	0.100	<0.050	<0.050	-	<0.10	<0.10	-	<0.10	<0.10	-
Chloride (Cl)	mg/L	0.500	3.36	3.36	0	2.59	2.56	1.2	13.7	13.7	0
Nitrate and Nitrite as N	mg/L	0.0210	-	-	-	<0.021	<0.021	-	0.714	0.715	0
Nitrate (as N)	mg/L	0.0200	0.0781	0.0788	0.89	<0.020	<0.020	-	0.714	0.715	0
Nitrite (as N)	mg/L	0.00500	0.0014	0.0024	53	<0.0050	<0.0050	-	<0.0050	<0.0050	-
Total Kjeldahl Nitrogen	mg/L	0.150	0.126	0.125	0.80	<0.15	<0.15	-	0.32	0.40	22
Phosphorus, Total	mg/L	0.00300	0.0085	0.0043	66	0.0032	0.0048	40	<0.0030	<0.0030	-
Sulfate (SO <sub>4</sub> )	mg/L	0.300	9.66	9.68	0	1.60	1.65	3.1	36.0	36.0	0
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.500	1.56	1.67	6.8	2.36	2.57	8.5	1.69	1.73	2.3
Total Organic Carbon	mg/L	0.500	1.79	1.62	10	2.02	3.02	40	2.74	2.83	3.2
Total Metals (Water)											
Aluminum (Al)	mg/L	0.00300	0.0192	0.0194	1.0	0.0391	0.0266	38	0.0337	0.0348	3.2
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Barium (Ba)	mg/L	0.0000500	0.00650	0.00648	0	0.00465	0.00435	6.7	0.0165	0.0157	5.0
Beryllium (Be)	mg/L	0.000500	<0.00010	<0.00010	-	<0.00050	<0.00050	-	<0.00010	<0.00010	-
Bismuth (Bi)	mg/L	0.000500	<0.000050	<0.000050	-	<0.00050	<0.00050	-	<0.000050	<0.000050	-
Boron (B)	mg/L	0.0100	<0.010	<0.010	-	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium (Cd)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.000010	<0.000010	-	<0.0000050	<0.0000050	-
Calcium (Ca)	mg/L	0.0500	11.7	11.5	1.7	7.01	6.95	0.86	29.4	29.0	1.4
Chromium (Cr)	mg/L	0.000500	0.00012	0.00010	18	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Copper (Cu)	mg/L	0.000500	0.00077	0.00075	2.6	0.00060	0.00058	3.4	<0.0010	<0.0010	-
Iron (Fe)	mg/L	0.0300	0.023	0.024	4.3	0.041	0.036	13	0.028	0.030	6.9
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Lithium (Li)	mg/L	0.00100	0.0011	0.0011	0	<0.0010	<0.0010	-	0.0026	0.0027	3.8
Magnesium (Mg)	mg/L	0.0500	7.04	6.81	3.3	4.40	4.25	3.5	21.4	20.5	4.3
Manganese (Mn)	mg/L	0.0000700	0.00335	0.00337	0.60	0.00184	0.00172	6.7	0.00103	0.00100	3.0
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)	mg/L	0.0000500	0.000662	0.000657	0.76	0.000114	0.000125	9.2	0.000491	0.000486	1.0
Nickel (Ni)	mg/L	0.000500	0.00063	0.00063	0	<0.00050	<0.00050	-	0.00057	0.00051	11
Potassium (K)	mg/L	0.200	1.04	1.01	2.9	0.58	0.55	5.3	1.81	1.75	3.4
Selenium (Se)	mg/L	0.00100	<0.000050	<0.000050	-	<0.0010	<0.0010	-	0.000070	0.000063	11
Silicon (Si)	mg/L	0.100	0.48	0.48	0	0.45	0.41	9.3	1.00	1.05	4.9
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000050	<0.000050	-
Sodium (Na)	mg/L	0.0500	1.40	1.36	2.9	1.34	1.24	7.8	3.23	3.09	4.4
Strontium (Sr)	mg/L	0.000100	0.00897	0.00876	2.4	0.00584	0.00591	1.2	0.0414	0.0408	1.5
Thallium (Tl)	mg/L	0.000100	<0.000010	<0.000010	-	<0.00010	<0.00010	-	<0.000010	<0.000010	-
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium (Ti)	mg/L	0.0100	0.00081	0.00091	12	<0.010	<0.010	-	0.00167	0.00185	10
Uranium (U)	mg/L	0.0000100	0.000931	0.00096	2.5	0.000642	0.000637	0.78	0.00369	0.00358	3.0
Vanadium (V)	mg/L	0.00100	<0.00050	<0.00050	-	<0.0010	<0.0010	-	<0.00050	<0.00050	-
Zinc (Zn)	mg/L	0.00300	<0.0030	<0.0030	-	<0.0030	<0.0030	-	<0.0030	0.0059	65
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.00300	0.0091	0.0057	46	0.0111	0.0090	21	0.0067	0.0063	6.2
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Barium (Ba)	mg/L	0.0000500	0.00677	0.00666	1.6	0.00444	0.00405	9.2	0.0168	0.0164	2.4
Beryllium (Be)	mg/L	0.000500	<0.00010	<0.00010	-	<0.00050	<0.00050	-	<0.00010	<0.00010	-
Bismuth (Bi)	mg/L	0.000500	<0.000050	<0.000050	-	<0.00050	<0.00050	-	<0.000050	<0.000050	-
Boron (B)	mg/L	0.0100	0.010	0.011	10	<0.010	<0.010	-	<0.010	<0.010	-
Cadmium (Cd)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.000010	<0.000010	-	<0.0000050	<0.0000050	-
Calcium (Ca)	mg/L	0.0500	12.0	12.1	0.83	6.71	6.91	2.9	30.8	31.0	0.65
Chromium (Cr)	mg/L	0.000500	<0.00010	<0.00010	-	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Copper (Cu)	mg/L	0.000500	0.00072	0.00071	1.4	0.00058	0.00052	11	0.00100	0.00094	6.2
Iron (Fe)	mg/L	0.0300	<0.010	<0.010	-	<0.030	<0.030	-	<0.010	<0.010	-
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	-	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Lithium (Li)	mg/L	0.00100	0.0010	0.0011	10	<0.0010	<0.0010	-	0.0032	0.0035	9.0
Magnesium (Mg)	mg/L	0.0500	8.06	7.96	1.2	4.51	4.04	11	21.6	21.1	2.3
Manganese (Mn)	mg/L	0.0000700	0.00056	0.00055	1.8	0.000416	0.000342	20	<0.00050	<0.00050	-
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)	mg/L	0.0000500	0.000593	0.000599	1.0	0.000109	0.000113	3.6	0.000561	0.000562	0.18
Nickel (Ni)	mg/L	0.000500	0.00051	<0.00050	2.0	<0.00050	<0.00050	-	0.00054	0.00051	5.7
Potassium (K)	mg/L	0.200	1.07	1.06	0.94	0.63	0.52	19	1.83	1.78	2.8
Selenium (Se)	mg/L	0.00100	<0.000050	<0.000050	-	<0.0010	<0.0010	-	0.000082	0.000079	3.7
Silicon (Si)	mg/L	0.100	0.407	0.415	1.9	0.39	0.39	0	1.10	1.10	0
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-	<0.000050	<0.000050	-
Sodium (Na)	mg/L	0.0500	1.55	1.48	4.6	1.36	1.21	12	3.32	3.21	3.4
Strontium (Sr)	mg/L	0.000100	0.00850	0.00860	1.2	0.00562	0.00566	0.71	0.0430	0.0439	2.1
Thallium (Tl)	mg/L	0.000100	<0.000010	<0.000010	-	<0.00010	<0.00010	-	0.000010	<0.000010	-
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium (Ti)	mg/L	0.0100	<0.00030	<0.00030	-	<0.010	<0.010	-	<0.00030	<0.00030	-
Uranium (U)	mg/L	0.0000100	0.000904	0.000885	2.1	0.000583	0.000604	3.5	0.00373	0.00371	0.54
Vanadium (V)	mg/L	0.00100	<0.00050	<0.00050	-	<0.0010	<0.0010	-	<0.00050	<0.00050	-
Zinc (Zn)	mg/L	0.00300	<0.0010	<0.0010	-	<0.0030	<0.0030	-	<0.0010	<0.0010	-
Aggregate Organics (Water)											
Phenols (4AAP)	mg/L	0.00100	0.0022	0.0025	13	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Plant Pigments (Water)											
Chlorophyll a	µg/L	0.100	1.60	2.56	46	1.69	2.18	25	0.41	0.43	4.8
Phaeophytin a	µg/L	0.100	1.93	2.37	20	1.48	1.68	13	1.02	1.05	2.9

Values exceeding the DQO of ≤ 25% RPD.

Notes: The RPD was calculated using <LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. LDL = Laboratory Detection Limit, RPD = Relative Percent Difference, DQO = Data Quality Objective.



Figure A.4: Water Sample Field Duplicate Results with Reference to the Data Quality Objective, Mary River CREMP, 2020

Sample ID	Units	LRL	DLO-02-06-B	DLO-02-06-B01	RPD	BLO-01B-S	BLO-01B-S01	RPD
Date Sampled			26-Aug-2020	26-Aug-2020		27-Aug-2020	27-Aug-2020	
ALS Sample ID			L2494774-6	L2494774-7		L2495476-3	L2495476-5	
Conductivity	umhos/cm	3	142	141	0.71	217	229	5.4
Hardness (as CaCO <sub>3</sub> )	mg/L	10.0	68.7	67.5	1.8	106	105	0.95
pH	pH units	0.100	8.03	8.01	0.25	8.18	8.22	0.49
Total Suspended Solids	mg/L	2	2.6	<2.0	26	<2.0	<2.0	-
Total Dissolved Solids	mg/L	20.0	75	75	0	129	133	3.1
Turbidity	NTU	0.100	2.16	2.27	5.0	0.67	0.77	14
Anions and Nutrients (Water)								
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	10.0	56	57	1.8	96	98	2.1
Ammonia, Total (as N)	mg/L	0.0200	0.011	0.011	0	<0.010	0.028	95
Bromide (Br)	mg/L	0.100	<0.10	<0.10	-	<0.10	<0.10	-
Chloride (Cl)	mg/L	0.500	3.92	3.93	0.25	9.51	9.48	0.32
Nitrate and Nitrite as N	mg/L	0.0210	0.079	0.082	3.7	0.037	0.038	2.7
Nitrate (as N)	mg/L	0.0200	0.079	0.082	3.7	0.037	0.038	2.7
Nitrite (as N)	mg/L	0.00500	<0.0050	<0.0050	-	<0.0050	<0.0050	-
Total Kjeldahl Nitrogen	mg/L	0.150	<0.15	0.19	24	0.17	0.19	11
Phosphorus, Total	mg/L	0.00300	0.0079	0.0063	23	0.0066	0.0116	55
Sulfate (SO <sub>4</sub> )	mg/L	0.300	9.76	9.79	0	4.02	4.05	0.74
Organic / Inorganic Carbon (Water)								
Dissolved Organic Carbon	mg/L	0.500	2.53	2.07	20	2.35	2.36	0
Total Organic Carbon	mg/L	0.500	2.41	2.44	1.2	24.8	2.88	158
Total Metals (Water)								
Aluminum (Al)	mg/L	0.00300	0.0585	0.0594	1.5	0.0178	0.0200	12
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Barium (Ba)	mg/L	0.0000500	0.00767	0.00775	1.0	0.0107	0.0111	3.7
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Boron (B)	mg/L	0.0100	0.012	0.013	8.0	<0.010	<0.010	-
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Calcium (Ca)	mg/L	0.0500	13.5	13.5	0	21.2	22.0	3.7
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Copper (Cu)	mg/L	0.000500	0.000820	0.000800	2.5	0.00097	0.00098	1.0
Iron (Fe)	mg/L	0.0300	0.0610	0.0610	0	<0.030	<0.030	-
Lead (Pb)	mg/L	0.0000500	0.0000550	0.0000510	7.5	<0.000050	<0.000050	-
Lithium (Li)	mg/L	0.00100	0.0014	0.0015	6.9	0.0013	0.0014	7.4
Magnesium (Mg)	mg/L	0.0500	8.35	8.53	2.1	12.5	12.7	1.6
Manganese (Mn)	mg/L	0.0000700	0.00345	0.00328	5.1	0.00238	0.00237	0.42
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)	mg/L	0.0000500	0.000645	0.000647	0.31	0.000317	0.000316	0.32
Nickel (Ni)	mg/L	0.000500	0.00060	0.00064	6.5	<0.00050	0.00052	3.9
Potassium (K)	mg/L	0.200	1.15	1.16	0.87	1.15	1.16	0.87
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Silicon (Si)	mg/L	0.100	0.49	0.51	4.0	0.74	0.71	4.1
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium (Na)	mg/L	0.0500	1.75	1.71	2.3	4.38	4.35	0.69
Strontium (Sr)	mg/L	0.000100	0.0101	0.0103	2.0	0.0166	0.0168	1.2
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	-	<0.010	<0.010	-
Uranium (U)	mg/L	0.0000100	0.00121	0.00119	1.7	0.00348	0.00345	0.87
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Zinc (Zn)	mg/L	0.00300	<0.0030	<0.0030	-	<0.0030	<0.0030	-
Dissolved Metals (Water)								
Aluminum (Al)	mg/L	0.00300	0.0132	0.0105	23	0.0045	0.0071	45
Antimony (Sb)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Arsenic (As)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Barium (Ba)	mg/L	0.0000500	0.00727	0.00724	0.41	0.0108	0.011	1.8
Beryllium (Be)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Bismuth (Bi)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Boron (B)	mg/L	0.0100	0.012	0.012	0	<0.010	<0.010	-
Cadmium (Cd)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Calcium (Ca)	mg/L	0.0500	13.5	13.4	0.74	21.8	21.1	3.3
Chromium (Cr)	mg/L	0.000500	<0.00050	<0.00050	-	<0.00050	<0.00050	-
Cobalt (Co)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Copper (Cu)	mg/L	0.000500	0.00075	0.00073	2.7	0.00096	0.00101	5.1
Iron (Fe)	mg/L	0.0300	<0.030	<0.030	-	<0.030	<0.030	-
Lead (Pb)	mg/L	0.0000500	<0.000050	<0.000050	-	<0.000050	<0.000050	-
Lithium (Li)	mg/L	0.00100	0.0013	0.0013	0	0.0013	0.0012	8.0
Magnesium (Mg)	mg/L	0.0500	8.48	8.29	2.3	12.5	12.8	2.4
Manganese (Mn)	mg/L	0.0000700	0.000525	0.000518	1.3	0.000479	0.000547	13
Mercury (Hg)	mg/L	0.0000100	<0.0000050	<0.0000050	-	<0.0000050	<0.0000050	-
Molybdenum (Mo)	mg/L	0.0000500	0.000626	0.000643	2.7	0.000306	0.000322	5.1
Nickel (Ni)	mg/L	0.000500	0.00052	0.00054	3.8	<0.00050	0.00051	2.0
Potassium (K)	mg/L	0.200	1.15	1.11	3.5	1.14	1.17	2.6
Selenium (Se)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Silicon (Si)	mg/L	0.100	0.41	0.38	7.6	0.7	0.72	2.8
Silver (Ag)	mg/L	0.0000100	<0.000010	<0.000010	-	<0.000010	<0.000010	-
Sodium (Na)	mg/L	0.0500	1.76	1.72	2.3	4.38	4.44	1.4
Strontium (Sr)	mg/L	0.000100	0.0101	0.0100	1.0	0.0161	0.0167	3.7
Thallium (Tl)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Tin (Sn)	mg/L	0.000100	<0.00010	<0.00010	-	<0.00010	<0.00010	-
Titanium (Ti)	mg/L	0.0100	<0.010	<0.010	-	<0.010	<0.010	-
Uranium (U)	mg/L	0.0000100	0.00117	0.00117	0	0.00341	0.00341	0
Vanadium (V)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	<0.0010	-
Zinc (Zn)	mg/L	0.00300	<0.0030	<0.0030	-	<0.0030	<0.0030	-
Aggregate Organics (Water)								
Phenols (4AAP)	mg/L	0.00100	<0.0010	<0.0010	-	<0.0010	0.0073	152
Plant Pigments (Water)								
Chlorophyll a	µg/L	0.100	1.14	1.41	21	1.02	1.14	11
Phaeophytin a	µg/L	0.100	0.68	0.92	30	0.82	0.86	4.8

Values exceeding the DQO of ≤ 25% RPD.

Notes: The RPD was calculated using <LRL results at the LRL if one result in a duplicate pair was below the LRL. The RPD was not calculated if both results were <LRL. LDL = Laboratory Detection Limit, RPD = Relative Percent Difference, DQO = Data Quality Objective.

Table A.5: Proportion of Benthic Invertebrates Samples Sorted for the 2020 CREMP

(a) Lotic (creek and river) samples

Station	Fraction	Station	Fraction	Station	Fraction	Station	Fraction Sorted	Station	Fraction
CLT1-US-B1	Whole	CLT1-DS-B2	Whole	CLT2-US-B3	Whole	CLT2-DS-B4	Whole	REF-CRK-B5	Whole
CLT1-US-B2	Whole <sup>a</sup>	CLT1-DS-B3	Whole	CLT2-US-B4	Whole	CLT2-DS-B5	Whole	-	-
CLT1-US-B3	1/2 <sup>a</sup>	CLT1-DS-B4	Whole	CLT2-US-B5	Whole	REF-CRK-B1	Whole	-	-
CLT1-US-B4	Whole	CLT1-DS-B5	Whole	CLT2-DS-B1	1/2	REF-CRK-B2	Whole	-	-
CLT1-US-B5	Whole	CLT2-US-B1	Whole	CLT2-DS-B2	Whole	REF-CRK-B3	Whole	-	-
CLT1-DS-B1	Whole	CLT2-US-B2	Whole	CLT2-DS-B3	Whole	REF-CRK-B4	Whole	-	-

(b) Lentic (lake) samples

Station	Fraction	Station	Fraction	Station	Fraction	Station	Fraction Sorted	Station	Fraction
REF-03-01	Whole	BLO-04	Whole	DLO-01-09	1/2	DLO-02-10	1/2	JLO-20	Whole
REF-03-02	1/2	BLO-05	1/2	DLO-01-10	1/2	DLO-02-11	1/2	JLO-21	1/2
REF-03-03	Whole	BLO-06	Whole	DLO-01-11	Whole	DLO-02-12	Whole	-	-
REF-03-04	Whole	BLO-07	Whole	DLO-01-12	Whole	DLO-02-13	Whole	-	-
REF-03-05	Whole	BLO-11	1/2	DLO-01-14	1/2	JLO-01	Whole	-	-
REF-03-06	Whole	BLO-13	Whole	DLO-01-15	Whole	JLO-02	1/2	-	-
REF-03-07	Whole	BLO-14	Whole	DLO-02-01	Whole	JLO-07	Whole	-	-
REF-03-08	Whole	BLO-15	Whole	DLO-02-02	Whole	JLO-11	1/2	-	-
REF-03-09	Whole	DLO-01-02	Whole	DLO-02-03	Whole	JLO-12	Whole	-	-
REF-03-10	Whole	DLO-01-03	1/2	DLO-02-04	1/2	JLO-16	Whole	-	-
BLO-01	Whole <sup>a</sup>	DLO-01-04	1/2	DLO-02-08	Whole	JLO-18	1/2	-	-
BLO-03	Whole	DLO-01-05	Whole	DLO-02-09	Whole <sup>a</sup>	JLO-19	Whole <sup>a</sup>	-	-

<sup>a</sup> Two halves were sorted for subsampling error.

**QA/QC Notes:** Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group. Immatures were not counted toward total number of taxa unless they were the sole representative of their taxa group. 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). Densities expressed per sampled area.

Table A.6: Subsampling Error for Benthic Invertebrate Community Samples, 2020 CREMP

(a) Lotic (creek and river) samples

Station	Whole Organisms	No. of Organisms in Fraction 1	No. of Organisms in Fraction 2	No. of Organisms in Fraction 3	No. of Organisms in Fraction 4	Actual Density*	Precision		Accuracy	
							% range		min	max
CLT1-US-B2	-	282	304	-	-	586	7.2	-	3.8	-

(b) Lentic (lake) samples

Station	Whole Organisms	No. of Organisms in Fraction 1	No. of Organisms in Fraction 2	No. of Organisms in Fraction 3	No. of Organisms in Fraction	Actual Density*	Precision		Accuracy	
							% range		min	max
BLO-01	0	285	286	-	-	571	0.3	-	0.2	-
DLO-02-09	0	315	324	-	-	639	2.8	-	1.4	-
JLO-19	0	306	329	-	-	635	7.0	-	3.6	-

Notes: whole large organisms excluded in calculations; min = minimum absolute % error; max = maximum absolute % error.

Table A.7: Percent Recovery from Benthic Invertebrate Samples, Mary River Project CREMP, 2020

(a) Lotic (creek and river) samples

Station	Number of Organisms Recovered	Number of Organisms in Re-sort	Percent Recovery
CLT1-US-B5	278	300	92.7%
CLT2-US-B3	307	314	97.8%
REF-CRK-B5	160	168	95.2%
SDLT1-R1-B2	235	237	99.2%
GO-03-B1	42	43	97.7%
GO-09-B2	97	98	99.0%
Average % Recovery			96.9%

Notes: All samples were sorted in their entirety. The Chironomidae genera of *Pseudosmittia* has been split into *Pseudosmittia* and *Hydrosmittia*.

**QA/QC Notes (all sampling areas):** Pupae were not counted toward total number of taxa unless they were the sole representative of their taxa group. Immatures were not counted toward total number of taxa unless they were the sole representative of their taxa group. 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). Densities expressed per sampled area.

(b) Lentic (lake) samples

Station	Number of Organisms Recovered	Number of Organisms in Re-sort	Percent Recovery
BLO-01	568	571	99.5%
DLO-01-05	95	96	99.0%
DLO-02-08	350	351	99.7%
DLO-02-12	383	387	99.0%
JLO-16	188	195	96.4%
Average % Recovery			98.7%



## A3 DATA QUALITY STATEMENT

The DQR results generally indicated that the water and benthic invertebrate community data were of acceptable quality. Few water quality parameters did not meet acceptable DQO. In general, most parameters that did not meet respective DQO typically showed very low margins of error relative to respective criteria and/or were observed at low concentrations often near LRL which led to relatively small incremental differences in concentrations between replicates resulting in failure to meet DQO. The benthic invertebrate community data quality was also acceptable, meeting all precision, accuracy, and percent recovery benchmarks. Overall, the data associated with the 2020 CREMP were considered defensible and acceptable for interpretation and derivation of conclusions with a good level of confidence.



**APPENDIX B**  
**REFERENCE AREA DESCRIPTIVE OVERVIEW**

## APPENDIX B OVERVIEW OF REFERENCE CONDITIONS

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## B1 INTRODUCTION

The initial review of background (reference) data collected from lotic (i.e., creeks 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 towards 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 Creek/Tributary Environments

Four reference creek/tributary (reference creek) stations were established among two unnamed tributaries to Angajurjualuk 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 creek water quality and phytoplankton monitoring components of the CREMP, and have been used as such in the six studies conducted since commercial mine operations commenced at the Mary River Project (i.e., 2015 to 2020; see Table 2.1). From 2016 to 2020, habitat conditions at the western tributary to Angajurjualuk 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 creek (REF-CRK) for comparisons involving the various mine-exposed tributaries as part of the 2016 to 2020 annual CREMP studies (see Figure 2.4), and herein has been referred to as Unnamed Reference Creek.

The reference creeks/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 and depth of the benthic reference tributary averaged 11.1 m and 0.09 m, respectively, during sampling conducted in August 2017 (Minnow 2018a). The corresponding water velocities across a representative riffle area of the benthic reference tributary ranged from 0.02 to 0.52 m/s in August 2017 (average of 0.28 m/s; Minnow 2018a). 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). 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 Project 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), has been used in comparisons to areas of the Mary River that are potentially influenced by mine activity. Mary River study area G0-03 also currently serves as a reference area, but potential advancement of the Mary River Project to include the Deposit 2 ore body would result in this area becoming a near-field mine-exposed area in the future.

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 corresponding water velocities across representative riffle areas of the G0-09 benthic study area have ranged from 0.20 to 0.47 m/s during these studies. 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 Project (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 <sup>2</sup> )	26.5	6.6	8.9	663.4	23.2
Lake Area (km <sup>2</sup> )	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 <sup>3</sup> )	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 Creek/Tributary Environments

Water chemistry at the reference creek stations met most applicable WQG and AEMP benchmarks for lotic environments in 2020, the exceptions to which included concentrations of total aluminum, total copper, and total iron (Appendix Table B.2). Concentrations of aluminum were elevated at reference creek station MRY-REF3 during spring, summer, and fall monitoring events in 2020 (Appendix Table B.2). Total copper and total iron concentrations were also elevated at station MRY-REF3 during the summer monitoring event. As reported in past studies, the occurrence of elevated concentrations of aluminum and iron at the reference creek stations appeared to be associated with naturally high turbidity at the time that samples were collected (Appendix Table B.2), which suggested that elevated turbidity and a corresponding elevation in aluminum and iron concentrations occur naturally in regional watercourses.

Water chemistry at the reference creek stations showed distinct seasonal changes for some parameters (Appendix Figure B.1; Appendix Table B.2). In general, conductivity and concentrations of conductivity, chloride, sulphate and metals were lowest in spring, intermediate in the summer, and highest during the fall in 2020 (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 2019 water quality monitoring conducted at reference creek stations showed similar seasonal patterns (KP 2014b; Minnow 2016a, 2017, 2018a, 2019, 2020). Temporal comparison of mean water chemistry for the reference creek stations indicated that water chemistry at the reference creek 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 creek stations were deemed to provide a meaningful benchmark for the evaluation of potential mine-related influences on water chemistry at mine-exposed creek/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, copper, iron, lead, zinc, and phosphorus at one or more stations during at least one monitoring event in spring, summer, and fall 2020 compared to



Table B.2: Water Chemistry at Reference Creek Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	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
					4-Jul-2020	4-Jul-2020	4-Jul-2020	4-Jul-2020	3-Aug-2020	3-Aug-2020	3-Aug-2020	3-Aug-2020	29-Aug-2020	29-Aug-2020	29-Aug-2020	29-Aug-2020
Conventional <sup>b</sup>	Conductivity (lab)	umho/cm	-	-	61.0	59.5	35.6	62.2	148	126	121	141	186	164	173	178
	pH (lab)	pH	6.5 - 9.0	-	7.83	7.79	7.18	7.70	8.12	7.93	7.86	8.13	8.17	8.02	7.89	8.12
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	27.8	27.4	12.4	26.8	66.3	57.8	44.3	59.8	93.7	83.8	67.4	85.5
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	6.8	<2.0	<2.0	<2.0	4.8	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	96	88	69	87	89	79	88	82	105	88	108	95
	Turbidity	NTU	-	-	1.06	0.49	5.16	0.77	0.29	0.74	24.3	1.15	0.37	0.40	7.82	1.36
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	29	28	<10	29	73	67	39	65	88	74	39	74
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.019	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	<0.020	<0.020	<0.020	<0.020	0.045	0.046	0.126	0.029	0.038	0.109	0.128	0.028
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.021	<0.021	<0.021	<0.021	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.71	2.13	1.80	2.06	1.81	4.90	4.27	2.79	1.83	2.66	2.12	2.62
	Total Organic Carbon	mg/L	-	-	1.97	2.34	2.26	2.33	2.26	3.54	3.06	3.35	1.95	2.32	1.86	2.42
	Total Phosphorus	mg/L	0.020 <sup>α</sup>	-	<0.0030	<0.0030	0.0091	<0.0030	<0.0030	<0.0030	0.0169	<0.0030	<0.0030	<0.0030	0.0066	<0.0030
Anions	Phenols	mg/L	0.004 <sup>α</sup>	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0031	<0.0010	0.0032	<0.0010
	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	0.51	0.53	2.32	1.51	1.57	1.37	8.69	4.64	2.27	2.33	16.0	7.76
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	0.68	0.89	2.75	0.90	2.87	3.78	11.8	3.64	4.93	7.62	19.0	5.43
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0508	0.0221	<b>0.202</b>	0.0351	0.0096	0.0228	<b>1.16</b>	0.0501	0.0170	0.0166	<b>0.137</b>	0.0666
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<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	0.00021	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00289	0.00342	0.00491	0.00327	0.00595	0.00674	0.0169	0.00834	0.00719	0.00844	0.0153	0.0103
	Beryllium (Be)	mg/L	0.011 <sup>α</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	5.85	5.47	2.74	5.44	13.9	11.3	9.05	12.9	18.5	16.2	14.0	17.1
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00178	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00033	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	<0.00050	0.00089	0.00084	0.00062	0.00057	0.00114	<b>0.0022</b>	0.00068	0.00064	0.00130	0.00140	0.00075
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	0.217	<0.030	<0.030	0.044	<b>0.856</b>	0.040	<0.030	0.031	0.160	0.044
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000083	0.000245	<0.000050	<0.000050	0.000090	0.000714	<0.000050	<0.000050	<0.000050	0.000218	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	-	-	3.32	3.31	1.50	3.31	7.79	7.04	4.72	7.22	10.7	10.1	7.20	10.3
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000397	0.000485	0.00377	0.000777	0.000099	0.00115	0.00991	0.000839	0.000106	0.00100	0.00200	0.000957
	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	-	0.000096	0.000303	0.000112	0.000082	0.000372	0.000708	0.000473	0.000264	0.000507	0.000895	0.000563	0.000332
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00067	0.00111	<0.00050	<0.00050	0.00076	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.40	0.44	0.52	0.45	0.69	0.74	1.39	0.89	0.82	0.96	1.33	1.06
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.57	0.63	0.78	0.49	0.66	0.92	2.56	0.87	0.59	0.91	1.13	0.85
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.598	0.585	1.15	0.995	2.35	1.60	4.34	2.75	3.23	2.09	6.53	4.02
	Strontium (Sr)	mg/L	-	-	0.00468	0.00384	0.00634	0.00467	0.0116	0.00824	0.0229	0.0129	0.0154	0.0114	0.0310	0.0162
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000023	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<0.010	0.013	<0.010	<0.010	<0.010	0.0665	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000509	0.000450	0.000491	0.000331	0.00802	0.00414	0.00180	0.00222	0.0138	0.00849	0.00337	0.00381
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00161	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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.

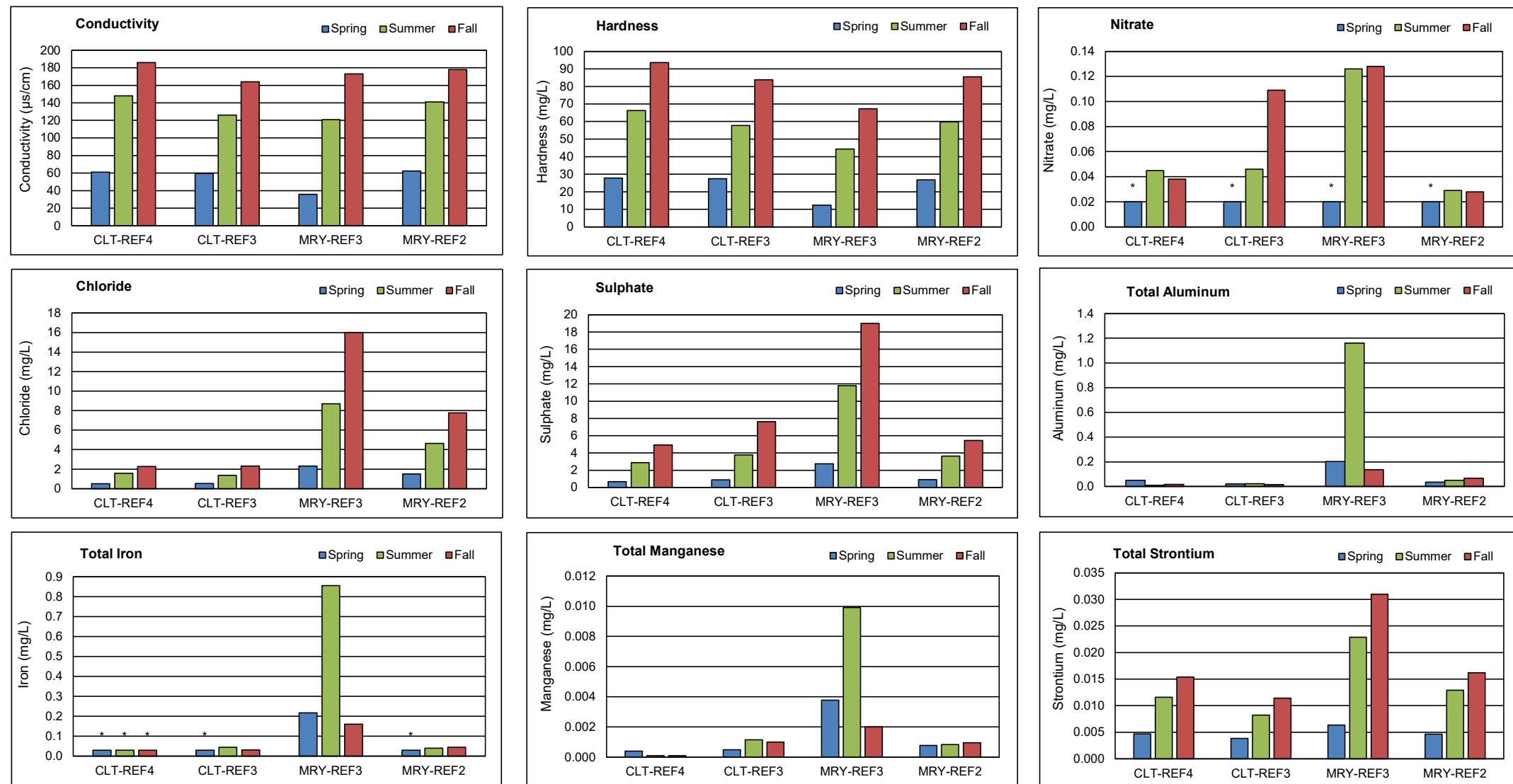
**BOLD**

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

Note: "-" indicates no WQG benchmark applicable.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intinsik (2013) using background water quality data. The values are specific to the Camp Lake system.



**Figure B.1: Seasonal Variation in Water Chemistry at Stream/Tributary Reference Stations, Mary River Project CREMP, 2020**

Note: Asterisk (\*) indicates that the parameter concentration was below the laboratory reportable detection limit.

WQG and/or AEMP benchmarks (Appendix Table B.3). As in previous CREMP studies, the WQG and/or AEMP benchmarks for aluminum and iron were generally exceeded at the Mary River reference area under highly turbid conditions (i.e.,  $\geq 5$  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 (compare 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 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, 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 creek stations in 2020, and in previous baseline (2005 to 2013), and 2015 to 2019 water quality monitoring data collected at the Mary River G0-09 series reference stations (KP 2014b; Minnow 2016a, 2017, 2018a, 2019, 2020). 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 chloride, iron, molybdenum, nickel, and uranium were elevated at the G0-09 series stations in 2020 compared to baseline and most previous years of mine operation (Appendix Figure C.23). Higher concentrations of these parameters in fall 2020 potentially reflected a drier than normal fall season, and corroborated that higher parameter concentrations may occur naturally during periods of low flow. 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 and fall of 2020 (Appendix Figure B.3). During the summer, the epilimnion extended to approximately 5 m below surface and the hypolimnion was established at depths greater than approximately 11 m, whereas in the fall, the corresponding depths for the epilimnion and hypolimnion were approximately the upper 21 m and depths below



Table B.3: Water Chemistry at Mary River GO-09 Series Reference Stations, Mary River Project CREMP, 2020

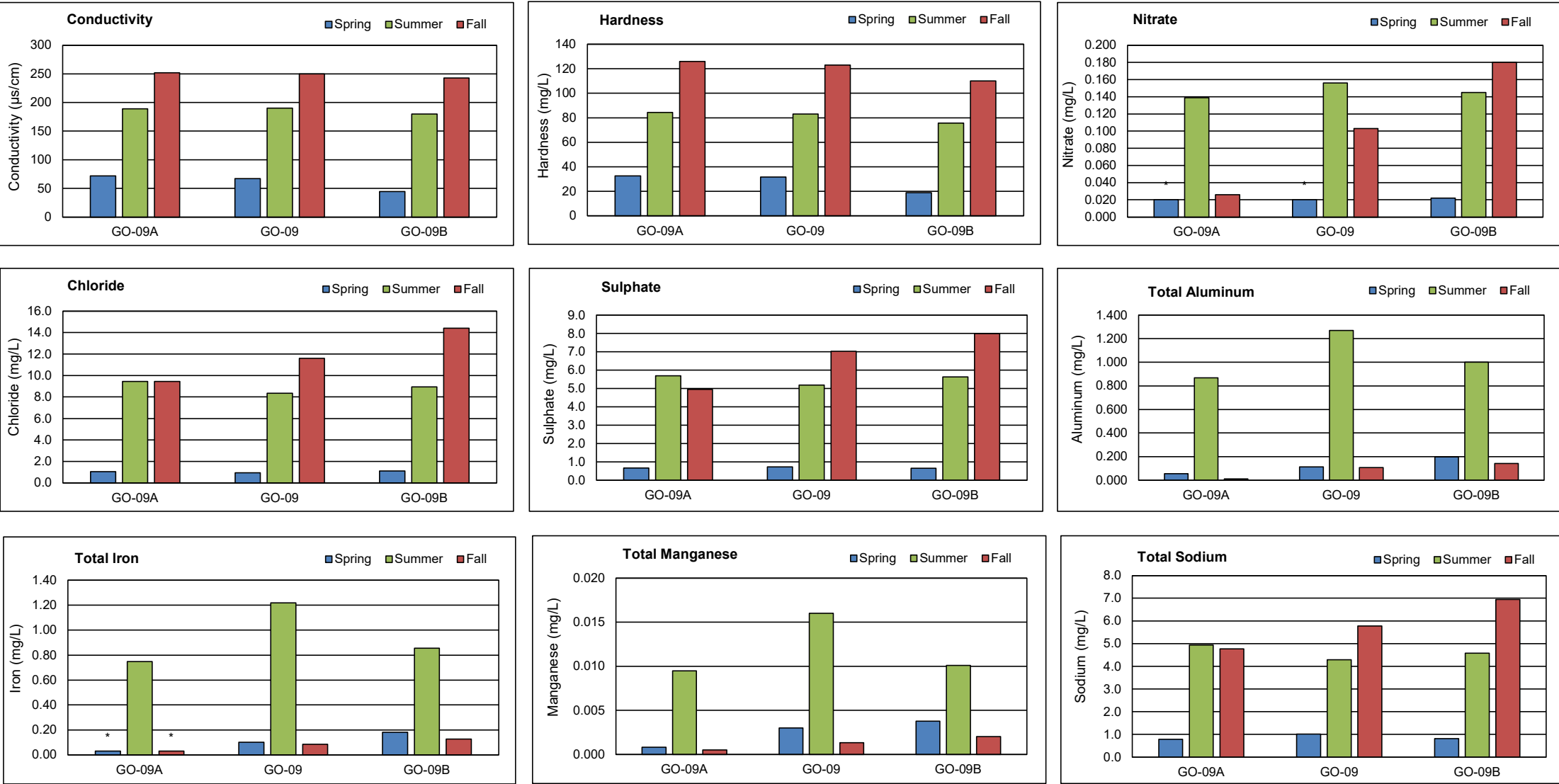
Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark	Spring Sampling Event			Summer Sampling Event			Fall Sampling Event		
					G0-09-A 4-Jul-2020	G0-09 4-Jul-2020	G0-09-B 4-Jul-2020	G0-09-A 3-Aug-2020	G0-09 2-Aug-2020	G0-09-B 2-Aug-2020	G0-09-A 28-Aug-2020	G0-09 28-Aug-2020	G0-09-B 28-Aug-2020
Conventional <sup>b</sup>	Conductivity (lab)	umho/cm	-	-	72.0	67.2	44.4	189	190	180	252	250	243
	pH (lab)	pH	6.5 - 9.0	-	7.83	7.83	7.55	8.22	8.23	8.22	8.34	8.37	8.29
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	32.5	31.7	19	84.4	83.2	75.7	126	123	110
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	6.8	21.2	9.8	<2.0	<2.0	2.4
	Total Dissolved Solids (TDS)	mg/L	-	-	60	69	70	114	93	83	134	127	127
	Turbidity	NTU	-	-	1.17	2.60	9.05	16.3	37.2	25.5	0.36	3.06	4.96
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	35	32	21	84	80	76	111	105	94
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	<0.020	<0.020	0.022	0.139	0.156	0.145	0.026	0.103	0.180
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.021	<0.021	0.022	<0.15	0.16	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.84	1.56	1.50	3.68	4.53	3.81	2.55	2.62	2.59
	Total Organic Carbon	mg/L	-	-	2.55	2.12	2.03	2.9	2.5	3.4	2.55	2.30	2.31
	Total Phosphorus	mg/L	0.020 <sup>α</sup>	-	0.0205	0.0036	0.0122	0.0220	0.0243	0.0182	<0.0030	0.0035	0.0036
Anions	Phenols	mg/L	0.004 <sup>α</sup>	-	0.0025	<0.0010	<0.0010	<0.0010	0.0013	0.0012	<0.0010	<0.0010	<0.0010
	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	1.05	0.94	1.11	9.45	8.36	8.94	9.45	11.6	14.4
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	0.67	0.73	0.65	5.69	5.19	5.63	4.96	7.03	7.99
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0551	0.112	0.197	0.868	1.27	1.00	0.0116	0.107	0.143
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<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	0.00012	<0.00010	0.00018	0.00025	0.00020	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00462	0.00530	0.00474	0.0155	0.0171	0.0152	0.0134	0.0140	0.0145
	Beryllium (Be)	mg/L	0.011 <sup>α</sup>	-	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050
	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	0.00008	<0.000010	0.000064	<0.000010	0.0000063	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	6.95	7.30	4.21	16.4	16.7	15.0	24.8	24.7	22.2
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	0.00167	0.00256	0.00171	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	<0.00010	<0.00010	<0.00010	0.00034	0.00056	0.00036	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00056	0.00670	0.00092	0.0019	0.0024	0.0019	0.00085	0.00102	0.00123
	Iron (Fe)	mg/L	0.30	0.326	<0.030	0.102	0.181	0.748	1.22	0.855	<0.030	0.084	0.127
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000387	0.000260	0.000587	0.000934	0.000661	<0.000050	0.000084	0.000130
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	<0.0010	0.0018	0.0023	0.0018	<0.0010	<0.0010	0.0010
	Magnesium (Mg)	mg/L	-	-	4.06	3.66	2.43	9.03	9.37	8.63	13.9	13.4	12.5
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000824	0.00299	0.00376	0.00948	0.0160	0.0101	0.000498	0.00133	0.00202
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000068	0.000087	0.000060	0.000458	0.000399	0.000434	0.000313	0.000447	0.000544
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00338	<0.00050	0.00121	0.00180	0.00130	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.53	0.76	0.53	1.62	1.69	1.63	1.30	1.44	1.61
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.67	0.66	0.73	1.93	2.72	2.11	0.88	0.94	1.03
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.783	1.02	0.818	4.94	4.29	4.58	4.77	5.77	6.95
	Strontium (Sr)	mg/L	-	-	0.00571	0.00584	0.00465	0.0225	0.0211	0.0207	0.0228	0.0259	0.0270
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	0.000021	0.000030	0.000021	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	0.00101	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	0.010	0.0518	0.0837	0.0593	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000441	0.000389	0.000304	0.00584	0.00522	0.00509	0.00673	0.00720	0.00776
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<0.0010	<0.0010	<0.0010	0.00161	0.00240	0.00176	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	0.0320	0.0033	0.0197	0.0032	<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.

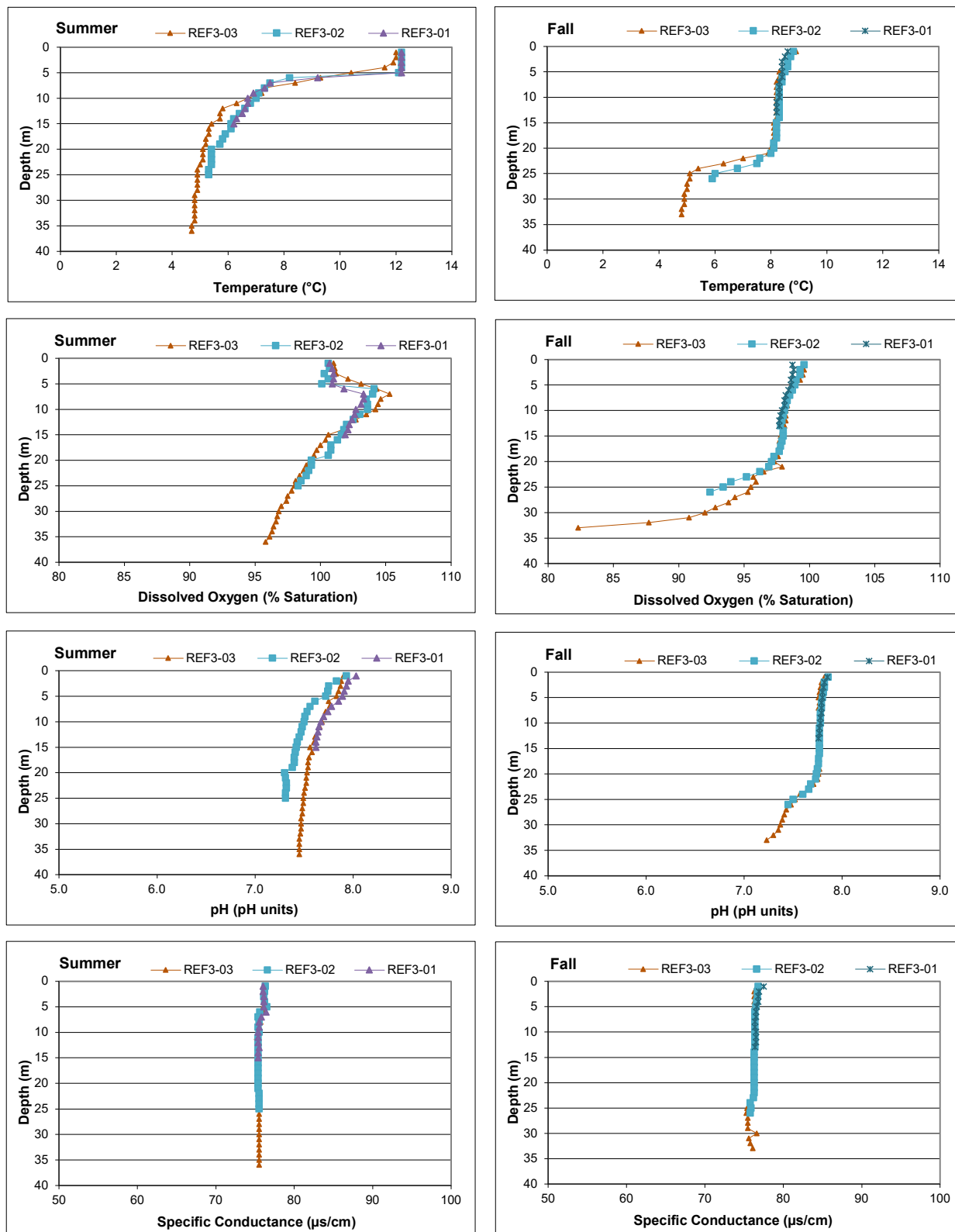
<sup>a</sup> Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999) except those indicated by α (Ontario Provincial Water Quality Objective [PWQO]) and β (British Columbia Water Quality Guideline [BCWQG]). See Table 2.2 for information regar





**Figure B.2: Seasonal Variation in Water Chemistry at Mary River GO-09 Reference Stations, Mary River Project CREMP, 2020**

Note: Asterisk (\*) indicates that the parameter concentration was below the laboratory reportable detection limit.



**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, 2020

25 m, respectively (Appendix Figure B.3). No marked changes in dissolved oxygen concentrations occurred with increased depth at any of the Reference Lake 3 basins, and dissolved oxygen saturation remained high (i.e.,  $\geq 80\%$ ) throughout the entire water column in both the summer and fall profiles (Appendix Figure B.3). The 2020 water quality profiles also showed only minor changes in pH and specific conductance among stations and with depth during each of the summer and fall sampling events (Appendix Figure B.3). Overall, the *in situ* water quality profiles suggested relatively thorough lateral mixing within Reference Lake 3 and despite the development of thermally stratification, 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 2020 (Appendix Table 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 2020, 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 2019 (KP 2014a; Minnow 2016a, 2017, 2018a, 2019, 20). Temporal comparisons also showed no substantial changes in water quality from 2015 to 2020 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 2020 (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 of local study area lakes provided no substantial gradients in dissolved oxygen saturation, pH, and/or specific conductance occur within the water column.



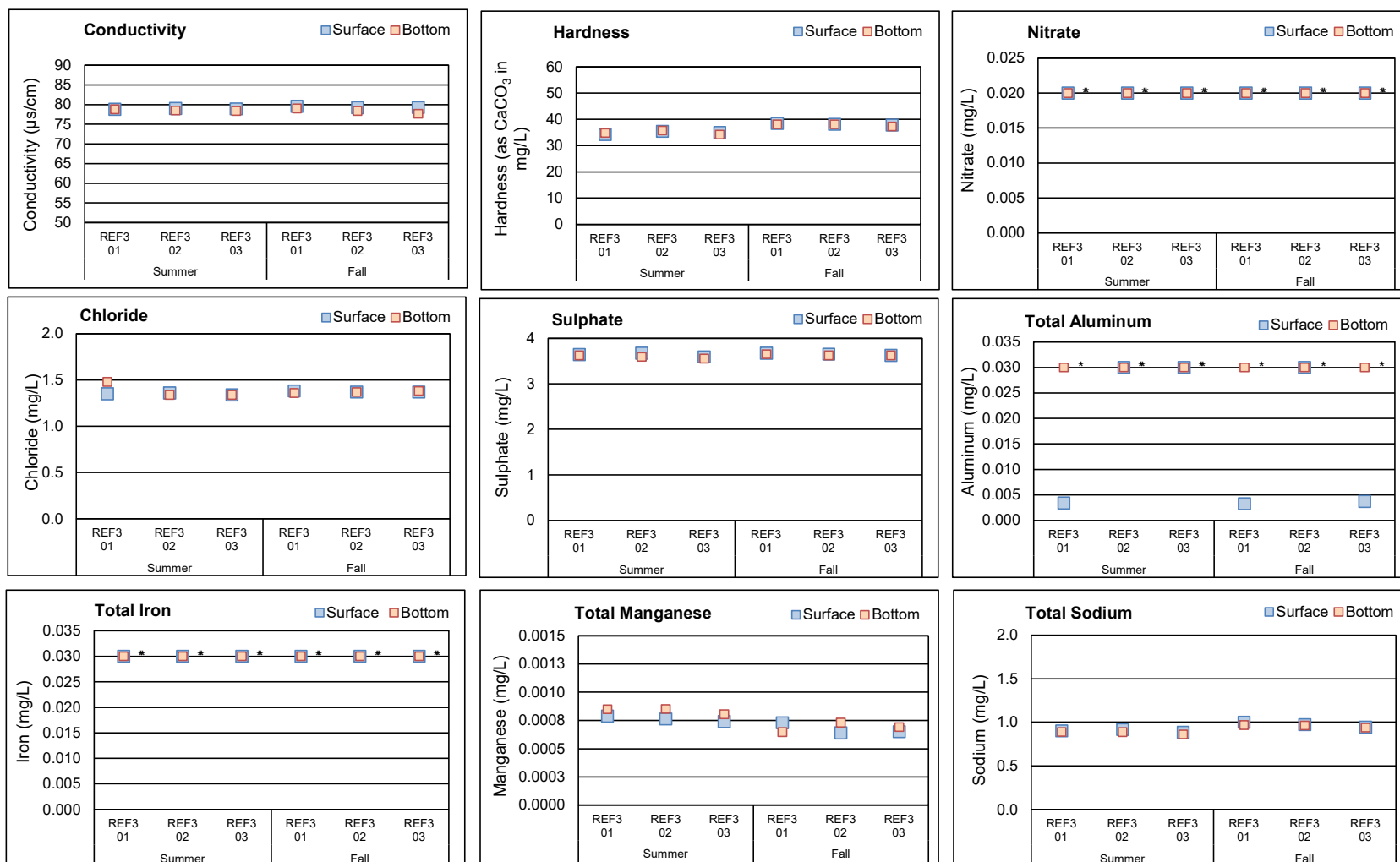
Table B.4: Water Chemistry at Reference Lake 3, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					2-Aug-2020	2-Aug-2020	2-Aug-2020	2-Aug-2020	2-Aug-2020	2-Aug-2020	29-Aug-2020	29-Aug-2020	29-Aug-2020	29-Aug-2020	29-Aug-2020	29-Aug-2020
Conventional <sup>b</sup>	Conductivity (lab)	umho/cm	-	-	78.8	78.8	78.5	79.0	78.4	78.9	79.0	79.6	78.4	79.2	77.7	79.3
	pH (lab)	pH	6.5 - 9.0	-	7.67	7.73	7.52	7.79	7.46	7.78	7.83	7.86	7.73	7.83	7.47	7.80
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	34.8	34.2	35.7	35.4	34.2	35	38.1	38.4	38.1	38.1	37.3	37.8
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	37	37	36	55	39	40	50	56	44	50	54	50
	Turbidity	NTU	-	-	0.15	0.14	0.18	0.14	0.13	0.15	0.12	0.14	0.20	0.16	0.12	0.13
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	43	45	52	45	43	47	34	35	34	35	33	35
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.031	0.014
	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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.16	0.16	0.17	<0.15	0.15	0.15
	Dissolved Organic Carbon	mg/L	-	-	3.44	3.40	3.18	3.27	3.32	3.38	3.39	3.42	3.52	3.62	3.25	3.50
	Total Organic Carbon	mg/L	-	-	4.72	4.68	4.42	4.29	4.70	4.92	3.76	3.96	3.72	3.71	3.63	3.75
	Total Phosphorus	mg/L	0.030 <sup>a</sup>	-	<0.0030	<0.0030	0.0092	<0.0030	<0.0030	0.0035	<0.0030	<0.0030	<0.0030	0.0034	<0.0030	<0.0030
Anions	Phenols	mg/L	0.004 <sup>a</sup>	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	0.0011	<0.0010
	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	1.48	1.35	1.34	1.36	1.34	1.34	1.36	1.38	1.37	1.37	1.38	1.37
Anions	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	3.62	3.64	3.59	3.67	3.55	3.59	3.65	3.67	3.62	3.65	3.62	3.62
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	<0.0030	0.0034	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0033	<0.0030	<0.0030	<0.0030	0.0037
	Antimony (Sb)	mg/L	0.020 <sup>a</sup>	-	<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	-	-	0.00640	0.00653	0.00631	0.00657	0.00600	0.00633	0.00649	0.00941	0.00665	0.00650	0.00630	0.00639
	Beryllium (Be)	mg/L	0.011 <sup>a</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	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
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	7.18	7.31	6.98	7.23	7.09	7.23	7.23	7.35	7.37	7.15	7.07	7.25
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>a</sup>	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	0.0022	0.00071	0.00073	0.00076	0.00075	0.00070	0.00072	0.00073	0.00079	0.00079	0.00073	0.00074	0.00074
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	-	-	4.23	4.30	4.28	4.40	4.03	4.17	4.71	4.77	4.67	4.75	4.51	4.59
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000850	0.000789	0.000852	0.000764	0.000805	0.000740	0.000647	0.000730	0.000731	0.000639	0.000691	0.000650
	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	-	0.000137	0.000139	0.000130	0.000127	0.000123	0.000130	0.000151	0.000176	0.000152	0.000155	0.000137	0.000150
	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
	Potassium (K)	mg/L	-	-	0.86	0.87	0.87	0.89	0.83	0.86	0.92	0.91	0.91	0.91	0.88	0.89
	Selenium (Se)	mg/L	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
	Silicon (Si)	mg/L	-	-	0.49	0.48	0.50	0.48	0.53	0.49	0.48	0.48	0.51	0.47	0.55	0.49
	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	-	-	0.889	0.902	0.886	0.917	0.862	0.885	0.968	1.00	0.963	0.972	0.939	0.942
	Strontium (Sr)	mg/L	-	-	0.00882	0.00843	0.00811	0.00840	0.00796	0.00859	0.00830	0.00837	0.00826	0.00821	0.00804	0.00820
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000315	0.000328	0.000299	0.000335	0.000293	0.000328	0.000340	0.000363	0.000319	0.000344	0.000294	0.000327
	Vanadium (V)	mg/L	0.006 <sup>a</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsik (2013) using background water quality data. The values presented are specific to the Camp Lake system.



**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, 2020**

Note: An asterisk (\*) indicates that the parameter concentration was below the laboratory reportable detection limit.

## B4 SEDIMENT QUALITY

### B4.1 Creek/Tributary Environments

Deposited sediment at Unnamed Reference Creek (CLT-REF) was visually characterized as predominantly medium-sized sand by Minnow (2018a). In-stream substrate of the reference creek was described as mainly cobble and pebble material (i.e., substrate diameter 6 to 25 cm, and 2 to 6 cm, respectively), with sand constituting only a small amount (i.e., ~7%) of the material observed at the sediment surface (Minnow 2018a). 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 (i.e., <0.1%) at the reference creek suggesting very limited deposition of fine organic materials (Minnow 2018a). Metal concentrations in deposited sediment at the reference creek were well below SQG during sampling conducted in 2017 (Minnow 2018a) and 2020 (Appendix Table D.2), 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 creeks.

### B4.2 River Environments

Deposited sediment at the Mary River (G0-09) upstream reference area was visually characterized as predominantly coarse sand in 2017 (Minnow 2018a). In-stream substrate of the reference creek was composed mainly of boulder and cobble material (i.e., substrate diameter >25 cm, and 6 to 25 cm, respectively), with sand constituting only a minor amount (i.e., ~10%) of the material observed at the sediment surface. 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) and 2020. 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 creek were shown to be well below SQG in 2017 (Minnow 2018a) and 2020 (Appendix Table D.34), 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 2020 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. Sediment moisture differed significantly between the Reference Lake 3 littoral and profundal habitats in 2020, with higher moisture content present at littoral stations compared to the profundal stations (Appendix Table F.17). No significant differences in substrate particle size or TOC content occurred between the littoral and profundal stations sampled at the reference lake in 2020 (Appendix Table F.17). A surficial and/or sub-surface layer of oxidized material (likely iron hydroxide or oxy-hydroxides), visible as an orange-brown floc or distinct layer, was occasionally observed in the surficial sediment of Reference Lake 3 (Appendix Tables D.3 and D.4). In addition, sub-surface sediment of Reference Lake 3 occasionally contained blackened/dark colouration, which suggested the occurrence of reducing (i.e., anoxic) sediment conditions (Appendix Tables D.3 and D.4). The physical properties of sediment observed at Reference Lake 3 in 2020 were consistent with those of the 2015 to 2019 studies (see Minnow 2016a, 2017, 2018a, 2019, 2020).

Metal concentrations in sediment at Reference Lake 3 were generally lower at the littoral stations than at the profundal stations, although 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). The differences in sediment metal concentrations between the littoral and profundal station depths likely reflected a naturally (but not significantly) higher proportion of clay-sized particles at the latter, which is consistent with expected depositional patterns in lakes. Among metals with established SQG, mean concentrations of iron were elevated above SQG at littoral and profundal stations, and mean concentrations of manganese were elevated above SQG at profundal stations of Reference Lake 3 in 2020 (Appendix Table B.5). Therefore, compared to SQG, high concentrations of iron and manganese appear to occur naturally in sediments of Mary River Project local study area lakes. Mean copper and iron concentrations at littoral stations, and mean copper, iron, and manganese concentrations at profundal stations, were above the most stringent (i.e., lowest) AEMP sediment quality benchmarks at Reference Lake 3 (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 2020 at littoral or profundal stations of Reference Lake 3 (Appendix Figure B.5; Figure 3.7).



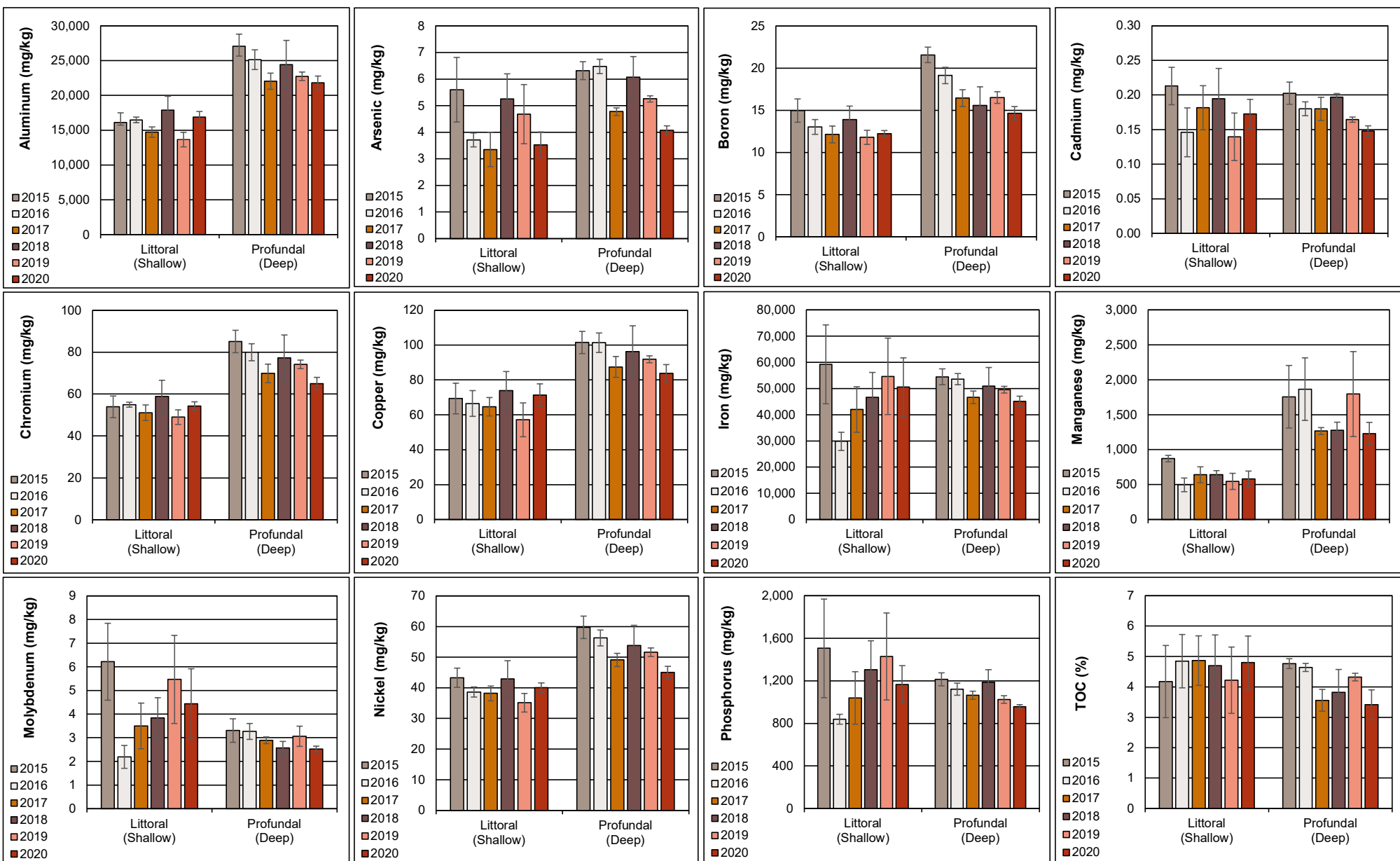
**Table B.5: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Reference Lake 3 (REF-03) Sediment Stations, Mary River Project CREMP, August 2020**

Parameter		Units	Sediment Quality Guideline (SQG) <sup>a</sup>	Most Stringent AEMP Benchmark	Reference Lake 3 Station										Study Area 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	%	-	-	40.4	56.6	23.4	13.9	24.7	55.3	34.5	15.2	24.8	16.8	30.6	15.7	4.97
	Silt	%	-	-	53.4	36.9	68.4	71.9	61.9	38.4	59.3	71.8	68.2	68.1	59.8	13.05	4.13
	Clay	%	-	-	6.3	6.5	8.2	14.2	13.4	6.3	6.2	13.0	7.0	15.1	9.6	3.79	1.198
	Moisture	%	-	-	90.0	78.3	92.3	86.6	87.9	79.4	80.2	84.9	89.2	84.0	85.3	4.79	1.51
	Total Organic Carbon	%	10 <sup>α</sup>	-	6.95	2.20	6.54	4.30	3.71	2.36	2.26	4.52	4.54	3.71	4.11	1.66	0.525
Metals	Aluminum (Al)	mg/kg	-	-	15,400	19,000	18,200	24,700	19,300	20,400	16,200	22,300	15,300	22,600	19,340	3,204	1,013
	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	0
	Arsenic (As)	mg/kg	17	5.9	4.73	3.66	4.36	4.65	3.67	3.76	2.78	4.03	2.10	4.24	3.80	0.82	0.261
	Barium (Ba)	mg/kg	-	-	139	98.4	134	143	99.7	108	88.4	129	124	132	120	19.3	6.10
	Beryllium (Be)	mg/kg	-	-	0.59	0.68	0.74	0.93	0.69	0.77	0.65	0.80	0.56	0.84	0.73	0.11	0.036
	Bismuth (Bi)	mg/kg	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0	0
	Boron (B)	mg/kg	-	-	11.6	11.9	13.1	16.8	13.2	14.5	11.7	15.1	11.5	15.0	13.4	1.84	0.580
	Cadmium (Cd)	mg/kg	3.5	1.5	0.246	0.128	0.184	0.175	0.120	0.144	0.163	0.142	0.150	0.150	0.160	0.0359	0.0114
	Calcium (Ca)	mg/kg	-	-	6,080	4,410	7,440	5,480	4,820	4,830	4,190	5,180	5,510	5,150	5,309	930	294
	Chromium (Cr)	mg/kg	90	79	54.9	57.1	57.4	73.0	59.4	59.3	48.6	68.5	51.3	67.3	59.7	7.75	2.45
	Cobalt (Co)	mg/kg	-	-	10.8	13.2	9.86	17.2	12.8	14.1	11.8	15.6	8.59	15.8	13.0	2.77	0.88
	Copper (Cu)	mg/kg	197	50	80.0	68.8	89.7	97.6	72.2	77.5	59.8	86.1	55.3	89.2	77.6	13.7	4.32
	Iron (Fe)	mg/kg	40,000 <sup>α</sup>	34,400	83,200	39,600	68,900	51,100	41,400	42,100	38,000	45,700	21,500	46,900	47,840	17,136	5,419
	Lead (Pb)	mg/kg	91.3	35	13.7	14.2	14.3	19.1	14.8	15.8	12.9	17.2	13.1	17.1	15.2	2.03	0.64
	Lithium (Li)	mg/kg	-	-	23.2	29.3	26.3	38.8	29.6	30.6	26.8	34.4	24.1	35.5	29.9	5.09	1.61
	Magnesium (Mg)	mg/kg	-	-	11,600	12,500	11,800	16,000	12,500	13,000	10,400	14,800	10,900	14,600	12,810	1,811	573
	Manganese (Mn)	mg/kg	1,100 <sup>α,β</sup>	657	578	909	413	1,250	790	1,010	866	1,820	246	1,160	904	451	143
	Mercury (Hg)	mg/kg	0.486	0.17	0.0730	0.0391	0.0594	0.0689	0.0396	0.0497	0.0269	0.0806	0.0511	0.0530	0.0541	0.0167	0.0053
	Molybdenum (Mo)	mg/kg	-	-	6.77	2.74	8.95	2.86	2.87	2.40	2.74	2.19	0.87	2.42	3.48	2.43	0.770
	Nickel (Ni)	mg/kg	75 <sup>α,β</sup>	66	44.5	39.5	41.7	50.9	40.4	41.6	38.5	47.3	35.1	45.7	42.5	4.64	1.47
	Phosphorus (P)	mg/kg	2,000 <sup>α</sup>	1,278	1,700	888	1,470	1,000	963	959	810	933	892	999	1,061	287	91
	Potassium (K)	mg/kg	-	-	3,560	4,660	4,280	6,030	4,760	4,940	4,040	5,590	3,860	5,470	4,719	805	255
	Selenium (Se)	mg/kg	-	-	1.02	0.40	1.09	0.68	0.58	0.55	0.42	0.89	0.53	0.55	0.67	0.24	0.077
	Silver (Ag)	mg/kg	-	-	0.17	0.12	0.21	0.26	0.12	0.18	<0.10	0.25	0.11	0.20	0.17	0.058	0.018
	Sodium (Na)	mg/kg	-	-	283	299	315	413	332	347	259	421	332	366	337	52	17
	Strontium (Sr)	mg/kg	-	-	11.7	10.5	14.3	13.8	11.3	11.8	9.64	12.9	11.0	12.6	12.0	1.46	0.461
	Sulphur (S)	mg/kg	-	-	1,700	<1,000	1,900	1,300	1,300	<1,000	<1,000	1,400	1,100	<1,000	1,270	320	101
	Thallium (Tl)	mg/kg	-	-	0.373	0.470	0.402	0.714	0.437	0.535	0.355	0.637	0.330	0.614	0.487	0.132	0.0418
	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	-	-	936	1,070	866	1,190	1,030	1,100	1,050	1,170	1,150	1,150	1,071	105	33
	Uranium (U)	mg/kg	-	-	14.3	15.5	12.5	24.2	10.3	19.5	9.85	16.7	8.13	22.8	15.4	5.48	1.73
	Vanadium (V)	mg/kg	-	-	52.4	57.7	61.7	70.2	57.2	60.0	51.3	63.4	47.9	65.7	58.8	6.90	2.18
	Zinc (Zn)	mg/kg	315	123	71.3	73.7	85.7	96.4	74.8	79.3	67.9	82.9	65.8	86.7	78.5	9.56	3.02
	Zirconium (Zr)	mg/kg	-	-	4.4	3.9	4.9	4.2	3.3	3.5	3.9	3.8	6.0	4.3	4.2	0.78	0.25

Indicates parameter concentration above Sediment Quality Guideline (SQG).

Note: "-" indicates no SQG applicable.

<sup>a</sup> 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)).



**Figure B.5: Sediment Metal Concentrations (mean  $\pm$  SE) at Littoral (<12m depth) and Profundal (>12m depth) Monitoring Stations of Reference Lake 3 (REF03), Mary River Project CREMP, 2015 to 2020**

## B5 PHYTOPLANKTON (CHLOROPHYLL-A)

### B5.1 Lotic Environments

Chlorophyll-a concentrations, which were used as a surrogate for phytoplankton abundance, ranged from 0.24 to 0.93 µg/L at the reference creek and river stations among spring, summer, and fall sampling events in 2020 (Appendix Table B.6). 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 meso-eutrophic CWQG (CCME 2020) categorization for the stream and river reference stations based on mean aqueous total phosphorus concentrations generally ranging between 3 and 24 µg/L during each respective spring, summer, and fall sampling event in 2020 (Appendix Tables B.2 and B.3). Chlorophyll-a concentrations were significantly lower in the spring but highest in the summer at the reference creeks and at the Mary River G0-09 series reference stations, in 2020 (Appendix Tables B.6 and B.7).

Like-season chlorophyll-a concentrations from 2015 to 2020 showed no consistent significant differences among years over the spring, summer, and fall sampling events at either the reference creek or the Mary River reference area stations (Appendix Figure B.6). The variability in response shown among seasons and years at the lotic reference areas indicated that significant differences in chlorophyll-a concentrations occur naturally among years and seasons in watercourses within the Mary River Project 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 2020 (Appendix Figure B.7). Reference Lake 3 chlorophyll-a concentrations averaged 0.69 µg/L in summer and fall 2020, 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 2020 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 CWQG (CCME 2020) categorization for Reference Lake 3 based on mean aqueous total phosphorus concentrations below 4 µg/L during the summer and fall sampling events in 2020 (Appendix Table B.4). Chlorophyll-a concentrations did not differ significantly



**Table B.6: Phytoplankton Monitoring Data Collected at Lotic Reference Stations, Mary River Project CREMP, 2020**

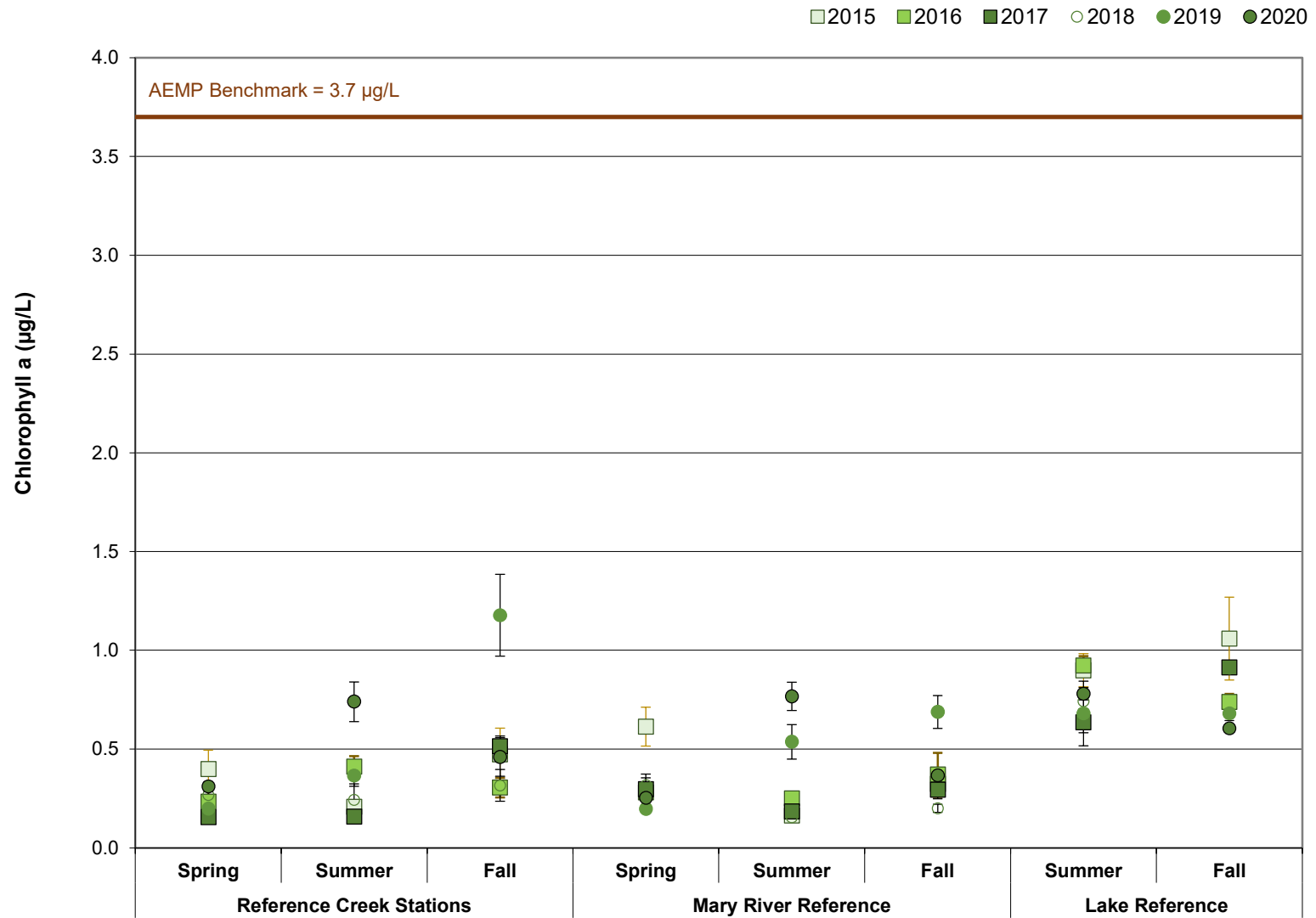
		Reference Creek Stations				Mary River Reference Stations		
		CLT-REF3	CLT-REF4	MRY-REF2	MRY-REF3	G0-09-A	G0-09	G0-09-B
Sample Collection Date	Spring	4-Jul-20	4-Jul-20	4-Jul-20	4-Jul-20	4-Jul-20	4-Jul-20	4-Jul-20
	Summer	3-Aug-20	3-Aug-20	3-Aug-20	3-Aug-20	3-Aug-20	2-Aug-20	2-Aug-20
	Fall	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
Chlorophyll-a (µg/L)	Spring	0.35	0.31	0.24	0.34	0.24	0.25	0.27
	Summer	0.62	0.90	0.92	0.52	0.66	0.71	0.93
	Fall	0.74	0.31	0.34	0.45	0.33	0.43	0.34
	Average	0.57	0.51	0.50	0.44	0.41	0.46	0.51
	Standard Deviation	0.20	0.34	0.37	0.09	0.22	0.23	0.36
	Standard Error	0.12	0.20	0.21	0.05	0.13	0.13	0.21
Phaeophytin-a (µg/L)	Spring	0.40	<0.10	0.37	0.45	0.35	0.66	0.43
	Summer	1.17	1.50	1.60	1.36	1.34	1.45	1.70
	Fall	0.78	0.46	0.57	0.58	0.85	0.84	0.99
	Average	0.78	0.69	0.85	0.80	0.85	0.98	1.04
	Standard Deviation	0.39	0.73	0.66	0.49	0.50	0.41	0.64
	Standard Error	0.22	0.42	0.38	0.28	0.29	0.24	0.37

**Table B.7: Statistical Comparisons of Chlorophyll-a Concentrations among Winter, Spring, Summer, and/or Fall Sampling Events at Reference Lotic and Lentic Study Areas, Mary River Project CREMP, 2020**

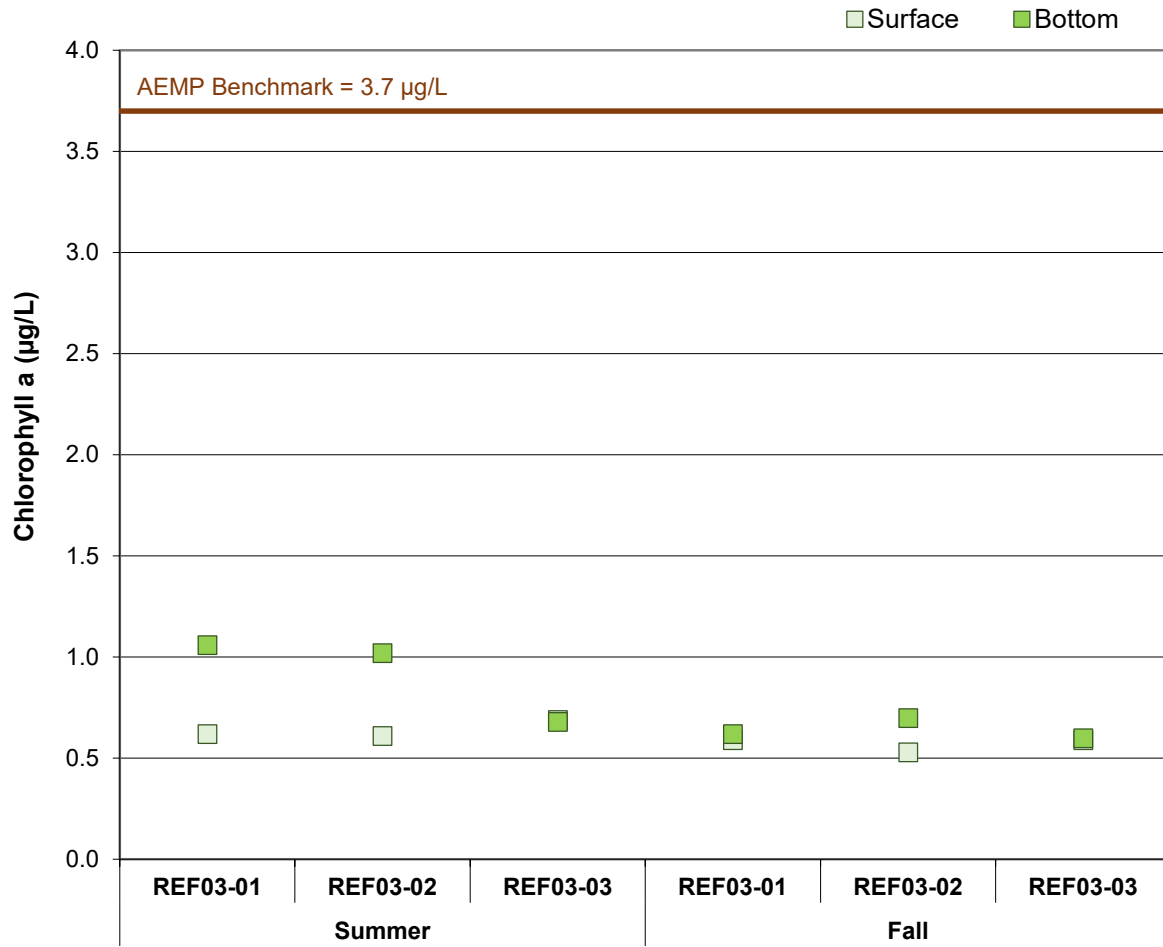
Study Lake	Overall 3-group Comparison			Pair-wise, <i>post hoc</i> comparisons <sup>a</sup>			
	Significant Difference Among Areas?	p-value	Statistical Test <sup>b</sup>	(I) Area	(J) Area	Significant Difference Between 2 Areas?	p-value
Stream Reference Stations	YES	0.036	K-W	Spring	Summer	YES	0.011
				Spring	Fall	NO	0.325
				Summer	Fall	NO	0.115
Mary River GO-09 Reference Stations	YES	0.027	K-W	Spring	Summer	YES	0.007
				Spring	Fall	NO	0.180
				Summer	Fall	NO	0.180
Reference Lake 3	-	-	-	Winter	Summer	not applicable	-
	-	-	-	Winter	Fall	not applicable	-
	YES	0.022	t-equal	Summer	Fall	YES	0.022

<sup>a</sup> *Post hoc* analysis of 1-way ANOVA among all areas protected for multiple comparisons.

<sup>b</sup> Statistical tests include Kruskal Wallis H-test (K-W) and t-test with equal variances.



**Figure B.6: Chlorophyll-a Concentration Seasonal Comparison from 2015 to 2020 at Creek, River, and Lake Reference Phytoplankton Monitoring Stations, Mary River Project CREMP**



**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, 2020



between the summer and fall at Reference Lake 3 in 2020 (Appendix Table B.7), which was similar to the 2015, but differed from the 2016 (significantly higher chlorophyll-a concentrations in summer compared to fall) and the 2017 and 2018 studies (significantly lower chlorophyll-a concentrations in summer compared to fall). Therefore, although chlorophyll-a concentrations were generally comparable from 2015 to 2020 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 Project mine local study area lakes.



## B6 BENTHIC INVERTEBRATE COMMUNITY

### B6.1 Creek/Tributary Environments

The original Mary River Project CREMP design had not included/identified a reference creek from which to evaluate potential mine-related effects on benthic invertebrate communities of creek/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 creek was incorporated into the 2016 to 2020 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 Angajurjualuk 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 creek 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 258 to 1,032 individuals/m<sup>2</sup> in the 2020 study (mean of 713 individuals/m<sup>2</sup>), which is considered moderate for Arctic streams (Craig and McCart 1975). Unnamed Reference Creek showed relatively high richness and Simpson's Evenness in 2020, which was unlike 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 2020 was Chironomidae (non-biting midges), collectively accounting for approximately 86% of the community (Appendix Table B.8). Collector-gatherers were the dominant benthic invertebrate functional feeding group (FFG) present at Unnamed Reference Creek (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 (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



**Table B.8: Benthic Invertebrate Community Summary Statistics for Unnamed Reference Creek and Mary River (GO-09) Reference Areas, Mary River Project CREMP, August 2020**

Metric	Area	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
<b>Density</b> (no. organisms / m <sup>2</sup> )	Unnamed Reference Creek	5	713	296	133	258	1,032
	Mary River GO-09 Reference	5	886	831	372	315	2,208
<b>Richness</b> (Number of Taxa)	Unnamed Reference Creek	5	16	4.4	2.0	9.0	20.0
	Mary River GO-09 Reference	5	15	2.0	0.9	12.0	17.0
<b>Simpson's Evenness</b>	Unnamed Reference Creek	5	0.84	0.04	0.02	0.77	0.88
	Mary River GO-09 Reference	5	0.83	0.15	0.07	0.56	0.92
<b>Nemata</b> (% of community)	Unnamed Reference Creek	5	0.7	1.3	0.6	0.0	3.0
	Mary River GO-09 Reference	5	0.5	0.6	0.3	0.0	1.2
<b>Hydracarina</b> (% of community)	Unnamed Reference Creek	5	4.5	3.7	1.7	2.1	11.1
	Mary River GO-09 Reference	5	1.1	1.3	0.6	0.0	3.2
<b>Chironomidae</b> (% of community)	Unnamed Reference Creek	5	48.3	12.9	5.8	36.7	67.3
	Mary River GO-09 Reference	5	89.6	5.1	2.3	83.2	96.2
<b>Metal Sensitive Chironomidae</b> (% of community)	Unnamed Reference Creek	5	0.8	1.2	0.6	0.0	3.0
	Mary River GO-09 Reference	5	32.0	23.7	10.6	10.8	68.7
<b>Tipulidae</b> (% of community)	Unnamed Reference Creek	5	1.5	2.3	1.0	0.0	5.6
	Mary River GO-09 Reference	5	1.2	0.5	0.2	0.9	2.0
<b>Collector-Gatherer FFG</b> (% of community)	Unnamed Reference Creek	5	80.7	8.8	3.9	70.0	91.1
	Mary River GO-09 Reference	5	80.2	4.1	1.8	74.9	85.5
<b>Filterer FFG</b> (% of community)	Unnamed Reference Creek	5	9.9	8.9	4.0	0.0	21.5
	Mary River GO-09 Reference	5	2.0	1.8	0.8	0.0	4.9
<b>Shredder FFG</b> (% of community)	Unnamed Reference Creek	5	2.8	2.7	1.2	0.0	7.0
	Mary River GO-09 Reference	5	11.3	7.1	3.2	4.7	20.1
<b>Clinger HPG</b> (% of community)	Unnamed Reference Creek	5	15.8	7.7	3.5	7.8	27.0
	Mary River GO-09 Reference	5	15.0	5.8	2.6	5.9	21.3
<b>Sprawler HPG</b> (% of community)	Unnamed Reference Creek	5	79.4	6.6	3.0	70.0	87.2
	Mary River GO-09 Reference	5	79.0	5.9	2.6	69.8	85.2
<b>Burrower HPG</b> (% of community)	Unnamed Reference Creek	5	4.8	3.3	1.5	1.4	8.3
	Mary River GO-09 Reference	5	6.0	10.2	4.6	1.1	24.3

group at Unnamed Reference Creek (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 2020 CREMP (see Table 2.5; Figure 2.4).

Benthic invertebrate density at the Mary River reference area in the 2020 study ranged from 315 to 2,208 individuals/m<sup>2</sup>, 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, with the relative abundance of this group ranging from 83% to nearly 96% of individuals (mean of 97.2%) and chironomid taxa considered metal-sensitive constituting 11% to 69% of the community (Appendix Table B.8). Similar to the reference creek, collector-gatherers were the dominant FFG present at the Mary River reference area (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 (Appendix Table B.8), which suggested that most benthic invertebrates were associated with the surface of rocky substrates.

Comparison of the Mary River reference area benthic invertebrate communities among baseline (2006, 2007) and mine-operational (2015 to 2020) studies for key metrics indicated no consistent significant differences in density, richness, and relative abundance of metal-sensitive chironomids or the collector-gatherer FFG between the baseline and mine-operational periods (Appendix Figure F.14; Appendix Table F.47). Simpson's Evenness and collector-gatherer FFG relative abundance has routinely been significantly higher and lower, respectively during years of mine operation (2015 to 2018, 2020) compared to baseline (Appendix Figure F.14; Appendix Table F.47). However, the direction of these differences was not consistent with an adverse change but rather suggested more even distribution of invertebrate groups and FFG for the mine-operational period (Appendix Figure F.14).



The changes in benthic invertebrate community metrics between the mine operational and baseline studies at the Mary River reference area were thus attributable to natural variability in community traits among years and/or to artifacts associated with CREMP sampling among studies.

### **B6.3 Lentic Environments (Reference Lake 3)**

The benthic invertebrate community of Reference Lake 3 differed dramatically between littoral (<12 m depth) and profundal (>12 m depth) stations in 2020. As in previous monitoring conducted from 2015 to 2019, significantly higher benthic invertebrate density and richness was observed at littoral stations compared to profundal stations in 2020, both at Critical Effect Sizes outside of  $\pm 2$  SD (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 or HPG were indicated between littoral and profundal habitats of Reference Lake 3 in 2020 with the exception of a higher relative abundance of the burrower HPG at littoral stations (Appendix Table B.9). The difference in benthic invertebrate community metrics and assemblage features between the littoral and profundal stations observed at Reference Lake 3 from 2015 to 2020 validated proposed changes to the CREMP benthic invertebrate community survey by Minnow (2016b). Specifically, benthic invertebrate community surveys can focus only on littoral habitat to reflect the fact that natural habitat factors that affect community assemblage at profundal areas limit the ability to interpret potential mine-related biological effects at profundal depths of the local study area lakes.

Littoral and profundal habitat benthic invertebrate communities at Reference Lake 3 in 2020 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 2019 (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 2020.



**Table B.9: Benthic Invertebrate Community Statistical Comparison Results between Littoral and Profundal Stations at Reference Lake 3, Mary River Project CREMP, August 2020**

Metric	Statistical Test Results					Summary Statistics						
	Statistical Test	Data Transformation	Significant Difference Between Areas?	p-value	Magnitude of Difference <sup>a</sup> (No. of SD)	Habitat	Mean ( n = 5 )	Standard Deviation	Standard Error	Minimum	Median	Maximum
Density (Individuals/m <sup>2</sup> )	t-equal	log10	YES	< 0.001	-2.5	Lake Littoral	1,571	430	193	1,190	1,474	2,310
						Lake Profundal	479	142	63	336	491	681
Richness (Number of Taxa)	t-equal	log10	YES	< 0.001	-3.0	Lake Littoral	14.6	2.5	1.1	13.0	14.0	19.0
						Lake Profundal	7.0	1.9	0.8	5.0	8.0	9.0
Simpson's Evenness (E )	t-equal	none	NO	0.177	-0.7	Lake Littoral	0.810	0.110	0.049	0.630	0.847	0.923
						Lake Profundal	0.731	0.045	0.020	0.689	0.721	0.795
Shannon Diversity	t-equal	log10	YES	0.004	-1.7	Lake Littoral	2.710	0.526	0.235	2.080	2.730	3.510
						Lake Profundal	1.800	0.196	0.088	1.580	1.720	2.030
Hydracarina (%)	t-equal	log10(x+1)	NO	0.134	-0.9	Lake Littoral	5.3	2.6	1.2	3.5	4.4	9.9
						Lake Profundal	2.8	2.0	0.9	0.0	3.5	5.1
Ostracoda (%)	t-equal	log10	YES	< 0.001	-2.0	Lake Littoral	37.9	14.5	6.5	26.7	36.2	62.6
						Lake Profundal	8.6	4.1	1.8	3.5	7.7	14.5
Chironomidae (%)	t-equal	none	YES	0.001	2.3	Lake Littoral	52.6	15.6	7.0	26.9	59.0	66.4
						Lake Profundal	87.9	4.2	1.9	82.3	87.2	92.7
Metal-Sensitive Chironomidae (%)	t-equal	none	NO	0.773	0.3	Lake Littoral	28.8	9.5	4.3	15.6	32.5	38.7
						Lake Profundal	31.5	17.6	7.9	7.9	38.0	49.3
Collector-Gatherers (%)	t-equal	log10	NO	0.917	0.0	Lake Littoral	63.1	11.4	5.1	53.6	60.3	81.5
						Lake Profundal	62.9	15.0	6.7	45.4	56.1	79.0
Filterers (%)	t-equal	none	NO	0.701	0.4	Lake Littoral	27.1	9.8	4.4	14.4	29.2	38.0
						Lake Profundal	30.7	17.5	7.8	7.9	38.0	49.3
Shredders (%)	t-equal	none	NO	0.396	-0.5	Lake Littoral	3.9	3.3	1.5	0.6	3.2	7.4
						Lake Profundal	2.2	2.3	1.0	0.0	2.5	5.3
Clingers (%)	t-equal	none	NO	0.863	0.2	Lake Littoral	31.9	9.3	4.2	17.9	33.5	41.6
						Lake Profundal	33.5	16.9	7.6	13.1	41.5	52.8
Sprawlers (%)	t-equal	none	NO	0.466	0.6	Lake Littoral	57.9	12.1	5.4	41.0	57.2	73.8
						Lake Profundal	64.8	16.2	7.2	45.5	58.5	87.0
Burrowers (%)	t-equal	none	YES	0.011	-1.7	Lake Littoral	10.2	4.9	2.2	4.6	8.3	17.3
						Lake Profundal	1.7	2.9	1.3	0.0	0.0	6.7

Grey shading indicates statistically significant difference between habitat types based on p-value  $\leq 0.10$ .

Blue shaded values indicate significant difference (p-value  $\leq 0.10$ ) that was also outside of a CES of  $\pm 2$  SD, indicating that the difference was ecologically meaningful.

<sup>a</sup> Magnitude calculated by comparing the difference between the lake littoral and profundal area means divided by the littoral area standard deviation.

## B7 FISH POPULATION

### B7.1 Lotic Environments

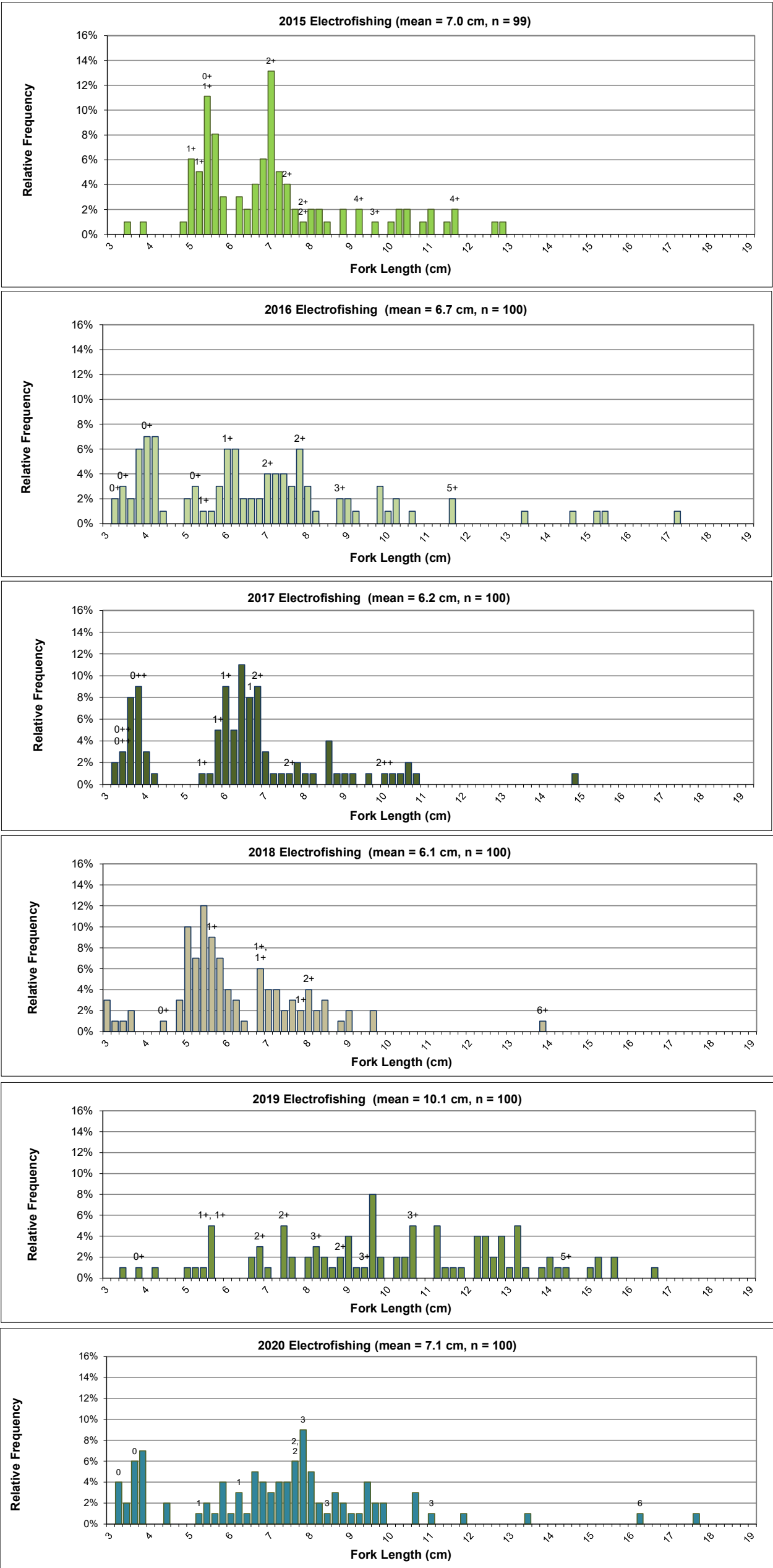
Fish population sampling of lotic habitats is not required as part of the Mary River Project CREMP (see NSC 2014). In part, this reflects the fact that fish can only inhabit local study area creeks/rivers for a short period each year (i.e., July to September) as a result of complete freezing/desiccation 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, 2021).

### B7.2 Lentic Environments (Reference Lake 3)

The Reference Lake 3 fish community has historically been composed of arctic charr and ninespine stickleback. The 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 in all previous studies (Minnow 2018a, 2019, 2020), and predominantly arctic charr were captured at the reference lake in 2020 (Appendix Tables G.1 and G.2). Suitable numbers of arctic charr were captured at nearshore habitat of Reference Lake 3 (i.e., 100 individuals) to allow evaluation of mine-related effects on survival, growth, and condition of fish collected at the mine-exposed lake shorelines. 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 B.8). 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 (Appendix Figure B.8). However, population comparisons of nearshore arctic charr captured between the mine-exposed and reference lakes from 2016 to 2018 and 2020 were completed separately for YOY and non-YOY data sets. Temporal comparisons of the 2015 to 2020 nearshore arctic charr data indicated that fish sizes in 2020 were within range of those captured in previous years, with condition of fish within the critical effect size for growth endpoints of  $\pm 25\%$  for 2020 compared to all years except 2018 for non-YOY (Appendix Table B.10). The data show that larger fish are likely to naturally exhibit lower condition than smaller sized fish (Appendix Table B.10; Appendix Figure B.9). Overall, the Reference Lake fish population data indicated that some year-to-year differences in fish population endpoints can be expected naturally at local study area lakes.

Low numbers of arctic charr were captured at littoral/profundal areas of Reference Lake 3 in 2020 (i.e., 69 individuals) despite application of similar fishing effort to that used at the






**Figure B.8: Length-frequency Distributions for Arctic Charr Captured by Backpack Electrofishing and Gill Netting at Reference Lake 3 (REF3) in August 2015 to 2020, Mary River Project CREMP**


Note: Fish ages are shown above the bars, where available.



**Table B.10: Statistical Comparisons For Length, Weight, and Condition Endpoints For non-Young-of-the-Year Arctic Charr from Reference Lake 3, 2015 to 2020**

Group	Indicator	Endpoint	Variables		Sample Size (n)						Test <sup>a</sup>	Area P-Value	Year 1	Year 2	Pairwise Comparisons <sup>b</sup>	
			Response	Covariate	2015	2016	2017	2018	2019	2020					P-value	Magnitude of Difference (%) <sup>c</sup>
Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	-	68	74	92	97	79	K-W	<0.001	2015	2016	0.023	5.8
														2017	0.781	-4.3
														2018	0.005	-16
														2019	<0.001	45
														2020	0.001	12
													2016	2017	0.058	-9.6
														2018	<0.001	-20
														2019	<0.001	37
														2020	0.416	5.5
													2017	2018	0.004	-12
														2019	<0.001	52
														2020	0.005	17
													2018	2019	<0.001	72
														2020	<0.001	72
													2019	2020	<0.001	-23
	Body Size	Body Weight	Body Weight (g)	-	-	68	74	92	97	79	K-W	<0.001	2015	2016	0.022	23
														2017	0.768	-8.4
														2018	0.069	-32
														2019	<0.001	211
														2020	0.004	31
													2016	2017	0.058	-26
														2018	<0.001	-45
														2019	<0.001	153
														2020	0.64	6.1
													2017	2018	0.045	-26
														2019	<0.001	240
														2020	0.014	43
													2018	2019	<0.001	362
														2020	<0.001	362
													2019	2020	<0.001	-58
	Energy Storage	Condition	log10[Body Weight (g)]	log10[Fork Length (cm)]	-	68	74	92	97	79	ANCOVA	<0.001	2015	2016	0.827	1.7
														2017	1	0.046
														2018	<0.001	12
														2019	0.082	-3.7
														2020	0.067	-3.7
													2016	2017	0.87	-1.7
														2018	<0.001	9.9
														2019	0.003	-5.3
														2020	0.003	-5.3
													2017	2018	<0.001	12
														2019	0.105	-3.7
														2020	0.091	-3.7
													2018	2019	<0.001	-14
														2020	<0.001	-14
													2019	2020	1	0.0091
YOY <sup>c</sup>	Body Size	Fork Length	Fork Length (cm)	-	-	31	26	8	-	21	K-W	<0.001	2016	2017	0.006	-6.4
														2018	<0.001	-18
														2020	0.004	-7.7
													2017	2018	0.106	-12
														2020	0.768	-1.4
													2018	2020	0.173	12
	Body Size	Body Weight	log10[Body Weight (g)]	-	-	31	26	8	-	21	ANOVA	0.001	2016	2017	0.716	-8.8
														2018	0.004	-37
														2020	0.018	-24
													2017	2018	0.033	-31
													2018	2020	0.217	-17
														2020	0.542	20
	Energy Storage	Condition	log10[Body Weight (g)]	log10[Fork Length (cm)]	-	31	25 <sup>e</sup>	8	-	21	ANCOVA	0.005	2016	2017	0.023	12
														2018	0.998	1.1
														2020	0.923	-2.6
													2017	2018	0.293	-9.9
														2020	0.006	-13
													2018	2020	0.924	-3.7

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

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

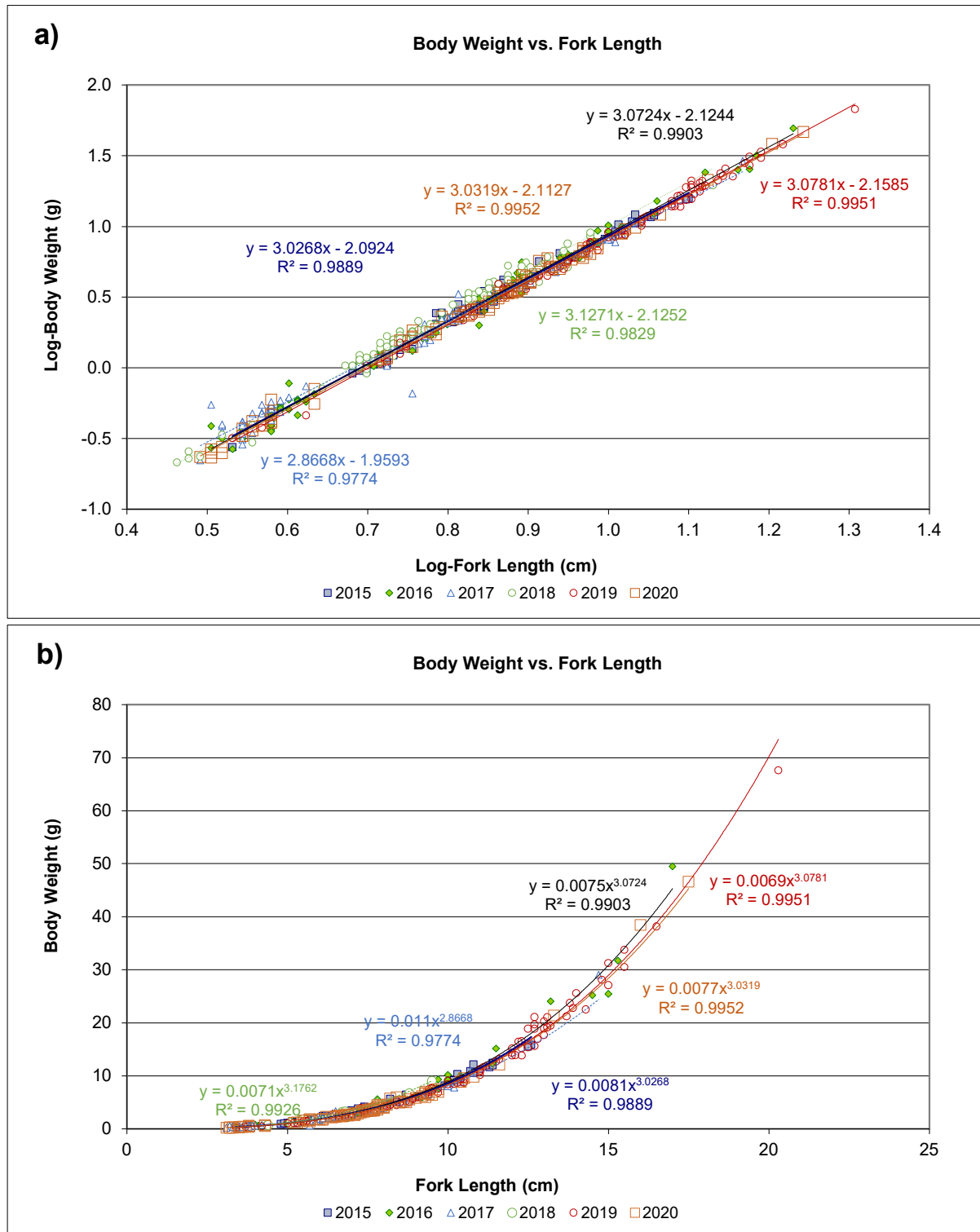
<sup>a</sup> Statistical tests included the Kruskal Wallis H-test (K-W), ANOVA, and ANCOVA.

<sup>b</sup> 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 (except for the K-W test; see footnote b).

<sup>c</sup> Calculated as the maximum difference in the cumulative relative frequency distributions (CRFD) between areas. A negative difference implies that the exposed area has a greater number of fish with length measures that are less than where the maximum difference in CRFDs was observed. A positive difference implies that the exposed area has fewer fish with length measures that are less than where the maximum difference in CRFDs was observed.

<sup>d</sup> Could not be calculated for 2015, 2018, or 2019 data sets.

<sup>e</sup> One outlier (REF317-ACJ-25, Stdnt resid: 4.226) removed from analysis.



**Figure B.9: Comparison of Condition (Weight-at-fork-length Relationship) for Arctic Charr Collected at the Nearshore Area of Reference Lake 3 in August from 2015 to 2020 using Log-transformed (a) and Untransformed (b) Data, Mary River Project CREMP**

mine-exposed study lakes (Appendix Table G.2). However, unlike previous studies conducted from 2015 to 2018 that resulted in catches ranging from 1 to 27, the sample size in 2020 was 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. Notably, because arctic charr can show differential growth rates between the sexes (females grow faster; Jonsson et al. 1988; Skúlason 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 Project 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).



## 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 2020 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 creek, 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 Project 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 2020 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 creek, river, and/or lake reference areas used for the CREMP from 2015 to 2020, and historically in baseline studies. Significant positive correlations between total concentrations of these metals and turbidity were identified using the 2015 to 2020 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 2020. Accordingly, greater emphasis should be placed on comparison of dissolved metal concentrations for assessing potential mine-related influences on water quality as part of the CREMP studies.
- **Use of fall sampling event water quality data to allow the most conservative evaluation of potential mine-related influences on water chemistry.** Water chemistry at lotic reference stations showed distinct seasonal changes in parameter concentrations during the baseline, and 2015 to 2020 studies. In general, conventional parameters, anions, and total metals were observed at lowest concentrations in spring, with intermediate concentrations in the summer, and highest



concentrations observed during the fall in each year. Therefore, although water chemistry data from winter, spring, and summer sampling events were examined, the fall water chemistry data generally served as the focus for the evaluation of potential mine-related influences on water quality at the mine-exposed lakes in CREMP studies conducted from 2016 to 2020.

- **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 2020. Therefore, the evaluation of water chemistry and phytoplankton productivity among stations and study areas for the 2016 to 2020 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 of 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 2020. 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.
- **Focus lake benthic invertebrate community survey on littoral zone.** Benthic invertebrate community data collected at Reference Lake 3 from 2015 to 2020 consistently indicated that, similar to most lakes, benthic invertebrate community features can be expected to naturally change with depth. In general, as depth increases, lower benthic invertebrate density and richness typically occurs. The occurrence of naturally low density and/or richness can, in turn, limit the ability to distinguish adverse effects associated with a project. Therefore, in order to maximize the confidence in the benthic invertebrate community analysis results, the littoral zone should serve as the focus for the lake benthic invertebrate community survey analysis for the CREMP.
- **Adopting of standard CES for benthic invertebrate community and fish population endpoints into the CREMP.** Year-to-year evaluation of reference creek 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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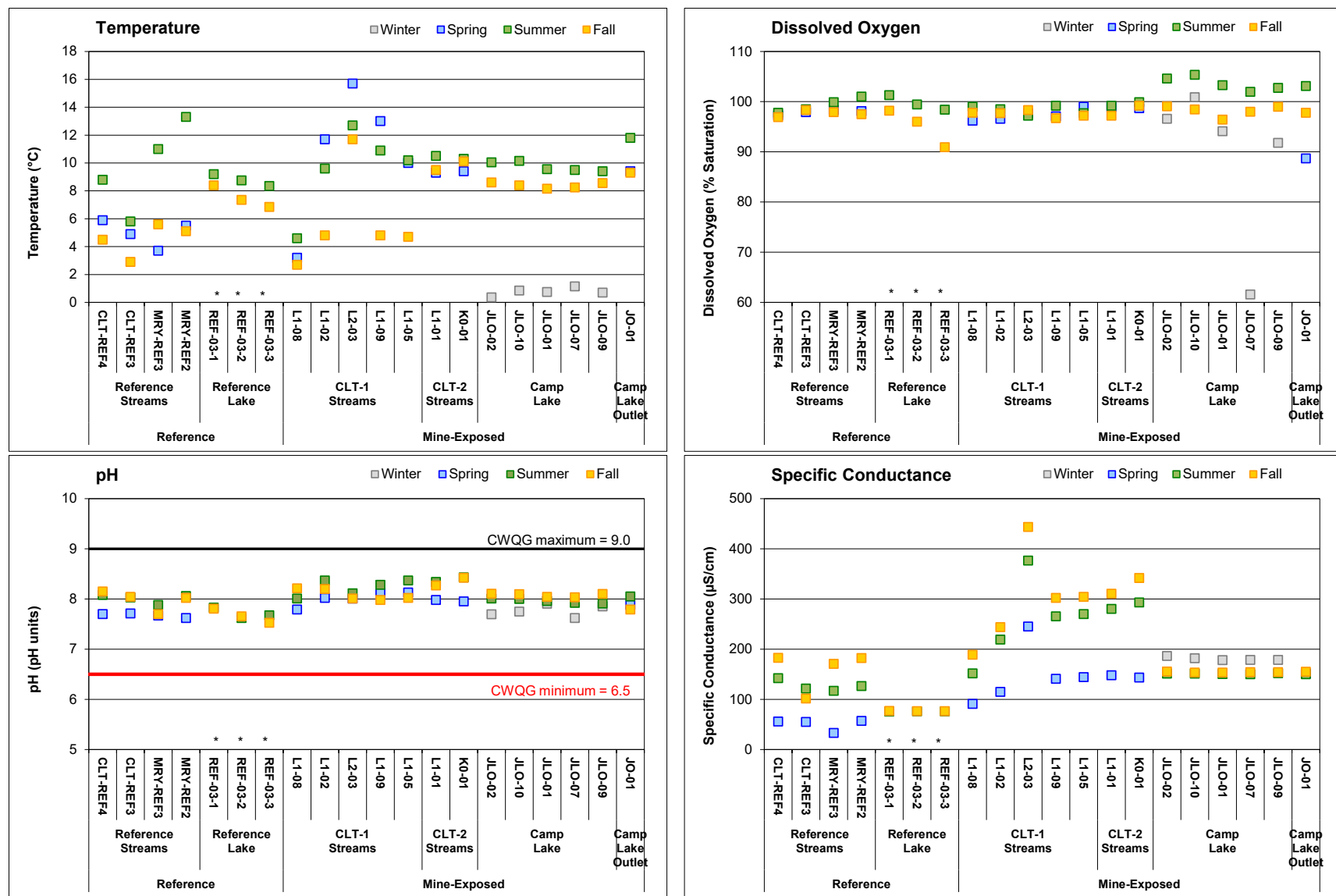




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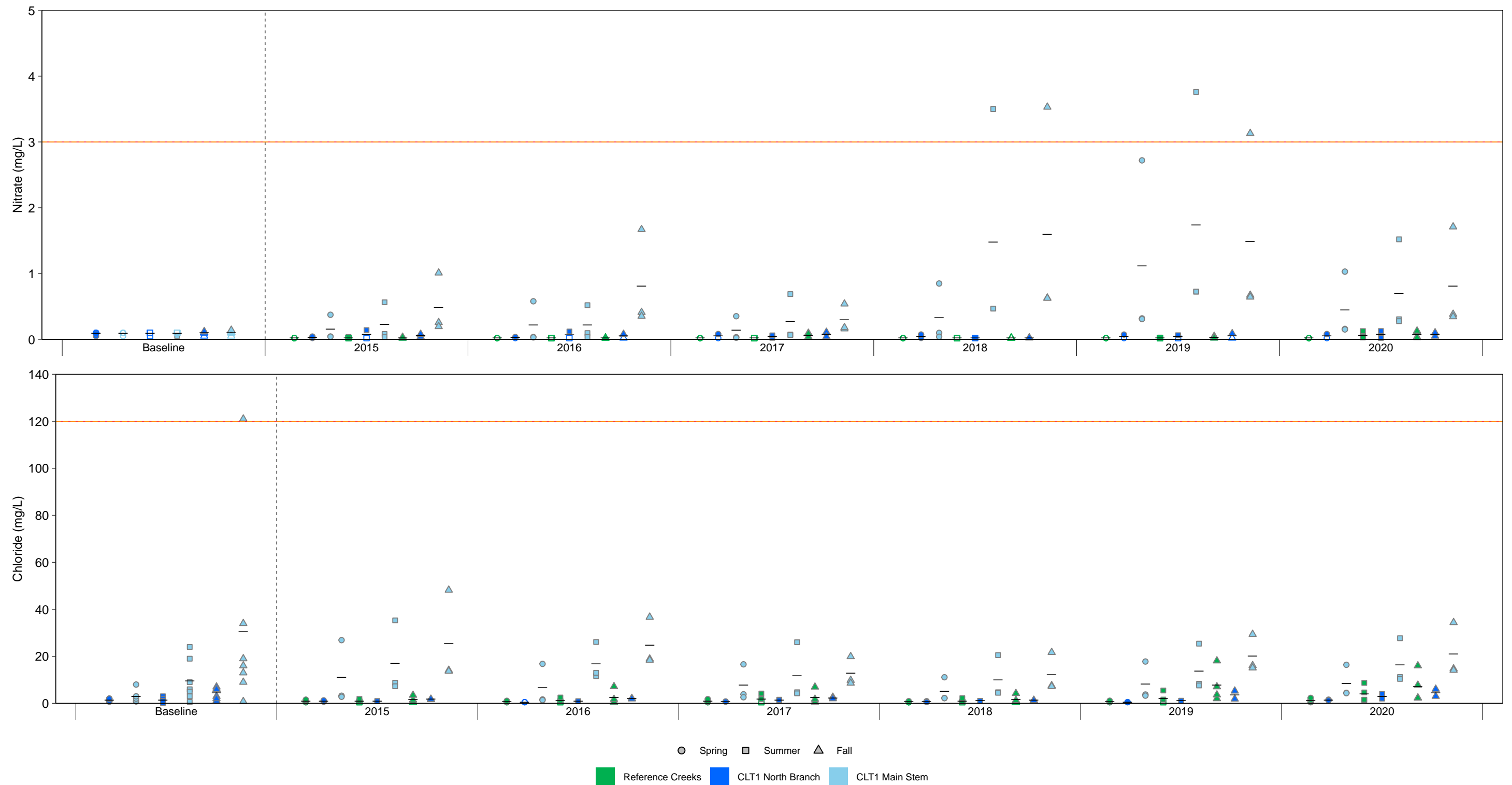
**APPENDIX C**  
**WATER QUALITY DATA**



**Figure C.1: Comparison of *In Situ* Water Quality Measured at Camp Lake System Water Quality Monitoring Stations in Winter, Spring, Summer, and Fall 2020, Mary River Project CREMP**

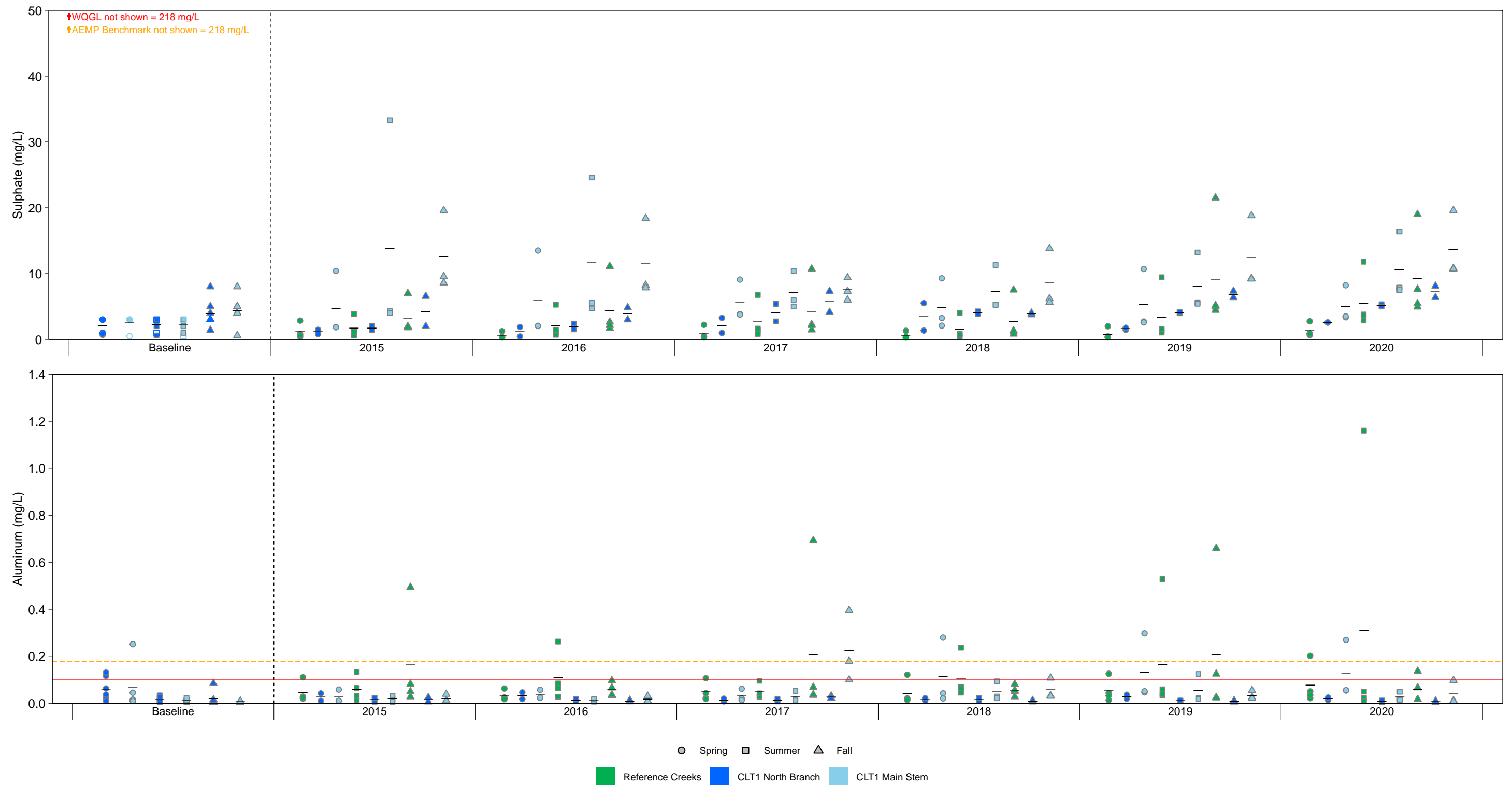
Notes: Lake values represent mean of surface and bottom *in situ* water quality measurements. Streams were not sampled in winter. Lakes were not sampled in spring.

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



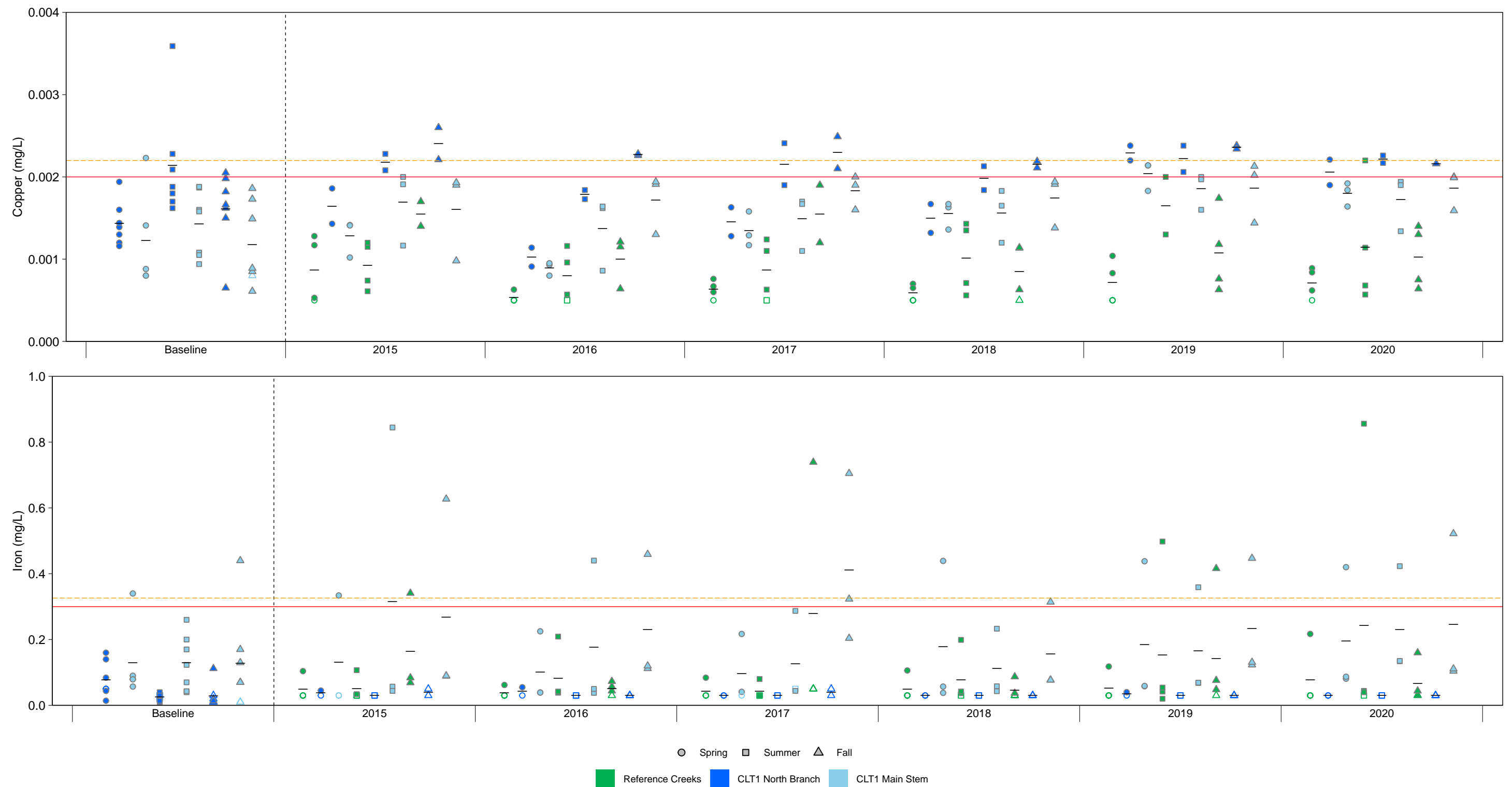
**Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



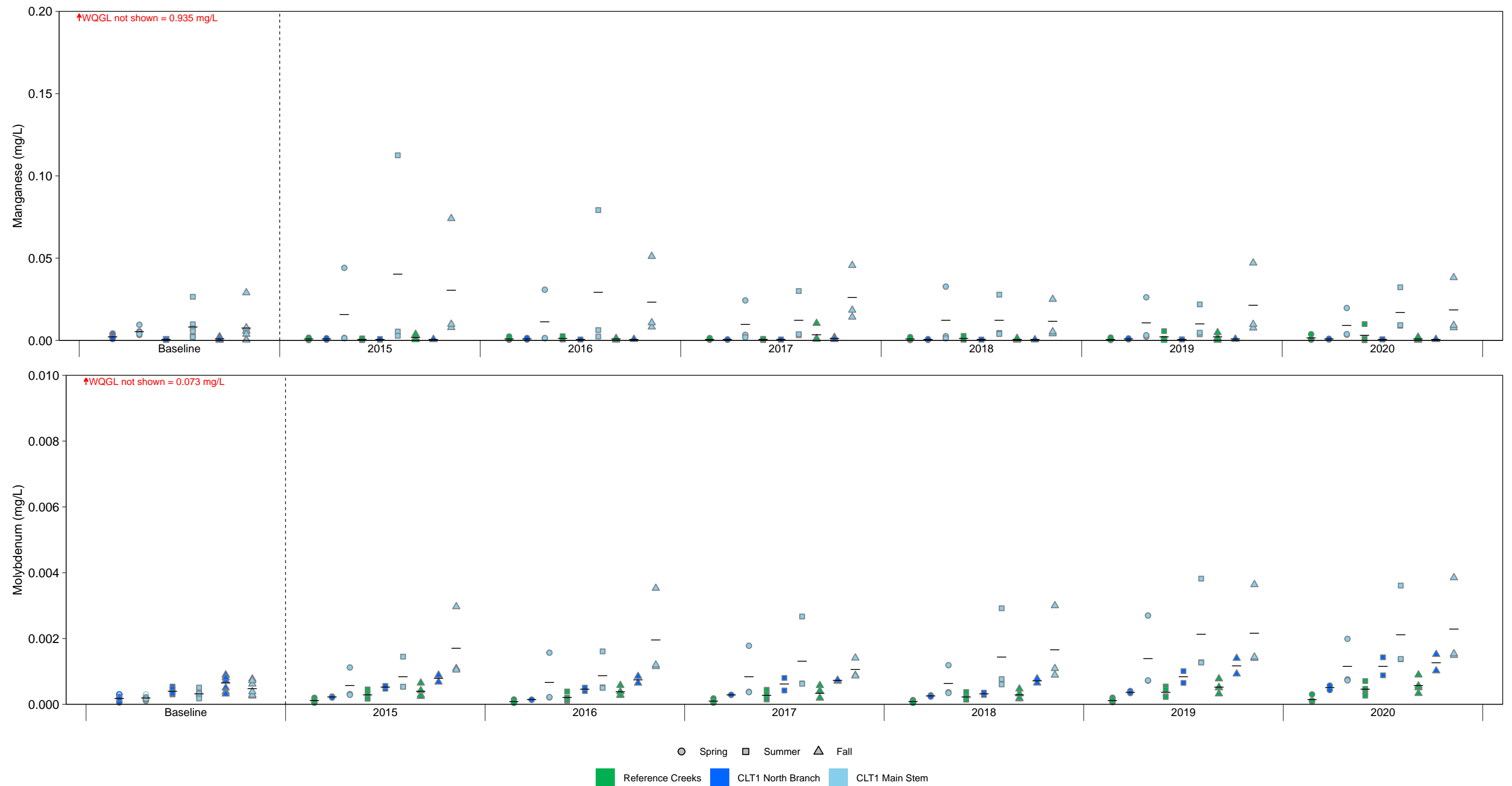
**Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

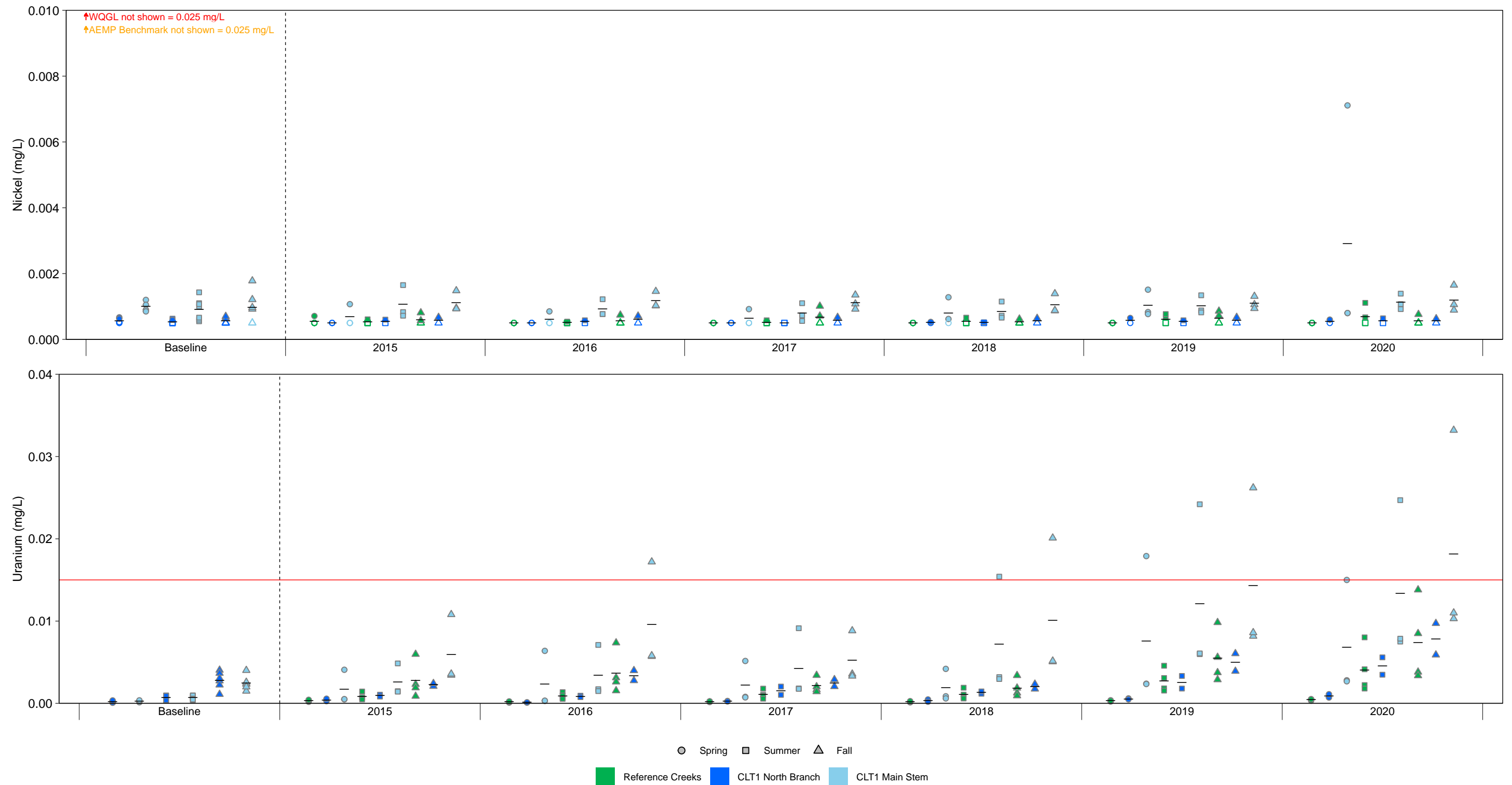
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

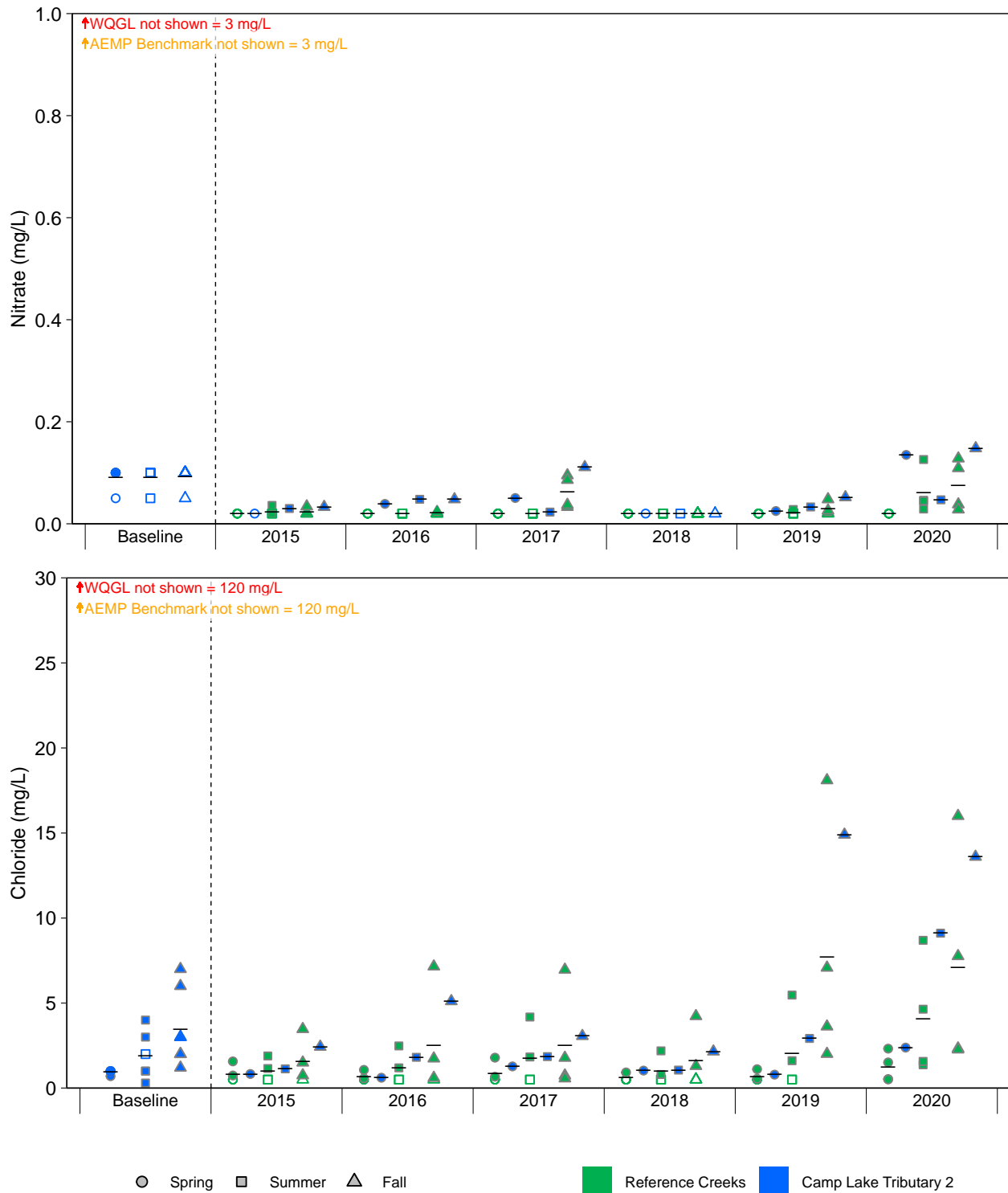
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.





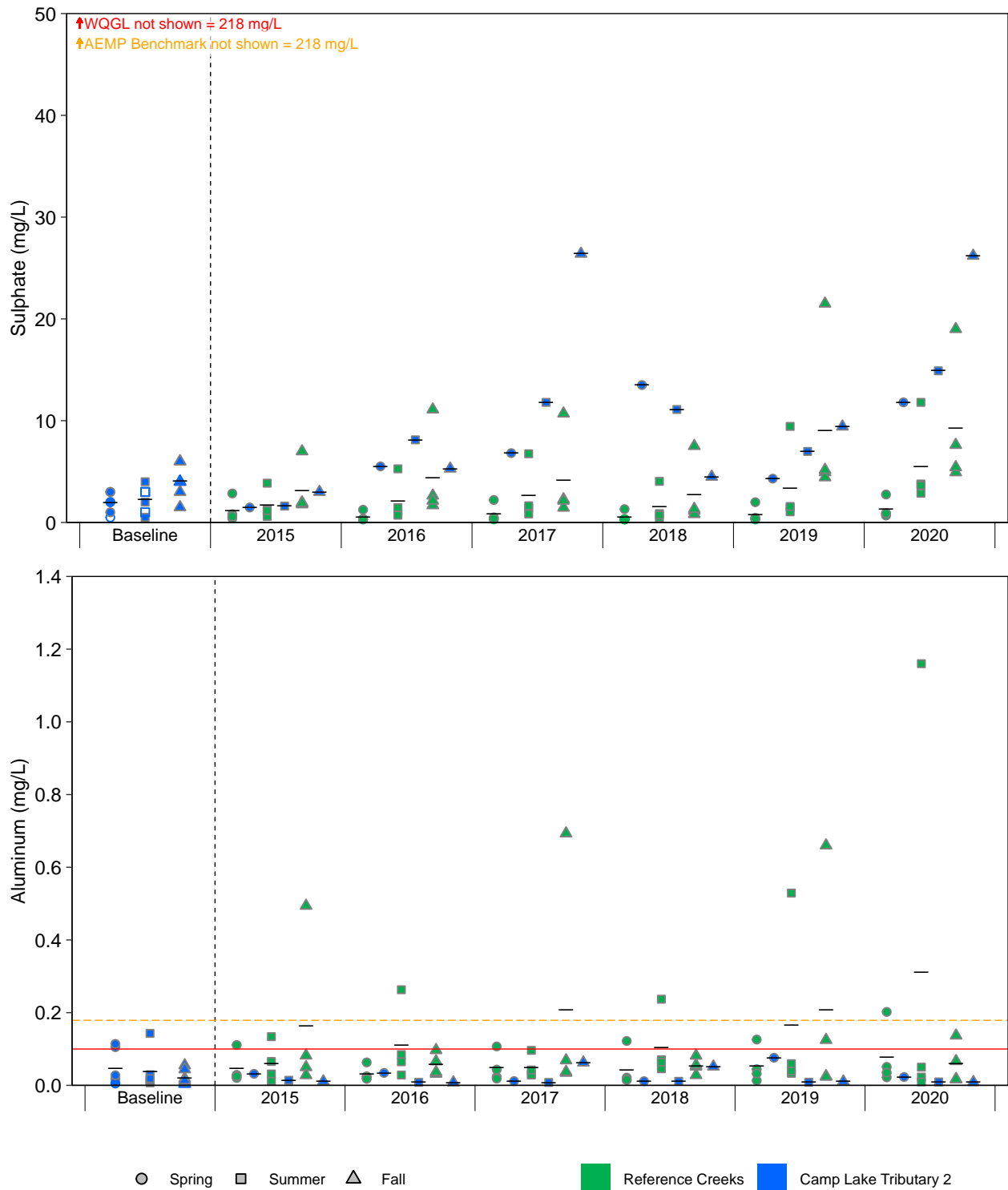
**Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



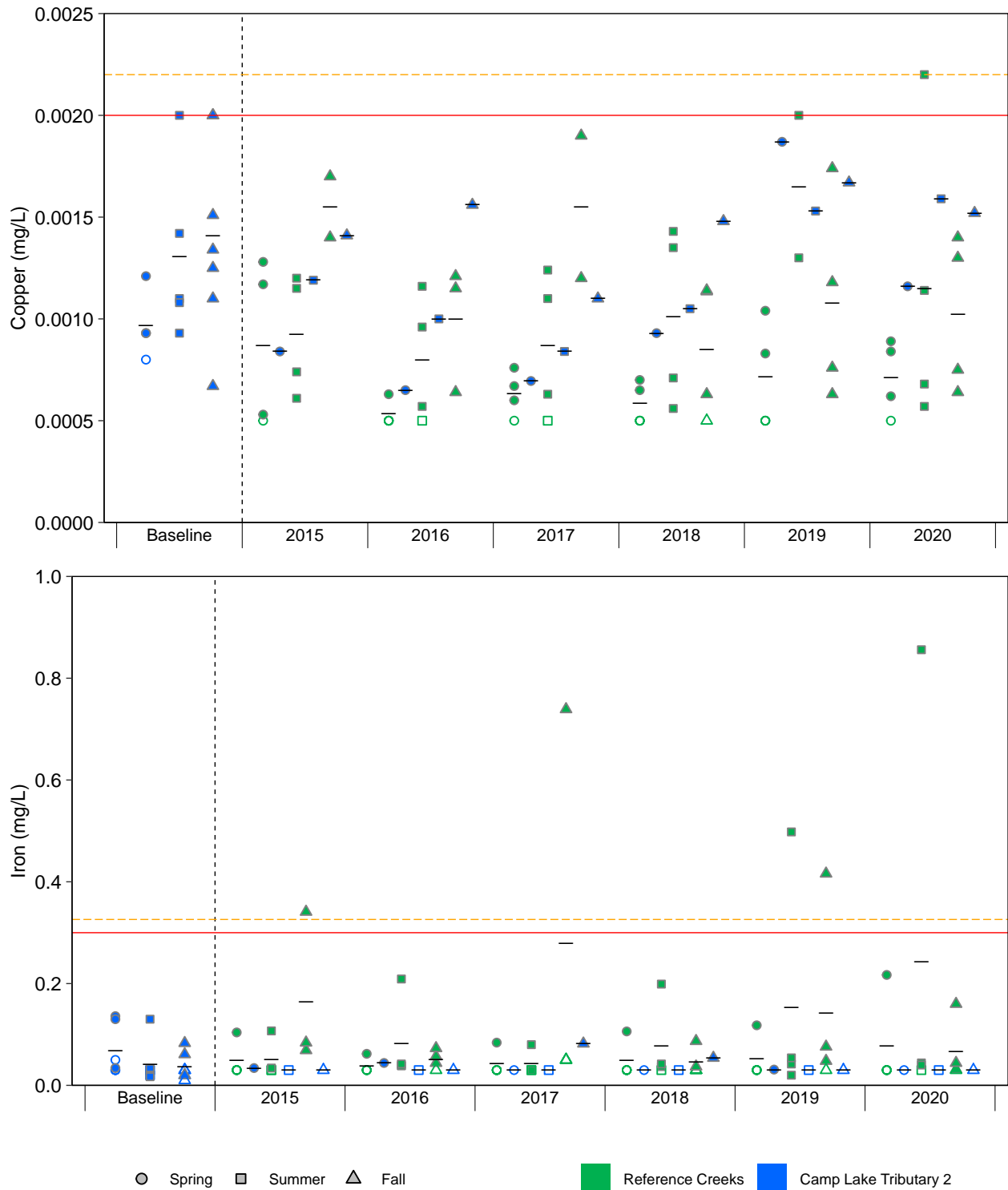
**Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



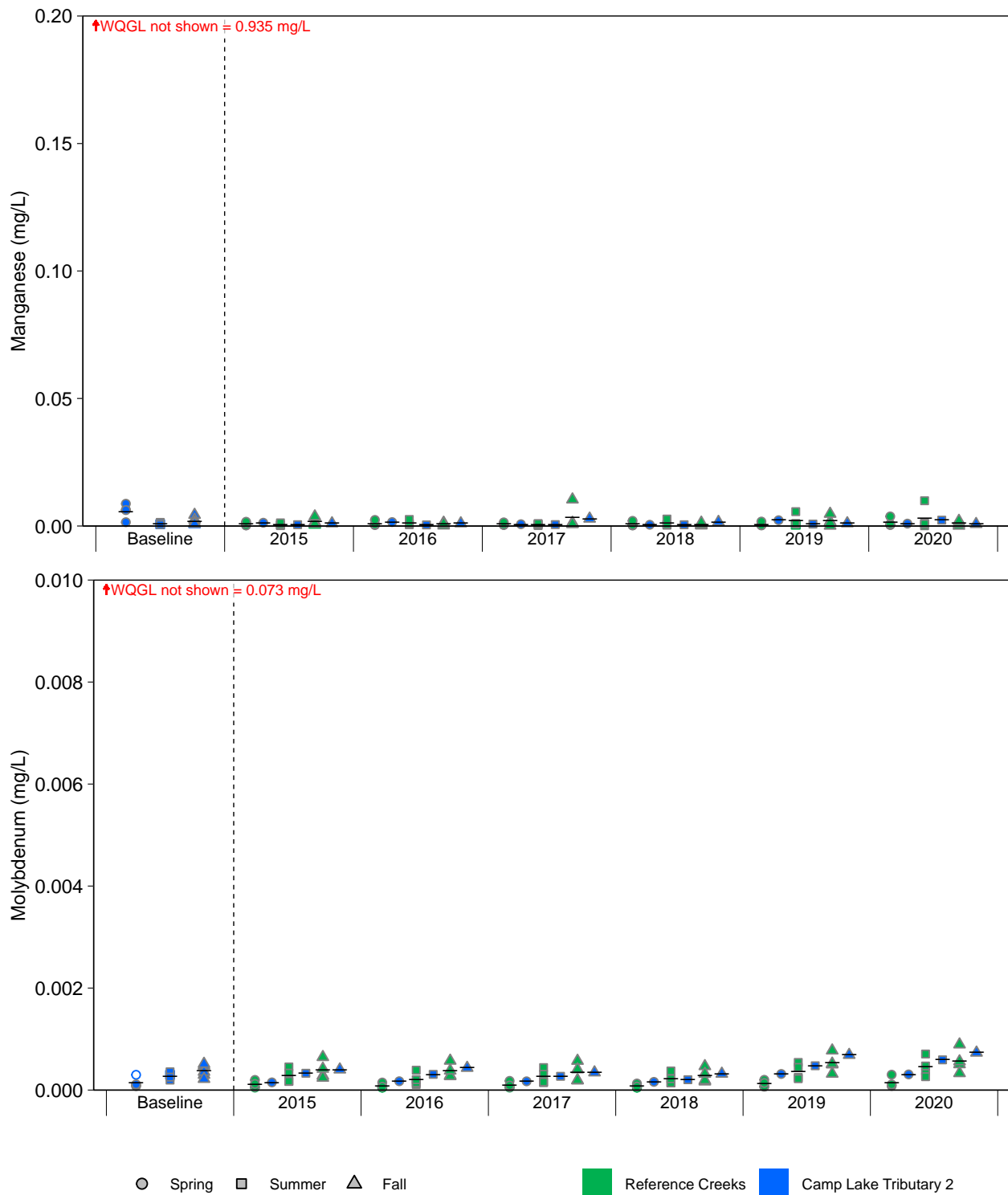
**Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



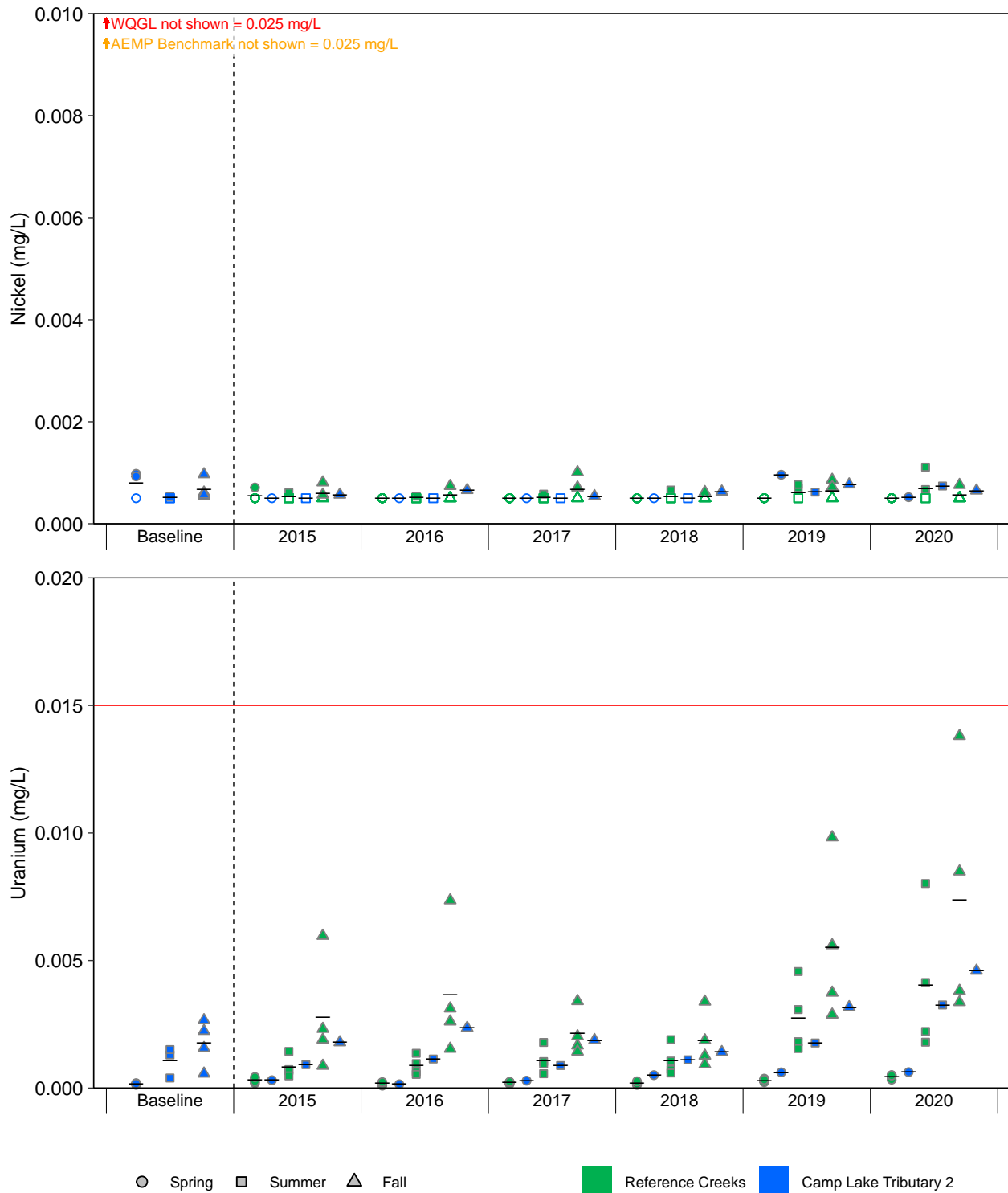
**Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



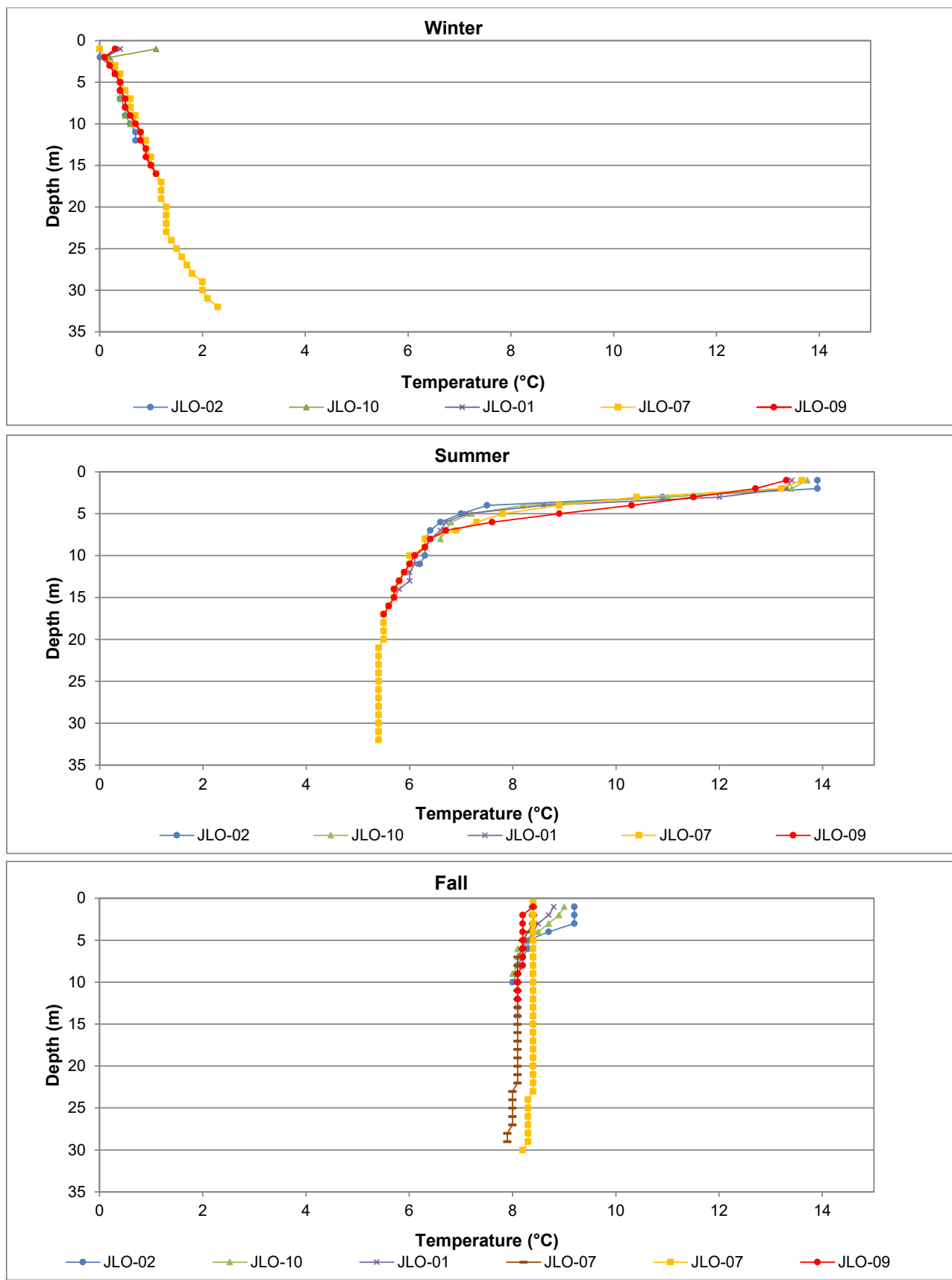
**Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



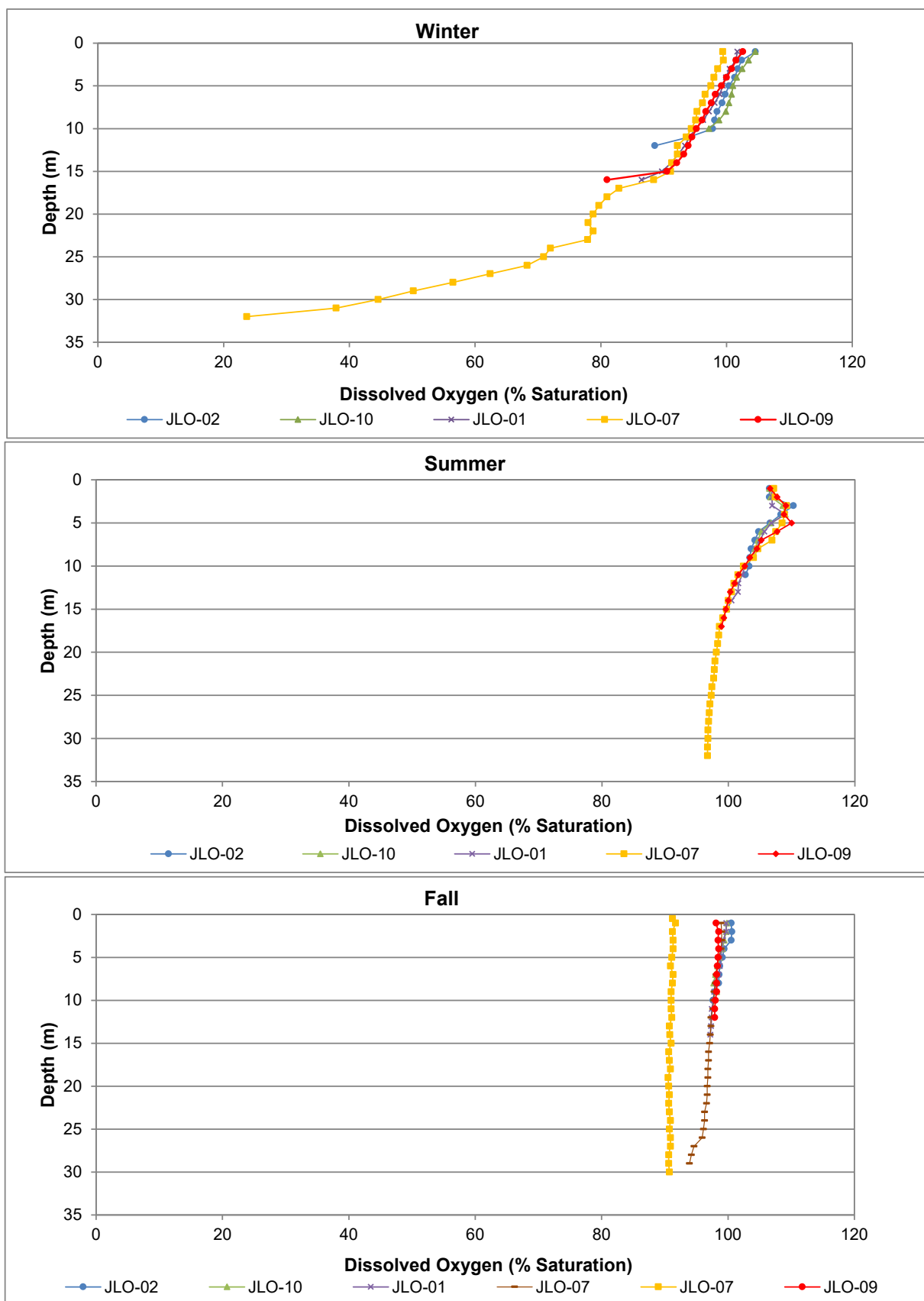
**Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.

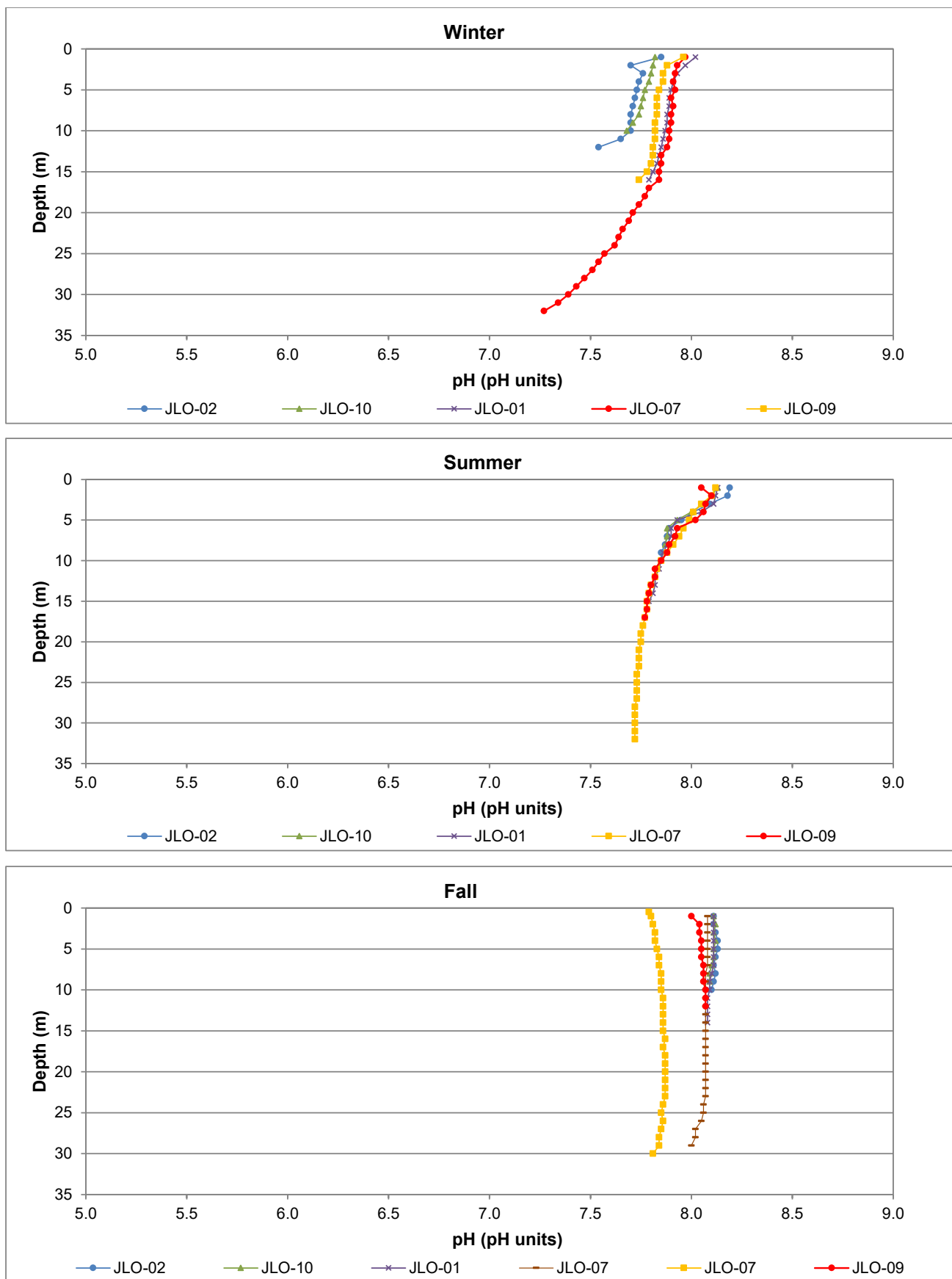


**Figure C.4:** Vertical Profiles of Temperature Measured at Camp Lake in Winter, Summer, and Fall, 2020

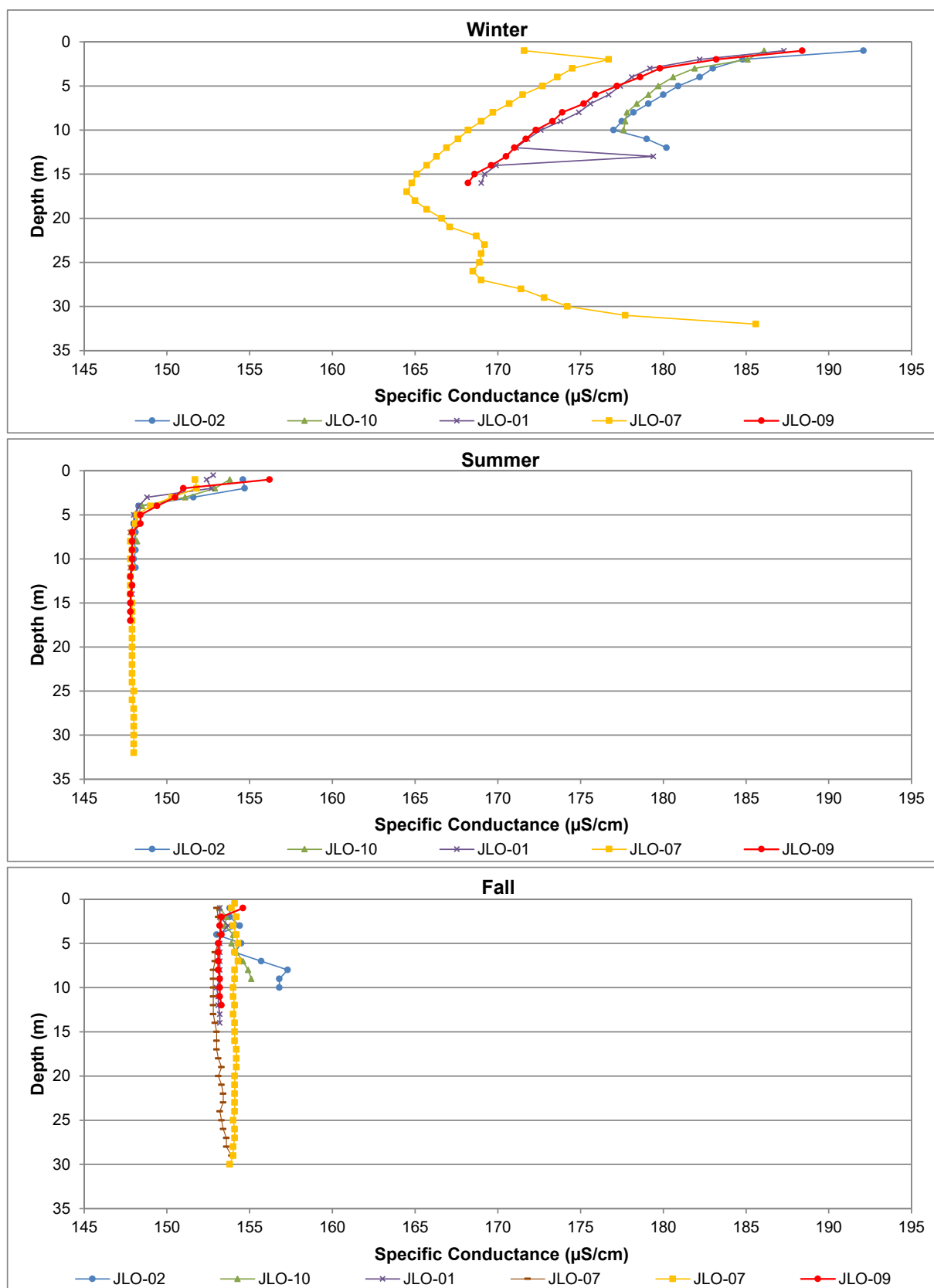




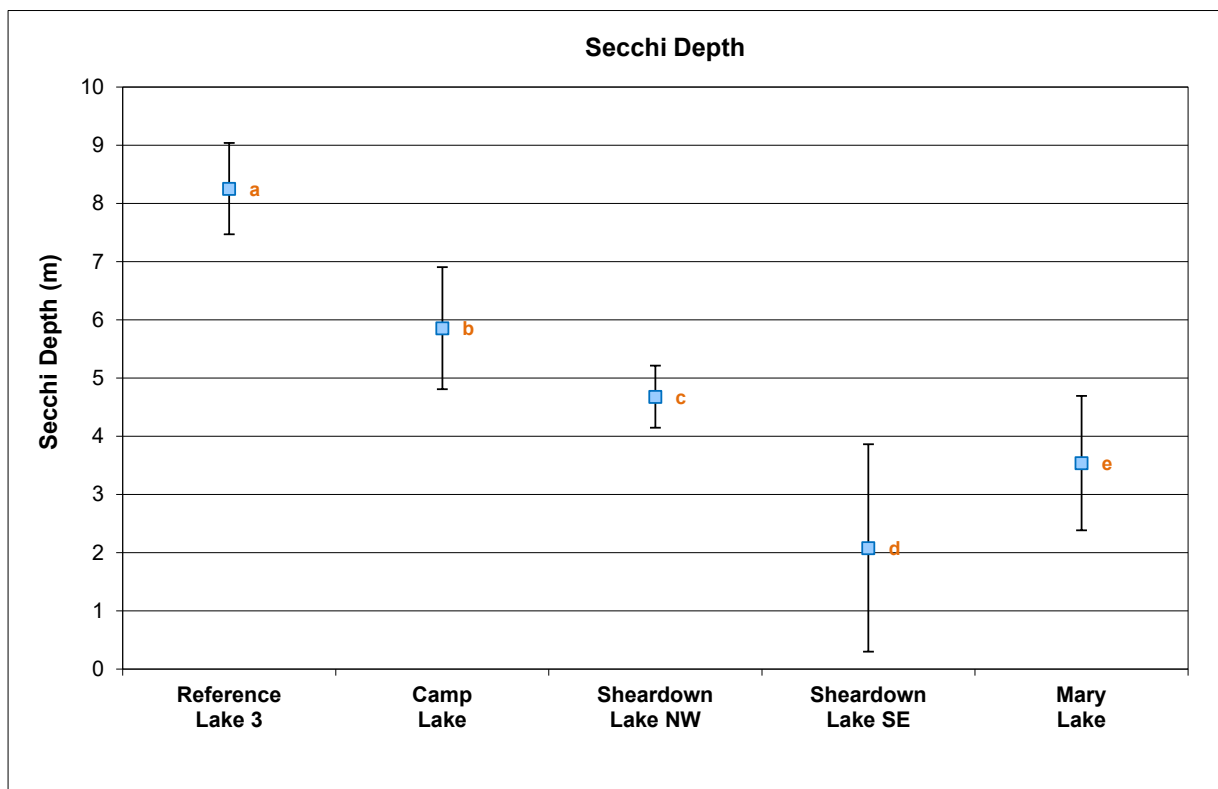
**Figure C.5:** Vertical Profiles of Dissolved Oxygen Measured at Camp Lake in Winter, Summer, and Fall, 2020



**Figure C.6: Vertical Profiles of pH Measured at Camp Lake in Winter, Summer, and Fall, 2020**

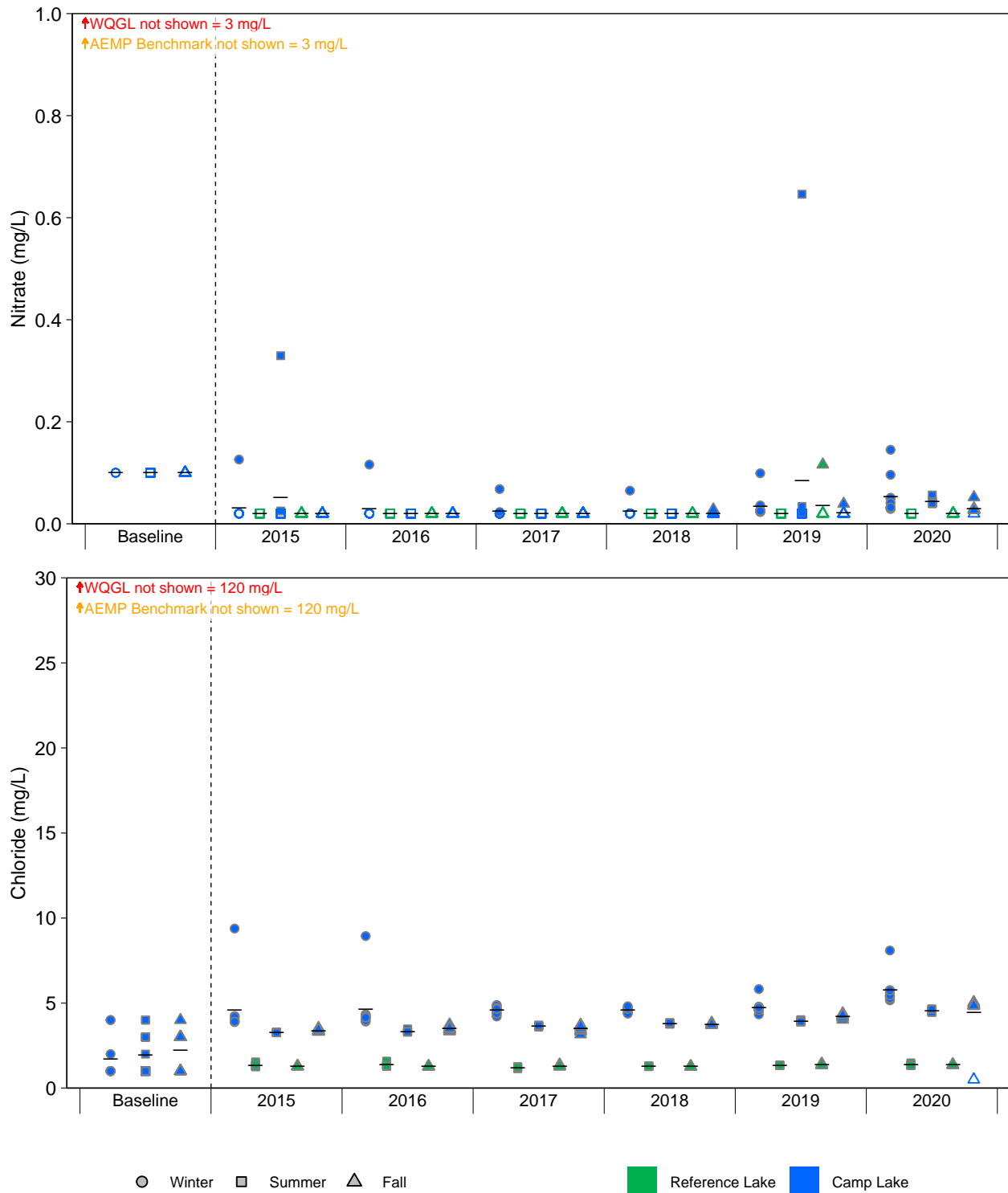


**Figure C.7:** Vertical Profiles of Specific Conductance Measured at Camp Lake in Winter, Summer, and Fall, 2020



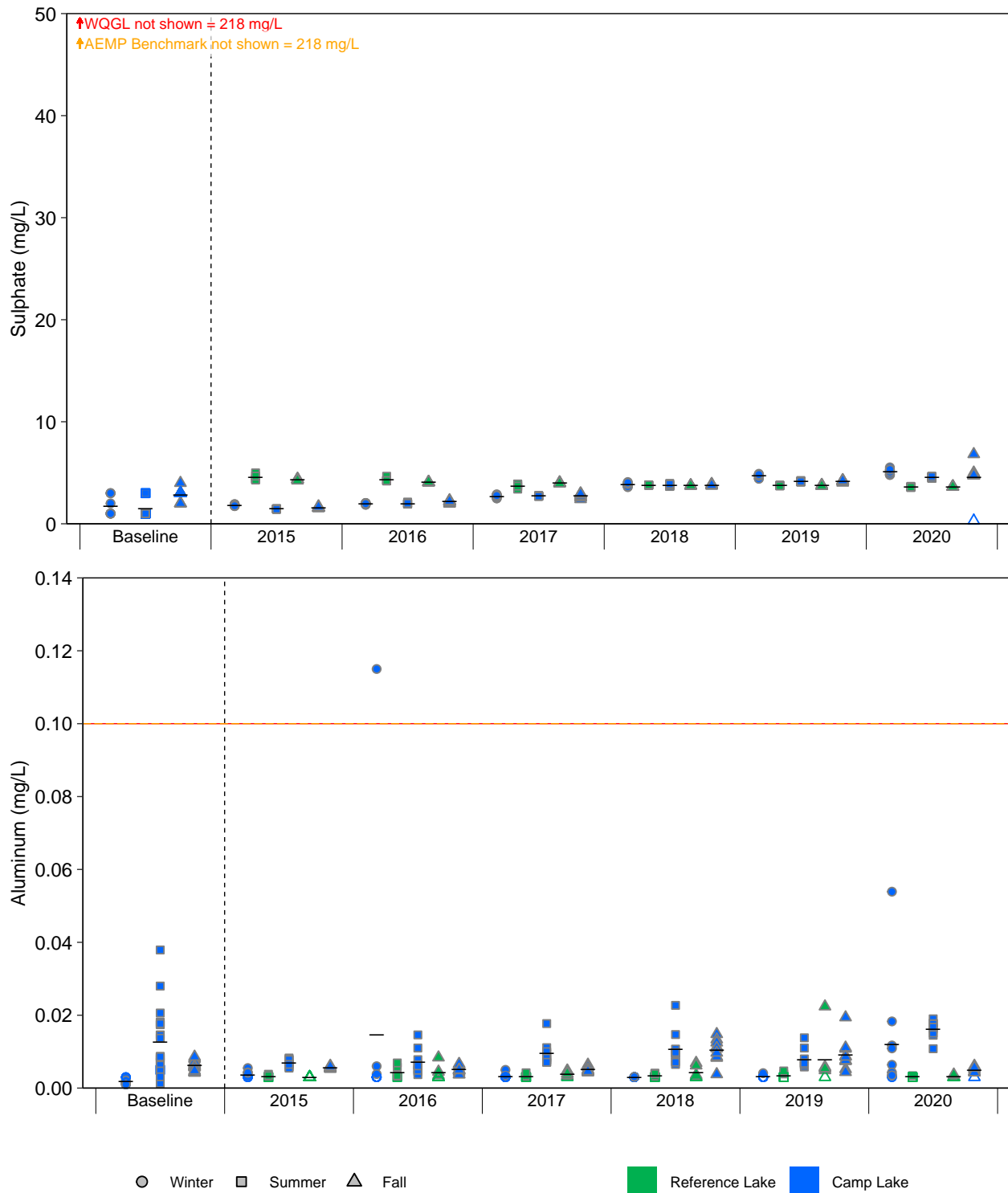
**Figure C.8: Comparison of Secchi Depth (mean  $\pm$  SD) Measured at the Mary River Project Lake Benthic Invertebrate Community Stations, August 2020**

Notes: The same letter(s) next to study area data points indicate no significant difference between study areas. Sample size (n) was 10 for all lakes except Sheardown Lake NW, where n was 9.



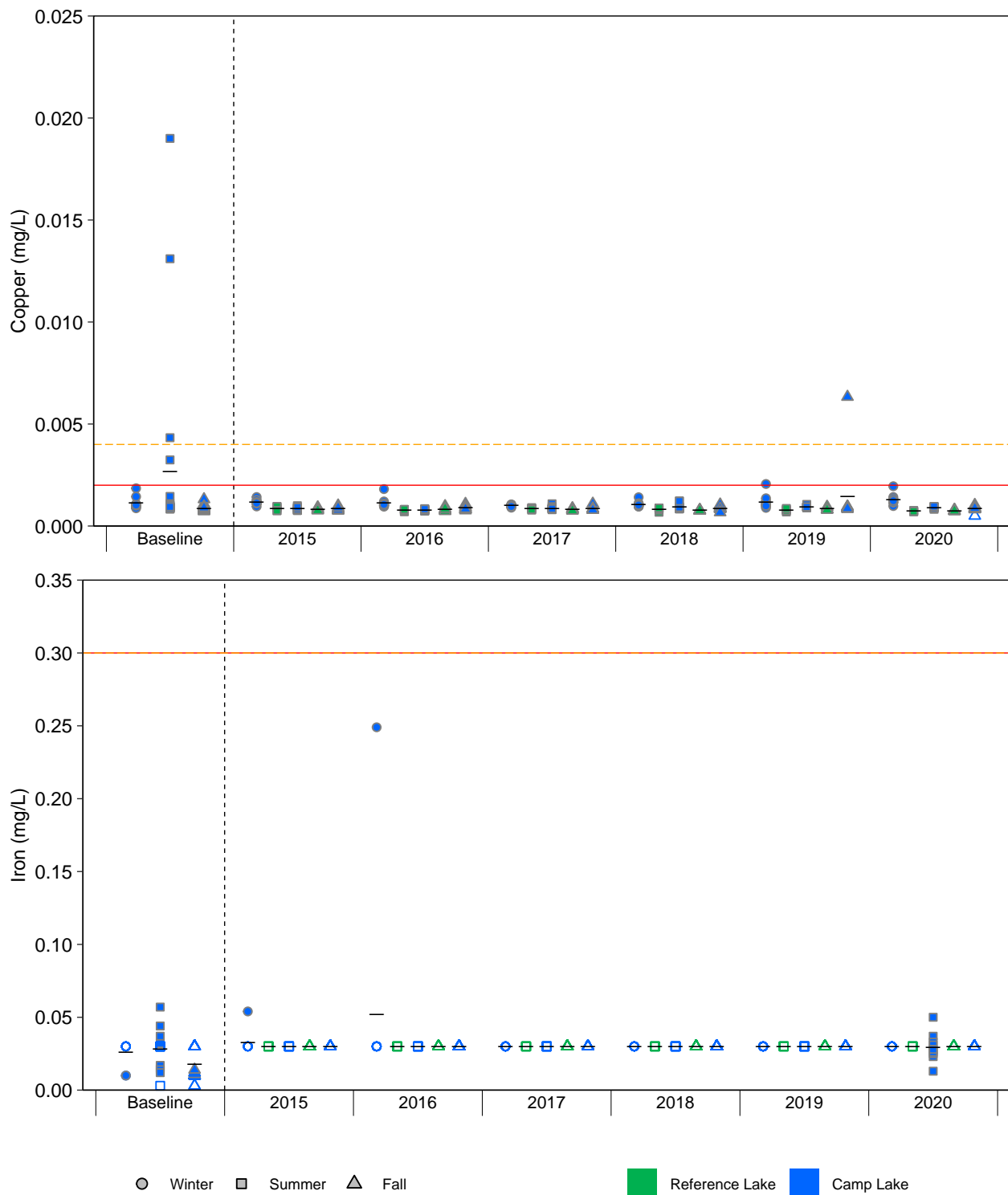
**Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JLO) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JLO) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

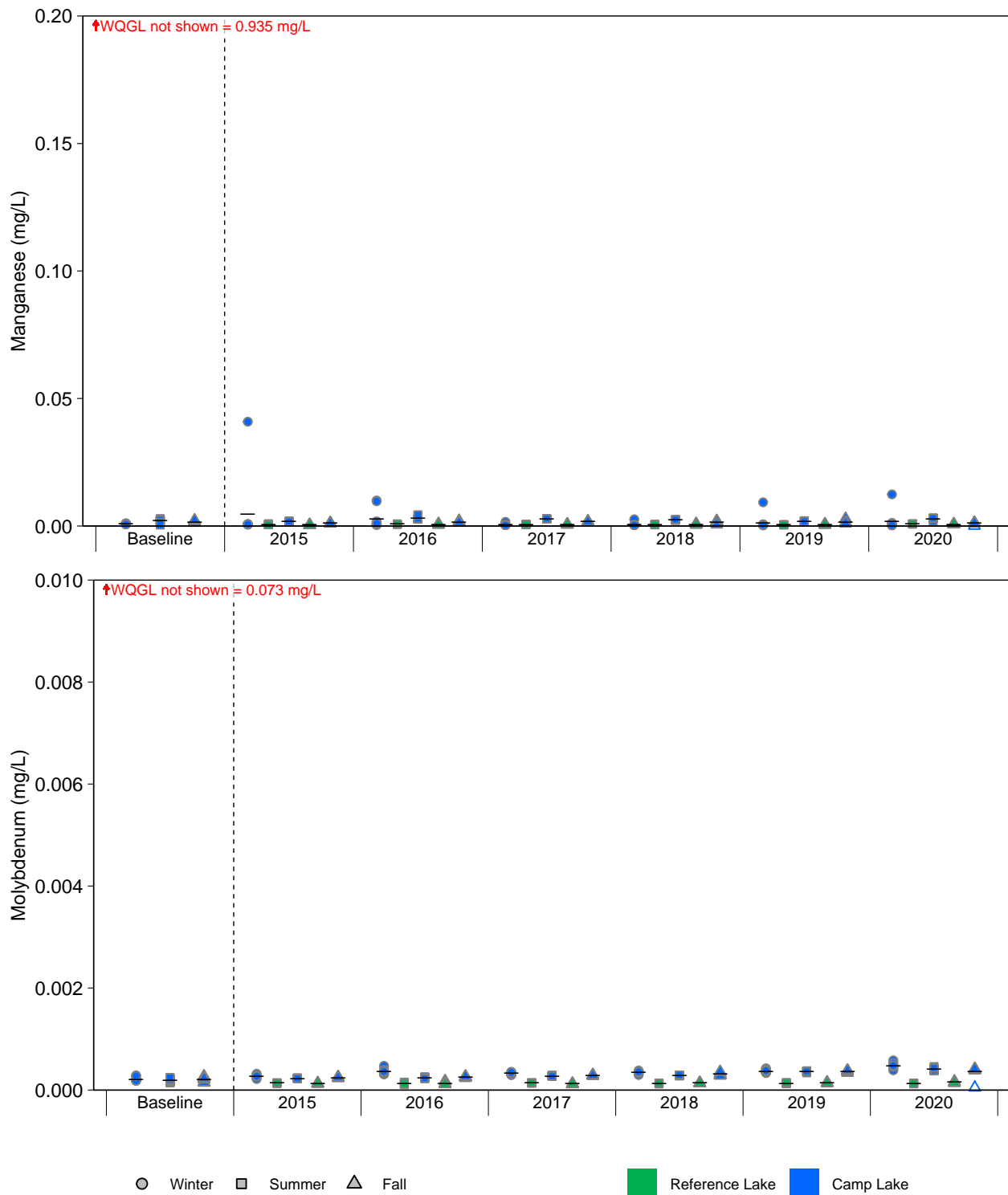
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JLO) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

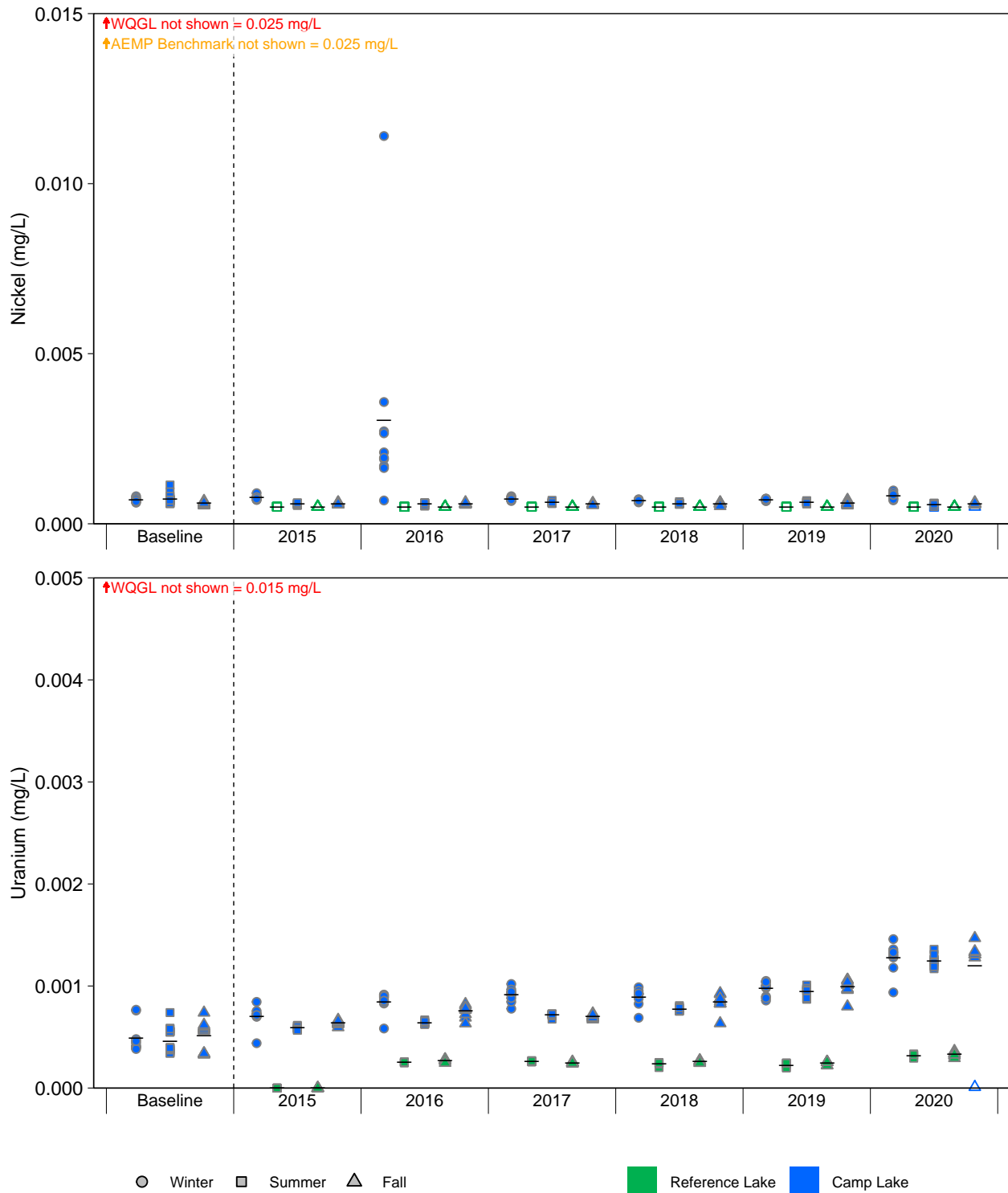
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.





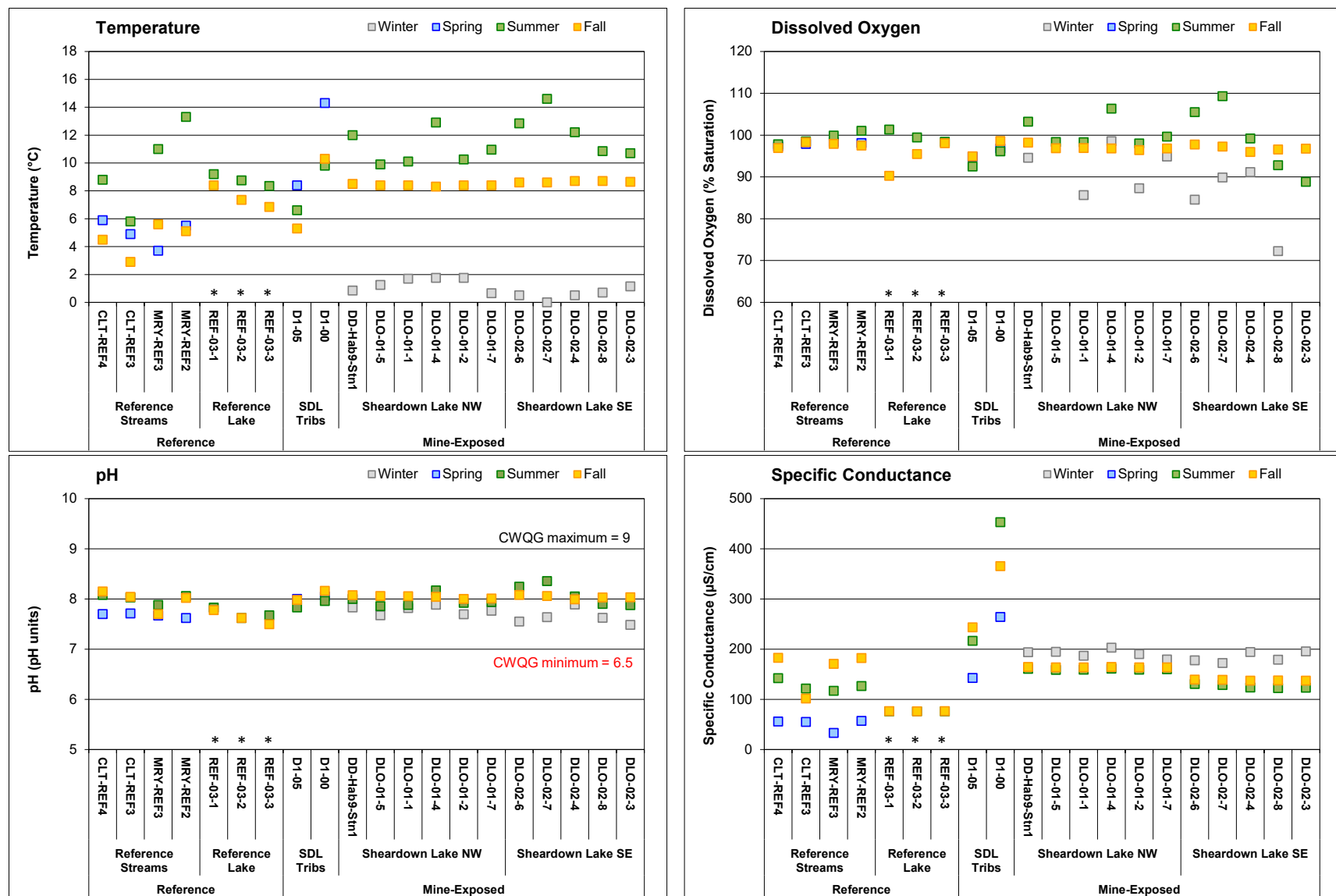
**Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JLO) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JLO) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

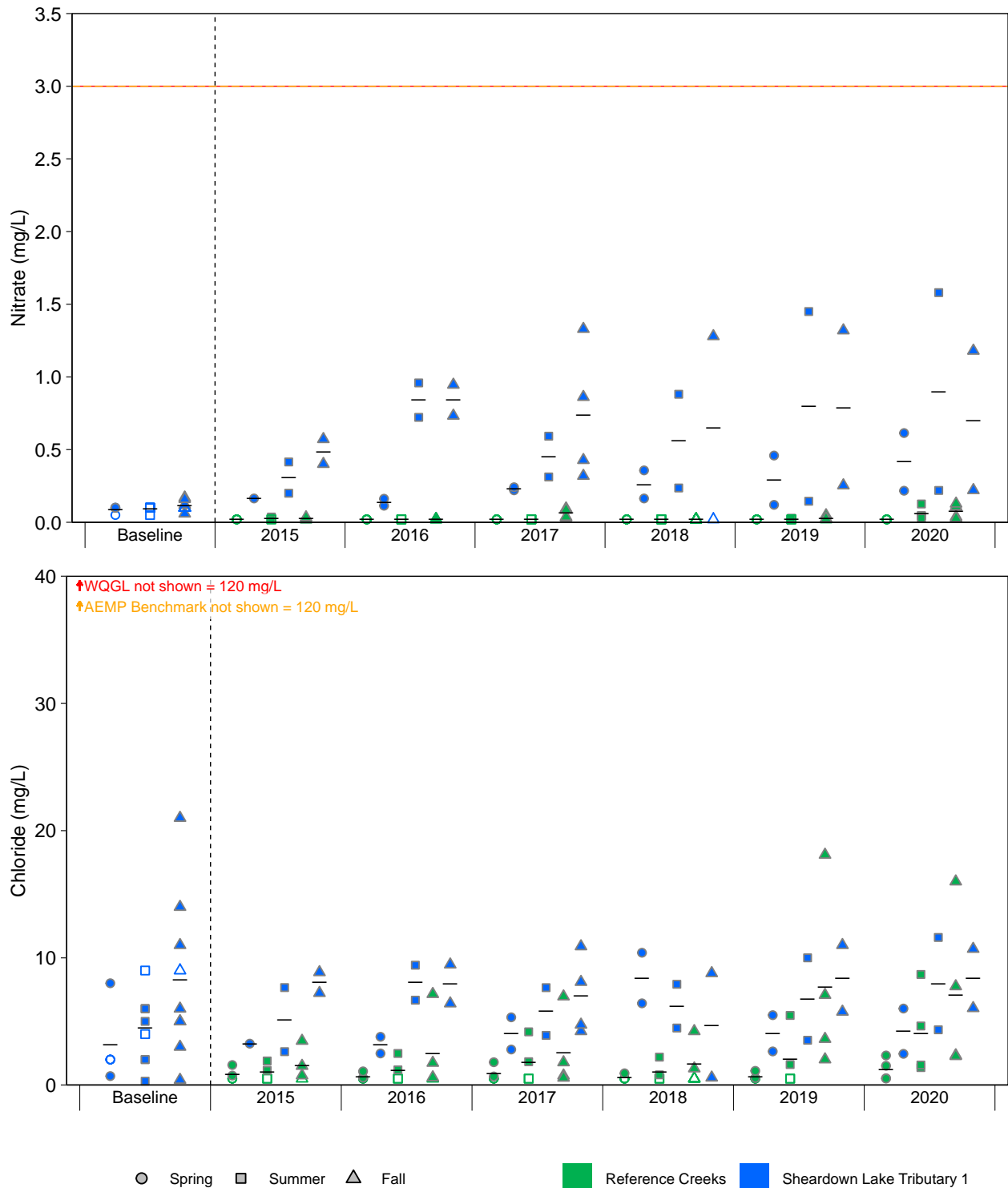
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**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 2020, Mary River Project CREMP**

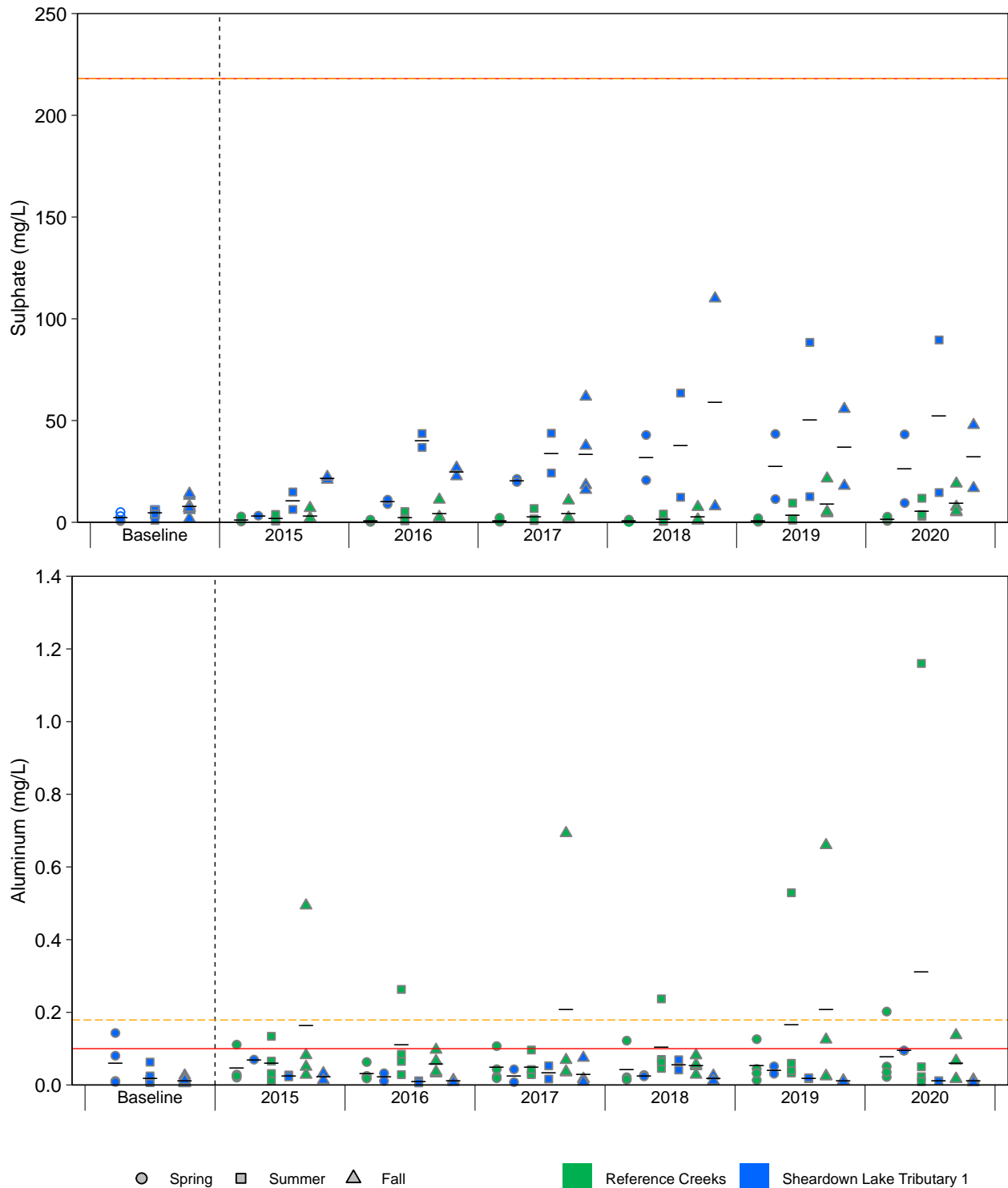
Notes: Lake values represent mean of surface and bottom *in situ* water quality measurements. Streams were not sampled in winter. Lakes were not sampled in spring.

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



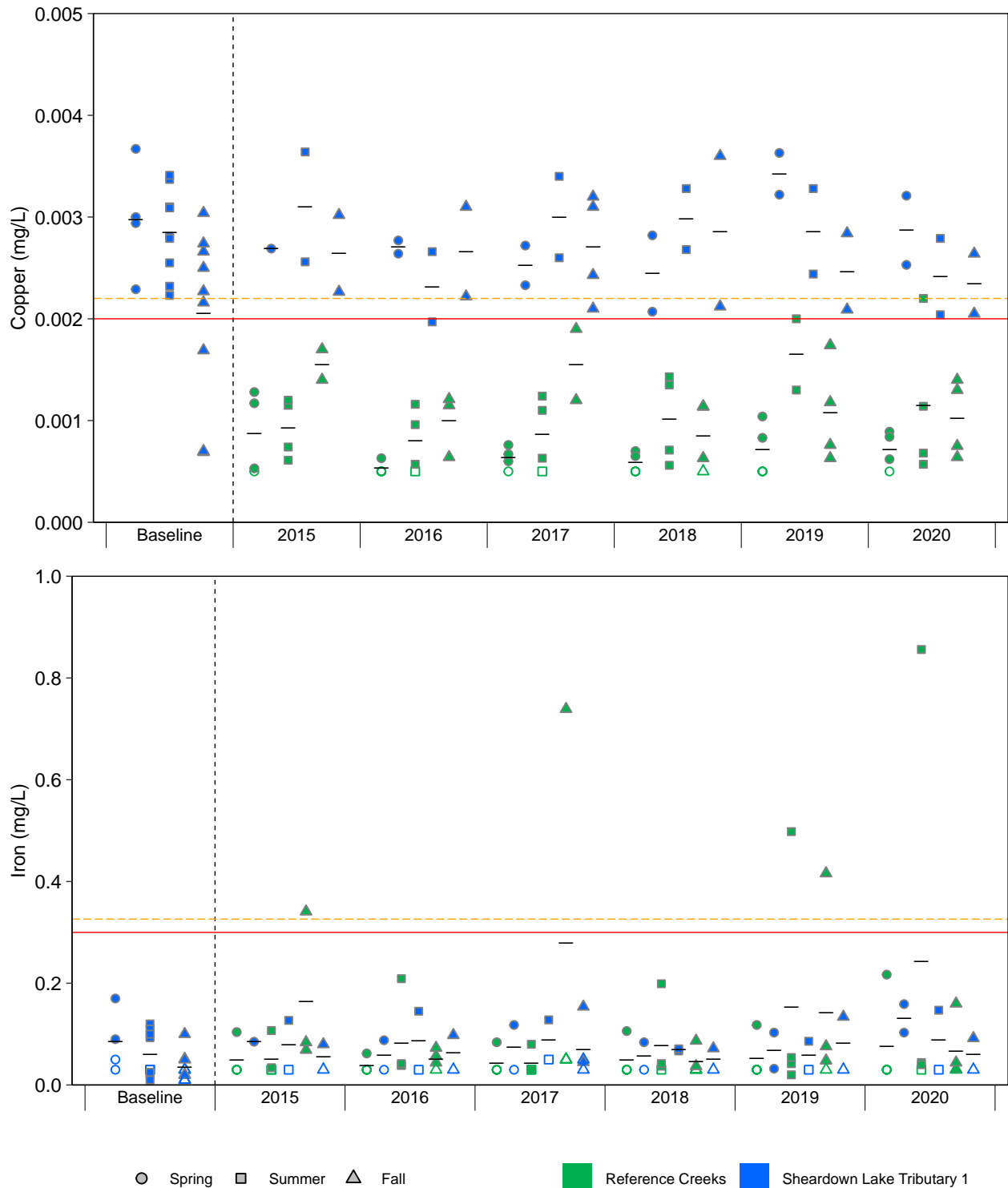
**Figure C.11: Temporal Comparison of Water Chemistry at Sheardown Lake Tributary 1 (SDLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



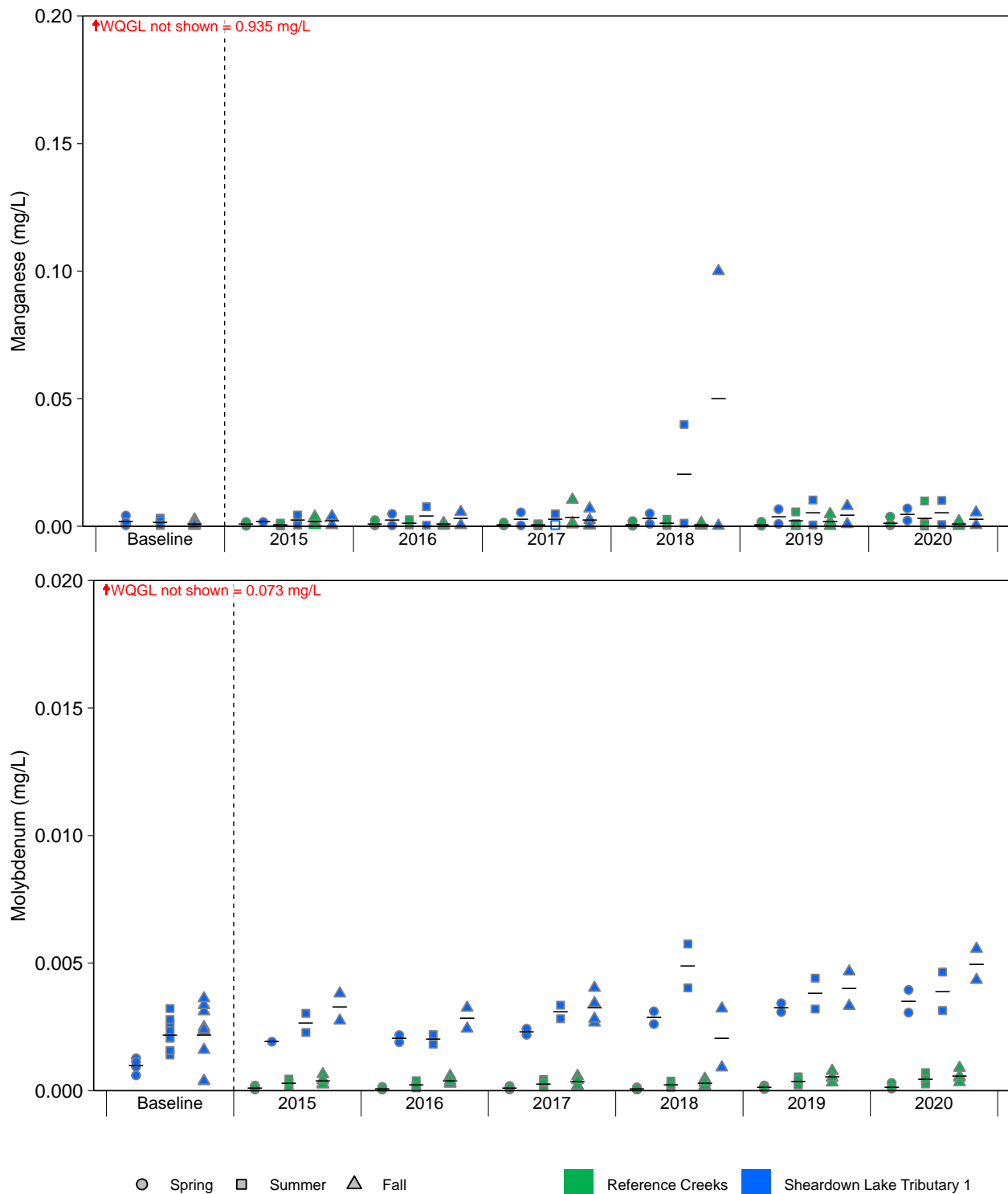
**Figure C.11: Temporal Comparison of Water Chemistry at Sheardown Lake Tributary 1 (SDLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



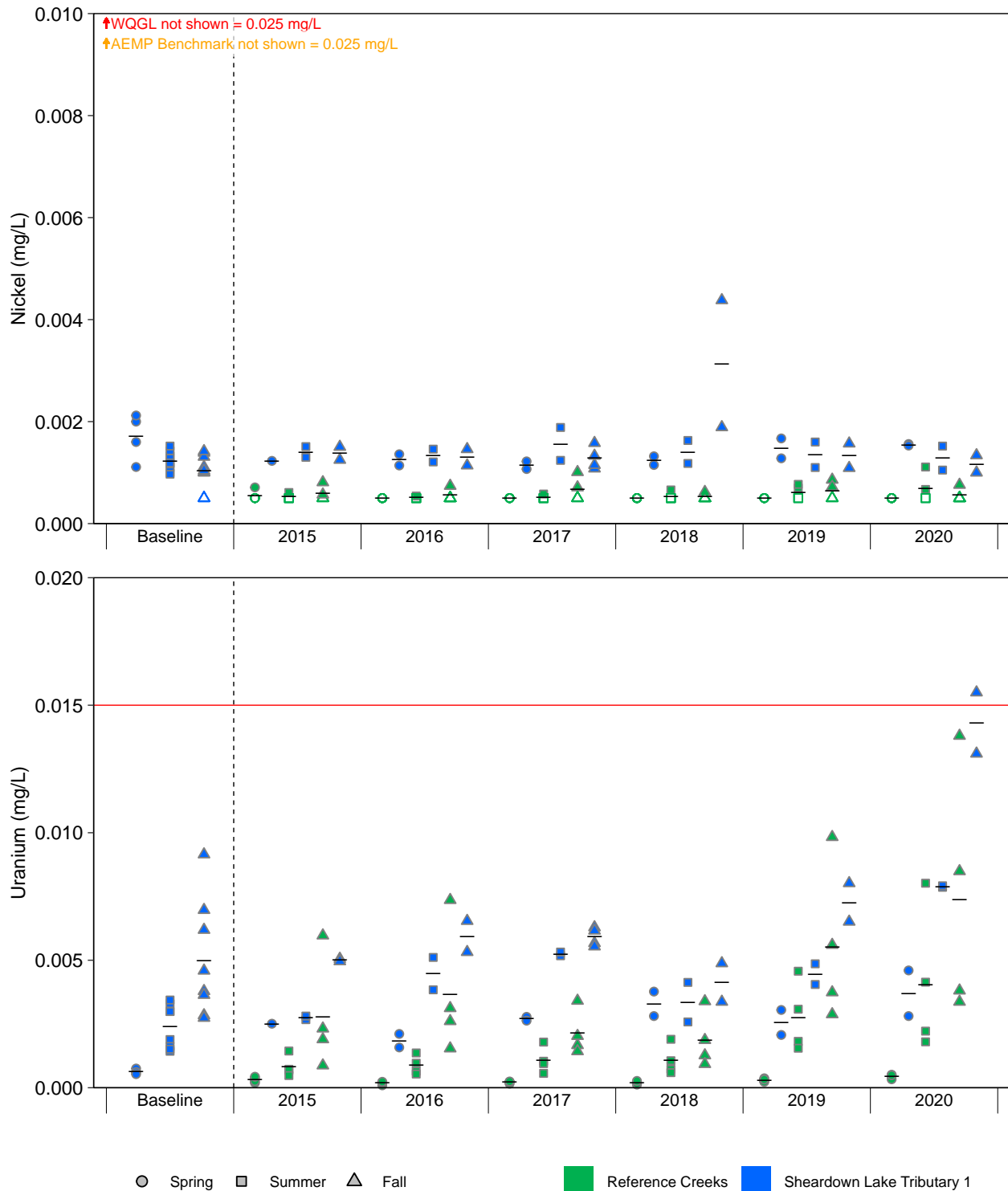
**Figure C.11: Temporal Comparison of Water Chemistry at Sheardown Lake Tributary 1 (SDLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.11: Temporal Comparison of Water Chemistry at Sheardown Lake Tributary 1 (SDLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

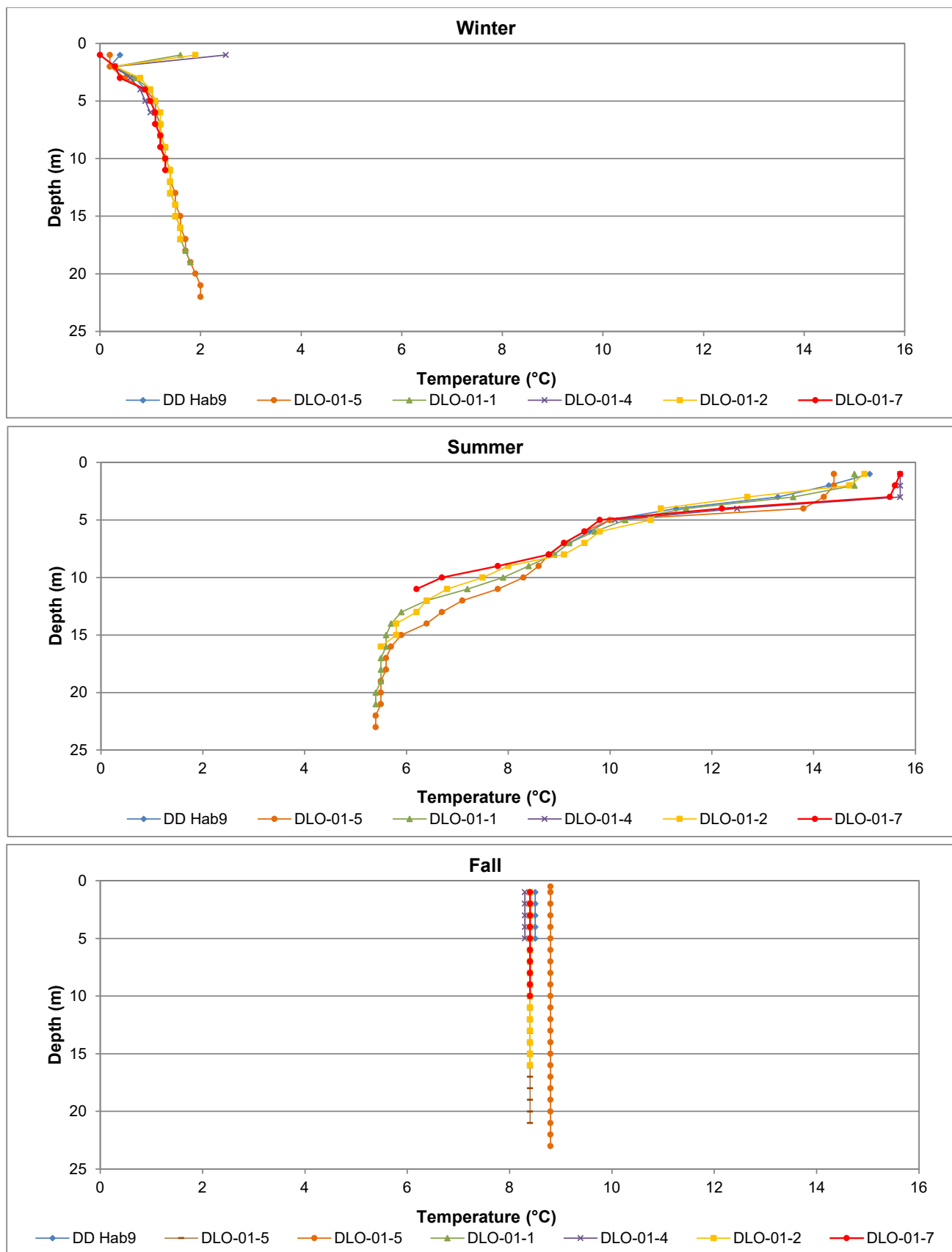
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



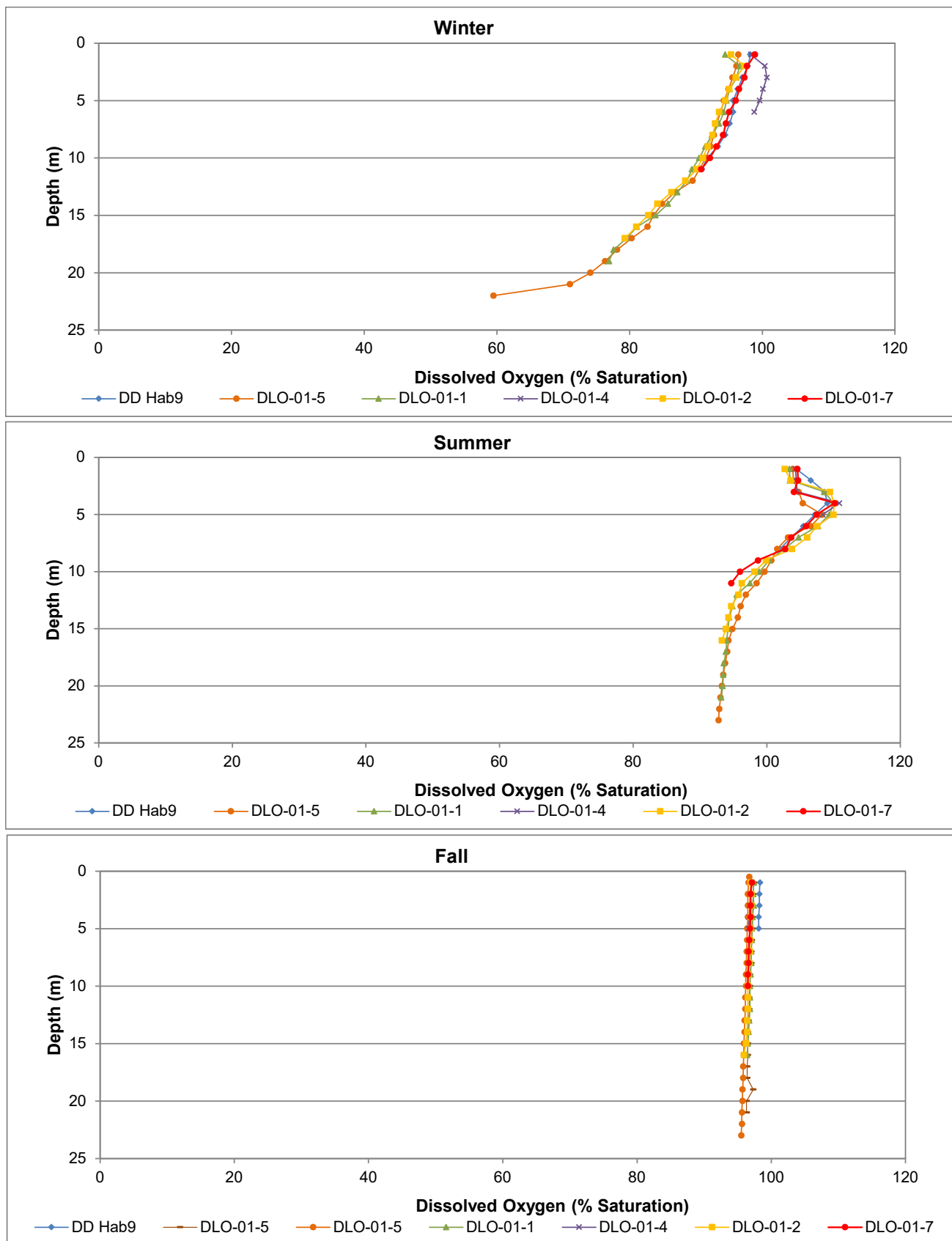
**Figure C.11: Temporal Comparison of Water Chemistry at Sheardown Lake Tributary 1 (SDLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.

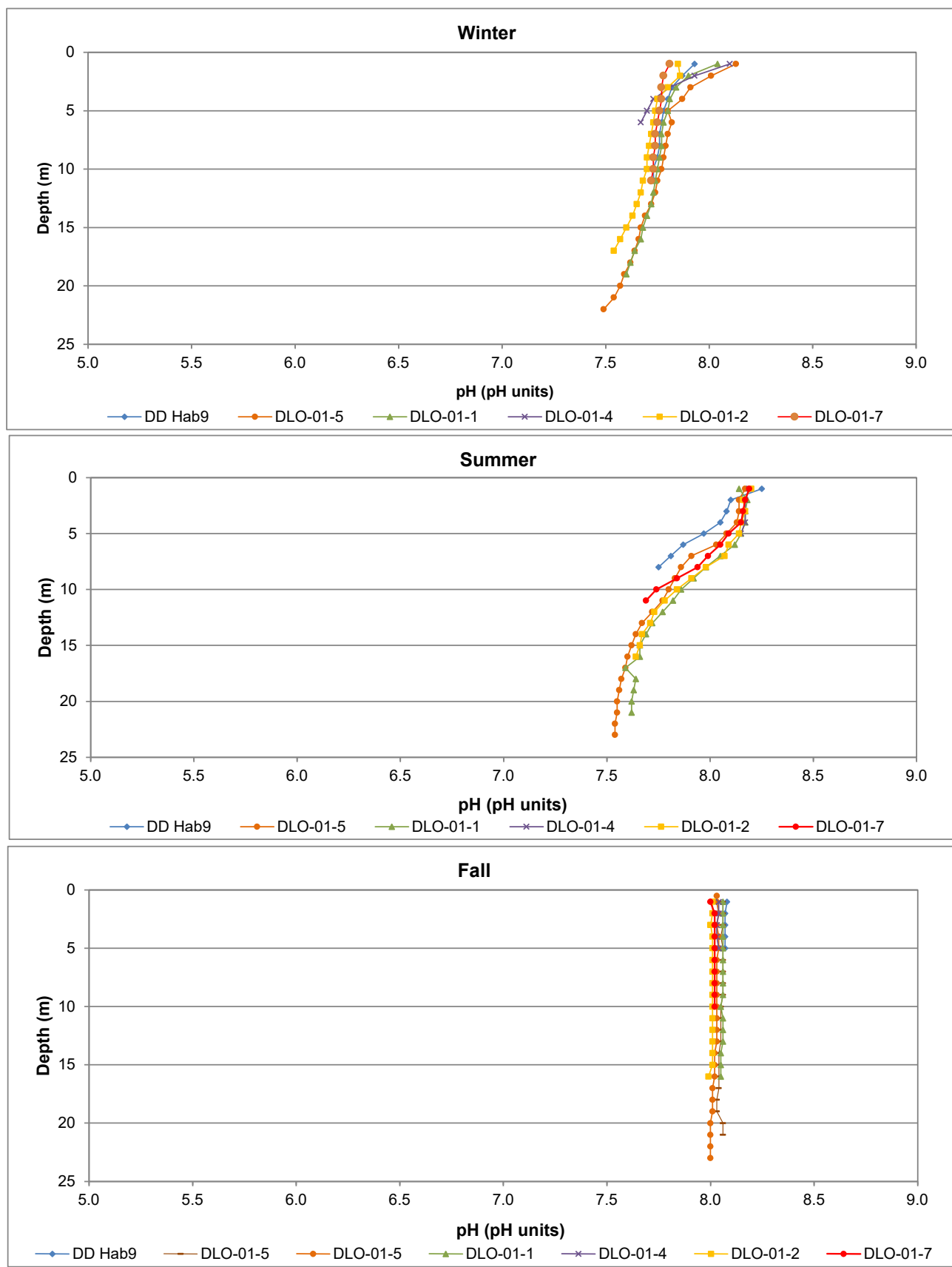




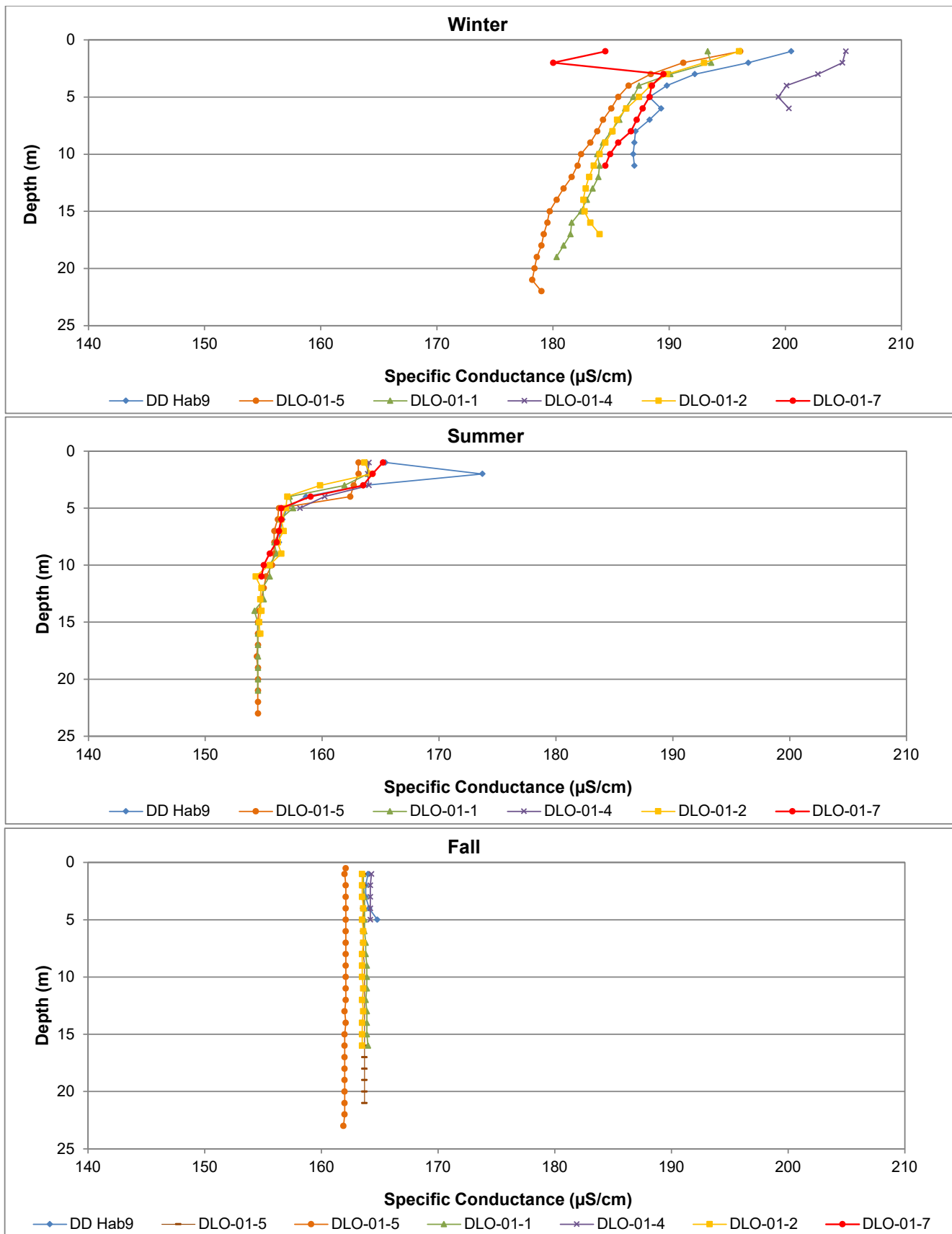
**Figure C.12:** Vertical Profiles of Temperature Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2020



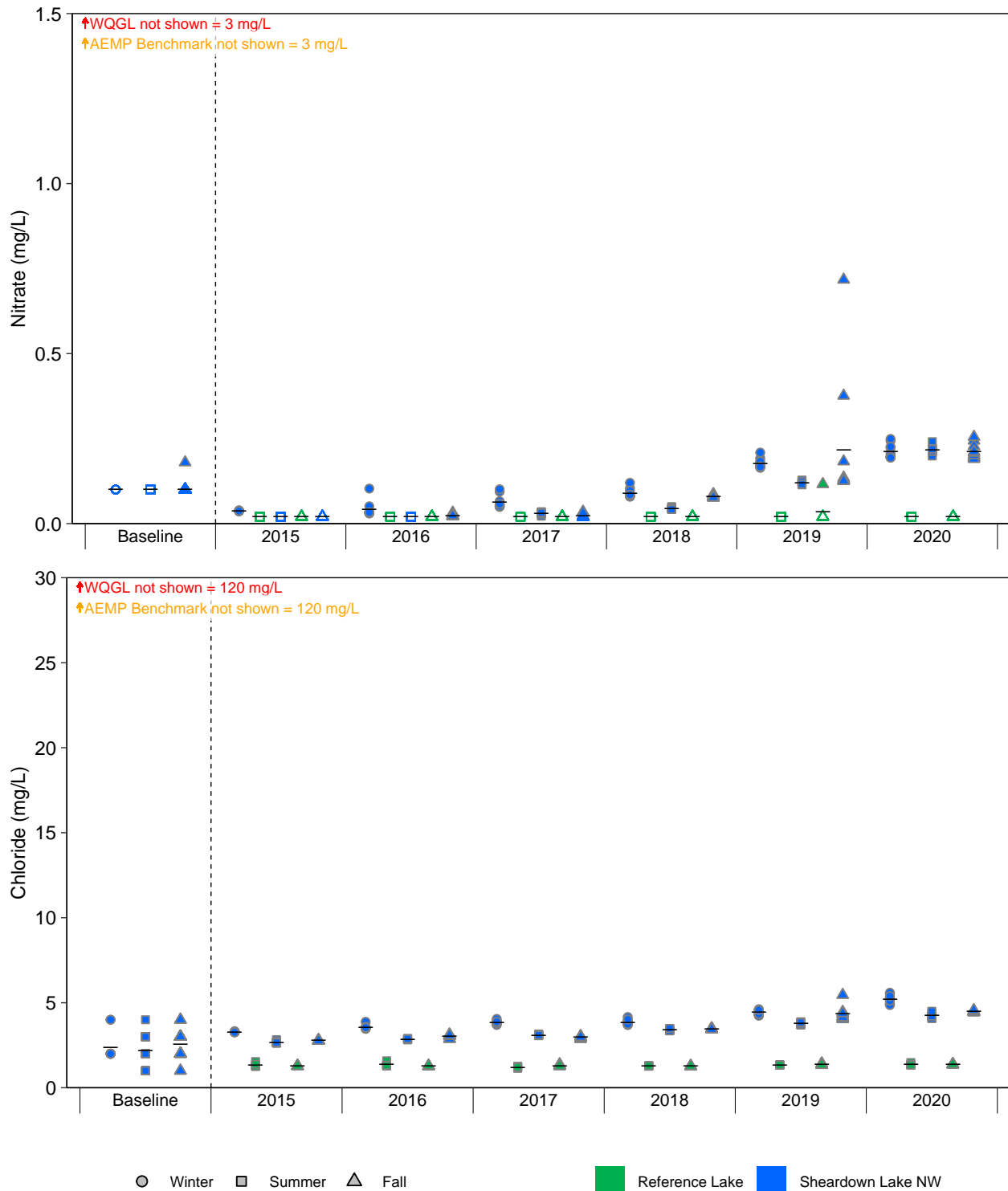
**Figure C.13:** Vertical Profiles of Dissolved Oxygen Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2020



**Figure C.14:** Vertical Profiles of pH Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2020

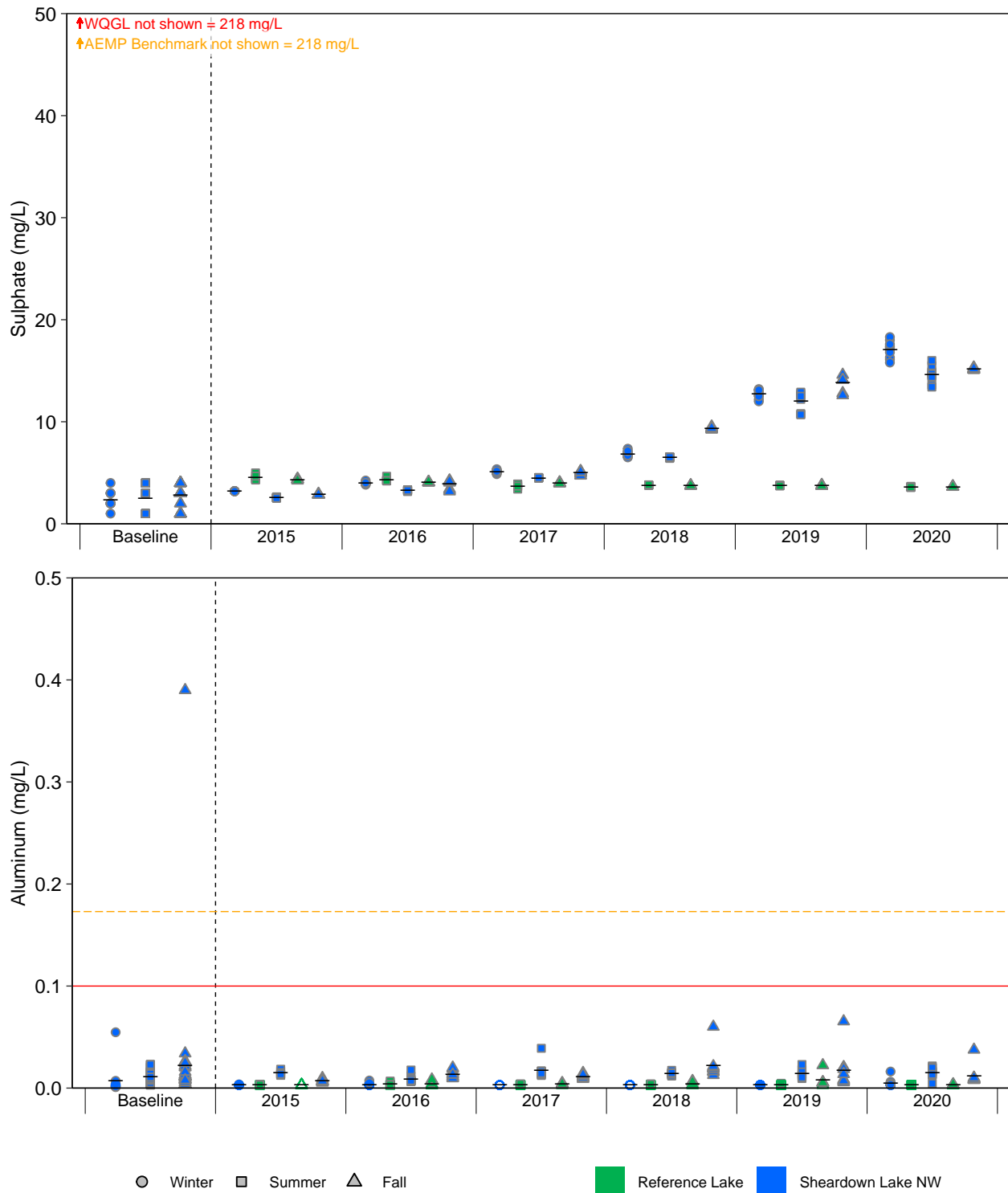


**Figure C.15: Vertical Profiles of Specific Conductance Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2020**



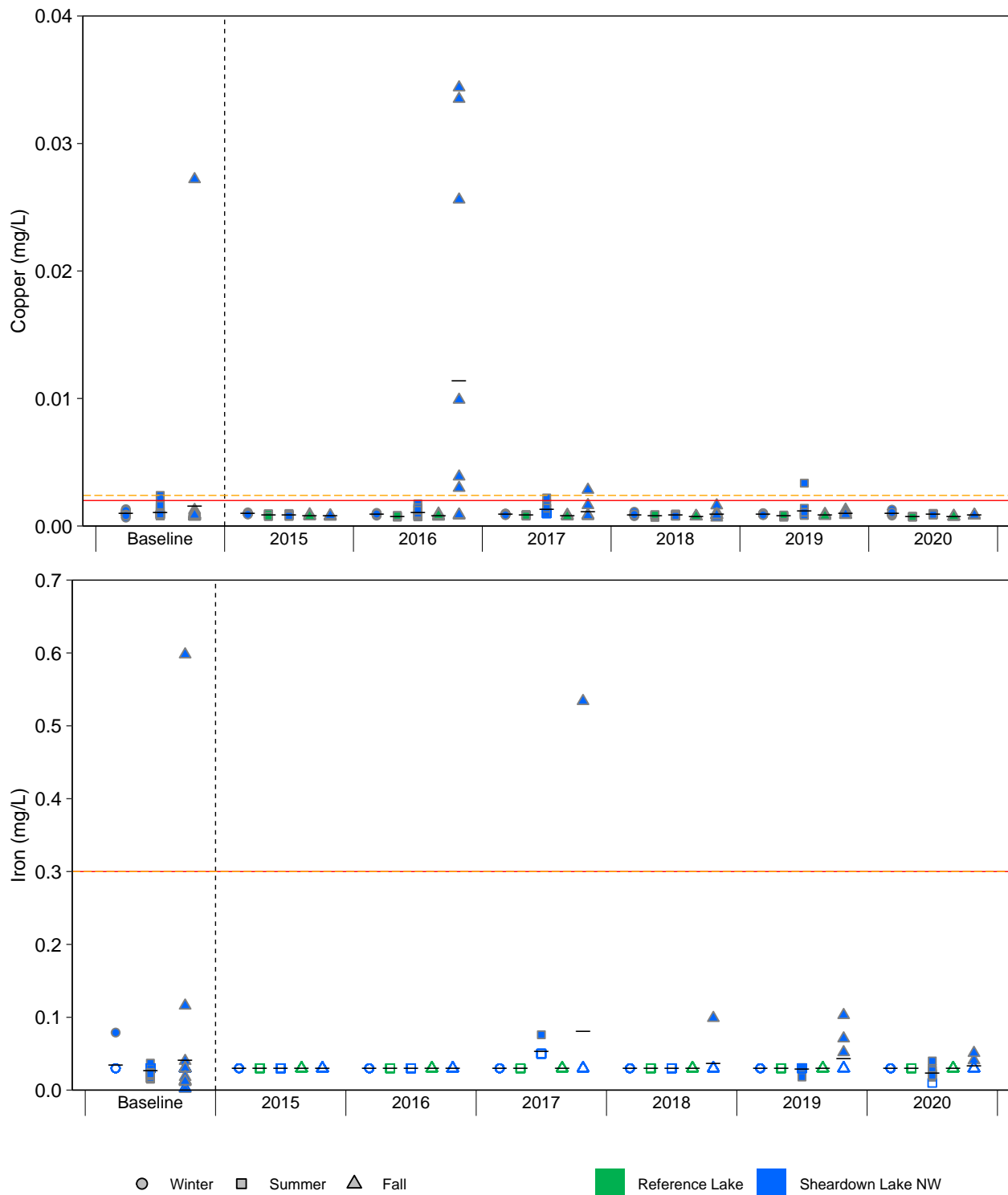
**Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



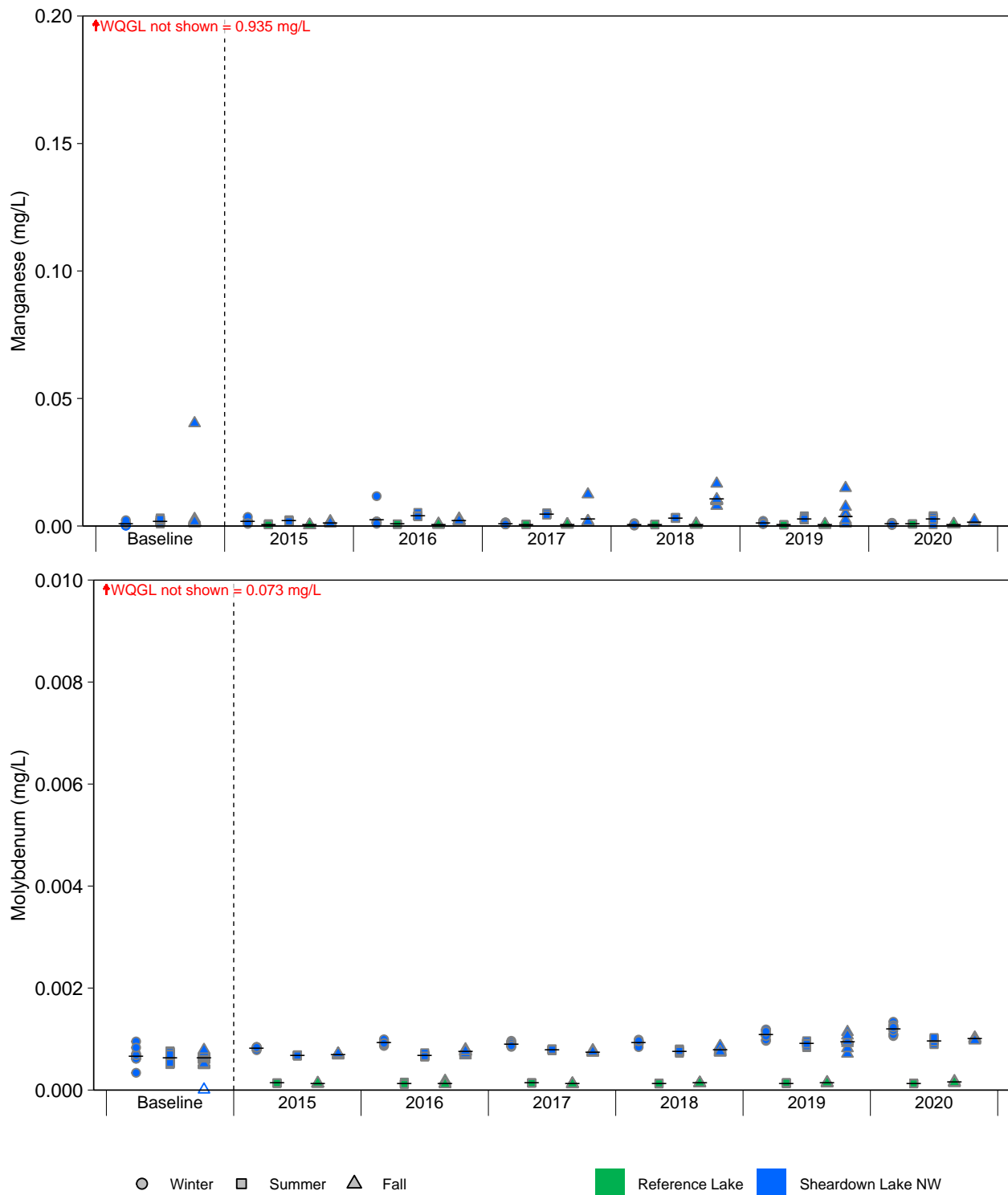
**Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

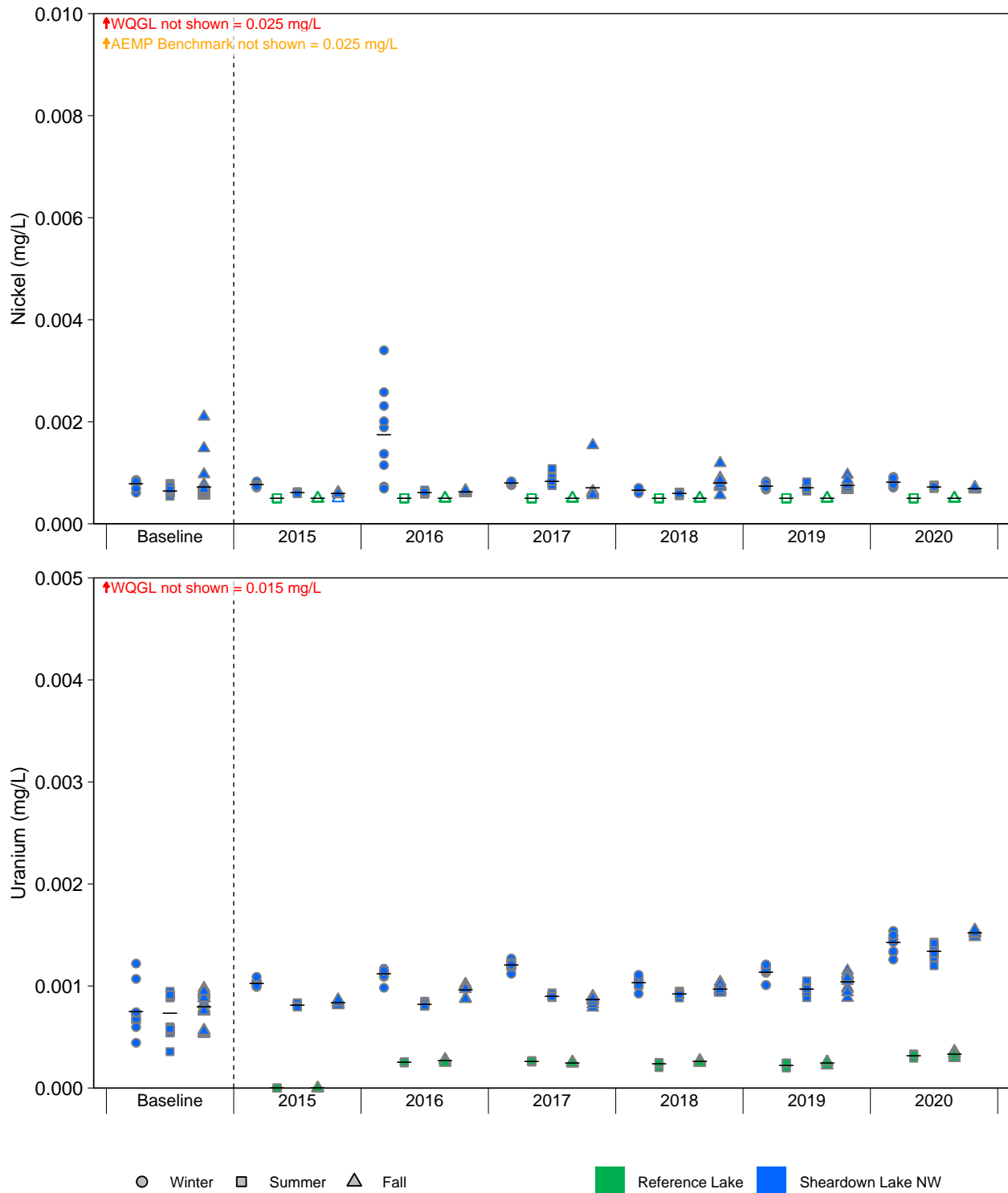
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

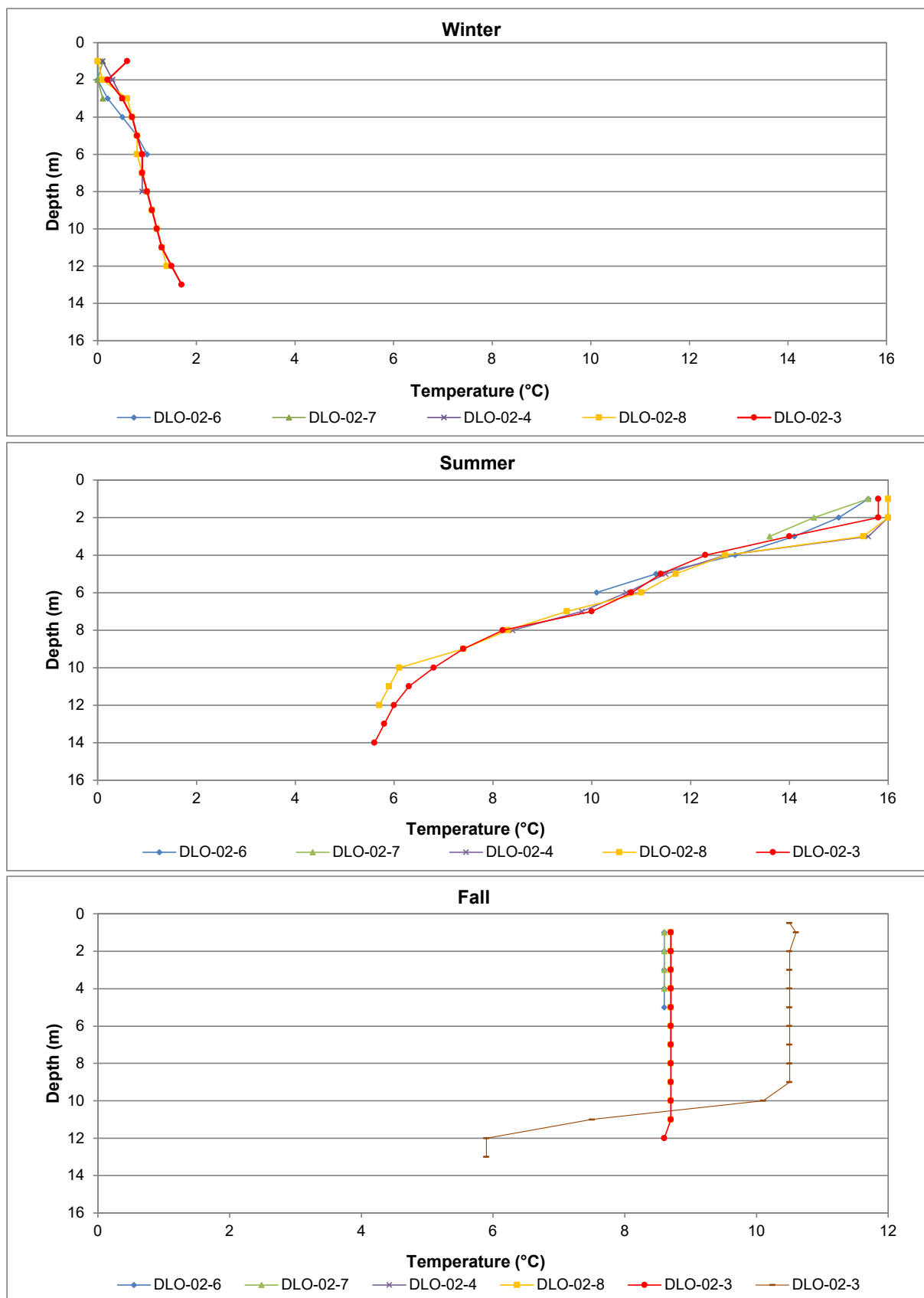
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



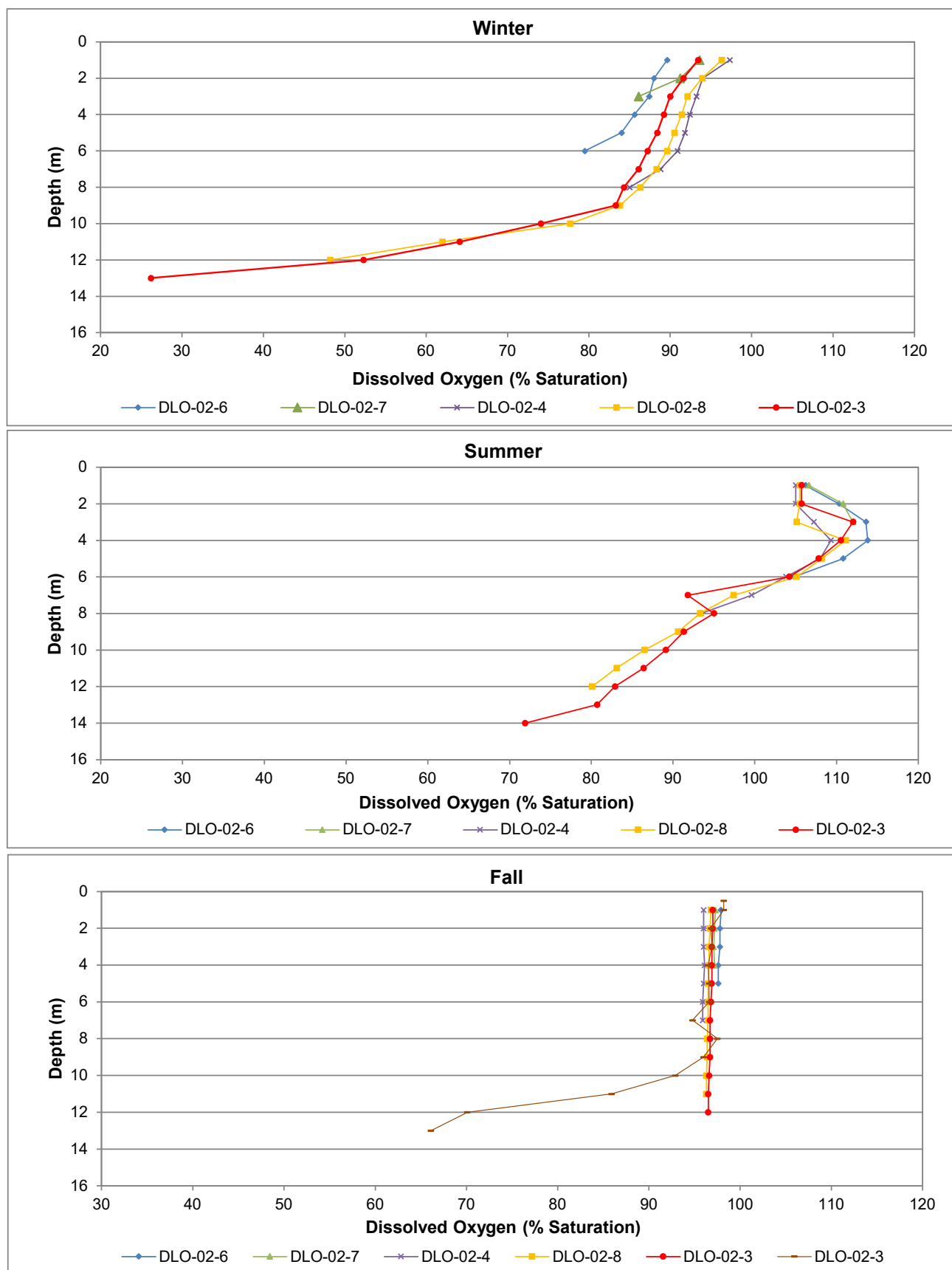


**Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

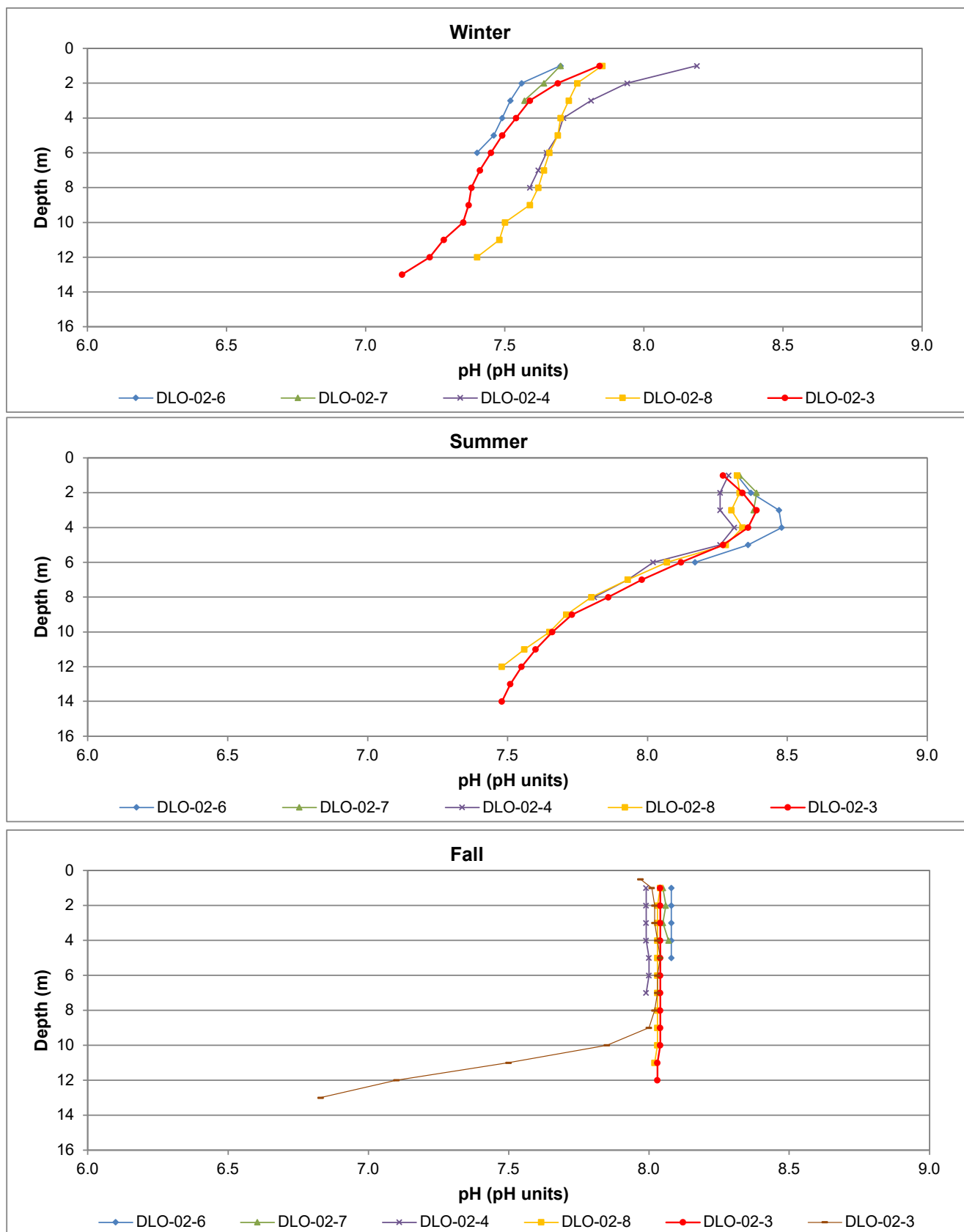
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



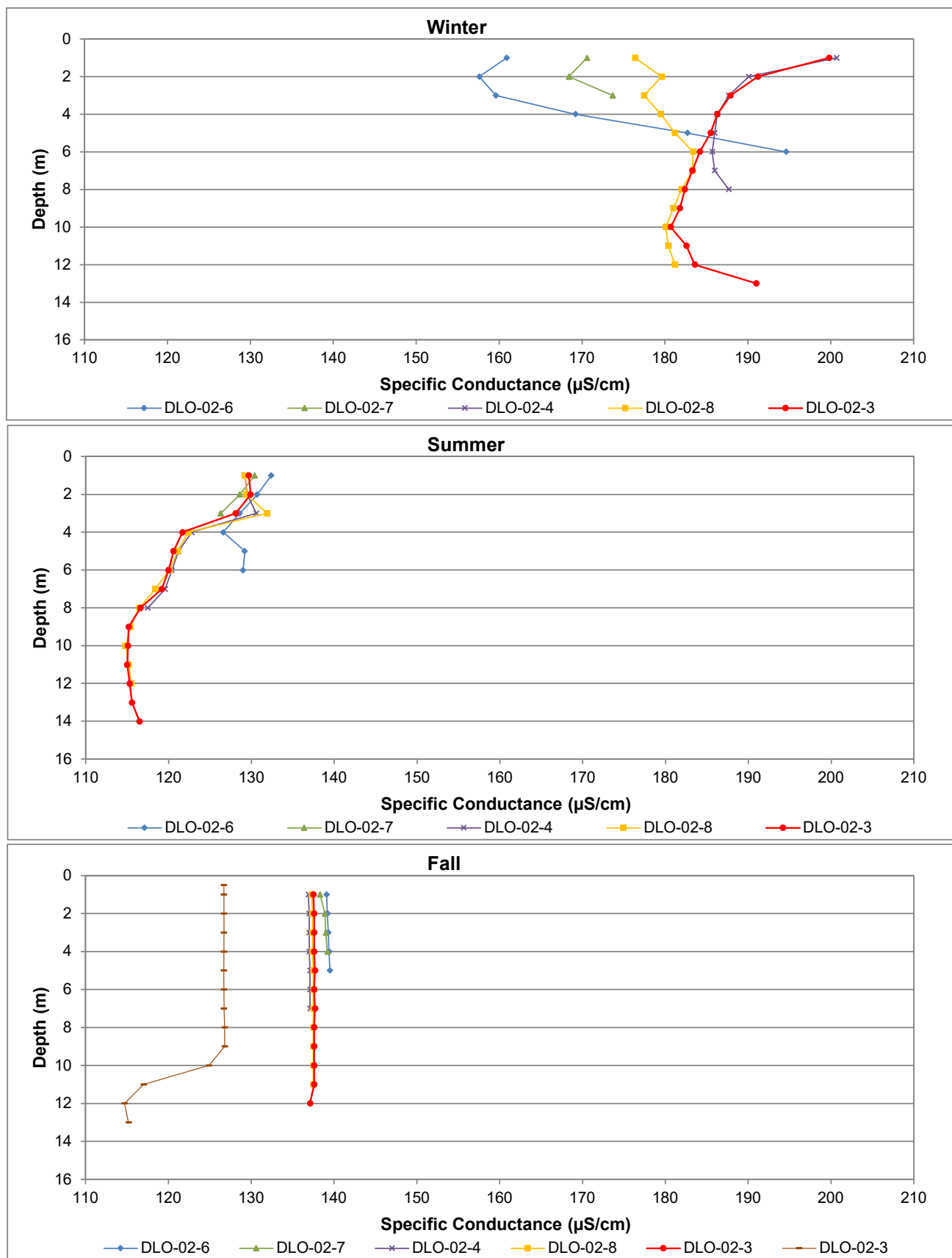
**Figure C.17: Vertical Profiles of Temperature Measured at Sheardown Lake SE in Winter, Summer, and Fall, 2020**



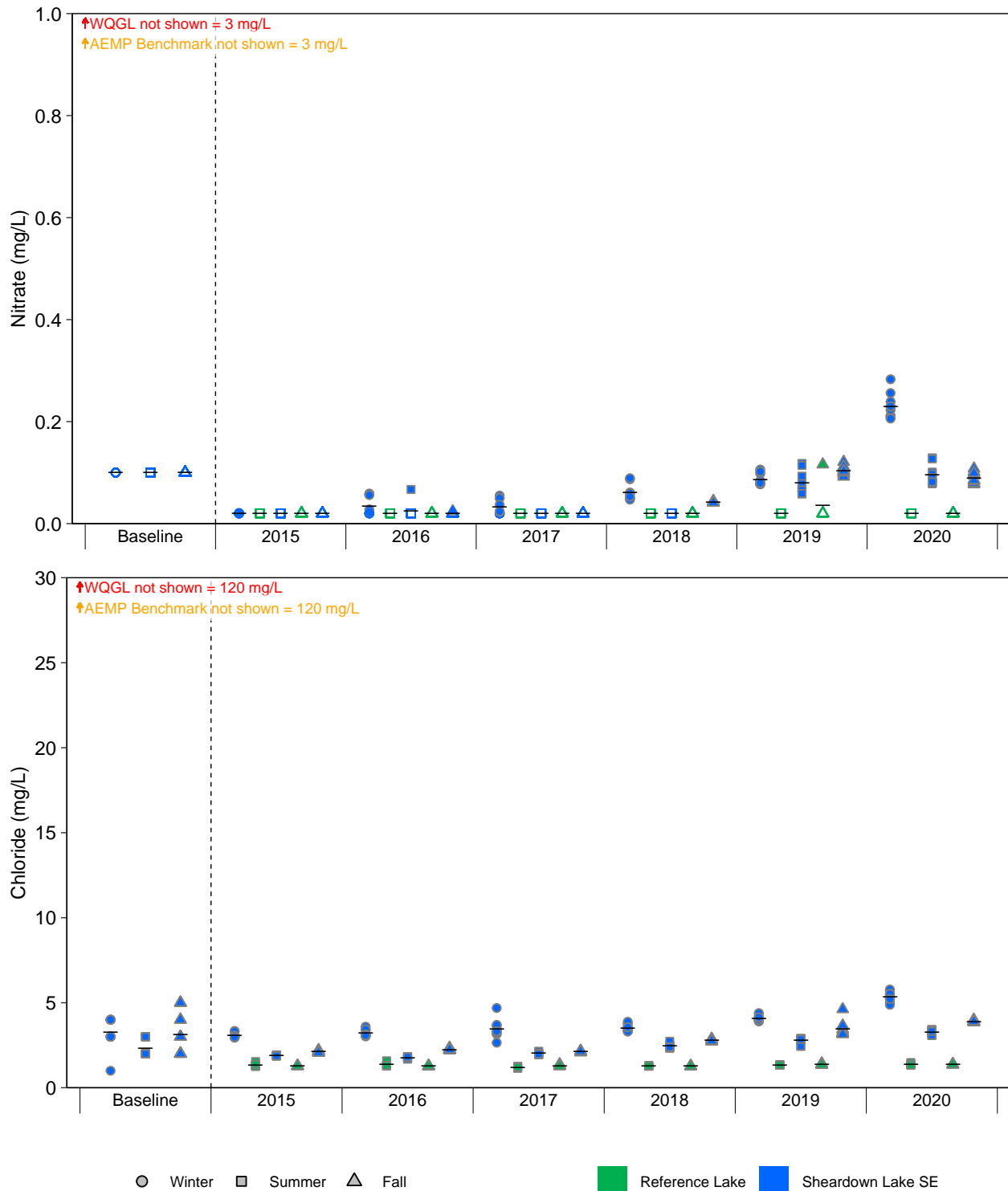
**Figure C.18: Vertical Profiles of Dissolved Oxygen Measured at Sheardown Lake SE in Winter, Summer, and Fall, 2020**



**Figure C.19: Vertical Profiles of pH Measured at Sheardown Lake SE in Winter, Summer, and Fall, 2020**

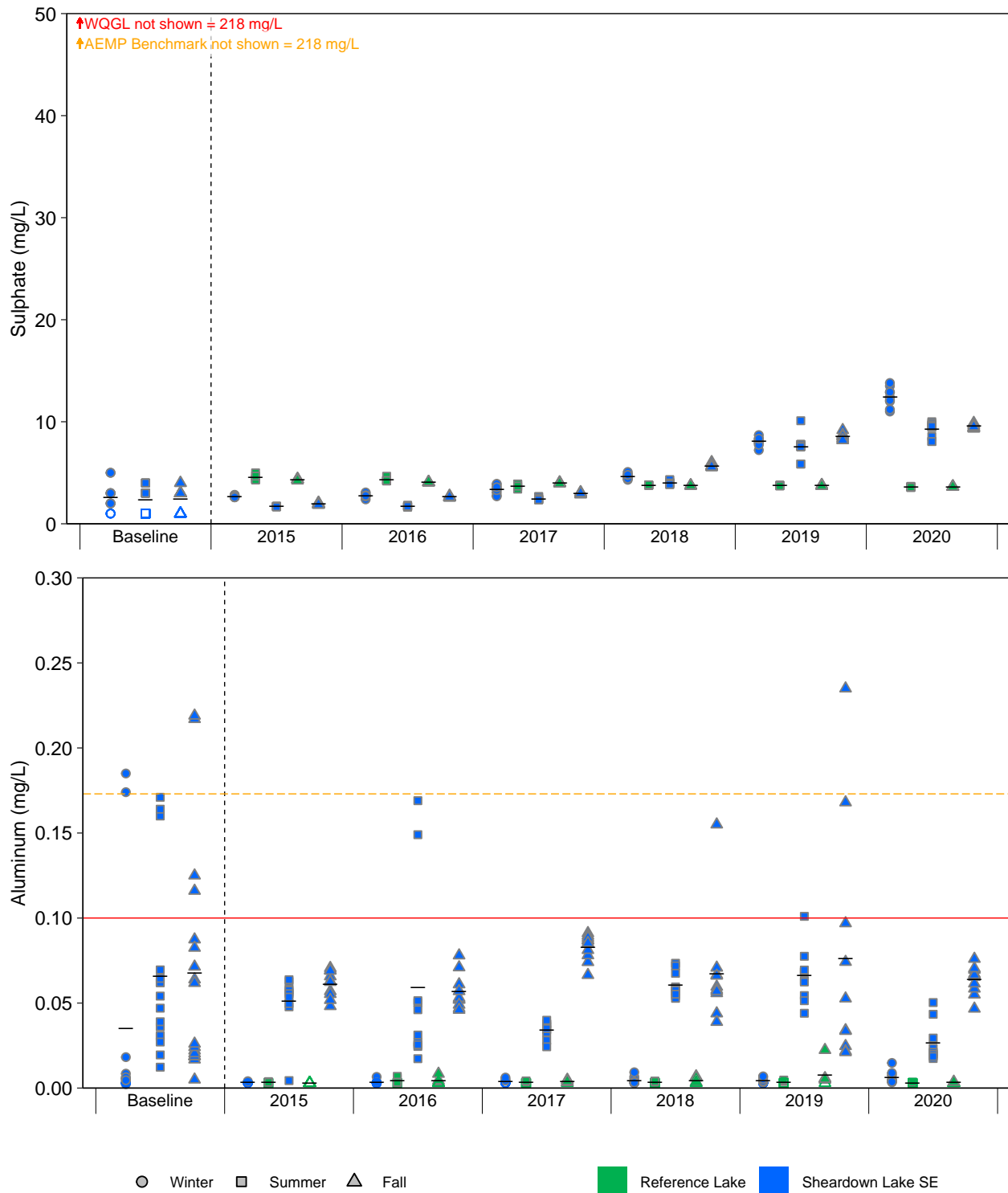


**Figure C.20: Vertical Profiles of Conductivity Measured at Sheardown Lake SE in Winter, Summer, and Fall 2020**



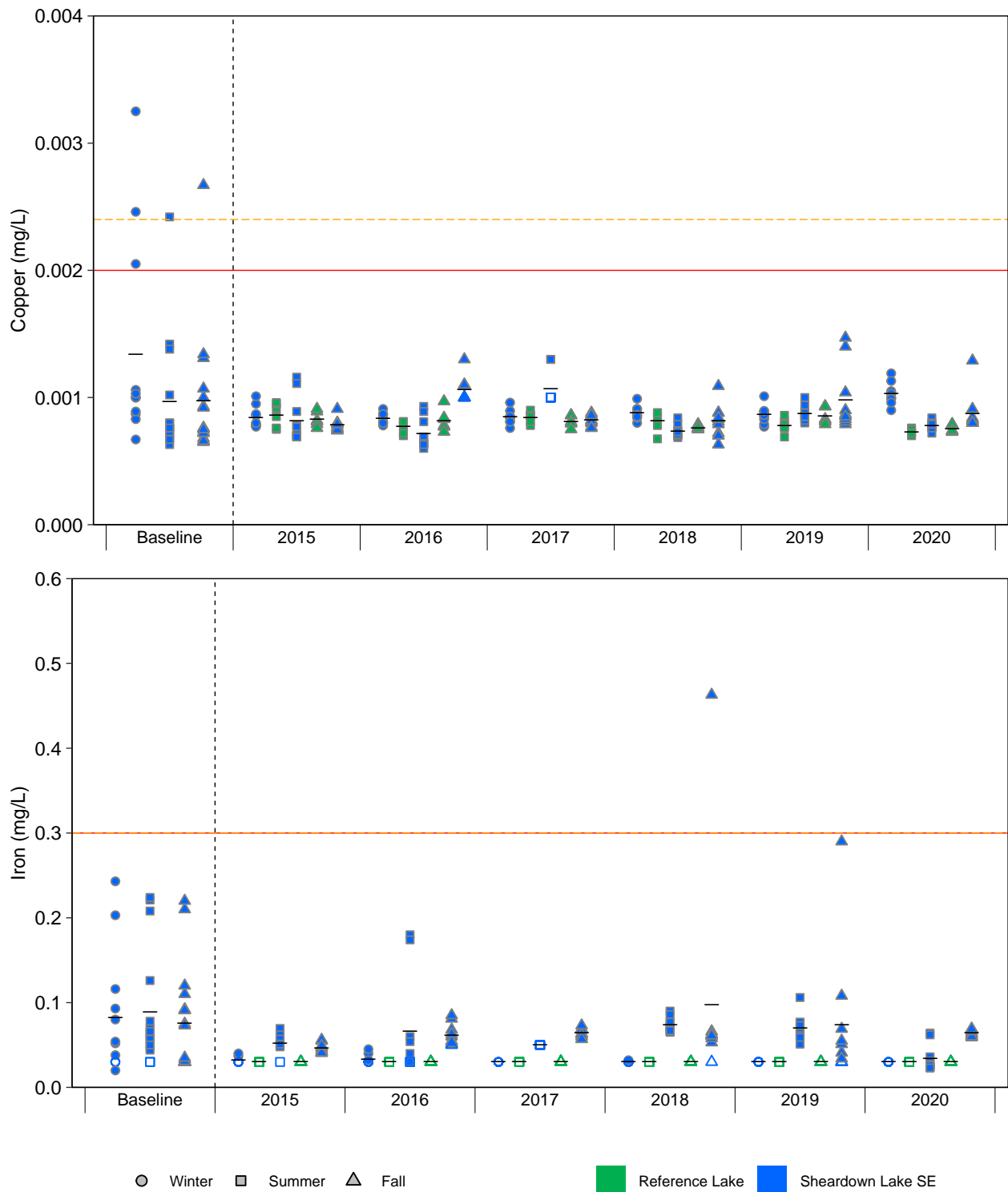
**Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

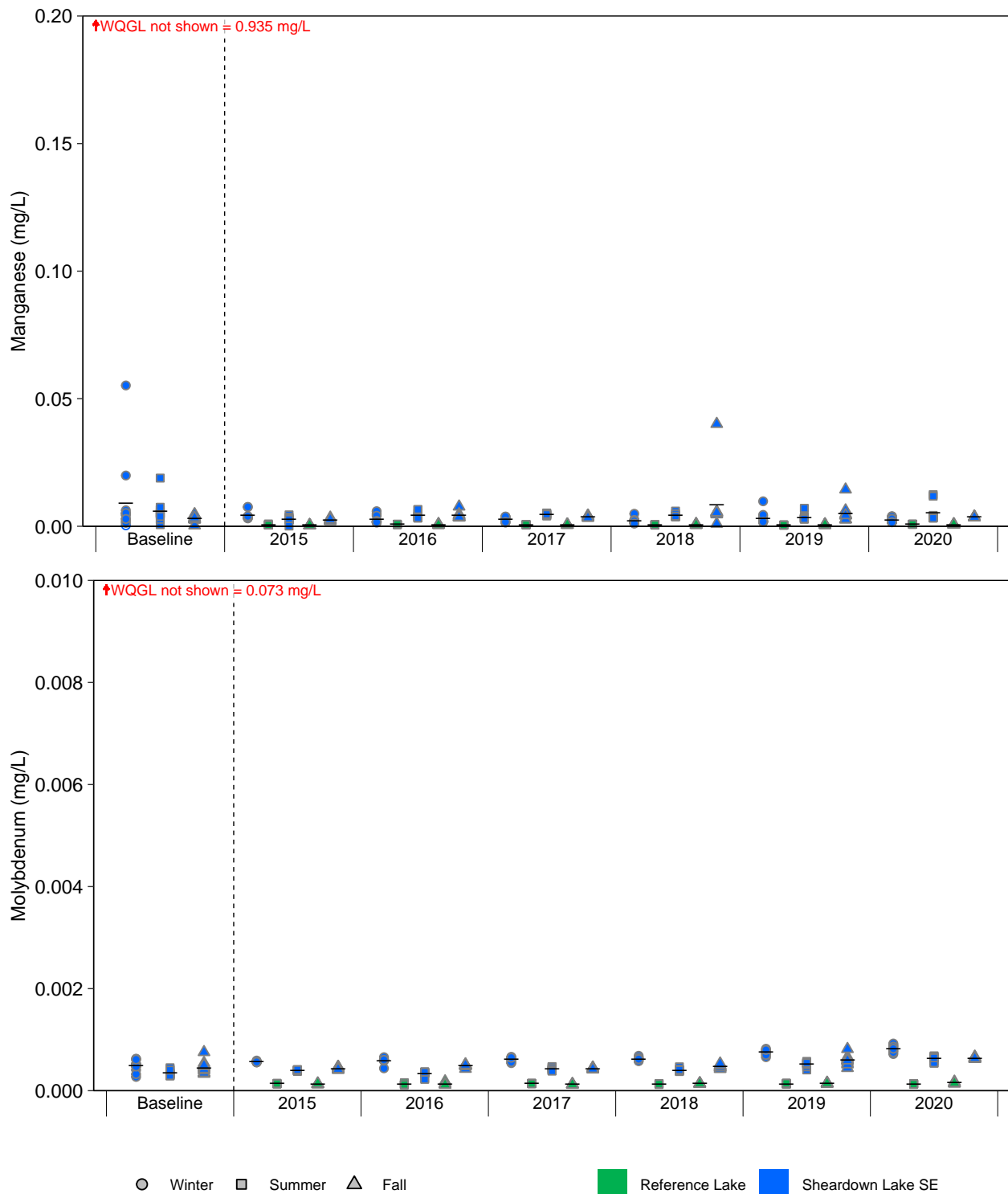
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

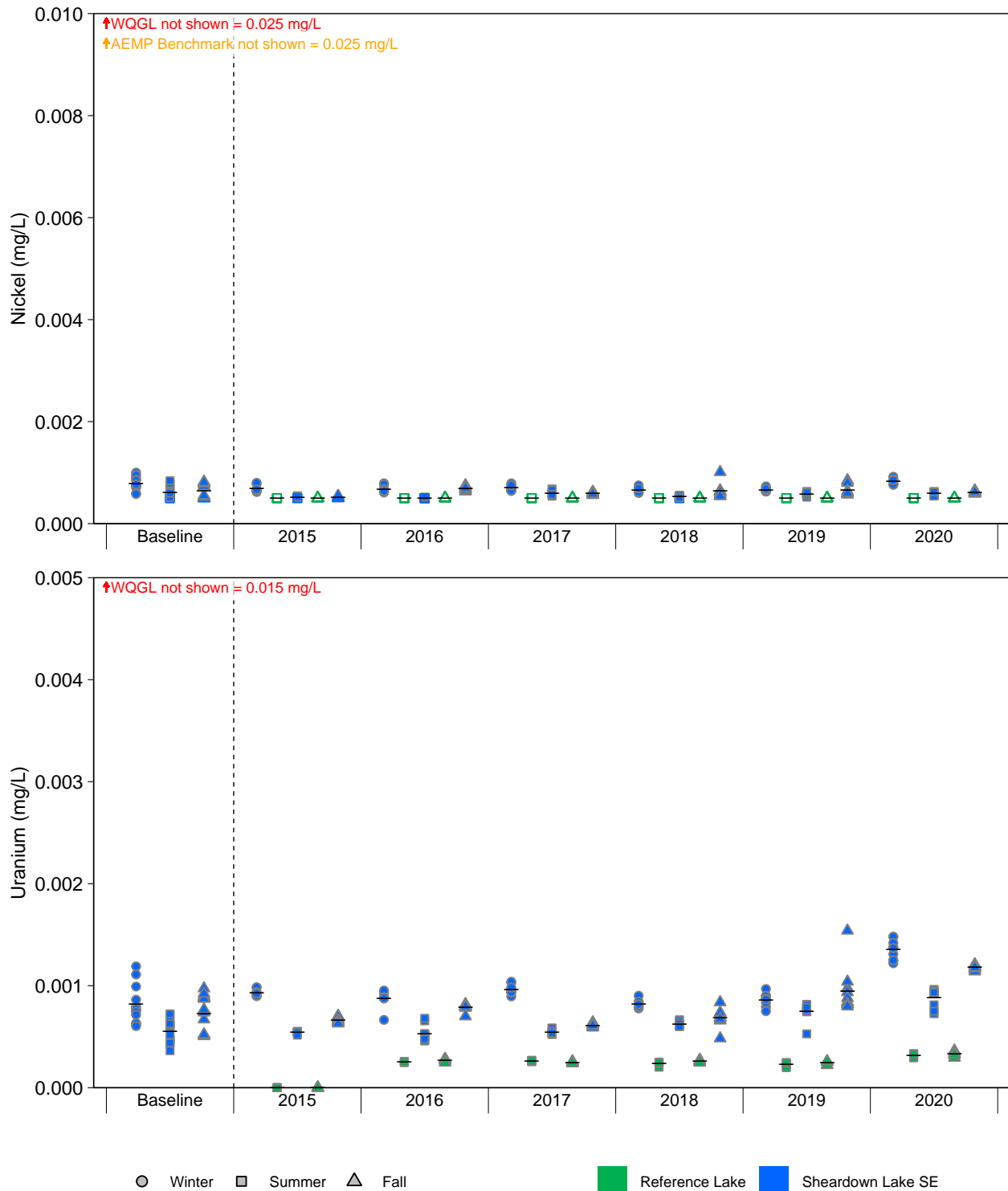
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.





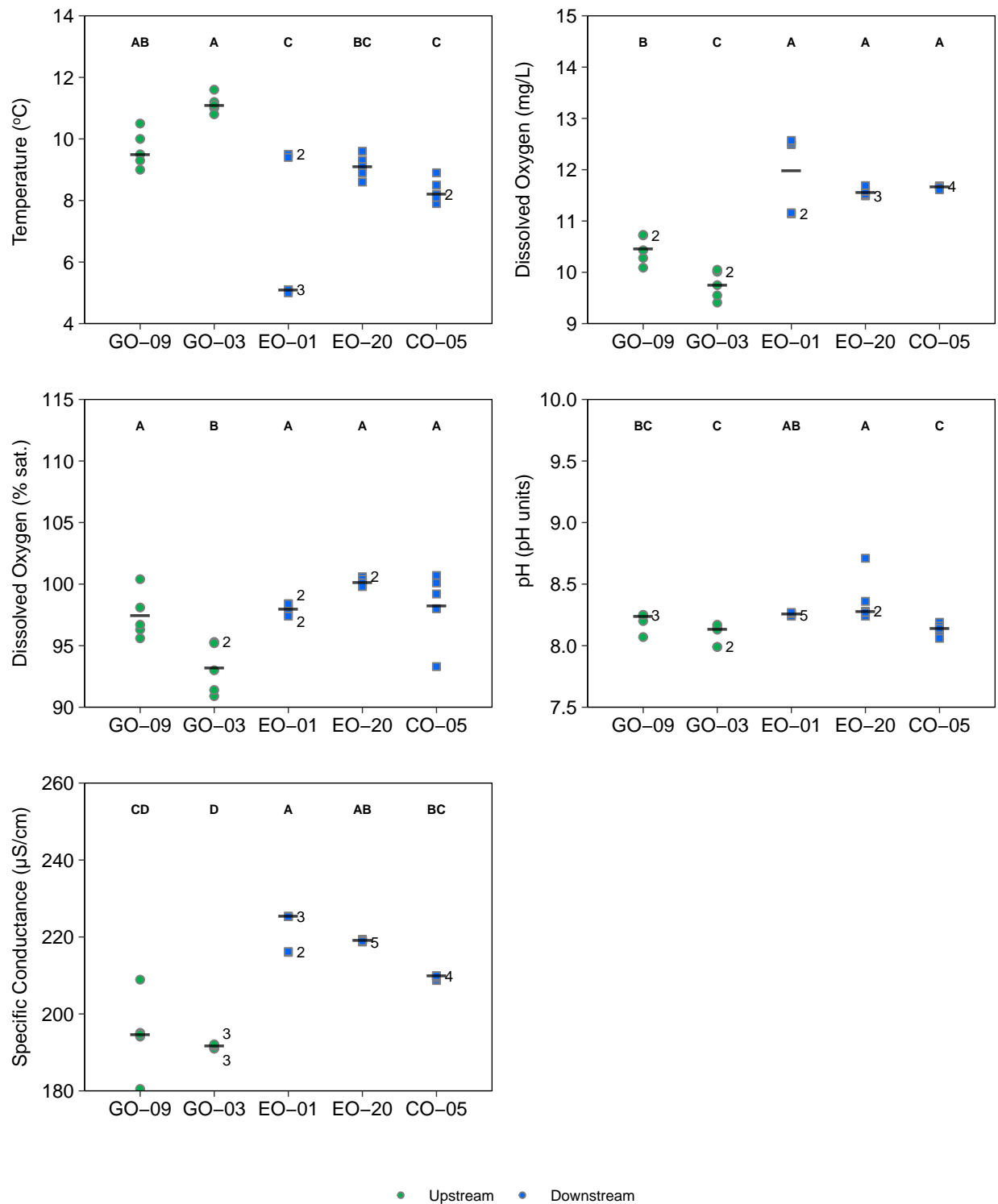
**Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) 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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



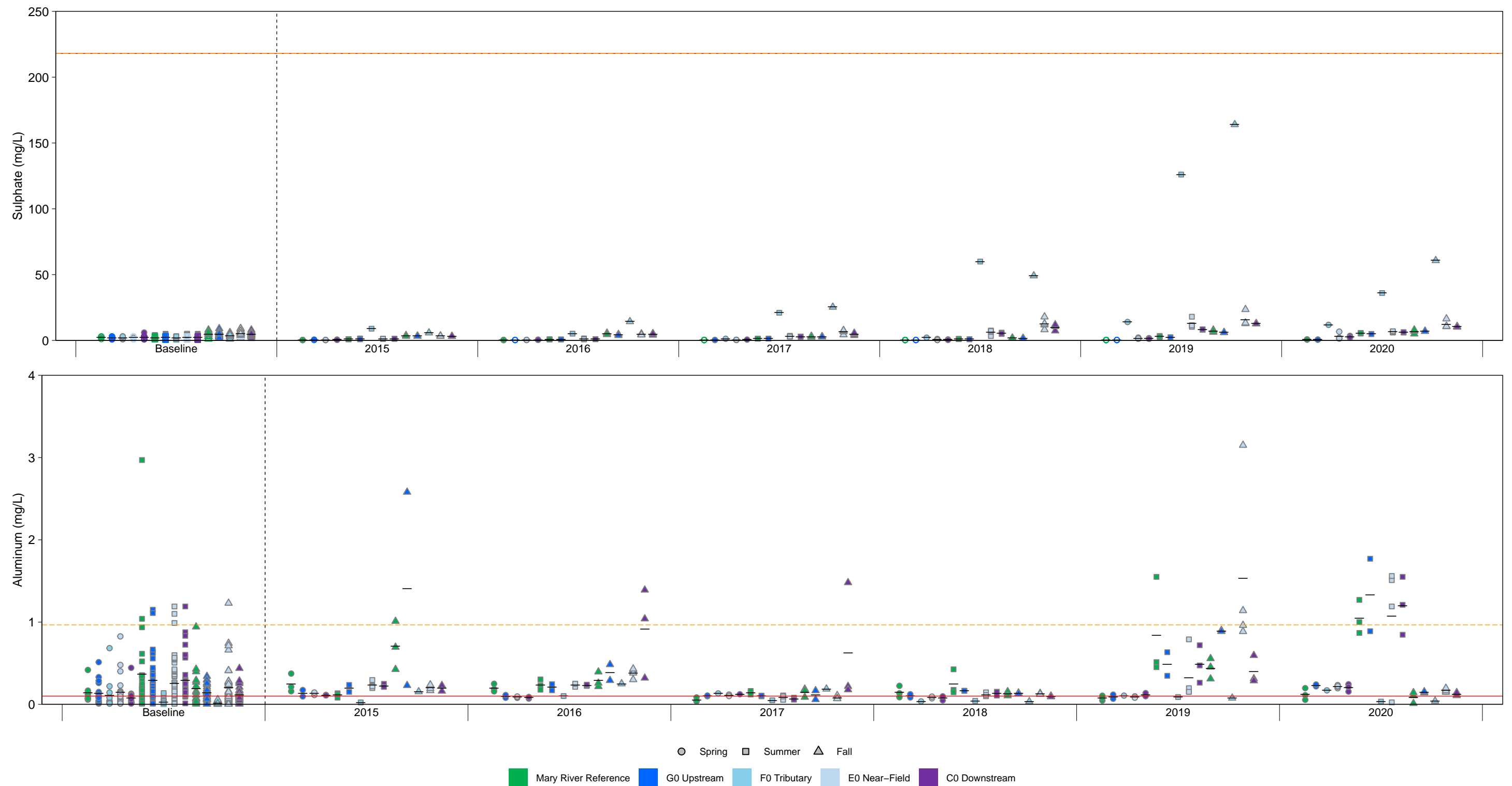
**Figure C.22:** In Situ Water Quality Measurements Collected at Mary River Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020

Notes: Study areas with the same letters do not differ significantly (alpha = 0.1).



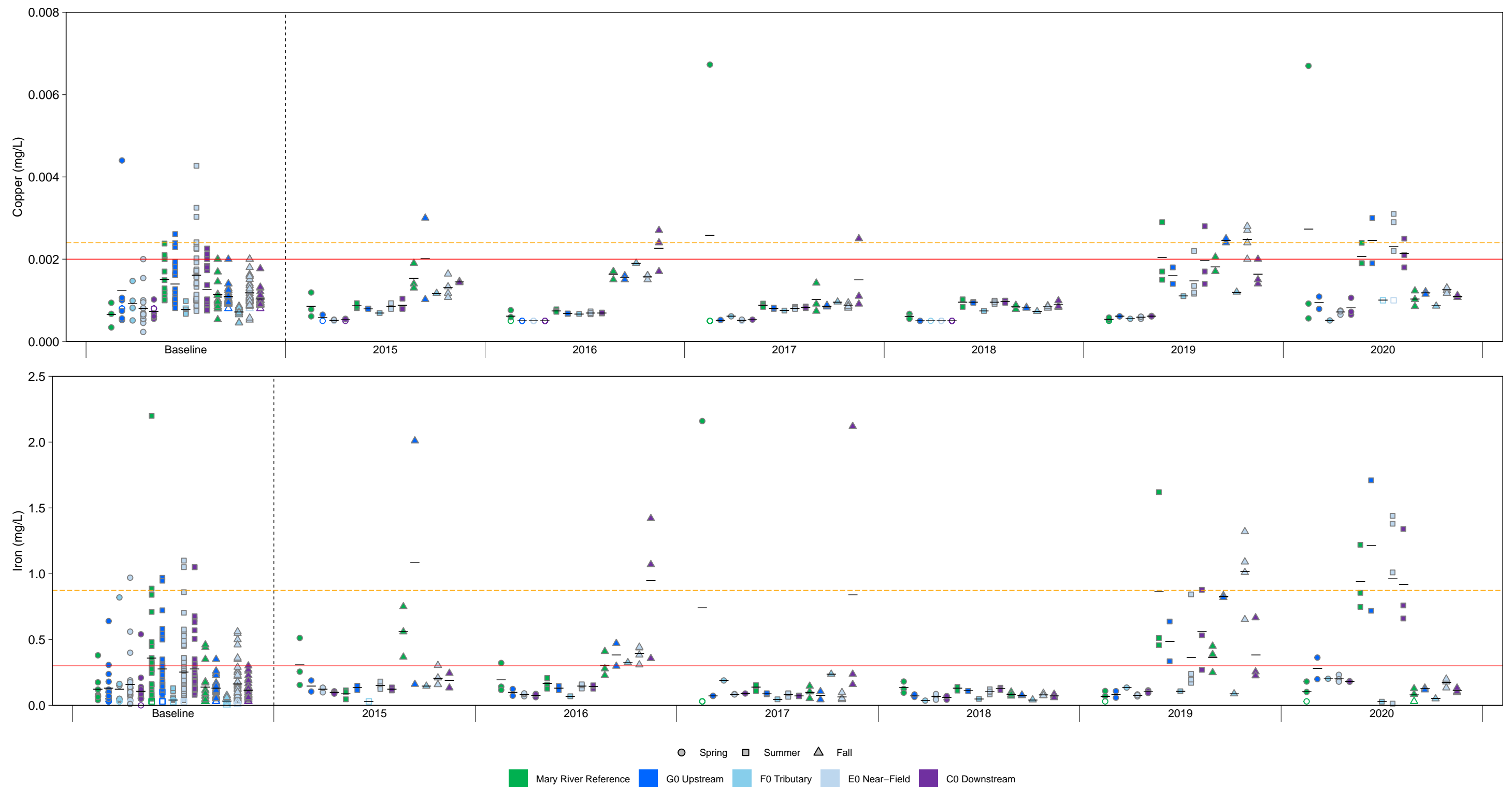
**Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



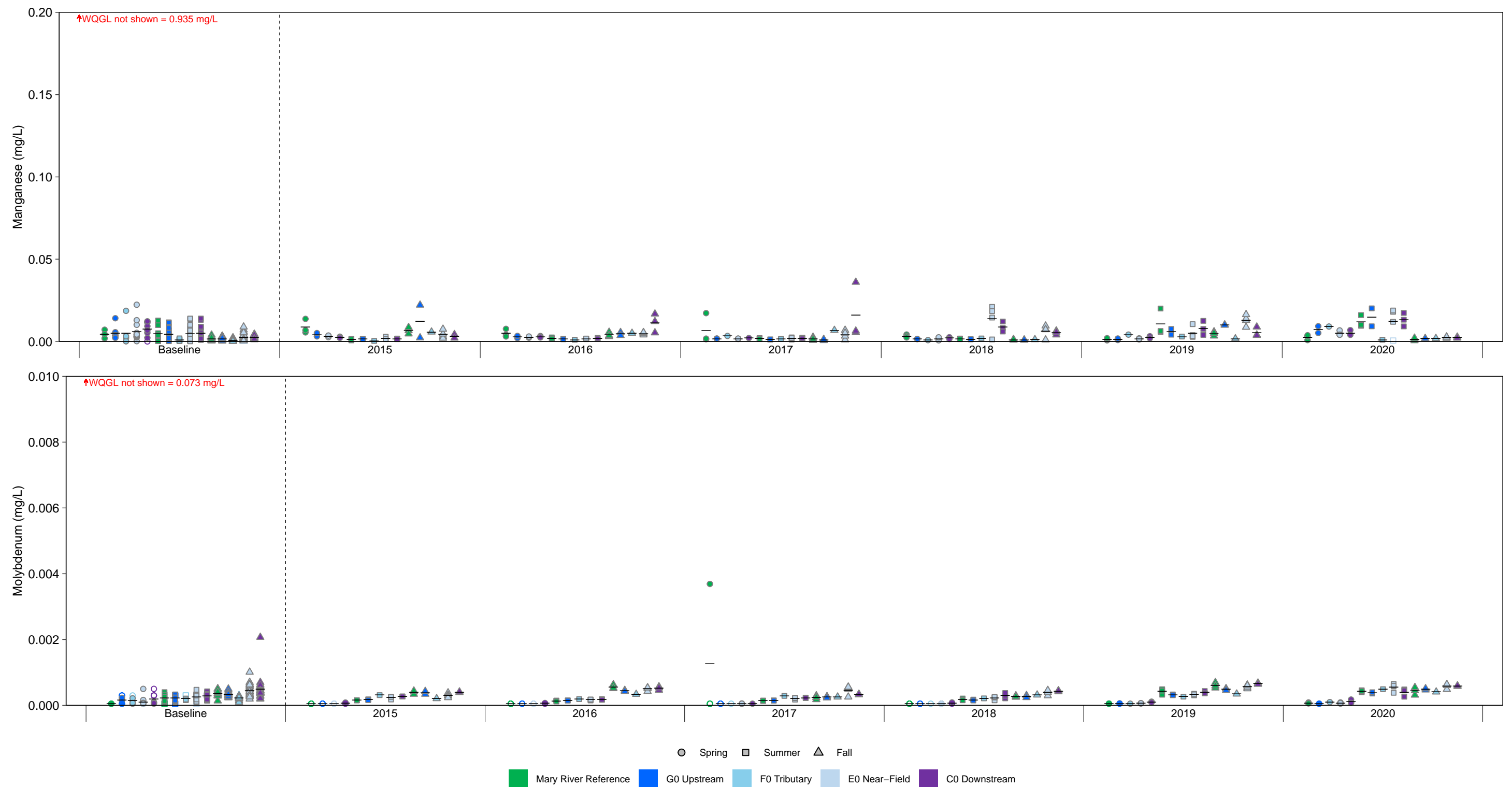
**Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



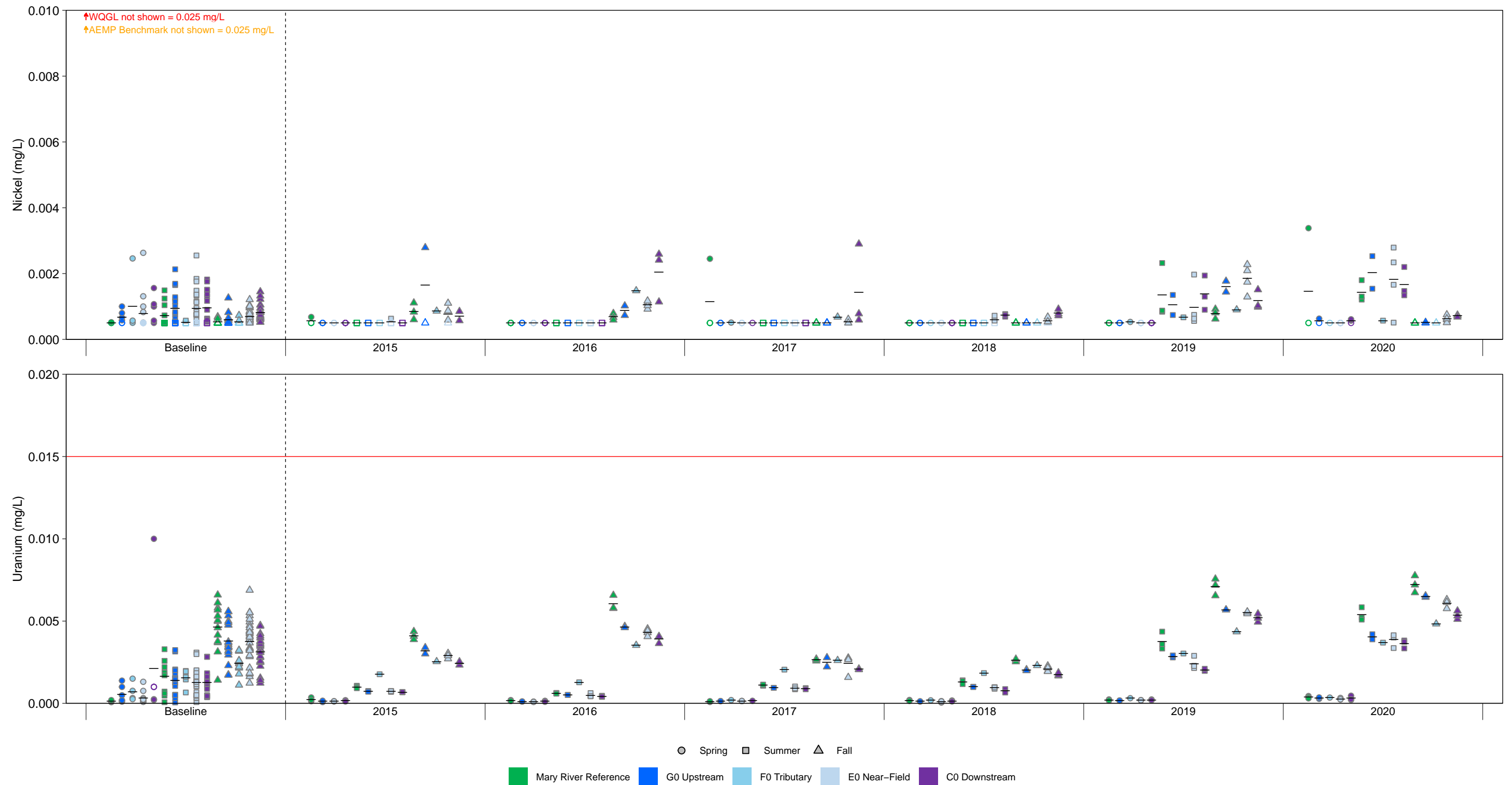
**Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

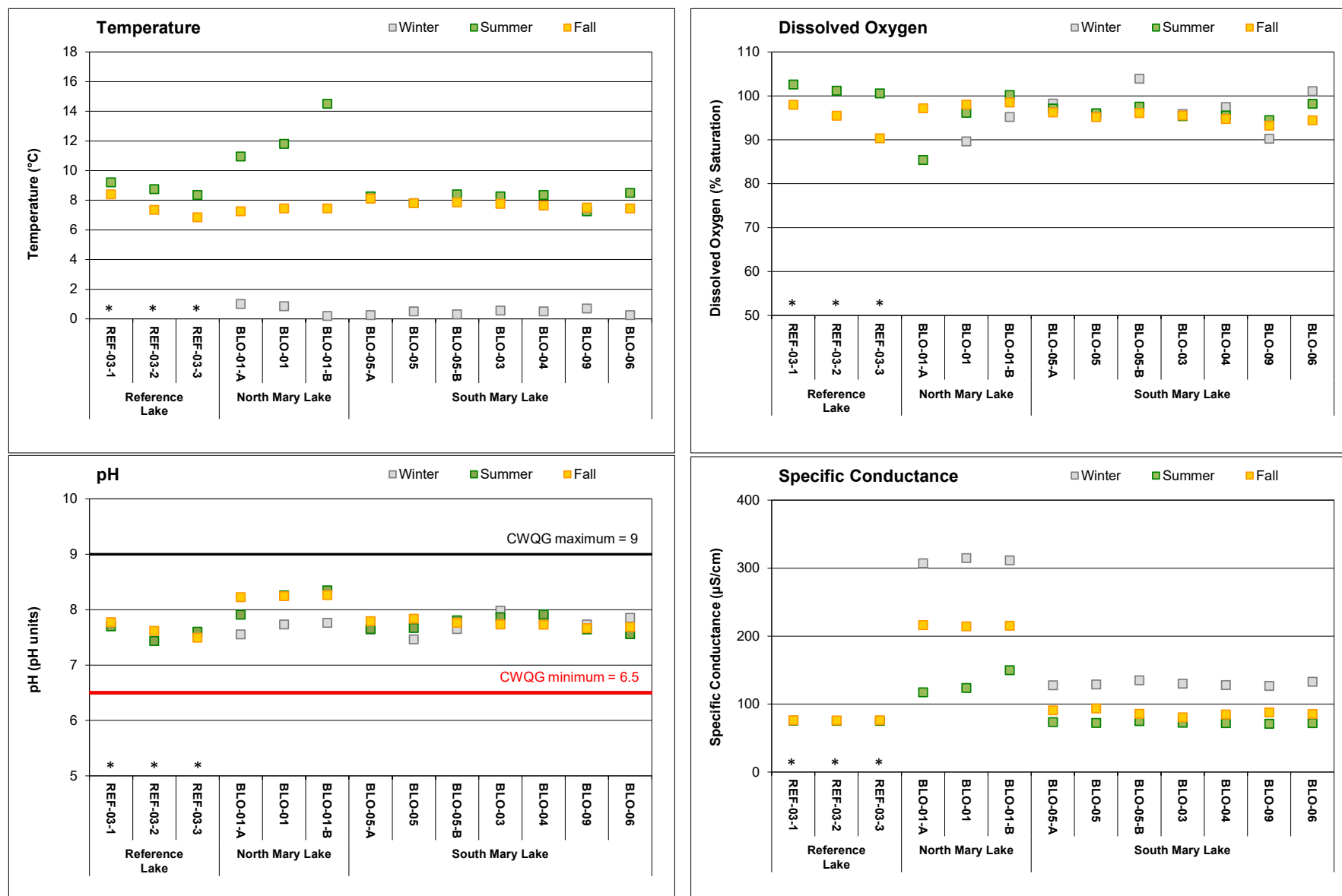
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

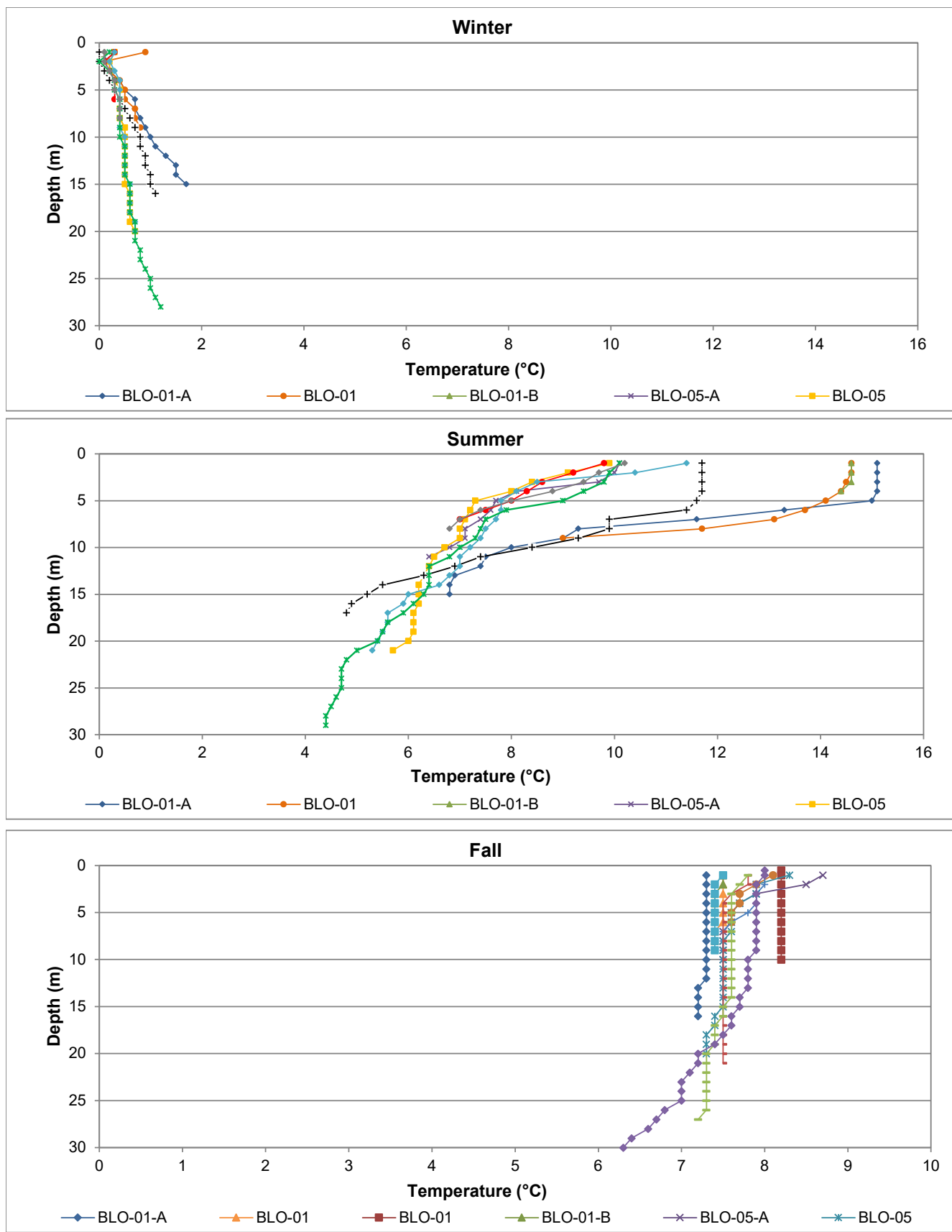
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



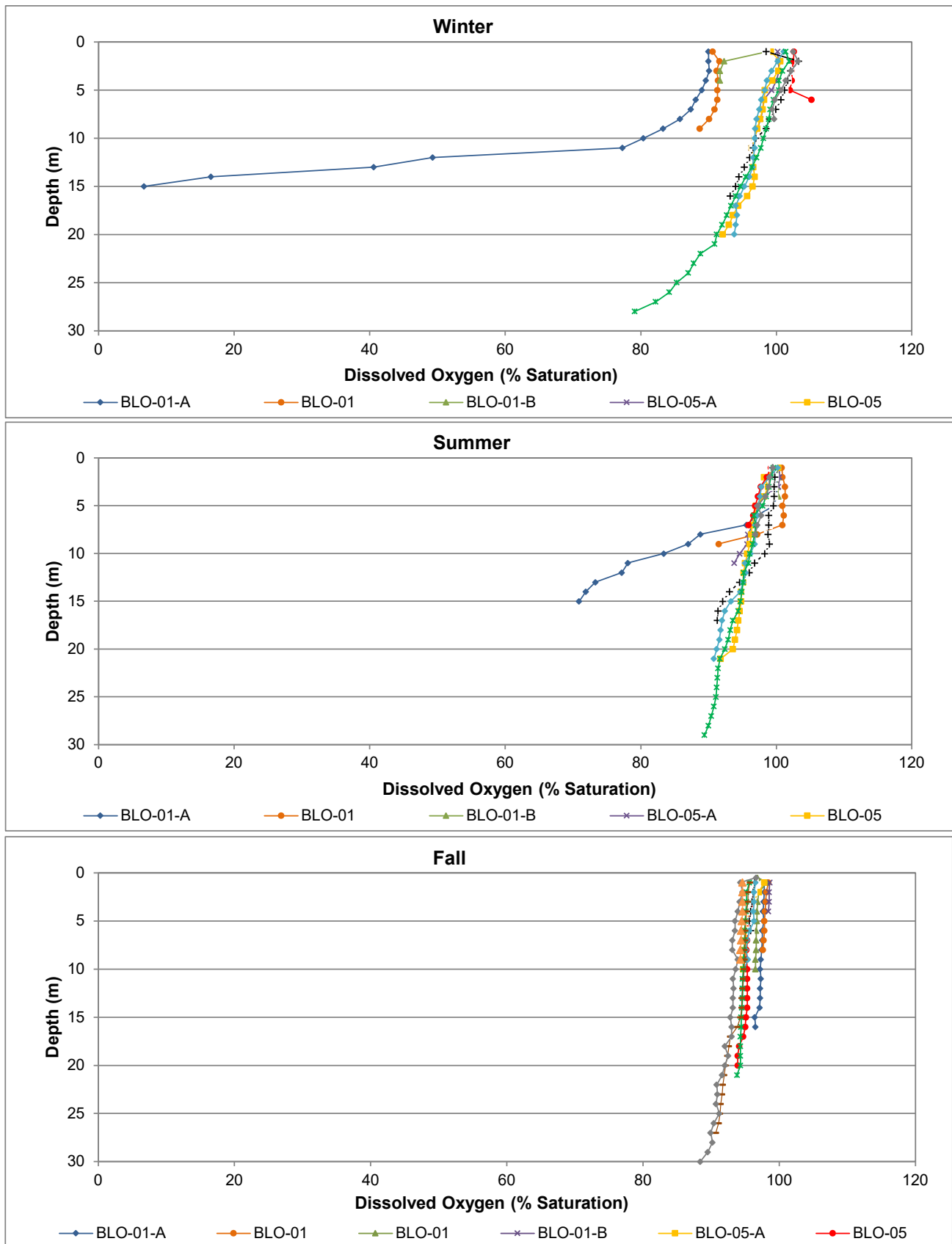


**Figure C.24: Comparison of *In Situ* Water Quality Variables Measured at Mary Lake Water Quality Monitoring Stations in Winter, Summer, and Fall 2020, Mary River Project CREMP**

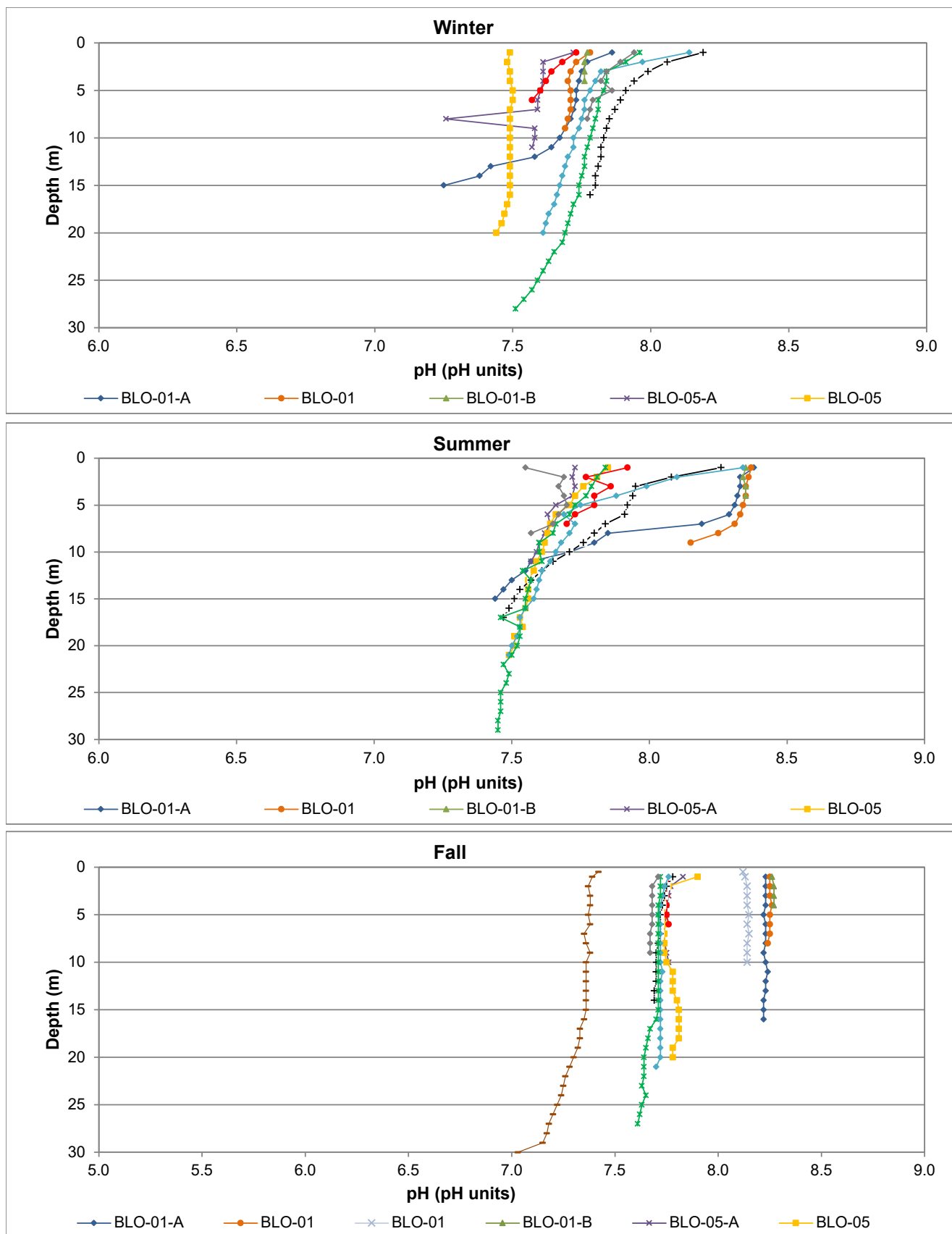
Notes: Lake values represent mean of surface and bottom *in situ* water quality measurements. \* Reference Lake 3 (REF-03) was not sampled in winter.



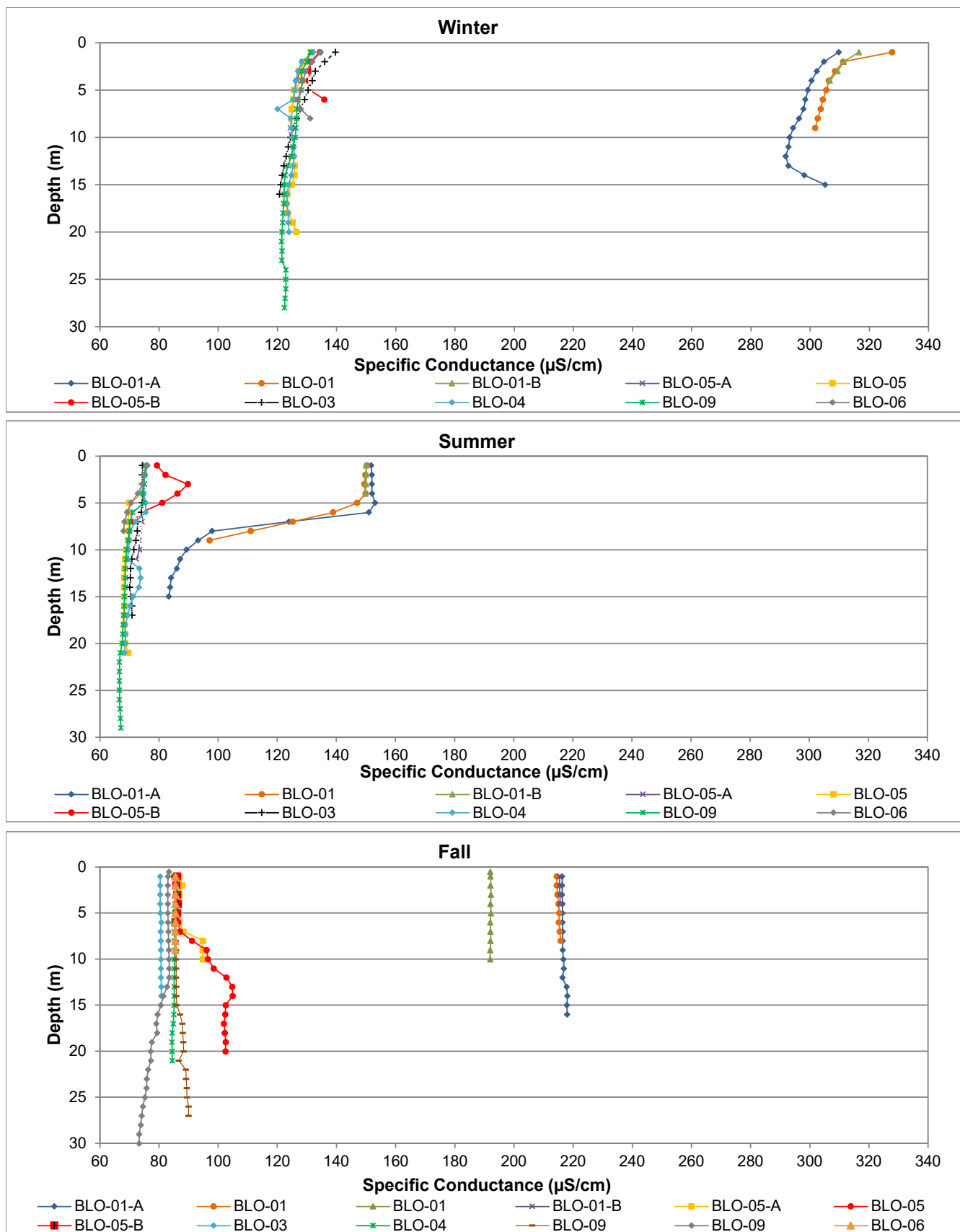
**Figure C.25:** Vertical Profiles of Temperature Measured at Mary Lake in Winter, Summer, and Fall, 2020



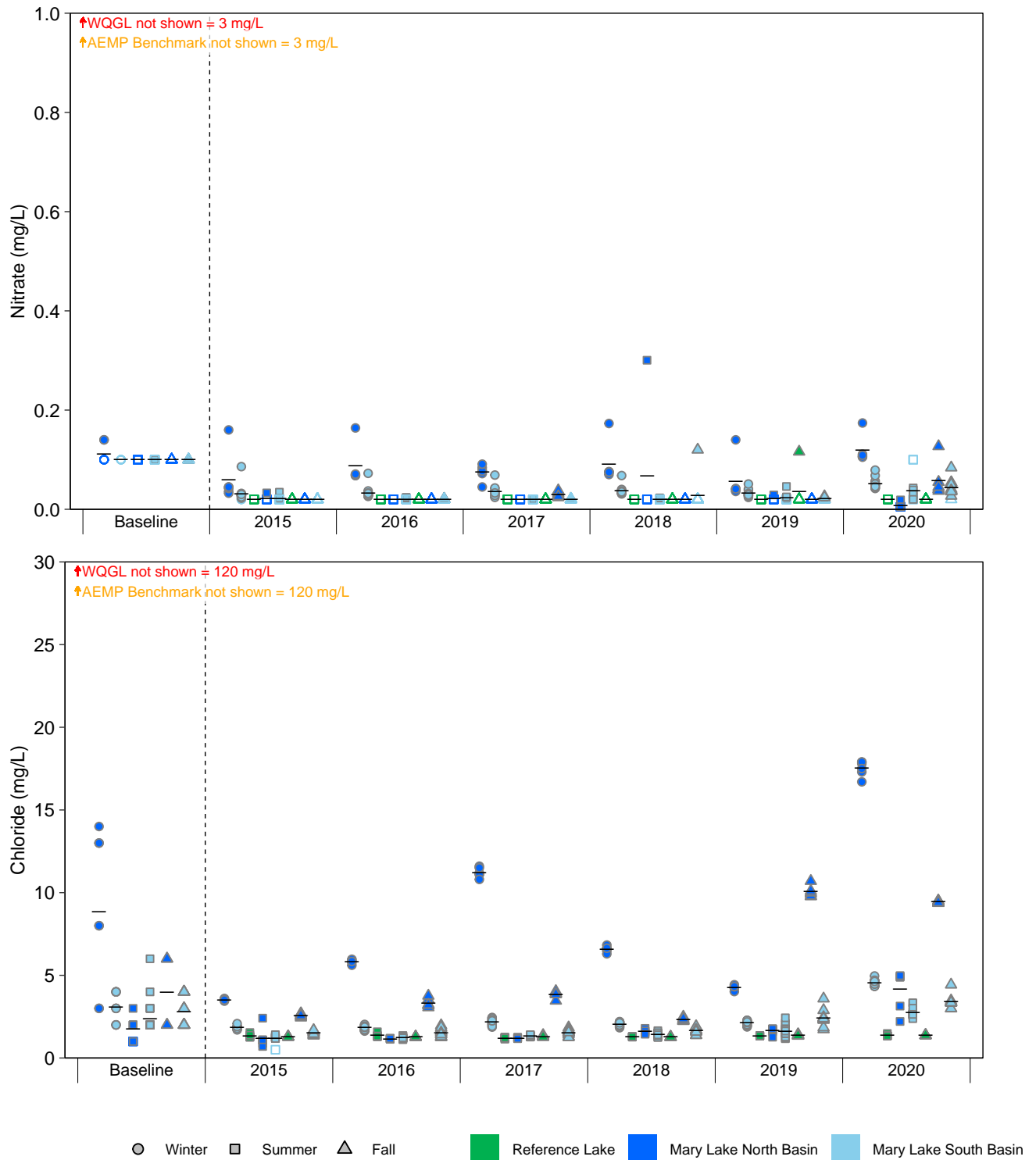
**Figure C.26:** Vertical Profiles of Dissolved Oxygen Measured at Mary Lake in Winter, Summer, and Fall, 2020



**Figure C.27: Vertical Profiles of pH Measured at Mary Lake in Winter, Summer, and Fall, 2020**

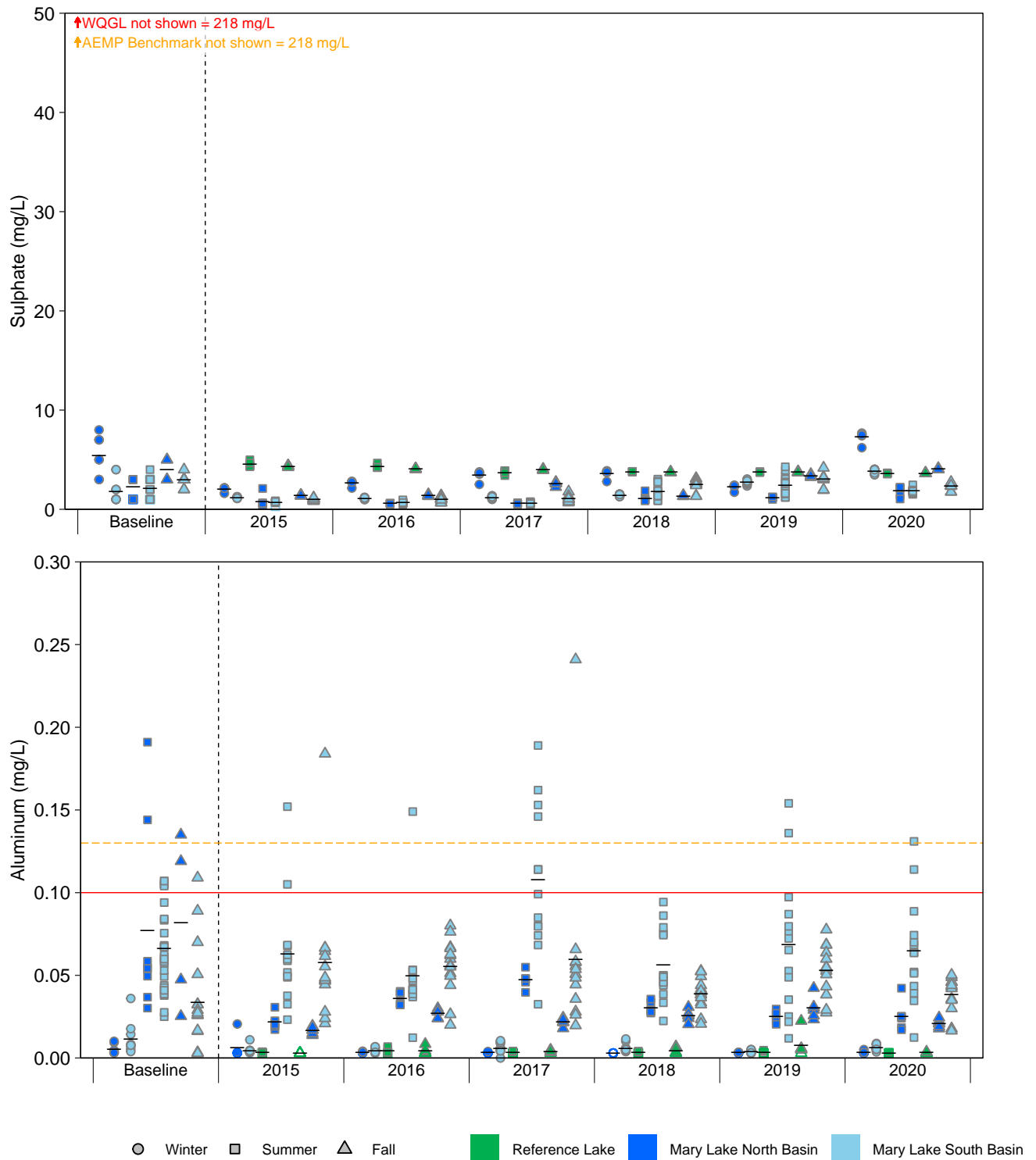


**Figure C.28: Vertical Profiles of Specific Conductance Measured at Mary Lake in Winter, Summer, and Fall, 2020**



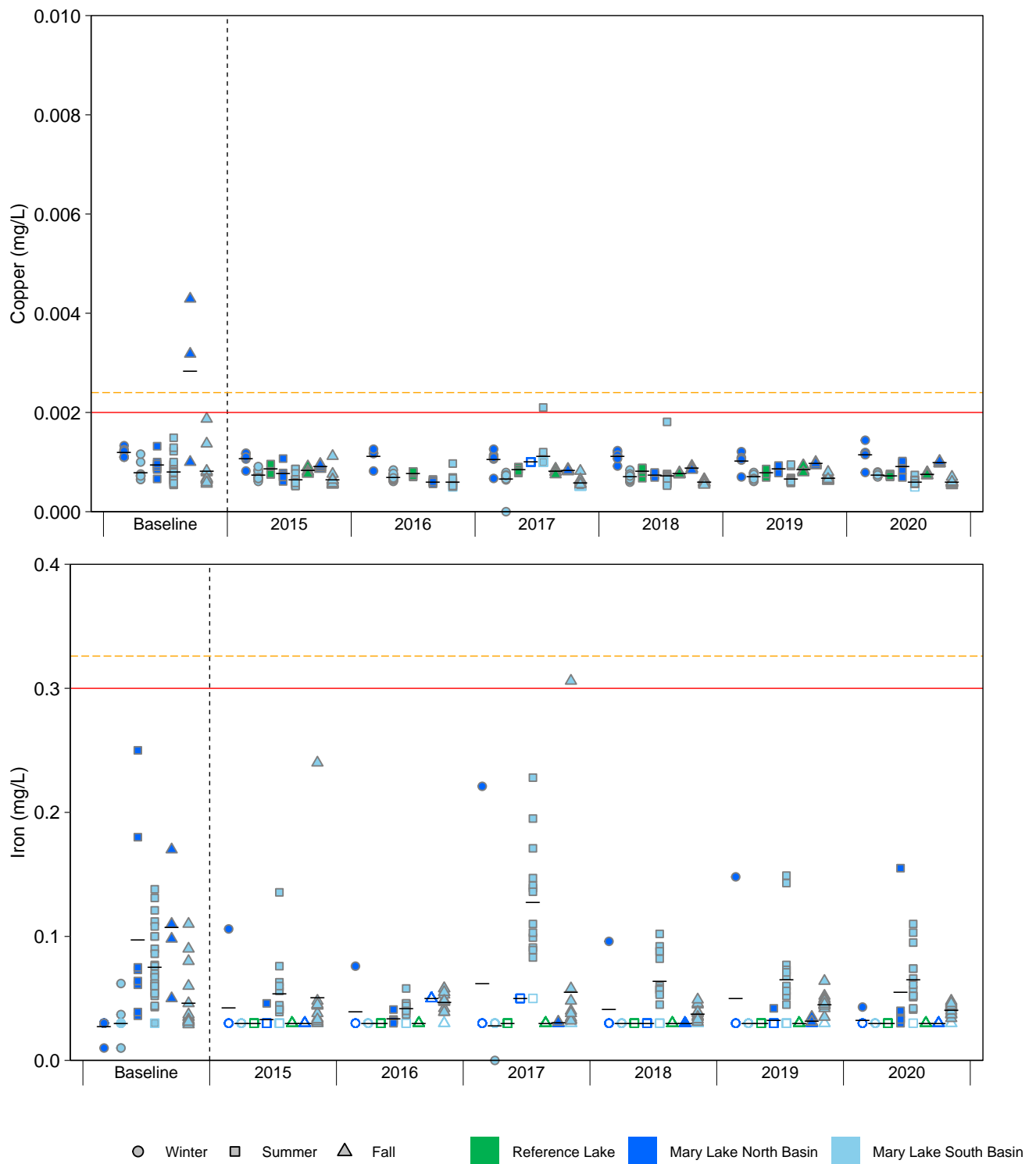
**Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

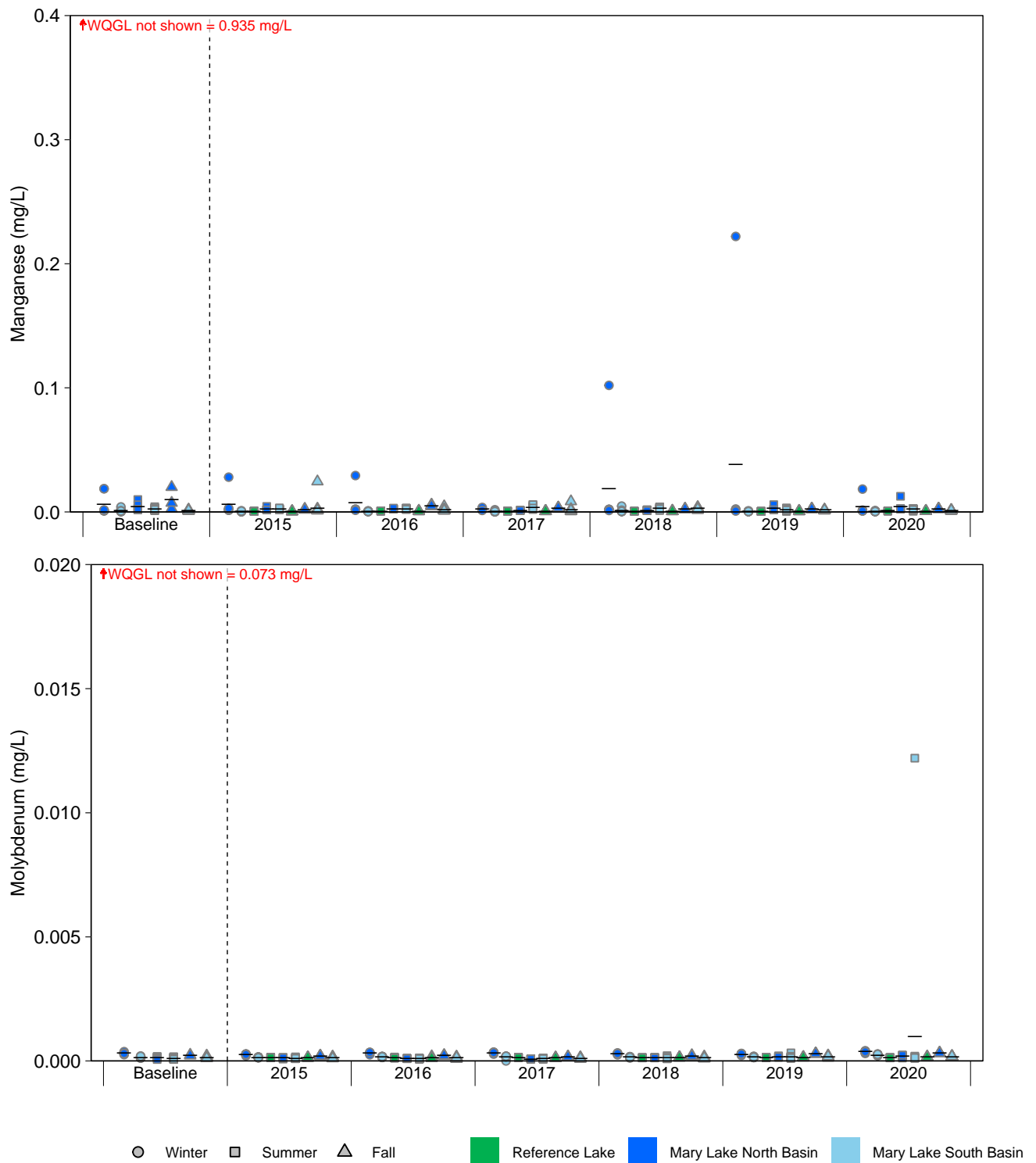
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) Periods**

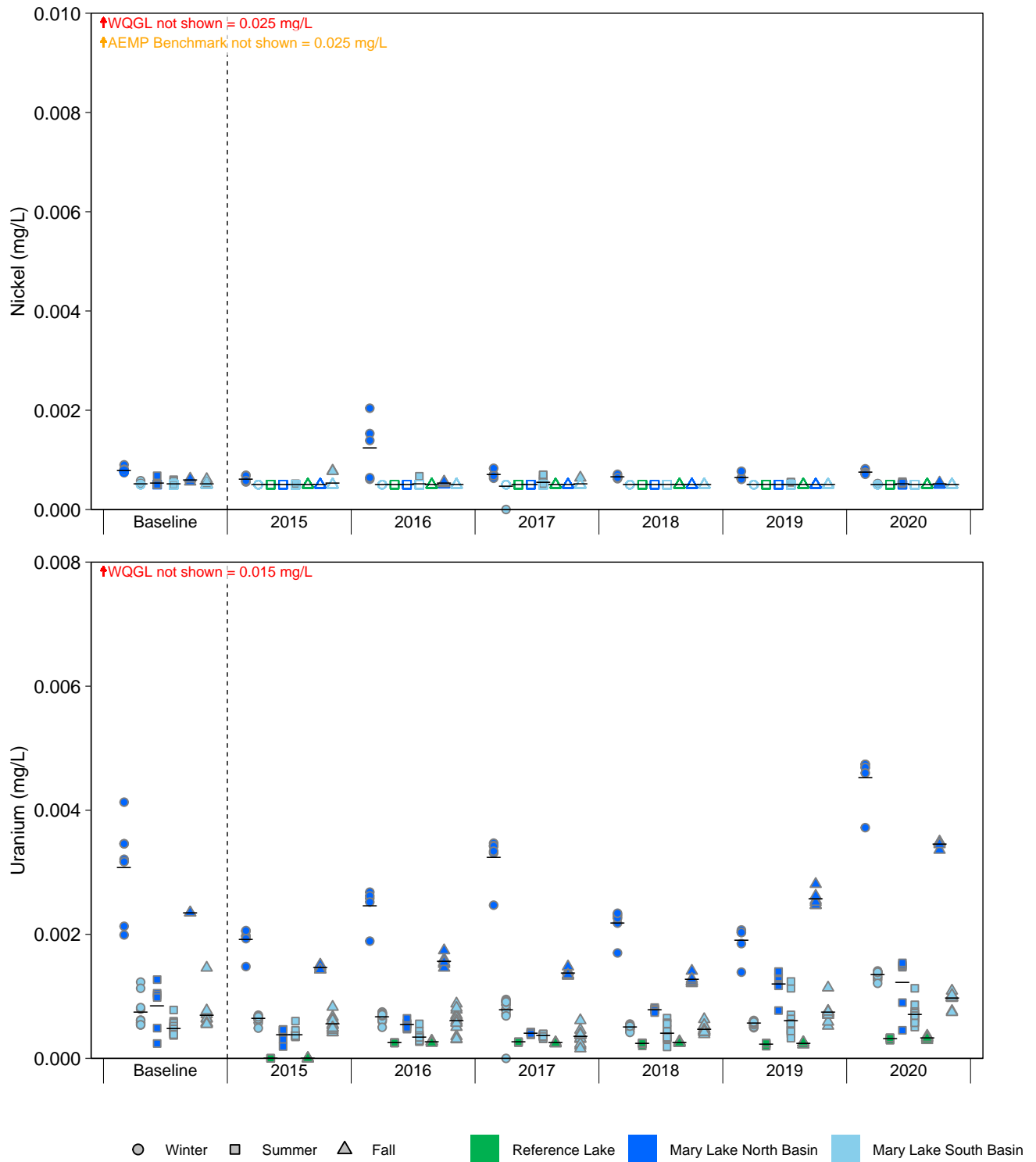
Notes: Concentrations below the laboratory reporting limit (LRL) are plotted as open symbols at the LRL and the open symbol represents one or more values reported below the LRL. Red line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.





**Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) 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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.



**Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2020) 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 line indicates Water Quality Guidelines; orange dashed line indicates AEMP Benchmark.

**Table C.1: *In Situ* Water Quality Data Collected from Lotic Environments for the Mary River Project CREMP, Spring 2020**

Study Area		Station	Sampling Date	<i>In Situ</i> Water Quality Parameter					
				Temperature (°C)	Dissolved Oxygen		pH	Specific Conductance (µS/cm)	Turbidity (NTU)
					(% saturated)	(mg/L)			
Camp Lake System	Reference Creek Stations	CLT-REF4	4-Jul-20	5.9	97.3	12.1	7.70	55.8	-0.30
		CLT-REF3	4-Jul-20	4.9	97.9	12.6	7.71	54.9	-0.84
		MRY-REF3	4-Jul-20	3.7	98.3	13.0	7.67	33.1	5.30
		MRY-REF2	4-Jul-20	5.5	98.1	12.4	7.62	56.9	-0.50
	CLT-1	L1-08	4-Jul-20	3.2	96.2	12.9	7.79	90.7	0.35
		L1-02	2-Jul-20	11.7	96.6	10.5	8.02	114.8	0.28
		L2-03	2-Jul-20	15.7	97.7	9.7	8.01	244.9	15.90
		L1-09	2-Jul-20	13.0	97.1	10.2	8.12	141.0	1.97
		L1-05	3-Jul-20	10.0	99.0	11.2	8.13	144.0	1.13
		L0-01	3-Jul-20	9.3	98.9	11.4	7.98	147.8	0.61
	CLT-2	K0-01	3-Jul-20	9.4	98.7	11.3	7.95	143.2	-0.54
	Camp Lake	J0-01	4-Jul-20	3.3	95.8	12.9	7.88	151.8	-0.07
Sheardown Lake System	SDL Tribs	D1-05	2-Jul-20	8.4	94.8	11.3	8.00	142.7	5.03
		D1-00	2-Jul-20	14.3	96.8	9.9	8.05	264.0	3.26
Mary River/Lake System	Tom River	I0-01	4-Jul-20	7.1	99.6	12.1	7.73	61.9	1.16
	Mary River	G0-09-A	4-Jul-20	4.9	95.5	12.3	7.75	66.6	-0.12
		G0-09	4-Jul-20	4.6	95.5	12.3	7.68	63.0	1.50
		G0-09-B	4-Jul-20	3.8	96.1	12.7	7.71	40.9	9.20
		G0-03	3-Jul-20	10.8	96.9	10.8	7.63	45.4	10.76
		G0-01	3-Jul-20	9.9	100.6	11.4	7.73	40.6	6.43
		F0-01	3-Jul-20	11.0	98.7	10.9	7.90	94.3	5.25
		E0-10	3-Jul-20	10.6	100.0	11.1	7.74	73.5	5.20
		E0-03	3-Jul-20	8.6	100.2	11.7	7.90	44.3	6.71
		E0-20	3-Jul-20	7.3	100.0	12.0	7.68	41.7	6.52
		E0-21	3-Jul-20	7.7	98.6	11.8	8.01	41.5	6.85
		C0-10	3-Jul-20	7.0	101.3	12.3	7.68	40.5	7.01
		C0-05	3-Jul-20	6.4	101.8	12.6	7.90	65.8	6.94
		C0-01	3-Jul-20	6.2	101.8	12.6	7.65	50.2	9.42

**Table C.2: *In Situ* Water Quality Data Collected from Lotic Environments for the Mary River Project CREMP, Summer 2020**

Study Area		Station	Sampling Date	<i>In Situ</i> Water Quality Parameter					
				Temperature (°C)	Dissolved Oxygen		pH	Specific Conductance (µS/cm)	Turbidity (NTU)
					(% saturated)	(mg/L)			
Camp Lake System	Reference Creek Stations	CLT-REF4	2-Aug-20	8.8	97.8	11.4	8.08	141.9	-0.96
		CLT-REF3	2-Aug-20	5.8	98.5	12.4	8.03	121.6	-0.82
		MRY-REF3	2-Aug-20	11.0	99.9	11.0	7.88	117.0	20.67
		MRY-REF2	2-Aug-20	13.3	101.0	10.6	8.06	126.3	0.28
	CLT-1	L1-08	2-Aug-20	4.6	99.0	12.8	8.01	151.5	-0.87
		L1-02	1-Aug-20	9.6	98.5	11.2	8.37	218.8	-1.97
		L2-03	1-Aug-20	12.7	97.2	10.3	8.11	376.5	1.09
		L1-09	1-Aug-20	10.9	99.2	11.0	8.28	265.4	-1.19
		L1-05	1-Aug-20	10.2	97.7	11.0	8.37	269.9	-0.84
		L0-01	1-Aug-20	10.5	99.2	11.1	8.34	280.3	-1.25
	CLT-2	K0-01	1-Aug-20	10.3	99.9	11.2	8.43	293.2	-1.65
	Camp Lake	J0-01	2-Aug-20	11.8	103.1	11.2	8.05	149.8	-0.49
Sheardown Lake System	SDL Tribs	D1-05	2-Aug-20	6.6	92.5	11.3	7.83	216.5	-1.05
		D1-00	2-Aug-20	9.8	96.1	10.9	7.96	453.1	0.67
Mary River/Lake System	Tom River	I0-01	2-Aug-20	10.6	100.4	11.2	8.31	216.3	-1.28
	Mary River	G0-09-A	2-Aug-20	9.0	96.1	11.2	8.15	187.2	14.52
		G0-09	1-Aug-20	10.0	96.8	10.9	8.38	184.9	31.42
		G0-09-B	1-Aug-20	10.2	96.7	10.9	8.33	172.4	24.20
		G0-03	1-Aug-20	4.8	96.5	11.0	8.02	161.5	42.01
		G0-01	31-Jul-20	13.3	98.5	10.3	8.31	167.1	21.01
		F0-01	31-Jul-20	11.7	97.7	10.6	8.33	335.6	-1.17
		E0-10	31-Jul-20	13.1	98.4	10.3	8.23	171.2	30.25
		E0-03	31-Jul-20	12.1	99.0	10.6	8.16	172.7	42.19
		E0-20	31-Jul-20	12.0	100.3	10.8	8.21	172.1	41.64
		E0-21	31-Jul-20	11.7	99.2	10.8	8.23	172.3	43.72
		C0-10	30-Jul-20	11.1	98.1	10.8	8.15	168.4	21.33
		C0-05	30-Jul-20	11.7	99.3	10.7	8.24	166.6	29.80
		C0-01	30-Jul-20	12.0	98.4	10.6	8.26	168.0	34.42

**Table C.3: *In Situ* Water Quality Data Collected From Lotic Environments for the Mary River Project CREMP, Fall 2020**

Study Area		Station	Sampling Date	<i>In Situ</i> Water Quality Parameter					
				Temperature (°C)	Dissolved Oxygen		pH	Specific Conductance (µS/cm)	Turbidity (NTU)
					(% saturated)	(mg/L)			
Camp Lake System	Reference Creek Stations	CLT-REF4	21-Aug-19	4.5	96.9	12.6	8.15	182.8	0.4
		CLT-REF3	21-Aug-19	2.9	98.3	13.3	8.04	101.6	0.5
		MRY-REF3	21-Aug-19	5.6	97.9	12.3	7.70	170.7	8.0
		MRY-REF2	21-Aug-19	5.1	97.5	12.5	8.02	182.4	0.6
	CLT-1	L1-08	18-Aug-19	2.7	97.8	13.3	8.21	188.9	0.3
		L1-02	19-Aug-19	4.8	97.7	12.6	8.20	243.9	0.2
		L2-03	19-Aug-19	11.7	98.3	10.7	8.01	443.3	2.3
		L1-09	19-Aug-19	4.8	96.7	12.4	7.98	301.9	0.6
		L1-05	19-Aug-19	4.7	97.2	12.5	8.02	304.0	0.6
		L0-01	19-Aug-19	9.5	97.2	11.1	8.27	310.4	0.7
	CLT-2	K0-01	19-Aug-19	10.1	99.2	11.2	8.42	341.7	0.2
	Camp Lake	J0-01	18-Aug-19	9.3	97.8	11.2	7.79	155.1	0.3
Sheardown Lake System	SDL Tribs	D1-05	19-Aug-19	5.3	94.9	12.0	7.98	243.3	0.2
		D1-00	19-Aug-19	10.3	98.6	11.1	8.16	365.2	2.3
Mary River/Lake System	Tom River	I0-01	19-Aug-19	6.3	99.4	12.3	8.25	263.5	0.2
	Mary River	G0-09-A	20-Aug-19	9.6	96.8	11.0	8.38	246.6	0.3
		G0-09	20-Aug-19	9.5	97.4	11.1	8.40	247.1	3.2
		G0-09-B	20-Aug-19	9.8	99.0	11.0	8.36	237.0	6.0
		G0-03	20-Aug-19	8.4	98.5	11.6	8.33	224.0	4.1
		G0-01	20-Aug-19	6.5	99.2	12.2	8.26	227.1	5.5
		F0-01	20-Aug-19	7.2	98.2	11.9	8.33	399.6	1.3
		E0-10	20-Aug-19	6.2	98.9	12.2	8.27	255.4	5.2
		E0-03	20-Aug-19	5.2	98.9	12.6	8.30	239.5	6.6
		E0-20	20-Aug-19	5.6	100.1	12.6	8.22	236.5	7.7
		E0-21	20-Aug-19	5.2	100.0	12.7	8.22	245.3	8.0
		C0-10	20-Aug-19	6.5	102.9	12.6	8.23	234.9	4.1
		C0-05	20-Aug-19	5.8	101.2	12.7	8.02	231.3	4.7
		C0-01	20-Aug-19	5.5	100.3	12.7	8.00	229.4	2.9

Table C.4: Dissolved Metal Concentrations at Reference Creek Monitoring Stations, Mary River Project CREMP, 2020

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
			04-Jul-20	04-Jul-20	04-Jul-20	04-Jul-20	03-Aug-20	03-Aug-20	03-Aug-20	03-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0200	0.0128	0.0289	0.0120	0.0055	0.0096	0.111	0.0173	0.0066	0.0083	0.0442	0.0152
	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	0.00275	0.00344	0.00330	0.00313	0.00588	0.00643	0.0106	0.00808	0.00709	0.00900	0.0142	0.0100
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	5.76	5.49	2.65	5.43	13.8	11.7	9.72	12.4	18.9	16.0	14.7	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
	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	<0.00050	0.00086	0.00053	<0.00050	0.00055	0.00110	0.00122	0.00065	0.00064	0.00119	0.00116	0.00071
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.054	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000077	<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	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	3.27	3.32	1.39	3.21	7.73	6.92	4.87	7.01	11.3	10.7	7.48	10.4
	Manganese (Mn)	mg/L	0.000105	0.000293	0.000726	0.000422	<0.000070	0.000805	0.00067	0.000526	0.000073	0.000955	0.000360	0.000611
	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	0.000094	0.000305	0.000134	0.000089	0.000353	0.000745	0.000639	0.000247	0.000563	0.000887	0.000619	0.000329
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00065	<0.00050	<0.00050	<0.00050	0.00075	<0.00050	<0.00050
	Potassium (K)	mg/L	0.38	0.43	0.44	0.43	0.68	0.73	1.14	0.85	0.83	0.96	1.31	1.05
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.51	0.61	0.42	0.43	0.64	0.86	1.22	0.66	0.60	0.91	1.08	0.79
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.584	0.575	1.14	0.959	2.33	1.56	4.71	2.66	3.38	2.22	6.73	4.09
	Strontium (Sr)	mg/L	0.00462	0.00385	0.00591	0.00467	0.0117	0.00841	0.0236	0.0123	0.0155	0.0115	0.0320	0.0164
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.00354	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000517	0.000447	0.000260	0.000330	0.00824	0.00423	0.00154	0.00212	0.0136	0.00854	0.00326	0.00372
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Note: "-" indicates no data reported.

**Table C.5: *In Situ* Water Quality Profile Data Collected at Reference Lake 3 Water Quality Monitoring Stations in Summer 2020, Mary River Project CREMP**

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
Date Collected	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20	2-Aug-20
1.0	12.0	12.2	12.2	10.89	10.78	10.80	101.0	100.6	100.7	7.90	7.93	8.03	76.0	76.3	76.0
2.0	12.0	12.2	12.2	10.91	10.84	10.83	101.1	100.7	100.9	7.88	7.83	7.95	76.1	76.2	76.0
3.0	11.9	12.2	12.2	10.94	10.77	10.83	101.2	100.3	101.0	7.87	7.75	7.93	76.1	76.1	76.1
4.0	11.6	12.2	12.2	11.17	10.80	10.83	102.1	100.6	101.0	7.85	7.74	7.91	76.1	76.2	76.1
5.0	10.4	12.1	12.2	11.53	10.79	10.83	103.1	100.1	100.9	7.83	7.72	7.89	76.0	76.5	76.1
6.0	9.3	8.2	9.2	11.99	12.33	11.86	104.3	104.1	101.8	7.75	7.61	7.85	76.1	75.6	76.4
7.0	8.4	7.5	7.5	12.35	12.48	12.41	105.3	104.0	103.3	7.76	7.56	7.78	75.6	75.4	75.8
8.0	7.3	7.3	7.3	12.60	12.51	12.52	104.6	103.5	103.3	7.72	7.53	7.74	75.7	75.5	75.5
9.0	7.2	7.1	6.9	12.64	12.56	12.54	104.4	103.6	103.1	7.70	7.51	7.70	75.4	75.4	75.5
10.0	6.7	7.0	6.7	12.74	12.56	12.57	104.2	103.6	102.7	7.68	7.50	7.67	75.5	75.5	75.4
11.0	6.3	6.8	6.7	12.77	12.56	12.57	103.5	103.0	102.6	7.66	7.48	7.65	75.2	75.4	75.4
12.0	5.8	6.6	6.6	12.84	12.57	12.57	102.7	102.5	102.4	7.64	7.47	7.64	75.5	75.4	75.4
13.0	5.7	6.4	6.5	12.81	12.60	12.61	102.2	102.0	102.2	7.61	7.45	7.63	75.4	75.4	75.5
14.0	5.7	6.2	6.3	12.79	12.60	12.61	101.7	101.8	102.1	7.60	7.43	7.62	75.4	75.4	75.4
15.0	5.4	6.1	6.2	12.71	12.60	12.63	100.6	101.6	101.9	7.56	7.42	7.62	75.4	75.4	75.4
16.0	5.3	6.1	-	12.71	12.60	-	100.4	101.3	-	7.58	7.41	-	75.4	75.4	-
17.0	5.3	5.9	-	12.58	12.59	-	100.0	100.8	-	7.55	7.40	-	75.4	75.4	-
18.0	5.2	5.8	-	12.67	12.61	-	99.7	100.8	-	7.54	7.40	-	75.4	75.4	-
19.0	5.2	5.7	-	12.65	12.61	-	99.5	100.6	-	7.54	7.38	-	75.4	75.4	-
20.0	5.1	5.4	-	12.63	12.54	-	99.2	99.3	-	7.53	7.30	-	75.4	75.4	-
21.0	5.1	5.4	-	12.61	12.54	-	98.9	99.3	-	7.52	7.31	-	75.4	75.4	-
22.0	5.1	5.4	-	12.60	12.53	-	98.7	99.1	-	7.52	7.32	-	75.5	75.5	-
23.0	5.0	5.4	-	12.57	12.51	-	98.4	98.9	-	7.51	7.32	-	75.5	75.5	-
24.0	4.9	5.3	-	12.55	12.48	-	98.1	98.5	-	7.50	7.31	-	75.5	75.5	-
25.0	4.9	5.3	-	12.54	12.46	-	98.0	98.3	-	7.49	7.31	-	75.5	75.5	-
26.0	4.9	-	-	12.52	-	-	97.8	-	-	7.49	-	-	75.5	-	-
27.0	4.9	-	-	12.49	-	-	97.5	-	-	7.48	-	-	75.5	-	-
28.0	4.9	-	-	12.48	-	-	97.4	-	-	7.48	-	-	75.5	-	-
29.0	4.8	-	-	12.44	-	-	97.0	-	-	7.47	-	-	75.5	-	-
30.0	4.8	-	-	12.42	-	-	96.8	-	-	7.47	-	-	75.5	-	-
31.0	4.8	-	-	12.42	-	-	96.7	-	-	7.47	-	-	75.5	-	-
32.0	4.8	-	-	12.41	-	-	96.6	-	-	7.46	-	-	75.5	-	-
33.0	4.8	-	-	12.39	-	-	96.4	-	-	7.45	-	-	75.5	-	-
34.0	4.8	-	-	12.37	-	-	96.3	-	-	7.45	-	-	75.5	-	-
35.0	4.7	-	-	12.35	-	-	96.1	-	-	7.45	-	-	75.5	-	-
36.0	4.7	-	-	12.31	-	-	95.8	-	-	7.45	-	-	75.5	-	-

Notes: "-" = no data / not applicable. Total depth at stations REF3-03, REF3-02, and REF3-01 was 36.7, 30.3, and 15.4 m, respectively, at the time of summer sampling.

**Table C.6: *In Situ* Water Quality Profile Data Collected at Reference Lake 3 Water Quality Monitoring Stations in Fall 2020, Mary River Project CREMP**

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
Date Collected	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20
1.0	8.9	8.8	8.6	11.56	11.58	11.51	99.5	99.6	98.7	7.82	7.86	7.85	76.6	76.8	77.5
2.0	8.7	8.7	8.5	11.60	11.57	11.56	99.6	99.3	98.8	7.79	7.82	7.82	76.3	76.7	76.9
3.0	8.6	8.6	8.4	11.60	11.58	11.56	99.5	99.3	98.7	7.78	7.82	7.81	76.3	76.7	76.8
4.0	8.6	8.6	8.4	11.61	11.56	11.56	99.3	99.0	98.6	7.77	7.81	7.80	76.3	76.6	76.8
5.0	8.3	8.5	8.4	11.61	11.58	11.56	98.8	98.9	98.6	7.76	7.80	7.80	76.3	76.5	76.6
6.0	8.3	8.4	8.4	11.60	11.57	11.54	98.6	98.7	98.4	7.77	7.79	7.79	76.3	76.4	76.5
7.0	8.2	8.4	8.3	11.59	11.56	11.53	98.4	98.5	98.2	7.76	7.79	7.79	76.3	76.4	76.5
8.0	8.2	8.3	8.3	11.58	11.54	11.53	98.3	98.3	98.1	7.78	7.78	7.79	76.3	76.4	76.4
9.0	8.2	8.3	8.3	11.58	11.54	11.53	98.3	98.2	98.1	7.77	7.78	7.78	76.3	76.4	76.4
10.0	8.2	8.3	8.3	11.58	11.53	11.52	98.2	98.1	97.9	7.77	7.78	7.78	76.3	76.4	76.5
11.0	8.2	8.3	8.2	11.57	11.52	11.52	98.2	98.0	97.8	7.77	7.77	7.77	76.3	76.4	76.5
12.0	8.2	8.3	8.2	11.57	11.52	11.51	98.2	97.9	97.7	7.77	7.77	7.77	76.3	76.4	76.5
13.0	8.2	8.3	8.2	11.56	11.51	11.50	98.1	97.8	97.7	7.77	7.77	7.76	76.3	76.4	76.4
14.0	8.2	8.3	-	11.55	11.53	-	98.0	98.0	-	7.78	7.77	-	76.3	76.3	-
15.0	8.1	8.2	-	11.54	11.53	-	97.8	98.0	-	7.77	7.77	-	76.3	76.3	-
16.0	8.1	8.2	-	11.54	11.53	-	97.7	97.9	-	7.77	7.77	-	76.3	76.3	-
17.0	8.1	8.2	-	11.54	11.52	-	97.7	97.8	-	7.76	7.76	-	76.3	76.3	-
18.0	8.1	8.2	-	11.53	11.51	-	97.7	97.7	-	7.76	7.76	-	76.3	76.3	-
19.0	8.1	8.1	-	11.52	11.49	-	97.6	97.3	-	7.77	7.75	-	76.3	76.3	-
20.0	8.0	8.1	-	11.51	11.47	-	97.3	97.1	-	7.76	7.74	-	76.3	76.3	-
21.0	7.9	8.0	-	11.52	11.49	-	97.9	96.9	-	7.75	7.73	-	76.3	76.3	-
22.0	7.0	7.6	-	11.64	11.49	-	96.5	96.2	-	7.71	7.68	-	76.3	76.3	-
23.0	6.3	7.5	-	11.88	11.47	-	95.7	95.2	-	7.65	7.66	-	76.2	76.2	-
24.0	5.4	6.8	-	12.11	11.57	-	95.9	94.0	-	7.57	7.60	-	75.7	75.8	-
25.0	5.1	6.0	-	12.16	11.62	-	95.5	93.4	-	7.52	7.50	-	75.4	75.9	-
26.0	5.1	5.9	-	12.14	11.53	-	95.3	92.4	-	7.48	7.45	-	75.3	75.8	-
27.0	5.0	-	-	12.04	-	-	94.3	-	-	7.43	-	-	75.5	-	-
28.0	5.0	-	-	11.98	-	-	93.8	-	-	7.41	-	-	75.5	-	-
29.0	4.9	-	-	11.86	-	-	92.8	-	-	7.39	-	-	75.5	-	-
30.0	4.9	-	-	11.76	-	-	92.0	-	-	7.37	-	-	76.6	-	-
31.0	4.9	-	-	11.62	-	-	90.8	-	-	7.35	-	-	75.6	-	-
32.0	4.8	-	-	11.24	-	-	87.7	-	-	7.30	-	-	75.8	-	-
33.0	4.8	-	-	10.57	-	-	82.3	-	-	7.23	-	-	76.1	-	-

Notes: "-" = no data / not applicable. Total depth at stations REF3-03, REF3-02, and REF3-01 was 36.7, 30.3, and 15.4 m, respectively, at the time of fall sampling.




**Table C.7: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Reference Lake 3 Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**

Replicate ID	Date Sampled	Station Depth (m)	Secchi Depth (m)	Colour/ Clarity	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (pH units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
REF 03-1	14-Aug-20	10.5	8.05	clear, colourless	surface	10.1	12.71	114.4	7.67	75.5
					bottom	9.7	11.94	108.2	7.12	76.8
REF 03-2	14-Aug-20	-	7.4	clear, colourless	surface	10.3	13.09	118.5	7.38	74.9
					bottom	9.2	11.83	104.6	6.94	82.1
REF 03-3	14-Aug-20	10.0	9.15	clear, colourless	surface	10.1	12.59	112.6	7.41	74.9
					bottom	9.4	13.00	115.0	7.56	75.2
REF 03-4	14-Aug-20	8.5	8.12	clear, colourless	surface	10.2	13.33	120.5	7.16	74.9
					bottom	9.4	13.03	115.0	7.13	74.8
REF 03-5	14-Aug-20	11.0	7.92	clear, colourless	surface	9.8	12.99	116.0	7.26	74.8
					bottom	8.9	13.34	116.7	7.20	74.5
REF 03-6	14-Aug-20	20.5	8.55	clear, colourless	surface	10.2	12.46	112.4	7.20	75.1
					bottom	6.1	13.73	112.0	6.94	78.1
REF 03-7	14-Aug-20	23.0	8.10	clear, colourless	surface	10.2	12.79	115.2	7.35	75.2
					bottom	5.8	12.82	103.5	6.27	76.0
REF 03-8	14-Aug-20	19.0	9.84	clear, colourless	surface	10.2	13.42	121.4	7.27	75.1
					bottom	5.7	15.78	127.9	6.95	75.2
REF 03-9	15-Aug-20	21.0	7.18	clear, colourless	surface	9.6	10.92	97.3	7.13	75.0
					bottom	5.6	12.93	104.2	6.53	74.0
REF 03-10	15-Aug-20	19.5	8.29	clear, colourless	surface	9.7	10.81	96.6	6.89	75.0
					bottom	5.9	12.91	105.2	6.82	74.3

Note: "-" indicates data not collected.

**Table C.8: Statistical Comparison of Bottom *In Situ* Water Quality Between Littoral and Profundal Stations of Reference Lake 3, Mary River Project CREMP, August 2020**

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Station Type	n	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	none	NO	0.621	Littoral	5	8.1	0.6	0.3	7.4	9.2
					Profundal	5	8.4	1.0	0.4	7.2	9.8
Temperature (°C)	tequal	none	YES	0.001	Littoral	5	9.3	0.3	0.1	8.9	9.7
					Profundal	5	5.8	0.2	0.1	5.6	6.1
Dissolved Oxygen (mg/L)	tequal	log10	NO	0.147	Littoral	5	12.6	0.7	0.3	11.8	13.3
					Profundal	5	13.6	1.3	0.6	12.8	15.8
Dissolved Oxygen (% saturation)	tequal	none	NO	0.801	Littoral	5	111.9	5.2	2.3	104.6	116.7
					Profundal	5	110.6	10.3	4.6	103.5	127.9
pH (units)	tequal	none	YES	0.019	Littoral	5	7.19	0.23	0.10	6.94	7.56
					Profundal	5	6.70	0.30	0.13	6.27	6.95
Specific Conductance (µS/cm)	M-W	rank	NO	0.600	Littoral	5	76.7	3.2	1.4	74.5	82.1
					Profundal	5	75.5	1.6	0.7	74.0	78.1

 Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).

**Table C.9: Dissolved Metal Concentrations at Reference Lake 3 Monitoring Stations, Mary River Project CREMP, 2020**

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
			02-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20	29-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0614	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	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
	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	0.00643	0.00618	0.00626	0.00609	0.00618	0.00624	0.00649	0.00637	0.00644	0.00632	0.00633	0.00630
	Beryllium (Be)	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
	Bismuth (Bi)	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
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	6.83	6.75	7.19	7.26	6.69	7.00	7.20	7.33	7.21	7.26	7.11	7.23
	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	0.00072	0.00069	0.00070	0.00068	0.00068	0.00069	0.00074	0.00074	0.00070	0.00074	0.00071	0.00072
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	4.32	4.22	4.31	4.19	4.24	4.25	4.88	4.88	4.88	4.86	4.75	4.80
	Manganese (Mn)	mg/L	0.000211	0.000247	0.000140	0.000279	0.000225	0.000241	0.000143	0.000160	0.000079	0.000159	0.000117	0.000164
	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	0.000129	0.000119	0.000129	0.000133	0.000133	0.000136	0.000153	0.000180	0.000151	0.000152	0.000146	0.000148
	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	0.89	0.86	0.86	0.85	0.84	0.86	0.92	0.97	0.91	0.94	0.89	1.03
	Selenium (Se)	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
	Silicon (Si)	mg/L	0.48	0.44	0.50	0.47	0.48	0.47	0.48	0.47	0.49	0.47	0.54	0.48
	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	0.980	0.889	0.906	0.879	0.868	0.896	1.00	1.02	1.01	1.00	0.993	1.13
	Strontium (Sr)	mg/L	0.00788	0.00799	0.00837	0.00839	0.00826	0.00834	0.00807	0.00811	0.00809	0.00813	0.00796	0.00828
	Thallium (Tl)	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
	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	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Uranium (U)	mg/L	0.000293	0.000307	0.000306	0.000318	0.000292	0.000313	0.000345	0.000354	0.000322	0.000340	0.000296	0.000329	
Vanadium (V)	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	
Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	

**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, 2020**

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
Conventional <sup>b</sup>	Conductivity (lab)	0.4	1.3	5.0	2.8	39	5	4	0	2.7	6.4	0.7	2.3	29	0.5	5.9	6.3	1.1
	pH (lab)	2.8	2.0	2.4	2.0	3.7	1.5	4.0	0.5	1.2	5.4	0.5	2.3	4.4	0.4	1.2	3.2	0.9
	Hardness (as CaCO <sub>3</sub> )	1.6	0.7	6.5	2.5	41	5.1	3.3	1.5	2.1	8.4	0.9	3.4	27	0.6	4.0	8.1	1.2
	Total Suspended Solids (TSS)	0	0	0	1.0	0	0	21	0	0	0	6.0	0	0	0	0	15	6.6
	Total Dissolved Solids (TDS)	15	11	7.8	5.7	78	2.6	9.3	16	7.1	9.6	17	3.4	30	3.7	11	9.9	7.9
	Turbidity	15	15	26	9.5	29	20	24	5.8	54	39	4.0	52	36	10.0	14	31	5.6
	Alkalinity (as CaCO <sub>3</sub> )	9.3	3.9	5.7	2.6	32	5.6	3.7	19	2.4	6.6	1.1	2.3	28	2.0	5.3	7.6	3.0
Nutrients and Organics	Total Ammonia	0	25	56	1.5	13	52	3.8	24	38	38	4.8	0	68	0	0	0	0
	Nitrate	0	0	70	13	19	13	10	12	7.4	27	13	17	46	46	18	22	33
	Nitrite	0	0	0	0	0	0	36	0	0	26	0	0	15	0	0	0	0
	Total Kjeldahl Nitrogen (TKN)	0	4.2	28	8.2	2.9	12	8.9	3.7	1.3	13	1.3	10.0	6.0	6.3	10	0	0
	Dissolved Organic Carbon	1.9	3.7	15	27	31	9.8	16	3.6	13	38	13	10	31	16	5.4	17	8.3
	Total Organic Carbon	2.8	2.9	8.9	5.4	17	5.6	11	5.2	5.0	8.4	3.1	6.4	9.5	51	6.5	11	6.8
	Total Phosphorus	39	4.2	39	36	34	84	22	38	24	27	23	20	42	30	1.4	30	45
Anions	Phenols	0	9.2	34	53	23	14	10	43	1.9	36	0	28	0	0	8.0	0	16
	Bromide (Br)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Chloride (Cl)	3.6	0.7	14	2.6	34	5.3	3.9	0.6	2.9	5.1	1.1	2.9	41	1.2	6.0	9.6	4.9
	Sulphate (SO <sub>4</sub> )	1.3	0.5	7.0	2.9	44	5.4	7.5	0.1	4.9	9.9	0.7	7.6	38	1.1	6.4	7.3	4.4
Total Metals	Aluminum (Al)	4.2	10	102	16	20	50	41	41	42	48	10	17	40	16	25	40	14
	Antimony (Sb)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Arsenic (As)	0	0	1.9	0	0	0	0	1.6	1.9	0	0	6.1	29	0	0	0	1.4
	Barium (Ba)	3.8	13	4.9	5.0	42	5.3	3.2	2.1	2.9	2.3	3.5	4.1	25	2.4	4.7	9.9	3.0
	Boron (B)	0	0	0	0	0	5.8	23	2.6	3.4	0	0	0	0	0	0	0	0
	Cadmium (Cd)	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Calcium (Ca)	2.4	2.4	7.2	3.3	41	5.7	4.3	1.3	2.8	6.8	1.5	2.5	27	0.6	3.4	6.0	0.8
	Chromium (Cr)	0	0	0	21	0	0	15	0	0	21	0	0	28	0	0	0	0
	Cobalt (Co)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Copper (Cu)	2.3	5.3	17	5.8	17	11	5.4	2.8	9.6	4.6	12	20	18	2.7	5.4	9.0	6.4
	Iron (Fe)	0	0	0	36	0	0	42	14	0	50	5.7	12	50	0	0	29	9.1
	Lead (Pb)	0	0	48	0	0	11	0	0	0	10	9.0	0	6.1	0	0	22	0
	Lithium (Li)	0	0	6.0	4.9	3.3	8.8	9.0	3.2	6.4	8.6	11	6.9	3.2	10	0	0	0
	Magnesium (Mg)	2.6	1.6	4.6	1.4	41	5.0	6.1	1.2	3.5	4.2	1.0	1.4	28	2.1	4.7	9.6	2.8
	Manganese (Mn)	8.9	11	58	12	43	39	44	38	37	54	2.2	79	47	2.9	45	35	13
	Mercury (Hg)	0	0	0	0	0	2.8	0	0	0	0	0	0	0	0	2.3	5.0	0
	Molybdenum (Mo)	3.1	8.8	16	8.9	35	9.0	4.5	2.2	7.6	10	2.3	9.8	35	0.4	6.3	39	6.4
	Nickel (Ni)	0	0	18	7.6	6.3	9.0	3.9	3.4	5.1	9.9	2.6	5.7	7.6	3.9	1.7	0	0
	Potassium (K)	2.3	0.7	8.1	2.8	30	6.3	4.0	1.3	4.3	2.6	0.5	2.4	23	0.6	5.4	8.3	1.8
	Selenium (Se)	0	0	0	0.7	0	0	7.1	0	0	0	0	0	0	0	0	0	0
	Silicon (Si)	4.7	6.6	26	2.2	25	15	4.8	2.4	16	19	4.1	16	7.5	2.3	6.8	9.8	4.7
	Silver (Ag)	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0	0	0
	Sodium (Na)	2.5	1.5	12	3.6	40	6.0	6.1	1.0	3.4	4.4	1.3	2.6	41	1.4	4.4	11	2.1
	Strontium (Sr)	5.2	1.1	5.7	3.9	41	5.3	4.9	0.5	2.1	5.5	0.8	2.8	33	3.0	6.7	7.6	2.0
	Thallium (Tl)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tin (Sn)	0	0	6.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Titanium (Ti)	0	0	0	27	0	0	44	0	0	62	0	0	66	0	0	0	0
	Uranium (U)	8.9	8.2	11	6.5	43	6.7	7.7	1.3	3.8	13	1.0	7.8	53	1.6	5.8	14	2.3
	Vanadium (V)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Zinc (Zn)	0	0	38	32	0	16	0	0	20	0	0	0	0	0	0	18	0

Note: Shaded values indicate RDP >30%.

**Table C.11: *In Situ* Water Quality Measurements Collected at Camp Lake Tributary 1 and Tributary 2 Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**


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	10-Aug-20	9.9	10.42	95.3	7.71	132.4
	REF-CRK-B2	10-Aug-20	9.0	10.61	94.6	7.58	132.8
	REF-CRK-B3	10-Aug-20	8.4	10.68	93.2	7.48	132.8
	REF-CRK-B4	10-Aug-20	8.0	11.09	96.5	7.50	130.8
	REF-CRK-B5	10-Aug-20	7.6	11.30	98.0	7.57	133.0
Camp Lake Tributary 1 Upstream	CLT-1-US-B1	17-Aug-20	7.9	10.51	92.0	8.22	240.0
	CLT-1-US B2	17-Aug-20	7.8	10.59	92.5	8.17	241.0
	CLT-1-US-B3	17-Aug-20	7.8	10.72	93.4	8.17	243.2
	CLT-1-US-B4	17-Aug-20	7.7	10.74	93.6	8.17	246.6
	CLT-1-US-B5	17-Aug-20	8.4	10.27	91.3	8.13	318.0
Camp Lake Tributary 1 Downstream	CLT-1-DS-B1	8-Aug-20	12.4	11.67	115.5	8.30	292.2
	CLT-1-DS-B2	8-Aug-20	12.3	11.23	107.3	7.91	299.0
	CLT-1-DS-B3	8-Aug-20	12.2	11.43	109.7	7.96	289.0
	CLT-1-DS-B4	8-Aug-20	11.9	11.55	110.7	8.18	289.3
	CLT-1-DS-B5	8-Aug-20	11.5	11.94	112.8	8.03	289.0
Camp Lake Tributary 2 Upstream	CLT-2-US-B1	9-Aug-20	11.1	10.90	103.4	8.26	307.4
	CLT-2-US-B2	9-Aug-20	11.0	11.22	103.4	8.09	307.7
	CLT-2-US-B3	9-Aug-20	10.4	11.61	106.9	8.18	307.4
	CLT-2-US-B4	9-Aug-20	10.2	11.69	107.0	8.13	287.5
	CLT-2-US-B5	9-Aug-20	9.5	11.66	105.8	8.20	308.1
Camp Lake Tributary 2 Downstream	CLT-2-DS-B1	9-Aug-20	8.7	12.63	111.5	8.33	311.5
	CLT-2-DS-B2	9-Aug-20	8.3	12.68	110.3	8.10	311.2
	CLT-2-DS-B3	9-Aug-20	7.8	12.91	111.5	8.08	309.7
	CLT-2-DS-B4	9-Aug-20	6.1	13.64	113.0	8.00	312.0
	CLT-2-DS-B5	9-Aug-20	5.9	13.85	115.0	8.03	310.0

**Table C.12: *In Situ* Water Quality Summary Statistics for the Camp Lake Tributary Benthic Stations, Mary River Project CREMP, August 2020**

Metric	Study Area	Sample Size	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Water Temperature (°C)	REF-CRK Unnamed Reference Creek	5	8.6	0.9	0.4	7.9	9.2	7.6	9.9
	CLT1-US North Branch	5	7.9	0.3	0.1	7.7	8.1	7.7	8.4
	CLT1-DS Lower Main Stem	5	12.1	0.4	0.2	11.8	12.3	11.5	12.4
	CLT2-US Upstream	5	10.4	0.7	0.3	10.0	10.9	9.5	11.1
	CLT2-DS Downstream	5	7.4	1.3	0.6	6.4	8.3	5.9	8.7
Dissolved Oxygen (mg/L)	REF-CRK Unnamed Reference Creek	5	10.82	0.36	0.16	10.55	11.09	10.42	11.30
	CLT1-US North Branch	5	10.57	0.19	0.09	10.43	10.71	10.27	10.74
	CLT1-DS Lower Main Stem	5	11.56	0.27	0.12	11.37	11.76	11.23	11.94
	CLT2-US Upstream	5	11.42	0.35	0.15	11.16	11.67	10.90	11.69
	CLT2-DS Downstream	5	13.14	0.57	0.25	12.73	13.56	12.63	13.85
Dissolved Oxygen (% Saturation)	REF-CRK Unnamed Reference Creek	5	95.5	1.8	0.8	94.2	96.9	93.2	98.0
	CLT1-US North Branch	5	92.6	1.0	0.4	91.9	93.3	91.3	93.6
	CLT1-DS Lower Main Stem	5	111.2	3.1	1.4	108.9	113.5	107.3	115.5
	CLT2-US Upstream	5	105.3	1.8	0.8	104.0	106.6	103.4	107.0
	CLT2-DS Downstream	5	112.3	1.8	0.8	110.9	113.6	110.3	115.0
pH (units)	REF-CRK Unnamed Reference Creek	5	7.57	0.09	0.04	7.50	7.63	7.48	7.71
	CLT1-US North Branch	5	8.17	0.03	0.01	8.15	8.20	8.13	8.22
	CLT1-DS Lower Main Stem	5	8.08	0.16	0.07	7.96	8.19	7.91	8.30
	CLT2-US Upstream	5	8.17	0.07	0.03	8.12	8.22	8.09	8.26
	CLT2-DS Downstream	5	8.11	0.13	0.06	8.01	8.20	8.00	8.33
Specific Conductance (µS/cm)	REF-CRK Unnamed Reference Creek	5	132	0.9	0.4	132	133	131	133
	CLT1-US North Branch	5	258	33.8	15.1	233	283	240	318
	CLT1-DS Lower Main Stem	5	292	4.3	1.9	289	295	289	299
	CLT2-US Upstream	5	304	9.0	4.0	297	310	288	308
	CLT2-DS Downstream	5	311	1.0	0.4	310	312	310	312

**Table C.13: *In Situ* Water Quality Statistical Comparisons among Camp Lake Tributary 1 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2020**

Metric	Overall 3-group Comparison				Pair-wise, <i>post hoc</i> comparisons <sup>a</sup>			
	Statistical Test <sup>a</sup>	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	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.215
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	<0.001
					CLT1 North Branch	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	0.360
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.003
					CLT1 North Branch	CLT1 Lower Main Stem	YES	<0.001
Dissolved Oxygen (% saturation)	ANOVA	none	YES	< 0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.117
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Lower Main Stem	YES	<0.001
pH (units)	ANOVA	none	YES	< 0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Lower Main Stem	NO	0.371
Specific Conductance (µS/cm)	K-W	rank	YES	0.0050	REF-CRK Unnamed Reference Creek	CLT1 North Branch	YES	0.034
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.001
					CLT1 North Branch	CLT1 Lower Main Stem	NO	0.288

 Highlighted values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> 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, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Spring Sampling Event						
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					04-Jul-20	02-Jul-20	02-Jul-20	02-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20
Conventionals	Conductivity (lab)	µS/cm	-	-	97.5	124	258	151	155	160	154
	pH (lab)	pH	6.5 - 9.0	-	7.93	8.14	8.16	8.23	8.15	8.20	8.18
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	44.5	59.9	103	68.7	69.3	71.2	70.4
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	2.7	9.9	2.6	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	92	80	158	109	118	104	120
	Turbidity	NTU	-	-	1.27	1.15	15.8	3.17	2.07	1.68	0.55
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	46	59	93	66	70	70	62
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.064	0.011	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.081	<0.020	1.03	0.151	0.159	0.137	0.135
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	0.0089	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.081	<0.021	1.0389	0.151	0.159	0.137	0.135
	Dissolved Organic Carbon	mg/L	-	-	2.27	3.03	4.79	3.32	3.50	3.41	2.81
	Total Organic Carbon	mg/L	-	-	2.62	4.38	5.87	4.78	4.57	4.68	3.86
	Total Phosphorus	mg/L	0.030 <sup>α</sup>	-	0.0042	0.0032	0.0197	0.0033	0.0184	<0.0030	0.0075
	Phenols	mg/L	0.004 <sup>α</sup>	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<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	1.26	1.57	16.4	4.33	4.47	4.41	2.38
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	2.59	2.55	8.22	3.50	3.36	3.57	11.8
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0248	0.0139	0.270	0.0560	0.0546	0.0592	0.0229
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<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	0.00018	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00691	0.00825	0.0124	0.00884	0.00880	0.00903	0.00856
	Beryllium (Be)	mg/L	0.011 <sup>α</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	8.67	11.8	20.6	13.7	14.0	14.5	13.9
	Chromium (Cr)	mg/L	0.0089	0.000856	<0.00050	<0.00050	0.00059	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	<0.00010	<0.00010	0.00027	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00221	0.00190	0.00164	0.00192	0.00184	0.00179	0.00116
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	0.420	0.087	0.081	0.073	<0.030
	Lead (Pb)	mg/L	0.001	0.001	0.000056	<0.000050	0.000987	0.000116	0.000100	0.000091	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0033	0.0014	0.0015	0.0016	0.0012
	Magnesium (Mg)	mg/L	-	-	5.62	7.23	13.1	8.42	8.78	9.19	8.91
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00104	0.000528	0.0197	0.00381	0.00352	0.00280	0.000933
	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	-	0.000570	0.000435	0.00199	0.000727	0.000758	0.000710	0.000308
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00060	0.00711	0.00080	0.00080	0.00085	0.00052
	Potassium (K)	mg/L	-	-	1.47	1.39	2.85	1.67	1.67	1.66	1.20
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.66	0.67	1.23	0.78	0.79	0.82	0.67
	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	-	-	0.470	0.897	9.30	2.34	2.47	2.48	1.85
	Strontium (Sr)	mg/L	-	-	0.00601	0.00658	0.0202	0.0103	0.0114	0.0113	0.00886
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00111	0.000707	0.0150	0.00268	0.00280	0.00247	0.000625
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	0.0034	<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.

<sup>a</sup> 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.

<sup>b</sup> 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, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Summer Sampling Event						
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					03-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20
Conventionals	Conductivity (lab)	µS/cm	-	-	157	227	393	274	283	289	300
	pH (lab)	pH	6.5 - 9.0	-	8.03	8.24	8.01	8.21	8.22	8.26	8.34
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	73	108	147	121	125	138	147
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	2.1	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	92	109	191	125	129	141	153
	Turbidity	NTU	-	-	0.24	0.14	2.38	0.81	0.84	0.71	0.20
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	78	110	138	120	120	125	134
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.024	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.127	0.021	1.52	0.277	0.306	0.256	0.047
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	0.0099	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	0.32	0.18	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.64	3.37	6.01	5.27	4.35	4.67	3.88
	Total Organic Carbon	mg/L	-	-	3.60	4.10	7.48	5.01	5.83	5.69	4.36
	Total Phosphorus	mg/L	0.030 <sup>α</sup>	-	<0.0030	<0.0030	0.0093	<0.0030	0.0033	<0.0030	<0.0030
	Phenols	mg/L	0.004 <sup>α</sup>	-	<0.0010	0.0015	0.0012	<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	2.02	3.99	27.7	10.4	11.2	12.1	9.11
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	5.00	5.34	16.4	7.51	7.87	8.54	14.9
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0122	0.0051	0.0495	0.0151	0.0164	0.0147	0.0094
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<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	0.00015	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0105	0.0138	0.0151	0.0141	0.0144	0.0156	0.0155
	Beryllium (Be)	mg/L	0.011 <sup>α</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.025	0.012	0.012	0.011	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	14.7	20.9	29.4	24.6	24.8	26.5	27.6
	Chromium (Cr)	mg/L	0.0089	0.000856	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	<0.00010	<0.00010	0.00019	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	<b>0.00226</b>	0.00217	0.00134	0.00190	0.00194	0.00199	0.00159
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	<b>0.423</b>	0.135	0.134	0.100	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	0.000092	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	0.0015	0.0042	0.0025	0.0026	0.0027	0.0021
	Magnesium (Mg)	mg/L	-	-	9.05	13.4	19.1	15.2	15.3	16.5	16.6
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000710	0.000556	0.0323	0.00933	0.00890	0.00715	0.00230
	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	-	0.00143	0.000882	0.00361	0.00138	0.00137	0.00122	0.000594
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00064	0.00139	0.00092	0.00107	0.00125	0.00074
	Potassium (K)	mg/L	-	-	2.38	2.22	4.05	2.67	2.56	2.69	2.10
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.84	0.99	0.94	1.08	1.11	1.18	0.86
	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	-	-	0.779	2.27	16.0	5.85	5.70	5.92	5.68
	Strontium (Sr)	mg/L	-	-	0.0111	0.0126	0.0311	0.0221	0.0233	0.0239	0.0195
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00559	0.00348	<b>0.0247</b>	0.00786	0.00751	0.00672	0.00326
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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.

<sup>a</sup> 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.

<sup>b</sup> 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, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Fall Sampling Event						
					LI-08	L1-02	L2-03	L1-09	L0-05	L0-01	K0-01
					28-Aug-20	30-Aug-20	29-Aug-20	30-Aug-20	30-Aug-20	29-Aug-20	29-Aug-20
Conventionals	Conductivity (lab)	µS/cm	-	-	190	242	449	288	298	315	345
	pH (lab)	pH	6.5 - 9.0	-	8.08	8.20	8.11	8.17	8.18	8.33	8.43
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	100	125	191	145	149	153	167
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	97	<10	236	85	81	163	192
	Turbidity	NTU	-	-	0.24	0.12	2.62	1.40	0.63	0.62	0.23
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	88	113	156	134	135	130	136
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.022	<0.010	0.036	0.015	0.014	<0.010	<0.010
	Nitrate	mg/L	3	3	0.101	0.049	1.71	0.345	0.383	0.322	0.148
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	0.0124	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	0.54	0.16	0.21	0.16	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.49	2.52	8.00	3.54	3.54	4.28	3.08
	Total Organic Carbon	mg/L	-	-	2.70	3.02	6.86	3.94	4.07	4.22	3.50
	Total Phosphorus	mg/L	0.030 <sup>α</sup>	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	Phenols	mg/L	0.004 <sup>α</sup>	-	<0.0010	<0.0010	0.0018	0.0017	0.0010	0.0012	0.0017
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	3.01	6.05	34.4	14.1	14.7	15.2	13.6
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	6.38	8.11	19.6	10.7	10.8	11.9	26.2
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0104	0.0055	0.0979	0.0092	0.0117	0.0162	0.0089
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<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	0.00014	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0122	0.0151	0.0180	0.0160	0.0162	0.0164	0.0184
	Beryllium (Be)	mg/L	0.011 <sup>α</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.023	0.012	0.012	0.012	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	19.3	24.3	35.7	28.0	27.7	28.6	31.8
	Chromium (Cr)	mg/L	0.0089	0.000856	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	<0.00010	<0.00010	0.00024	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00216	0.00216	0.00159	0.00199	0.00200	0.00189	0.00152
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	0.522	0.111	0.104	0.084	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	0.000222	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	0.0015	0.0042	0.0024	0.0025	0.0028	0.0019
	Magnesium (Mg)	mg/L	-	-	12.1	15.7	24.2	18.0	18.2	18.4	20.3
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000673	0.000554	0.0382	0.00920	0.00774	0.00603	0.000767
	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	-	0.00152	0.00102	0.00385	0.00154	0.00149	0.00141	0.000734
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00063	0.00165	0.00089	0.00106	0.00106	0.00065
	Potassium (K)	mg/L	-	-	2.60	2.52	4.40	2.81	2.79	2.79	2.45
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.93	0.98	1.08	1.05	1.11	1.16	0.72
	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	-	-	0.885	2.80	19.0	6.93	6.98	7.09	7.36
	Strontium (Sr)	mg/L	-	-	0.0147	0.0146	0.0385	0.0268	0.0273	0.0271	0.0221
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00972	0.00589	0.0332	0.0110	0.0103	0.00935	0.00460
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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.

<sup>a</sup> 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.

<sup>b</sup> 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 (Total Metal Concentration Data Provided) Between the Camp Lake Tributaries and Average Reference Creek Stations, Mary River Project CREMP, 2020**

Parameter	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01
Conductivity (lab)	2.0	4.7	2.8	2.8	1.4	2.9	2.1	2.2	1.2	2.6	1.7	2.0
Hardness (as CaCO <sub>3</sub> )	2.2	4.4	3.0	3.0	1.6	2.6	2.2	2.6	1.4	2.3	1.8	2.0
Total Suspended Solids (TSS)	0.7	3.1	0.7	0.6	0.7	0.7	0.8	0.7	1.0	1.0	1.0	1.0
Total Dissolved Solids (TDS)	1.0	1.9	1.3	1.4	1.2	2.3	1.6	1.8	0.5	2.4	1.1	1.9
Turbidity	0.6	8.4	1.2	0.3	0.0	0.4	0.1	0.0	0.1	1.1	0.4	0.1
Alkalinity (as CaCO <sub>3</sub> )	2.2	3.9	2.9	2.6	1.5	2.3	2.0	2.2	1.5	2.3	1.9	2.0
Total Ammonia	1.0	6.4	1.0	1.0	0.8	2.0	0.8	0.8	1.6	3.6	1.3	1.0
Nitrate	2.5	52	7.5	6.8	1.2	25	4.5	0.8	1.0	23	4.6	2.0
Nitrite	1.0	1.8	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.5	1.0	1.0
Total Kjeldahl Nitrogen (TKN)	2.4	49	7.1	6.4	1.0	2.1	1.1	1.0	1.0	3.6	1.2	1.0
Dissolved Organic Carbon	1.4	2.5	1.8	1.5	0.9	1.7	1.4	1.1	1.1	3.5	1.6	1.3
Total Organic Carbon	1.6	2.6	2.1	1.7	1.3	2.5	1.8	1.4	1.3	3.2	1.9	1.6
Total Phosphorus	0.8	4.4	1.8	1.7	0.5	1.4	0.5	0.5	0.8	0.8	0.8	0.8
Phenols	1.0	1.0	1.0	1.0	1.3	1.2	1.0	1.0	0.5	0.9	0.6	0.8
Bromide (Br)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Chloride (Cl)	1.2	13	3.6	2.0	0.7	6.8	2.8	2.2	0.6	4.9	2.1	1.9
Sulphate (SO <sub>4</sub> )	2.0	6.3	2.7	9.0	0.9	3.0	1.4	2.7	0.8	2.1	1.2	2.8
Aluminum (Al)	0.2	3.5	0.7	0.3	0.0	0.2	0.0	0.0	0.1	1.7	0.2	0.2
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.8	1.0	1.0	0.8	1.2	0.8	0.8	1.0	1.4	1.0	1.0
Barium (Ba)	2.1	3.4	2.5	2.4	1.3	1.6	1.6	1.6	1.3	1.7	1.6	1.8
Beryllium (Be)	1.0	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.0	1.0	1.0	1.0
Boron (B)	1.0	1.7	1.0	1.0	1.0	2.5	1.2	1.0	1.0	2.3	1.2	1.0
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0
Calcium (Ca)	2.1	4.2	2.9	2.9	1.5	2.5	2.1	2.3	1.3	2.2	1.7	1.9
Chromium (Cr)	1.0	1.2	1.0	1.0	0.6	0.6	0.6	0.6	1.0	1.0	1.0	1.0
Cobalt (Co)	1.0	2.7	1.0	1.0	0.6	1.2	0.6	0.6	1.0	2.4	1.0	1.0
Copper (Cu)	2.9	2.3	2.6	1.6	1.9	1.2	1.7	1.4	2.1	1.6	1.9	1.5
Iron (Fe)	0.4	5.5	1.0	0.4	0.1	1.7	0.5	0.1	0.5	7.9	1.5	0.5
Lead (Pb)	0.5	9.2	1.0	0.5	0.2	0.4	0.2	0.2	0.5	2.4	0.5	0.5
Lithium (Li)	1.0	3.3	1.5	1.2	1.2	3.9	2.4	2.0	1.3	4.2	2.6	1.9
Magnesium (Mg)	2.2	4.6	3.1	3.1	1.7	2.9	2.3	2.5	1.5	2.5	1.9	2.1
Manganese (Mn)	0.6	15	2.5	0.7	0.2	11	2.8	0.8	0.6	38	7.5	0.8
Mercury (Hg)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Molybdenum (Mo)	3.4	13	4.9	2.1	2.5	7.9	2.9	1.3	2.2	6.7	2.6	1.3
Nickel (Ni)	1.1	14	1.6	1.0	0.8	2.0	1.6	1.1	1.0	2.9	1.8	1.2
Potassium (K)	3.2	6.3	3.7	2.7	2.5	4.4	2.8	2.3	2.5	4.2	2.7	2.4
Selenium (Se)	1.0	1.0	1.0	1.0	1.3	1.3	1.3	1.3	1.0	1.0	1.0	1.0
Silicon (Si)	1.1	2.0	1.3	1.1	0.7	0.8	0.9	0.7	1.1	1.2	1.3	0.8
Silver (Ag)	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0
Sodium (Na)	0.8	11	2.9	2.2	0.6	5.8	2.1	2.1	0.5	4.8	1.8	1.9
Strontium (Sr)	1.3	4.1	2.3	1.8	0.9	2.2	1.7	1.4	0.8	2.1	1.5	1.2
Thallium (Tl)	1.0	1.0	1.0	1.0	1.2	1.2	1.2	1.2	1.0	1.0	1.0	1.0
Tin (Sn)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Titanium (Ti)	0.9	0.9	0.9	0.9	0.4	0.4	0.4	0.4	1.0	1.0	1.0	1.0
Uranium (U)	2.0	34	6.0	1.4	1.1	6.1	1.8	0.8	1.1	4.5	1.4	0.6
Vanadium (V)	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Zinc (Zn)	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

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

Denotes moderate elevation (mean concentration 5 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.



**Table C.17: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between the Camp Lake Tributaries and Average Reference Creek Stations, Mary River Project CREMP, 2020**

Parameter	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01
Aluminum (Al)	0.5	0.6	0.5	0.5	0.1	0.3	0.1	0.1	0.2	0.4	0.2	1.6
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.1	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.3	1.0	1.0
Barium (Ba)	2.3	1.3	2.7	2.7	1.5	1.9	2.0	2.2	1.4	1.7	1.6	1.9
Beryllium (Be)	1.0	1.3	1.0	1.0	1.3	1.3	1.3	1.3	1.0	1.0	1.0	1.0
Bismuth (Bi)	1.0	1.3	1.0	1.0	1.3	1.3	1.3	1.3	1.0	1.0	1.0	1.0
Boron (B)	1.0	1.6	1.0	1.0	1.0	2.3	1.2	1.0	1.0	2.2	1.2	1.0
Cadmium (Cd)	1.0	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0
Calcium (Ca)	2.1	1.7	2.9	2.9	1.5	2.4	2.2	2.4	1.3	2.2	1.7	1.9
Chromium (Cr)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cobalt (Co)	1.0	1.0	1.0	1.0	1.0	1.6	1.0	1.0	1.0	1.9	1.0	1.0
Copper (Cu)	3.3	1.3	2.8	1.9	2.4	1.3	2.2	1.9	2.3	1.6	2.0	1.7
Iron (Fe)	1.0	1.6	1.0	1.0	0.8	6.4	2.0	0.8	1.0	7.4	1.6	1.0
Lead (Pb)	1.0	1.9	1.0	1.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0
Lithium (Li)	1.0	2.6	1.3	1.1	1.2	3.6	2.6	2.2	1.1	4.3	2.6	2.2
Magnesium (Mg)	2.3	1.9	3.1	3.1	1.7	2.8	2.5	2.8	1.4	2.4	1.9	2.1
Manganese (Mn)	1.1	25	5.4	1.3	0.9	59	13	4.1	0.9	66	11	1.3
Mercury (Hg)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Molybdenum (Mo)	3.4	5.1	4.9	2.0	2.3	6.8	2.8	1.4	2.2	6.4	2.4	1.2
Nickel (Ni)	1.1	2.0	1.5	1.0	1.1	2.3	2.2	1.5	1.0	2.5	1.8	1.2
Potassium (K)	3.4	3.2	3.8	2.9	2.8	4.7	3.0	2.6	2.5	4.3	2.7	2.4
Selenium (Se)	1.0	1.3	1.0	1.0	1.3	1.3	1.3	1.3	1.0	1.0	1.0	1.0
Silicon (Si)	1.3	1.0	1.4	1.3	1.1	1.1	1.3	1.0	1.1	1.1	1.3	0.9
Silver (Ag)	1.0	0.5	1.0	1.0	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0
Sodium (Na)	0.9	3.2	3.0	2.2	0.5	5.6	2.1	2.2	0.5	4.8	1.8	1.9
Strontium (Sr)	1.3	1.4	2.3	1.8	0.9	2.1	1.7	1.4	0.8	2.0	1.4	1.2
Thallium (Tl)	1.0	1.3	1.0	1.0	1.3	1.3	1.3	1.3	1.0	1.0	1.0	1.0
Tin (Sn)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Titanium (Ti)	1.0	1.2	1.0	1.0	1.2	1.2	1.2	1.2	1.0	1.0	1.0	1.0
Uranium (U)	2.5	3.6	6.8	1.7	1.1	5.7	1.7	0.8	1.1	4.7	1.4	0.6
Vanadium (V)	1.0	1.1	1.0	1.0	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0
Zinc (Zn)	1.0	1.2	1.0	1.0	1.2	1.2	1.2	1.2	1.0	1.0	1.0	1.0

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

Denotes moderate elevation (mean concentration 5 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.

**Table C.18: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations at the Camp Lake Tributaries between 2020 and Mine Baseline (2005 to 2013) Periods**

Variable	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station KO-01
Aluminum (Al)	1.2	7.2	1.4	1.6	1.0	1.7	1.1	0.7	1.2	3.0	1.2	8.4
Antimony (Sb)	0.5	1.0	1.0	0.6	0.7	1.0	1.0	0.6	0.7	1.0	1.0	0.6
Arsenic (As)	1.0	1.1	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.3	1.0	1.0
Barium (Ba)	2.4	2.3	2.2	1.6	1.7	1.6	1.7	2.1	1.4	1.0	1.1	1.8
Beryllium (Be)	0.3	5.0	5.0	0.4	0.5	2.1	2.1	0.4	0.5	2.1	2.1	0.4
Bismuth (Bi)	1.1	1.0	1.0	1.1	1.1	1.0	1.0	1.1	1.1	1.0	1.0	1.1
Boron (B)	0.5	1.6	1.0	0.6	0.6	2.3	1.2	1.0	1.0	2.2	1.1	1.0
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
Calcium (Ca)	2.4	1.7	2.0	1.9	1.8	1.3	1.8	2.1	1.3	0.8	1.0	1.5
Chromium (Cr)	-	-	-	-	-	-	-	0.5	-	-	-	-
Cobalt (Co)	0.6	1.0	1.0	0.6	0.8	1.5	1.0	0.6	0.8	1.8	1.0	0.6
Copper (Cu)	2.1	1.8	1.8	1.5	1.3	1.4	1.2	1.7	1.3	2.1	1.1	0.7
Iron (Fe)	1.2	1.7	1.2	1.1	1.6	1.2	2.6	1.4	1.8	2.1	1.3	1.4
Lead (Pb)	0.5	2.2	1.0	0.6	0.7	1.0	1.0	0.6	0.7	1.0	1.0	0.6
Lithium (Li)	0.7	2.8	2.5	0.5	0.5	1.2	1.1	1.0	0.5	0.7	0.7	0.7
Magnesium (Mg)	2.4	1.9	2.1	1.9	1.8	1.6	1.9	2.3	1.4	1.2	1.3	1.6
Manganese (Mn)	0.4	4.6	0.8	0.1	1.5	2.4	3.4	3.1	1.1	2.3	1.5	0.5
Mercury (Hg)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Molybdenum (Mo)	2.9	17	5.2	2.1	2.9	16	3.2	2.4	1.9	15	2.4	1.7
Nickel (Ni)	0.8	1.4	1.0	0.2	1.0	1.2	1.9	0.4	0.9	1.1	1.1	0.4
Potassium (K)	2.3	3.4	2.3	2.0	1.9	4.1	2.0	2.3	1.5	3.0	1.6	1.9
Selenium (Se)	-	-	-	-	-	-	-	-	-	-	-	0.0
Silicon (Si)	1.7	1.4	1.7	1.4	1.6	1.0	1.7	1.4	1.3	0.7	1.1	1.2
Silver (Ag)	0.3	-	-	0.2	0.5	-	-	0.2	0.6	-	-	0.2
Sodium (Na)	2.0	8.9	4.0	4.8	2.4	8.8	5.2	5.6	1.9	5.9	3.2	4.4
Strontium (Sr)	2.8	1.5	1.9	2.5	2.3	0.9	1.8	2.6	1.8	0.3	0.5	1.9
Thallium (Tl)	1.3	-	-	1.3	1.4	2.5	2.4	1.2	1.6	2.5	2.5	0.2
Tin (Sn)	0.3	1.0	1.0	0.0	0.4	1.0	1.0	0.0	0.4	1.0	1.0	0.0
Titanium (Ti)	1.3	1.0	1.0	1.2	1.1	1.0	1.0	1.2	1.1	1.0	1.0	1.5
Uranium (U)	5.9	66	15	4.4	7.7	40	9.7	4.8	3.1	21	3.9	2.6
Vanadium (V)	1.0	1.0	1.0	1.0	0.8	1.0	1.0	0.9	0.9	1.0	1.0	0.6
Zinc (Zn)	2.1	2.1	1.5	1.9	2.2	1.7	1.2	1.2	2.2	1.6	2.1	2.4

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

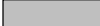
Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference value).

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

Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.

**Table C.19: *In Situ* Water Quality Statistical Comparisons among Camp Lake Tributary 2 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2020**

Metric	Overall 3-group Comparison				Pair-wise, <i>post hoc</i> comparisons <sup>a</sup>			
	Statistical Test <sup>a</sup>	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	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	0.028
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	NO	0.163
					CLT2 Upstream	CLT2 Downstream	YES	<0.001
Dissolved Oxygen (mg/L)	ANOVA	none	YES	< 0.001	REF-CRK Unnamed Reference Creek	CLT2 Upstream	NO	0.119
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	YES	<0.001
					CLT2 Upstream	CLT2 Downstream	YES	<0.001
Dissolved Oxygen (% saturation)	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	YES	<0.001
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	0.578
Specific Conductance (µS/cm)	K-W	rank	YES	0.0020	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	0.077
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	YES	<0.001
					CLT2 Upstream	CLT2 Downstream	YES	0.077

 Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> 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 Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2020

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09
Date Collected	12-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	14-Apr-20	12-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	14-Apr-20	12-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	14-Apr-20	12-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	14-Apr-20	12-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	14-Apr-20
1.0	0.0	1.1	0.4	0.0	0.3	15.30	14.77	14.66	14.51	14.51	104.6	104.6	101.7	99.4	102.6	7.85	7.82	8.02	7.97	7.96	192.1	186.1	187.3	171.6	188.4
2.0	0.0	0.2	0.1	0.1	0.1	14.92	15.03	14.77	14.46	14.75	102.4	103.5	101.5	99.5	101.5	7.70	7.81	7.97	7.93	7.88	184.8	185.1	182.2	176.7	183.2
3.0	0.2	0.3	0.3	0.3	0.2	14.78	14.86	14.56	14.27	14.60	101.8	102.5	100.5	98.6	100.8	7.76	7.80	7.93	7.92	7.86	183.0	181.9	179.2	174.5	179.8
4.0	0.3	0.3	0.3	0.4	0.3	14.68	14.71	14.45	14.16	14.46	101.3	101.6	99.9	98.0	100.0	7.74	7.79	7.91	7.91	7.86	182.2	180.6	178.1	173.6	178.6
5.0	0.4	0.4	0.4	0.4	0.4	14.52	14.62	14.38	14.06	14.33	100.4	101.0	99.4	97.5	99.2	7.73	7.77	7.90	7.92	7.84	180.9	179.7	177.4	172.7	177.2
6.0	0.4	0.4	0.4	0.5	0.4	14.42	14.56	14.28	13.92	14.17	99.8	100.8	98.9	96.6	98.2	7.72	7.76	7.89	7.90	7.83	180.0	179.1	176.7	171.5	175.9
7.0	0.4	0.4	0.5	0.6	0.5	14.34	14.49	14.13	13.83	14.05	99.3	100.4	98.1	96.2	97.6	7.71	7.75	7.89	7.91	7.83	179.1	178.4	175.6	170.7	175.2
8.0	0.5	0.5	0.5	0.6	0.5	14.20	14.40	14.00	13.68	13.90	98.5	99.9	97.2	95.3	96.7	7.70	7.74	7.88	7.90	7.83	178.2	177.8	174.9	169.7	173.9
9.0	0.5	0.5	0.6	0.7	0.6	14.12	14.21	13.83	13.52	13.80	98.1	98.8	96.3	95.1	96.1	7.70	7.71	7.88	7.90	7.82	177.5	177.7	173.8	169.0	173.3
10.0	0.6	0.6	0.7	0.7	0.7	14.04	13.95	13.63	13.51	13.65	97.8	97.2	95.1	94.4	95.2	7.70	7.68	7.87	7.89	7.82	177.0	177.6	172.6	168.2	172.3
11.0	0.7	-	0.8	0.8	0.8	13.45	-	13.45	13.38	13.52	94.0	-	94.1	93.6	94.5	7.65	-	7.86	7.89	7.82	179.0	-	171.8	167.6	171.7
12.0	0.7	-	0.8	0.9	0.8	12.68	-	13.33	13.25	13.40	88.6	-	93.4	92.2	93.9	7.54	-	7.85	7.88	7.81	180.2	-	171.1	166.9	171.0
13.0	-	-	0.9	0.9	0.9	-	-	13.15	13.09	13.28	-	-	92.3	92.2	93.2	-	-	7.84	7.85	7.81	-	-	179.4	166.3	170.5
14.0	-	-	1.0	1.0	0.9	-	-	12.97	12.97	13.09	-	-	91.2	91.3	92.1	-	-	7.83	7.85	7.80	-	-	169.9	165.7	169.6
15.0	-	-	1.0	1.0	1.0	-	-	12.73	12.91	12.84	-	-	89.7	91.1	90.5	-	-	7.81	7.84	7.78	-	-	169.2	165.1	168.6
16.0	-	-	1.1	1.1	1.1	-	-	12.25	12.51	12.6	-	-	86.5	88.4	81.0	-	-	7.79	7.84	7.74	-	-	169.0	164.8	168
17.0	-	-	-	1.2	-	-	-	-	11.70	-	-	-	-	82.9	-	-	-	-	7.79	-	-	-	-	164.5	-
18.0	-	-	-	1.2	-	-	-	-	11.43	-	-	-	-	81.0	-	-	-	-	7.77	-	-	-	-	165.0	-
19.0	-	-	-	1.2	-	-	-	-	11.25	-	-	-	-	79.7	-	-	-	-	7.74	-	-	-	-	165.7	-
20.0	-	-	-	1.3	-	-	-	-	11.11	-	-	-	-	78.8	-	-	-	-	7.71	-	-	-	-	166.6	-
21.0	-	-	-	1.3	-	-	-	-	10.99	-	-	-	-	78.0	-	-	-	-	7.69	-	-	-	-	167.1	-
22.0	-	-	-	1.3	-	-	-	-	11.11	-	-	-	-	78.8	-	-	-	-	7.66	-	-	-	-	168.7	-
23.0	-	-	-	1.3	-	-	-	-	10.96	-	-	-	-	77.9	-	-	-	-	7.64	-	-	-	-	169.2	-
24.0	-	-	-	1.4	-	-	-	-	10.14	-	-	-	-	72.0	-	-	-	-	7.62	-	-	-	-	169.0	-
25.0	-	-	-	1.5	-	-	-	-	9.91	-	-	-	-	70.9	-	-	-	-	7.57	-	-	-	-	168.9	-
26.0	-	-	-	1.6	-	-	-	-	9.40	-	-	-	-	68.3	-	-	-	-	7.54	-	-	-	-	168.5	-
27.0	-	-	-	1.7	-	-	-	-	8.50	-	-	-	-	62.4	-	-	-	-	7.51	-	-	-	-	169.0	-
28.0	-	-	-	1.8	-	-	-	-	7.82	-	-	-	-	56.5	-	-	-	-	7.47	-	-	-	-	171.4	-
29.0	-	-	-	2.0	-	-	-	-	6.90	-	-	-	-	50.2	-	-	-	-	7.43	-	-	-	-	172.8	-
30.0	-	-	-	2.0	-	-	-	-	6.14	-	-	-	-	44.6	-	-	-	-	7.39	-	-	-	-	174.2	-
31.0	-	-	-	2.1	-	-	-	-	5.19	-	-	-	-	37.9	-	-	-	-	7.34	-	-	-	-	177.7	-
32.0	-	-	-	2.3	-	-	-	-	3.22	-	-	-	-	23.7	-	-	-	-	7.27	-	-	-	-	185.6	-

Notes: "-" = data not available / data not applicable. Total depth at stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 was 11.7, 10.2, 16.5, 31.0, and 15.2 m, respectively, at the time of winter sampling. Ice thickness at stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 was 1.69, 1.25, 1.72, 1.63, and 1.53 m, respectively, at the time of winter sampling.



Table C.21: In Situ Water Quality Profile Data Collected at Camp Lake Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2020

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-09
Date Collected	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20
1.0	13.9	13.7	13.4	13.6	13.3	11.00	11.05	11.14	15.16	11.15	106.5	106.5	106.8	107.2	106.6	8.19	8.13	8.13	8.12	8.05	154.6	153.8	152.8	151.7	156.2
2.0	13.9	13.4	13.3	13.2	12.7	11.01	11.14	11.19	11.27	11.43	106.5	106.7	106.9	107.4	107.7	8.18	8.10	8.12	8.10	8.10	154.7	152.9	152.4	151.8	151.0
3.0	10.9	11.0	12.0	10.4	11.5	12.20	11.99	11.53	12.17	11.90	110.3	108.6	106.9	109.2	109.1	8.09	8.06	8.11	8.05	8.07	151.6	151.1	152.7	150.3	150.5
4.0	7.5	8.2	8.6	8.9	10.3	13.01	12.85	12.72	12.62	12.20	108.3	109.0	109.0	108.9	108.8	8.01	8.00	8.05	8.01	8.06	148.3	148.5	148.8	149.0	149.4
5.0	7.0	7.2	7.1	7.8	8.9	12.93	12.88	12.92	12.90	12.74	106.6	106.7	106.8	108.5	110.0	7.95	7.93	7.93	7.99	8.02	148.1	148.2	148.3	148.2	148.4
6.0	6.6	6.8	6.7	7.3	7.6	12.85	12.84	12.93	12.96	12.86	104.8	105.2	105.7	107.5	107.7	7.89	7.88	7.90	7.96	7.93	148.0	148.2	148.0	148.1	148.4
7.0	6.4	6.7	6.6	6.9	6.7	12.83	12.79	12.87	13.01	12.87	104.2	104.7	105.0	106.9	105.2	7.88	7.88	7.90	7.94	7.92	148.1	148.0	148.0	147.9	147.9
8.0	6.3	6.6	6.4	6.3	6.4	12.78	12.80	12.86	12.91	12.88	103.6	104.2	104.4	104.7	104.5	7.87	7.87	7.88	7.91	7.89	148.0	148.2	147.8	147.8	147.9
9.0	6.3	-	6.3	6.3	6.3	12.76	-	12.81	12.85	12.80	103.4	-	103.7	104.0	103.4	7.85	-	7.86	7.88	7.88	148.1	-	147.9	147.9	147.9
10.0	6.3	-	6.1	6.0	6.1	12.75	-	12.72	12.72	12.73	103.3	-	102.6	102.4	102.6	7.85	-	7.85	7.85	7.85	148.0	-	147.9	147.8	147.9
11.0	6.2	-	6.1	6.0	6.0	12.70	-	12.68	12.65	12.66	102.7	-	102.2	101.5	101.6	7.83	-	7.84	7.83	7.82	148.1	-	147.9	147.9	147.9
12.0	-	-	6.0	5.9	5.9	-	-	12.64	12.59	12.60	-	-	101.6	100.9	101.0	-	-	7.82	7.82	7.82	-	-	147.8	147.8	147.8
13.0	-	-	6.0	5.8	5.8	-	-	12.63	12.57	12.55	-	-	101.5	100.5	100.3	-	-	7.82	7.80	7.80	-	-	147.8	147.8	147.9
14.0	-	-	5.8	5.7	5.7	-	-	12.55	12.53	12.52	-	-	100.5	100.0	100.0	-	-	7.81	7.79	7.79	-	-	147.9	147.8	147.8
15.0	-	-	5.7	5.7	5.7	-	-	12.51	12.50	12.50	-	-	99.8	99.7	99.6	-	-	7.79	7.78	7.78	-	-	147.9	147.9	147.8
16.0	-	-	-	5.6	5.6	-	-	-	12.46	12.48	-	-	-	99.1	99.3	-	-	-	7.78	7.78	-	-	-	147.9	147.8
17.0	-	-	-	5.5	5.5	-	-	-	12.42	12.46	-	-	-	98.6	98.9	-	-	-	7.77	7.77	-	-	-	147.9	147.8
18.0	-	-	-	5.5	-	-	-	-	12.40	-	-	-	-	98.5	-	-	-	-	7.76	-	-	-	-	147.9	-
19.0	-	-	-	5.5	-	-	-	-	12.39	-	-	-	-	98.3	-	-	-	-	7.75	-	-	-	-	147.9	-
20.0	-	-	-	5.5	-	-	-	-	12.37	-	-	-	-	98.1	-	-	-	-	7.75	-	-	-	-	147.9	-
21.0	-	-	-	5.4	-	-	-	-	12.35	-	-	-	-	97.9	-	-	-	-	7.74	-	-	-	-	147.9	-
22.0	-	-	-	5.4	-	-	-	-	12.34	-	-	-	-	97.8	-	-	-	-	7.74	-	-	-	-	147.9	-
23.0	-	-	-	5.4	-	-	-	-	12.33	-	-	-	-	97.7	-	-	-	-	7.74	-	-	-	-	147.9	-
24.0	-	-	-	5.4	-	-	-	-	12.31	-	-	-	-	97.4	-	-	-	-	7.73	-	-	-	-	147.9	-
25.0	-	-	-	5.4	-	-	-	-	12.29	-	-	-	-	97.3	-	-	-	-	7.73	-	-	-	-	148.0	-
26.0	-	-	-	5.4	-	-	-	-	12.28	-	-	-	-	97.1	-	-	-	-	7.73	-	-	-	-	147.9	-
27.0	-	-	-	5.4	-	-	-	-	12.26	-	-	-	-	97.0	-	-	-	-	7.73	-	-	-	-	148.0	-
28.0	-	-	-	5.4	-	-	-	-	12.25	-	-	-	-	96.9	-	-	-	-	7.72	-	-	-	-	148.0	-
29.0	-	-	-	5.4	-	-	-	-	12.24	-	-	-	-	96.8	-	-	-	-	7.72	-	-	-	-	148.0	-
30.0	-	-	-	5.4	-	-	-	-	12.23	-	-	-	-	96.8	-	-	-	-	7.72	-	-	-	-	148.0	-
31.0	-	-	-	5.4	-	-	-	-	12.23	-	-	-	-	96.7	-	-	-	-	7.72	-	-	-	-	148.0	-
32.0	-	-	-	5.4	-	-	-	-	12.22	-	-	-	-	96.7	-	-	-	-	7.72	-	-	-	-	148.0	-

Notes: "-" = no data / not applicable. Total depth at stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 was 11.4, 8.8, 15.5, 34.1, and 18.9 m, respectively, at the time of summer sampling.

**Table C.22: *In Situ* Water Quality Profile Data Collected at Camp Lake Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020**

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	JLO-02	JLO-10	JLO-01	JLO-07	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-07	JLO-09
Date Collected	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	18-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	18-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	18-Aug-20	30-Aug-20
0.5	-	-	-	-	8.4	-	-	-	-	-	10.46	-	-	-	-	-	91.2	-
1.0	9.2	9.0	8.8	8.4	8.4	8.4	11.50	11.50	11.59	11.59	10.48	11.5	100.5	99.8	99.7	98.9	91.7	98.1
2.0	9.2	8.9	8.7	8.4	8.4	8.2	11.56	11.59	11.59	11.62	10.48	11.6	100.6	99.7	99.7	99.0	91.2	98.5
3.0	9.2	8.7	8.5	8.4	8.4	8.2	11.56	11.59	11.62	11.61	10.46	11.6	100.5	99.4	99.2	99.0	91.3	98.4
4.0	8.7	8.5	8.4	8.3	8.4	8.2	11.61	11.62	11.60	11.61	10.44	11.6	99.4	99.1	99.0	98.9	91.3	98.5
5.0	8.3	8.3	8.3	8.2	8.4	8.2	11.63	11.61	11.62	11.60	10.43	11.6	99.1	98.7	98.8	98.5	91.1	98.4
6.0	8.3	8.1	8.2	8.2	8.4	8.2	11.63	11.60	11.62	11.58	10.43	11.6	98.7	98.3	98.7	98.3	90.9	98.3
7.0	8.2	8.1	8.2	8.1	8.4	8.2	11.62	11.58	11.59	11.57	10.44	11.6	98.6	98.0	98.5	98.1	91.3	98.2
8.0	8.1	8.1	8.1	8.1	8.4	8.2	11.62	11.55	11.58	11.55	10.44	11.6	98.5	97.7	98.1	98.0	91.2	98.2
9.0	8.1	8.0	8.1	8.1	8.4	8.1	11.57	11.61	11.55	11.54	10.44	11.6	97.9	98.2	97.8	97.8	91.0	98.2
10.0	8.0	-	8.1	8.1	8.4	8.1	11.56	-	11.53	11.53	10.43	11.6	97.6	-	97.7	97.7	91.0	98.0
11.0	-	-	8.1	8.1	8.4	8.1	-	-	11.51	11.52	10.42	11.6	-	-	97.4	97.6	91.0	97.9
12.0	-	-	8.1	8.1	8.4	8.1	-	-	11.50	11.48	10.42	11.6	-	-	97.4	97.3	91.1	97.9
13.0	-	-	8.1	8.1	8.4	-	-	-	11.49	11.48	10.38	-	-	-	97.3	97.3	90.7	-
14.0	-	-	8.1	8.1	8.4	-	-	-	11.48	11.47	10.41	-	-	-	97.2	97.2	90.8	-
15.0	-	-	-	8.1	8.4	-	-	-	-	11.47	10.42	-	-	-	-	97.1	91.0	-
16.0	-	-	-	8.1	8.4	-	-	-	-	11.45	10.38	-	-	-	-	96.9	90.6	-
17.0	-	-	-	8.1	8.4	-	-	-	-	11.45	10.40	-	-	-	-	96.9	90.7	-
18.0	-	-	-	8.1	8.4	-	-	-	-	11.44	10.42	-	-	-	-	96.8	90.9	-
19.0	-	-	-	8.1	8.4	-	-	-	-	11.44	10.37	-	-	-	-	96.8	90.5	-
20.0	-	-	-	8.1	8.4	-	-	-	-	11.43	10.37	-	-	-	-	96.7	90.6	-
21.0	-	-	-	8.1	8.4	-	-	-	-	11.43	10.40	-	-	-	-	96.7	90.7	-
22.0	-	-	-	8.1	8.4	-	-	-	-	11.42	10.36	-	-	-	-	96.6	90.6	-
23.0	-	-	-	8.0	8.4	-	-	-	-	11.40	10.38	-	-	-	-	96.3	90.7	-
24.0	-	-	-	8.0	8.3	-	-	-	-	11.39	10.42	-	-	-	-	96.3	90.9	-
25.0	-	-	-	8.0	8.3	-	-	-	-	11.37	10.41	-	-	-	-	96.1	90.7	-
26.0	-	-	-	8.0	8.3	-	-	-	-	11.34	10.42	-	-	-	-	95.9	90.9	-
27.0	-	-	-	8.0	8.3	-	-	-	-	11.21	10.37	-	-	-	-	94.6	90.9	-
28.0	-	-	-	7.9	8.3	-	-	-	-	11.16	10.41	-	-	-	-	94.2	90.6	-
29.0	-	-	-	7.9	8.3	-	-	-	-	11.13	10.40	-	-	-	-	93.9	90.6	-
30.0					8.2						10.46						90.7	

Notes: "-" = no data / not applicable. August 18, 2020 sampling was conducted by Minnow. Camp Lake water profile sampling on all other dates was conducted by Baffinland. Total depth at Stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 was 11.4, 10.2, 15.8, 32.2, and 14.1 m, respectively, at the time of fall sampling.

**Table C.22: *In Situ* Water Quality Profile Data Collected at Camp Lake Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020**

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	JLO-02	JLO-10	JLO-01	JLO-07	JLO-07	JLO-09	JLO-02	JLO-10	JLO-01	JLO-07	JLO-07	JLO-09
Date Collected	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	18-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	18-Aug-20	30-Aug-20
0.5	-	-	-	-	7.79	-	-	-	-	-	154.1	-
1.0	8.11	8.11	8.11	8.08	7.80	8.00	153.8	153.2	153.2	153.0	153.9	154.6
2.0	8.11	8.12	8.11	8.08	7.81	8.04	153.8	153.6	153.2	153.1	154.2	153.3
3.0	8.12	8.11	8.11	8.08	7.82	8.04	154.4	153.5	153.7	153.2	154.0	153.2
4.0	8.13	8.12	8.11	8.08	7.82	8.05	162.7	154.0	153.2	153.2	154.2	153.3
5.0	8.13	8.11	8.11	8.08	7.83	8.05	154.5	153.9	153.2	153.1	154.3	153.1
6.0	8.12	8.11	8.11	8.08	7.84	8.05	154.1	154.2	153.2	152.9	154.1	153.1
7.0	8.11	8.10	8.11	8.08	7.84	8.06	155.7	154.6	153.2	152.9	154.3	153.1
8.0	8.12	8.09	8.10	8.07	7.85	8.06	157.3	154.9	153.2	152.8	154.1	153.1
9.0	8.11	8.09	8.09	8.07	7.85	8.06	156.8	155.1	153.2	152.8	154.1	153.2
10.0	8.10	-	8.09	8.07	7.85	8.07	156.8	-	153.0	152.8	154.0	153.2
11.0	-	-	8.08	8.07	7.86	8.07	-	-	153.1	152.8	154.0	153.2
12.0	-	-	8.08	8.07	7.86	8.07	-	-	153.1	152.8	154.1	153.3
13.0	-	-	8.08	8.07	7.86	-	-	-	153.2	152.8	154.0	-
14.0	-	-	8.08	8.07	7.86	-	-	-	153.2	152.9	154.1	-
15.0	-	-	-	8.07	7.86	-	-	-	-	153.0	154.1	-
16.0	-	-	-	8.07	7.87	-	-	-	-	153.0	154.1	-
17.0	-	-	-	8.07	7.86	-	-	-	-	153.0	154.2	-
18.0	-	-	-	8.07	7.87	-	-	-	-	153.1	154.2	-
19.0	-	-	-	8.07	7.87	-	-	-	-	153.3	154.2	-
20.0	-	-	-	8.07	7.87	-	-	-	-	153.1	154.1	-
21.0	-	-	-	8.07	7.87	-	-	-	-	153.3	154.1	-
22.0	-	-	-	8.07	7.87	-	-	-	-	153.4	154.1	-
23.0	-	-	-	8.07	7.87	-	-	-	-	153.4	154.1	-
24.0	-	-	-	8.06	7.86	-	-	-	-	153.2	154.1	-
25.0	-	-	-	8.06	7.85	-	-	-	-	153.3	154.0	-
26.0	-	-	-	8.05	7.86	-	-	-	-	153.4	154.1	-
27.0	-	-	-	8.02	7.85	-	-	-	-	153.6	154.1	-
28.0	-	-	-	8.02	7.84	-	-	-	-	153.6	154.0	-
29.0	-	-	-	8.00	7.84	-	-	-	-	153.9	154.0	-
30.0					7.81						153.8	


Notes: "-" = no data / not applicable. August 18, 2020 sampling was conducted by Minnow. Camp Lake water profile sampling on all other dates was conducted by Baffinland. Total depth at Stations JLO-02, JLO-10, JLO-01, JLO-07, and JLO-09 was 11.4, 10.2, 15.8, 32.2, and 14.1 m, respectively, at the time of fall sampling.

**Table C.23: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Camp Lake Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**

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)
								(mg/L)	(% sat.)		
Littoral (Shallow) Stations	JLO-02	18-Aug-20	11.0	4.29	clear, colourless	surface	8.3	10.58	92.1	7.78	154.6
						bottom	8.2	9.63	83.3	7.73	155.7
	JLO-21	18-Aug-20	10.0	4.72	clear, colourless	surface	8.3	10.71	92.9	7.60	155.6
						bottom	8.3	9.34	81.8	7.32	154.7
	JLO-20	18-Aug-20	7.0	5.15	clear, colourless	surface	8.3	10.65	92.7	7.65	154.2
						bottom	8.3	10.14	88.3	7.64	154.1
	JLO-19	11-Aug-20	7.5	6.23	clear, colourless	surface	10.8	10.58	98.6	8.13	148.1
						bottom	9.8	9.12	83.8	7.23	147.3
	JLO-18	11-Aug-20	12.0	7.10	clear, colourless	surface	10.9	10.33	95.9	8.13	150.1
						bottom	7.1	8.96	75.4	7.56	158.2
Profundal (Deep) Stations	JLO-01	18-Aug-20	18.0	5.08	clear, colourless	surface	8.4	10.89	95.7	7.70	154.4
						bottom	8.3	9.90	86.4	7.27	155.5
	JLO-07	11-Aug-20	33.0	6.40	clear, colourless	surface	10.4	10.40	95.7	8.70	147.4
						bottom	6.0	11.04	91.1	7.26	144.0
	JLO-16	11-Aug-20	16.0	6.44	clear, colourless	surface	10.3	10.42	95.8	8.05	148.2
						bottom	6.8	10.01	84.5	7.53	145.1
	JLO-11	11-Aug-20	28.5	7.50	clear, colourless	surface	10.0	10.57	96.7	7.94	147.4
						bottom	5.8	12.22	101.9	7.45	144.4
	JLO-12	11-Aug-20	17.0	5.71	clear, colourless	surface	9.8	10.59	95.6	7.72	147.3
						bottom	6.2	11.11	92.5	7.27	144.8

**Table C.24: Statistical Comparison of Bottom *In Situ* Water Quality Between Camp Lake Littoral and Profundal Stations, Mary River Project CREMP, August 2020**

Parameter	Statistical Test Results				Summary Statistics					
	Statistical Test <sup>a</sup>	Transform-ation	Significant Difference Between Areas?	P-value	Lake Zone	Mean ( n = 5 )	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	none	NO	0.298	Littoral	5.49	1.15	0.51	4.29	7.10
					Profundal	6.22	0.91	0.41	5.08	7.50
Temperature (°C)	tequal	none	YES	0.025	Littoral	8.34	0.96	0.43	7.10	9.80
					Profundal	6.62	1.01	0.45	5.80	8.30
Dissolved Oxygen (mg/L)	tequal	none	YES	0.017	Littoral	9.4	0.5	0.2	9.0	10.1
					Profundal	10.9	0.9	0.4	9.9	12.2
Dissolved Oxygen (% saturation)	tequal	none	YES	0.045	Littoral	82.5	4.7	2.1	75.4	88.3
					Profundal	91.3	6.8	3.0	84.5	101.9
pH (units)	tequal	none	NO	0.241	Littoral	7.50	0.21	0.10	7.23	7.73
					Profundal	7.36	0.13	0.06	7.26	7.53
Specific Conductance (µS/cm)	tequal	none	YES	0.035	Littoral	154.0	4.1	1.8	147.3	158.2
					Profundal	146.8	4.9	2.2	144.0	155.5

 Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).

**Table C.25: Statistical Comparison of Bottom *In Situ* Water Quality Between Camp Lake and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test <sup>a</sup>	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	0.690	Reference	4	10.00	1.08	0.54	8.50	11.00
						Camp	5	9.50	2.18	0.97	7.00	12.00
	Secchi Depth (m)	tequal	none	YES	0.002	Reference	5	8.12	0.64	0.29	7.38	9.15
						Camp	5	5.49	1.15	0.51	4.29	7.10
	Temperature (°C)	tequal	none	YES	0.061	Reference	5	9.32	0.29	0.13	8.90	9.70
						Camp	5	8.34	0.96	0.43	7.10	9.80
	Dissolved Oxygen (mg/L)	tequal	none	YES	0.001	Reference	5	12.6	0.7	0.3	11.8	13.3
						Camp	5	9.4	0.5	0.2	9.0	10.1
	Dissolved Oxygen (% saturation)	tequal	none	YES	0.001	Reference	5	111.9	5.2	2.3	104.6	116.7
						Camp	5	82.5	4.7	2.1	75.4	88.3
	pH (units)	tequal	none	YES	0.060	Reference	5	7.19	0.23	0.10	6.94	7.56
						Camp	5	7.50	0.21	0.10	7.23	7.73
	Specific Conductance (µS/cm)	tequal	none	YES	0.001	Reference	5	76.7	3.2	1.4	74.5	82.1
						Camp	5	154.0	4.1	1.8	147.3	158.2
Profundal (Deep) Stations	Station Depth (m)	tequal	none	NO	0.605	Reference	5	20.60	1.56	0.70	19.00	23.00
						Camp	5	22.50	7.73	3.46	16.00	33.00
	Secchi Depth (m)	tequal	none	YES	0.006	Reference	5	8.39	0.96	0.43	7.18	9.84
						Camp	5	6.22	0.91	0.41	5.08	7.50
	Temperature (°C)	tequal	none	NO	0.120	Reference	5	5.82	0.19	0.09	5.60	6.10
						Camp	5	6.62	1.01	0.45	5.80	8.30
	Dissolved Oxygen (mg/L)	tequal	log10	YES	0.003	Reference	5	13.6	1.3	0.6	12.8	15.8
						Camp	5	10.9	0.9	0.4	9.9	12.2
	Dissolved Oxygen (% saturation)	tequal	log10	YES	0.006	Reference	5	110.6	10.3	4.6	103.5	127.9
						Camp	5	91.3	6.8	3.0	84.5	101.9
	pH (units)	tequal	none	YES	0.002	Reference	5	6.70	0.30	0.13	6.27	6.95
						Camp	5	7.36	0.13	0.06	7.26	7.53
	Specific Conductance (µS/cm)	M-W	rank	YES	0.008	Reference	5	75.5	1.6	0.7	74.0	78.1
						Camp	5	146.8	4.9	2.2	144.0	155.5

Highlighted values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).

**Table C.26: Water Chemistry at Camp Lake (JLO) Water Quality Monitoring Stations, Mary River Project CREMP, 2020**

	Parameters	Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Winter Sampling Event								Spring Sampling Event	Summer Sampling Event					
					JLO-02	JLO-02	JLO-10	JLO-10	JLO-01	JLO-01	JLO-07	JLO-07	JLO-09	JLO-09	JLO-02	JLO-02	JLO-10	JLO-10	JLO-01
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom
					12-Apr-20	12-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	14-Apr-20	14-Apr-20	04-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20
Conventional	Conductivity (lab)	µmho/cm	-	-	179	186	178	187	170	182	179	176	171	185	163	152	158	152	159
	pH (lab)	pH	6.5 - 9.0	-	7.84	7.90	7.79	7.79	7.66	7.81	7.19	7.82	7.69	7.77	7.83	7.89	8.14	7.90	8.13
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	96.3	102	97.4	99.4	90.2	101	91.1	96	90.5	98.2	76.4	70.7	72.3	68.2	70.7
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	100	93	118	132	112	114	130	128	119	100	132	80	86	79	93
	Turbidity	NTU	-	-	<0.10	0.13	<0.10	<0.10	<0.10	<0.10	0.15	0.14	<0.10	0.28	1.03	0.81	0.87	0.85	0.73
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	79	84	80	84	76	83	76	79	79	83	69	65.1	68.7	66.3	67.4
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.018	0.042	0.019	0.020	<0.010	0.020	<0.010	0.020	<0.010	0.019	<0.010	<0.0050	<0.0050	<0.0050	0.0054
	Nitrate	mg/L	3	3	0.029	0.096	0.041	0.032	0.049	0.030	0.145	0.031	0.051	0.033	0.053	0.0410	0.0404	0.0433	0.0402
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	0.17	<0.15	0.40	<0.15	0.25	0.17	<0.15	<0.15	<0.15	0.109	0.126	0.126	0.114
	Dissolved Organic Carbon	mg/L	-	-	2.78	2.20	2.11	2.30	2.05	2.31	1.88	2.24	3.07	2.69	2.74	5.17	2.19	1.78	2.34
	Total Organic Carbon	mg/L	-	-	2.62	3.00	2.72	2.82	2.62	2.63	2.32	2.64	2.79	3.22	3.76	1.96	2.04	1.89	2.07
	Total Phosphorus	mg/L	0.020 <sup>b</sup>	-	<0.0030	0.0092	<0.0030	<0.0030	0.0032	0.0083	0.0042	0.0043	<0.0030	<0.0030	0.0066	0.0034	0.0043	0.0038	0.0025
Anions	Phenols	mg/L	0.004 <sup>a</sup>	-	<0.0010	0.0115	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0028	0.0023	0.0016	0.0025
	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	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	5.43	5.73	5.45	5.73	5.16	5.60	8.09	5.39	5.27	5.76	4.73	4.48	4.66	4.46	4.63
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>b</sup>	218	5.05	5.53	5.07	5.31	4.79	5.19	4.79	5.01	4.87	5.32	4.46	4.48	4.66	4.48	4.64
	Aluminum (Al)	mg/L	0.100	0.1	<0.0030	0.0183	0.0035	0.0109	<0.0030	0.0035	0.0064	0.0539	0.0043	0.0117	0.0219	0.0190	0.0162	0.0176	0.0167
	Antimony (Sb)	mg/L	0.020 <sup>a</sup>	-	<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
	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
Total Metals	Barium (Ba)	mg/L	-	-	0.00876	0.00918	0.00867	0.00885	0.00841	0.00901	0.00868	0.00904	0.00912	0.00976	0.00776	0.00711	0.00757	0.00725	0.00754
	Beryllium (Be)	mg/L	0.011 <sup>a</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<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
	Cadmium (Cd)	mg/L	0.00012	0.0001	<0.000010	0.000017	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000016	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	18.3	19.7	18.5	19.1	17.5	19.3	17.7	19.1	17.6	19.1	15.0	13.4	14.2	13.7	14.1
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00011	0.00013	<0.00010	0.00011
	Cobalt (Co)	mg/L	0.0009 <sup>a</sup>	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
	Copper (Cu)	mg/L	0.002	0.004	0.00132	0.00142	0.00116	0.00124	0.00098	0.00116	0.00129	0.00195	0.00117	0.00133	0.00095	0.00092	0.00096	0.00088	0.00096
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.033	0.031	0.026	0.028
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000108	<0.000050	0.000114	<0.000050	<0.000050	<0.000050	0.000091	<0.000050	0.000067	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.0015	0.0016	0.0016	0.0016	0.0017	0.0017	0.0015	0.0019	0.0013	0.0013	0.0013	0.0011	0.0013	0.0012	0.0013
	Magnesium (Mg)	mg/L	-	-	12.0	12.4	12.0	12.0	11.6	12.3	11.4	11.8	11.1	12.3	9.42	8.40	8.55	8.45	8.44
	Manganese (Mn)	mg/L	0.935 <sup>b</sup>	-	0.000367	0.000479	0.000301	0.000311	0.000460	0.000322	0.0124	0.00123	0.000614	0.000328	0.00210	0.00302	0.00303	0.00296	0.00312
	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
	Molybdenum (Mo)	mg/L	0.073	-	0.000455	0.000505	0.000466	0.000484	0.000417	0.000476	0.000388	0.000584	0.000456	0.000527	0.000393	0.000384	0.000430	0.000386	0.000434
	Nickel (Ni)	mg/L	0.025	0.025	0.00075	0.00087	0.00072	0.00085	0.00069	0.00086	0.00082	0.00098	0.00077	0.00091	0.00084	0.00053	0.00057	0.00051	0.00057
	Potassium (K)	mg/L	-	-	1.50	1.61	1.50	1.56	1.46	1.59	1.41	1.57	1.55	1.72	1.33	1.29	1.33	1.25	1.32
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	0.000059	0.000057
	Silicon (Si)	mg/L	-	-	0.42	0.42	0.41	0.42	0.46	0.42	1.51	0.43	0.45	0.42	0.46	0.45	0.47	0.46	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
	Sodium (Na)	mg/L	-	-	2.39	2.56	2.42	2.44	2.35	2.54	3.90	2.64	2.40	2.59	2.00	1.83	1.99	1.78	1.89
	Strontium (Sr)	mg/L	-	-	0.0147	0.0156	0.0147	0.0155	0.0140	0.0153	0.0155	0.0153	0.0149	0.0160	0.0121	0.0110	0.0115	0.0111	0.0115
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.00089	0.00066	0.00083	0.00093
	Uranium (U)	mg/L	0.015	-	0.00128	0.00134	0.00130	0.00133	0.00118	0.00130	0.000938	0.00132	0.00136	0.00146	0.00119	0.00117	0.00136	0.00119	0.00131
	Vanadium (V)	mg/L	0.006 <sup>a</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	0.0032	<0.0030	0.0036	<0.0030	<0.0030	<0.0030	<b>0.0304</b>	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

**BOLD** Indicates parameter concentration above applicable Water Quality Guideline.

Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsic (2013) using baseline water quality data specific to the Camp Lake system.

**Table C.26: Water Chemistry at Camp Lake (JLO) Water Quality Monitoring Stations, Mary River Project CREMP, 2020**

	Parameters	Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Summer Sampling Event					Fall Sampling Event									
					JLO-07 bottom	JLO-07 surface	JLO-09 bottom	JLO-09 surface	J0-01 outlet	JLO-02 bottom	JLO-02 surface	JLO-10 bottom	JLO-10 surface	JLO-01 bottom	JLO-01 surface	JLO-07 bottom	JLO-07 surface	JLO-09 bottom	JLO-09 surface
					29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	03-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20
Conventional	Conductivity (lab)	umho/cm	-	-	151	154	154	155	155	160	157	157	156	156	<3.0	158	157	158	157
	pH (lab)	pH	6.5 - 9.0	-	8.13	8.13	7.85	8.13	8.06	8.14	8.15	8.12	8.13	8.06	6.75	8.12	8.08	8.13	8.12
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	69.2	70.8	70.6	72.3	74.1	82	80	79.5	78.9	79.9	<50	78.6	79	76.3	78.5
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	2.1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	89	89	84	84	85	83	<10	80	89	98	88	89	126	<10	167
	Turbidity	NTU	-	-	0.77	0.71	0.79	0.72	0.72	0.36	0.4	0.33	0.29	0.34	<0.10	0.35	0.33	0.33	0.31
Nutrients and Organics	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	65.7	67.2	67.4	67.4	75	72	70	71	70	69	<10	67	69	68	71
	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.02	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.0563	0.0395	0.0398	0.0408	0.024	0.029	0.028	0.028	0.027	0.027	<0.020	0.052	0.03	0.028	0.027
	Nitrite	mg/L	0.06	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.113	0.108	0.114	0.111	<0.15	0.22	0.19	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.83	1.92	1.96	1.92	2.52	2.45	2.7	2.49	2.38	2.39	<0.50	2.58	2.37	2.46	2.39
Anions	Total Organic Carbon	mg/L	-	-	1.99	1.94	2.02	1.92	3.66	3.1	2.85	3.17	3.02	2.96	1.43	2.98	2.99	3.05	2.94
	Total Phosphorus	mg/L	0.020 <sup>d</sup>	-	0.0036	0.0026	0.0056	0.0030	0.0037	<0.0030	<0.0030	0.0072	<0.0030	<0.0030	<0.0030	0.0078	<0.0030	<0.0030	<0.0030
	Phenols	mg/L	0.004 <sup>e</sup>	-	<0.0010	0.0043	0.0038	0.0045	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0036	<0.0010	<0.0010	0.0045
	Bromide (Br)	mg/L	-	-	<0.050	<0.050	<0.050	<0.050	<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	4.49	4.56	4.54	4.55	4.58	5.05	4.96	4.92	4.85	4.85	<0.50	5.02	4.83	4.83	4.81
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>b</sup>	218	4.45	4.60	4.57	4.59	4.40	5.01	4.77	4.9	4.76	4.73	<0.30	6.82	4.75	4.73	4.70
Total Metals	Aluminum (Al)	mg/L	0.100	0.1	0.0166	0.0177	0.0145	0.0151	0.0106	0.0046	0.0057	0.0043	0.0056	0.0043	<0.0030	0.0052	0.0046	0.0057	0.0061
	Antimony (Sb)	mg/L	0.020 <sup>d</sup>	-	<0.00010	<0.00010	<0.00010	<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	0.0001	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00735	0.00743	0.00727	0.00759	0.00748	0.00787	0.00741	0.00744	0.00772	0.00725	<0.000050	0.0073	0.00757	0.00741	0.00755
	Beryllium (Be)	mg/L	0.011 <sup>d</sup>	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	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
	Cadmium (Cd)	mg/L	0.00012	0.0001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	14.2	14.0	13.9	14.4	14.0	15.4	15.3	15.3	15.5	15.3	<0.050	15	14.9	15.1	14.8
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00021	0.00010	<0.00010	<0.00010	<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 <sup>d</sup>	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
	Copper (Cu)	mg/L	0.002	0.004	0.00092	0.00091	0.00089	0.00091	0.00087	0.0009	0.00082	0.00087	0.00087	0.00082	<0.00050	0.00083	0.00103	0.00087	0.0009
	Iron (Fe)	mg/L	0.30	0.300	0.050	0.027	0.023	0.025	0.068	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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
	Lithium (Li)	mg/L	-	-	0.0012	0.0012	0.0012	0.0012	0.0011	0.0012	0.0013	0.0011	0.0012	<0.0010	<0.0010	0.0011	0.0011	0.0011	0.0011
	Magnesium (Mg)	mg/L	-	-	8.55	8.70	8.69	8.45	8.62	9.71	9.35	9.37	9.45	9.35	<0.050	9.26	9.44	9.52	9.6
	Manganese (Mn)	mg/L	0.935 <sup>b</sup>	-	0.00296	0.00296	0.00297	0.00302	0.00354	0.00123	0.0011	0.00121	0.00119	0.00125	<0.000070	0.00108	0.00124	0.00119	0.00129
	Mercury (Hg)	mg/L	0.000026	-	<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
	Molybdenum (Mo)	mg/L	0.073	-	0.000376	0.000407	0.000387	0.000389	0.000357	0.000407	0.000415	0.00039	0.000416	0.000412	<0.000050	0.00042	0.000391	0.000389	0.000407
	Nickel (Ni)	mg/L	0.025	0.025	0.00060	0.00052	0.00052	<0.00050	0.00066	0.00058	0.00061	0.0006	0.0006	0.00058	<0.00050	0.00063	0.00056	0.0006	0.00066
	Potassium (K)	mg/L	-	-	1.31	1.29	1.28	1.31	1.23	1.35	1.31	1.33	1.32	1.29	<0.20	1.3	1.29	1.3	1.3
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.48	0.46	0.45	0.45	0.40	0.37	0.34	0.33	0.35	0.33	<0.10	0.34	0.34	0.34	0.36
	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
	Sodium (Na)	mg/L	-	-	1.93	1.88	1.88	1.88	1.87	2.2	2.05	2.09	2.1	2.07	<0.050	2.06	2.09	2.11	2.1
	Strontium (Sr)	mg/L	-	-	0.0111	0.0113	0.0112	0.0109	0.0111	0.0116	0.0112	0.0113	0.0114	0.0112	<0.00010	0.0114	0.0111	0.0112	0.0111
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.000010	<0.000010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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
	Titanium (Ti)	mg/L	-	-	0.00075	0.00080	0.00073	0.00076	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00124	0.00126	0.00126	0.00123	0.00120	0.00147	0.00131	0.00133	0.00134	0.00131	<0.000010	0.00128	0.00133	0.00131	0.00131
	Vanadium (V)	mg/L	0.006 <sup>d</sup>	0.006	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	0.0259	<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

**BOLD** Indicates parameter concentration above applicable Water Quality Guideline.

Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsic (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 and Reference Lake 3 in 2020, and Between Camp Lake 2020 and Baseline (2005 to 2013) Data, Mary River Project CREMP**

Parameter	Camp Lake vs Reference Lake 3 in 2020		Camp Lake 2020 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	2.0	1.8	1.4	1.3	1.2
Hardness (as CaCO <sub>3</sub> )	2.0	1.9	1.5	1.2	1.2
Total Suspended Solids (TSS)	1.0	1.0	1.0	1.0	1.0
Total Dissolved Solids (TDS)	2.1	1.7	1.4	1.1	1.1
Turbidity	5.3	2.2	0.7	1.5	1.0
Alkalinity (as CaCO <sub>3</sub> )	1.5	1.9	1.2	1.2	1.1
Total Ammonia	0.5	0.8	0.3	0.1	0.4
Nitrate	2.2	1.5	0.5	0.4	0.3
Nitrite	0.2	1.0	1.9	0.0	1.0
Total Kjeldahl Nitrogen (TKN)	0.8	1.0	1.1	0.6	0.5
Dissolved Organic Carbon	0.7	0.7	1.2	1.3	1.3
Total Organic Carbon	0.4	0.8	1.4	1.0	1.5
Total Phosphorus	0.8	1.3	0.7	0.7	0.8
Phenols	2.8	1.2	2.1	2.1	1.3
Bromide (Br)	0.5	1.0	1.1	0.2	0.4
Chloride (Cl)	3.3	3.3	4.1	2.3	2.0
Sulphate (SO <sub>4</sub> )	1.3	1.3	3.7	3.1	1.6
Aluminum (Al)	5.3	1.6	7.3	1.3	0.8
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.0	1.0	1.0	1.0
Barium (Ba)	1.2	1.0	1.5	1.4	1.2
Beryllium (Be)	0.2	1.0	1.1	0.3	2.8
Cadmium (Cd)	0.5	1.0	0.7	0.4	0.9
Calcium (Ca)	2.0	1.9	1.5	1.2	1.2
Chromium (Cr)	0.2	1.0	-	1.0	1.0
Cobalt (Co)	1.0	1.0	1.0	1.0	0.9
Copper (Cu)	1.2	1.1	1.2	0.3	1.0
Iron (Fe)	1.0	1.0	1.1	1.0	1.7
Lead (Pb)	1.0	1.0	0.9	0.6	1.0
Lithium (Li)	1.2	1.1	0.4	0.3	
Magnesium (Mg)	2.0	1.8	1.5	1.2	1.2
Manganese (Mn)	3.6	1.6	2.0	1.4	0.7
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	3.1	2.4	2.3	2.1	1.8
Nickel (Ni)	1.1	1.2	1.2	0.8	1.0
Potassium (K)	1.5	1.3	-	1.6	1.4
Selenium (Se)	0.1	1.0	-	0.6	-
Silicon (Si)	0.9	0.6	1.1	1.0	0.8
Silver (Ag)	1.0	1.0	1.1	1.6	2.7
Sodium (Na)	2.1	2.0	-	2.1	1.9
Strontium (Sr)	1.4	1.2	2.1	1.6	1.3
Thallium (Tl)	0.1	1.0	1.1	0.1	-
Tin (Sn)	1.0	1.0	0.1	0.2	0.1
Titanium (Ti)	0.1	1.0	1.0	0.1	1.0
Uranium (U)	3.9	3.6	2.8	2.7	2.4
Vanadium (V)	0.5	1.0	1.0	0.5	1.0
Zinc (Zn)	1.8	1.0	4.6	2.2	1.3

	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 greater than 10 times higher than respective mean reference or baseline period value).
	Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.28: Dissolved Metal Concentrations at Camp Lake Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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
			12-Apr-20	12-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	13-Apr-20	14-Apr-20	14-Apr-20	4-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	0.0033	<0.0030	<0.0030	<0.0030	0.0282	<0.0030	<0.0030	<0.0030	0.0171	0.0045	0.0059	0.0046	0.0037	0.0048	0.0028	0.0037
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<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	0.00011	<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
	Barium (Ba)	mg/L	0.00882	0.00931	0.00883	0.00927	0.00814	0.0101	0.00854	0.00879	0.00910	0.0107	0.00820	0.00710	0.00809	0.00707	0.00732	0.00735	0.00761
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000029	<0.000010	<0.000010	<0.000010	0.000067	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	18.8	19.7	19.1	19.4	17.4	19.8	17.6	18.4	17.8	19.1	14.9	14.3	14.0	13.5	14.4	14.8	13.9
	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	0.00016	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	0.00126	0.00117	0.00099	0.00118	0.00092	0.00211	0.00098	0.00108	0.00109	0.00230	0.00087	0.00085	0.00095	0.00079	0.00081	0.00073	0.00088
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<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	0.000188	<0.000050	<0.000050	<0.000050	0.000539	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0018	0.0018	0.0018	0.0018	0.0017	0.0019	0.0016	0.0019	0.0012	0.0014	0.0013	0.0011	0.0012	0.0011	0.0012	0.0011	0.0011
	Magnesium (Mg)	mg/L	12.0	12.8	12.1	12.4	11.4	12.4	11.5	12.1	11.2	12.3	9.53	8.49	9.05	8.36	8.41	8.85	9.07
	Manganese (Mn)	mg/L	0.000186	0.000222	0.000108	0.000189	0.000214	0.00163	0.00855	0.000143	0.000178	0.00137	0.000986	0.00063	0.00114	0.00052	0.00104	0.00027	0.00105
	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	0.000467	0.000478	0.000455	0.000503	0.000426	0.000642	0.000381	0.000474	0.000450	0.000605	0.000399	0.000394	0.000407	0.000383	0.000404	0.000378	0.000392
	Nickel (Ni)	mg/L	0.00074	0.00082	0.00072	0.00077	0.00068	0.00119	0.00076	0.00072	0.00077	0.00100	0.00068	0.00065	0.00065	0.00058	0.00065	0.00059	0.00069
	Potassium (K)	mg/L	1.54	1.65	1.54	1.62	1.42	1.65	1.42	1.54	1.53	1.73	1.34	1.30	1.35	1.22	1.29	1.28	1.37
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.41	0.43	0.41	0.44	0.47	0.46	1.58	0.42	0.44	0.45	0.42	0.386	0.421	0.408	0.419	0.427	0.414
	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	2.41	2.60	2.46	2.53	2.25	2.74	4.04	2.43	2.35	2.68	2.02	2.02	2.12	1.92	2.03	1.96	2.16
	Strontium (Sr)	mg/L	0.0151	0.0154	0.0151	0.0154	0.0140	0.0162	0.0156	0.0150	0.0150	0.0179	0.0121	0.0111	0.0108	0.0104	0.0110	0.0112	0.0109
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000010	<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	0.00018	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00131	0.00140	0.00132	0.00135	0.00120	0.00140	0.000938	0.00130	0.00137	0.00154	0.00122	0.00120	0.00134	0.00119	0.00128	0.00125	0.00128
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0157	<0.0030	<0.0030	<0.0030	0.0141	<0.0030	0.0043	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Table C.28: Dissolved Metal Concentrations at Camp Lake Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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
			bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
			29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	3-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20	30-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0039	0.0042	0.0037	0.0047	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0596	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	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
	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
	Barium (Ba)	mg/L	0.00780	0.00759	0.00712	0.00735	0.00777	0.00751	0.00756	0.0075	0.00752	0.00754	0.000359	0.00745	0.00776	0.00746	0.00739
	Beryllium (Be)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	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
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	13.7	14.0	14.1	14.4	14.3	16.1	15.6	15.4	15.3	15.9	<0.050	15.2	15.5	15.3	15.3
	Chromium (Cr)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<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
	Copper (Cu)	mg/L	0.00086	0.00089	0.00088	0.00091	0.00091	0.0009	0.0009	0.00087	0.00089	0.00088	<0.00050	0.00088	0.00087	0.00088	0.00087
	Iron (Fe)	mg/L	<0.010	<0.010	<0.010	<0.010	0.038	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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
	Lithium (Li)	mg/L	0.0011	0.0011	0.0012	0.0012	0.0014	0.0013	0.0013	0.0013	0.0013	0.0015	<0.0010	0.0013	0.0013	0.001	0.0013
	Magnesium (Mg)	mg/L	8.49	8.69	8.59	8.82	9.29	10.1	9.97	9.95	9.91	9.79	<0.050	9.86	9.76	9.23	9.8
	Manganese (Mn)	mg/L	0.00094	0.00093	0.00090	0.00097	0.00198	0.000177	0.000372	0.000203	0.000309	0.000107	<0.000070	0.000302	0.000088	0.000166	0.000178
	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
	Molybdenum (Mo)	mg/L	0.000404	0.000392	0.000380	0.000402	0.000398	0.00041	0.000404	0.000402	0.00042	0.000399	<0.000050	0.000413	0.000416	0.000426	0.00039
	Nickel (Ni)	mg/L	0.00062	0.00063	0.00064	0.00064	0.00071	0.00059	0.00061	0.00059	0.00059	0.00059	<0.00050	0.00059	0.0006	0.0006	0.00061
	Potassium (K)	mg/L	1.24	1.49	1.29	1.33	1.28	1.35	1.36	1.33	1.4	1.34	<0.20	1.34	1.37	1.27	1.31
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.424	0.412	0.413	0.422	0.39	0.37	0.34	0.35	0.35	0.36	<0.10	0.34	0.35	0.34	0.33
	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
	Sodium (Na)	mg/L	2.01	2.22	1.99	2.04	2.02	2.43	2.3	2.28	2.19	2.27	<0.050	2.21	2.22	2.05	2.2
	Strontium (Sr)	mg/L	0.0109	0.0113	0.0108	0.0109	0.0110	0.0114	0.0112	0.0113	0.0113	0.0111	<0.00010	0.0112	0.0111	0.0117	0.011
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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
	Titanium (Ti)	mg/L	<0.00030	<0.00030	<0.00030	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00126	0.00123	0.00123	0.00126	0.00128	0.00147	0.00132	0.00132	0.00133	0.00131	<0.000010	0.00132	0.00133	0.00131	0.00129
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0010	0.0029	<0.0010	0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

**Table C.29: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Camp Lake and Reference Lake 3 in 2020, and Between Camp Lake 2020 and Baseline (2005 to 2013) Data, Mary River Project CREMP**

Parameter	Camp Lake vs Reference Lake 3 in 2020		Camp Lake 2020 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	0.3	2.0	0.0	0.9	2.9
Antimony (Sb)	1.0	1.0	0.0	0.0	1.0
Arsenic (As)	1.0	1.0	1.0	0.8	1.0
Barium (Ba)	1.2	1.1	0.0	1.4	1.2
Beryllium (Be)	0.2	1.0	1.2	0.2	2.1
Bismuth (Bi)	0.1	1.0	1.0	0.0	1.0
Boron (B)	1.0	1.0	1.0	1.0	1.0
Cadmium (Cd)	0.5	1.0	0.5	0.0	0.8
Calcium (Ca)	2.0	1.9	1.4	1.2	1.2
Chromium (Cr)	0.2	1.0	-	0.9	-
Cobalt (Co)	1.0	1.0	1.0	1.0	0.9
Copper (Cu)	1.2	1.2	1.0	0.6	1.0
Iron (Fe)	0.3	1.0	1.2	0.4	1.7
Lead (Pb)	1.0	1.0	0.7	1.0	1.0
Lithium (Li)	1.1	1.3	0.4	0.0	0.5
Magnesium (Mg)	2.0	1.8	1.5	1.3	1.3
Manganese (Mn)	3.7	1.4	2.1	0.0	0.3
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	3.0	2.4	2.0	0.0	1.9
Nickel (Ni)	1.3	1.2	1.1	0.7	1.0
Potassium (K)	1.5	1.3	1.0	1.2	1.0
Selenium (Se)	0.1	1.0	-	0.5	-
Silicon (Si)	0.9	0.7	1.1	1.0	0.8
Silver (Ag)	1.0	1.0	1.2	1.8	2.7
Sodium (Na)	2.3	2.0	1.5	1.6	1.6
Strontium (Sr)	1.3	1.3	2.0	1.5	1.3
Thallium (Tl)	0.1	1.0	1.2	0.1	2.6
Tin (Sn)	1.0	1.0	0.1	0.2	0.1
Titanium (Ti)	0.0	1.0	1.0	0.0	1.0
Uranium (U)	4.1	3.6	2.6	2.8	2.4
Vanadium (V)	0.5	1.0	1.0	0.5	1.0
Zinc (Zn)	0.6	1.0	2.2	0.6	1.9

- 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 greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.

**Table C.30: *In Situ* Water Quality Measurements Collected at Sheardown Lake Tributary 1, Tributary 12, and Tributary 9 Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**

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	10-Aug-20	9.9	10.42	95.3	7.71	132.4
	REF-CRK-B2	10-Aug-20	9.0	10.61	94.6	7.58	132.8
	REF-CRK-B3	10-Aug-20	8.4	10.68	93.2	7.48	132.8
	REF-CRK-B4	10-Aug-20	8.0	11.09	96.5	7.50	130.8
	REF-CRK-B5	10-Aug-20	7.6	11.30	98.0	7.57	133.0
Sheardown Lake Tributary 1 Reach 1	SDLT-1-R1-B1	17-Aug-20	7.7	10.41	90.6	7.95	451.4
	SDLT-1-R1-B2	17-Aug-20	7.6	10.55	91.5	7.02	430.2
	SDLT-1-R1-B3	17-Aug-20	7.3	10.78	93.6	7.87	440.2
	SDLT-1-R1-B4	17-Aug-20	7.1	10.87	93.3	7.81	417.5
	SDLT-1-R1-B5	17-Aug-20	7.0	11.00	100.8	7.82	419.5
Sheardown Lake Tributary 12 Downstream	SDLT-12-DS-B1	13-Aug-20	4.4	9.22	77.5	7.79	376.2
	SDLT-12-DS-B2	13-Aug-20	4.1	9.49	76.9	7.83	370.0
	SDLT-12-DS-B3	13-Aug-20	4.2	9.71	74.5	7.82	361.7
Sheardown Lake Tributary 9 Upstream	SDLT-9-DS-B1	13-Aug-20	5.3	9.26	74.1	7.64	275.8
	SDLT-9-DS-B2	13-Aug-20	5.3	10.25	81.0	7.69	284.6
	SDLT-9-DS-B3	13-Aug-20	5.3	10.91	86.7	7.69	284.2
	SDLT-9-DS-B4	13-Aug-20	5.3	11.35	92.8	7.67	283.6
	SDLT-9-DS-B5	13-Aug-20	5.7	11.35	90.8	7.70	283.4

**Table C.31: *In Situ* Water Quality Summary Statistics for the Sheardown Lake Tributary Benthic Stations, Mary River Project CREMP, August 2020**

Metric	Study Area	Sample Size	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Water Temperature (°C)	Unnamed Reference Creek	5	8.6	0.9	0.4	7.9	9.2	7.6	9.9
	Sheardown Lake Tributary 1 (SDLT1)	5	7.3	0.3	0.1	7.1	7.6	7.0	7.7
	Sheardown Lake Tributary 12 (SDLT12)	3	4.2	0.2	0.1	4.1	4.4	4.1	4.4
	Sheardown Lake Tributary 9 (SDLT9)	5	5.4	0.2	0.1	5.2	5.5	5.3	5.7
Dissolved Oxygen (mg/L)	Unnamed Reference Creek	5	10.82	0.36	0.16	10.55	11.09	10.42	11.30
	Sheardown Lake Tributary 1 (SDLT1)	5	10.72	0.24	0.11	10.55	10.90	10.41	11.00
	Sheardown Lake Tributary 12 (SDLT12)	3	9.47	0.25	0.14	9.24	9.71	9.22	9.71
	Sheardown Lake Tributary 9 (SDLT9)	5	10.62	0.89	0.40	9.97	11.28	9.26	11.35
Dissolved Oxygen (% Saturation)	Unnamed Reference Creek	5	95.5	1.8	0.8	94.2	96.9	93.2	98.0
	Sheardown Lake Tributary 1 (SDLT1)	5	94.0	4.0	1.8	91.0	96.9	90.6	100.8
	Sheardown Lake Tributary 12 (SDLT12)	3	76.3	1.6	0.9	74.8	77.8	74.5	77.5
	Sheardown Lake Tributary 9 (SDLT9)	5	85.1	7.6	3.4	79.5	90.7	74.1	92.8
pH (units)	Unnamed Reference Creek	5	7.57	0.09	0.04	7.50	7.63	7.48	7.71
	Sheardown Lake Tributary 1 (SDLT1)	5	7.69	0.38	0.17	7.41	7.97	7.02	7.95
	Sheardown Lake Tributary 12 (SDLT12)	3	7.81	0.02	0.01	7.79	7.83	7.79	7.83
	Sheardown Lake Tributary 9 (SDLT9)	5	7.68	0.02	0.01	7.66	7.70	7.64	7.70
Specific Conductance (µS/cm)	Unnamed Reference Creek	5	132	0.9	0.4	131.7	133.0	130.8	133
	Sheardown Lake Tributary 1 (SDLT1)	4	432	14	6	421	442	418	451
	Sheardown Lake Tributary 12 (SDLT12)	3	369	7	4	362	376	362	376
	Sheardown Lake Tributary 9 (SDLT9)	5	282	4	2	280	285	276	285

**Table C.32: *In Situ* Water Quality Statistical Comparisons Among the Sheardown Lake Tributaries and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2020**

Metric	Overall 4-group Comparison				Pair-wise, <i>post hoc</i> comparisons <sup>a</sup>			
	Statistical Test <sup>a</sup>	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 12	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 9	YES	<0.001
					Sheardown Tributary 1	Sheardown Tributary 12	YES	0.041
					Sheardown Tributary 1	Sheardown Tributary 9	YES	0.041
					Sheardown Tributary 12	Sheardown Tributary 9	YES	0.041
Dissolved Oxygen (mg/L)	ANOVA	none	YES	0.019	Unnamed Reference Creek	Sheardown Tributary 1	YES	0.018
					Unnamed Reference Creek	Sheardown Tributary 12	YES	0.018
					Unnamed Reference Creek	Sheardown Tributary 9	NO	0.937
					Sheardown Tributary 1	Sheardown Tributary 12	YES	0.047
					Sheardown Tributary 1	Sheardown Tributary 9	YES	0.047
					Sheardown Tributary 12	Sheardown Tributary 9	YES	0.047
Dissolved Oxygen (% saturation)	ANOVA	none	YES	0.001	Unnamed Reference Creek	Sheardown Tributary 1	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 12	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 9	YES	0.017
					Sheardown Tributary 1	Sheardown Tributary 12	YES	0.098
					Sheardown Tributary 1	Sheardown Tributary 9	YES	0.098
					Sheardown Tributary 12	Sheardown Tributary 9	YES	0.098
pH (units)	K-W	rank	YES	0.045	Unnamed Reference Creek	Sheardown Tributary 1	YES	0.019
					Unnamed Reference Creek	Sheardown Tributary 12	YES	0.019
					Unnamed Reference Creek	Sheardown Tributary 9	NO	0.374
					Sheardown Tributary 1	Sheardown Tributary 12	NO	0.113
					Sheardown Tributary 1	Sheardown Tributary 9	NO	0.113
					Sheardown Tributary 12	Sheardown Tributary 9	NO	0.113
Specific Conductance (µS/cm)	ANOVA	none	YES	0.001	Unnamed Reference Creek	Sheardown Tributary 1	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 12	YES	<0.001
					Unnamed Reference Creek	Sheardown Tributary 9	YES	<0.001
					Sheardown Tributary 1	Sheardown Tributary 12	YES	<0.001
					Sheardown Tributary 1	Sheardown Tributary 9	YES	<0.001
					Sheardown Tributary 12	Sheardown Tributary 9	YES	<0.001

Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> 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 Tributary 1 (SDLT1) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Spring Sampling Event		Summer Sampling Event		Fall Sampling Event	
					D1-05	D1-00	D1-05	D1-00	DI-05	DI-00
					02-Jul-20	02-Jul-20	03-Aug-20	03-Aug-20	29-Aug-20	29-Aug-20
Conventionals	Conductivity (lab)	umho/cm	-	-	154	280	217	458	248	369
	pH (lab)	pH	6.5 - 9.0	-	7.92	8.22	7.85	8.02	7.94	8.20
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	72.5	128	98.8	205	123	186
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	3.2	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	99	145	117	278	130	213
	Turbidity	NTU	-	-	6.52	4.22	0.32	0.82	0.22	0.17
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	64	84	98	125	99	123
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.217	0.614	0.219	1.58	0.221	1.18
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	0.21	<0.15	0.31
	Dissolved Organic Carbon	mg/L	-	-	3.27	3.43	3.20	4.33	2.96	3.24
	Total Organic Carbon	mg/L	-	-	4.82	4.86	4.41	5.46	3.25	3.58
	Total Phosphorus	mg/L	0.030 <sup>α</sup>	-	0.0073	0.0043	<0.0030	0.0504	<0.0030	<0.0030
Anions	Phenols	mg/L	0.004 <sup>α</sup>	-	0.0025	<0.0010	<0.0010	<0.0010	0.0015	<0.0010
	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.45	6.01	4.34	11.6	6.04	10.7
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	9.47	43.2	14.6	89.6	16.8	47.8
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0946	0.0946	0.0111	0.0115	0.0077	0.0149
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<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
	Barium (Ba)	mg/L	-	-	0.00878	0.0126	0.0110	0.0191	0.0122	0.0171
	Beryllium (Be)	mg/L	0.011 <sup>α</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	0.011	0.015	0.013	0.018	0.014	0.017
	Cadmium (Cd)	mg/L	0.00012	0.00008	0.000035	0.000016	0.000035	0.000015	0.000037	0.000013
	Calcium (Ca)	mg/L	-	-	13.1	21.8	18.3	35.8	22.1	32.8
	Chromium (Cr)	mg/L	0.0089	0.00856	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	<0.00010	0.00012	<0.00010	0.00012	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	<b>0.00321</b>	<b>0.00253</b>	<b>0.00279</b>	<b>0.00204</b>	<b>0.00264</b>	<b>0.00205</b>
	Iron (Fe)	mg/L	0.30	0.326	0.103	0.159	<0.030	0.147	<0.030	0.092
	Lead (Pb)	mg/L	0.001	0.001	0.000301	0.000167	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.0014	0.0023	0.0013	0.0026	0.0014	0.0024
	Magnesium (Mg)	mg/L	-	-	8.90	17.1	13.3	28.0	16.3	24.4
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00224	0.00699	0.000675	0.0101	0.000440	0.00541
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00395	0.00306	0.00465	0.00314	0.00556	0.00434
	Nickel (Ni)	mg/L	0.025	0.025	0.00153	0.00156	0.00105	0.00152	0.00100	0.00134
	Potassium (K)	mg/L	-	-	2.25	2.63	2.61	3.06	2.77	3.35
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	1.35	1.42	1.35	1.49	1.37	1.48
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.49	3.42	2.32	5.48	2.90	5.50
	Strontium (Sr)	mg/L	-	-	0.0112	0.0171	0.0146	0.0254	0.0156	0.0218
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00281	0.00460	0.00792	0.00786	0.0131	0.0155
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	0.0033	0.0093	<0.0030	0.0083	<0.0030	0.0067

Indicates parameter concentration above applicable Water Quality Guideline.

**BOLD** Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

<sup>a</sup> 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

<sup>b</sup> 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 (Total Metal Concentration Data Provided) Between SDLT1 and Reference Creek Stations in 2020, and at SDLT1 Between 2020 and the Baseline Period**

Parameter	2020 vs Reference Creek				2020 vs Baseline	
	Spring	Summer	Fall	Spring	Summer	Fall
Conductivity (lab)	4.0	2.5	1.8	2.8	1.9	1.3
Hardness (as CaCO <sub>3</sub> )	4.2	2.7	1.9	2.6	1.7	1.4
Total Suspended Solids (TSS)	0.8	0.7	1.0	1.3	1.0	1.0
Total Dissolved Solids (TDS)	1.4	2.3	1.7	2.5	1.7	1.1
Turbidity	2.9	0.1	0.1	5.1	1.1	0.6
Alkalinity (as CaCO <sub>3</sub> )	3.1	1.8	1.6	2.2	1.4	1.1
Total Ammonia	1.0	0.8	1.0	0.1	0.1	0.2
Nitrate	21	15	9.2	4.3	9.1	6.4
Nitrite	1.0	1.0	1.0	1.0		0.8
Total Kjeldahl Nitrogen (TKN)	7.1	1.2	1.5	0.9	1.2	1.9
Dissolved Organic Carbon	1.7	1.1	1.3	0.9	1.4	1.3
Total Organic Carbon	2.2	1.6	1.6	1.2	1.8	1.4
Total Phosphorus	1.3	4.1	0.8	0.5	5.8	0.7
Phenols	1.8	1.0	0.6			
Bromide (Br)	1.0	1.0	1.0	0.4		
Chloride (Cl)	3.5	2.0	1.2	0.6	1.9	1.0
Sulphate (SO <sub>4</sub> )	20	9.4	3.5	49	9.7	3.6
Aluminum (Al)	1.2	0.0	0.2	1.8	0.6	1.0
Antimony (Sb)	1.0	1.0	1.0	0.8	0.8	0.9
Arsenic (As)	1.0	0.8	1.0	1.0	1.0	1.0
Barium (Ba)	3.0	1.6	1.4	2.2	1.6	1.3
Beryllium (Be)	1.0	1.3	1.0	-		
Bismuth (Bi)	1.0	1.3	1.0	1.0		
Boron (B)	1.3	1.6	1.6	1.2	0.9	1.1
Cadmium (Cd)	2.6	2.9	2.5	1.2	0.9	1.0
Calcium (Ca)	3.6	2.3	1.7	2.4	1.6	1.3
Chromium (Cr)	1.0	0.6	1.0	2.0	2.1	3.5
Cobalt (Co)	1.1	0.7	1.0	0.8	1.0	0.9
Copper (Cu)	4.0	2.1	2.3	1.0	0.9	1.1
Iron (Fe)	1.7	0.4	0.9	1.4	1.3	1.5
Lead (Pb)	2.2	0.2	0.5	0.8	0.7	0.8
Lithium (Li)	1.9	1.8	1.9	3.7	1.8	1.8
Magnesium (Mg)	4.5	3.1	2.1	2.6	1.8	1.5
Manganese (Mn)	3.4	1.8	2.9	2.1	2.4	2.2
Mercury (Hg)	1.0	1.0	1.0	0.5		
Molybdenum (Mo)	24	8.6	8.6	3.4	1.8	2.1
Nickel (Ni)	3.1	1.8	2.1	0.9	1.0	1.1
Potassium (K)	5.4	3.1	2.9	2.6	1.7	1.7
Selenium (Se)	1.0	1.3	1.0			
Silicon (Si)	2.2	1.1	1.6	1.4	1.1	1.1
Silver (Ag)	1.0	0.5	1.0	0.9		
Sodium (Na)	3.0	1.4	1.1	5.9	3.4	2.0
Strontium (Sr)	2.9	1.4	1.0	3.3	2.0	1.4
Thallium (Tl)	1.0	1.2	1.0	-	-	-
Tin (Sn)	1.0	1.0	1.0	1.0		
Titanium (Ti)	0.9	0.4	1.0	1.0		
Uranium (U)	8.3	2.0	1.9	5.9	3.1	2.7
Vanadium (V)	1.0	0.9	1.0	1.0		
Zinc (Zn)	2.1	1.9	1.6	5.9	1.5	1.9

- 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 greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2020 and reference area or baseline data, precluding an evaluation of magnitude of elevation

**Table C.35: Dissolved Metal Concentrations at Sheardown Lake Tributary Water Quality Monitoring Stations, Mary River Project CREMP, 2020**

Parameters		Units	Spring Sampling Event		Summer Sampling Event		Fall Sampling Event	
			D1-05	D1-00	D1-05	D1-00	D1-05	DI-00
			2-Jul-20	2-Jul-20	3-Aug-20	3-Aug-20	29-Aug-20	29-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0216	0.0181	0.0055	0.0047	0.0063	0.0039
	Antimony (Sb)	mg/L	<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
	Barium (Ba)	mg/L	0.00808	0.0125	0.0111	0.0185	0.0119	0.0172
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.012	0.014	0.013	0.018	0.014	0.016
	Cadmium (Cd)	mg/L	0.000026	0.000013	0.000036	0.000014	0.000038	0.000015
	Calcium (Ca)	mg/L	14.2	22.9	17.8	36.3	22.2	33.1
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00294	0.00236	0.00276	0.00199	0.00264	0.00204
	Iron (Fe)	mg/L	<0.030	0.052	<0.030	0.102	<0.030	0.055
	Lead (Pb)	mg/L	0.000064	0.000063	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0016	0.0022	0.0011	0.0026	0.0015	0.0023
	Magnesium (Mg)	mg/L	9.02	17.3	13.2	27.7	16.4	25.1
	Manganese (Mn)	mg/L	0.000521	0.00508	0.000585	0.00955	0.000421	0.00483
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.00438	0.00314	0.00442	0.00314	0.00546	0.00430
	Nickel (Ni)	mg/L	0.00117	0.00142	0.00100	0.00148	0.00102	0.00131
	Potassium (K)	mg/L	2.19	2.62	2.53	3.13	2.73	3.32
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	1.26	1.29	1.31	1.55	1.39	1.44
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.48	3.45	2.33	5.42	3.02	5.76
	Strontium (Sr)	mg/L	0.0115	0.0173	0.0137	0.0243	0.0161	0.0227
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00291	0.00459	0.00788	0.00788	0.0129	0.0163
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	0.0076	<0.0030	0.0075	<0.0030	0.0061

**Table C.36: *In Situ* Water Quality Profile Data Collected at Sheardown Lake NW Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2020**

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
Date Collected	17-Apr-20	17-Apr-20	17-Apr-20	16-Apr-20	17-Apr-20	15-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	16-Apr-20	17-Apr-20	15-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	16-Apr-20	17-Apr-20	15-Apr-20
1.0	0.4	0.2	1.6	2.5	1.9	0.0	14.14	14.02	13.14	13.42	13.10	14.44	98.2	96.4	94.4	98.3	95.3	98.9
2.0	0.2	0.2	0.3	0.3	0.3	0.3	14.18	13.90	14.00	14.50	14.04	14.15	97.8	96.1	96.6	100.4	97.3	97.7
3.0	0.7	0.5	0.7	0.6	0.8	0.4	13.89	13.66	13.70	14.45	13.71	13.92	97.0	95.5	96.1	100.7	96.0	97.3
4.0	0.9	0.9	1.0	0.8	1.0	0.9	13.70	13.47	13.51	14.28	13.50	13.72	96.3	94.9	95.1	100.1	95.0	96.5
5.0	1.1	1.1	1.1	0.9	1.1	1.0	13.55	13.34	13.40	14.18	13.37	13.61	95.6	94.2	94.6	99.6	94.4	96.0
6.0	1.1	1.1	1.1	1.0	1.2	1.1	13.55	13.24	13.32	14.04	13.22	13.47	95.6	93.7	94.2	98.8	93.5	95.0
7.0	1.2	1.2	1.2	-	1.2	1.1	13.44	13.14	13.21	-	13.11	13.37	95.1	93.1	93.5	-	92.9	94.5
8.0	1.2	1.2	1.2	-	1.2	1.2	13.32	13.07	13.03	-	13.04	13.28	94.4	92.7	92.4	-	92.5	94.1
9.0	1.2	1.3	1.3	-	1.3	1.2	13.16	12.97	12.88	-	12.93	13.13	93.3	92.2	91.4	-	91.8	93.1
10.0	1.3	1.3	1.3	-	1.3	1.3	12.92	12.86	12.72	-	12.80	12.96	91.7	91.5	90.5	-	91.0	92.1
11.0	1.3	1.4	1.4	-	1.4	1.3	12.81	12.71	12.57	-	12.60	12.78	90.9	90.5	89.4	-	90.1	90.8
12.0	-	1.4	1.4	-	1.4	-	-	12.55	12.45	-	12.41	-	-	89.5	88.6	-	88.4	-
13.0	-	1.5	1.4	-	1.4	-	-	12.16	12.22	-	12.10	-	-	86.8	87.2	-	86.3	-
14.0	-	1.5	1.5	-	1.5	-	-	11.89	12.02	-	11.78	-	-	84.9	85.8	-	84.2	-
15.0	-	1.6	1.5	-	1.5	-	-	11.67	11.72	-	11.59	-	-	83.6	83.9	-	82.8	-
16.0	-	1.6	1.6	-	1.6	-	-	11.53	11.31	-	11.31	-	-	82.7	81.1	-	81.0	-
17.0	-	1.7	1.6	-	1.6	-	-	11.16	11.07	-	11.06	-	-	80.3	79.5	-	79.3	-
18.0	-	1.7	1.7	-	-	-	-	10.84	10.80	-	-	-	-	78.1	77.6	-	-	-
19.0	-	1.8	1.8	-	-	-	-	10.58	10.67	-	-	-	-	76.3	76.9	-	-	-
20.0	-	1.9	-	-	-	-	-	10.25	-	-	-	-	-	74.1	-	-	-	-
21.0	-	2.0	-	-	-	-	-	9.80	-	-	-	-	-	71.0	-	-	-	-
22.0	-	2.0	-	-	-	-	-	8.20	-	-	-	-	-	59.5	-	-	-	-
23.0	-	2.3	-	-	-	-	-	0.80	-	-	-	-	-	6.1	-	-	-	-

Notes: Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 9.5, 23.5, 19.7, 6.5, 17.4 and 11.7 m, respectively, at the time of winter sampling. Ice thickness at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 1.40, 1.58, 1.26, 1.43, 1.77, and 1.54 m, respectively, at the time of winter sampling.

**Table C.36: *In Situ* Water Quality Profile Data Collected at Sheardown Lake NW Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2020**

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
Date Collected	17-Apr-20	17-Apr-20	17-Apr-20	16-Apr-20	17-Apr-20	15-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	16-Apr-20	17-Apr-20	15-Apr-20
1.0	7.93	8.13	8.04	8.10	7.85	7.81	200.5	196.1	193.3	205.2	196.0	174.5
2.0	7.87	8.01	7.90	7.93	7.86	7.78	196.8	191.2	193.6	204.9	193.0	170.0
3.0	7.82	7.91	7.84	7.81	7.80	7.77	192.2	188.4	190.1	202.8	189.8	189.5
4.0	7.80	7.87	7.81	7.73	7.75	7.77	189.8	186.5	187.4	200.1	188.4	188.5
5.0	7.78	7.80	7.80	7.70	7.74	7.76	188.3	185.6	186.9	199.4	187.4	188.3
6.0	7.77	7.82	7.78	7.67	7.73	7.75	189.3	185.0	186.2	200.3	186.3	187.7
7.0	7.76	7.80	7.77	-	7.72	7.74	188.3	184.3	185.7	-	185.5	187.2
8.0	7.76	7.79	7.77	-	7.71	7.74	187.1	183.8	185.0	-	185.1	186.7
9.0	7.75	7.78	7.76	-	7.70	7.73	187.0	183.2	184.3	-	184.5	185.6
10.0	7.73	7.77	7.75	-	7.70	7.73	186.9	182.4	183.8	-	184.0	184.9
11.0	7.73	7.75	7.74	-	7.68	7.72	187.0	182.1	184.0	-	183.5	184.5
12.0	-	7.74	7.73	-	7.67	-	-	181.6	183.9	-	183.1	-
13.0	-	7.72	7.72	-	7.65	-	-	180.9	183.4	-	182.8	-
14.0	-	7.69	7.70	-	7.63	-	-	180.3	182.9	-	182.6	-
15.0	-	7.67	7.68	-	7.60	-	-	179.7	182.4	-	182.7	-
16.0	-	7.66	7.67	-	7.57	-	-	179.5	181.6	-	183.2	-
17.0	-	7.64	7.64	-	7.54	-	-	179.2	181.5	-	184	-
18.0	-	7.62	7.62	-	-	-	-	179.0	180.9	-	-	-
19.0	-	7.59	7.60	-	-	-	-	178.6	180.3	-	-	-
20.0	-	7.57	-	-	-	-	-	178.4	-	-	-	-
21.0	-	7.54	-	-	-	-	-	178.2	-	-	-	-
22.0	-	7.49	-	-	-	-	-	179.0	-	-	-	-
23.0	-	7.22	-	-	-	-	-	193.2	-	-	-	-

Notes: Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 9.5, 23.5, 19.7, 6.5, 17.4 and 11.7 m, respectively, at the time of winter sampling. Ice thickness at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 1.40, 1.58, 1.26, 1.43, 1.77, and 1.54 m, respectively, at the time of winter sampling.

**Table C.37: *In Situ* Water Quality Profile Data Collected at Sheardown Lake NW Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2020**

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
Date Collected	28-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	29-Jul-20	28-Jul-20	28-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	29-Jul-20	28-Jul-20	28-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	29-Jul-20	28-Jul-20
1.0	15.1	14.4	14.8	15.7	15.0	15.7	10.50	10.62	10.46	10.35	10.36	10.39	104.4	103.9	103.4	104.3	102.7	104.6
2.0	14.3	14.4	14.8	15.7	14.7	15.6	10.91	10.63	10.49	10.36	10.53	10.39	106.6	104.0	103.5	104.4	103.6	104.7
3.0	13.3	14.2	13.6	15.7	12.7	15.5	11.39	10.76	11.07	10.37	11.62	10.39	108.7	104.8	108.6	104.5	109.5	104.1
4.0	11.3	13.8	11.5	12.5	11.0	12.2	12.00	10.91	11.96	11.86	12.14	11.91	109.1	105.4	110.0	110.9	110.1	110.2
5.0	10.0	10.0	10.3	10.1	10.8	9.8	12.09	12.21	12.25	12.23	12.02	12.17	107.2	108.3	109.4	108.4	110.0	107.5
6.0	9.6	9.5	9.7	-	9.8	9.5	12.00	12.15	12.23	-	12.19	12.08	105.5	106.6	107.7	-	107.6	105.9
7.0	9.2	9.1	9.2	-	9.5	9.1	11.91	11.89	12.04	-	12.11	11.95	103.7	103.2	104.8	-	106.1	103.7
8.0	8.9	8.8	8.9	-	9.1	8.8	11.79	11.79	11.90	-	11.95	11.86	102.0	101.6	102.7	-	103.8	102.8
9.0	-	8.6	8.4	-	8.0	7.8	-	11.75	11.78	-	11.82	11.75	-	100.7	100.4	-	99.9	98.7
10.0	-	8.3	7.9	-	7.5	6.7	-	11.72	11.74	-	11.76	11.75	-	99.7	98.9	-	98.2	96.0
11.0	-	7.8	7.2	-	6.8	6.2	-	11.72	11.77	-	11.75	11.74	-	98.5	97.5	-	96.3	94.7
12.0	-	7.1	6.4	-	6.4	-	-	11.74	11.77	-	11.79	-	-	96.9	95.5	-	95.8	-
13.0	-	6.7	5.9	-	6.2	-	-	11.75	11.85	-	11.77	-	-	96.1	94.9	-	94.7	-
14.0	-	6.4	5.7	-	5.8	-	-	11.78	11.82	-	11.78	-	-	95.7	94.4	-	94.3	-
15.0	-	5.9	5.6	-	5.8	-	-	11.83	11.84	-	11.76	-	-	94.9	94.2	-	93.9	-
16.0	-	5.7	5.6	-	5.5	-	-	11.83	11.83	-	11.76	-	-	94.3	94.0	-	93.3	-
17.0	-	5.6	5.5	-	-	-	-	11.82	11.83	-	-	-	-	94.1	93.9	-	-	-
18.0	-	5.6	5.5	-	-	-	-	11.79	11.81	-	-	-	-	93.8	93.6	-	-	-
19.0	-	5.5	5.5	-	-	-	-	11.78	11.80	-	-	-	-	93.5	93.5	-	-	-
20.0	-	5.5	5.4	-	-	-	-	11.77	11.79	-	-	-	-	93.3	93.4	-	-	-
21.0	-	5.5	5.4	-	-	-	-	11.75	11.78	-	-	-	-	93.1	93.2	-	-	-
22.0	-	5.4	-	-	-	-	-	11.74	-	-	-	-	-	92.9	-	-	-	-
23.0	-	5.4	-	-	-	-	-	11.72	-	-	-	-	-	92.8	-	-	-	-

Note: Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 8.8, 22.9, 22.1, 5.8, 15.8, and 11.3 m, respectively, at the time of summer sampling.

**Table C.37: *In Situ* Water Quality Profile Data Collected at Sheardown Lake NW Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2020**

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
Date Collected	28-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	29-Jul-20	28-Jul-20	28-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	29-Jul-20	28-Jul-20
1.0	8.25	8.17	8.14	8.19	8.20	8.19	165.4	163.1	163.8	164.0	163.6	165.2
2.0	8.10	8.14	8.18	8.17	8.16	8.17	173.7	163.1	163.9	163.9	164.2	164.3
3.0	8.08	8.14	8.17	8.17	8.17	8.16	163.5	162.7	161.9	164.0	159.8	163.5
4.0	8.05	8.13	8.17	8.17	8.15	8.15	158.6	162.4	157.2	160.2	157.0	159.0
5.0	7.97	8.08	8.15	8.15	8.14	8.09	157.0	156.3	157.5	158.1	156.9	156.5
6.0	7.87	8.03	8.12	-	8.09	8.05	156.6	156.2	156.4	-	156.5	156.5
7.0	7.81	7.91	8.05	-	8.07	7.99	156.4	155.9	156.4	-	156.7	156.3
8.0	7.75	7.86	7.98	-	7.98	7.94	156.3	155.9	155.9	-	156.2	156.1
9.0	-	7.83	7.92	-	7.91	7.84	-	155.9	156.1	-	156.5	155.5
10.0	-	7.80	7.86	-	7.84	7.74	-	155.7	155.5	-	155.5	155.0
11.0	-	7.77	7.82	-	7.78	7.69	-	155.2	155.5	-	154.3	154.8
12.0	-	7.72	7.77	-	7.73	-	-	155.0	154.9	-	154.8	-
13.0	-	7.67	7.72	-	7.71	-	-	154.8	155.0	-	154.7	-
14.0	-	7.64	7.69	-	7.67	-	-	154.6	154.2	-	154.8	-
15.0	-	7.62	7.66	-	7.66	-	-	154.5	154.5	-	154.6	-
16.0	-	7.60	7.66	-	7.64	-	-	154.5	154.5	-	154.7	-
17.0	-	7.59	7.59	-	-	-	-	154.5	154.5	-	-	-
18.0	-	7.57	7.64	-	-	-	-	154.4	154.5	-	-	-
19.0	-	7.56	7.63	-	-	-	-	154.5	154.5	-	-	-
20.0	-	7.55	7.62	-	-	-	-	154.5	154.5	-	-	-
21.0	-	7.55	7.62	-	-	-	-	154.5	154.5	-	-	-
22.0	-	7.54	-	-	-	-	-	154.5	-	-	-	-
23.0	-	7.54	-	-	-	-	-	154.5	-	-	-	-

Note: Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 8.8, 22.9, 22.1, 5.8, 15.8, and 11.3 m, respectively, at the time of summer sampling.

**Table C.38: *In Situ* Water Quality Profile Data Collected at Sheardown Lake NW Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020**

Depth (m)	Temperature (°C)							Dissolved Oxygen (mg/L)							Dissolved Oxygen (% Saturation)						
	DD Hab9	DLO-01-5	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
Date Collected	26-Aug-20	27-Aug-20	18-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	26-Aug-20	26-Aug-20	27-Aug-20	18-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	26-Aug-20	26-Aug-20	27-Aug-20	18-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	26-Aug-20
surface	-	-	8.8	-	-	-	-	-	-	11.21	-	-	-	-	-	-	96.7	-	-	-	-
1.0	8.5	8.4	8.8	8.4	8.3	8.4	8.4	11.49	11.42	11.20	11.41	11.40	11.35	11.38	98.3	97.4	96.6	97.4	97.0	96.9	97.1
2.0	8.5	8.4	8.8	8.4	8.3	8.4	8.4	11.48	11.41	11.20	11.40	11.39	11.36	11.36	98.2	97.3	96.5	97.3	96.9	97.0	96.9
3.0	8.5	8.4	8.8	8.4	8.3	8.4	8.4	11.48	11.40	11.19	11.41	11.38	11.36	11.36	98.2	97.2	96.5	97.4	96.8	97.0	96.9
4.0	8.5	8.4	8.8	8.4	8.3	8.4	8.4	11.48	11.39	11.19	11.39	11.37	11.35	11.35	98.1	97.2	96.5	97.2	96.7	96.9	96.9
5.0	8.5	8.4	8.8	8.4	8.3	8.4	8.4	11.47	11.40	11.18	11.38	11.36	11.35	11.34	98.1	97.2	96.4	97.1	96.6	96.9	96.8
6.0	-	8.4	8.8	8.4	-	8.4	8.4	-	11.38	11.18	11.38	-	11.34	11.33	-	97.1	96.4	97.1	-	96.8	96.7
7.0	-	8.4	8.8	8.4	-	8.4	8.4	-	11.38	11.17	11.37	-	11.33	11.32	-	97.0	96.3	97.0	-	96.8	96.6
8.0	-	8.4	8.8	8.4	-	8.4	8.4	-	11.37	11.17	11.37	-	11.33	11.32	-	97.0	96.3	97.0	-	96.7	96.6
9.0	-	8.4	8.8	8.4	-	8.4	8.4	-	11.36	11.16	11.36	-	11.32	11.31	-	96.8	96.2	96.9	-	96.6	96.5
10.0	-	8.4	8.8	8.4	-	8.4	8.4	-	11.35	11.16	11.35	-	11.31	11.30	-	96.8	96.2	96.8	-	96.5	96.5
11.0	-	8.4	8.8	8.4	-	8.4	-	-	11.34	11.15	11.34	-	11.31	-	-	96.7	96.1	96.8	-	96.5	-
12.0	-	8.4	8.8	8.4	-	8.4	-	-	11.34	11.15	11.34	-	11.31	-	-	96.7	96.1	96.8	-	96.5	-
13.0	-	8.4	8.8	8.4	-	8.4	-	-	11.33	11.14	11.34	-	11.30	-	-	96.6	96.0	96.7	-	96.4	-
14.0	-	8.4	8.8	8.4	-	8.4	-	-	11.33	11.14	11.33	-	11.30	-	-	96.5	96.0	96.6	-	96.4	-
15.0	-	8.4	8.8	8.4	-	8.4	-	-	11.32	11.13	11.32	-	11.28	-	-	96.5	95.9	96.5	-	96.2	-
16.0	-	8.4	8.8	8.4	-	8.4	-	-	11.31	11.13	11.31	-	11.23	-	-	96.5	95.9	96.4	-	95.9	-
17.0	-	8.4	8.8	-	-	-	-	-	11.30	11.12	-	-	-	-	-	96.4	95.8	-	-	-	-
18.0	-	8.4	8.8	-	-	-	-	-	11.30	11.12	-	-	-	-	-	96.4	95.8	-	-	-	-
19.0	-	8.4	8.8	-	-	-	-	-	11.29	11.11	-	-	-	-	-	97.3	95.7	-	-	-	-
20.0	-	8.4	8.8	-	-	-	-	-	11.30	11.11	-	-	-	-	-	96.3	95.7	-	-	-	-
21.0	-	8.4	8.8	-	-	-	-	-	11.29	11.10	-	-	-	-	-	96.3	95.6	-	-	-	-
22.0	-	-	8.8	-	-	-	-	-	-	11.10	-	-	-	-	-	-	95.6	-	-	-	-
23.0	-	-	8.8	-	-	-	-	-	-	11.09	-	-	-	-	-	-	95.5	-	-	-	-

Notes: 18-Aug-20 sampling was conducted by Minnow. Sheardown Lake NW water profile sampling on all other dates was conducted by Baffinland. Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 9.9, 22.2, 17.6, 6.7 , 18.2, and 11.4 m, respectively, at the time of fall sampling.

**Table C.38: *In Situ* Water Quality Profile Data Collected at Sheardown Lake NW Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020**

Depth (m)	pH (pH units)							Specific Conductance (µS/cm)						
	DD Hab9	DLO-01-5	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7	DD Hab9	DLO-01-5	DLO-01-5	DLO-01-1	DLO-01-4	DLO-01-2	DLO-01-7
Date Collected	26-Aug-20	27-Aug-20	18-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	26-Aug-20	26-Aug-20	27-Aug-20	18-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	26-Aug-20
surface	-	-	8.03	-	-	-	-	-	-	162.1	-	-	-	-
1.0	8.08	8.06	8.03	8.06	8.04	8.01	8.00	164.0	163.6	162.0	163.6	164.3	163.5	163.4
2.0	8.07	8.06	8.04	8.06	8.04	8.01	8.02	163.8	163.6	162.1	163.6	164.2	163.5	163.4
3.0	8.07	8.06	8.03	8.06	8.03	8.00	8.02	163.8	163.6	162.1	163.7	164.2	163.5	163.4
4.0	8.07	8.05	8.04	8.06	8.03	8.01	8.02	164.1	163.6	162.1	163.7	164.2	163.6	163.5
5.0	8.07	8.06	8.04	8.06	8.04	8.01	8.02	164.8	163.6	162.1	163.7	164.2	163.5	163.4
6.0	-	8.06	8.03	8.06	-	8.01	8.02	-	163.6	162.1	163.7	-	163.6	163.4
7.0	-	8.06	8.03	8.06	-	8.01	8.02	-	163.6	162.1	163.8	-	163.6	163.4
8.0	-	8.06	8.03	8.06	-	8.01	8.02	-	163.6	162.1	163.8	-	163.5	163.4
9.0	-	8.06	8.03	8.06	-	8.01	8.02	-	163.7	162.1	163.9	-	163.5	163.4
10.0	-	8.05	8.03	8.05	-	8.01	8.02	-	163.7	162.1	163.9	-	163.5	163.4
11.0	-	8.05	8.03	8.06	-	8.01	-	-	163.7	162.1	163.9	-	163.6	-
12.0	-	8.05	8.03	8.06	-	8.01	-	-	163.7	162.1	163.8	-	163.5	-
13.0	-	8.05	8.03	8.06	-	8.01	-	-	163.7	162.0	163.9	-	163.6	-
14.0	-	8.04	8.02	8.05	-	8.01	-	-	163.7	162.1	163.9	-	163.5	-
15.0	-	8.04	8.02	8.05	-	8.01	-	-	163.7	162.0	163.9	-	163.5	-
16.0	-	8.04	8.02	8.05	-	7.99	-	-	163.7	162.0	164.0	-	163.5	-
17.0	-	8.04	8.01	-	-	-	-	-	163.7	162.0	-	-	-	-
18.0	-	8.03	8.01	-	-	-	-	-	163.7	162.0	-	-	-	-
19.0	-	8.03	8.01	-	-	-	-	-	163.7	162.0	-	-	-	-
20.0	-	8.06	8.00	-	-	-	-	-	163.7	162.0	-	-	-	-
21.0	-	8.06	8.00	-	-	-	-	-	163.7	162.0	-	-	-	-
22.0	-	-	8.00	-	-	-	-	-	-	162.0	-	-	-	-
23.0	-	-	8.00	-	-	-	-	-	-	161.9	-	-	-	-

Notes: 18-Aug-20 sampling was conducted by Minnow. Sheardown Lake NW water profile sampling on all other dates was conducted by Baffinland. Total depth at stations DD Hab9, DLO-01-5, DLO-01-1, DLO-01-4, DLO-01-2, and DLO-01-7 was 9.9, 22.2, 17.6, 6.7 , 18.2, and 11.4 m, respectively, at the time of fall sampling.




**Table C.39: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Sheardown Lake NW Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**

Categorization & Replicate ID		Date Sampled	Station Depth (m)	Secchi Depth (m)	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
Littoral (Shallow) Stations	DLO-01-9	18-Aug-2020	7.6	4.53	surface	8.5	11.30	96.7	8.02	161.4
					bottom	8.6	11.26	96.4	8.00	161.7
	DLO-01-4	18-Aug-2020	7.5	4.53	surface	8.5	11.29	96.6	8.00	160.8
					bottom	8.5	11.25	96.3	7.99	160.7
	DLO-01-3	18-Aug-2020	8.2	3.88	surface	8.7	11.22	96.5	7.95	161.7
					bottom	8.7	11.19	96.2	7.93	161.8
	DLO-01-11	18-Aug-2020	8.2	5.28	surface	8.6	11.20	96.2	7.88	161.2
					bottom	8.6	11.10	95.9	7.88	160.9
	DLO-01-10	18-Aug-2020	7.9	4.10	surface	8.6	11.18	95.8	7.81	161.0
					bottom	8.6	11.15	95.6	7.77	160.9
Profundal (Deep) Stations	DLO-01-5	15-Aug-2020	23.3	4.37	surface	10.4	10.39	95.3	7.87	159.9
					bottom	5.5	10.94	89.1	7.31	151.4
	DLO-01-14	15-Aug-2020	22.0	5.14	surface	10.4	10.19	93.1	7.86	159.8
					bottom	5.5	10.82	88.2	7.27	151.3
	DLO-01-15	15-Aug-2020	21.7	4.91	surface	10.3	10.36	94.7	7.69	159.8
					bottom	5.7	10.78	88.2	7.18	151.5
	DLO-01-2	18-Aug-2020	17.5	-	surface	8.8	11.20	96.5	7.98	162.0
					bottom	8.7	11.10	95.5	7.96	161.8
	DLO-01-12	15-Aug-2020	14.0	5.41	surface	10.1	10.51	95.8	7.84	159.7
					bottom	6.5	11.23	94.0	7.47	152.1

Note: "-" indicates no available data.

**Table C.40: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake NW Littoral and Profundal Stations, Mary River Project CREMP, August 2020**

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	none	NO	0.183	Littoral	5	4.46	0.54	0.24	3.88	5.28
					Profundal	4	4.96	0.44	0.22	4.37	5.41
Temperature (°C)	M-W	rank	NO	0.110	Littoral	5	8.60	0.07	0.03	8.50	8.70
					Profundal	5	6.38	1.36	0.61	5.50	8.70
Dissolved Oxygen (mg/L)	tequal	none	YES	0.043	Littoral	5	11.2	0.1	0.0	11.1	11.3
					Profundal	5	11.0	0.2	0.1	10.8	11.2
Dissolved Oxygen (% saturation)	tequal	none	YES	0.012	Littoral	5	96.1	0.3	0.1	95.6	96.4
					Profundal	5	91.0	3.5	1.6	88.2	95.5
pH (units)	tequal	none	YES	0.011	Littoral	5	7.91	0.09	0.04	7.77	8.00
					Profundal	5	7.44	0.31	0.14	7.18	7.96
Specific Conductance (umho/cm)	M-W	rank	NO	0.115	Littoral	5	161.2	0.5	0.2	160.7	161.8
					Profundal	5	153.6	4.6	2.0	151.3	161.8

 Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).

**Table C.41: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake NW and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test <sup>a</sup>	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	YES	0.004	Reference	4	10.0	1.1	0.5	8.5	11.0
						Sheardown NW	5	7.9	0.3	0.1	7.5	8.2
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	8.12	0.64	0.29	7.38	9.15
						Sheardown NW	5	4.46	0.54	0.24	3.88	5.28
	Temperature (°C)	tequal	none	YES	0.001	Reference	5	9.32	0.29	0.13	8.90	9.70
						Sheardown NW	5	8.60	0.07	0.03	8.50	8.70
	Dissolved Oxygen (mg/L)	tequal	none	YES	0.002	Reference	5	12.6	0.7	0.3	11.8	13.3
						Sheardown NW	5	11.2	0.1	0.0	11.1	11.3
	Dissolved Oxygen (% saturation)	tequal	none	YES	0.001	Reference	5	111.9	5.2	2.3	104.6	116.7
						Sheardown NW	5	96.1	0.3	0.1	95.6	96.4
Profundal (Deep) Stations	pH (units)	tequal	none	YES	0.001	Reference	5	7.19	0.23	0.10	6.94	7.56
						Sheardown NW	5	7.91	0.09	0.04	7.77	8.00
	Specific Conductance (umho/cm)	M-W	rank	YES	0.012	Reference	5	76.7	3.2	1.4	74.5	82.1
						Sheardown NW	5	161.2	0.5	0.2	160.7	161.8
	Station Depth (m)	tequal	none	NO	0.642	Reference	5	20.6	1.6	0.7	19.0	23.0
						Sheardown NW	5	19.7	3.9	1.7	14.0	23.3
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	8.39	0.96	0.43	7.18	9.84
						Sheardown NW	4	4.96	0.44	0.22	4.37	5.41
	Temperature (°C)	M-W	rank	NO	0.916	Reference	5	5.82	0.19	0.09	5.60	6.10
						Sheardown NW	5	6.38	1.36	0.61	5.50	8.70
	Dissolved Oxygen (mg/L)	tequal	log10	YES	0.008	Reference	5	13.6	1.3	0.6	12.8	15.8
						Sheardown NW	5	11.0	0.2	0.1	10.8	11.2
	Dissolved Oxygen (% saturation)	tequal	log10	YES	0.002	Reference	5	110.6	10.3	4.6	103.5	127.9
						Sheardown NW	5	91.0	3.5	1.6	88.2	95.5
	pH (units)	tequal	none	YES	0.005	Reference	5	6.70	0.30	0.13	6.27	6.95
						Sheardown NW	5	7.44	0.31	0.14	7.18	7.96
	Specific Conductance (umho/cm)	M-W	rank	YES	0.008	Reference	5	75.5	1.6	0.7	74.0	78.1
						Sheardown NW	5	153.6	4.6	2.0	151.3	161.8

Highlighted values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).

Table C.42: Water Chemistry at Sheardown Lake NW (DLO-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Winter Sampling Event											
					DD-HAB9-STN1 bottom	DD-HAB9-STN1 surface	DL0-01-5 bottom	DL0-01-5 surface	DL0-01-1 bottom	DL0-01-1 surface	DL0-01-4 bottom	DL0-01-4 surface	DL0-01-2 bottom	DL0-01-2 surface	DL0-01-7 bottom	DL0-01-7 surface
					17-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	16-Apr-20	16-Apr-20	17-Apr-20	17-Apr-20	15-Apr-20	15-Apr-20
Conventionals	Conductivity (lab)	umho/cm	-	-	187	197	179	193	182	196	197	203	182	193	187	194
	pH (lab)	pH	6.5 - 9.0	-	7.69	7.70	7.49	7.71	7.50	7.72	7.67	7.70	7.54	7.70	7.66	7.70
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	96.3	105	92.4	97.7	91.3	97.5	102	102	90.9	94.9	96.5	102
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	115	118	107	107	112	112	130	124	107	100	139	141
	Turbidity	NTU	-	-	0.18	<0.10	<0.10	<0.10	0.12	0.17	0.13	<0.10	<0.10	<0.10	<0.10	<0.10
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	75	78	71	75	70	78	81	83	73	78	71	74
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.028	0.031	<0.010	0.029	<0.010	0.028	0.036	0.031	0.012	0.028	0.028	0.032
	Nitrate	mg/L	3	3	0.196	0.201	0.249	0.196	0.243	0.197	0.202	0.209	0.223	0.194	0.194	0.226
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.19	0.23	<0.15	0.19	<0.15	<0.15	0.17	0.18	0.16	0.20	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.74	2.83	2.73	2.51	2.46	2.78	2.74	2.75	2.38	3.05	2.89	2.61
	Total Organic Carbon	mg/L	-	-	3.61	3.98	3.50	3.40	4.25	4.59	4.42	4.15	4.18	4.30	2.54	2.65
	Total Phosphorus	mg/L	0.020 <sup>d</sup>	-	0.0113	<0.0030	0.0112	<0.0030	0.0249	<0.0030	0.0045	0.0079	<0.0030	0.0038	<0.0030	0.0043
	Phenols	mg/L	0.004 <sup>d</sup>	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0029	0.0029	0.0025	0.0020	0.0024	0.0013	<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	5.09	5.39	4.86	5.22	4.93	5.29	5.54	5.59	4.98	5.27	5.11	5.39
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>b</sup>	218	16.8	17.6	15.8	17.1	16.1	17.4	18.0	18.3	16.3	17.3	16.8	17.6
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 <sup>c</sup>	<0.0030	0.0037	<0.0030	0.0035	0.0062	<0.0030	<0.0030	0.0046	<0.0030	0.0162	<0.0030	0.0035
	Antimony (Sb)	mg/L	0.020 <sup>d</sup>	-	<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	-	-	0.00890	0.00939	0.00853	0.00918	0.00865	0.00930	0.00943	0.00958	0.00865	0.00927	0.00955	0.00990
	Beryllium (Be)	mg/L	0.011 <sup>d</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	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
	Boron (B)	mg/L	1.5	-	0.012	0.012	0.011	0.012	0.011	0.012	0.011	0.012	0.011	0.011	0.011	0.012
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	19.0	19.3	17.7	19.0	17.0	19.6	19.0	20.4	18.1	18.9	18.3	18.3
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>d</sup>	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	0.00090	0.00093	0.00090	0.00093	0.00088	0.00091	0.00092	0.00096	0.00082	0.00128	0.00099	0.00105
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	0.000096	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.0015	0.0016	0.0015	0.0016	0.0014	0.0016	0.0014	0.0016	0.0016	0.0015	0.0014	0.0015
	Magnesium (Mg)	mg/L	-	-	11.6	12.2	11.1	11.9	11.0	11.6	12.3	12.5	11.1	11.9	12.6	13.1
	Manganese (Mn)	mg/L	0.935 <sup>b</sup>	-	0.000548	0.000542	0.00105	0.000428	0.00126	0.000476	0.000632	0.000543	0.000926	0.00119	0.000755	0.000626
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000059	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00121	0.00124	0.00109	0.00121	0.00106	0.00123	0.00126	0.00127	0.00109	0.00134	0.00117	0.00123
	Nickel (Ni)	mg/L	0.025	0.025	0.00076	0.00079	0.00073	0.00077	0.00072	0.00080	0.00080	0.00086	0.00071	0.00092	0.00089	0.00090
	Potassium (K)	mg/L	-	-	1.61	1.70	1.51	1.66	1.52	1.66	1.71	1.74	1.51	1.65	1.67	1.73
	Selenium (Se)	mg/L	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
	Silicon (Si)	mg/L	-	-	0.56	0.57	0.81	0.55	0.75	0.56	0.57	0.59	0.65	0.56	0.63	0.60
	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	-	-	2.20	2.32	2.05	2.27	2.08	2.24	2.32	2.38	2.07	2.25	2.39	2.45
	Strontium (Sr)	mg/L	-	-	0.0129	0.0138	0.0121	0.0131	0.0121	0.0133	0.0137	0.0138	0.0124	0.0128	0.0137	0.0142
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00139	0.00146	0.00126	0.00146	0.00133	0.00144	0.00149	0.00154	0.00134	0.00143	0.00146	0.00150
	Vanadium (V)	mg/L	0.006 <sup>d</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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	0.0088	<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.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

<sup>c</sup> Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.42: Water Chemistry at Sheardown Lake NW (DLO-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Summer Sampling Event											
					DD-HAB9-STN1 bottom	DD-HAB9-STN1 surface	DL0-01-5 bottom	DL0-01-5 surface	DL0-01-1 bottom	DL0-01-1 surface	DL0-01-4 bottom	DL0-01-4 surface	DL0-01-2 bottom	DL0-01-2 surface	DL0-01-7 bottom	DL0-01-7 surface
					28-Jul-20	28-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	28-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	28-Jul-20
Conventionals	Conductivity (lab)	umho/cm	-	-	160	167	158	166	161	168	161	166	163	167	158	168
	pH (lab)	pH	6.5 - 9.0	-	7.95	8.10	7.69	8.14	7.67	8.18	8.14	8.15	7.68	8.17	7.85	8.17
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	71.9	73	74.7	77.3	74.3	75.3	75.9	78.6	76	77.3	74	80.3
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	2.1	<2.0	<2.0	<2.0	8.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	80	100	91	93	99	104	87	107	93	93	80	85
	Turbidity	NTU	-	-	1.04	0.76	0.87	0.65	0.94	0.78	0.90	0.77	1.01	0.69	0.88	0.77
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	57.6	60.0	57.3	60.0	58.5	60.1	57.4	61.1	58.8	59.9	58.6	60.1
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	0.0063	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.204	0.260	0.212	0.221	0.207	0.221	0.199	0.241	0.212	0.222	0.213	0.219
	Nitrite	mg/L	0.06	0.06	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	0.0023	<0.0010	<0.0010	<0.0010	0.0023
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.122	0.127	0.105	0.116	0.120	0.130	0.127	0.122	0.120	0.148	0.115	0.108
	Dissolved Organic Carbon	mg/L	-	-	1.58	1.97	1.52	2.01	1.67	1.90	1.55	1.89	1.92	2.08	1.55	1.64
	Total Organic Carbon	mg/L	-	-	1.55	1.92	1.78	1.76	1.81	1.81	1.65	1.91	1.73	2.06	1.66	1.84
	Total Phosphorus	mg/L	0.020 <sup>d</sup>	-	0.0057	0.0054	0.0026	0.0022	0.0044	0.0042	0.0046	0.0094	0.0028	0.0028	0.0041	0.0060
	Phenols	mg/L	0.004 <sup>d</sup>	-	0.0025	0.0023	<0.0010	<0.0010	<0.0010	<0.0010	0.0021	0.0033	<0.0010	<0.0010	0.0024	0.0026
Anions	Bromide (Br)	mg/L	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	4.21	4.37	4.07	4.21	4.08	4.25	4.24	4.40	4.18	4.25	4.21	4.50
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>b</sup>	218	14.5	15.7	13.4	14.7	13.6	14.9	14.6	15.5	14.5	14.8	14.4	16.0
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 <sup>c</sup>	0.0195	0.0162	0.0204	0.0168	0.0159	0.0126	0.0217	0.0045	0.0155	0.0133	0.0199	0.0135
	Antimony (Sb)	mg/L	0.020 <sup>d</sup>	-	<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	-	-	0.00742	0.00752	0.00738	0.00805	0.00742	0.00758	0.00760	0.00743	0.00779	0.00790	0.00735	0.00759
	Beryllium (Be)	mg/L	0.011 <sup>d</sup>	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	0.012	0.014	0.010	0.012	0.010	0.013	0.011	0.013	0.011	0.013	0.011	0.017
	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	<0.0000050
	Calcium (Ca)	mg/L	-	-	14.0	14.7	13.8	14.3	13.4	14.3	14.0	14.5	13.9	14.2	13.6	14.3
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	0.00010	<0.00010	0.00011	<0.00010	0.00015	0.00011
	Cobalt (Co)	mg/L	0.0009 <sup>d</sup>	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	0.00090	0.00093	0.00089	0.00095	0.00090	0.00093	0.00090	0.00085	0.00092	0.00095	0.00099	0.00089
	Iron (Fe)	mg/L	0.30	0.300	0.028	0.024	0.040	0.022	0.023	0.018	0.030	<0.010	0.023	0.018	0.027	0.020
	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	-	-	0.0014	0.0014	0.0013	0.0014	0.0013	0.0014	0.0014	0.0018	0.0014	0.0014	0.0013	0.0015
	Magnesium (Mg)	mg/L	-	-	8.70	9.00	9.23	9.57	9.10	9.94	8.65	9.73	9.41	10.1	8.69	8.51
	Manganese (Mn)	mg/L	0.935 <sup>b</sup>	-	0.00334	0.00295	0.00404	0.00258	0.00320	0.00251	0.00351	0.00053	0.00273	0.00247	0.00347	0.00262
	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	-	0.000962	0.00104	0.000898	0.000947	0.000893	0.000981	0.000990	0.00101	0.000966	0.000972	0.00101	0.00103
	Nickel (Ni)	mg/L	0.025	0.025	0.00072	0.00069	0.00071	0.00075	0.00073	0.00073	0.00075	0.00069	0.00071	0.00072	0.00076	0.00073
	Potassium (K)	mg/L	-	-	1.30	1.35	1.29	1.35	1.30	1.37	1.31	1.37	1.32	1.38	1.30	1.28
	Selenium (Se)	mg/L	0.001	-	0.000064	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000060
	Silicon (Si)	mg/L	-	-	0.66	0.68	0.67	0.60	0.62	0.59	0.63	0.63	0.60	0.59	0.66	0.61
	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	-	-	1.72	1.82	1.77	1.91	1.78	1.91	1.77	1.95	1.85	1.93	1.74	1.78
	Strontium (Sr)	mg/L	-	-	0.00977	0.0103	0.0102	0.0108	0.00986	0.0107	0.0102	0.0107	0.0104	0.0110	0.0102	0.0102
	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	-	-	0.00108	0.00073	0.00119	0.00070	0.00088	0.00057	0.00117	<0.00030	0.00075	0.00055	0.00099	0.00058
	Uranium (U)	mg/L	0.015	-	0.00131	0.00146	0.00120	0.00136	0.00128	0.00136	0.00134	0.00143	0.00132	0.00136	0.00132	0.00142
	Vanadium (V)	mg/L	0.006 <sup>d</sup>	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.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

<sup>c</sup> Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.42: Water Chemistry at Sheardown Lake NW (DLO-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Fall Sampling Event											
					DD-HAB9-STN1 bottom	DD-HAB9-STN1 surface	DL0-01-5 bottom	DL0-01-5 surface	DL0-01-1 bottom	DL0-01-1 surface	DL0-01-4 bottom	DL0-01-4 surface	DL0-01-2 bottom	DL0-01-2 surface	DL0-01-7 bottom	DL0-01-7 surface
					26-Aug-20	26-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	26-Aug-20	26-Aug-20
Conventionals	Conductivity (lab)	umho/cm	-	-	165	165	166	168	167	167	168	168	166	166	164	164
	pH (lab)	pH	6.5 - 9.0	-	8.05	8.03	7.98	7.99	8.07	7.99	8.05	8.03	7.97	8.03	8.00	8.03
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	81.2	79.1	78.5	79.3	79.4	82.2	80.7	81.2	80.3	79.7	79.8	80.1
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	84	92	87	110	88	83	76	80	98	101	78	127
	Turbidity	NTU	-	-	0.58	0.57	0.48	0.51	0.61	0.52	0.49	0.51	0.60	0.62	0.58	0.56
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	62	62	68	63	64	63	62	63	190	63	61	61
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.028	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.207	0.202	0.19	0.201	0.244	0.194	0.201	0.255	0.228	0.195	0.208	0.212
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	0.20	0.16	<0.15	0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.03	2.08	2.06	2.09	1.95	1.95	2.15	2.05	1.98	2.13	2.04	1.93
	Total Organic Carbon	mg/L	-	-	2.49	2.46	2.76	2.54	2.45	2.61	2.64	2.40	2.54	2.60	2.33	2.42
	Total Phosphorus	mg/L	0.020 <sup>d</sup>	-	0.0083	0.0062	0.0102	0.004	0.0061	0.0094	0.0067	0.0079	0.0085	0.0059	0.0059	0.0071
	Phenols	mg/L	0.004 <sup>d</sup>	-	<0.0010	<0.0010	0.0056	<0.0010	<0.0010	0.0031	<0.0010	<0.0010	0.0012	<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	4.56	4.52	4.44	4.45	4.49	4.45	4.48	4.5	4.45	4.44	4.52	4.56
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>b</sup>	218	15.3	15.3	15.1	15.1	15.2	15.1	15.3	15.3	15.1	15.1	15.2	15.2
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 <sup>c</sup>	0.0087	0.003	0.0097	0.0087	0.0079	0.0083	0.0082	0.0092	0.009	0.0084	0.0102	0.0376
	Antimony (Sb)	mg/L	0.020 <sup>d</sup>	-	<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	0.00011	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00813	0.00817	0.00817	0.0081	0.00814	0.00793	0.00838	0.00865	0.00785	0.00813	0.0082	0.00837
	Beryllium (Be)	mg/L	0.011 <sup>d</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	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
	Boron (B)	mg/L	1.5	-	0.014	0.014	0.013	0.013	0.013	0.013	0.015	0.015	0.014	0.013	0.013	0.012
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	15.8	15.7	15.6	15.4	15.4	15.2	15.3	15.8	15.4	15.6	15.3	15.3
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>d</sup>	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	0.00086	0.00081	0.00083	0.00085	0.00084	0.00083	0.00084	0.00084	0.00088	0.00086	0.00082	0.00086
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.041	<0.030	<0.030	<0.030	<0.030	0.051
	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	-	-	0.0016	0.0017	0.0014	0.0014	0.0014	0.0014	0.0016	0.0016	0.0016	0.0016	0.0016	0.0014
	Magnesium (Mg)	mg/L	-	-	10.1	10.0	10.1	9.96	9.92	10.1	10.2	10.3	10.1	10.2	10.1	10.0
	Manganese (Mn)	mg/L	0.935 <sup>b</sup>	-	0.00136	0.000124	0.00134	0.00134	0.00141	0.00129	0.00138	0.00137	0.00127	0.00131	0.00141	0.00228
	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	-	0.000999	0.00103	0.00102	0.00102	0.00101	0.001	0.000998	0.00101	0.00103	0.000986	0.00101	0.000973
	Nickel (Ni)	mg/L	0.025	0.025	0.00068	0.00065	0.0007	0.00072	0.00067	0.00069	0.00068	0.0007	0.0007	0.00068	0.00068	0.00071
	Potassium (K)	mg/L	-	-	1.39	1.36	1.36	1.37	1.37	1.36	1.41	1.40	1.38	1.36	1.36	1.39
	Selenium (Se)	mg/L	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
	Silicon (Si)	mg/L	-	-	0.56	0.55	0.54	0.56	0.54	0.55	0.57	0.57	0.55	0.56	0.56	0.59
	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	-	-	1.96	1.94	1.95	1.96	1.94	1.96	1.98	1.95	1.98	1.98	1.93	1.97
	Strontium (Sr)	mg/L	-	-	0.0109	0.0109	0.0109	0.0108	0.0108	0.0108	0.011	0.011	0.0108	0.0107	0.0108	0.0107
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00155	0.00156	0.00153	0.00152	0.00155	0.00153	0.00153	0.00151	0.00148	0.00151	0.00152	0.00155
	Vanadium (V)	mg/L	0.006 <sup>d</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

<sup>c</sup> Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

**Table C.43: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between the Sheardown Lake Basins and Reference Lake 3 in 2020, and at the Sheardown Lake Basins Between 2020 and the Baseline Period**

Variable	Sheardown Lake NW					Sheardown Lake SE				
	2020 vs Reference Lake 3		2020 vs Baseline			2020 vs Reference Lake 3		2020 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	2.1	2.1	1.3	1.4	1.4	1.6	1.8	1.2	1.3	1.3
Hardness (as CaCO <sub>3</sub> )	2.2	2.1	1.5	1.3	1.3	1.7	1.8	1.3	1.3	1.3
Total Suspended Solids (TSS)	1.3	1.0	1.0	0.6	0.8	1.0	1.1	0.9	0.8	0.9
Total Dissolved Solids (TDS)	2.3	1.8	1.3	1.2	1.2	1.7	1.5	1.3	1.1	1.1
Turbidity	5.7	3.8	0.5	1.1	1.0	6.3	16	0.5	0.6	1.3
Alkalinity (as CaCO <sub>3</sub> )	1.3	2.1	1.1	1.0	1.3	1.1	1.6	1.0	1.0	1.1
Total Ammonia	0.5	0.9	0.2	0.1	0.3	0.7	0.9	0.2	0.3	0.4
Nitrate	11	11	2.1	2.2	2.1	4.8	4.5	2.3	1.0	0.9
Nitrite	0.3	1.0	1.3	0.0	1.1	0.3	1.0	1.4	0.1	1.1
Total Kjeldahl Nitrogen (TKN)	0.8	1.0	0.8	0.8	1.0	0.8	1.0	0.7	0.9	0.7
Dissolved Organic Carbon	0.5	0.6	1.5	1.0	1.2	0.6	0.6	1.4	1.3	1.4
Total Organic Carbon	0.4	0.7	2.1	1.0	1.4	0.4	0.6	1.4	1.1	1.5
Total Phosphorus	1.1	2.3	1.9	0.7	1.4	1.6	2.9	0.8	0.9	1.7
Phenols	1.8	1.5	1.7	1.8	1.6	2.6	1.0	1.0	2.6	1.0
Bromide (Br)	0.5	1.0	0.6	0.2	0.4	0.5	1.0	0.7	0.2	0.4
Chloride (Cl)	3.1	3.3	1.6	1.7	1.6	2.4	2.8	1.6	1.4	1.3
Sulphate (SO <sub>4</sub> )	4.1	4.2	5.2	5.4	5.0	2.6	2.6	4.3	4.2	3.9
Aluminum (Al)	5.2	3.4	1.6	1.1	0.5	8.6	20	1.0	0.3	0.9
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Barium (Ba)	1.2	1.2	1.5	1.5	1.6	1.0	1.1	1.6	1.2	1.3
Beryllium (Be)	0.2	1.0	2.0	0.3	1.5	0.2	1.0	1.5	0.2	1.3
Bismuth (Bi)	0.1	1.0	1.0	0.1	1.0	0.1	1.0	1.0	0.1	1.0
Boron (B)	1.2	1.4	1.1	1.2	1.4	1.0	1.1	1.1	1.0	1.1
Cadmium (Cd)	0.5	1.0	0.8	0.4	0.9	0.5	1.0	0.8	0.4	0.8
Calcium (Ca)	2.0	2.1	1.3	1.2	1.3	1.6	1.8	1.2	1.2	1.2
Chromium (Cr)	0.2	1.0	-	0.9	-	0.3	1.0	-	1.1	-
Cobalt (Co)	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	0.9	0.9
Copper (Cu)	1.3	1.1	1.0	0.9	0.6	1.1	1.2	1.0	0.6	0.9
Iron (Fe)	0.8	1.1	1.2	0.8	0.9	1.1	2.1	0.6	0.3	0.8
Lead (Pb)	1.0	1.0	1.0	0.9	0.1	1.1	1.2	0.5	0.5	0.7
Lithium (Li)	1.4	1.5	0.6	0.4	0.0	1.1	1.3	0.4	0.3	0.3
Magnesium (Mg)	2.2	2.2	1.4	1.3	1.4	1.6	1.8	1.4	1.3	1.3
Manganese (Mn)	3.5	1.9	1.2	1.6	0.6	6.6	5.3	0.2	0.9	1.1
Mercury (Hg)	1.0	1.0	0.5	0.4	0.1	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	7.4	6.6	1.5	1.5	1.5	4.8	4.2	1.6	1.8	1.5
Nickel (Ni)	1.4	1.4	1.0	1.1	1.0	1.2	1.2	1.1	0.9	1.0
Potassium (K)	1.5	1.5	1.6	1.7	1.6	1.2	1.3	1.6	1.6	1.5
Selenium (Se)	0.1	1.0	-	0.6	-	0.1	1.0	-	-	-
Silicon (Si)	1.3	1.1	0.8	1.0	0.9	1.1	1.0	0.8	0.8	0.7
Silver (Ag)	1.0	1.0	2.5	1.0	1.3	1.0	1.0	1.6	1.4	1.4
Sodium (Na)	2.1	2.0	1.5	1.7	1.7	1.5	1.8	1.9	2.1	1.9
Strontium (Sr)	1.2	1.3	1.4	1.4	1.4	1.0	1.2	1.3	1.1	1.1
Thallium (Tl)	0.1	1.0	2.3	0.2	0.4	0.1	1.0	1.6	0.1	1.3
Tin (Sn)	1.0	1.0	0.2	0.2	0.2	1.0	1.0	0.1	0.1	0.1
Titanium (Ti)	0.1	1.0	1.0	0.1	1.0	0.1	1.0	1.0	0.1	0.9
Uranium (U)	4.3	4.6	1.5	1.8	1.8	2.8	3.6	1.6	1.6	1.6
Vanadium (V)	0.5	1.0	1.0	0.5	1.0	0.5	1.0	1.0	0.5	1.0
Zinc (Zn)	1.0	1.0	1.4	1.5	1.2	1.0	1.0	1.2	1.8	1.9

- 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 greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.



Table C.44: Dissolved Metal Concentrations at Sheardown Lake NW Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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
			17-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	17-Apr-20	16-Apr-20	16-Apr-20	17-Apr-20	17-Apr-20	15-Apr-20	15-Apr-20	28-Jul-20	28-Jul-20	29-Jul-20	29-Jul-20	29-Jul-20
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	<0.0030	<0.0030	0.0032	0.0406	<0.0030	<0.0030	0.0052	0.0037	<0.0030	0.0065	<0.0030	0.0025	0.0035	0.0031	0.0036	0.0030	0.0226
	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	0.00880	0.0102	0.00861	0.00899	0.00877	0.00891	0.00936	0.00960	0.00847	0.00873	0.00951	0.0102	0.00663	0.00693	0.00755	0.00752	0.00736	0.00775
	Beryllium (Be)	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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	0.012	0.012	0.011	0.012	0.011	0.012	0.012	0.012	0.010	0.011	0.012	0.012	0.011	0.012	0.010	0.012	0.011	0.012
	Cadmium (Cd)	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	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	19.4	20.6	19.0	19.8	18.1	19.4	20.6	20.3	18.0	18.7	18.1	19.3	13.8	14.2	14.7	15.0	14.6	14.3
	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	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010
	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	0.00095	0.00101	0.00095	0.00096	0.00096	0.00096	0.00093	0.00095	0.00089	0.00093	0.00110	0.00101	0.00070	0.00079	0.00081	0.00085	0.00080	0.00081
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<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	0.0017	0.0017	0.0016	0.0016	0.0016	0.0017	0.0016	0.0017	0.0014	0.0015	0.0014	0.0017	0.0013	0.0013	0.0013	0.0014	0.0014	0.0015
	Magnesium (Mg)	mg/L	11.6	12.9	10.9	11.7	11.2	11.9	12.2	12.4	11.2	11.7	12.5	13.2	9.09	9.10	9.21	9.69	9.19	9.65
	Manganese (Mn)	mg/L	0.000171	0.000173	0.000174	0.000137	0.000296	0.000123	0.000133	0.000208	0.000200	0.000153	0.000215	0.000148	<0.00010	0.00038	0.00015	0.00041	<0.00010	0.00043
	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	0.00119	0.00124	0.00108	0.00128	0.00109	0.00124	0.00133	0.00129	0.00113	0.00120	0.00115	0.00127	0.000906	0.000980	0.000920	0.00101	0.000927	0.000940
	Nickel (Ni)	mg/L	0.00076	0.00084	0.00072	0.00079	0.00075	0.00080	0.00077	0.00081	0.00081	0.00078	0.00087	0.00087	0.00060	0.00064	0.00066	0.00069	0.00067	0.00072
	Potassium (K)	mg/L	1.62	1.73	1.51	1.65	1.54	1.67	1.69	1.74	1.54	1.60	1.65	1.73	1.30	1.27	1.33	1.36	1.33	1.42
	Selenium (Se)	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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.55	0.56	0.79	0.55	0.74	0.55	0.58	0.59	0.66	0.53	0.61	0.62	0.561	0.527	0.634	0.559	0.604	0.542
	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	2.21	2.43	2.11	2.24	2.15	2.31	2.32	2.41	2.13	2.21	2.35	2.44	1.77	1.81	1.82	1.93	1.84	2.10
	Strontium (Sr)	mg/L	0.0127	0.0136	0.0122	0.0135	0.0123	0.0136	0.0143	0.0136	0.0121	0.0130	0.0133	0.0146	0.00945	0.0101	0.0103	0.0108	0.0101	0.0108
	Thallium (Tl)	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	<0.000010	<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	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00142	0.00151	0.00128	0.00146	0.00136	0.00148	0.00159	0.00159	0.00136	0.00147	0.00148	0.00156	0.00127	0.00142	0.00121	0.00137	0.00127	0.00142
	Vanadium (V)	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0116	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0050	<0.0030	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Table C.44: Dissolved Metal Concentrations at Sheardown Lake NW Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Summer Sampling Event						Fall Sampling Event											
			DL0-01-04	DL0-01-04	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7	DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-1	DL0-01-1	DL0-01-5	DL0-01-5	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
			28-Jul-20	28-Jul-20	29-Jul-20	29-Jul-20	28-Jul-20	28-Jul-20	26-Aug-20	26-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	26-Aug-20	26-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0028	0.0149	0.0241	0.0038	0.0038	0.0039	<0.0030	0.0088	<0.0030	<0.0030	0.0032	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
	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	0.00760	0.00792	0.00769	0.00788	0.00745	0.00786	0.0082	0.00799	0.00786	0.00774	0.00786	0.00808	0.00812	0.00797	0.00786	0.00795	0.00791	0.00802
	Beryllium (Be)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	0.012	0.013	0.011	0.013	0.011	0.019	0.014	0.014	0.013	0.013	0.014	0.014	0.015	0.015	0.014	0.013	0.013	0.013
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	15.2	14.9	14.7	15.0	13.6	15.2	15.8	15.3	15.2	15.4	15.1	15.9	15.4	15.9	15.5	15.3	15.5	15.5
	Chromium (Cr)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<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	0.00078	0.00087	0.00080	0.00086	0.00081	0.00085	0.00082	0.00082	0.00079	0.00079	0.00082	0.0008	0.00079	0.0008	0.00081	0.00082	0.0008	0.00082
	Iron (Fe)	mg/L	<0.010	0.019	<0.010	<0.010	<0.010	<0.010	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	0.0015	0.0013	0.0014	0.0015	0.0012	0.0015	0.0017	0.0016	0.0014	0.0015	0.0017	0.0018	0.0017	0.0018	0.0015	0.0016	0.0015	0.0016
	Magnesium (Mg)	mg/L	9.24	10.1	9.58	9.67	9.70	10.3	10.1	9.92	9.85	9.95	10.1	10.3	10.3	10.1	10.1	10.1	9.98	10
	Manganese (Mn)	mg/L	0.00018	0.00267	0.00024	0.00043	<0.00010	0.00059	0.000158	0.00136	0.000092	0.000095	0.000108	0.000113	0.000138	0.000114	0.000104	0.000128	0.000091	0.0001
	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	0.000977	0.000989	0.000972	0.000988	0.000856	0.000946	0.00106	0.001	0.00103	0.00099	0.00101	0.00102	0.00101	0.00101	0.00101	0.00101	0.00102	0.00105
	Nickel (Ni)	mg/L	0.00064	0.00067	0.00068	0.00068	0.00062	0.00066	0.00068	0.0007	0.00064	0.00065	0.00075	0.00066	0.00066	0.00069	0.00066	0.00069	0.00067	0.00063
	Potassium (K)	mg/L	1.41	1.32	1.38	1.39	1.31	1.35	1.38	1.36	1.33	1.35	1.37	1.39	1.4	1.39	1.37	1.38	1.36	1.36
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.583	0.572	0.570	0.561	0.532	0.560	0.57	0.55	0.53	0.55	0.55	0.58	0.55	0.55	0.55	0.55	0.57	0.55
	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	1.81	1.96	2.03	1.92	1.86	1.95	1.96	1.95	1.93	1.94	1.97	2.02	2.05	1.95	2	2	1.91	1.92
	Strontium (Sr)	mg/L	0.0103	0.0104	0.0108	0.0110	0.00987	0.0109	0.011	0.0108	0.011	0.0105	0.0109	0.0108	0.0109	0.0109	0.0109	0.0108	0.0107	0.0109
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	0.00057	<0.00030	<0.00030	<0.00030	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00135	0.00139	0.00130	0.00134	0.00123	0.00136	0.00178	0.00157	0.00153	0.00152	0.00152	0.00154	0.00149	0.00152	0.00149	0.0015	0.00151	0.00152
	Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	0.0012	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0032	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

**Table C.45: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Sheardown Lake Northwest and Reference Lake 3 in 2020, and at Sheardown Lake Northwest Between 2020 and the Baseline Period**

Dissolved Metal	Sheardown Lake NW				
	2020 vs Reference Lake 3		2020 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	0.6	0.8	0.0	1.6	1.2
Antimony (Sb)	1.0	1.0	0.0	0.0	1.0
Arsenic (As)	1.0	1.0	1.0	0.8	1.0
Barium (Ba)	1.2	1.2	0.0	1.4	1.4
Beryllium (Be)	0.2	1.0	1.2	0.2	2.1
Bismuth (Bi)	0.1	1.0	1.0	0.0	1.0
Boron (B)	1.2	1.4	1.2	1.3	1.4
Cadmium (Cd)	0.5	1.0	0.4	0.0	0.8
Calcium (Ca)	2.1	2.1	1.5	1.3	1.3
Chromium (Cr)	0.2	1.0	-	0.9	-
Cobalt (Co)	1.0	1.0	1.0	1.0	0.9
Copper (Cu)	1.2	1.1	0.8	0.5	1.0
Iron (Fe)	0.4	1.0	1.2	0.4	1.7
Lead (Pb)	1.0	1.0	0.6	1.0	1.0
Lithium (Li)	1.4	1.6	0.4	0.0	0.7
Magnesium (Mg)	2.2	2.1	1.5	1.4	1.4
Manganese (Mn)	2.2	1.6	0.3	0.0	0.3
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	7.3	6.6	5.3	0.0	5.1
Nickel (Ni)	1.3	1.3	1.1	0.7	1.2
Potassium (K)	1.6	1.5	1.0	1.2	1.1
Selenium (Se)	0.1	1.0	-	0.5	-
Silicon (Si)	1.2	1.1	1.3	1.4	1.4
Silver (Ag)	1.0	1.0	1.2	1.8	2.7
Sodium (Na)	2.1	1.9	1.4	1.5	1.5
Strontium (Sr)	1.3	1.3	1.7	1.5	1.4
Thallium (Tl)	0.1	1.0	1.2	0.1	2.6
Tin (Sn)	1.0	1.0	0.1	0.2	0.1
Titanium (Ti)	0.0	1.0	1.0	0.0	1.0
Uranium (U)	4.4	4.7	3.0	2.9	3.1
Vanadium (V)	0.5	1.0	1.0	0.5	1.0
Zinc (Zn)	0.3	1.0	2.0	0.3	1.9

	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 $\geq 10$ times higher than respective mean reference or baseline period value).
	Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.46: In Situ Water Quality Profile Data Collected at Sheardown Lake SE Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2020

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3
Date Collected	15-Apr-20	15-Apr-20	14-Apr-20	14-Apr-20	15-Apr-20	15-Apr-20	15-Apr-20	14-Apr-20	14-Apr-20	15-Apr-20	15-Apr-20	15-Apr-20	14-Apr-20	14-Apr-20	15-Apr-20	15-Apr-20	15-Apr-20	14-Apr-20	14-Apr-20	15-Apr-20	15-Apr-20	15-Apr-20	14-Apr-20	14-Apr-20	15-Apr-20
1.0	0.0	-0.1	0.1	0.0	0.6	13.10	13.71	14.17	14.03	13.39	89.6	93.6	97.3	96.3	93.4	7.70	7.70	8.19	7.85	7.84	160.9	170.6	200.7	176.4	199.8
2.0	0.0	0.0	0.3	0.1	0.2	12.82	13.33	13.63	13.63	13.28	88.0	91.2	94.0	93.9	91.6	7.56	7.64	7.94	7.76	7.69	157.6	168.4	190.1	179.6	191.2
3.0	0.2	0.1	0.5	0.6	0.5	12.67	12.54	13.39	13.24	12.92	87.4	86.1	93.2	92.1	90.0	7.52	7.57	7.81	7.73	7.59	159.6	173.7	187.7	177.5	187.9
4.0	0.5	-	0.7	0.7	0.7	12.31	-	13.20	13.09	12.74	85.6	-	92.4	91.4	89.2	7.49	-	7.71	7.70	7.54	169.2	-	186.3	179.5	186.3
5.0	0.8	-	0.8	0.8	0.8	12.00	-	13.11	12.93	12.61	84.0	-	91.8	90.5	88.4	7.46	-	7.69	7.69	7.49	182.7	-	186.0	181.2	185.5
6.0	1.0	-	0.9	0.8	0.9	11.28	-	12.96	12.77	12.42	79.5	-	90.9	89.6	87.2	7.40	-	7.65	7.66	7.45	194.6	-	185.7	183.4	184.2
7.0	-	-	0.9	0.9	0.9	-	-	12.64	12.57	12.25	-	-	88.8	88.3	86.1	-	-	7.62	7.64	7.41	-	-	186.0	183.3	183.3
8.0	-	-	0.9	1.0	1.0	-	-	12.06	12.23	11.98	-	-	85.0	86.3	84.3	-	-	7.59	7.62	7.38	-	-	187.7	182.0	182.4
9.0	-	-	-	1.1	1.1	-	-	-	11.85	11.78	-	-	-	83.8	83.3	-	-	-	7.59	7.37	-	-	-	181.0	181.8
10.0	-	-	-	1.2	1.2	-	-	-	10.97	10.46	-	-	-	77.7	74.1	-	-	-	7.50	7.35	-	-	-	180.1	180.7
11.0	-	-	-	1.3	1.3	-	-	-	8.72	9.00	-	-	-	62.0	64.1	-	-	-	7.48	7.28	-	-	-	180.4	182.6
12.0	-	-	-	1.4	1.5	-	-	-	6.74	7.31	-	-	-	48.2	52.3	-	-	-	7.40	7.23	-	-	-	181.2	183.6
13.0	-	-	-	-	1.7	-	-	-	-	3.66	-	-	-	-	26.2	-	-	-	-	7.13	-	-	-	-	191.0

Notes: Total depth at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 was 6.8, 4.2, 8.7, 12.9, and 14.1 m, respectively, at the time of winter sampling. Ice thickness at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 was 1.40, 1.62, 1.86, 1.96, and 1.62 m, respectively, at the time of winter sampling.

Table C.47: *In Situ* Water Quality Profile Data Collected at Sheardown Lake SE Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2020

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3
Date Collected	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20
1.0	15.6	15.6	16.0	16.0	15.8	10.56	10.62	10.35	10.41	10.47	106.2	106.6	105.0	105.5	105.7	8.32	8.33	8.29	8.32	8.27	132.4	130.4	129.2	129.2	129.7
2.0	15.0	14.5	16.0	16.0	15.8	11.16	11.31	10.35	10.43	10.49	110.3	110.8	105.0	105.5	105.7	8.37	8.39	8.26	8.33	8.34	130.7	128.6	129.5	129.4	129.9
3.0	14.1	13.6	15.6	15.5	14.0	11.70	11.64	10.73	10.49	11.55	113.6	112.0	107.2	105.1	112.0	8.47	8.38	8.26	8.30	8.39	128.6	126.3	130.6	131.9	128.1
4.0	12.9	-	12.7	12.7	12.3	12.03	-	11.64	11.82	11.83	113.8	-	109.3	111.1	110.5	8.48	-	8.31	8.34	8.36	126.6	-	122.8	122.4	121.7
5.0	11.3	-	11.5	11.7	11.4	12.15	-	11.75	11.74	11.77	110.8	-	108.0	108.2	107.8	8.36	-	8.26	8.28	8.27	129.2	-	121.2	121.1	120.6
6.0	10.1	-	10.7	11.0	10.8	11.78	-	11.52	11.58	11.53	104.8	-	103.8	105.1	104.2	8.17	-	8.02	8.07	8.12	129.0	-	120.4	120.1	120.0
7.0	-	-	9.8	9.5	10.0	-	-	11.28	11.12	11.26	-	-	99.6	97.4	91.8	-	-	7.93	7.93	7.98	-	-	119.6	118.4	119.2
8.0	-	-	8.4	8.3	8.2	-	-	10.94	10.97	11.16	-	-	93.4	93.3	95.0	-	-	7.81	7.80	7.86	-	-	117.5	116.5	116.6
9.0	-	-	-	7.4	7.4	-	-	-	10.89	10.98	-	-	-	90.6	91.3	-	-	-	7.71	7.73	-	-	-	115.4	115.2
10.0	-	-	-	6.1	6.8	-	-	-	10.70	10.86	-	-	-	86.5	89.1	-	-	-	7.65	7.66	-	-	-	114.8	115.1
11.0	-	-	-	5.9	6.3	-	-	-	10.31	10.68	-	-	-	83.1	86.4	-	-	-	7.56	7.60	-	-	-	115.2	115.0
12.0	-	-	-	5.7	6.0	-	-	-	10.03	10.33	-	-	-	80.1	82.9	-	-	-	7.48	7.55	-	-	-	115.5	115.3
13.0	-	-	-	-	5.8	-	-	-	-	10.06	-	-	-	-	80.7	-	-	-	-	7.51	-	-	-	-	115.6
14.0	-	-	-	-	5.6	-	-	-	-	9.05	-	-	-	-	71.9	-	-	-	-	7.48	-	-	-	-	116.5

Note: Total depth at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 was 6.5, 3.8, 8.4, 12.6, and 13.3 m, respectively, at the time of summer sampling.

**Table C.48: *In Situ* Water Quality Profile Data Collected at Sheardown Lake SE Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020**

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-3
Date Collected	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	13-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	13-Aug-20
surface	-	-	-	-	-	10.5	-	-	-	-	-	10.67	-	-	-	-	-	98.2
1.0	8.6	8.6	8.7	8.7	8.7	10.6	11.42	11.34	11.17	11.26	11.30	10.69	97.9	97.3	96.0	96.8	97.0	98.2
2.0	8.6	8.6	8.7	8.7	8.7	10.5	11.41	11.34	11.17	11.25	11.28	10.50	97.8	97.2	96.0	96.7	97.0	96.8
3.0	8.6	8.6	8.7	8.7	8.7	10.5	11.41	11.34	11.17	11.24	11.27	10.54	97.8	97.1	96.0	96.6	96.9	96.9
4.0	8.6	8.6	8.7	8.7	8.7	10.5	11.39	11.36	11.18	11.23	11.27	10.51	97.6	97.2	96.1	96.6	96.9	96.5
5.0	8.6	-	8.7	8.7	8.7	10.5	11.39	-	11.17	11.23	11.27	10.50	97.6	-	96.0	96.5	96.9	96.6
6.0	-	-	8.7	8.7	8.7	10.5	-	-	11.16	11.23	11.26	10.51	-	-	95.9	96.5	96.8	96.6
7.0	-	-	8.7	8.7	8.7	10.5	-	-	11.16	11.22	11.26	10.30	-	-	95.9	96.5	96.7	94.8
8.0	-	-	-	8.7	8.7	10.5	-	-	-	11.22	11.25	10.62	-	-	-	96.4	96.7	97.5
9.0	-	-	-	8.7	8.7	10.5	-	-	-	11.21	11.25	10.47	-	-	-	96.4	96.7	96.0
10.0	-	-	-	8.7	8.7	10.1	-	-	-	11.21	11.24	10.23	-	-	-	96.3	96.6	92.9
11.0	-	-	-	8.7	8.7	7.5	-	-	-	11.20	11.23	10.03	-	-	-	96.3	96.5	85.9
12.0	-	-	-	-	8.6	5.9	-	-	-	-	11.22	8.53	-	-	-	-	96.5	70.1
13.0	-	-	-	-	-	5.9	-	-	-	-	-	8.07	-	-	-	-	-	66.1
14.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: 13-Aug-20 sampling was conducted by Minnow. Sheardown Lake SE water profile sampling on all other dates was conducted by Baffinland. Total depth at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 was 6.5, 3.7, 8.2, 12.6, and 14.1 m, respectively, at the time of fall sampling.

**Table C.48: *In Situ* Water Quality Profile Data Collected at Sheardown Lake SE Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020**

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-3	DLO-02-6	DLO-02-7	DLO-02-4	DLO-02-8	DLO-02-3	DLO-02-3
Date Collected	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	13-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	13-Aug-20
surface	-	-	-	-	-	7.97	-	-	-	-	-	126.7
1.0	8.08	8.05	7.99	8.04	8.04	8.01	139.1	138.3	136.9	137.3	137.5	126.7
2.0	8.08	8.06	7.99	8.03	8.04	8.02	139.2	138.9	137.0	137.4	137.6	126.7
3.0	8.08	8.05	7.99	8.03	8.04	8.02	139.3	139.0	137.0	137.4	137.6	126.7
4.0	8.08	8.07	7.99	8.03	8.04	8.03	139.4	139.2	137.0	137.4	137.6	126.7
5.0	8.08	-	8.00	8.03	8.04	8.04	139.5	-	137.1	137.5	137.7	126.7
6.0	-	-	8.00	8.03	8.04	8.03	-	-	137.1	137.5	137.6	126.7
7.0	-	-	7.99	8.03	8.04	8.03	-	-	137.1	137.5	137.7	126.7
8.0	-	-	-	8.03	8.04	8.02	-	-	-	137.5	137.6	126.8
9.0	-	-	-	8.03	8.04	8.00	-	-	-	137.5	137.6	126.8
10.0	-	-	-	8.03	8.04	7.85	-	-	-	137.5	137.6	124.9
11.0	-	-	-	8.02	8.03	7.50	-	-	-	137.5	137.6	117.0
12.0	-	-	-	-	8.03	7.10	-	-	-	-	137.1	114.7
13.0	-	-	-	-	-	6.83	-	-	-	-	-	115.2
14.0	-	-	-	-	-	-	-	-	-	-	-	-

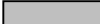
Notes: 13-Aug-20 sampling was conducted by Minnow. Sheardown Lake SE water profile sampling on all other dates was conducted by Baffinland. Total depth at stations DLO-02-6, DLO-02-7, DLO-02-4, DLO-02-8, and DLO-02-3 was 6.5, 3.7, 8.2, 12.6, and 14.1 m, respectively, at the time of fall sampling.

**Table C.49: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Sheardown Lake SE Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**

Categorization & Replicate ID		Date Sampled	Station Depth (m)	Secchi Depth (m)	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
Littoral (Shallow) Stations	DLO-02-1	13-Aug-20	12.1	5.53	surface	10.5	10.69	98.1	7.92	126.8
					bottom	10.4	10.45	96.0	7.90	128.1
	DLO-02-11	18-Aug-20	7.0	1.00	surface	9.4	9.88	88.7	7.97	135.7
					bottom	9.4	9.73	87.2	7.98	135.7
	DLO-02-10	18-Aug-20	7.0	1.07	surface	9.4	9.79	87.7	7.93	135.6
					bottom	9.4	9.80	87.6	7.95	135.8
	DLO-02-4	18-Aug-20	8.0	1.26	surface	9.4	9.86	88.4	7.87	135.5
					bottom	9.4	9.17	82.2	7.75	134.7
	DLO-02-9	19-Aug-20	8.5	1.19	surface	9.1	10.16	90.1	7.62	136.5
					bottom	9.1	10.03	89.3	7.55	136.5
Profundal (Deep) Stations	DLO-02-12	18-Aug-20	11.0	1.66	surface	9.3	11.06	96.5	8.11	132.8
					bottom	9.3	10.99	95.8	8.10	132.9
	DLO-02-8	19-Aug-20	13.0	1.10	surface	9.1	10.60	94.4	7.51	136.4
					bottom	9.0	10.75	95.6	7.41	136.9
	DLO-02-13	19-Aug-20	11.0	1.28	surface	9.1	10.66	94.6	7.55	136.1
					bottom	9.1	10.47	93.3	7.36	136.2
	DLO-02-2	19-Aug-20	15.0	1.40	surface	9.1	10.65	94.6	7.61	136.4
					bottom	9.0	10.56	93.8	7.61	136.8
	DLO-02-3	13-Aug-20	13.2	5.36	surface	10.5	10.56	97.9	7.89	126.6
					bottom	6.0	8.43	69.6	7.12	115.0

**Table C.50: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake SE Littoral and Profundal Stations, Mary River Project CREMP, August 2020**

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	M-W	rank	NO	0.310	Littoral	5	2.01	1.97	0.88	1.00	5.53
					Profundal	5	2.16	1.80	0.80	1.10	5.36
Temperature (°C)	M-W	rank	YES	0.025	Littoral	5	9.54	0.50	0.22	9.10	10.40
					Profundal	5	8.48	1.39	0.62	6.00	9.30
Dissolved Oxygen (mg/L)	M-W	rank	NO	0.151	Littoral	5	9.8	0.5	0.2	9.2	10.5
					Profundal	5	10.2	1.0	0.5	8.4	11.0
Dissolved Oxygen (% saturation)	M-W	rank	NO	0.548	Littoral	5	88.5	5.0	2.2	82.2	96.0
					Profundal	5	89.6	11.2	5.0	69.6	95.8
pH (units)	tequal	none	NO	0.133	Littoral	5	7.83	0.18	0.08	7.55	7.98
					Profundal	5	7.52	0.37	0.16	7.12	8.10
Specific Conductance (umho/cm)	M-W	rank	NO	0.690	Littoral	5	134.2	3.4	1.5	128.1	136.5
					Profundal	5	131.6	9.4	4.2	115.0	136.9

 Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).



**Table C.51: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake SE Lake and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**

Lake Zone	Habitat Variable	Statistical Test Results				Summary Statistics						
		Significant Difference Between Areas?	P-value	Statistical Analysis	Transformation	Study Lake	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Station Depth (m)	NO	0.246	tequal	none	Reference	4	10.0	1.08	0.540	8.50	11.0
						Mary Lake	5	8.52	2.10	0.941	7.00	12.1
	Secchi Depth (m)	YES	0.008	M-W	rank	Reference	5	8.12	0.645	0.288	7.38	9.15
						Mary Lake	5	2.01	1.97	0.882	1.00	5.53
	Temperature (°C)	NO	0.420	tequal	none	Reference	5	9.32	0.295	0.132	8.90	9.70
						Mary Lake	5	9.54	0.498	0.223	9.10	10.4
	Dissolved Oxygen (mg/L)	YES	0.001	tequal	none	Reference	5	112	5.23	2.34	105	117
						Mary Lake	5	88.5	4.98	2.23	82.2	96.0
	Dissolved Oxygen (% saturation)	YES	0.001	tequal	none	Reference	5	112	5.23	2.34	105	117
						Mary Lake	5	88.5	4.98	2.23	82.2	96.0
	pH (units)	YES	0.001	tequal	none	Reference	5	7.19	0.228	0.102	6.94	7.56
						Mary Lake	5	7.83	0.178	0.0795	7.55	7.98
	Specific Conductance (umho/cm)	YES	0.001	tequal	none	Reference	5	76.7	3.16	1.41	74.5	82.1
						Mary Lake	5	134	3.45	1.54	128	137
Profundal (Deep) Stations	Station Depth (m)	YES	0.001	tequal	none	Reference	5	20.6	1.56	0.696	19.0	23.0
						Mary Lake	5	12.6	1.69	0.755	11.0	15.0
	Secchi Depth (m)	YES	0.008	M-W	rank	Reference	5	8.39	0.962	0.430	7.18	9.84
						Mary Lake	5	2.16	1.80	0.805	1.10	5.36
	Temperature (°C)	YES	0.021	M-W	rank	Reference	5	5.82	0.192	0.0860	5.60	6.10
						Mary Lake	5	8.48	1.39	0.622	6.00	9.30
	Dissolved Oxygen (mg/L)	YES	0.015	tequal	none	Reference	5	111	10.3	4.59	104	128
						Mary Lake	5	89.6	11.2	5.03	69.6	95.8
	Dissolved Oxygen (% saturation)	YES	0.015	tequal	none	Reference	5	111	10.3	4.59	104	128
						Mary Lake	5	89.6	11.2	5.03	69.6	95.8
	pH (units)	YES	0.005	tequal	none	Reference	5	6.70	0.295	0.132	6.27	6.95
						Mary Lake	5	7.52	0.368	0.165	7.12	8.10
	Specific Conductance (umho/cm)	YES	0.008	M-W	rank	Reference	5	75.5	1.64	0.734	74.0	78.1
						Mary Lake	5	132	9.40	4.20	115	137

Highlighted values indicate significant difference between study areas based on ANOVA p-value less than 0.10.

Notes: Analysis was completed on samples collected at the bottom of the water column. M-W = Mann-Whitney U-Test, tequal = T-test with equal variance, tunequal = T-test with unequal variance.

Table C.52: Water Chemistry at Sheardown Lake SE (DLO-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					15-Apr-20	15-Apr-20	15-Apr-20	15-Apr-20	14-Apr-20	14-Apr-20	14-Apr-20	14-Apr-20	15-Apr-20	15-Apr-20
Conventionals	Conductivity (lab)	umho/cm	-	-	204	208	196	200	188	192	183	191	186	192
	pH (lab)	pH	6.5 - 9.0	-	7.37	7.42	7.47	7.45	7.48	7.50	7.37	7.51	7.28	7.50
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	108	108	105	105	96.7	98.5	94.6	99.5	97.6	101
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	155	147	134	148	117	118	131	117	114	105
	Turbidity	NTU	-	-	0.18	0.14	0.14	0.80	0.17	0.13	0.18	0.20	0.22	0.11
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	85	85	81	81	76	78	73	77	76	79
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.020	0.018	0.026	0.030	<0.010	0.024	<0.010	0.024
	Nitrate	mg/L	3	3	0.256	0.283	0.223	0.229	0.211	0.208	0.230	0.206	0.239	0.212
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	0.16	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	3.69	2.64	2.57	2.52	2.46	2.95	2.31	2.46	2.45	2.64
	Total Organic Carbon	mg/L	-	-	2.71	2.80	2.73	2.72	2.51	2.70	2.53	2.63	2.48	2.75
	Total Phosphorus	mg/L	0.020 <sup>a</sup>	-	0.0032	0.0052	0.0036	0.0039	<0.0030	0.0032	0.0035	0.0042	0.0046	0.0031
	Phenols	mg/L	0.004 <sup>a</sup>	-	<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
	Chloride (Cl)	mg/L	120	120	5.70	5.78	5.53	5.52	5.25	5.28	4.88	5.22	5.03	5.32
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	13.5	13.8	12.9	12.9	12.0	12.3	11.2	12.1	11.0	12.4
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 <sup>c</sup>	0.0039	0.0046	0.0048	0.0034	0.0042	0.0047	0.0037	0.0089	0.0075	0.0148
	Antimony (Sb)	mg/L	0.020 <sup>a</sup>	-	<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	0.00011	<0.00010
	Barium (Ba)	mg/L	-	-	0.0119	0.0123	0.0117	0.0114	0.0105	0.0104	0.0104	0.0108	0.0105	0.0101
	Beryllium (Be)	mg/L	0.011 <sup>a</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	0.013	0.014	0.012	0.012	0.011	0.011	0.010	0.011	0.011	0.011
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	20.6	20.8	19.8	20.1	18.2	18.3	18.0	19.2	18.5	17.7
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>a</sup>	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	0.00105	0.00103	0.00100	0.00099	0.00090	0.00104	0.00096	0.00113	0.00103	0.00119
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	-	-	0.0015	0.0015	0.0014	0.0014	0.0012	0.0013	0.0011	0.0012	0.0014	0.0012
	Magnesium (Mg)	mg/L	-	-	13.8	14.2	13.5	13.2	12.5	12.6	12.1	12.7	12.5	11.7
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00382	0.00287	0.00162	0.00176	0.00165	0.00159	0.00286	0.00160	0.00397	0.00158
	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	-	0.000882	0.000924	0.000862	0.000860	0.000780	0.000789	0.000752	0.000822	0.000718	0.000906
	Nickel (Ni)	mg/L	0.025	0.025	0.00088	0.00092	0.00087	0.00085	0.00078	0.00081	0.00077	0.00085	0.00076	0.00080
	Potassium (K)	mg/L	-	-	1.82	1.95	1.78	1.75	1.58	1.64	1.55	1.65	1.60	1.55
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.83	0.82	0.71	0.73	0.61	0.62	0.81	0.65	1.02	0.61
	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	-	-	2.65	2.71	2.55	2.48	2.35	2.42	2.31	2.43	2.40	2.31
	Strontium (Sr)	mg/L	-	-	0.0170	0.0169	0.0165	0.0160	0.0150	0.0150	0.0148	0.0156	0.0148	0.0146
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00148	0.00148	0.00138	0.00142	0.00131	0.00137	0.00125	0.00137	0.00122	0.00125
	Vanadium (V)	mg/L	0.006 <sup>a</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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	0.0092

Indicates parameter concentration above applicable Water Quality Guideline.

**BOLD** Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

<sup>c</sup> Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.52: Water Chemistry at Sheardown Lake SE (DLO-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20
Conventionals	Conductivity (lab)	umho/cm	-	-	131	133	129	133	122	131	118	130	118	131
	pH (lab)	pH	6.5 - 9.0	-	8.13	8.25	8.30	8.25	7.83	8.13	7.41	8.24	7.43	8.24
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	61.7	63	62.9	66.4	53.4	58.4	53	61	56.3	63.1
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	68	70	74	74	70	67	55	77	64	69
	Turbidity	NTU	-	-	0.89	0.75	0.82	0.75	0.90	0.73	1.59	0.69	1.51	0.72
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	49.6	51.3	50.3	51.3	46.5	50.4	45.8	50.4	45.8	50.6
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0153	<0.0050	0.0132	<0.0050
	Nitrate	mg/L	3	3	0.0974	0.0809	0.0900	0.0791	0.101	0.0884	0.127	0.0818	0.129	0.0781
	Nitrite	mg/L	0.06	0.06	0.0013	0.0017	0.0016	0.0025	0.0013	0.0017	0.0019	0.0016	0.0016	0.0014
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.121	0.121	0.121	0.115	0.113	0.183	0.114	0.121	0.119	0.126
	Dissolved Organic Carbon	mg/L	-	-	1.80	1.58	6.23	1.41	1.52	1.69	1.12	1.37	1.30	1.56
	Total Organic Carbon	mg/L	-	-	1.65	1.71	1.71	1.89	1.58	1.76	1.53	1.66	1.63	1.79
	Total Phosphorus	mg/L	0.020 <sup>a</sup>	-	0.0072	0.0060	0.0059	0.0044	0.0065	0.0066	0.0083	0.0052	0.0058	0.0085
	Phenols	mg/L	0.001 <sup>a</sup>	-	0.0022	0.0025	0.0047	0.0029	0.0018	<0.0010	0.0027	0.0023	0.0035	0.0022
Anions	Bromide (Br)	mg/L	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	3.43	3.40	3.30	3.36	3.11	3.31	3.08	3.32	3.07	3.36
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	10.0	9.86	9.44	9.70	8.55	9.51	8.06	9.55	8.08	9.66
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 <sup>c</sup>	0.0234	0.0174	0.0211	0.0199	0.0294	0.0202	0.0434	0.0186	0.0503	0.0192
	Antimony (Sb)	mg/L	0.020 <sup>a</sup>	-	<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	-	-	0.00668	0.00649	0.00628	0.00649	0.00632	0.00640	0.00623	0.00634	0.00634	0.00650
	Beryllium (Be)	mg/L	0.011 <sup>a</sup>	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	0.010	0.010	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	11.4	11.8	11.3	11.7	10.6	11.7	10.3	11.4	10.9	11.7
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00010	<0.00010	0.00017	0.00021	0.00014	<0.00010	0.00015	0.00010	0.00011	0.00012
	Cobalt (Co)	mg/L	0.0009 <sup>a</sup>	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	0.00078	0.00078	0.00077	0.00080	0.00084	0.00077	0.00076	0.00079	0.00072	0.00077
	Iron (Fe)	mg/L	0.30	0.300	0.031	0.024	0.027	0.026	0.036	0.025	0.062	0.023	0.064	0.023
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000069	<0.000050	0.000061	<0.000050
	Lithium (Li)	mg/L	-	-	0.0011	0.0011	0.0011	0.0011	<0.0010	0.0011	0.0010	0.0011	0.0014	0.0011
	Magnesium (Mg)	mg/L	-	-	6.87	7.31	6.87	6.98	6.74	6.90	6.22	6.88	7.08	7.04
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00389	0.00349	0.00343	0.00352	0.00427	0.00325	0.0118	0.00321	0.0124	0.00335
	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	-	0.000683	0.000672	0.000655	0.000645	0.000576	0.000637	0.000545	0.000644	0.000537	0.000662
	Nickel (Ni)	mg/L	0.025	0.025	0.00058	0.00060	0.00057	0.00062	0.00056	0.00062	0.00054	0.00062	0.00055	0.00063
	Potassium (K)	mg/L	-	-	1.05	1.05	1.03	1.05	1.01	1.06	0.969	1.03	1.04	1.04
	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	-	-	0.52	0.49	0.49	0.48	0.51	0.51	0.75	0.50	0.79	0.48
	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	-	-	1.38	1.44	1.38	1.41	1.34	1.41	1.28	1.36	1.34	1.40
	Strontium (Sr)	mg/L	-	-	0.00892	0.00887	0.00876	0.00884	0.00816	0.00876	0.00799	0.00866	0.00806	0.00897
	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	-	-	0.00137	0.00083	0.00105	0.00102	0.00163	0.00090	0.00267	0.00098	0.00276	0.00081
	Uranium (U)	mg/L	0.015	-	0.000947	0.000964	0.000924	0.000948	0.000812	0.000925	0.000751	0.000935	0.000726	0.000931
	Vanadium (V)	mg/L	0.006 <sup>a</sup>	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.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

<sup>c</sup> Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.52: Water Chemistry at Sheardown Lake SE (DLO-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20
Conventionals	Conductivity (lab)	umho/cm	-	-	142	146	141	140	145	145	139	139	139	139
	pH (lab)	pH	6.5 - 9.0	-	8.03	8.04	8	8.05	7.98	7.95	8.02	7.98	7.97	8.03
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	68.7	67.3	67.6	68.2	67.2	66.3	67.3	67.2	67.8	67.8
	Total Suspended Solids (TSS)	mg/L	-	-	2.6	2.5	<2.0	<2.0	<2.0	<2.0	2.6	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	75	83	71	89	74	89	81	72	60	76
	Turbidity	NTU	-	-	2.16	2.22	2.23	2.28	2.53	2.43	2.40	2.39	2.16	2.40
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	56	57	57	57	56	55	56	56	56	57
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.011	0.012	0.013	0.013	0.013	0.014	0.012	0.013	0.012	0.012
	Nitrate	mg/L	3	3	0.079	0.094	0.083	0.085	0.086	0.077	0.108	0.099	0.102	0.079
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	0.16	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.53	1.98	2.07	1.92	2.18	1.89	2.11	1.93	2.05	1.89
	Total Organic Carbon	mg/L	-	-	2.41	2.41	2.43	2.33	2.54	2.41	2.35	2.37	2.36	2.49
	Total Phosphorus	mg/L	0.020 <sup>a</sup>	-	0.0079	0.0068	0.014	0.0095	0.0101	0.009	0.0117	0.0088	0.0053	0.0067
	Phenols	mg/L	0.001 <sup>a</sup>	-	<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	3.92	4.00	3.97	3.90	3.85	3.87	3.87	3.90	3.88	3.86
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	9.76	9.78	9.88	9.65	9.33	9.35	9.44	9.52	9.44	9.43
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 <sup>c</sup>	0.0585	0.0696	0.0615	0.0665	0.055	0.0467	0.0704	0.076	0.0671	0.0654
	Antimony (Sb)	mg/L	0.020 <sup>a</sup>	-	<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	-	-	0.00767	0.00782	0.00767	0.00823	0.00769	0.00754	0.00767	0.00818	0.00756	0.00757
	Beryllium (Be)	mg/L	0.011 <sup>a</sup>	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	0.012	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	13.5	13.4	13.9	13.9	12.6	13.3	13.3	13.1	13.4	13.4
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>a</sup>	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	0.00082	0.0008	0.00082	0.00084	0.00091	0.00081	0.0008	0.0008	0.00083	0.00129
	Iron (Fe)	mg/L	0.30	0.300	0.061	0.064	0.060	0.066	0.062	0.059	0.068	0.069	0.064	0.069
	Lead (Pb)	mg/L	0.001	0.001	0.000055	0.000052	0.000055	0.000061	0.000056	0.000053	0.000071	0.000058	0.000059	0.000057
	Lithium (Li)	mg/L	-	-	0.0014	0.0014	0.0013	0.0015	<0.0010	0.0012	0.0012	0.0013	0.0012	0.0014
	Magnesium (Mg)	mg/L	-	-	8.35	8.33	8.47	8.42	8.18	8.13	8.31	8.46	8.48	8.35
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00345	0.00361	0.00355	0.00354	0.00373	0.00376	0.00369	0.00353	0.00363	0.0036
	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	-	0.000645	0.000647	0.000666	0.000632	0.000658	0.000627	0.000629	0.000635	0.000622	0.000621
	Nickel (Ni)	mg/L	0.025	0.025	0.0006	0.00059	0.00061	0.00065	0.0006	0.00059	0.00063	0.00062	0.00061	0.00062
	Potassium (K)	mg/L	-	-	1.15	1.16	1.15	1.15	1.13	1.12	1.17	1.16	1.15	1.15
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.49	0.52	0.48	0.51	0.48	0.45	0.53	0.52	0.50	0.50
	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	-	-	1.75	1.70	1.70	1.70	1.69	1.68	1.74	1.76	1.69	1.72
	Strontium (Sr)	mg/L	-	-	0.0101	0.0102	0.0104	0.0102	0.0102	0.0102	0.0102	0.0103	0.0101	0.0101
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00121	0.00120	0.00119	0.00119	0.00114	0.00117	0.00119	0.00118	0.00117	0.00116
	Vanadium (V)	mg/L	0.006 <sup>a</sup>	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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.

<sup>a</sup> 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.

<sup>b</sup> AEMP Water Quality Benchmarks developed by Intrinsik (2013) using baseline water quality data specific to Sheardown Lake.

<sup>c</sup> Benchmark is 0.179 mg/L and 0.173 mg/L for shallow and deep stations, respectively.

Table C.53: Dissolved Metal Concentrations at Sheardown Lake SE Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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
			15-Apr-20	15-Apr-20	15-Apr-20	15-Apr-20	14-Apr-20	14-Apr-20	14-Apr-20	14-Apr-20	15-Apr-20	15-Apr-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0046	<0.0030	0.0044	<0.0030	0.0044	<0.0030	0.0041	<0.0030	0.0047	<0.0030	0.0039	0.0089	0.0255	0.0066	0.0060	0.0053
	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	<0.00050	<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	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.0119	0.0119	0.0115	0.0113	0.0105	0.0106	0.0102	0.0108	0.0110	0.0109	0.00673	0.00678	0.00675	0.00702	0.00611	0.00633
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00025	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)	mg/L	0.013	0.013	0.013	0.012	0.011	0.011	0.011	0.011	0.011	0.012	0.011	<0.050	0.010	0.011	<0.010	<0.010
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000025	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	20.6	20.3	20.4	20.1	18.5	18.7	17.8	19.1	18.6	19.3	11.9	12.6	11.9	12.5	10.2	11.4
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010
	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	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00119	0.00098	0.00104	0.00106	0.00097	0.00103	0.00098	0.00103	0.00090	0.00095	0.00067	<0.0010	0.00075	0.00081	0.00058	0.00062
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.010	<0.050	0.020	<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	<0.00025	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0015	0.0015	0.0015	0.0016	0.0013	0.0012	0.0011	0.0011	0.0014	0.0014	0.0010	<0.0050	0.0010	0.0011	<0.0010	0.0010
	Magnesium (Mg)	mg/L	13.8	13.9	13.1	13.3	12.2	12.6	12.2	12.6	12.4	12.9	7.77	7.69	8.04	8.54	6.75	7.27
	Manganese (Mn)	mg/L	0.000497	0.000294	0.000263	0.000303	0.000189	0.000275	0.000296	0.000242	0.000312	0.000218	0.00016	0.00067	0.00064	0.00053	0.00012	0.00033
	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	0.000911	0.000883	0.000853	0.000864	0.000788	0.000807	0.000710	0.000816	0.000680	0.000856	0.000612	0.00061	0.000576	0.000625	0.000519	0.000588
	Nickel (Ni)	mg/L	0.00092	0.00088	0.00084	0.00093	0.00078	0.00081	0.00077	0.00083	0.00071	0.00080	<0.00050	<0.0025	0.00052	0.00054	<0.00050	0.00052
	Potassium (K)	mg/L	1.90	1.91	1.75	1.75	1.56	1.65	1.57	1.66	1.60	1.67	1.07	1.15	1.08	1.11	0.975	1.01
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.00025	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	0.81	0.82	0.72	0.74	0.62	0.62	0.80	0.63	0.98	0.65	0.411	0.42	0.417	0.407	0.435	0.422
	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	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.71	2.65	2.53	2.53	2.32	2.40	2.29	2.40	2.35	2.44	1.50	1.57	1.55	1.61	1.32	1.41
	Strontium (Sr)	mg/L	0.0176	0.0171	0.0169	0.0168	0.0154	0.0160	0.0152	0.0158	0.0148	0.0160	0.00872	0.0094	0.00849	0.00892	0.00771	0.00826
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000010	<0.000050	<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	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.00030	<0.0015	0.00126	<0.00030	<0.00030	<0.00030
	Uranium (U)	mg/L	0.00144	0.00147	0.00143	0.00146	0.00133	0.00139	0.00126	0.00137	0.00124	0.00139	0.000930	0.000939	0.000863	0.000934	0.000789	0.000920
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0025	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0010	<0.0050	0.0019	<0.0010	<0.0010	<0.0010

Table C.53: Dissolved Metal Concentrations at Sheardown Lake SE Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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
			28-Jul-20	28-Jul-20	28-Jul-20	28-Jul-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20	26-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0110	0.0067	0.0154	0.0091	0.0132	0.0125	0.012	0.0079	0.0106	0.0108	0.0091	0.0137	0.009	0.0089
	Antimony (Sb)	mg/L	<0.00050	<0.00050	<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	<0.00050	<0.00050	<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	0.00616	0.00671	0.00632	0.00677	0.00727	0.00736	0.00769	0.00735	0.0074	0.00735	0.00722	0.00719	0.00722	0.00724
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00025	<0.00025	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)	mg/L	<0.050	<0.050	<0.010	0.010	0.012	0.012	0.012	0.011	0.011	0.010	0.011	0.011	0.011	0.011
	Cadmium (Cd)	mg/L	<0.000025	<0.000025	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	10.6	12.1	10.9	12.0	13.5	13.1	13.5	13.6	13.1	13.0	13.4	13.2	13.3	13.6
	Chromium (Cr)	mg/L	<0.00050	<0.00050	0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00050	<0.00050	<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	<0.0010	<0.0010	0.00082	0.00072	0.00075	0.00071	0.00072	0.00072	0.00076	0.00072	0.0007	0.00072	0.0007	0.00072
	Iron (Fe)	mg/L	<0.050	<0.050	0.011	<0.010	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.00025	<0.00025	<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	<0.0050	<0.0050	<0.0010	0.0010	0.0013	0.0012	0.0012	0.0013	0.0014	0.0012	0.0012	0.0012	0.0011	0.0013
	Magnesium (Mg)	mg/L	6.44	7.50	7.08	8.06	8.48	8.43	8.23	8.32	8.39	8.22	8.20	8.31	8.39	8.22
	Manganese (Mn)	mg/L	0.00226	<0.00050	0.00158	0.00056	0.000525	0.00058	0.000598	0.000451	0.000323	0.000353	0.000427	0.000399	0.000418	0.000437
	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	0.00050	0.00065	0.000501	0.000593	0.000626	0.000665	0.000628	0.000624	0.000633	0.00062	0.000631	0.000646	0.000611	0.000651
	Nickel (Ni)	mg/L	<0.0025	<0.0025	<0.00050	0.00051	0.00052	0.00056	0.00054	0.00053	0.00052	0.00053	0.00054	0.00077	0.00053	0.00052
	Potassium (K)	mg/L	1.03	1.14	0.986	1.07	1.15	1.14	1.13	1.12	1.13	1.11	1.13	1.13	1.10	1.11
	Selenium (Se)	mg/L	<0.00025	<0.00025	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.64	0.40	0.592	0.407	0.41	0.40	0.40	0.40	0.41	0.41	0.39	0.40	0.40	0.40
	Silver (Ag)	mg/L	<0.000050	<0.000050	<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	1.37	1.50	1.40	1.55	1.76	1.7	1.72	1.75	1.75	1.71	1.68	1.72	1.72	1.68
	Strontium (Sr)	mg/L	0.0082	0.0093	0.00767	0.00850	0.0101	0.0101	0.01	0.00997	0.0102	0.01	0.0101	0.0101	0.01	0.00987
	Thallium (Tl)	mg/L	<0.000050	<0.000050	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00050	<0.00050	<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	<0.0015	<0.0015	0.00038	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000721	0.000923	0.000709	0.000904	0.00117	0.00118	0.00117	0.00116	0.00114	0.00115	0.00115	0.00114	0.00116	0.00116
	Vanadium (V)	mg/L	<0.0025	<0.0025	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0050	<0.0050	<0.0010	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

**Table C.54: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Sheardown Lake Southeast and Reference Lake 3 in 2020, and at Sheardown Lake Southeast Between 2020 and the Baseline Period**

Dissolved Metal	Sheardown Lake SE				
	2020 vs Reference Lake 3		2020 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	0.8	2.5	0.0	2.1	3.6
Antimony (Sb)	2.2	1.0	0.0	0.0	1.0
Arsenic (As)	2.2	1.0	1.0	1.9	1.0
Barium (Ba)	1.1	1.1	0.0	1.3	1.3
Beryllium (Be)	0.4	1.0	1.2	0.5	2.1
Bismuth (Bi)	0.2	1.0	1.0	0.1	1.0
Boron (B)	2.2	1.1	1.2	2.3	1.1
Cadmium (Cd)	1.1	1.0	0.4	0.0	0.8
Calcium (Ca)	1.7	1.8	1.5	1.0	1.1
Chromium (Cr)	0.4	1.0	-	2.0	-
Cobalt (Co)	2.2	1.0	1.0	2.2	0.9
Copper (Cu)	1.1	1.0	0.8	0.5	0.9
Iron (Fe)	0.8	1.0	1.2	1.0	1.7
Lead (Pb)	2.2	1.0	0.6	2.2	1.0
Lithium (Li)	2.2	1.2	0.3	0.1	0.5
Magnesium (Mg)	1.8	1.7	1.6	1.1	1.2
Manganese (Mn)	3.3	3.3	0.5	0.0	0.7
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	4.4	4.1	3.6	0.0	3.1
Nickel (Ni)	2.2	1.1	1.2	1.2	1.0
Potassium (K)	1.2	1.2	1.1	1.0	0.9
Selenium (Se)	0.1	1.0	-	1.1	-
Silicon (Si)	1.0	0.8	1.5	1.1	1.0
Silver (Ag)	2.2	1.0	1.2	-	2.7
Sodium (Na)	1.6	1.7	1.5	1.2	1.3
Strontium (Sr)	1.0	1.2	2.1	1.2	1.3
Thallium (Tl)	0.2	1.0	1.2	0.3	2.6
Tin (Sn)	2.2	1.0	0.1	0.4	0.1
Titanium (Ti)	0.1	1.0	1.0	0.1	1.0
Uranium (U)	2.8	3.5	2.8	1.9	2.3
Vanadium (V)	1.1	1.0	1.0	1.1	1.0
Zinc (Zn)	0.8	1.0	1.5	0.8	1.9

	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 $\geq 10$ times higher than respective mean reference or baseline period value).
	Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.



**Table C.55: *In Situ* Water Quality Measurements Collected at Mary River Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**

Study Area	Station	Date Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	pH (pH units)	Specific Conductance (µS/cm)
Mary River Upstream (GO-09)	GO-09 B1	10-Aug-20	10.5	10.09	95.6	8.25	208.9
	GO-09 B2	10-Aug-20	10.0	10.28	96.3	8.24	195.1
	GO-09 B3	10-Aug-20	9.5	10.43	96.7	8.20	194.1
	GO-09 B4	10-Aug-20	9.3	10.72	100.4	8.25	194.7
	GO-09 B5	10-Aug-20	9.0	10.73	98.1	8.07	180.5
Mary River Upstream (GO-03)	GO-03 B1	10-Aug-20	11.6	9.41	90.9	8.15	191.0
	GO-03 B2	10-Aug-20	11.0	9.55	91.4	8.13	191.0
	GO-03 B3	10-Aug-20	11.2	9.75	93.0	7.99	191.7
	GO-03 B4	10-Aug-20	11.1	10.01	95.3	7.99	192.0
	GO-03 B5	10-Aug-20	10.8	10.05	95.2	8.17	192.1
Mary River Downstream (EO-01)	EO-01 B1	13-Aug-20	5.1	12.49	98.0	8.25	225.3
	EO-01 B2	13-Aug-20	5.1	12.53	98.4	8.26	225.4
	EO-01 B3	13-Aug-20	5.0	12.57	98.4	8.24	225.3
	EO-01 B4	11-Aug-20	9.5	11.14	97.6	8.26	216.0
	EO-01 B5	11-Aug-20	9.4	11.16	97.4	8.27	216.2
Mary River Downstream (EO-20)	EO-20 B1	11-Aug-20	9.6	11.49	100.6	8.36	218.7
	EO-20 B2	11-Aug-20	9.3	11.52	100.4	8.28	219.4
	EO-20 B3	11-Aug-20	9.1	11.52	99.9	8.24	219.1
	EO-20 B4	11-Aug-20	8.9	11.58	100.1	8.71	219.1
	EO-20 B5	11-Aug-20	8.6	11.69	99.8	8.27	218.9
Mary River Downstream (CO-05)	CO-05 B1	11-Aug-20	8.9	11.68	100.7	8.12	208.7
	CO-05 B2	11-Aug-20	8.5	11.68	100.1	8.19	209.3
	CO-05 B3	11-Aug-20	8.2	11.68	99.2	8.16	209.8
	CO-05 B4	11-Aug-20	7.9	11.66	98.0	8.14	209.9
	CO-05 B5	11-Aug-20	8.1	11.61	93.3	8.06	209.9



**Table C.56: *In Situ* Water Quality Summary for Mary River Benthic Invertebrate Community Study Areas, Mary River Project CREMP, August 2020**

Metric	Station	Sample Size	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Temperature (°C)	GO-09	5	9.66	0.59	0.27	9.22	10.10	9.00	10.50
	GO-03	5	11.14	0.30	0.13	10.92	11.36	10.80	11.60
	EO-01	5	6.82	2.40	1.07	5.05	8.59	5.00	9.50
	EO-20	5	9.10	0.38	0.17	8.82	9.38	8.60	9.60
	CO-05	5	8.32	0.39	0.17	8.03	8.61	7.90	8.90
Dissolved Oxygen (mg/L)	GO-09	5	10.5	0.3	0.1	10.2	10.7	10.1	10.7
	GO-03	5	9.8	0.3	0.1	9.5	10.0	9.4	10.1
	EO-01	5	12.0	0.8	0.3	11.4	12.5	11.1	12.6
	EO-20	5	11.6	0.1	0.0	11.5	11.6	11.5	11.7
	CO-05	5	11.7	0.0	0.0	11.6	11.7	11.6	11.7
Dissolved Oxygen (% saturation)	GO-09	5	97.4	1.9	0.8	96.0	98.8	95.6	100.4
	GO-03	5	93.2	2.1	0.9	91.6	94.7	90.9	95.3
	EO-01	5	98.0	0.5	0.2	97.6	98.3	97.4	98.4
	EO-20	5	100.2	0.3	0.2	99.9	100.4	99.8	100.6
	CO-05	5	98.3	3.0	1.3	96.1	100.4	93.3	100.7
pH (pH units)	GO-09	5	8.20	0.08	0.03	8.15	8.26	8.07	8.25
	GO-03	5	8.09	0.09	0.04	8.02	8.15	7.99	8.17
	EO-01	5	8.26	0.01	0.01	8.25	8.26	8.24	8.27
	EO-20	5	8.37	0.19	0.09	8.23	8.51	8.24	8.71
	CO-05	5	8.13	0.05	0.02	8.10	8.17	8.06	8.19
Specific Conductance (µS/cm)	GO-09	5	194.7	10.0	4.5	187.3	202.1	180.5	208.9
	GO-03	5	191.6	0.5	0.2	191.2	192.0	191.0	192.1
	EO-01	5	221.6	5.1	2.3	217.9	225.4	216.0	225.4
	EO-20	5	219.0	0.3	0.1	218.8	219.2	218.7	219.4
	CO-05	5	209.5	0.5	0.2	209.1	209.9	208.7	209.9

**Table C.57: Statistical Comparison of *In Situ* Water Quality Variables Among Mary River Benthic Invertebrate Community Study Areas, Mary River Project CREMP, August 2020**

<i>In Situ</i> Variable	Overall 5-group Comparison				Pair-wise, <i>post hoc</i> comparisons <sup>a</sup>			
	Statistical Test <sup>a</sup>	Transform-ation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Temperature (°C)	K-W	rank	YES	0.00200	GO-09	GO-03	NO	0.132
					GO-09	EO-01	YES	0.068
					GO-09	EO-20	NO	0.414
					GO-09	CO-05	YES	0.037
					GO-03	EO-01	YES	<0.001
					GO-03	EO-20	YES	0.02
					GO-03	CO-05	YES	<0.001
					EO-01	EO-20	NO	0.312
					EO-01	CO-05	NO	0.796
					EO-20	CO-05	NO	0.205
Dissolved Oxygen (mg/L)	ANOVA	none	YES	0.00100	GO-09	GO-03	YES	0.064
					GO-09	EO-01	YES	<0.001
					GO-09	EO-20	YES	0.002
					GO-09	CO-05	YES	<0.001
					GO-03	EO-01	YES	<0.001
					GO-03	EO-20	YES	<0.001
					GO-03	CO-05	YES	<0.001
					EO-01	EO-20	NO	0.443
					EO-01	CO-05	NO	0.693
					EO-20	CO-05	NO	0.993
Dissolved Oxygen (% Saturation)	ANOVA	none	YES	0.001	GO-09	GO-03	YES	0.012
					GO-09	EO-01	NO	0.99
					GO-09	EO-20	NO	0.168
					GO-09	CO-05	NO	0.949
					GO-03	EO-01	YES	0.004
					GO-03	EO-20	YES	<0.001
					GO-03	CO-05	YES	0.002
					EO-01	EO-20	NO	0.353
					EO-01	CO-05	NO	0.999
					EO-20	CO-05	NO	0.494
pH (pH units)	K-W	rank	YES	0.001	GO-09	GO-03	NO	0.111
					GO-09	EO-01	NO	0.236
					GO-09	EO-20	YES	0.061
					GO-09	CO-05	NO	0.212
					GO-03	EO-01	YES	0.005
					GO-03	EO-20	YES	<0.001
					GO-03	CO-05	NO	0.73
					EO-01	EO-20	NO	0.491
					EO-01	CO-05	YES	0.015
					EO-20	CO-05	YES	0.002
Specific Conductance (uS/cm)	K-W	rank	YES	0.001	GO-09	GO-03	NO	0.491
					GO-09	EO-01	YES	0.003
					GO-09	EO-20	YES	0.006
					GO-09	CO-05	NO	0.229
					GO-03	EO-01	YES	<0.001
					GO-03	EO-20	YES	<0.001
					GO-03	CO-05	YES	0.058
					EO-01	EO-20	NO	0.83
					EO-01	CO-05	YES	0.078
					EO-20	CO-05	NO	0.122

Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> 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 Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					04-Jul-20	04-Jul-20	04-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20
Conventional	Conductivity (lab)	umho/cm	-	-	72.0	67.2	44.4	47.7	43.2	108	78.5	45.4	42.7	43.4	46.8	70.9	54.7
	pH (lab)	pH	6.5 - 9.0	-	7.83	7.83	7.55	7.64	7.63	7.89	7.83	7.66	7.65	7.54	7.65	7.73	7.61
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	32.5	31.7	19	20.7	19.3	49.9	35.3	20.8	19.7	20.2	19.3	32.2	23.6
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	18.5	10.6	9.8	9.0	8.3	8.8	7.7	6.3	7.4	9.4
	Total Dissolved Solids (TDS)	mg/L	-	-	60	69	70	79	53	90	88	69	72	67	65	77	77
	Turbidity	NTU	-	-	1.17	2.60	9.05	7.76	6.81	2.19	4.37	6.91	7.11	6.79	7.72	7.43	10.2
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	35	32	21	22	20	39	47	21	20	21	19	29	24
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	<0.020	<0.020	0.022	0.040	<0.020	0.187	0.099	0.031	0.023	0.020	0.163	0.061	0.042
	Nitrite	mg/L	0.06	0.06	<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
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	1.84	1.56	1.50	2.19	2.34	2.12	2.55	2.11	2.14	2.15	2.15	2.27	2.12
	Total Organic Carbon	mg/L	-	-	2.55	2.12	2.03	2.71	2.77	2.94	2.68	3.00	2.95	3.15	3.16	3.44	3.18
	Total Phosphorus	mg/L	0.030 <sup>α</sup>	-	0.0205	0.0036	0.0122	0.0609	0.0504	0.0377	0.0681	0.0266	0.0676	0.0295	0.0189	0.0665	0.0240
Anions	Phenols	mg/L	0.004 <sup>α</sup>	-	0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	0.0012	<0.0010	0.0013	<0.0010	<0.0010
	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	1.05	0.94	1.11	2.07	1.04	1.34	1.26	1.01	0.98	0.95	0.99	1.77	1.30
Anions	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	0.67	0.73	0.65	0.63	0.53	11.8	6.67	2.00	1.58	1.36	2.36	3.44	1.97
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.0551	0.112	0.197	0.241	0.219	0.170	0.234	0.196	0.221	0.213	0.212	0.155	0.244
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<0.00010	<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	0.00012	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00462	0.00530	0.00474	0.00567	0.00467	0.00544	0.00529	0.00465	0.00467	0.00458	0.00447	0.00556	0.00532
	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	<0.000010	<b>0.000064</b>	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000011	<0.000010
	Calcium (Ca)	mg/L	-	-	6.95	7.30	4.21	5.47	4.10	9.35	6.90	4.24	3.94	3.98	3.94	6.62	4.90
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	0.00064	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	<0.00010	<0.00010	<0.00010	0.00022	0.00011	0.00016	0.00013	0.00011	0.00010	<0.00010	<0.00010	0.00011	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00056	<b>0.00670</b>	0.00092	0.00109	0.00079	0.00051	0.00065	0.00075	0.00073	0.00074	0.00072	0.00106	0.00065
	Iron (Fe)	mg/L	0.30	0.874	<0.030	0.102	0.181	0.363	0.199	0.202	0.232	0.192	0.180	0.198	0.181	0.179	0.184
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000387	0.000260	0.000447	0.000236	0.000212	0.000184	0.000219	0.000214	0.000216	0.000214	0.000235	0.000159
	Magnesium (Mg)	mg/L	-	-	4.06	3.66	2.43	2.75	2.42	6.67	4.68	2.75	2.50	2.60	2.48	4.00	3.26
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000824	0.00299	0.00376	0.00922	0.00514	0.00905	0.00669	0.00477	0.00405	0.00410	0.00401	0.00686	0.00415
	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	-	0.000068	0.000087	0.000060	<0.000050	0.000053	0.000099	0.000088	0.000053	0.000070	0.000074	0.000076	0.000176	0.000091
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00338	<0.00050	0.00063	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00061	0.00057
	Potassium (K)	mg/L	-	-	0.53	0.76	0.53	0.52	0.50	0.65	0.58	0.49	0.49	0.49	0.49	0.66	0.62
	Selenium (Se)	mg/L	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	<0.0010
	Silicon (Si)	mg/L	-	-	0.67	0.66	0.73	0.74	0.78	0.64	0.81	0.69	0.79	0.78	0.74	0.64	0.87
	Sodium (Na)	mg/L	-	-	0.783	1.02	0.818	0.601	0.657	0.439	0.543	0.580	0.569	0.580	0.597	0.902	0.789
	Strontium (Sr)	mg/L	-	-	0.00571	0.00584	0.00465	0.00505	0.00419	0.00994	0.00745	0.00456	0.00426	0.00409	0.00403	0.00565	0.00475
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	0.00101	<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	-	-	<0.010	<0.010	0.010	0.017	0.012	0.011	0.014	0.010	0.011	0.011	0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.000441	0.000389	0.000304	0.000358	0.000274	0.000349	0.000328	0.000265	0.000245	0.000241	0.000242	0.000462	0.000210
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<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
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<b>0.0320</b>	0.0033	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0041	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

**BOLD**Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

<sup>a</sup> 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.

<sup>b</sup> 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 Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					03-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	31-Jul-20	31-Jul-20	31-Jul-20
Conventional	Conductivity (lab)	umho/cm	-	-	189	190	180	169	173	345	177	179	179	178	178	174	176
	pH (lab)	pH	6.5 - 9.0	-	8.22	8.23	8.22	8.09	8.18	8.30	8.18	8.16	8.17	8.17	8.25	8.21	8.19
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	84.4	83.2	75.7	73	75.5	166	78.3	76.9	77.2	76.4	75	75.1	75.7
	Total Suspended Solids (TSS)	mg/L	-	-	6.8	21.2	9.8	13.6	6.9	<2.0	8.2	11.5	16.1	14.1	9.1	17.9	18.3
	Total Dissolved Solids (TDS)	mg/L	-	-	114	93	83	95	110	190	116	113	121	112	106	107	107
	Turbidity	NTU	-	-	16.3	37.2	25.5	45.6	23.3	0.41	30.4	40.6	43.2	40.0	21.8	33.2	33.5
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	84	80	76	72	84	122	86	87	82	78	84	81	82
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.139	0.156	0.145	0.124	0.078	0.714	0.106	0.129	0.133	0.165	0.164	0.173	0.175
	Nitrite	mg/L	0.06	0.06	<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
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	0.16	<0.15	<0.15	<0.15	0.32	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	3.68	4.53	3.81	4.31	3.70	1.69	4.04	3.95	1.87	2.23	2.20	2.53	2.94
	Total Organic Carbon	mg/L	-	-	2.9	2.5	3.4	<2.5	3.02	2.74	3.12	3.35	3.17	3.32	3.06	3.32	3.41
	Total Phosphorus	mg/L	0.020 <sup>α</sup>	-	0.0220	0.0243	0.0182	0.0316	0.0133	<0.0030	0.0180	0.0253	0.0275	0.0251	0.0203	0.0241	0.0246
	Phenols	mg/L	0.004 <sup>α</sup>	-	<0.0010	0.0013	0.0012	<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	9.45	8.36	8.94	8.08	7.48	13.7	7.68	7.78	7.77	7.31	7.43	7.57	7.54
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	5.69	5.19	5.63	4.76	4.95	36.0	5.95	6.45	6.97	6.38	6.28	6.14	5.93
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.868	1.27	1.00	1.77	0.889	0.0337	1.19	1.51	1.56	0.0243	0.846	1.21	1.55
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<0.00010	<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	0.00018	0.00025	0.00020	0.00030	0.00019	<0.00010	0.00022	0.00028	0.00027	<0.00010	0.00019	0.00026	0.00024
	Barium (Ba)	mg/L	-	-	0.0155	0.0171	0.0152	0.0204	0.0151	0.0165	0.0161	0.0185	0.0191	0.0102	0.0145	0.0173	0.0151
	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	0.0000063	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000121	0.0000096	<0.0000050	0.0000056	<0.0000050	0.0000060
	Calcium (Ca)	mg/L	-	-	16.4	16.7	15.0	14.9	14.1	29.4	15.0	15.4	15.6	15.5	14.4	15.7	15.5
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00167	0.00256	0.00171	0.00356	0.00163	<0.00050	0.00218	0.00306	0.00325	<0.00050	0.00142	0.00270	0.00142
	Cobalt (Co)	mg/L	0.0009 <sup>α</sup>	0.004	0.00034	0.00056	0.00036	0.00074	0.00034	<0.00010	0.00044	0.00064	0.00069	<0.00010	0.00031	0.00058	0.00034
	Copper (Cu)	mg/L	0.002	0.0024	0.0019	0.0024	0.0019	0.0030	0.0019	<0.0010	0.0022	0.0029	0.0031	<0.0010	0.0018	0.0025	0.0021
	Iron (Fe)	mg/L	0.30	0.874	0.748	1.22	0.855	1.71	0.719	0.028	1.01	1.44	1.38	0.013	0.660	1.34	0.759
	Lead (Pb)	mg/L	0.001	0.001	0.000587	0.000934	0.000661	0.00125	0.000532	<0.000050	0.000745	0.00105	0.00117	<0.000050	0.000497	0.000936	0.000798
	Magnesium (Mg)	mg/L	-	-	9.03	9.37	8.63	8.68	8.92	21.4	8.81	9.32	9.44	8.90	9.12	9.19	8.91
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00948	0.0160	0.0101	0.0201	0.00919	0.00103	0.0119	0.0180	0.0188	<0.00050	0.00914	0.0173	0.0132
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	0.0000051	<0.0000050	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000458	0.000399	0.000434	0.000398	0.000360	0.000491	0.000382	0.000574	0.000597	0.000647	0.000453	0.000484	0.000263
	Nickel (Ni)	mg/L	0.025	0.025	0.00121	0.00180	0.00130	0.00253	0.00154	0.00057	0.00166	0.00234	0.00279	0.00051	0.00134	0.00220	0.00147
	Potassium (K)	mg/L	-	-	1.62	1.69	1.63	1.84	1.58	1.81	1.61	1.78	1.83	1.26	1.50	1.69	1.48
	Selenium (Se)	mg/L	0.001	-	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000070	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Silicon (Si)	mg/L	-	-	1.93	2.72	2.11	3.56	1.85	1.00	2.35	3.09	3.00	0.74	1.86	3.51	1.73
	Sodium (Na)	mg/L	-	-	4.94	4.29	4.58	3.98	4.02	3.23	3.75	3.94	3.88	3.66	3.82	3.89	4.01
	Strontium (Sr)	mg/L	-	-	0.0225	0.0211	0.0207	0.0202	0.0173	0.0414	0.0189	0.0200	0.0206	0.0181	0.0178	0.0204	0.0193
	Thallium (Tl)	mg/L	0.0008	0.0008	0.000021	0.000030	0.000021	0.000041	0.000021	<0.000010	0.000025	0.000032	0.000037	<0.000010	0.000019	0.000034	0.000024
	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	-	-	0.0518	0.0837	0.0593	0.112	0.0526	0.00167	0.0694	0.0932	0.0970	0.00070	0.0534	0.0756	0.0944
	Uranium (U)	mg/L	0.015	-	0.00584	0.00522	0.00509	0.00420	0.00389	0.00369	0.00400	0.00407	0.00414	0.00336	0.00334	0.00374	0.00382
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	0.00161	0.00240	0.00176	0.00327	0.00167	<0.00050	0.00202	0.00276	0.00294	<0.00050	0.00142	0.00242	0.00150
	Zinc (Zn)	mg/L	0.030	0.030	0.0197	0.0032	<0.0030	0.0044	<0.0030	<0.0030	<0.0030	0.0061	0.0043	<0.0030	<0.0030	0.0032	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

**BOLD** Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

<sup>a</sup> 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.

<sup>b</sup> 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 Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Fall Sampling Event												
					G0-09-A	G0-09	G0-09-B	G0-03	GO-01	F0-01	E0-10	EO-03	EO-21	EO-20	C0-10	C0-05	CO-01
					28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
Conventional	Conductivity (lab)	umho/cm	-	-	252	250	243	226	229	403	259	240	240	240	239	232	232
	pH (lab)	pH	6.5 - 9.0	-	8.34	8.37	8.29	8.75	8.20	8.32	8.22	8.13	8.20	8.20	8.21	8.14	8.16
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	126	123	110	104	108	211	127	114	114	114	112	113	110
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	2.4	3.6	2.0	<2.0	<2.0	3.2	<2.0	2.8	2.0	<2.0	2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	134	127	127	113	124	224	126	123	131	132	124	122	134
	Turbidity	NTU	-	-	0.36	3.06	4.96	4.16	5.21	0.61	4.61	6.18	6.97	6.89	4.26	3.05	2.70
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	111	105	94	89	92	132	100	95	93	93	95	94	93
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010
	Nitrate	mg/L	3	3	0.026	0.103	0.180	0.161	0.164	1.09	0.324	0.230	0.228	0.252	0.240	0.216	0.230
	Nitrite	mg/L	0.06	0.06	<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
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	0.16	0.15	<0.15	0.22	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.55	2.62	2.59	2.42	2.23	1.96	2.35	2.26	1.84	2.16	2.15	2.50	2.11
	Total Organic Carbon	mg/L	-	-	2.55	2.30	2.31	2.22	2.28	2.27	2.11	2.38	2.44	2.27	2.41	2.83	2.45
	Total Phosphorus	mg/L	0.020 <sup>α</sup>	-	<0.0030	0.0035	0.0036	<0.0030	0.0046	<0.0030	<0.0030	0.0035	0.0057	0.0063	0.0074	0.0045	0.0101
	Phenols	mg/L	0.004 <sup>α</sup>	-	<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	9.45	11.6	14.4	13.5	12.9	11.7	12.7	13.0	13.0	12.1	11.9	11.6	11.5
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	4.96	7.03	7.99	6.90	7.08	60.7	16.4	10.7	10.7	10.5	10.3	10.1	10.7
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.0116	0.107	0.143	0.154	0.141	0.0407	0.148	0.181	0.196	0.166	0.144	0.113	0.107
	Antimony (Sb)	mg/L	0.020 <sup>α</sup>	-	<0.00010	<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	-	-	0.0134	0.0140	0.0145	0.0144	0.0151	0.0179	0.0159	0.0155	0.0159	0.0157	0.0152	0.0143	0.0149
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	24.8	24.7	22.2	21.1	21.6	36.7	24.7	22.7	22.6	22.5	22.6	21.6	21.4
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>α</sup>	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00017	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00085	0.00102	0.00123	0.00115	0.00121	0.00086	0.00117	0.00124	0.00130	0.00130	0.00112	0.00107	0.00107
	Iron (Fe)	mg/L	0.30	0.874	<0.030	0.084	0.127	0.118	0.132	0.050	0.133	0.178	0.200	0.191	0.132	0.104	0.097
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	0.000084	0.000130	0.000121	0.000147	<0.000050	0.000130	0.000172	0.000195	0.000190	0.000120	0.000087	0.000077
	Magnesium (Mg)	mg/L	-	-	13.9	13.4	12.5	12.4	12.4	27.8	15.2	13.1	13.5	13.4	13.2	13.2	13.0
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000498	0.00133	0.00202	0.00169	0.00180	0.00182	0.00197	0.00232	0.00266	0.00275	0.00204	0.00266	0.00246
	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	-	0.000313	0.000447	0.000544	0.000508	0.000470	0.000408	0.000485	0.000625	0.000636	0.000607	0.000595	0.000581	0.000584
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	0.00051	0.00060	0.00063	0.00075	0.00068	0.00074	0.00072
	Potassium (K)	mg/L	-	-	1.30	1.44	1.61	1.51	1.49	1.69	1.53	1.53	1.59	1.53	1.51	1.45	1.46
	Selenium (Se)	mg/L	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	<0.0010
	Silicon (Si)	mg/L	-	-	0.88	0.94	1.03	0.98	0.98	1.09	1.07	1.22	1.08	1.07	1.03	0.96	0.91
	Sodium (Na)	mg/L	-	-	4.77	5.77	6.95	5.87	5.74	3.39	5.46	5.63	5.77	5.41	5.38	5.15	5.10
	Strontium (Sr)	mg/L	-	-	0.0228	0.0259	0.0270	0.0246	0.0241	0.0373	0.0261	0.0259	0.0263	0.0244	0.0248	0.0228	0.0234
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.012	0.011	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00673	0.00720	0.00776	0.00654	0.00645	0.00483	0.00614	0.00631	0.00615	0.00576	0.00562	0.00532	0.00511
	Vanadium (V)	mg/L	0.006 <sup>α</sup>	0.006	<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
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0494	<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.

<sup>a</sup> 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.

<sup>b</sup> 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 (GO-09) Stations in 2020**

Variable	Spring										Summer									
	G0-03	G0-01	FO-01	E0-10	E0-03	E0-21	E0-20	C0-10	CO-05	CO-01	G0-03	G0-01	FO-01	E0-10	E0-03	E0-21	E0-20	C0-10	CO-05	CO-01
Conductivity (lab)	0.8	0.7	1.8	1.3	0.7	0.7	0.7	0.8	1.2	0.9	0.9	0.9	1.9	0.9	1.0	1.0	1.0	1.0	0.9	0.9
Hardness (as CaCO <sub>3</sub> )	0.7	0.7	1.8	1.3	0.8	0.7	0.7	0.7	1.2	0.9	0.9	0.9	2.0	1.0	0.9	1.0	0.9	0.9	0.9	0.9
Total Suspended Solids (TSS)	9.3	5.3	4.9	4.5	4.2	4.4	3.9	3.2	3.7	4.7	1.1	0.5	0.2	0.7	0.9	1.3	1.1	0.7	1.4	1.5
Total Dissolved Solids (TDS)	1.2	0.8	1.4	1.3	1.0	1.1	1.0	1.0	1.2	1.2	1.0	1.1	2.0	1.2	1.2	1.3	1.2	1.1	1.1	1.1
Turbidity	1.8	1.6	0.5	1.0	1.6	1.7	1.6	1.8	1.7	2.4	1.7	0.9	0.0	1.2	1.5	1.6	1.5	0.8	1.3	1.3
Alkalinity (as CaCO <sub>3</sub> )	0.8	0.7	1.3	1.6	0.7	0.7	0.7	0.6	1.0	0.8	0.9	1.1	1.5	1.1	1.1	1.0	1.0	1.1	1.0	1.0
Total Ammonia	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	1.0	1.0	1.1	1.0	1.0	1.0
Nitrate	1.9	1.0	9.0	4.8	1.5	1.1	1.0	7.9	3.0	2.0	0.8	0.5	4.9	0.7	0.9	0.9	1.1	1.1	1.2	1.2
Nitrite	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	1.0	1.0	1.0	1.0	1.0	1.0
Total Kjeldahl Nitrogen (TKN)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Dissolved Organic Carbon	1.3	1.4	1.3	1.6	1.3	1.3	1.3	1.3	1.4	1.3	1.1	0.9	0.4	1.0	1.0	0.5	0.6	0.5	0.6	0.7
Total Organic Carbon	1.2	1.2	1.3	1.2	1.3	1.3	1.4	1.4	1.5	1.4	0.9	1.0	0.9	1.1	1.1	1.1	1.1	1.0	1.1	1.2
Total Phosphorus	5.0	4.2	3.1	5.6	2.2	5.6	2.4	1.6	5.5	2.0	1.5	0.6	0.1	0.8	1.2	1.3	1.2	0.9	1.1	1.1
Phenols	0.7	0.7	0.7	0.7	1.1	0.8	0.7	0.9	0.7	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Bromide (Br)	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	1.0	1.0	1.0	1.0	1.0	1.0
Chloride (Cl)	2.0	1.0	1.3	1.2	1.0	0.9	0.9	1.0	1.7	1.3	0.9	0.8	1.5	0.9	0.9	0.9	0.8	0.8	0.8	0.8
Sulphate (SO <sub>4</sub> )	0.9	0.8	17	9.8	2.9	2.3	2.0	3.5	5.0	2.9	0.9	0.9	6.5	1.1	1.2	1.3	1.2	1.1	1.1	1.1
Aluminum (Al)	2.0	1.8	1.4	1.9	1.6	1.8	1.8	1.7	1.3	2.0	1.7	0.8	0.0	1.1	1.4	1.5	0.0	0.8	1.2	1.5
Antimony (Sb)	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	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.4	0.9	0.5	1.0	1.3	1.3	0.5	0.9	1.2	1.1
Barium (Ba)	1.2	1.0	1.1	1.1	1.0	1.0	0.9	0.9	1.1	1.1	1.3	0.9	1.0	1.0	1.2	1.2	0.6	0.9	1.1	0.9
Boron (B)	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	1.0	1.0	1.0	1.0	1.0	1.0
Cadmium (Cd)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.9	0.9	0.9	0.9	2.2	1.8	0.9	1.0	0.9	1.1
Calcium (Ca)	0.9	0.7	1.5	1.1	0.7	0.6	0.6	0.6	1.1	0.8	0.9	0.9	1.8	0.9	1.0	1.0	1.0	0.9	1.0	1.0
Chromium (Cr)	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.8	0.8	0.3	1.1	1.5	1.6	0.3	0.7	1.4	0.7
Cobalt (Co)	2.2	1.1	1.6	1.3	1.1	1.0	1.0	1.0	1.1	1.0	1.8	0.8	0.2	1.0	1.5	1.6	0.2	0.7	1.4	0.8
Copper (Cu)	0.4	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.2	1.5	0.9	0.5	1.1	1.4	1.5	0.5	0.9	1.2	1.0
Iron (Fe)	3.5	1.9	1.9	2.2	1.8	1.7	1.9	1.7	1.7	1.8	1.8	0.8	0.0	1.1	1.5	1.5	0.0	0.7	1.4	0.8
Lead (Pb)	1.9	1.0	0.9	0.8	0.9	0.9	0.9	0.9	1.0	0.7	1.7	0.7	0.1	1.0	1.4	1.6	0.1	0.7	1.3	1.1
Lithium (Li)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.6	0.8	1.3	1.0	1.4	1.4	0.5	0.8	1.4	0.9
Magnesium (Mg)	0.8	0.7	2.0	1.4	0.8	0.7	0.8	0.7	1.2	1.0	1.0	1.0	2.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Manganese (Mn)	3.7	2.0	3.6	2.6	1.9	1.6	1.6	1.6	2.7	1.6	1.7	0.8	0.1	1.0	1.5	1.6	0.0	0.8	1.5	1.1
Mercury (Hg)	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	1.0	1.0	1.0	1.0	1.0	1.0
Molybdenum (Mo)	0.7	0.7	1.4	1.2	0.7	1.0	1.0	1.1	2.5	1.3	0.9	0.8	1.1	0.9	1.3	1.4	1.5	1.1	1.1	0.6
Nickel (Ni)	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	1.8	1.1	0.4	1.2	1.6	1.9	0.4	0.9	1.5	1.0
Potassium (K)	0.9	0.8	1.1	1.0	0.8	0.8	0.8	0.8	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.1	0.8	0.9	1.0	0.9
Selenium (Se)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Silicon (Si)	1.1	1.1	0.9	1.2	1.0	1.2	1.1	1.1	0.9	1.3	1.6	0.8	0.4	1.0	1.4	1.3	0.3	0.8	1.6	0.8
Silver (Ag)	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	1.0	1.0	1.0	1.0	1.0	1.0
Sodium (Na)	0.7	0.8	0.5	0.6	0.7	0.7	0.7	0.7	1.0	0.9	0.9	0.9	0.7	0.8	0.9	0.8	0.8	0.8	0.8	0.9
Strontium (Sr)	0.9	0.8	1.8	1.4	0.8	0.8	0.8	0.7	1.0	0.9	0.9	0.8	1.9	0.9	0.9	1.0	0.8	0.8	1.0	0.9
Thallium (Tl)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	0.9	0.4	1.0	1.3	1.5	0.4	0.8	1.4	1.0
Tin (Sn)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Titanium (Ti)	1.7	1.2	1.1	1.4	1.0	1.1	1.1	1.0	1.0	1.0	1.7	0.8	0.0	1.1	1.4	1.5	0.0	0.8	1.2	1.5
Uranium (U)	0.9	0.7	0.9	0.9	0.7	0.6	0.6	0.6	1.2	0.6	0.8	0.7	0.7	0.7	0.8	0.8	0.6	0.6	0.7	0.7
Vanadium (V)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	0.9	0.3	1.1	1.4	1.5	0.3	0.7	1.3	0.8
Zinc (Zn)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.5	0.3	0.3	0.3	0.7	0.5	0.3	0.3	0.4	0.3

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).



**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 (GO-09) Stations in 2020**

Variable	Fall									
	G0-03	G0-01	FO-01	E0-10	E0-03	E0-21	E0-20	C0-10	CO-05	CO-01
Conductivity (lab)	0.9	0.9	1.6	1.0	1.0	1.0	1.0	1.0	0.9	0.9
Hardness (as CaCO <sub>3</sub> )	0.9	0.9	1.8	1.1	1.0	1.0	1.0	0.9	0.9	0.9
Total Suspended Solids (TSS)	1.7	0.9	0.9	0.9	1.5	0.9	1.3	0.9	0.9	0.9
Total Dissolved Solids (TDS)	0.9	1.0	1.7	1.0	1.0	1.0	1.0	1.0	0.9	1.0
Turbidity	1.5	1.9	0.2	1.7	2.2	2.5	2.5	1.5	1.1	1.0
Alkalinity (as CaCO <sub>3</sub> )	0.9	0.9	1.3	1.0	0.9	0.9	0.9	0.9	0.9	0.9
Total Ammonia	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.0
Nitrate	1.6	1.6	11	3.1	2.2	2.2	2.4	2.3	2.1	2.2
Nitrite	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Kjeldahl Nitrogen (TKN)	1.0	1.0	1.1	1.0	1.0	1.5	1.0	1.0	1.0	1.0
Dissolved Organic Carbon	0.9	0.9	0.8	0.9	0.9	0.7	0.8	0.8	1.0	0.8
Total Organic Carbon	0.9	1.0	1.0	0.9	1.0	1.0	1.0	1.0	1.2	1.0
Total Phosphorus	0.9	1.4	0.9	0.9	1.0	1.7	1.9	2.2	1.3	3.0
Phenols	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Bromide (Br)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Chloride (Cl)	1.1	1.1	1.0	1.1	1.1	1.1	1.0	1.0	1.0	1.0
Sulphate (SO <sub>4</sub> )	1.0	1.1	9.1	2.5	1.6	1.6	1.6	1.5	1.5	1.6
Aluminum (Al)	1.8	1.6	0.5	1.7	2.1	2.2	1.9	1.7	1.3	1.2
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Barium (Ba)	1.0	1.1	1.3	1.1	1.1	1.1	1.1	1.1	1.0	1.1
Boron (B)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Calcium (Ca)	0.9	0.9	1.5	1.0	0.9	0.9	0.9	0.9	0.9	0.9
Chromium (Cr)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cobalt (Co)	1.0	1.0	1.7	1.0	1.0	1.0	1.1	1.0	1.0	1.0
Copper (Cu)	1.1	1.2	0.8	1.1	1.2	1.3	1.3	1.1	1.0	1.0
Iron (Fe)	1.5	1.6	0.6	1.7	2.2	2.5	2.4	1.6	1.3	1.2
Lead (Pb)	1.4	1.7	0.6	1.5	2.0	2.2	2.2	1.4	1.0	0.9
Lithium (Li)	1.0	1.0	1.8	1.2	1.1	1.1	1.1	1.0	1.0	1.0
Magnesium (Mg)	0.9	0.9	2.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0
Manganese (Mn)	1.3	1.4	1.4	1.5	1.8	2.1	2.1	1.6	2.1	1.9
Mercury (Hg)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Molybdenum (Mo)	1.2	1.1	0.9	1.1	1.4	1.5	1.4	1.4	1.3	1.3
Nickel (Ni)	1.0	1.0	1.0	1.0	1.2	1.3	1.5	1.4	1.5	1.4
Potassium (K)	1.0	1.0	1.2	1.1	1.1	1.1	1.1	1.0	1.0	1.0
Selenium (Se)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Silicon (Si)	1.0	1.0	1.1	1.1	1.3	1.1	1.1	1.1	1.0	1.0
Silver (Ag)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sodium (Na)	1.0	1.0	0.6	0.9	1.0	1.0	0.9	0.9	0.9	0.9
Strontium (Sr)	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	0.9	0.9
Thallium (Tl)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Tin (Sn)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Titanium (Ti)	1.0	1.0	1.0	1.0	1.0	1.2	1.1	1.0	1.0	1.0
Uranium (U)	0.9	0.9	0.7	0.8	0.9	0.9	0.8	0.8	0.7	0.7
Vanadium (V)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Zinc (Zn)	1.0	1.0	1.0	1.0	16	1.0	1.0	1.0	1.0	1.0

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).

Table C.60: Dissolved Metal Concentrations at Mary River Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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
			04-Jul-20	04-Jul-20	04-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Jul-20	03-Aug-20	02-Aug-20	02-Aug-20	02-Aug-20	01-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0112	0.0172	0.0825	0.0512	0.0517	0.0099	0.0273	0.0440	0.0528	0.0456	0.0426	0.0282	0.0412	0.0291	0.0305	0.0271	0.0592	0.0325	0.0067
	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	0.00416	0.00366	0.00320	0.00334	0.00325	0.00405	0.00378	0.00314	0.00311	0.00316	0.00315	0.00418	0.00358	0.0117	0.0108	0.0105	0.0107	0.0105	0.0168
	Beryllium (Be)	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	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)	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	<0.000050	<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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	6.75	6.76	3.86	4.26	3.98	9.23	6.55	4.11	3.92	3.98	3.90	6.22	4.69	17.3	17.6	15.6	15.2	15.6	30.8
	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	<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	<0.00050	<0.00050	0.00051	0.00053	0.00058	<0.00050	<0.00050	<0.00050	0.00051	0.00054	<0.00050	0.00057	0.00063	0.00110	0.00099	0.00093	0.00090	0.00097	0.00100
	Iron (Fe)	mg/L	<0.030	<0.030	0.039	0.030	0.031	<0.030	<0.030	<0.030	<0.030	0.032	0.031	<0.030	0.031	0.015	0.013	0.011	0.034	0.013	<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	0.000056	<0.000050	0.000055	<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	0.0017	0.0016	0.0017	0.0016	0.0016	0.0032
	Magnesium (Mg)	mg/L	3.80	3.59	2.29	2.45	2.27	6.51	4.60	2.56	2.41	2.49	2.32	4.05	2.89	9.99	9.54	8.94	8.51	8.86	21.6
	Manganese (Mn)	mg/L	0.000352	0.000291	0.000908	0.000994	0.00121	0.00240	0.00169	0.000980	0.000957	0.00123	0.00135	0.00315	0.00227	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	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	0.000078	0.000074	0.000092	0.000077	0.000077	0.000111	0.000102	0.000089	0.000103	0.000101	0.000104	0.000265	0.000161	0.000562	0.000503	0.000563	0.000487	0.000467	0.000561
	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	<0.00050	<0.00050	<0.00050	<0.00050	0.00054
	Potassium (K)	mg/L	0.49	0.46	0.44	0.44	0.46	0.57	0.52	0.43	0.43	0.43	0.40	0.63	0.50	1.43	1.32	1.39	1.28	1.36	1.83
	Selenium (Se)	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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000082
	Silicon (Si)	mg/L	0.57	0.52	0.57	0.52	0.49	0.42	0.45	0.47	0.48	0.45	0.46	0.45	0.43	0.820	0.906	0.747	0.741	0.809	1.10
	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	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Sodium (Na)	mg/L	0.735	0.688	0.698	0.587	0.679	0.433	0.555	0.573	0.570	0.576	0.577	0.874	0.712	5.40	4.70	5.12	4.24	4.22	3.32
	Strontium (Sr)	mg/L	0.00571	0.00518	0.00433	0.00425	0.00402	0.00971	0.00717	0.00437	0.00419	0.00401	0.00384	0.00528	0.00444	0.0220	0.0209	0.0216	0.0194	0.0183	0.0430
	Thallium (Tl)	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	<0.000010	<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	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.00092	0.00087	0.00073	0.00227	0.00086	<0.00030
	Uranium (U)	mg/L	0.000441	0.000345	0.000234	0.000224	0.000193	0.000309	0.000268	0.000193	0.000184	0.000184	0.000179	0.000381	0.000237	0.00533	0.00485	0.00491	0.00367	0.00381	0.00373
	Vanadium (V)	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0035	0.0021	<0.0010	0.0098	<0.0010	0.0018	<0.0010



Table C.60: Dissolved Metal Concentrations at Mary River Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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	CO-01
			01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	31-Jul-20	31-Jul-20	31-Jul-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0276	0.0265	0.0247	0.720	0.0199	0.106	0.0308	0.0064	0.0112	0.0194	0.0199	0.0154	0.0055	0.0141	0.0223	0.0198	0.0091	0.0137	0.0650	0.0519
	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	0.00024	<0.00010	<0.00010	<0.00010	<0.00010	<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	0.0105	0.0107	0.0109	0.0164	0.0106	0.0107	0.0106	0.0135	0.0137	0.0141	0.0137	0.0140	0.0176	0.0148	0.0146	0.0147	0.0145	0.0140	0.0145	0.0140
	Beryllium (Be)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<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
	Bismuth (Bi)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<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
	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	0.0000081	<0.0000050	<0.0000050	<0.0000050	<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
	Calcium (Ca)	mg/L	16.6	15.8	16.1	15.5	15.4	15.4	15.9	26.4	25.8	22.2	21.0	22.2	37.3	24.5	22.8	22.8	22.6	22.5	22.2	21.8
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	0.00173	<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	0.00045	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00094	0.00090	0.00089	0.00231	0.00098	0.00115	0.00100	0.00102	0.00096	0.00108	0.00137	0.00106	0.00136	0.00099	0.00101	0.00105	0.00098	0.00098	0.00106	0.00100
	Iron (Fe)	mg/L	0.013	0.013	0.012	1.03	0.011	0.084	0.020	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	0.000921	<0.000050	0.000108	<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	0.0015	0.0012	0.0012	0.0023	0.0010	0.0014	<0.0010	0.0010	0.0011	0.0011	<0.0010	0.0011	0.0022	0.0012	0.0010	0.0011	0.0011	0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	8.97	9.09	8.99	9.16	8.86	8.92	8.72	14.6	14.1	13.4	12.6	12.7	28.5	15.9	13.9	13.8	13.9	13.5	14.1	13.6
	Manganese (Mn)	mg/L	<0.00050	<0.00050	<0.00050	0.0127	<0.00050	0.00201	0.00230	0.000404	0.000268	0.000309	0.000265	0.000222	0.000634	0.000307	0.000356	0.000374	0.000477	0.000580	0.00189	0.00104
	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	0.000486	0.000720	0.000781	0.000421	0.000617	0.000583	0.000585	0.000313	0.000481	0.000570	0.000504	0.000532	0.000415	0.000520	0.000664	0.000689	0.000673	0.000648	0.000616	0.000595
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	0.00177	<0.00050	0.00088	0.00056	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	0.00052	0.00067	0.00065
	Potassium (K)	mg/L	1.28	1.30	1.28	1.56	1.26	1.29	1.26	1.36	1.49	1.61	1.48	1.49	1.69	1.53	1.54	1.55	1.50	1.48	1.52	1.44
	Selenium (Se)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<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
	Silicon (Si)	mg/L	0.797	0.834	0.756	2.02	0.941	1.17	0.912	0.92	0.79	0.85	0.79	0.79	1.07	0.84	0.79	0.81	0.81	0.80	0.80	0.76
	Silver (Ag)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<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	3.94	3.89	3.77	3.93	4.00	3.96	5.27	6.22	7.28	6.06	5.99	3.59	5.65	6.02	5.93	5.66	5.64	5.76	5.45
	Strontium (Sr)	mg/L	0.0198	0.0198	0.0202	0.0197	0.0194	0.0188	0.0193	0.0241	0.0251	0.0275	0.0240	0.0240	0.0363	0.0275	0.0257	0.0261	0.0247	0.0247	0.0229	0.0236
	Thallium (Tl)	mg/L	<0.000010	<0.000010	<0.000010	0.000029	<0.000010	0.000011	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	0.00076	0.00076	0.00081	0.0571	0.00058	0.00463	0.00107	<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	
Uranium (U)	mg/L	0.00390	0.00373	0.00368	0.00370	0.00336	0.00331	0.00342	0.00662	0.00712	0.00761	0.00649	0.00625	0.00469	0.00590	0.00615	0.00604	0.00563	0.00558	0.00539	0.00514	
Vanadium (V)	mg/L	<0.00050	<0.00050	<0.00050	0.00192	<0.00050	<0.00050	<0.00050	<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	
Zinc (Zn)	mg/L	<0.0010	<0.0010	<0.0010	0.0030	<0.0010	0.0036	<0.0010	<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	

Table C.61: Summary of the Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Mary River Mine-Exposed and Reference (GO-09) Stations in 2020

Variable	Spring										Summer										Fall									
	G0-03	G0-01	FO-01	E0-10	E0-03	E0-21	E0-20	C0-10	CO-05	CO-01	G0-03	G0-01	FO-01	E0-10	E0-03	E0-21	E0-20	C0-10	CO-05	CO-01	G0-03	G0-01	FO-01	E0-10	E0-03	E0-21	E0-20	C0-10	CO-05	CO-01
Aluminum (Al)	1.4	1.4	0.3	0.7	1.2	1.4	1.2	1.2	0.8	1.1	2.0	1.1	0.2	1.0	0.9	0.9	25	0.7	3.7	1.1	1.6	1.2	0.4	1.1	1.8	1.6	0.7	1.1	5.3	4.2
Antimony (Sb)	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	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	1.0	1.0
Arsenic (As)	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	1.0	1.0	2.4	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
Barium (Ba)	0.9	0.9	1.1	1.0	0.9	0.8	0.9	0.9	1.1	1.0	1.0	1.0	1.5	1.0	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.3	1.1	1.1	1.1	1.1	1.0	1.1	1.0
Beryllium (Be)	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	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	1.0	1.0
Bismuth (Bi)	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	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	1.0	1.0
Boron (B)	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	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	1.0	1.0
Cadmium (Cd)	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	1.0	1.0	1.6	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
Calcium (Ca)	0.7	0.7	1.6	1.1	0.7	0.7	0.7	0.7	1.1	0.8	0.9	0.9	1.8	1.0	0.9	1.0	0.9	0.9	0.9	0.9	0.8	0.9	1.5	1.0	0.9	0.9	0.9	0.9	0.9	0.9
Chromium (Cr)	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	1.0	1.0	3.5	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
Cobalt (Co)	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	1.0	1.0	4.5	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Copper (Cu)	1.1	1.2	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.3	0.9	1.0	1.0	0.9	0.9	0.9	2.3	1.0	1.1	1.0	1.3	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Iron (Fe)	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	0.9	0.9	2.6	1.0	0.8	1.0	1.0	0.9	79	0.8	6.5	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead (Pb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	18	1.0	2.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lithium (Li)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.9	0.9	0.7	0.7	1.4	0.6	0.8	0.6	0.9	1.0	2.1	1.1	0.9	1.0	1.0	0.9	0.9	0.9
Magnesium (Mg)	0.8	0.7	2.0	1.4	0.8	0.7	0.8	0.7	1.3	0.9	0.9	0.9	2.3	0.9	1.0	0.9	1.0	0.9	0.9	0.9	0.9	0.9	2.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0
Manganese (Mn)	1.9	2.3	4.6	3.3	1.9	1.9	2.4	2.6	6.1	4.4	1.0	1.0	1.0	1.0	1.0	1.0	25	1.0	4.0	4.6	0.8	0.7	1.9	0.9	1.1	1.1	1.5	1.8	5.8	3.2
Mercury (Hg)	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	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	1.0	1.0
Molybdenum (Mo)	0.9	0.9	1.4	1.3	1.1	1.3	1.2	1.3	3.3	2.0	0.9	0.9	1.0	0.9	1.3	1.4	0.8	1.1	1.1	1.1	1.1	1.2	0.9	1.1	1.5	1.5	1.5	1.4	1.4	1.3
Nickel (Ni)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	3.5	1.0	1.8	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.3	1.3
Potassium (K)	0.9	1.0	1.2	1.1	0.9	0.9	0.9	0.9	1.4	1.1	0.9	1.0	1.3	0.9	0.9	0.9	1.1	0.9	0.9	0.9	1.0	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Selenium (Se)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.6	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	1.0	1.0	1.0
Silicon (Si)	0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.9	1.0	1.3	1.0	1.0	0.9	2.5	1.1	1.4	1.1	0.9	0.9	1.3	1.0	0.9	0.9	0.9	0.9	0.9	0.9
Silver (Ag)	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	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	1.0	1.0
Sodium (Na)	0.8	1.0	0.6	0.8	0.8	0.8	0.8	0.8	1.2	1.0	0.8	0.8	0.7	0.8	0.8	0.8	0.7	0.8	0.8	0.8	1.0	1.0	0.6	0.9	1.0	0.9	0.9	0.9	0.9	0.9
Strontium (Sr)	0.8	0.8	1.9	1.4	0.9	0.8	0.8	0.8	1.0	0.9	0.9	0.9	2.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.4	1.1	1.0	1.0	1.0	1.0	0.9	0.9
Thallium (Tl)	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	1.0	1.0	2.9	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Tin (Sn)	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	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	1.0	1.0
Titanium (Ti)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.7	1.0	0.4	0.9	0.9	1.0	-	0.7	5.5	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Uranium (U)	0.7	0.6	0.9	0.8	0.6	0.5	0.5	0.5	1.1	0.7	0.7	0.8	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.9	0.9	0.7	0.8	0.9	0.8	0.8	0.8	0.8	0.7
Vanadium (V)	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	1.0	1.0	3.8	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
Zinc (Zn)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	0.2	0.4	0.2	0.2	0.2	0.2	0.7	0.2	0.8	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

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 2020 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.62: In Situ Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2020

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)										Dissolved Oxygen (% Saturation)				
	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05
Date Collected	19-Apr-20	19-Apr-20	19-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20	19-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20	19-Apr-20	19-Apr-20	19-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20	19-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20	19-Apr-20	19-Apr-20	19-Apr-20	21-Apr-20	21-Apr-20
1.0	0.3	0.9	0.1	0.0	0.3	0.3	0.0	0.3	0.2	0.1	13.11	12.93	13.52	14.67	14.40	14.77	14.57	14.63	14.78	14.95	90.0	90.6	98.7	100.2	99.2
2.0	0.1	0.1	0.0	0.2	0.2	0.1	0.0	0.2	0.0	0.1	13.09	13.32	13.44	14.58	14.66	14.93	15.09	14.55	14.87	15.02	90.0	91.6	92.3	100.3	100.6
3.0	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.3	0.2	0.2	13.03	13.24	13.32	14.58	14.55	14.86	14.82	14.40	14.66	14.81	90.1	91.2	91.7	100.4	100.3
4.0	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.4	0.3	0.3	12.89	13.20	13.23	14.48	14.38	14.82	14.74	14.25	14.57	14.68	89.6	91.4	91.7	100.0	99.4
5.0	0.5	0.5	-	0.4	0.4	0.3	0.3	0.4	0.3	0.3	12.79	13.15	-	14.36	14.21	14.78	14.65	14.21	14.53	14.56	89.0	91.3	-	99.3	98.3
6.0	0.7	0.5	-	0.4	0.4	0.3	0.4	0.4	0.4	0.4	12.62	13.11	-	14.17	14.18	15.23	14.53	14.14	14.39	14.42	88.1	91.3	-	98.1	98.2
7.0	0.7	0.7	-	0.4	0.4	-	0.5	0.4	0.4	0.4	12.48	13.01	-	14.15	14.14	-	14.37	14.08	14.32	14.37	87.4	90.9	-	98.0	98.0
8.0	0.8	0.7	-	0.4	0.4	-	0.6	0.4	0.4	0.4	12.19	12.86	-	14.10	14.08	-	14.22	14.02	14.28	14.42	85.8	90.1	-	97.7	97.6
9.0	0.9	0.8	-	0.5	0.5	-	0.7	0.4	0.4	-	11.79	12.62	-	14.01	14.02	-	14.08	13.99	14.20	-	83.3	88.7	-	97.2	97.2
10.0	1.0	-	-	0.5	0.5	-	0.8	0.5	0.4	-	11.33	-	-	13.94	13.94	-	13.86	13.96	14.15	-	80.4	-	-	96.8	96.8
11.0	1.1	-	-	0.5	0.5	-	0.8	0.5	0.5	-	10.81	-	-	13.87	13.89	-	13.78	13.95	14.08	-	77.3	-	-	96.3	96.4
12.0	1.3	-	-	-	0.5	-	0.9	0.5	0.5	-	6.90	-	-	-	13.90	-	13.70	13.92	13.99	-	49.3	-	-	-	96.5
13.0	1.5	-	-	-	0.5	-	0.9	0.5	0.5	-	5.58	-	-	-	13.92	-	13.55	13.89	13.88	-	40.6	-	-	-	96.6
14.0	1.5	-	-	-	0.5	-	1.0	0.5	0.5	-	2.30	-	-	-	13.93	-	13.42	13.82	13.74	-	16.6	-	-	-	96.8
15.0	1.7	-	-	-	0.5	-	1.0	0.6	0.6	-	0.93	-	-	-	13.88	-	13.34	13.70	13.61	-	6.7	-	-	-	96.5
16.0	-	-	-	-	0.6	-	1.1	0.6	0.6	-	-	-	-	-	13.73	-	13.20	13.59	13.50	-	-	-	-	-	95.7
17.0	-	-	-	-	0.6	-	-	0.6	0.6	-	-	-	-	-	13.54	-	-	13.50	13.39	-	-	-	-	-	94.4
18.0	-	-	-	-	0.6	-	-	0.6	0.6	-	-	-	-	-	13.42	-	-	13.52	13.29	-	-	-	-	-	93.6
19.0	-	-	-	-	0.6	-	-	0.7	0.7	-	-	-	-	-	13.35	-	-	13.48	13.20	-	-	-	-	-	93.0
20.0	-	-	-	-	0.7	-	-	0.7	0.7	-	-	-	-	-	13.25	-	-	13.43	13.07	-	-	-	-	-	92.1
21.0	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	13.00	-	-	-	-	-	-
22.0	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	12.66	-	-	-	-	-	-
23.0	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	12.52	-	-	-	-	-	-
24.0	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	12.40	-	-	-	-	-	-
25.0	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	12.14	-	-	-	-	-	-
26.0	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	11.94	-	-	-	-	-	-
27.0	-	-	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	11.35	-	-	-	-	-	-
28.0	-	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	11.18	-	-	-	-	-	-

Notes: Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 15.8, 9.7, 5.0, 11.5, 20.7, 7.3, 16.9, 20.0, 27.0, and 8.5 m, respectively, at the time of winter sampling. Ice thickness at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 1.32, 1.75, 1.40, 1.39, 1.43, 1.52, 1.65, 1.50, 1.33, and 1.40 m, respectively, at the time of winter sampling.

Table C.62: *In Situ* Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2020

Depth (m)	Dissolved Oxygen (% Saturation)					pH (pH units)										Specific Conductance (µS/cm)									
	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06
Date Collected	21-Apr-20	19-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20	19-Apr-20	19-Apr-20	19-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20	19-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20	19-Apr-20	19-Apr-20	19-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20	19-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20
1.0	102.6	98.5	101.1	101.4	102.5	7.86	7.78	7.77	7.72	7.49	7.73	8.19	8.14	7.96	7.94	309.7	327.7	316.5	131.7	131.5	134.4	139.6	132.1	131.1	134.6
2.0	102.5	103.3	100.2	101.9	103.2	7.77	7.73	7.76	7.61	7.48	7.68	8.06	7.97	7.91	7.89	304.7	311.2	311.4	128.6	129.3	131.2	136.0	128.2	130.0	131.8
3.0	102.3	102.1	99.3	100.9	102.2	7.75	7.71	7.76	7.61	7.49	7.64	7.99	7.82	7.84	7.84	302.3	308.5	309.3	127.7	127.4	131.0	132.8	127.0	128.2	129.6
4.0	102.3	101.7	98.6	100.4	101.4	7.74	7.70	7.76	7.61	7.49	7.62	7.94	7.80	7.84	7.82	300.5	306.4	306.7	126.6	128.3	130.5	131.8	126.2	128.3	128.7
5.0	102.0	101.2	98.3	100.4	100.7	7.73	7.71	-	7.60	7.50	7.60	7.91	7.78	7.83	7.86	299.3	305.5	-	125.9	125.6	130.9	130.4	125.9	128.1	127.9
6.0	105.2	100.7	97.8	99.6	99.8	7.73	7.71	-	7.59	7.50	7.57	7.89	7.76	7.81	7.79	298.4	304.3	-	125.3	125.4	135.9	129.2	125.4	127.0	127.0
7.0	-	99.9	97.5	99.1	99.4	7.72	7.71	-	7.59	7.49	-	7.87	7.76	7.81	7.78	297.8	303.6	-	125.0	124.9	-	127.7	120.0	126.6	127.9
8.0	-	99.0	97.1	98.9	99.7	7.71	7.70	-	7.26	7.49	-	7.85	7.75	7.80	7.77	296.3	302.6	-	124.7	124.6	-	126.5	124.6	126.6	131.1
9.0	-	98.5	96.9	98.5	-	7.69	7.69	-	7.58	7.49	-	7.84	7.74	7.79	-	294.3	301.8	-	124.4	125.2	-	125.3	124.7	126.3	-
10.0	-	97.0	96.8	98.1	-	7.67	-	-	7.58	7.49	-	7.83	7.72	7.78	-	293.1	-	-	123.9	124.4	-	124.4	125.0	126.0	-
11.0	-	96.6	96.8	97.7	-	7.64	-	-	7.57	7.49	-	7.82	7.72	7.77	-	292.7	-	-	123.9	124.7	-	123.7	125.6	125.3	-
12.0	-	96.1	96.6	97.1	-	7.58	-	-	-	7.49	-	7.82	7.70	7.76	-	291.8	-	-	-	125.3	-	123.0	125.7	124.6	-
13.0	-	95.3	96.5	96.4	-	7.42	-	-	-	7.49	-	7.81	7.69	7.76	-	292.7	-	-	-	125.9	-	122.2	125.3	123.6	-
14.0	-	94.5	96.0	95.5	-	7.38	-	-	-	7.49	-	7.80	7.68	7.75	-	298.1	-	-	-	125.8	-	121.7	124.7	122.7	-
15.0	-	94.0	95.3	94.7	-	7.25	-	-	-	7.49	-	7.80	7.67	7.74	-	305.1	-	-	-	124.9	-	121.1	123.8	122.3	-
16.0	-	93.2	94.6	94.0	-	-	-	-	-	7.49	-	7.78	7.66	7.74	-	-	-	-	-	123.4	-	120.7	123.3	122.3	-
17.0	-	-	94.0	93.3	-	-	-	-	-	7.48	-	-	7.65	7.72	-	-	-	-	-	122.9	-	-	123.3	122.1	-
18.0	-	-	94.2	92.7	-	-	-	-	-	7.47	-	-	7.63	7.71	-	-	-	-	-	123.5	-	-	123.7	121.9	-
19.0	-	-	94.0	92.0	-	-	-	-	-	7.46	-	-	7.62	7.70	-	-	-	-	-	125.2	-	-	123.7	121.8	-
20.0	-	-	93.8	91.2	-	-	-	-	-	7.44	-	-	7.61	7.69	-	-	-	-	-	126.4	-	-	123.9	121.6	-
21.0	-	-	-	90.9	-	-	-	-	-	-	-	-	-	7.68	-	-	-	-	-	-	-	-	-	121.4	-
22.0	-	-	-	88.8	-	-	-	-	-	-	-	-	-	7.65	-	-	-	-	-	-	-	-	-	121.6	-
23.0	-	-	-	87.8	-	-	-	-	-	-	-	-	-	7.63	-	-	-	-	-	-	-	-	-	121.5	-
24.0	-	-	-	87.0	-	-	-	-	-	-	-	-	-	7.61	-	-	-	-	-	-	-	-	-	122.9	-
25.0	-	-	-	85.3	-	-	-	-	-	-	-	-	-	7.59	-	-	-	-	-	-	-	-	-	122.8	-
26.0	-	-	-	84.2	-	-	-	-	-	-	-	-	-	7.57	-	-	-	-	-	-	-	-	-	122.9	-
27.0	-	-	-	82.2	-	-	-	-	-	-	-	-	-	7.54	-	-	-	-	-	-	-	-	-	122.6	-
28.0	-	-	-	79.1	-	-	-	-	-	-	-	-	-	7.51	-	-	-	-	-	-	-	-	-	122.4	-

Notes: Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 15.8, 9.7, 5.0, 11.5, 20.7, 7.3, 16.9, 20.0, 27.0, and 8.5 m, respectively, at the time of winter sampling. Ice thickness at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 1.32, 1.75, 1.40, 1.39, 1.43, 1.52, 1.65, 1.50, 1.33, and 1.40 m, respectively, at the time of winter sampling.

**Table C.63: *In Situ* Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2020**

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)										Dissolved Oxygen (% Saturation)				
	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05
Date Collected	30-Jul-20	30-Jul-20	30-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	31-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	30-Jul-20	30-Jul-20	30-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	31-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	30-Jul-20	30-Jul-20	30-Jul-20	1-Aug-20	1-Aug-20
1.0	15.1	14.6	14.6	10.1	9.9	9.8	11.7	11.4	10.1	10.2	10.05	10.25	10.19	11.30	11.36	11.24	10.81	10.94	11.20	11.19	99.9	100.8	100.1	100.4	100.3
2.0	15.1	14.6	14.6	10.0	9.1	9.2	11.7	10.4	9.9	9.7	10.06	10.28	10.20	11.35	11.46	11.36	10.83	11.10	11.23	11.28	100.2	100.9	100.3	100.5	98.2
3.0	15.1	14.5	14.6	9.7	8.4	8.6	11.7	8.5	9.8	9.4	10.06	10.34	10.20	11.42	11.59	11.42	10.83	11.48	11.24	11.33	100.0	101.3	100.2	100.3	98.8
4.0	15.1	14.4	14.4	8.1	8.0	8.3	11.7	8.1	9.4	8.8	10.06	10.35	10.26	11.63	11.65	11.47	10.83	11.53	11.31	11.43	100.0	101.3	100.3	98.2	98.2
5.0	15.0	14.1	-	7.7	7.3	8.0	11.6	7.8	9.0	8.0	10.05	10.40	-	11.63	11.68	11.50	10.83	11.57	11.34	11.55	99.7	100.9	-	97.3	97.0
6.0	13.3	13.7	-	7.6	7.2	7.5	11.4	7.8	7.9	7.4	10.16	10.55	-	11.60	11.69	11.60	10.96	11.58	11.55	11.74	97.2	101.1	-	96.9	96.8
7.0	11.6	13.1	-	7.4	7.1	7.0	9.9	7.7	7.5	7.0	10.40	10.85	-	11.60	11.69	11.63	11.20	11.58	11.62	11.83	95.6	100.9	-	96.5	96.4
8.0	9.3	11.7	-	7.1	7.0	-	9.9	7.5	7.4	6.8	10.20	10.70	-	11.59	11.68	-	11.22	11.63	11.64	11.81	88.8	97.2	-	95.8	96.3
9.0	9.0	9.0	-	7.1	7.0	-	9.3	7.4	7.3	-	10.08	10.57	-	11.59	11.67	-	11.35	11.63	11.63	-	87.0	91.5	-	95.7	96.1
10.0	8.0	-	-	6.8	6.7	-	8.4	7.2	7.0	-	9.88	-	-	11.57	11.71	-	11.50	11.63	11.69	-	83.4	-	-	94.6	95.7
11.0	7.5	-	-	6.4	6.5	-	7.4	7.0	6.8	-	9.37	-	-	11.57	11.74	-	11.61	11.65	11.69	-	78.1	-	-	93.8	95.4
12.0	7.4	-	-	-	6.4	-	6.9	7.0	6.4	-	9.27	-	-	-	11.74	-	11.68	11.60	11.71	-	77.2	-	-	-	95.2
13.0	6.9	-	-	-	6.3	-	6.3	6.8	6.4	-	8.90	-	-	-	11.74	-	11.70	11.59	11.70	-	73.3	-	-	-	95.1
14.0	6.8	-	-	-	6.2	-	5.5	6.6	6.4	-	8.75	-	-	-	11.74	-	11.75	11.60	11.70	-	71.9	-	-	-	94.8
15.0	6.8	-	-	-	6.2	-	5.2	6.0	6.3	-	8.65	-	-	-	11.74	-	11.72	11.58	11.71	-	70.9	-	-	-	94.8
16.0	-	-	-	-	6.2	-	4.9	5.9	6.1	-	-	-	-	-	11.73	-	11.72	11.57	11.71	-	-	-	-	-	94.6
17.0	-	-	-	-	6.1	-	4.8	5.6	5.9	-	-	-	-	-	11.71	-	11.71	11.56	11.67	-	-	-	-	-	94.4
18.0	-	-	-	-	6.1	-	-	5.6	5.6	-	-	-	-	-	11.70	-	-	11.56	11.70	-	-	-	-	-	94.2
19.0	-	-	-	-	6.1	-	-	5.5	5.5	-	-	-	-	-	11.66	-	-	11.55	11.69	-	-	-	-	-	93.9
20.0	-	-	-	-	6.0	-	-	5.4	5.4	-	-	-	-	-	11.64	-	-	11.53	11.67	-	-	-	-	-	93.6
21.0	-	-	-	-	5.7	-	-	5.3	5.0	-	-	-	-	-	11.50	-	-	11.52	11.72	-	-	-	-	-	91.8
22.0	-	-	-	-	-	-	-	-	4.8	-	-	-	-	-	-	-	-	-	11.76	-	-	-	-	-	-
23.0	-	-	-	-	-	-	-	-	4.7	-	-	-	-	-	-	-	-	-	11.74	-	-	-	-	-	-
24.0	-	-	-	-	-	-	-	-	4.7	-	-	-	-	-	-	-	-	-	11.74	-	-	-	-	-	-
25.0	-	-	-	-	-	-	-	-	4.7	-	-	-	-	-	-	-	-	-	11.74	-	-	-	-	-	-
26.0	-	-	-	-	-	-	-	-	4.6	-	-	-	-	-	-	-	-	-	11.73	-	-	-	-	-	-
27.0	-	-	-	-	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	11.68	-	-	-	-	-	-
28.0	-	-	-	-	-	-	-	-	4.4	-	-	-	-	-	-	-	-	-	11.64	-	-	-	-	-	-
29.0	-	-	-	-	-	-	-	-	4.4	-	-	-	-	-	-	-	-	-	11.58	-	-	-	-	-	-

Notes: Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 15.0, 10.3, 4.5, 11.7, 20.9, 7.5, 17.6, 21.2, 30.3, and 8.8 m, respectively, at the time of summer sampling.

Table C.63: *In Situ* Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Summer, Mary River Project CREMP, July 2020

Depth (m)	Dissolved Oxygen (% Saturation)					pH (pH units)										Specific Conductance (µS/cm)									
	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-06
Date Collected	1-Aug-20	31-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	30-Jul-20	30-Jul-20	30-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	31-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	30-Jul-20	30-Jul-20	30-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20	31-Jul-20	1-Aug-20	1-Aug-20	1-Aug-20
1.0	99.2	99.5	100.2	99.6	99.5	8.38	8.37	8.35	7.73	7.85	7.92	8.26	8.34	7.84	7.55	151.8	150.3	150.1	74.5	74.9	79.3	74.4	76.1	75.4	75.9
2.0	98.6	99.8	99.0	99.2	99.0	8.33	8.36	8.34	7.72	7.81	7.77	8.08	8.10	7.81	7.69	152.0	149.8	150.1	74.8	74.0	82.2	74.4	75.3	75.1	74.9
3.0	97.7	99.7	97.8	98.9	98.9	8.33	8.35	8.35	7.73	7.76	7.86	7.95	7.99	7.79	7.67	152.0	149.5	150.1	75.1	74.0	89.8	74.4	74.4	75.0	74.4
4.0	97.3	99.7	97.6	98.5	98.4	8.32	8.35	8.35	7.72	7.73	7.80	7.94	7.88	7.77	7.69	152.1	149.9	149.8	74.9	74.7	86.3	74.4	74.8	74.5	72.8
5.0	96.9	99.6	97.3	98.0	97.2	8.31	8.34	-	7.66	7.71	7.80	7.92	7.75	7.73	7.70	153.1	147.0	-	74.6	69.9	81.1	74.3	75.5	74.8	70.6
6.0	96.6	98.9	97.2	96.7	97.8	8.29	8.33	-	7.63	7.66	7.73	7.91	7.69	7.71	7.67	151.0	138.9	-	74.4	69.8	74.0	74.0	75.5	71.1	69.2
7.0	95.9	98.9	96.9	97.0	97.2	8.19	8.31	-	7.64	7.64	7.70	7.84	7.73	7.66	7.65	124.0	125.2	-	74.2	69.5	71.1	72.8	72.1	70.2	68.3
8.0	-	98.8	96.9	96.8	96.9	7.85	8.25	-	7.62	7.63	-	7.80	7.71	7.65	7.57	98.0	111.0	-	73.4	69.8	-	72.7	70.1	70.0	68.0
9.0	-	99.0	96.8	96.5	-	7.80	8.15	-	7.60	7.62	-	7.76	7.68	7.60	-	93.2	97.1	-	73.2	69.7	-	72.2	69.9	69.5	-
10.0	-	98.3	96.2	96.1	-	7.71	-	-	7.59	7.61	-	7.71	7.66	7.60	-	89.3	-	-	73.4	68.9	-	71.5	69.7	69.0	-
11.0	-	96.8	95.4	95.9	-	7.57	-	-	7.57	7.59	-	7.65	7.64	7.61	-	87.1	-	-	72.4	68.5	-	70.8	69.4	68.9	-
12.0	-	96.0	95.5	95.2	-	7.55	-	-	-	7.58	-	7.61	7.61	7.54	-	86.0	-	-	-	68.4	-	70.4	73.4	68.6	-
13.0	-	94.6	95.1	95.1	-	7.50	-	-	-	7.56	-	7.57	7.60	7.57	-	84.1	-	-	-	68.3	-	70.3	73.8	68.6	-
14.0	-	93.1	94.7	94.9	-	7.47	-	-	-	7.56	-	7.53	7.59	7.56	-	83.8	-	-	-	68.2	-	70.1	73.2	68.5	-
15.0	-	92.1	93.3	94.7	-	7.44	-	-	-	7.56	-	7.51	7.58	7.55	-	83.3	-	-	-	68.2	-	70.5	71.3	68.4	-
16.0	-	91.4	92.4	94.4	-	-	-	-	-	7.55	-	7.49	7.55	7.55	-	-	-	-	-	68.2	-	70.8	70.2	68.3	-
17.0	-	91.3	92.0	93.6	-	-	-	-	-	7.53	-	7.47	7.53	7.46	-	-	-	-	-	68.2	-	70.9	69.5	68.1	-
18.0	-	-	91.8	93.2	-	-	-	-	-	7.54	-	-	7.53	7.53	-	-	-	-	-	68.3	-	-	68.6	67.8	-
19.0	-	-	91.6	92.9	-	-	-	-	-	7.51	-	-	7.52	7.53	-	-	-	-	-	68.5	-	-	68.7	67.7	-
20.0	-	-	91.2	92.4	-	-	-	-	-	7.51	-	-	7.50	7.52	-	-	-	-	-	68.6	-	-	68.7	67.5	-
21.0	-	-	90.8	91.7	-	-	-	-	-	7.49	-	-	7.49	7.50	-	-	-	-	-	69.6	-	-	68.3	66.9	-
22.0	-	-	-	91.4	-	-	-	-	-	-	-	-	-	7.47	-	-	-	-	-	-	-	-	66.6	-	
23.0	-	-	-	91.3	-	-	-	-	-	-	-	-	-	7.49	-	-	-	-	-	-	-	-	66.6	-	
24.0	-	-	-	91.2	-	-	-	-	-	-	-	-	-	7.48	-	-	-	-	-	-	-	-	66.6	-	
23.0	-	-	-	91.1	-	-	-	-	-	-	-	-	-	7.46	-	-	-	-	-	-	-	-	66.6	-	
24.0	-	-	-	90.8	-	-	-	-	-	-	-	-	-	7.46	-	-	-	-	-	-	-	-	66.6	-	
25.0	-	-	-	90.4	-	-	-	-	-	-	-	-	-	7.46	-	-	-	-	-	-	-	-	66.8	-	
26.0	-	-	-	90.0	-	-	-	-	-	-	-	-	-	7.45	-	-	-	-	-	-	-	-	67.0	-	
27.0	-	-	-	89.4	-	-	-	-	-	-	-	-	-	7.45	-	-	-	-	-	-	-	-	67.1	-	

Notes: Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 15.0, 10.3, 4.5, 11.7, 20.9, 7.5, 17.6, 21.2, 30.3, and 8.8 m, respectively, at the time of summer sampling.

Table C.64: In Situ Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020

Depth (m)	Temperature (°C)												Dissolved Oxygen (mg/L)											
	BLO-01-A	BLO-01	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-09	BLO-06
Date Collected	27-Aug-20	27-Aug-20	20-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	19-Aug-20	28-Aug-20	27-Aug-20	27-Aug-20	20-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	19-Aug-20	28-Aug-20
surface	-	-	8.2	-	-	-	-	-	-	-	8.00	-	-	-	11.40	-	-	-	-	-	-	-	11.19	-
1.0	7.3	7.5	8.2	7.5	8.7	8.3	8.1	8.0	7.8	7.8	8.0	7.5	11.76	11.79	11.55	11.83	11.38	11.34	11.39	11.42	11.36	11.40	10.95	11.34
2.0	7.3	7.5	8.2	7.5	8.5	7.9	7.9	8.0	7.8	7.7	7.9	7.4	11.76	11.75	11.42	11.82	11.42	11.42	11.42	11.42	11.38	11.39	11.04	11.35
3.0	7.3	7.5	8.2	7.4	7.9	7.9	7.7	7.9	7.6	7.6	7.9	7.4	11.75	11.75	11.40	11.82	11.44	11.42	11.45	11.43	11.39	11.41	10.98	11.36
4.0	7.3	7.5	8.2	7.4	7.7	7.7	7.7	7.9	7.5	7.6	7.9	7.4	11.74	11.74	11.40	11.81	11.43	11.43	11.44	11.43	11.39	11.38	10.93	11.36
5.0	7.3	7.5	8.2	-	7.6	7.6	7.6	7.8	7.5	7.6	7.9	7.4	11.75	11.74	11.39	-	11.40	11.42	11.44	11.45	11.38	11.38	10.89	11.35
6.0	7.3	7.5	8.2	-	7.6	7.6	7.6	7.6	7.5	7.6	7.9	7.4	11.73	11.73	11.38	-	11.38	11.41	11.47	11.44	11.37	11.37	10.90	11.34
7.0	7.3	7.4	8.2	-	7.5	7.6	-	7.5	7.5	7.6	7.9	7.4	11.73	11.73	11.38	-	11.39	11.40	-	11.41	11.36	11.37	10.85	11.33
8.0	7.3	7.4	8.2	-	7.5	7.5	-	7.5	7.5	7.6	7.9	7.4	11.72	11.71	11.38	-	11.38	11.41	-	11.40	11.35	11.36	10.86	11.33
9.0	7.3	-	8.2	-	7.5	7.5	-	7.5	7.5	7.6	7.9	7.4	11.71	-	11.37	-	11.37	11.42	-	11.38	11.35	11.35	10.95	11.31
10.0	7.3	-	8.2	-	7.5	7.5	-	7.5	7.5	7.6	7.8	-	11.70	-	11.37	-	11.36	11.42	-	11.37	11.35	11.35	10.90	-
11.0	7.3	-	-	-	-	7.5	-	7.5	7.5	7.6	7.8	-	11.72	-	-	-	-	11.42	-	11.35	11.34	11.33	10.89	-
12.0	7.3	-	-	-	-	7.5	-	7.5	7.5	7.6	7.8	-	11.71	-	-	-	-	11.42	-	11.35	11.34	11.32	10.88	-
13.0	7.2	-	-	-	-	7.5	-	7.5	7.5	7.6	7.8	-	11.72	-	-	-	-	11.43	-	11.34	11.33	11.32	10.87	-
14.0	7.2	-	-	-	-	7.5	-	7.5	7.5	7.6	7.7	-	11.72	-	-	-	-	11.42	-	11.34	11.32	11.31	10.89	-
15.0	7.2	-	-	-	-	7.5	-	-	7.5	7.5	7.7	-	11.64	-	-	-	-	11.41	-	-	11.32	11.30	10.89	-
16.0	7.2	-	-	-	-	7.4	-	-	7.5	7.5	7.6	-	11.65	-	-	-	-	11.41	-	-	11.31	11.24	10.89	-
17.0	-	-	-	-	-	7.4	-	-	7.5	7.4	7.6	-	-	-	-	-	-	11.49	-	-	11.31	11.15	10.90	-
18.0	-	-	-	-	-	7.3	-	-	7.5	7.4	7.5	-	-	-	-	-	-	11.33	-	-	11.31	11.13	10.82	-
19.0	-	-	-	-	-	7.3	-	-	7.5	7.4	7.4	-	-	-	-	-	-	11.31	-	-	11.30	11.11	10.95	-
20.0	-	-	-	-	-	7.3	-	-	7.5	7.3	7.2	-	-	-	-	-	-	11.31	-	-	11.30	11.08	10.92	-
21.0	-	-	-	-	-	-	-	-	7.5	7.3	7.2	-	-	-	-	-	-	-	-	-	11.22	11.06	10.86	-
22.0	-	-	-	-	-	-	-	-	-	7.3	7.1	-	-	-	-	-	-	-	-	-	-	11.04	10.78	-
23.0	-	-	-	-	-	-	-	-	-	7.3	7.0	-	-	-	-	-	-	-	-	-	-	11.03	10.82	-
24.0	-	-	-	-	-	-	-	-	-	7.3	7.0	-	-	-	-	-	-	-	-	-	-	11.01	10.80	-
25.0	-	-	-	-	-	-	-	-	-	7.3	7.0	-	-	-	-	-	-	-	-	-	-	11.01	10.86	-
26.0	-	-	-	-	-	-	-	-	-	7.3	6.8	-	-	-	-	-	-	-	-	-	-	10.99	10.82	-
27.0	-	-	-	-	-	-	-	-	-	7.2	6.7	-	-	-	-	-	-	-	-	-	-	10.94	10.87	-
28.0	-	-	-	-	-	-	-	-	-	-	6.6	-	-	-	-	-	-	-	-	-	-	-	10.85	-
29.0	-	-	-	-	-	-	-	-	-	-	6.4	-	-	-	-	-	-	-	-	-	-	-	10.82	-
30.0	-	-	-	-	-	-	-	-	-	-	6.3	-	-	-	-	-	-	-	-	-	-	-	10.68	-

Notes: 19-Aug-20 and 20-Aug-20 sampling was conducted by Minnow. Mary Lake water profile sampling on all other dates was conducted by Baffinland. Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 15.1, 9.1, 5.0, 12.0, 20.6, 7.4, 15.3, 22.1, 29.7 and 9.5 m, respectively, at the time of fall sampling.

Table C.64: In Situ Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020

Depth (m)	Dissolved Oxygen (% Saturation)												pH (pH units)											
	BLO-01-A	BLO-01	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-09	BLO-06	BLO-01-A	BLO-01	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-09	BLO-06
Date Collected	27-Aug-20	27-Aug-20	20-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	19-Aug-20	28-Aug-20	27-Aug-20	27-Aug-20	20-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	19-Aug-20	28-Aug-20
surface	-	-	96.8	-	-	-	-	-	-	-	96.6	-	-	-	8.12	-	-	-	-	-	-	-	7.42	-
1.0	97.8	98.4	98.2	98.6	97.8	96.4	96.4	96.5	95.6	95.7	94.3	94.6	8.23	8.25	8.13	8.26	7.83	7.90	7.77	7.78	7.76	7.72	7.39	7.71
2.0	97.8	98.1	97.0	98.5	97.0	96.3	96.2	96.3	95.2	95.4	94.6	94.6	8.23	8.25	8.14	8.27	7.77	7.76	7.75	7.75	7.74	7.72	7.37	7.68
3.0	97.7	98.0	96.8	98.5	96.2	96.2	96.0	96.3	95.2	95.4	94.2	94.6	8.23	8.25	8.14	8.27	7.76	7.74	7.75	7.74	7.73	7.72	7.38	7.68
4.0	97.6	97.9	96.7	98.4	95.6	95.8	95.8	96.2	95.1	95.2	93.9	94.6	8.23	8.26	8.14	8.27	7.75	7.74	7.75	7.73	7.72	7.71	7.38	7.68
5.0	97.7	97.8	96.7	-	95.3	95.4	95.6	96.3	95.0	95.1	93.5	94.5	8.22	8.25	8.15	-	7.75	7.74	7.75	7.72	7.71	7.71	7.37	7.68
6.0	97.5	97.8	96.6	-	95.2	95.4	95.8	95.6	94.9	95.0	93.5	94.4	8.23	8.25	8.14	-	7.74	7.74	7.76	7.72	7.72	7.71	7.38	7.68
7.0	97.5	97.7	96.6	-	95.1	95.3	-	95.3	94.9	95.0	93.1	94.4	8.23	8.25	8.15	-	7.74	7.74	-	7.72	7.72	7.71	7.35	7.67
8.0	97.4	97.6	96.6	-	95.0	95.2	-	95.1	94.8	94.9	93.1	94.3	8.23	8.24	8.14	-	7.74	7.74	-	7.71	7.72	7.71	7.36	7.67
9.0	97.3	-	96.5	-	94.9	95.2	-	95.4	94.7	94.9	93.9	94.3	8.22	-	8.14	-	7.75	7.74	-	7.70	7.72	7.71	7.38	7.67
10.0	97.2	-	96.5	-	94.7	95.3	-	94.8	94.7	94.8	93.6	-	8.23	-	8.14	-	7.76	7.75	-	7.70	7.72	7.71	7.36	-
11.0	97.3	-	-	-	-	95.3	-	94.7	94.6	94.7	93.2	-	8.24	-	-	-	-	7.78	-	7.70	7.73	7.71	7.36	-
12.0	97.2	-	-	-	-	95.3	-	94.6	94.6	94.6	93.3	-	8.23	-	-	-	-	7.78	-	7.70	7.72	7.71	7.36	-
13.0	97.2	-	-	-	-	95.3	-	94.5	94.6	94.5	93.2	-	8.23	-	-	-	-	7.78	-	7.69	7.72	7.71	7.36	-
14.0	97.1	-	-	-	-	95.3	-	94.5	94.5	94.5	93.2	-	8.22	-	-	-	-	7.80	-	7.69	7.72	7.71	7.36	-
15.0	96.4	-	-	-	-	95.1	-	-	94.4	94.3	92.8	-	8.22	-	-	-	-	7.81	-	-	7.72	7.71	7.36	-
16.0	96.5	-	-	-	-	95.0	-	-	94.4	93.8	93.0	-	8.22	-	-	-	-	7.81	-	-	7.72	7.70	7.35	-
17.0	-	-	-	-	-	94.7	-	-	94.3	92.8	93.0	-	-	-	-	-	-	7.81	-	-	7.72	7.67	7.33	-
18.0	-	-	-	-	-	94.1	-	-	94.3	92.6	92.0	-	-	-	-	-	-	7.81	-	-	7.72	7.66	7.33	-
19.0	-	-	-	-	-	93.9	-	-	94.3	92.4	92.5	-	-	-	-	-	-	7.78	-	-	7.72	7.65	7.32	-
20.0	-	-	-	-	-	93.9	-	-	94.3	92.1	92.0	-	-	-	-	-	-	7.78	-	-	7.72	7.64	7.30	-
21.0	-	-	-	-	-	-	-	-	93.8	91.9	91.6	-	-	-	-	-	-	-	-	-	7.70	7.64	7.28	-
22.0	-	-	-	-	-	-	-	-	-	91.7	90.8	-	-	-	-	-	-	-	-	-	-	7.64	7.26	-
23.0	-	-	-	-	-	-	-	-	-	91.6	90.9	-	-	-	-	-	-	-	-	-	-	7.63	7.25	-
24.0	-	-	-	-	-	-	-	-	-	91.4	90.7	-	-	-	-	-	-	-	-	-	-	7.65	7.24	-
25.0	-	-	-	-	-	-	-	-	-	91.3	91.2	-	-	-	-	-	-	-	-	-	-	7.63	7.22	-
26.0	-	-	-	-	-	-	-	-	-	91.1	90.4	-	-	-	-	-	-	-	-	-	-	7.62	7.20	-
27.0	-	-	-	-	-	-	-	-	-	90.7	89.9	-	-	-	-	-	-	-	-	-	-	7.61	7.18	-
28.0	-	-	-	-	-	-	-	-	-	-	90.2	-	-	-	-	-	-	-	-	-	-	-	7.17	-
29.0	-	-	-	-	-	-	-	-	-	-	89.5	-	-	-	-	-	-	-	-	-	-	-	7.15	-
30.0	-	-	-	-	-	-	-	-	-	-	88.4	-	-	-	-	-	-	-	-	-	-	-	7.03	-

Notes: 19-Aug-20 and 20-Aug-20 sampling was conducted by Minnow. Mary Lake water profile sampling on all other dates was conducted by Baffinland. Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 15.1, 5.0, 9.5, 12.0, 20.6, 7.4, 15.3, 22.1, 29.7 and 9.5 m, respectively, at the time of fall sampling.



Table C.64: In Situ Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Fall, Mary River Project CREMP, August 2020

Depth (m)	Specific Conductance (µS/cm)											
	BLO-01-A	BLO-01	BLO-01	BLO-01-B	BLO-05-A	BLO-05	BLO-05-B	BLO-03	BLO-04	BLO-09	BLO-09	BLO-06
Date Collected	27-Aug-20	27-Aug-20	20-Aug-20	27-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	19-Aug-20	28-Aug-20
surface	-	-	192.0	-	-	-	-	-	-	-	83.4	-
1.0	216.3	214.5	192.1	215.4	86.9	85.1	86.1	80.4	85.5	85.8	83.1	85.6
2.0	216.3	214.5	192.1	215.4	87.9	85.9	85.9	80.4	85.8	85.7	83.0	85.6
3.0	216.3	214.7	192.2	215.5	87.0	86.3	86.2	80.4	85.8	85.7	83.0	85.6
4.0	216.4	215.1	192.1	215.6	86.7	86.1	86.4	80.4	85.4	85.8	83.0	85.6
5.0	216.4	215.3	192.2	-	86.6	86.3	86.1	80.5	85.4	85.7	83.0	85.6
6.0	216.4	215.2	192.0	-	86.9	86.5	85.6	80.8	85.3	85.7	83.1	85.6
7.0	216.5	215.5	192.1	-	88.2	87.1	-	80.6	85.3	85.7	83.2	85.6
8.0	216.5	215.8	192.1	-	94.9	91.2	-	80.7	85.3	85.7	83.2	85.6
9.0	216.5	-	192.0	-	94.8	96.1	-	80.7	85.3	85.8	83.4	85.6
10.0	216.7	-	192.0	-	94.9	96.6	-	80.7	85.2	85.8	83.4	-
11.0	216.9	-	-	-	-	98.5	-	80.7	85.3	85.8	83.5	-
12.0	216.4	-	-	-	-	102.8	-	80.7	85.2	85.8	83.5	-
13.0	217.8	-	-	-	-	104.8	-	80.8	85.2	85.9	82.8	-
14.0	218.1	-	-	-	-	104.9	-	80.8	85.2	85.9	81.5	-
15.0	217.9	-	-	-	-	102.6	-	-	85.2	86.0	80.7	-
16.0	218.0	-	-	-	-	102.4	-	-	85.0	87.1	79.6	-
17.0	-	-	-	-	-	102.0	-	-	84.9	87.9	79.1	-
18.0	-	-	-	-	-	102.3	-	-	84.5	88.1	79.4	-
19.0	-	-	-	-	-	102.6	-	-	84.4	88.2	77.6	-
20.0	-	-	-	-	-	102.5	-	-	84.5	88.4	77.2	-
21.0	-	-	-	-	-	-	-	-	84.5	86.7	77.3	-
22.0	-	-	-	-	-	-	-	-	-	89.1	76.4	-
23.0	-	-	-	-	-	-	-	-	-	89.2	75.9	-
24.0	-	-	-	-	-	-	-	-	-	89.4	75.8	-
25.0	-	-	-	-	-	-	-	-	-	89.5	75.3	-
26.0	-	-	-	-	-	-	-	-	-	90.0	74.6	-
27.0	-	-	-	-	-	-	-	-	-	90.0	74.2	-
28.0	-	-	-	-	-	-	-	-	-	-	73.9	-
29.0	-	-	-	-	-	-	-	-	-	-	73.3	-
30.0	-	-	-	-	-	-	-	-	-	-	73.3	-

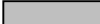
Notes: 19-Aug-20 and 20-Aug-20 sampling was conducted by Minnow. Mary Lake water profile sampling on all other dates was conducted by Baffinland. Total depth at stations BLO-01-A, BLO-01, BLO-01-B, BLO-05-A, BLO-05, BLO-05-B, BLO-03, BLO-04, BLO-09, and BLO-06 was 15.1, 5.0, 9.5, 12.0, 20.6, 7.4, 15.3, 22.1, 29.7 and 9.5 m, respectively, at the time of fall sampling.

**Table C.65: Sampling Depth, Water Clarity Measures, and Surface and Bottom *In Situ* Water Quality Measures Collected at Mary Lake Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2020**

Categorization & Replicate ID		Date Sampled	Station Depth (m)	Secchi Depth (m)	Depth sampled	Temperature (°C)	Dissolved Oxygen		pH (units)	Specific Conductance (µS/cm)
							(mg/L)	(% sat.)		
Littoral (Shallow) Stations	BLO-01	20-Aug-20	10.0	4.78	surface	8.2	11.40	96.8	8.12	192.0
					bottom	9.2	11.37	96.5	8.14	192.0
	BLO-11	16-Aug-20	9.3	3.33	surface	9.3	10.46	93.8	7.20	80.7
					bottom	9.4	10.35	92.9	7.26	84.2
	BLO-07	16-Aug-20	12.8	3.79	surface	8.9	10.99	97.5	7.01	76.0
					bottom	8.8	10.62	94.0	6.74	76.4
	BLO-06	16-Aug-20	6.7	4.38	surface	8.8	10.67	94.3	6.96	76.0
					bottom	8.5	10.59	92.9	6.93	76.0
Profundal (Deep) Stations	BLO-03	16-Aug-20	16.4	3.94	surface	9.2	10.62	94.8	7.19	74.8
					bottom	6.4	11.26	94.1	6.97	72.2
	BLO-15	16-Aug-20	29.1	3.16	surface	9.1	10.71	95.5	7.24	74.9
					bottom	4.6	10.75	85.5	6.89	72.3
	BLO-14	20-Aug-20	20.0	5.28	surface	7.8	11.46	96.3	7.90	76.9
					bottom	7.6	11.43	95.7	7.69	76.9
	BLO-05	16-Aug-20	21.5	3.18	surface	9.3	10.58	95.1	7.32	80.9
					bottom	5.8	10.25	84.5	7.13	69.5
	BLO-13	19-Aug-20	22.0	1.95	surface	7.8	11.11	95.2	7.46	82.8
					bottom	7.5	10.89	92.9	7.30	90.6
	BLO-04	19-Aug-20	22.0	1.63	surface	7.8	11.05	94.7	7.41	83.4
					bottom	7.6	10.68	91.7	7.28	84.7

**Table C.66: Statistical Comparison of Bottom *In Situ* Water Quality Between Mary Lake Littoral and Profundal Stations, Mary River Project CREMP, August 2020**

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test <sup>a</sup>	Transform-ation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	none	NO	0.261	Littoral	4	4.07	0.64	0.32	3.33	4.78
					Profundal	6	3.19	1.34	0.55	1.63	5.28
Temperature (°C)	tequal	none	YES	0.006	Littoral	4	8.98	0.40	0.20	8.50	9.40
					Profundal	6	6.58	1.22	0.50	4.60	7.60
Dissolved Oxygen (mg/L)	tequal	none	NO	0.618	Littoral	4	10.7	0.4	0.2	10.4	11.4
					Profundal	6	10.9	0.4	0.2	10.3	11.4
Dissolved Oxygen (% saturation)	tequal	none	NO	0.212	Littoral	4	94.1	1.7	0.8	92.9	96.5
					Profundal	6	90.7	4.6	1.9	84.5	95.7
pH (units)	tequal	none	NO	0.845	Littoral	4	7.27	0.62	0.31	6.74	8.14
					Profundal	6	7.21	0.29	0.12	6.89	7.69
Specific Conductance (umho/cm)	M-W	rank	NO	0.476	Littoral	4	107.2	56.7	28.3	76.0	192.0
					Profundal	6	77.7	8.3	3.4	69.5	90.6

 Shaded values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).

**Table C.67: Statistical Comparison of Bottom *In Situ* Water Quality Between Mary Lake and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test <sup>a</sup>	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	0.833	Reference	4	10.0	1.1	0.5	8.5	11.0
						Mary Lake	4	9.7	2.5	1.3	6.7	12.8
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	8.12	0.64	0.29	7.38	9.15
						Mary Lake	4	4.07	0.64	0.32	3.33	4.78
	Temperature (°C)	tequal	none	NO	0.180	Reference	5	9.32	0.29	0.13	8.90	9.70
						Mary Lake	4	8.98	0.40	0.20	8.50	9.40
	Dissolved Oxygen (mg/L)	tequal	none	YES	0.002	Reference	5	12.6	0.7	0.3	11.8	13.3
						Mary Lake	4	10.7	0.4	0.2	10.4	11.4
	Dissolved Oxygen (% saturation)	tequal	none	YES	0.001	Reference	5	111.9	5.2	2.3	104.6	116.7
						Mary Lake	4	94.1	1.7	0.8	92.9	96.5
Profundal (Deep) Stations	pH (units)	tequal	none	NO	0.801	Reference	5	7.19	0.23	0.10	6.94	7.56
						Mary Lake	4	7.27	0.62	0.31	6.74	8.14
	Specific Conductance (umho/cm)	M-W	rank	NO	0.190	Reference	5	76.7	3.2	1.4	74.5	82.1
						Mary Lake	4	107.2	56.7	28.3	76.0	192.0
	Station Depth (m)	tequal	none	NO	0.547	Reference	5	20.6	1.6	0.7	19.0	23.0
						Mary Lake	6	21.8	4.1	1.7	16.4	29.1
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	8.39	0.96	0.43	7.18	9.84
						Mary Lake	6	3.19	1.34	0.55	1.63	5.28
	Temperature (°C)	tunequal	none	NO	0.189	Reference	5	5.82	0.19	0.09	5.60	6.10
						Mary Lake	6	6.58	1.22	0.50	4.60	7.60
	Dissolved Oxygen (mg/L)	tequal	log10	YES	0.001	Reference	5	13.6	1.3	0.6	12.8	15.8
						Mary Lake	6	10.9	0.4	0.2	10.3	11.4
	Dissolved Oxygen (% saturation)	tequal	log10	YES	0.001	Reference	5	110.6	10.3	4.6	103.5	127.9
						Mary Lake	6	90.7	4.6	1.9	84.5	95.7
	pH (units)	tequal	none	YES	0.018	Reference	5	6.70	0.30	0.13	6.27	6.95
						Mary Lake	6	7.21	0.29	0.12	6.89	7.69
	Specific Conductance (umho/cm)	tequal	none	NO	0.580	Reference	5	75.5	1.6	0.7	74.0	78.1
						Mary Lake	6	77.7	8.3	3.4	69.5	90.6

Highlighted values indicate significant difference between study areas based on test p-value less than 0.10.

<sup>a</sup> Statistical tests include Student's t-test assuming equal variance (tequal), Student's t-test assuming unequal variance (tunequal), or Mann-Whitney U-test (M-W).



**Table C.69: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Provided) Between Mary Lake and Reference Lake 3 in 2020, and at Mary Lake Between 2020 and the Baseline Period**

Parameter	Mary Lake North Basin					Mary Lake South Basin				
	2020 vs Reference Lake 3		2020 vs Baseline			2020 vs Reference Lake 3		2020 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	1.7	2.8	1.2	1.3	1.3	1.0	1.1	1.3	1.2	1.1
Hardness (as CaCO <sub>3</sub> )	1.8	2.8	1.3	1.2	1.2	1.0	1.1	1.5	1.1	1.1
Total Suspended Solids (TSS)	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	0.6	1.0
Total Dissolved Solids (TDS)	2.0	2.4	1.1	1.2	1.1	1.2	1.0	1.4	1.1	1.0
Turbidity	6.2	4.6	0.7	0.3	0.8	13	9.7	0.2	1.1	1.2
Alkalinity (as CaCO <sub>3</sub> )	1.3	2.9	1.1	1.1	1.2	0.9	1.1	1.3	1.3	1.0
Total Ammonia	1.0	0.7	0.1	0.1	0.1	1.0	0.7	0.1	0.1	0.1
Nitrate	0.4	2.9	1.1	0.1	0.6	1.9	2.2	0.5	0.4	0.4
Nitrite	0.2	1.0	1.2	0.3	0.8	1.6	1.0	1.6	0.4	1.1
Total Kjeldahl Nitrogen (TKN)	0.7	1.0	0.8	0.3	0.6	1.0	1.0	1.1	0.9	0.9
Dissolved Organic Carbon	0.7	0.7	1.7	1.6	1.5	0.7	0.5	2.0	1.6	1.4
Total Organic Carbon	0.4	1.8	2.3	1.0	3.8	0.6	0.6	2.4	1.9	1.5
Total Phosphorus	1.1	2.1	0.5	0.6	0.9	1.1	1.7	0.9	0.8	0.8
Phenols	1.0	1.0	2.2	1.0	1.0	1.0	1.1	1.6	1.0	1.1
Bromide (Br)	0.5	1.0	0.5	0.3	0.7	1.6	1.0	0.9	0.7	0.4
Chloride (Cl)	3.1	6.9	2.0	2.4	2.4	2.0	2.5	1.5	1.2	1.2
Sulphate (SO <sub>4</sub> )	0.5	1.1	1.3	0.8	1.0	0.5	0.6	2.1	0.9	0.8
Aluminum (Al)	8.3	6.6	0.6	0.3	0.3	21	12	0.5	1.0	1.1
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	1.2	1.0	1.0	1.2	0.5	1.0	1.0	1.0	1.0	0.9
Barium (Ba)	1.1	1.6	1.2	1.1	1.2	0.7	0.7	1.4	1.0	1.0
Beryllium (Be)	0.2	1.0	1.5	0.3	1.0	1.0	1.0	1.1	1.5	2.0
Bismuth (Bi)	0.1	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0
Boron (B)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cadmium (Cd)	0.5	1.0	0.8	0.4	0.7	1.0	1.0	0.2	0.9	0.8
Calcium (Ca)	1.8	2.9	1.3	1.1	1.2	1.0	1.1	1.4	1.0	1.0
Chromium (Cr)	0.3	1.0	1.4	0.2	0.7	1.0	1.0	1.2	1.1	1.1
Cobalt (Co)	1.0	1.0	1.0	0.8	0.7	1.0	1.0	1.0	0.9	0.9
Copper (Cu)	1.3	1.3	1.0	1.0	0.4	0.8	0.8	1.0	0.7	0.7
Iron (Fe)	1.8	1.0	1.2	0.6	0.3	2.2	1.3	1.0	0.9	0.9
Lead (Pb)	1.0	1.0	0.9	0.7	0.7	1.4	1.0	0.9	0.9	0.9
Lithium (Li)	1.0	1.3	0.5	0.3	0.3	1.0	1.0	0.2	0.3	0.4
Magnesium (Mg)	1.8	2.7	1.3	1.2	1.3	1.0	1.1	1.5	1.1	1.1
Manganese (Mn)	5.3	3.5	0.6	1.1	0.2	2.5	1.7	0.5	0.9	1.0
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	1.5	2.1	1.2	1.5	1.4	7.6	1.1	1.6	9.3	1.2
Nickel (Ni)	1.0	1.0	0.9	1.0	0.9	1.0	1.0	1.0	1.0	1.0
Potassium (K)	1.0	1.3	1.1	1.5	1.5	0.7	0.7	1.2	1.2	1.2
Selenium (Se)	0.1	1.0	2.8	0.1	1.8	1.0	1.0	1.2	1.4	1.9
Silicon (Si)	1.3	1.5	1.2	1.0	0.8	1.1	1.0	1.2	1.0	1.1
Silver (Ag)	1.0	1.0	1.6	1.8	1.8	1.0	1.0	1.2	1.9	2.3
Sodium (Na)	2.7	4.5	1.6	2.9	2.1	1.4	1.7	1.5	1.6	1.6
Strontium (Sr)	1.2	2.0	1.4	1.4	1.4	0.7	0.9	1.2	1.0	0.9
Thallium (Tl)	0.1	1.0	1.6	0.1	1.0	1.0	1.0	1.1	1.5	2.1
Tin (Sn)	1.0	1.0	0.1	0.0	0.0	1.0	1.0	0.2	0.1	0.1
Titanium (Ti)	0.1	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0
Uranium (U)	3.9	10	1.5	1.5	1.5	2.2	2.9	1.8	1.5	1.4
Vanadium (V)	0.5	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0
Zinc (Zn)	1.0	1.0	1.6	1.6	-	1.3	1.0	1.7	1.8	1.4

- 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 greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.70: Dissolved Metal Concentrations at Mary Lake North Basin Water Quality Monitoring Stations, Mary River Project CREMP, 2020

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
			19-Apr-20	19-Apr-20	19-Apr-20	19-Apr-20	19-Apr-20	19-Apr-20	30-Jul-20	30-Jul-20	30-Jul-20	30-Jul-20	30-Jul-20	30-Jul-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20	27-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	0.0041	0.0060	0.0058	0.0067	<0.0030	0.0097	0.0085	0.0070	0.0078	0.0580	0.0078	0.0063	0.0047	0.0045	0.0049	0.005	0.0045
	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	0.0136	0.0145	0.0144	0.0154	0.0144	0.0150	0.00454	0.00809	0.00617	0.00816	0.00800	0.00807	0.011	0.011	0.0106	0.0107	0.0105	0.0108
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	30.1	30.4	30.0	31.1	30.6	31.8	8.11	14.8	11.7	14.8	14.3	14.3	22.2	21.5	21.1	21.2	21.4	21.8
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<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	0.00078	0.00126	0.00124	0.00124	0.00125	0.00119	0.00055	0.00091	0.00071	0.00088	0.00089	0.00087	0.00102	0.00096	0.00098	0.00097	0.00095	0.00096
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.049	0.013	0.010	0.014	0.011	0.012	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	0.0013	0.0014	0.0014	0.0013	0.0014	0.0016	<0.0010	0.0010	<0.0010	0.0010	0.0010	<0.0010	0.0013	0.0013	0.0013	0.0013	0.0013	0.0013
	Magnesium (Mg)	mg/L	18.3	19.3	18.9	20.2	19.4	19.5	4.61	8.29	6.62	8.34	8.13	8.21	12.7	12.7	12.9	12.8	12.9	12.5
	Manganese (Mn)	mg/L	0.00187	0.000444	0.000494	0.000395	0.000501	0.000403	0.00207	0.00074	0.00030	0.00065	0.00080	0.00073	0.000548	0.000448	0.000423	0.000364	0.000464	0.000479
	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	0.000307	0.000393	0.000383	0.000396	0.000397	0.000393	0.000126	0.000236	0.000180	0.000232	0.000238	0.000233	0.00031	0.000323	0.000311	0.000318	0.000313	0.000306
	Nickel (Ni)	mg/L	0.00074	0.00077	0.00075	0.00079	0.00075	0.00073	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050
	Potassium (K)	mg/L	1.32	1.40	1.38	1.47	1.41	1.45	0.585	0.941	0.777	0.959	0.941	0.953	1.17	1.13	1.16	1.16	1.18	1.14
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	2.16	1.37	1.39	1.41	1.39	1.39	0.633	0.635	0.553	0.615	0.615	0.633	0.700	0.710	0.720	0.700	0.700	0.700
	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	6.55	6.90	6.78	7.19	6.85	6.97	1.15	2.87	1.98	2.80	2.74	2.75	4.43	4.38	4.46	4.40	4.39	4.38
	Strontium (Sr)	mg/L	0.0218	0.0225	0.0231	0.0231	0.0226	0.0230	0.00580	0.0117	0.00855	0.0118	0.0115	0.0115	0.0165	0.0165	0.0161	0.0163	0.0163	0.0161
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00366	0.00480	0.00462	0.00482	0.00470	0.00482	0.000428	0.00147	0.000947	0.00146	0.00145	0.00147	0.00343	0.00343	0.00338	0.00339	0.00346	0.00341
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	0.0082	<0.0030	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	<0.0010	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

**Table C.71: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Mary Lake and Reference Lake 3 in 2020, and at Mary Lake Between 2020 and the Baseline Period**

Dissolved Metal	Mary Lake North Basin					Mary Lake South Basin				
	2020 vs Reference Lake 3		2020 vs Baseline			2020 vs Reference Lake 3		2020 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	1.3	1.2	0.4	1.4	1.0	1.2	3.1	0.5	1.3	2.8
Antimony (Sb)	1.0	1.0	0.8	0.8	1.0	1.0	1.0	0.8	0.8	1.0
Arsenic (As)	1.0	1.0	0.8	0.9	1.0	1.0	1.0	0.8	0.9	1.0
Barium (Ba)	1.2	1.7	1.6	0.8	2.4	0.7	0.8	0.8	0.5	1.1
Beryllium (Be)	0.2	1.0	1.0	0.3	2.1	1.0	1.0	1.0	1.4	2.1
Bismuth (Bi)	0.1	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0
Boron (B)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cadmium (Cd)	0.5	1.0	0.8	0.3	1.0	1.0	1.0	0.8	0.5	1.0
Calcium (Ca)	1.9	3.0	1.8	0.7	1.4	1.0	1.1	0.8	0.4	0.5
Chromium (Cr)	0.2	1.0	1.3	0.3	2.1	1.0	1.0	1.3	1.7	2.1
Cobalt (Co)	1.0	1.0	0.8	0.8	1.0	1.0	1.0	0.8	0.8	1.0
Copper (Cu)	1.2	1.3	0.8	0.6	1.3	0.8	0.8	0.6	0.4	0.7
Iron (Fe)	0.6	1.0	0.9	0.6	1.8	1.0	1.0	0.9	1.1	1.8
Lead (Pb)	1.0	1.0	1.0	0.8	1.0	1.0	1.0	1.0	0.8	1.0
Lithium (Li)	1.0	1.3	0.3	0.3	0.6	1.0	1.0	0.2	0.3	0.4
Magnesium (Mg)	1.7	2.6	1.9	0.7	1.4	1.0	1.0	0.8	0.4	0.6
Manganese (Mn)	3.9	3.3	0.5	0.6	0.1	2.8	1.8	0.3	0.4	0.1
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	1.6	2.0	1.6	0.8	1.8	1.0	1.1	1.0	0.5	1.0
Nickel (Ni)	1.0	1.0	1.2	0.7	0.9	1.0	1.0	0.8	0.7	0.9
Potassium (K)	1.0	1.2	1.7	1.0	1.5	0.6	0.7	1.0	0.6	0.9
Selenium (Se)	0.1	1.0	-	0.5	-	1.0	1.0	-	-	-
Silicon (Si)	1.3	1.4	1.7	0.7	0.8	0.9	0.9	0.7	0.5	0.5
Silver (Ag)	1.0	1.0	0.2	1.8	2.5	1.0	1.0	0.2	1.8	2.5
Sodium (Na)	2.6	4.3	4.0	1.1	2.1	1.4	1.6	1.3	0.6	0.8
Strontium (Sr)	1.2	2.0	2.1	0.9	1.7	0.7	0.9	1.1	0.5	0.7
Thallium (Tl)	0.1	1.0	1.0	0.1	2.5	1.0	1.0	1.0	1.4	2.5
Tin (Sn)	1.0	1.0	0.0	0.2	0.4	1.0	1.0	0.0	0.2	0.4
Titanium (Ti)	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
Uranium (U)	4.0	10	2.3	0.6	2.3	2.2	2.8	0.7	0.3	0.6
Vanadium (V)	0.5	1.0	0.8	0.5	1.0	1.0	1.0	0.8	0.9	1.0
Zinc (Zn)	0.4	1.0	2.1	0.5	1.2	1.0	1.1	1.9	1.3	1.3

	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 $\geq 10$ times higher than respective mean reference or baseline period value).
	Denotes differences in method detection limit between the 2020 and baseline data, precluding an evaluation of magnitude of elevation.



Table C.72: Water Chemistry at Mary Lake South Basin (BLO) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					21-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20	21-Apr-20	19-Apr-20	19-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20	20-Apr-20
Conventionals	Conductivity (lab)	umho/cm	-	-	123	131	125	130	130	133	124	138	123	131	122	132	128	133
	pH (lab)	pH	6.5 - 9.0	-	7.70	7.73	7.56	7.67	7.68	7.68	7.65	7.71	7.61	7.72	7.42	7.66	7.60	7.68
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	65.4	68.1	65.5	68.2	69.5	69.4	65.2	71	63.5	66.2	62.4	63.9	64.9	67.8
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	82	95	91	102	91	89	83	96	66	79	73	78	77	82
	Turbidity	NTU	-	-	<0.10	<0.10	0.14	<0.10	0.12	0.12	<0.10	0.10	0.13	0.12	0.18	<0.10	<0.10	0.10
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	57	59	59	60	60	61	56	62	58	62	56	62	59	61
Nutrients and Organics	Total Ammonia	mg/L	variable <sup>c</sup>	0.855	<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
	Nitrate	mg/L	3	3	0.044	0.049	0.051	0.048	0.042	0.050	0.043	0.052	0.057	0.068	0.079	0.046	0.050	0.051
	Nitrite	mg/L	0.06	0.06	<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
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	0.20	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.23
	Dissolved Organic Carbon	mg/L	-	-	3.00	3.14	3.18	3.20	3.19	2.84	3.51	3.36	3.02	3.11	2.63	2.96	2.99	3.05
	Total Organic Carbon	mg/L	-	-	3.86	4.16	3.84	4.21	3.87	4.04	3.34	3.36	3.24	3.46	3.22	3.39	3.22	3.63
	Total Phosphorus	mg/L	0.020 <sup>d</sup>	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0033	<0.0030	<0.0030
	Phenols	mg/L	0.004 <sup>d</sup>	-	0.0023	0.0026	0.0022	0.0025	0.0026	0.0019	<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	4.33	4.63	4.36	4.60	4.64	4.70	4.35	4.96	4.34	4.67	4.47	4.63	4.48	4.69
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	3.73	3.95	3.74	3.97	4.01	4.03	3.47	3.94	3.72	3.99	3.66	3.99	3.88	4.04
Total Metals	Aluminum (Al)	mg/L	0.100	0.130	0.0057	0.0052	0.0064	0.0058	0.0053	0.0088	0.0049	0.0037	0.0060	0.0055	0.0085	0.0053	0.0063	0.0081
	Antimony (Sb)	mg/L	0.020 <sup>d</sup>	-	<0.00010	<0.00010	<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	-	-	0.00671	0.00739	0.00675	0.00699	0.00694	0.00706	0.00662	0.00698	0.00663	0.00710	0.00706	0.00720	0.00702	0.00731
	Beryllium (Be)	mg/L	0.011 <sup>d</sup>	-	<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
	Bismuth (Bi)	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
	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	<0.000010	<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
	Calcium (Ca)	mg/L	-	-	12.7	13.0	13.0	13.1	13.6	13.3	12.4	13.6	12.4	12.7	12.3	12.6	13.0	13.6
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>d</sup>	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	0.00072	0.00080	0.00071	0.00074	0.00073	0.00077	0.00078	0.00075	0.00071	0.00074	0.00070	0.00074	0.00075	0.00078
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	-	-	7.73	8.46	7.64	7.84	7.91	8.16	7.97	8.26	7.10	7.65	7.34	7.56	7.50	7.81
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.000413	0.000394	0.000822	0.000322	0.000364	0.000416	0.000521	0.00103	0.000514	0.000318	0.000913	0.000351	0.000398	0.000428
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000061	0.0000052	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000223	0.000230	0.000217	0.000235	0.000243	0.000241	0.000215	0.000228	0.000254	0.000276	0.000230	0.000264	0.000263	0.000275
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00052	<0.00050	<0.00050	<0.00050	<0.00050	0.00052	<0.00050	<0.00050	0.00051	<0.00050	<0.00050	<0.00050	0.00051
	Potassium (K)	mg/L	-	-	0.79	0.87	0.79	0.82	0.82	0.82	0.79	0.86	0.83	0.88	0.84	0.89	0.88	0.92
	Selenium (Se)	mg/L	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	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.58	0.60	0.60	0.59	0.56	0.59	0.58	0.61	0.58	0.60	0.79	0.60	0.59	0.60
	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	-	-	1.99	2.19	1.98	2.08	2.12	2.11	2.11	2.22	2.00	2.12	2.09	2.11	2.13	2.21
	Strontium (Sr)	mg/L	-	-	0.0111	0.0117	0.0112	0.0113	0.0118	0.0120	0.0109	0.0121	0.0106	0.0119	0.0102	0.0116	0.0117	0.0122
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<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
	Uranium (U)	mg/L	0.015	-	0.00133	0.00140	0.00129	0.00137	0.00139	0.00141	0.00126	0.00138	0.00131	0.00137	0.00121	0.00139	0.00139	0.00140
	Vanadium (V)	mg/L	0.006 <sup>d</sup>	0.006	<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
	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.

<sup>a</sup> 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.

<sup>b</sup> 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 (BLO) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	31-Jul-20	31-Jul-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20	01-Aug-20
Conventional	Conductivity (lab)	umho/cm	-	-	76.5	76.1	76.2	77.1	79.4	93.3	73.2	78.0	73.1	79.9	70.1	78.4	78.9	79.0
	pH (lab)	pH	6.5 - 9.0	-	7.54	7.72	7.52	7.72	7.63	7.82	7.55	7.89	7.45	7.81	7.44	7.75	7.61	7.72
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	32.9	34.6	33.8	34.3	35	41.6	31.5	35.3	31.1	34.1	29.9	33.7	33.8	33.6
	Total Suspended Solids (TSS)	mg/L	-	-	2.1	<2.0	2.1	<2.0	2.1	2.5	2.1	<2.0	2.5	<2.0	2.2	<2.0	3.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	47	52	43	48	53	63	38	46	53	53	49	51	47	51
	Turbidity	NTU	-	-	3.12	1.73	1.83	1.75	3.33	4.09	1.47	1.13	1.96	1.03	1.80	1.38	1.83	1.50
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	40	40	44	44	41	55	42	44	39	38	40	45	43	41
Nutrients and Organics	Total Ammonia	mg/L	variable <sup>c</sup>	0.855	<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
	Nitrate	mg/L	3	3	0.039	0.021	0.024	0.021	0.039	0.043	0.025	<0.020	<0.10	<0.10	0.030	0.020	<0.020	0.022
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.025	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
	Dissolved Organic Carbon	mg/L	-	-	2.09	1.95	2.24	2.11	1.39	2.28	2.06	2.36	2.68	1.90	2.50	2.65	2.46	2.57
	Total Organic Carbon	mg/L	-	-	2.91	3.06	2.81	3.07	3.13	3.21	2.94	2.02	2.84	3.10	2.94	3.12	3.20	3.03
	Total Phosphorus	mg/L	0.020 <sup>d</sup>	-	0.0042	0.0035	0.0051	<0.0030	0.0072	0.0047	0.0043	0.0032	0.0072	0.0043	0.0047	0.0049	0.0050	0.0045
	Phenols	mg/L	0.004 <sup>a</sup>	-	<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	<0.50	<0.50	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	3.01	2.63	2.66	2.67	2.79	3.34	2.57	2.59	2.6	3.3	2.38	2.64	2.63	2.64
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	1.94	1.86	1.84	1.81	2.00	2.46	1.51	1.60	1.7	1.9	1.68	1.81	1.83	1.84
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.0887	0.0635	0.0639	0.0700	0.114	<b>0.131</b>	0.0124	0.0391	0.0684	0.0346	0.0743	0.0435	0.0520	0.0512
	Antimony (Sb)	mg/L	0.020 <sup>d</sup>	-	<0.00010	<0.00010	<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	-	-	0.00489	0.00453	0.00429	0.00474	0.00507	0.00602	0.00384	0.00465	0.00416	0.00444	0.00449	0.00444	0.00446	0.00482
	Beryllium (Be)	mg/L	0.011 <sup>d</sup>	-	<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
	Bismuth (Bi)	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
	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	<0.000010	<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
	Calcium (Ca)	mg/L	-	-	7.21	7.22	6.48	6.80	7.67	8.22	6.38	7.01	6.54	6.94	6.16	6.69	7.45	6.99
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>a</sup>	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	0.00064	0.00057	0.00057	0.00060	0.00064	0.00074	<0.00050	0.00060	0.00057	0.00056	0.00063	0.00057	0.00056	0.00057
	Iron (Fe)	mg/L	0.30	0.326	0.103	0.061	0.057	0.066	0.095	0.110	<0.030	0.041	0.074	0.042	0.074	0.052	0.051	0.052
	Lead (Pb)	mg/L	0.001	0.001	0.000101	0.000061	0.000066	0.000059	0.000107	0.000109	<0.000050	<0.000050	0.000084	<0.000050	0.000080	0.000060	0.000061	0.000053
	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	-	-	4.03	4.08	3.83	4.19	4.15	4.94	4.08	4.40	3.48	4.11	3.69	4.12	3.99	4.17
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00269	0.00177	0.00223	0.00197	0.00246	0.00249	0.000527	0.00184	0.00240	0.00175	0.00274	0.00178	0.00171	0.00177
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	0.0000051	0.0000053	<0.0000050	0.0000063	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000052	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000130	0.000143	0.000114	0.000135	0.000148	0.000193	0.0122	0.000114	0.000121	0.000125	0.000113	0.000132	0.000139	0.000131
	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	-	-	0.59	0.57	0.54	0.58	0.60	0.72	0.53	0.58	0.50	0.55	0.54	0.56	0.54	0.58
	Selenium (Se)	mg/L	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	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.57	0.53	0.52	0.59	0.64	0.71	0.45	0.45	0.55	0.44	0.53	0.49	0.50	0.46
	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	-	-	1.26	1.27	1.17	1.35	1.38	1.74	1.28	1.34	1.06	1.24	1.13	1.27	1.20	1.30
	Strontium (Sr)	mg/L	-	-	0.00635	0.00644	0.00556	0.00614	0.00708	0.00813	0.00530	0.00584	0.00591	0.00591	0.00555	0.00618	0.00658	0.00609
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<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
	Uranium (U)	mg/L	0.015	-	0.000755	0.000721	0.000583	0.000681	0.000864	0.00113	0.000505	0.000642	0.000639	0.000648	0.000574	0.000689	0.000728	0.000686
	Vanadium (V)	mg/L	0.006 <sup>a</sup>	0.006	<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
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	0.0136	<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.

<sup>a</sup> 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.

<sup>b</sup> 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 (BLO) Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	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
					28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20	28-Aug-20
Conventionals	Conductivity (lab)	umho/cm	-	-	89.2	88.9	87.8	87.4	88.4	88	83.3	84.1	89.1	88.2	91.1	87.8	87.9	88.4
	pH (lab)	pH	6.5 - 9.0	-	7.76	7.78	7.81	7.75	7.78	7.79	7.73	7.75	7.76	7.76	7.7	7.75	7.73	7.39
	Hardness (as CaCO <sub>3</sub> )	mg/L	-	-	42.2	41.5	41.9	41.5	42.6	42.3	39.5	38.9	40.1	41.0	41.3	41.0	40.6	40.8
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	2.0	3.2
	Total Dissolved Solids (TDS)	mg/L	-	-	49	52	57	57	52	45	46	58	58	56	48	50	52	50
	Turbidity	NTU	-	-	1.45	1.44	1.56	1.56	1.49	1.59	0.63	0.63	1.41	1.60	1.69	1.45	1.67	1.60
	Alkalinity (as CaCO <sub>3</sub> )	mg/L	-	-	40	38	38	39	38	38	36	37	37	38	39	38	38	40
Nutrients and Organics	Total Ammonia	mg/L	variable <sup>c</sup>	0.855	<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
	Nitrate	mg/L	3	3	0.038	0.037	0.036	0.051	0.041	0.054	<0.020	0.027	0.054	0.039	0.084	0.036	0.05	0.038
	Nitrite	mg/L	0.06	0.06	<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
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	0.15
	Dissolved Organic Carbon	mg/L	-	-	1.75	1.83	1.72	1.69	1.88	1.82	1.89	2.03	2.18	1.86	1.84	2.18	1.81	1.66
	Total Organic Carbon	mg/L	-	-	2.21	2.16	2.19	2.09	2.41	2.31	2.23	2.61	2.17	2.20	2.23	2.40	2.33	2.07
	Total Phosphorus	mg/L	0.020 <sup>d</sup>	-	<0.0030	<0.0030	0.0032	<0.0030	0.0041	0.0061	0.0093	<0.0030	0.0067	0.0049	0.0031	0.0049	0.0045	0.0124
	Phenols	mg/L	0.004 <sup>d</sup>	-	0.0014	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0016	<0.0010	<0.0010	0.0012	0.0013	0.0013	<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	3.40	3.39	3.33	3.37	3.37	3.39	2.99	3.00	3.35	3.47	4.43	3.35	3.38	3.37
	Sulphate (SO <sub>4</sub> )	mg/L	218 <sup>β</sup>	218	2.40	2.41	2.34	2.39	2.41	2.64	1.77	1.76	2.35	2.44	2.74	2.37	2.37	2.38
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.0459	0.0459	0.03	0.0432	0.0489	0.035	0.0178	0.0165	0.0357	0.0356	0.044	0.0502	0.0421	0.0459
	Antimony (Sb)	mg/L	0.020 <sup>d</sup>	-	<0.00010	<0.00010	<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	0.00011	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00523	0.0053	0.00507	0.0052	0.00522	0.00507	0.00441	0.00445	0.00515	0.00529	0.00543	0.00509	0.00504	0.00527
	Beryllium (Be)	mg/L	0.011 <sup>d</sup>	-	<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
	Bismuth (Bi)	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
	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	<0.000010	<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
	Calcium (Ca)	mg/L	-	-	7.97	8.07	7.95	7.93	8.08	8.00	7.51	7.52	7.98	7.95	8.27	8.08	7.93	7.91
	Chromium (Cr)	mg/L	0.0089	0.0089	<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 <sup>d</sup>	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	0.00061	0.0006	0.00057	0.0006	0.00059	0.00055	0.00057	0.00053	0.00058	0.00059	0.0007	0.0006	0.00058	0.00062
	Iron (Fe)	mg/L	0.30	0.326	0.044	0.04	0.034	0.038	0.045	0.037	<0.030	<0.030	0.042	0.037	0.048	0.046	0.044	0.047
	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	0.00005	<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	-	-	4.91	5.03	4.93	5.08	4.97	5.01	4.64	4.72	5.03	4.92	5.23	4.96	4.81	5.02
	Manganese (Mn)	mg/L	0.935 <sup>β</sup>	-	0.00124	0.00113	0.00105	0.00108	0.00127	0.00106	0.0011	0.000787	0.00118	0.00112	0.00148	0.00116	0.00126	0.00125
	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	-	0.000171	0.000182	0.00017	0.000179	0.000184	0.000164	0.000144	0.000152	0.000173	0.000177	0.000194	0.000185	0.000166	0.000183
	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	-	-	0.63	0.65	0.63	0.65	0.65	0.63	0.57	0.57	0.64	0.64	0.64	0.64	0.62	0.64
	Selenium (Se)	mg/L	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	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.51	0.50	0.47	0.53	0.49	0.48	0.43	0.46	0.48	0.48	0.53	0.51	0.47	0.50
	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	-	-	1.63	1.62	1.60	1.65	1.57	1.61	1.49	1.46	1.65	1.59	1.64	1.63	1.59	1.63
	Strontium (Sr)	mg/L	-	-	0.00709	0.00725	0.00711	0.00709	0.00727	0.00711	0.00626	0.00621	0.00714	0.00713	0.0075	0.00707	0.00698	0.00713
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	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	-	-	<0.010	<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
	Uranium (U)	mg/L	0.015	-	0.00101	0.00102	0.000984	0.000981	0.00101	0.000974	0.000762	0.000744	0.000994	0.000983	0.00109	0.00102	0.000973	0.000984
	Vanadium (V)	mg/L	0.006 <sup>d</sup>	0.006	<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
	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.

<sup>a</sup> 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.

<sup>b</sup> 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 Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Winter Sampling Event													
			BL0-05-A bottom 21-Apr-20	BL0-05-A surface 21-Apr-20	BL0-05 bottom 21-Apr-20	BL0-05 surface 21-Apr-20	BL0-05-B bottom 21-Apr-20	BL0-05-B surface 21-Apr-20	BL0-03 bottom 19-Apr-20	BL0-03 surface 19-Apr-20	BL0-04 bottom 20-Apr-20	BL0-04 surface 20-Apr-20	BL0-09 bottom 20-Apr-20	BL0-09 surface 20-Apr-20	BL0-06 bottom 20-Apr-20	BL0-06 surface 20-Apr-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0081	0.0048	0.0046	0.0051	0.0076	0.0041	0.0037	0.0031	0.0045	0.0038	0.0097	0.0091	0.0060	0.0045
	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	0.00706	0.00726	0.00711	0.00742	0.00750	0.00744	0.00665	0.00762	0.00679	0.00709	0.00708	0.00730	0.00699	0.00721
	Beryllium (Be)	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
	Bismuth (Bi)	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
	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	<0.000010	<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
	Calcium (Ca)	mg/L	13.1	13.8	12.9	13.5	13.9	13.8	13.1	14.1	13.2	14.1	13.0	13.2	13.7	14.2
	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
	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	0.00079	0.00082	0.00076	0.00081	0.00084	0.00081	0.00074	0.00080	0.00073	0.00157	0.00081	0.00080	0.00076	0.00076
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000102	0.000055	<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	7.93	8.21	8.05	8.37	8.44	8.48	7.89	8.68	7.42	7.53	7.30	7.54	7.48	7.85
	Manganese (Mn)	mg/L	0.000436	0.000302	0.000541	0.000298	0.000328	0.000281	0.000300	0.000847	0.000348	0.000239	0.000696	0.000386	0.000310	0.000306
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	0.0000051	<0.0000050	<0.0000050	<0.0000050	0.0000054	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000223	0.000234	0.000229	0.000254	0.000247	0.000252	0.000204	0.000242	0.000253	0.000257	0.000256	0.000258	0.000266	0.000268
	Nickel (Ni)	mg/L	<0.00050	<0.00050	<0.00050	0.00053	0.00054	0.00051	<0.00050	<0.00050	<0.00050	<0.00050	0.00051	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	0.81	0.84	0.81	0.87	0.87	0.87	0.78	0.88	0.84	0.87	0.85	0.91	0.87	0.91
	Selenium (Se)	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
	Silicon (Si)	mg/L	0.57	0.59	0.60	0.61	0.60	0.60	0.57	0.63	0.58	0.59	0.78	0.62	0.58	0.59
	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	2.07	2.18	2.08	2.20	2.17	2.20	2.03	2.27	2.10	2.14	2.10	2.18	2.08	2.22
	Strontium (Sr)	mg/L	0.0114	0.0118	0.0115	0.0120	0.0121	0.0119	0.0110	0.0119	0.0103	0.0116	0.0104	0.0119	0.0116	0.0120
	Thallium (Tl)	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
	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	<0.010	<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
	Uranium (U)	mg/L	0.00138	0.00143	0.00132	0.00144	0.00145	0.00145	0.00130	0.00146	0.00135	0.00144	0.00127	0.00148	0.00142	0.00147
	Vanadium (V)	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
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0107	<0.0030	<0.0030

**Table C.73: Dissolved Metal Concentrations at Mary Lake South Basin Water Quality Monitoring Stations, Mary River Project CREMP, 2020**

Parameters		Units	Summer Sampling Event													
			BL0-05-A bottom 01-Aug-20	BL0-05-A surface 01-Aug-20	BL0-05 bottom 01-Aug-20	BL0-05 surface 01-Aug-20	BL0-05-B bottom 01-Aug-20	BL0-05-B surface 01-Aug-20	BL0-03 bottom 31-Jul-20	BL0-03 surface 31-Jul-20	BL0-04 bottom 01-Aug-20	BL0-04 surface 01-Aug-20	BL0-09 bottom 01-Aug-20	BL0-09 surface 01-Aug-20	BL0-06 bottom 01-Aug-20	BL0-06 surface 01-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0143	0.0132	0.0155	0.0163	0.0126	0.0196	0.0357	0.0111	0.0137	0.0103	0.0141	0.0097	0.0127	0.0119
	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	0.00423	0.00407	0.00414	0.00417	0.00446	0.00545	0.00398	0.00444	0.00394	0.00409	0.00385	0.00406	0.00416	0.00415
	Beryllium (Be)	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
	Bismuth (Bi)	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
	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	<0.000010	<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
	Calcium (Ca)	mg/L	6.41	7.03	6.85	6.96	7.14	8.54	6.39	6.71	6.30	6.94	6.00	6.94	6.90	6.72
	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	<0.00050	0.00050	0.00051	0.00051	0.00057	0.00111	0.00051	0.00058	<0.00050	0.00051	<0.00050	0.00051	0.00052	0.00052
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.044	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	4.09	4.14	4.05	4.11	4.18	4.92	3.77	4.51	3.73	4.08	3.63	3.98	4.04	4.09
	Manganese (Mn)	mg/L	0.000621	0.000492	0.000469	0.000469	0.000545	0.000601	0.00239	0.000416	0.000634	0.000362	0.000595	0.000410	0.000422	0.000409
	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	0.000128	0.000145	0.000134	0.000133	0.000148	0.000206	0.000093	0.000109	0.000126	0.000128	0.000110	0.000131	0.000130	0.000132
	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	0.55	0.54	0.54	0.55	0.58	0.68	0.49	0.63	0.51	0.53	0.50	0.54	0.55	0.56
	Selenium (Se)	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
	Silicon (Si)	mg/L	0.44	0.42	0.42	0.43	0.45	0.49	0.45	0.39	0.43	0.39	0.43	0.40	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	1.28	1.27	1.23	1.27	1.40	1.71	1.14	1.36	1.13	1.26	1.07	1.26	1.32	1.27
	Strontium (Sr)	mg/L	0.00581	0.00604	0.00600	0.00599	0.00657	0.00817	0.00538	0.00562	0.00569	0.00609	0.00549	0.00609	0.00599	0.00578
	Thallium (Tl)	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
	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	<0.010	<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
	Uranium (U)	mg/L	0.000642	0.000688	0.000687	0.000682	0.000804	0.00113	0.000596	0.000583	0.000582	0.000661	0.000551	0.000682	0.000658	0.000630
	Vanadium (V)	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
	Zinc (Zn)	mg/L	<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

Table C.73: Dissolved Metal Concentrations at Mary Lake South Basin Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Fall Sampling Event													
			BL0-05-A bottom 28-Aug-20	BL0-05-A surface 28-Aug-20	BL0-05 bottom 28-Aug-20	BL0-05 surface 28-Aug-20	BL0-05-B bottom 28-Aug-20	BL0-05-B surface 28-Aug-20	BL0-03 bottom 28-Aug-20	BL0-03 surface 28-Aug-20	BL0-04 bottom 28-Aug-20	BL0-04 surface 28-Aug-20	BL0-09 bottom 28-Aug-20	BL0-09 surface 28-Aug-20	BL0-06 bottom 28-Aug-20	BL0-06 surface 28-Aug-20
Dissolved Metals	Aluminum (Al)	mg/L	0.0141	0.0169	0.0105	0.0142	0.0144	0.012	0.0063	0.0065	0.0142	0.0175	0.0148	0.016	0.0118	0.0161
	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	0.00508	0.00508	0.00507	0.00488	0.00489	0.00509	0.00442	0.00434	0.00486	0.00499	0.0051	0.00478	0.00505	0.00481
	Beryllium (Be)	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
	Bismuth (Bi)	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
	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	<0.000010	<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
	Calcium (Ca)	mg/L	8.11	8.19	8.16	8.04	8.51	8.25	7.74	7.57	7.93	8.14	7.99	8.20	8.06	8.15
	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	0.00054	0.00056	0.0006	0.00057	0.00056	0.00054	0.0005	0.00052	0.00054	0.00057	0.00058	0.00055	0.00056	0.00057
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	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	5.33	5.12	5.23	5.20	5.19	5.26	4.91	4.86	4.92	5.02	5.17	4.98	4.97	4.96
	Manganese (Mn)	mg/L	0.000321	0.000327	0.000225	0.000298	0.000193	0.000246	0.000141	0.000182	0.000245	0.000248	0.000205	0.000227	0.00034	0.000208
	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	0.000178	0.000183	0.000179	0.00019	0.000178	0.000183	0.000143	0.000139	0.000181	0.000181	0.000188	0.00018	0.000185	0.000175
	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	0.66	0.73	0.66	0.73	0.67	0.73	0.58	0.62	0.63	0.73	0.65	0.74	0.66	0.74
	Selenium (Se)	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
	Silicon (Si)	mg/L	0.46	0.47	0.45	0.46	0.45	0.47	0.43	0.42	0.44	0.43	0.46	0.44	0.45	0.47
	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	1.74	1.73	1.71	1.73	1.77	1.71	1.54	1.56	1.65	1.67	1.76	1.63	1.67	1.62
	Strontium (Sr)	mg/L	0.00724	0.00727	0.00715	0.00721	0.00727	0.00709	0.00623	0.00619	0.00707	0.00712	0.00729	0.00711	0.00719	0.00719
	Thallium (Tl)	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
	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	<0.010	<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
	Uranium (U)	mg/L	0.00099	0.000976	0.000962	0.000972	0.000986	0.000955	0.000743	0.000739	0.000949	0.000963	0.00103	0.000973	0.000932	0.000945
	Vanadium (V)	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
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0072	<0.0030	<0.0030	<0.0030	<0.0030

**APPENDIX D**

**SEDIMENT QUALITY DATA**

**Table D.1: Deposited Sediment Field Observations and Collection Details at Unnamed Reference Creek<sup>a</sup>, Mary River Project CREMP, August 2020**

Station	Visually Assessed Texture Observations	Presence of Silt Precipitate
REF-CRK-1	medium (sized) course sand	none observed
REF-CRK-3	medium (sized) course sand	none observed
REF-CRK-5	medium (sized) course sand	none observed

<sup>a</sup> Deposited sediment samples were collected using a stainless steel spoon.



**Table D.2: Deposited Sediment Total Organic Carbon and Metal Concentrations at Unnamed Reference Creek (REF-CRK), Mary River Project CREMP, August 2020**

Parameter	Units	SQG <sup>a</sup>	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 <sup>α</sup>	<0.10	<0.10	0.16	0.12	0.035	0.020
Aluminum (Al)	µg/g	-	482	473	797	584	185	107
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.13	0.18	0.34	0.22	0.11	0.06
Barium (Ba)	µg/g	-	2.18	2.44	3.54	2.72	0.722	0.417
Beryllium (Be)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	<5.0	<5.0	<5.0	<5.0	0	0
Cadmium (Cd)	µg/g	3.5	<0.020	<0.020	<0.020	<0.020	0	0
Calcium (Ca)	µg/g	-	342	358	781	494	249	144
Chromium (Cr)	µg/g	90	1.82	9.25	12.3	7.79	5.39	3.11
Cobalt (Co)	µg/g	-	0.350	1.06	1.45	0.953	0.558	0.322
Copper (Cu)	µg/g	197	0.570	0.830	2.24	1.21	0.899	0.519
Iron (Fe)	µg/g	40,000 <sup>α</sup>	1,880	14,700	20,900	12,493	9,700	5,600
Lead (Pb)	µg/g	91.3	0.870	1.70	1.90	1.49	0.546	0.315
Lithium (Li)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Magnesium (Mg)	µg/g	-	377	322	632	444	165	95
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	12.3	28.5	41.4	27.4	14.6	8.42
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	<0.0050	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	0.820	1.79	2.66	1.76	0.920	0.531
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	109	111	280	167	98	57
Potassium (K)	µg/g	-	120	100	180	133	42	24
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	<50	<50	<50	<50	0	0
Strontium (Sr)	µg/g	-	1.59	1.80	2.62	2.00	0.544	0.314
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	<0.050	<0.050	<0.050	<0.050	0	0
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	35.3	84.6	130	83.3	47.4	27.3
Uranium (U)	µg/g	-	0.195	0.600	0.643	0.5	0.25	0.14
Vanadium (V)	µg/g	-	2.44	21.0	27.1	16.8	12.8	7.4
Zinc (Zn)	µg/g	315	<2.0	2.7	4.4	3.0	1.2	0.71
Zirconium (Zr)	µg/g	-	1.1	2.5	2.8	2.1	0.91	0.52



Indicates parameter concentration above SQG.

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

<sup>a</sup> 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.3: Field Observations of Sediment Properties at Reference Lake 3 (REF-03) Benthic Stations<sup>a</sup>, Mary River Project CREMP, August 2020**

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia <sup>b</sup>	Plant or Algal Presence
REF-03-1	10.5	brown silt on top of grey silt	presence of hydrogen sulphide odour	none observed
REF-03-2	10.6	grey silt sand	presence of hydrogen sulphide odour	sparse macrophytes, sparse algae
REF-03-3	10.0	brown grey silt and clay, some sandy material	none detected	none observed
REF-03-4	8.5	brown silt on grey silt	presence of hydrogen sulphide odour	sparse algae
REF-03-5	11.0	brown silt	none detected	sparse algae
REF-03-6	20.5	brown silt	none detected	none observed
REF-03-7	23.0	brown silt	none detected	none observed
REF-03-8	19.0	light brown and orange brown silt	none detected	none observed
REF-03-9	21.0	brown silt, slightly clay-like	none detected	none observed
REF-03-10	19.5	brown silt/clay, some red brown silt	none detected	none observed

<sup>a</sup> Sediment particle size and benthic invertebrate community samples were collected using a petite Ponar.

<sup>b</sup> Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

**Table D.4: Observations from Sediment Cores Collected at Reference Lake 3 (REF-03), Mary River Project CREMP, August 2020**

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
REF-03-1	9.0	Littoral	1	30.0	dark brown unconsolidated silt over dark grey fine sand.
			2	31.0	
			3	27.5	
			4	34.0	
REF-03-6	20.0	Profundal	1	20.5	light brown silt and fine sand over dark brown/grey coarse silt and sand.
			2	22.0	
			3	11.0	
			4	15.0	
REF-03-2	9.0	Littoral	1	37.0	light brown silt over dark grey fine sand.
			2	38.0	
			3	35.0	
			4	33.0	
REF-03-7	23.0	Profundal	1	12.0	light brown mixture of fine sand and silt with orange brown floc present, overlying unconsolidated light brown silt.
			2	17.0	
			3	19.0	
			4	21.0	
REF-03-3	10.0	Littoral	1	25.0	brown unconsolidated silt-sand fines overlying dark grey fine sand.
			2	26.0	
			3	20.0	
			4	19.0	
REF-03-8	18.5	Profundal	1	8.0	brown silt/fine sand (brown) upper layer on top of consolidated light grey sand overlying brown silt/sand.
			2	19.5	
			3	18.5	
			4	20.0	
REF-03-4	8.0	Littoral	1	23.0	light brown silt on top of consolidated dark grey fine sand underlain by light brown silt/sand.
			2	8.0	
			3	16.0	
			4	27.5	
REF-03-9	21.0	Profundal	1	10.5	brown silt, unconsolidated, or red/brown silt with some minor black streaking overlying consolidated grey silt.
			2	9.0	
			3	10.0	
			4	12.0	
REF-03-5	11.0	Littoral	1	30.5	brown unconsolidated silt overlying fine grey sand or dark grey silt/sand unconsolidated floc overlying dark grey silt/sand.
			2	33.5	
			3	26.0	
			4	27.0	
REF-03-10	20.0	Profundal	1	9.0	loose light brown silt overlying consolidated light grey silt.
			2	11.0	
			3	14.0	
			4	16.0	

**Table D.5: Statistical Comparison of Substrate Physical Properties between Littoral and Profundal Sediment Stations of Individual Study Lakes, Mary River Project CREMP, August 2020**


Lake	Habitat Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Station Type	N	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Camp Lake	Sand (% by weight)	tequal	none	NO	0.109	Littoral	5	65.4	20.1	9.0	41.1	85.0
						Profundal	9	41.5	26.8	8.9	17.3	86.8
	Silt (% by weight)	tequal	none	NO	0.156	Littoral	5	32.1	18.2	8.2	14.2	55.1
						Profundal	9	50.6	23.6	7.9	11.8	79.2
	Clay (% by weight)	M-W	rank	YES	0.045	Littoral	5	2.6	2.0	0.9	1.0	5.5
						Profundal	9	7.9	4.7	1.6	1.4	14.7
Sheardown Lake NW	Sand (% by weight)	tequal	log10	YES	0.009	Littoral	7	40.5	24.6	9.3	20.1	93.0
						Profundal	7	17.2	9.3	3.5	8.5	35.3
	Silt (% by weight)	M-W	rank	YES	0.038	Littoral	7	48.6	20.5	7.7	6.4	67.1
						Profundal	7	68.2	9.8	3.7	49.3	78.9
	Clay (% by weight)	M-W	rank	YES	0.073	Littoral	7	10.9	4.7	1.8	1.0	14.8
						Profundal	7	14.6	3.3	1.2	8.8	17.2
Sheardown Lake SE	Sand (% by weight)	tequal	none	NO	0.330	Littoral	5	11.1	6.7	3.0	5.2	21.6
						Profundal	5	15.1	5.3	2.4	8.3	20.7
	Silt (% by weight)	tequal	none	NO	0.383	Littoral	5	75.0	5.5	2.5	68.9	81.5
						Profundal	5	72.2	4.0	1.8	67.5	76.6
	Clay (% by weight)	tequal	none	NO	0.590	Littoral	5	13.9	3.7	1.7	9.4	17.5
						Profundal	5	12.7	2.8	1.2	9.5	15.6
Mary Lake	Sand (% by weight)	tequal	log10	NO	0.839	Littoral	5	1.4	0.8	0.4	0.4	2.3
						Profundal	5	1.1	0.6	0.2	0.2	1.6
	Silt (% by weight)	M-W	rank	NO	0.851	Littoral	4	28.1	34.5	17.2	5.2	78.6
						Profundal	11	21.6	24.7	7.4	2.3	91.9
	Clay (% by weight)	tequal	none	NO	0.458	Littoral	4	53.6	24.0	12.0	18.0	69.9
						Profundal	11	54.9	18.6	5.6	6.0	73.4
	TOC (%)	tequal	none	NO	0.796	Littoral	4	18.3	14.5	7.2	3.4	32.0
						Profundal	11	23.5	10.6	3.2	2.1	33.2
						Littoral	4	0.8	0.5	0.2	0.2	1.3
						Profundal	11	0.7	0.3	0.1	0.2	1.5

Highlighted values indicate significant difference between study areas based on statistical test p-value less than 0.10.

<sup>a</sup> Statistical tests included tequal (t-test assuming equal variance), tunequal (t-test assuming unequal variance), and M-W (Mann-Whitney U-test).

**Table D.6: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Reference Lake 3 (REF-03) Sediment Stations, Mary River Project CREMP, August 2020**

Parameter		Units	Sediment Quality Guideline (SQG) <sup>a</sup>	Reference Lake 3 Station										Study Area 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	%	-	40.4	56.6	23.4	13.9	24.7	55.3	34.5	15.2	24.8	16.8	30.6	15.7	4.97
	Silt	%	-	53.4	36.9	68.4	71.9	61.9	38.4	59.3	71.8	68.2	68.1	59.8	13.05	4.13
	Clay	%	-	6.3	6.5	8.2	14.2	13.4	6.3	6.2	13.0	7.0	15.1	9.6	3.79	1.198
	Moisture	%	-	90.0	78.3	92.3	86.6	87.9	79.4	80.2	84.9	89.2	84.0	85.3	4.79	1.51
	Total Organic Carbon	%	10 <sup>α</sup>	6.95	2.20	6.54	4.30	3.71	2.36	2.26	4.52	4.54	3.71	4.11	1.66	0.525
Metals	Aluminum (Al)	mg/kg	-	15,400	19,000	18,200	24,700	19,300	20,400	16,200	22,300	15,300	22,600	19,340	3,204	1,013
	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	0
	Arsenic (As)	mg/kg	17	4.73	3.66	4.36	4.65	3.67	3.76	2.78	4.03	2.10	4.24	3.80	0.82	0.261
	Barium (Ba)	mg/kg	-	139	98.4	134	143	99.7	108	88.4	129	124	132	120	19.3	6.10
	Beryllium (Be)	mg/kg	-	0.59	0.68	0.74	0.93	0.69	0.77	0.65	0.80	0.56	0.84	0.73	0.11	0.036
	Bismuth (Bi)	mg/kg	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0	0
	Boron (B)	mg/kg	-	11.6	11.9	13.1	16.8	13.2	14.5	11.7	15.1	11.5	15.0	13.4	1.84	0.580
	Cadmium (Cd)	mg/kg	3.5	0.246	0.128	0.184	0.175	0.120	0.144	0.163	0.142	0.150	0.150	0.160	0.0359	0.0114
	Calcium (Ca)	mg/kg	-	6,080	4,410	7,440	5,480	4,820	4,830	4,190	5,180	5,510	5,150	5,309	930	294
	Chromium (Cr)	mg/kg	90	54.9	57.1	57.4	73.0	59.4	59.3	48.6	68.5	51.3	67.3	59.7	7.75	2.45
	Cobalt (Co)	mg/kg	-	10.8	13.2	9.86	17.2	12.8	14.1	11.8	15.6	8.59	15.8	13.0	2.77	0.88
	Copper (Cu)	mg/kg	197	80.0	68.8	89.7	97.6	72.2	77.5	59.8	86.1	55.3	89.2	77.6	13.7	4.32
	Iron (Fe)	mg/kg	40,000 <sup>α</sup>	83,200	39,600	68,900	51,100	41,400	42,100	38,000	45,700	21,500	46,900	47,840	17,136	5,419
	Lead (Pb)	mg/kg	91.3	13.7	14.2	14.3	19.1	14.8	15.8	12.9	17.2	13.1	17.1	15.2	2.03	0.64
	Lithium (Li)	mg/kg	-	23.2	29.3	26.3	38.8	29.6	30.6	26.8	34.4	24.1	35.5	29.9	5.09	1.61
	Magnesium (Mg)	mg/kg	-	11,600	12,500	11,800	16,000	12,500	13,000	10,400	14,800	10,900	14,600	12,810	1,811	573
	Manganese (Mn)	mg/kg	1,100 <sup>α,β</sup>	578	909	413	1,250	790	1,010	866	1,820	246	1,160	904	451	143
	Mercury (Hg)	mg/kg	0.486	0.0730	0.0391	0.0594	0.0689	0.0396	0.0497	0.0269	0.0806	0.0511	0.0530	0.0541	0.0167	0.0053
	Molybdenum (Mo)	mg/kg	-	6.77	2.74	8.95	2.86	2.87	2.40	2.74	2.19	0.87	2.42	3.48	2.43	0.770
	Nickel (Ni)	mg/kg	75 <sup>α,β</sup>	44.5	39.5	41.7	50.9	40.4	41.6	38.5	47.3	35.1	45.7	42.5	4.64	1.47
	Phosphorus (P)	mg/kg	2,000 <sup>α</sup>	1,700	888	1,470	1,000	963	959	810	933	892	999	1,061	287	91
	Potassium (K)	mg/kg	-	3,560	4,660	4,280	6,030	4,760	4,940	4,040	5,590	3,860	5,470	4,719	805	255
	Selenium (Se)	mg/kg	-	1.02	0.40	1.09	0.68	0.58	0.55	0.42	0.89	0.53	0.55	0.67	0.24	0.077
	Silver (Ag)	mg/kg	-	0.17	0.12	0.21	0.26	0.12	0.18	<0.10	0.25	0.11	0.20	0.17	0.058	0.018
	Sodium (Na)	mg/kg	-	283	299	315	413	332	347	259	421	332	366	337	52	17
	Strontium (Sr)	mg/kg	-	11.7	10.5	14.3	13.8	11.3	11.8	9.64	12.9	11.0	12.6	12.0	1.46	0.461
	Sulphur (S)	mg/kg	-	1,700	<1,000	1,900	1,300	1,300	<1,000	<1,000	1,400	1,100	<1,000	1,270	320	101
	Thallium (Tl)	mg/kg	-	0.373	0.470	0.402	0.714	0.437	0.535	0.355	0.637	0.330	0.614	0.487	0.132	0.0418
	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	-	936	1,070	866	1,190	1,030	1,100	1,050	1,170	1,150	1,150	1,071	105	33
	Uranium (U)	mg/kg	-	14.3	15.5	12.5	24.2	10.3	19.5	9.85	16.7	8.13	22.8	15.4	5.48	1.73
	Vanadium (V)	mg/kg	-	52.4	57.7	61.7	70.2	57.2	60.0	51.3	63.4	47.9	65.7	58.8	6.90	2.18
	Zinc (Zn)	mg/kg	315	71.3	73.7	85.7	96.4	74.8	79.3	67.9	82.9	65.8	86.7	78.5	9.56	3.02
	Zirconium (Zr)	mg/kg	-	4.4	3.9	4.9	4.2	3.3	3.5	3.9	3.8	6.0	4.3	4.2	0.78	0.25

 Indicates parameter concentration above Sediment Quality Guideline (SQG).

Note: "-" indicates no SQG applicable.

<sup>a</sup> 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.7: Deposited Sediment Field Sampling Observations from Camp Lake Tributary 1 and Camp Lake Tributary 2<sup>a</sup>, Mary River Project CREMP, August 2020**

Study Area	Station	Texture of Collected Sediment	Silt Presence <sup>b</sup>
<b>Camp Lake Tributary 1 Upstream (North Branch; CLT1 US)</b>	CLT1 US-1	medium (sized) coarse sand	none observed
	CLT1 US-3	medium (sized) sand	none observed
	CLT1 US-5	medium (sized) sand	none observed
<b>Camp Lake Tributary 1 Downstream (Lower Main Stem; CLT1 DS)</b>	CLT1 DS-1	medium (sized) coarse sand	precipitate and deposits (<1 mm )
	CLT1 DS-3	medium (sized) coarse sand	precipitate and deposits (<1 mm )
	CLT1 DS-5	medium (sized) coarse sand	precipitate and deposits (<1 mm )
<b>Camp Lake Tributary 2 Upstream (CLT2 US)</b>	CLT2 US-1	medium (sized) coarse sand	none observed
	CLT2 US-3	medium (sized) coarse sand	none observed
	CLT2 US-5	medium (sized) coarse sand	precipitate and deposits (<1 mm )
<b>Camp Lake Tributary 2 Downstream (CLT2 DS)</b>	CLT2 DS-1	medium (sized) coarse sand	none observed
	CLT2 DS-3	medium (sized) coarse sand	none observed
	CLT2 DS-5	medium (sized) coarse sand	precipitate and deposits (<1 mm )

<sup>a</sup> Sediment samples collected using a stainless steel scoop directly from the streambed or shoreline, as available.

<sup>b</sup> 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.8: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 1 Upstream (CLT1-US) Stations, Mary River Project CREMP, August 2020**

Parameter	Units	SQG <sup>a</sup>	Camp Lake Tributary 1 Upstream Station			Study Area Summary Statistics		
			CLT1-US-1	CLT1-US-3	CLT1-US-5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	1.05	0.94	0.66	0.88	0.20	0.12
Aluminum (Al)	µg/g	-	8,010	7,080	7,080	7,390	537	310
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.82	0.58	0.67	0.69	0.12	0.07
Barium (Ba)	µg/g	-	21.2	17.4	14.8	17.8	3.2	1.9
Beryllium (Be)	µg/g	-	0.32	0.27	0.26	0.28	0.03	0.02
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	10.2	9.2	8.5	9.3	0.9	0.5
Cadmium (Cd)	µg/g	3.5	0.056	0.043	0.042	0.047	0.008	0.005
Calcium (Ca)	µg/g	-	2,890	2,430	2,660	2,660	230	133
Chromium (Cr)	µg/g	90	29.4	25.7	24.9	26.7	2.4	1.4
Cobalt (Co)	µg/g	-	7.36	6.14	5.69	6.40	0.86	0.50
Copper (Cu)	µg/g	197	35.8	22.1	13.8	23.9	11.1	6.41
Iron (Fe)	µg/g	40,000 <sup>α</sup>	29,300	18,200	21,000	22,833	5,773	3,333
Lead (Pb)	µg/g	91.3	4.88	3.86	3.66	4.13	0.65	0.38
Lithium (Li)	µg/g	-	11.5	11.5	10.7	11.2	0.46	0.27
Magnesium (Mg)	µg/g	-	8,610	8,180	8,100	8,297	274	158
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	199	171	132	167	34	19
Mercury (Hg)	µg/g	0.486	0.0053	<0.0050	<0.0050	0.0051	0.0002	0.0001
Molybdenum (Mo)	µg/g	-	0.37	0.30	0.21	0.29	0.08	0.05
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	20.2	19.4	17.2	18.9	1.6	0.9
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	291	236	256	261	28	16
Potassium (K)	µg/g	-	1,380	1,260	1,140	1,260	120	69
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	84	71	78	78	7	4
Strontium (Sr)	µg/g	-	3.04	2.65	2.86	2.85	0.195	0.113
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.120	0.093	0.079	0.097	0.021	0.012
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	508	397	422	442	58	34
Uranium (U)	µg/g	-	0.984	0.914	0.795	0.898	0.096	0.055
Vanadium (V)	µg/g	-	27.2	22.7	22.9	24.3	2.5	1.5
Zinc (Zn)	µg/g	315	21.5	17.6	17.7	18.9	2.2	1.3
Zirconium (Zr)	µg/g	-	2.8	2.6	2.7	2.7	0.1	0.1

 Indicates parameter concentration above SQG.

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

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

**Table D.9: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 1 Downstream (CLT1-DS) Stations, Mary River Project CREMP, August 2020**

Parameter	Units	SQG <sup>a</sup>	Camp Lake Tributary 1 Downstream Station			Study Area Summary Statistics		
			CLT1-DS-1	CLT1-DS-3	CLT1-DS-5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	0.46	0.70	3.55	1.57	1.72	0.992
Aluminum (Al)	µg/g	-	7,160	4,690	5,690	5,847	1,242	717
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.73	0.47	0.80	0.67	0.17	0.10
Barium (Ba)	µg/g	-	32.9	24.1	21.5	26.2	5.97	3.45
Beryllium (Be)	µg/g	-	0.28	0.19	0.23	0.23	0.045	0.026
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	<5.0	<5.0	6.4	5.5	0.81	0.47
Cadmium (Cd)	µg/g	3.5	0.052	0.044	0.050	0.049	0.0042	0.0024
Calcium (Ca)	µg/g	-	4,200	2,610	4,300	3,703	948	547
Chromium (Cr)	µg/g	90	23.7	13.9	25.9	21.2	6.39	3.69
Cobalt (Co)	µg/g	-	6.45	3.69	5.66	5.27	1.42	0.82
Copper (Cu)	µg/g	197	10.6	7.27	17.0	11.6	4.95	2.86
Iron (Fe)	µg/g	40,000 <sup>α</sup>	24,700	18,300	36,600	26,533	9,287	5,362
Lead (Pb)	µg/g	91.3	5.24	3.62	8.33	5.73	2.39	1.38
Lithium (Li)	µg/g	-	9.1	6.4	7.8	7.8	1.4	0.8
Magnesium (Mg)	µg/g	-	8,910	5,460	6,360	6,910	1,790	1,033
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	327	183	230	247	73	42
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	0.0076	0.0059	0.0015	0.00087
Molybdenum (Mo)	µg/g	-	1.18	1.44	0.59	1.07	0.44	0.25
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	26.0	13.1	31.1	23.4	9.3	5.4
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	197	176	332	235	85	49
Potassium (K)	µg/g	-	2,900	2,050	1,430	2,127	738	426
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	100	63	62	75	22	13
Strontium (Sr)	µg/g	-	3.96	2.86	5.11	3.98	1.13	0.65
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.159	0.102	0.105	0.122	0.032	0.019
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	462	342	396	400	60	35
Uranium (U)	µg/g	-	1.52	1.01	2.03	1.52	0.51	0.29
Vanadium (V)	µg/g	-	16.0	10.8	20.7	15.8	5.0	2.9
Zinc (Zn)	µg/g	315	33.7	23.2	22.1	26.3	6.4	3.7
Zirconium (Zr)	µg/g	-	6.1	4.2	3.7	4.7	1.3	0.73

 Indicates parameter concentration above SQG.

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

<sup>a</sup> 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 Study Areas and Average Lotic Reference Area Data, Mary River Project CREMP, August 2020**

Parameter	Units	Reference Area Data		Camp Lake Tributary 1		Camp Lake Tributary 2	
		Reference Creek (REF-CRK)	Mary River Reference (GO-09)	CLT1-US Magnitude of Elevation	CLT1-DS Magnitude of Elevation	CLT2-US Magnitude of Elevation	CLT2-DS Magnitude of Elevation
Total Organic Carbon	%	0.12	0.11	7.6	13.5	2.9	2.2
Aluminum (Al)	µg/g	584	2,757	7.7	6.1	4.7	3.2
Antimony (Sb)	µg/g	<0.10	<0.10	1.0	1.0	1.0	1.0
Arsenic (As)	µg/g	0.22	0.38	2.5	2.4	2.7	1.7
Barium (Ba)	µg/g	2.72	12.6	4.0	5.9	3.5	2.2
Beryllium (Be)	µg/g	<0.10	0.14	2.5	2.0	1.6	1.4
Bismuth (Bi)	µg/g	<0.20	<0.20	1.0	1.0	1.0	1.0
Boron (B)	µg/g	<5.0	5.4	1.8	1.0	1.0	1.0
Cadmium (Cd)	µg/g	<0.020	<0.020	2.4	2.4	1.5	1.3
Calcium (Ca)	µg/g	494	2,750	3.2	4.4	6.3	2.6
Chromium (Cr)	µg/g	7.79	13.6	2.7	2.1	2.2	1.5
Cobalt (Co)	µg/g	0.953	2.40	4.7	3.9	3.3	2.0
Copper (Cu)	µg/g	1.21	4.45	12.5	6.1	6.2	3.9
Iron (Fe)	µg/g	12,493	11,063	1.9	2.3	1.5	1.2
Lead (Pb)	µg/g	1.49	3.07	2.1	2.9	1.7	1.5
Lithium (Li)	µg/g	<2.0	5.0	3.9	2.7	2.3	1.4
Magnesium (Mg)	µg/g	444	2,810	10.8	9.0	9.2	5.3
Manganese (Mn)	µg/g	27.4	75.7	4.2	6.1	3.6	2.5
Mercury (Hg)	µg/g	<0.0050	<0.0050	1.0	1.2	1.0	1.0
Molybdenum (Mo)	µg/g	<0.10	0.11	2.8	10.1	3.2	4.5
Nickel (Ni)	µg/g	1.76	6.11	6.9	8.6	5.6	3.7
Phosphorus (P)	µg/g	167	350	1.2	1.0	1.1	0.8
Potassium (K)	µg/g	133	750	5.6	9.4	5.8	4.8
Selenium (Se)	µg/g	<0.20	<0.20	1.0	1.0	1.0	1.0
Silver (Ag)	µg/g	<0.10	<0.10	1.0	1.0	1.0	1.0
Sodium (Na)	µg/g	<50	68	1.3	1.3	1.1	1.0
Strontium (Sr)	µg/g	2.00	4.72	1.0	1.4	1.4	0.9
Sulphur (S)	µg/g	<1,000	<1,000	1.0	1.0	1.0	1.0
Thallium (Tl)	µg/g	<0.050	0.068	1.7	2.1	1.4	1.2
Tin (Sn)	µg/g	<2.0	<2.0	1.0	1.0	1.0	1.0
Titanium (Ti)	µg/g	83.3	353	3.3	3.0	2.5	1.8
Uranium (U)	µg/g	0.479	0.922	1.4	2.4	1.2	1.7
Vanadium (V)	µg/g	16.8	19.5	1.3	0.9	0.9	0.7
Zinc (Zn)	µg/g	3.03	10.3	4.0	5.6	3.0	3.8
Zirconium (Zr)	µg/g	2.1	5.8	0.9	1.5	1.2	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.11: Deposited Sediment Total Organic Carbon and Metal Concentrations at Camp Lake Tributary 2 Upstream (CLT2-US) Stations, Mary River Project CREMP, August 2020**

Parameter	Units	SQG <sup>a</sup>	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 <sup>α</sup>	0.24	0.31	0.45	0.33	0.11	0.015
Aluminum (Al)	µg/g	-	3,210	3,230	7,010	4,483	2,188	301
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.55	0.61	1.06	0.74	0.28	0.038
Barium (Ba)	µg/g	-	12.0	12.0	23.6	15.9	6.70	0.920
Beryllium (Be)	µg/g	-	0.14	0.15	0.27	0.19	0.072	0.0099
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	<5.0	<5.0	5.9	5.3	0.52	0.071
Cadmium (Cd)	µg/g	3.5	0.029	0.024	0.038	0.030	0.0071	0.0010
Calcium (Ca)	µg/g	-	4,770	3,670	7,390	5,277	1,911	263
Chromium (Cr)	µg/g	90	19.0	16.3	29.6	21.6	7.03	0.97
Cobalt (Co)	µg/g	-	3.61	3.37	6.38	4.45	1.67	0.230
Copper (Cu)	µg/g	197	7.11	13.8	14.7	11.9	4.15	0.570
Iron (Fe)	µg/g	40,000 <sup>α</sup>	13,600	12,700	27,900	18,067	8,528	1,171
Lead (Pb)	µg/g	91.3	2.68	2.55	5.23	3.49	1.51	0.208
Lithium (Li)	µg/g	-	5.1	5.0	9.6	6.6	2.6	0.36
Magnesium (Mg)	µg/g	-	5,640	5,200	10,300	7,047	2,826	388
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	119	122	189	143	40	5.4
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	<0.0050	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	0.16	0.35	0.51	0.34	0.18	0.024
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	11.9	10.5	23.5	15.3	7.14	0.980
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	219	214	328	254	64	8.8
Potassium (K)	µg/g	-	830	780	2,330	1,313	881	121
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	51	<50	87	63	21	2.9
Strontium (Sr)	µg/g	-	3.37	3.18	5.03	3.86	1.018	0.140
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.060	0.055	0.132	0.082	0.043	0.0059
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	261	242	506	336	147	20
Uranium (U)	µg/g	-	0.480	0.460	1.29	0.743	0.474	0.0650
Vanadium (V)	µg/g	-	15.9	12.8	20.8	16.5	4.03	0.55
Zinc (Zn)	µg/g	315	9.40	9.70	22.5	13.9	7.48	1.03
Zirconium (Zr)	µg/g	-	3.3	2.6	5.2	3.7	1.3	0.18

 Indicates parameter concentration above SQG.

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

<sup>a</sup> 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 2020**

Parameter	Units	SQG <sup>a</sup>	Camp Lake Tributary 2 Downstream Station			Study Area Summary Statistics		
			CLT2-DS-1	CLT2-DS-3	CLT2-DS-5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	0.48	0.17	0.13	0.26	0.19	0.026
Aluminum (Al)	µg/g	-	3,720	4,210	1,240	3,057	1,592	219
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.62	0.47	0.31	0.47	0.16	0.021
Barium (Ba)	µg/g	-	12.0	12.3	4.61	9.64	4.36	0.598
Beryllium (Be)	µg/g	-	0.17	0.21	<0.10	0.16	0.056	0.0076
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	<5.0	<5.0	<5.0	<5.0	0	0
Cadmium (Cd)	µg/g	3.5	0.024	0.033	<0.020	0.026	0.0067	0.0009
Calcium (Ca)	µg/g	-	2,810	2,540	1,220	2,190	851	117
Chromium (Cr)	µg/g	90	25.7	12.8	7.19	15.2	9.49	1.30
Cobalt (Co)	µg/g	-	3.90	3.06	1.15	2.70	1.41	0.194
Copper (Cu)	µg/g	197	7.45	8.40	6.54	7.46	0.930	0.128
Iron (Fe)	µg/g	40,000 <sup>α</sup>	20,800	15,400	4,570	13,590	8,265	1,135
Lead (Pb)	µg/g	91.3	3.31	3.77	2.07	3.05	0.879	0.121
Lithium (Li)	µg/g	-	5.1	5.3	<2.0	4.1	1.9	0.25
Magnesium (Mg)	µg/g	-	5,060	5,460	1,700	4,073	2,065	284
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	131	131	43	102	50.8	6.98
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	<0.0050	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	0.38	0.92	0.12	0.47	0.41	0.056
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	14.4	11.1	4.96	10.2	4.79	0.658
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	232	198	101	177	68.0	9.34
Potassium (K)	µg/g	-	1,020	1,780	430	1,077	677	93
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	80	<50	<50	60	17	2.4
Strontium (Sr)	µg/g	-	3.08	2.63	1.83	2.51	0.633	0.087
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.070	0.091	<0.050	0.070	0.021	0.0028
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	308	317	120	248	111	15
Uranium (U)	µg/g	-	1.25	1.31	0.708	1.09	0.332	0.0455
Vanadium (V)	µg/g	-	22.4	10.1	5.60	12.7	8.70	1.19
Zinc (Zn)	µg/g	315	22.9	22.0	8.10	17.7	8.30	1.140
Zirconium (Zr)	µg/g	-	3.4	5.0	1.8	3.4	1.6	0.22

 Indicates parameter concentration above SQG.

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

<sup>a</sup> 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 (JLO) Benthic Stations<sup>a</sup>, Mary River Project CREMP, August 2020**

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia <sup>b</sup>	Plant or Algal Presence
JLO-02	11.0	dark grey silt, red brown silt on top, contains organics	none detected	sparse algae
JLO-01	18.0	light brown silt	none detected	sparse algae
JLO-21	10.0	dark brown silt	none detected	sparse algae
JLO-20	7.0	grey-brown silt-sand mixture	none detected	sparse algae
JLO-19	7.5	thick brown silt layer over dark grey fine silt-sand mixture	none detected	sparse algae
JLO-07	33.0	thin layer of silt overlying grey, very fine sand	none detected	sparse algae
JLO-18	12.0	dark grey organics (roots) mixed in with silt and sand	some hydrogen sulphide odour	sparse algae
JLO-16	16.0	thin layer of silt overlying grey fine sand	none detected	sparse algae
JLO-11	28.5	grey-brown fine sand mixed with some silt overlying degraded organics	some hydrogen sulphide odour	sparse algae
JLO-12	17.0	brown sand overlying grey sand; some black streaking between brown and grey layers	some blackened substrate	none observed

<sup>a</sup> Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

<sup>b</sup> Evidence of anoxic sediments assessed visually as the 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 (JLO), Mary River Project CREMP, August 2020**

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
JLO-02	11.0	Littoral	1	19.5	light floc of light reddish brown silt overlying grey sandy material; no black streaking
			2	19.5	
			3	17.0	
			4	16.5	
JLO-01	17.7	Profundal	1	15.5	black-brown silt floc (some speckling in second core) over light brown slightly consolidated silt and consolidated brown silt
			2	11.5	
			3	11.5	
			4	12.0	
JLO-14	26.5	Profundal	1	6.0	light brown silt floc over consolidated brown silt and grey sandy material (core 3 and 4 had black streaking between brown and grey layer)
			2	20.0	
			3	14.0	
			4	10.0	
JLO-17	15.6	Profundal	1	14.5	unconsolidated light brown silt over consolidated grey fine sand; no dark streaking
			2	13.0	
			3	13.5	
			4	17.0	
JLO-07	33.1	Profundal	1	11.5	light brown unconsolidated silt floc overlying consolidated dark grey sand (some dark brown sand mixed) and variegated unconsolidated brown silt or consolidated grey sand
			2	16.0	
			3	17.0	
			4	14.0	
JLO-16	16.2	Profundal	1	4.5	light brown silt floc over consolidated grey sand with some light brown silt
			2	6.5	
			3	5.0	
			4	4.5	
JLO-15	17.0	Profundal	1	11.0	unconsolidated brown silt overlying consolidated brown silt mixed with fine grey sand; black streaking associated with brown silt layer
			2	12.0	
			3	10.5	
			4	11.5	
JLO-11	29.0	Profundal	1	8.5	unconsolidated fine light brown silt over consolidated grey sand; some black streaking
			2	14.0	
			3	11.0	
			4	14.5	
JLO-13	17.0	Profundal	1	13.5	unconsolidated light brown fine silt over consolidated light brown fine silt
			2	7.0	
			3	15.0	
			4	10.0	
JLO-12	17.0	Profundal	1	5.0	thin (<1 mm) layer of brown silt overlying consolidated light brown coarse sand, or consolidated light grey coarse sand; some black streaking present
			2	5.5	
			3	5.5	
			4	4.5	

**Table D.15: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Camp Lake (JLO) Sediment Stations, Mary River Project CREMP, August 2020**

Parameter		Units	Sediment Quality Guideline (SQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Camp Lake Stations										Summary Statistics	
					JLO-02 (littoral)	JLO-01 (profundal)	JLO-14 (profundal)	JLO-17 (profundal)	JLO-07 (profundal)	JLO-16 (profundal)	JLO-15 (profundal)	JLO-11 (profundal)	JLO-13 (profundal)	JLO-12 (profundal)	Mean	Standard Deviation
Non-metals	Sand	%	-	-	46.5	27.6	20.8	17.3	18.3	86.8	42.2	47.8	29.3	83.4	42.0	25.3
	Silt	%	-	-	48.0	62.9	64.5	79.2	69.4	11.8	49.5	42.9	60.4	14.9	50.4	22.3
	Clay	%	-	-	5.5	9.6	14.7	3.4	12.3	1.4	8.3	9.3	10.3	1.7	7.65	4.50
	Moisture	%	-	-	81.7	73.6	75.4	70.3	74.4	26.4	59.2	63.8	71.9	38.8	63.6	17.7
	Total Organic Carbon	%	10 <sup>α</sup>	-	3.39	1.83	1.99	2.03	3.13	0.26	1.18	1.33	1.52	0.33	1.70	1.03
Metals	Aluminum (Al)	mg/kg	-	-	15,500	19,800	19,400	15,200	19,300	5,070	16,100	17,900	18,700	6,260	15,323	5,359
	Antimony (Sb)	mg/kg	-	-	0.11	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	0.0032
	Arsenic (As)	mg/kg	17	5.9	<b>9.03</b>	5.61	<b>6.82</b>	<b>16.6</b>	3.49	1.00	3.90	4.99	5.22	2.21	5.89	4.40
	Barium (Ba)	mg/kg	-	-	122	80.3	83.1	222	73.6	20.6	57.9	96.5	71.2	39.5	86.7	55.3
	Beryllium (Be)	mg/kg	-	-	0.78	1.06	1.10	0.90	1.07	0.26	0.82	0.91	1.08	0.31	0.83	0.31
	Bismuth (Bi)	mg/kg	-	-	0.29	0.31	0.34	0.28	0.35	<0.20	0.23	0.25	0.27	<0.20	0.27	0.053
	Boron (B)	mg/kg	-	-	17.8	34.2	34.6	22.6	30.9	7.6	19.9	28.5	32.7	9.3	23.8	10.0
	Cadmium (Cd)	mg/kg	3.5	1.5	0.269	0.206	0.204	0.183	0.268	0.041	0.151	0.166	0.167	0.045	0.17	0.078
	Calcium (Ca)	mg/kg	-	-	5,650	5,010	5,120	5,290	5,860	10,600	3,770	4,120	4,500	1,830	5,175	2,234
	Chromium (Cr)	mg/kg	90	98	66.2	81.3	82.9	66.9	79.9	33.3	65.9	70.7	72.5	28.4	64.8	19.0
	Cobalt (Co)	mg/kg	-	-	18.4	19.2	20.8	22.0	17.9	6.05	16.2	18.3	18.5	7.63	16.5	5.34
	Copper (Cu)	mg/kg	197	50	49.9	49.7	<b>51.5</b>	42.2	<b>61.6</b>	12.6	38.7	43.8	44.4	12.1	40.7	16.2
	Iron (Fe)	mg/kg	40,000 <sup>α</sup>	52,400	<b>61,000</b>	39,300	<b>52,500</b>	<b>63,100</b>	34,900	13,200	31,900	<b>40,100</b>	35,800	20,700	39,250	16,075
	Lead (Pb)	mg/kg	91.3	35	18.9	22.7	24.0	20.3	24.5	4.98	17.5	19.3	22.6	5.80	18.1	7.05
	Lithium (Li)	mg/kg	-	-	22.4	33.2	34.0	27.3	33.6	8.7	29.7	32.1	36.2	10.9	26.8	9.80
	Magnesium (Mg)	mg/kg	-	-	13,400	14,300	14,000	12,100	14,800	11,200	13,300	13,700	13,500	5,380	12,568	2,732
	Manganese (Mn)	mg/kg	1,100 <sup>α,β</sup>	4,370	1,410	1,320	1,850	<b>7,790</b>	300	150	958	<b>2,820</b>	<b>1,510</b>	<b>1,870</b>	<b>1,998</b>	2,178
	Mercury (Hg)	mg/kg	0.486	0.17	0.0530	0.0508	0.0637	0.0473	0.0761	0.0059	0.0325	0.0407	0.0399	0.0069	0.0417	0.0223
	Molybdenum (Mo)	mg/kg	-	-	2.45	1.37	1.54	5.67	1.08	0.32	0.72	1.33	1.18	0.50	1.62	1.55
	Nickel (Ni)	mg/kg	75 <sup>α,β</sup>	72	<b>72.5</b>	<b>77.2</b>	<b>74.6</b>	<b>72.1</b>	71.4	33.2	60.8	66.3	67.4	26.1	62.2	17.8
	Phosphorus (P)	mg/kg	2,000 <sup>α</sup>	1,580	1,310	963	1,370	<b>2,220</b>	808	494	827	1,030	995	625	1,064	488
	Potassium (K)	mg/kg	-	-	4,100	5,730	5,640	4,190	5,540	1,290	3,960	4,650	5,160	1,380	4,164	1,626
	Selenium (Se)	mg/kg	-	-	0.49	0.44	0.53	0.46	0.56	<0.20	0.28	0.33	0.31	<0.20	0.38	0.13
	Silver (Ag)	mg/kg	-	-	0.12	0.14	0.15	0.10	0.23	<0.10	<0.10	0.11	0.13	<0.10	0.13	0.040
	Sodium (Na)	mg/kg	-	-	203	265	284	212	495	78	182	235	223	70	225	118
	Strontium (Sr)	mg/kg	-	-	9.87	12.8	15.2	12.0	25.6	7.58	9.27	10.8	13.6	4.55	12.1	5.64
	Sulphur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	8,100	<1,000	<1,000	<1,000	<1,000	<1,000	1,710	2,245
	Thallium (Tl)	mg/kg	-	-	0.467	0.597	0.541	0.592	0.545	0.112	0.416	0.445	0.519	0.148	0.438	0.173
	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
	Titanium (Ti)	mg/kg	-	-	833	1,040	1,020	697	948	379	880	989	979	413	818	244
	Uranium (U)	mg/kg	-	-	7.39	6.45	8.07	5.66	7.67	0.990	4.39	5.44	5.45	1.22	5.27	2.48
	Vanadium (V)	mg/kg	-	-	54.3	68.4	69.2	54.7	58.4	20.1	56.6	59.7	63.4	21.9	52.7	17.5
	Zinc (Zn)	mg/kg	315	135	59.4	67.6	64.3	52.3	70.4	17.9	50.4	55.1	54.3	19.5	51.1	18.3
	Zirconium (Zr)	mg/kg	-	-	7.8	4.6	5.2	3.7	14.4	4.2	5.1	4.4	4.9	1.7	5.6	3.4

Indicates parameter concentration above Sediment Quality Guideline (SQG).

**BOLD** Indicates parameter concentration above the AEMP Benchmark.


Note: "-" indicates no SQG applicable.

<sup>a</sup> 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]).

<sup>b</sup> 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.16: Statistical Comparison of Sediment Physical Properties Between Camp Lake and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**




Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	tequal	none	YES	0.006	Reference	5	29.6	7.5	3.4	23.4	40.4
						Camp	5	65.4	20.1	9.0	41.1	85.0
	Silt-Sized Material (%)	tequal	none	YES	0.008	Reference	5	62.2	6.3	2.8	53.4	68.4
						Camp	5	32.1	18.2	8.2	14.2	55.1
	Clay-Sized Material (%)	M-W	rank	YES	0.012	Reference	5	8.2	3.0	1.3	6.2	13.4
						Camp	5	2.6	2.0	0.9	1.0	5.5
	Moisture (%)	tequal	none	YES	0.006	Reference	5	87.9	4.6	2.1	80.2	92.3
						Camp	5	57.3	17.9	8.0	37.7	81.7
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.011	Reference	5	4.8	2.0	0.9	2.3	7.0
						Camp	5	1.4	1.2	0.5	0.3	3.4
Profundal (Deep) Stations	Sand-Sized Material (%)	M-W	rank	NO	0.298	Reference	5	31.6	22.3	10.0	13.9	56.6
						Camp	9	41.5	26.8	8.9	17.3	86.8
	Silt-Sized Material (%)	tequal	none	NO	0.588	Reference	5	57.4	18.1	8.1	36.9	71.9
						Camp	9	50.6	23.6	7.9	11.8	79.2
	Clay-Sized Material (%)	tequal	none	NO	0.243	Reference	5	11.0	4.3	1.9	6.3	15.1
						Camp	9	7.9	4.7	1.6	1.4	14.7
	Moisture (%)	M-W	rank	YES	0.001	Reference	5	82.6	3.6	1.6	78.3	86.6
						Camp	9	61.5	17.5	5.8	26.4	75.4
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.004	Reference	5	3.4	1.1	0.5	2.2	4.5
						Camp	9	1.5	0.9	0.3	0.3	3.1

 Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.10.

<sup>a</sup> Statistical tests included tequal (t-test assuming equal variance), tunequal (t-test assuming unequal variance), and M-W (Mann-Whitney U-test).

**Table D.17: Magnitude of Elevation in Sediment Metal Concentrations between Camp Lake and Reference Lake 3 2020 Data, and between Camp Lake 2020 and Baseline Data, Mary River Project CREMP, 2020**

Parameter	Camp Lake 2020 versus Reference Lake 3 2020				Camp Lake 2020 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)	16,880	0.9	21,800	0.7	18,267	0.8	15,175	1.0
Antimony (Sb)	<0.10	1.1	<0.10	1.0	1.0	0.1	1.0	0.1
Arsenic (As)	3.53	2.6	4.07	1.4	2.80	3.2	3.47	1.6
Barium (Ba)	117	1.0	122	0.7	105	1.2	68	1.2
Beryllium (Be)	0.65	1.2	0.80	1.0	1.0	0.8	1.0	0.8
Bismuth (Bi)	<0.20	1.5	<0.20	1.4	-	-	-	-
Boron (B)	12.2	1.5	14.7	1.7	0.733	24.3	1.83	13.4
Cadmium (Cd)	0.173	1.6	0.148	1.1	0.500	0.5	0.50	0.3
Calcium (Ca)	5,608	1.0	5,010	1.0	3,130	1.8	2,857	1.8
Chromium (Cr)	54.3	1.2	65.0	1.0	81.0	0.8	71.0	0.9
Cobalt (Co)	10.8	1.7	15.2	1.1	18.3	1.0	16.5	1.0
Copper (Cu)	71.4	0.7	83.8	0.5	45.0	1.1	39.5	1.0
Iron (Fe)	50,600	1.2	45,080	0.8	36,133	1.7	33,206	1.1
Lead (Pb)	13.8	1.4	16.7	1.1	18.0	1.1	18.7	1.0
Lithium (Li)	26.0	0.9	33.7	0.8	-	-	-	-
Magnesium (Mg)	11,440	1.2	14,180	0.9	13,967	1.0	10,113	1.2
Manganese (Mn)	579	2.4	1,230	1.7	699	2.0	942	2.2
Mercury (Hg)	0.0500	1.1	0.0583	0.7	0.100	0.5	0.100	0.4
Molybdenum (Mo)	4.44	0.6	2.52	0.6	1.00	2.5	1.00	1.5
Nickel (Ni)	40.0	1.8	45.0	1.4	67.0	1.1	62.5	1.0
Phosphorus (P)	1,167	1.1	956	1.1	800	1.6	1,125	0.9
Potassium (K)	4,100	1.0	5,338	0.8	3,450	1.2	3,771	1.1
Selenium (Se)	0.73	0.7	0.61	0.6	1.0	0.5	1.0	0.4
Silver (Ag)	0.14	0.8	0.20	0.6	0.27	0.4	0.35	0.4
Sodium (Na)	304	0.7	369	0.6	279	0.7	254	0.9
Strontium (Sr)	11.6	0.9	12.3	1.0	9.33	1.1	12.0	1.0
Sulphur (S)	1,400	0.7	1,140	1.6	-	-	-	-
Thallium (Tl)	0.379	1.2	0.594	0.7	1.0	0.5	1.0	0.4
Tin (Sn)	<2.0	1.0	<2.0	1.0	-	-	-	-
Titanium (Ti)	1,006	0.8	1,136	0.7	-	-	-	-
Uranium (U)	11.0	0.7	19.7	0.3	-	-	-	-
Vanadium (V)	54.1	1.0	63.4	0.8	69.0	0.8	56.8	0.9
Zinc (Zn)	73.1	0.8	83.8	0.6	67.0	0.9	56.8	0.9
Zirconium (Zr)	4.5	1.7	3.9	1.4	-	-	-	-

 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.



**Table D.18: Deposited Sediment Field Sampling Observations at Sheardown Lake Tributaries 1, 12, and 9<sup>a</sup>, Mary River Project CREMP, August 2020**

Study Area	Station	Texture of Collected Sediment	Silt Presence <sup>b</sup>
Sheardown Lake Tributary 1 (SDLT1)	SDLT1-1	red-brown silt	precipitate and deposits (>1 mm)
	SDLT1-3	red-brown silt	precipitate and deposits (>1 mm)
	SDLT1-5	red-brown silt	precipitate and deposits (>1 mm)
Sheardown Lake Tributary 12 (SDLT12)	SDLT12-1	coarse sand	precipitate and deposits (<1 mm)
	SDLT12-2	coarse sand and gravel	precipitate and deposits (<1 mm)
	SDLT12-3	coarse sand and gravel	precipitate and deposits (<1 mm)
Sheardown Lake Tributary 9 (SDLT9)	SDLT9-1	medium (sized) coarse sand	none observed
	SDLT9-3	medium (sized) coarse sand	precipitate and deposits (<1 mm)
	SDLT9-5	medium (sized) coarse sand	none observed

<sup>a</sup> Sediment samples collected using a stainless steel scoop directly from the streambed or shoreline, as available.

<sup>b</sup> 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 2020**

Parameter	Units	SQG <sup>a</sup>	Sheardown Lake Tributary 1 Station			Study Area Summary Statistics		
			SDLT1-1	SDLT1-3	SDLT1-5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>a</sup>	0.71	0.97	0.61	0.76	0.19	0.107
Aluminum (Al)	µg/g	-	17,600	15,900	14,400	15,967	1,601	924
Antimony (Sb)	µg/g	-	0.12	0.23	0.15	0.17	0.057	0.033
Arsenic (As)	µg/g	17	2.26	4.50	3.11	3.29	1.13	0.65
Barium (Ba)	µg/g	-	78.0	51.9	61.0	63.6	13.2	7.65
Beryllium (Be)	µg/g	-	0.68	0.66	0.60	0.65	0.042	0.024
Bismuth (Bi)	µg/g	-	0.61	0.31	0.53	0.48	0.16	0.090
Boron (B)	µg/g	-	7.3	7.6	5.6	6.8	1.1	0.62
Cadmium (Cd)	µg/g	3.5	0.156	0.113	0.160	0.143	0.0261	0.0150
Calcium (Ca)	µg/g	-	4,850	2,730	3,790	3,790	1,060	612
Chromium (Cr)	µg/g	90	34.5	35.5	31.2	33.7	2.25	1.30
Cobalt (Co)	µg/g	-	12.4	14.9	12.7	13.3	1.37	0.788
Copper (Cu)	µg/g	197	25.5	21.5	24.9	24.0	2.16	1.25
Iron (Fe)	µg/g	40,000 <sup>a</sup>	114,000	174,000	170,000	152,667	33,546	19,368
Lead (Pb)	µg/g	91.3	13.0	12.6	11.7	12.4	0.666	0.384
Lithium (Li)	µg/g	-	19.0	17.8	16.6	17.8	1.20	0.693
Magnesium (Mg)	µg/g	-	16,500	12,800	12,700	14,000	2,166	1,250
Manganese (Mn)	µg/g	1,100 <sup>a,β</sup>	646	657	740	681	51.4	29.7
Mercury (Hg)	µg/g	0.486	0.0059	0.0072	0.0063	0.0065	0.00067	0.00038
Molybdenum (Mo)	µg/g	-	5.41	7.19	4.59	5.73	1.33	0.767
Nickel (Ni)	µg/g	75 <sup>a,β</sup>	32.8	34.4	32.2	33.1	1.14	0.657
Phosphorus (P)	µg/g	2,000 <sup>a</sup>	368	287	378	344	49.9	28.8
Potassium (K)	µg/g	-	6,590	5,870	4,990	5,817	801	463
Selenium (Se)	µg/g	-	<0.20	0.22	0.22	0.21	0.012	0.0067
Silver (Ag)	µg/g	-	0.14	0.10	0.13	0.12	0.021	0.012
Sodium (Na)	µg/g	-	158	118	101	126	29	17
Strontium (Sr)	µg/g	-	4.43	3.52	3.67	3.87	0.488	0.282
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.296	0.276	0.241	0.271	0.0278	0.0161
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	971	714	777	821	134	77
Uranium (U)	µg/g	-	3.85	5.94	3.26	4.35	1.41	0.813
Vanadium (V)	µg/g	-	31.9	25.4	25.8	27.7	3.64	2.10
Zinc (Zn)	µg/g	315	79.4	65.7	82.4	75.8	8.90	5.14
Zirconium (Zr)	µg/g	-	9.5	10.6	6.9	9.0	1.9	1.1

 Indicates parameter concentration above SQG.

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

<sup>a</sup> 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: Magnitude of Elevation in Deposited Sediment Metal Concentrations at the Sheardown Lake Tributaries Compared to Average Lotic Reference Area Data, Mary River Project CREMP, August 2020**

Parameter	Units	Reference Area Data		Sheardown Lake Tributary 1 (SDLT1) Magnitude of Elevation	Sheardown Lake Tributary 12 (SDLT12) Magnitude of Elevation	Sheardown Lake Tributary 9 (SDLT9) Magnitude of Elevation
		Reference Creek (REF-CRK)	Mary River Reference (GO-09)			
Total Organic Carbon	%	0.12	0.11	6.5	6.4	17.4
Aluminum (Al)	µg/g	584	2,757	16.6	8.5	7.3
Antimony (Sb)	µg/g	<0.10	<0.10	1.7	2.2	1.1
Arsenic (As)	µg/g	0.22	0.38	11.9	21.1	6.0
Barium (Ba)	µg/g	2.72	12.6	14.2	3.8	7.2
Beryllium (Be)	µg/g	<0.10	0.14	5.6	5.9	2.8
Bismuth (Bi)	µg/g	<0.20	<0.20	2.4	1.3	1.1
Boron (B)	µg/g	<5.0	5.4	1.3	1.1	1.6
Cadmium (Cd)	µg/g	<0.020	<0.020	7.2	2.5	3.2
Calcium (Ca)	µg/g	494	2,750	4.5	1.5	3.5
Chromium (Cr)	µg/g	7.79	13.6	3.4	3.1	2.3
Cobalt (Co)	µg/g	0.953	2.40	9.8	10.7	4.6
Copper (Cu)	µg/g	1.21	4.45	12.6	10.2	8.2
Iron (Fe)	µg/g	12,493	11,063	13.0	29.4	5.1
Lead (Pb)	µg/g	1.49	3.07	6.2	2.7	2.7
Lithium (Li)	µg/g	<2.0	5.0	6.2	2.9	2.7
Magnesium (Mg)	µg/g	444	2,810	18.3	7.6	7.9
Manganese (Mn)	µg/g	27.4	75.7	16.9	20.1	7.3
Mercury (Hg)	µg/g	<0.0050	<0.0050	1.3	1.0	2.4
Molybdenum (Mo)	µg/g	<0.10	0.11	53.9	36.0	17.1
Nickel (Ni)	µg/g	1.76	6.11	12.1	13.4	9.0
Phosphorus (P)	µg/g	167	350	1.5	1.1	1.9
Potassium (K)	µg/g	133	750	25.7	3.5	7.1
Selenium (Se)	µg/g	<0.20	<0.20	1.1	1.3	1.4
Silver (Ag)	µg/g	<0.10	<0.10	1.2	1.0	1.0
Sodium (Na)	µg/g	<50	68	2.2	0.9	1.1
Strontium (Sr)	µg/g	2.00	4.72	1.4	0.7	1.4
Sulphur (S)	µg/g	<1,000	<1,000	1.0	1.0	1.0
Thallium (Tl)	µg/g	<0.050	0.068	4.7	1.2	2.7
Tin (Sn)	µg/g	<2.0	<2.0	1.0	1.0	1.0
Titanium (Ti)	µg/g	83.3	353	6.1	1.6	3.6
Uranium (U)	µg/g	0.479	0.922	6.9	3.7	2.0
Vanadium (V)	µg/g	16.8	19.5	1.5	0.9	1.0
Zinc (Zn)	µg/g	3.03	10.3	16.2	5.4	4.9
Zirconium (Zr)	µg/g	2.1	5.8	2.9	1.1	0.9



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 ≥10 times higher than respective mean reference creek value).

**Table D.21: Deposited Sediment Total Organic Carbon and Metal Concentrations at Sheardown Lake Tributary 12 (SDLT12) Stations, Mary River Project CREMP, August 2020**

Parameter	Units	SQG <sup>a</sup>	Sheardown Lake Tributary 12 Station			Study Area Summary Statistics		
			SDLT12-1	SDLT12-2	SDLT12-3	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	0.91	0.54	0.80	0.75	0.19	0.11
Aluminum (Al)	µg/g	-	9,070	7,840	7,550	8,153	807	466
Antimony (Sb)	µg/g	-	0.21	0.21	0.25	0.22	0.02	0.01
Arsenic (As)	µg/g	17	5.04	6.95	5.50	5.83	1.00	0.576
Barium (Ba)	µg/g	-	23.0	10.8	17.5	17.1	6.11	3.53
Beryllium (Be)	µg/g	-	0.68	0.70	0.66	0.68	0.020	0.012
Bismuth (Bi)	µg/g	-	0.29	0.21	0.26	0.25	0.040	0.023
Boron (B)	µg/g	-	6.3	<5.0	5.3	5.5	0.68	0.39
Cadmium (Cd)	µg/g	3.5	0.050	0.040	0.062	0.051	0.011	0.0064
Calcium (Ca)	µg/g	-	1,830	549	1,290	1,223	643	371
Chromium (Cr)	µg/g	90	30.1	31.3	30.3	30.6	0.643	0.371
Cobalt (Co)	µg/g	-	14.6	15.3	13.8	14.6	0.751	0.433
Copper (Cu)	µg/g	197	20.1	18.8	19.3	19.4	0.656	0.379
Iron (Fe)	µg/g	40,000 <sup>α</sup>	283,000	378,000	374,000	345,000	53,731	31,021
Lead (Pb)	µg/g	91.3	6.24	4.28	5.91	5.48	1.05	0.606
Lithium (Li)	µg/g	-	10.1	7.0	7.4	8.2	1.7	0.97
Magnesium (Mg)	µg/g	-	6,890	5,150	5,330	5,790	957	552
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	699	905	825	810	104	60
Mercury (Hg)	µg/g	0.486	0.0055	<0.0050	<0.0050	0.0052	0.00029	0.00017
Molybdenum (Mo)	µg/g	-	4.10	3.63	3.73	3.82	0.248	0.143
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	36.3	38.2	34.8	36.4	1.70	0.984
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	300	198	259	252	51.3	29.6
Potassium (K)	µg/g	-	1,180	410	810	800	385	222
Selenium (Se)	µg/g	-	<0.20	0.28	0.32	0.27	0.061	0.035
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	0.10	0	0
Sodium (Na)	µg/g	-	<50	<50	<50	<50	0	0
Strontium (Sr)	µg/g	-	2.62	1.50	2.13	2.08	0.561	0.324
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.084	<0.050	0.071	0.068	0.017	0.010
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	283	146	226	218	69	40
Uranium (U)	µg/g	-	2.63	1.88	2.47	2.33	0.395	0.228
Vanadium (V)	µg/g	-	16.3	14.3	16.3	15.6	1.15	0.667
Zinc (Zn)	µg/g	315	31.1	19.8	24.7	25.2	5.67	3.27
Zirconium (Zr)	µg/g	-	3.7	3.1	3.8	3.5	0.38	0.22

 Indicates parameter concentration above SQG.

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

<sup>a</sup> 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.22: Deposited Sediment Total Organic Carbon and Metal Concentrations at Sheardown Lake Tributary 9 (SDLT9) Stations, Mary River Project CREMP, August 2020**

Analyte	Units	SQG <sup>a</sup>	Sheardown Lake Tributary 9 Station			Study Area Summary Statistics		
			SDLT9-1	SDLT9-3	SDLT9-5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	0.81	1.31	3.96	2.03	1.69	0.977
Aluminum (Al)	µg/g	-	4,310	5,880	10,800	6,997	3,386	1,955
Antimony (Sb)	µg/g	-	<0.10	<0.10	0.12	<0.10	0	0
Arsenic (As)	µg/g	17	0.86	1.13	2.97	1.65	1.15	0.66
Barium (Ba)	µg/g	-	17.6	24.8	54.3	32.2	19.4	11.2
Beryllium (Be)	µg/g	-	0.17	0.24	0.55	0.32	0.20	0.12
Bismuth (Bi)	µg/g	-	<0.20	<0.20	0.26	0.22	0.035	0.020
Boron (B)	µg/g	-	<5.0	<5.0	15.5	8.50	6.06	3.50
Cadmium (Cd)	µg/g	3.5	0.037	0.044	0.110	0.064	0.040	0.023
Calcium (Ca)	µg/g	-	1,610	1,960	5,190	2,920	1,974	1,139
Chromium (Cr)	µg/g	90	15.1	18.6	34.5	22.7	10.3	5.97
Cobalt (Co)	µg/g	-	3.86	5.16	9.71	6.24	3.07	1.77
Copper (Cu)	µg/g	197	7.17	11.3	28.5	15.7	11.3	6.53
Iron (Fe)	µg/g	40,000 <sup>α</sup>	31,300	42,100	107,000	60,133	40,945	23,640
Lead (Pb)	µg/g	91.3	3.25	4.27	8.92	5.48	3.02	1.75
Lithium (Li)	µg/g	-	4.90	6.50	11.6	7.67	3.50	2.02
Magnesium (Mg)	µg/g	-	3,630	4,990	9,430	6,017	3,033	1,751
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	164	225	493	294	175	101
Mercury (Hg)	µg/g	0.486	0.0061	0.0103	0.0196	0.0120	0.0069	0.0040
Molybdenum (Mo)	µg/g	-	0.960	1.22	3.27	1.82	1.27	0.731
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	13.6	18.6	41.3	24.5	14.8	8.52
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	330	347	606	428	155	89
Potassium (K)	µg/g	-	900	1,380	2,510	1,597	827	477
Selenium (Se)	µg/g	-	<0.20	<0.20	0.41	0.27	0.12	0.070
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	<50	<50	88	63	22	13
Strontium (Sr)	µg/g	-	3.13	2.99	6.05	4.06	1.73	1.00
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.088	0.130	0.240	0.153	0.078	0.045
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	379	433	642	485	139	80
Uranium (U)	µg/g	-	0.672	0.800	2.37	1.28	0.946	0.546
Vanadium (V)	µg/g	-	11.6	15.3	27.1	18.0	8.10	4.67
Zinc (Zn)	µg/g	315	13.5	18.7	37.2	23.1	12.5	7.19
Zirconium (Zr)	µg/g	-	1.4	1.9	5.3	2.9	2.1	1.2

 Indicates parameter concentration above SQG.

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

<sup>a</sup> Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except  $\alpha$  = Ontario Provincial Sediment Quality Guideline (PSQG) severe effect level (SEL; OMOE 1993) and  $\beta$  = British Columbia Working SQG PEL (BC ENV 2020).

**Table D.23: Field Observations of Sediment Properties at Sheardown Lake Northwest (DLO-01) Benthic Stations<sup>a</sup>, Mary River Project CREMP, August 2020**

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia <sup>b</sup>	Plant or Algal Presence
DLO-01-9	7.6	thin oxidized layer over brown-coloured silt and sand	none detected	sparse macrophytes, sparse algae
DLO-01-4	7.5	brown-coloured silt	none detected	sparse macrophytes, sparse algae
DLO-01-3	8.2	brown-coloured silt	none detected	sparse macrophytes
DLO-01-11	8.2	thin layer of red-brown silt floc over grey-brown silt	slight hydrogen sulphide odour	none observed
DLO-01-10	7.9	reddish-brown coloured silt over grey-brown sandy silt	none detected	none observed
DLO-01-5	23.3	brown-coloured silt	slight hydrogen sulphide odour	none observed
DLO-01-14	22.0	reddish-brown coloured silt over grey-brown sandy silt	slight hydrogen sulphide odour	none observed
DLO-01-15	21.7	brown-coloured silt	none detected	none observed
DLO-01-2	17.5	brown-coloured silt	none detected	none observed
DLO-01-12	14.0	reddish-brown coloured silt	none detected	none observed

<sup>a</sup> Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

<sup>b</sup> Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

**Table D.24: Observations from Sediment Cores Collected at Sheardown Lake NW (DLO-01), Mary River Project CREMP, August 2020**

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
DLO-01-05	23.1	Profundal	1	14.0	dark brown silt floc over consolidated dark grey silt/clay
			2	12.0	
			3	13.0	
			4	12.5	
DD-HAB 9-STN2	10.8	Littoral	1	22.0	unconsolidated red brown silt overlying grey silt (some sand intermixed) and dark grey silty-clay
			2	17.5	
			3	19.0	
			4	18.0	
DLO-01-08	11.5	Littoral	1	19.0	red-brown silt floc overlying brown silt and grey silty-clay layers containing some fine sand
			2	19.0	
			3	19.5	
			4	18.0	
DLO-01	20.8	Profundal	1	5.5	brown silt floc overlying consolidated brown silt containing some fine sand
			2	11.5	
			3	12.0	
			4	5.0	
DLO-01-13	18.4	Profundal	1	19.0	red-brown silt floc overlying consolidated brown silt containing some fine sand
			2	21.0	
			3	19.0	
			4	16.0	
DLO-01-2	18.6	Profundal	1	16.0	red-brown silt floc overlying brown silt-clay and grey silt-clay layers containing some fine sand; black streaking in upper layers
			2	8.0	
			3	19.5	
			4	18.5	
DLO-01-9	7.8	Littoral	1	16.0	red-brown silt floc overlying grey silt; some black streaking in third core
			2	20.0	
			3	21.0	
			4	20.0	
DLO-01-10	7.6	Littoral	1	14.0	red-brown silt floc overlying grey silty clay and brown silty clay layers, each containing some sand
			2	10.0	
			3	14.0	
			4	15.0	

**Table D.25: Sediment Particle Size, Total Organic Carbon, Metal Concentrations at Sheardown Lake Northwest (DLO-01) Sediment Stations, Mary River Project CREMP, August 2020**

Parameter		Units	Sediment Quality Guideline (SQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Sheardown Lake Northwest Stations								Summary Statistics	
					DLO-01-5 (profundal)	DD-HAB 9-STN2 (littoral)	DLO-01-8 (littoral)	DLO-01 (profundal)	DLO-01-13 (profundal)	DLO-01-2 (profundal)	DLO-01-9 (littoral)	DLO-01-10 (littoral)	Mean	Standard Deviation
Non-metals	Sand	%	-	-	8.5	38.0	20.1	35.3	18.9	9.9	45.0	93.0	33.6	27.4
	Silt	%	-	-	74.3	47.2	65.8	49.3	64.7	78.9	44.6	6.40	53.9	23.0
	Clay	%	-	-	17.2	14.8	14.1	15.3	16.3	11.1	10.4	<1.0	12.5	5.22
	Moisture	%	-	-	64.3	75.2	76.2	49.9	65.7	70.9	84.3	27.4	64.2	18.0
	Total Organic Carbon	%	10 <sup>α</sup>	-	1.76	3.15	1.60	0.38	1.24	1.30	3.47	0.17	1.63	1.18
Metals	Aluminum (Al)	mg/kg	-	-	23,100	19,300	20,800	15,000	23,700	20,900	19,800	2,640	18,155	6,808
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0
	Arsenic (As)	mg/kg	17	6.2	4.40	<b>7.13</b>	5.43	2.87	4.03	3.57	3.03	0.62	3.89	1.92
	Barium (Ba)	mg/kg	-	-	144	149	80.9	61.5	90.4	143	106	11.1	98.2	47.9
	Beryllium (Be)	mg/kg	-	-	1.05	1.09	1.17	0.72	1.12	1.01	1.08	0.16	0.925	0.338
	Bismuth (Bi)	mg/kg	-	-	0.29	0.25	0.23	<0.20	0.23	0.22	0.25	<0.20	0.23	0.030
	Boron (B)	mg/kg	-	-	33.8	30.7	36.6	21.6	33.9	30.3	30.7	<5.0	27.8	10.2
	Cadmium (Cd)	mg/kg	3.5	1.5	0.270	0.447	0.225	0.186	0.263	0.292	0.309	0.025	0.252	0.119
	Calcium (Ca)	mg/kg	-	-	4,540	5,200	4,290	3,390	4,470	4,680	5,280	1,320	4,146	1,283
	Chromium (Cr)	mg/kg	90	97	77.3	74.2	77.1	54.5	79.4	73.9	75.4	13.8	65.7	22.4
	Cobalt (Co)	mg/kg	-	-	19.0	16.2	15.0	11.2	17.0	16.2	12.7	2.18	13.7	5.25
	Copper (Cu)	mg/kg	197	58	47.9	53.0	43.4	33.8	47.2	41.1	49.7	5.82	40.2	15.1
	Iron (Fe)	mg/kg	40,000 <sup>α</sup>	52,200	<b>60,300</b>	<b>62,200</b>	<b>48,300</b>	28,800	<b>42,200</b>	<b>42,100</b>	<b>42,900</b>	11,400	<b>42,275</b>	16,447
	Lead (Pb)	mg/kg	91.3	35	22.8	21.5	20.2	14.2	22.3	19.6	20.6	3.70	18.1	6.40
	Lithium (Li)	mg/kg	-	-	36.7	36.4	39.1	23.9	38.8	33.5	37.6	5.1	31.4	11.7
	Magnesium (Mg)	mg/kg	-	-	14,800	12,700	12,300	9,520	14,900	13,200	12,700	2,020	11,518	4,186
	Manganese (Mn)	mg/kg	1,100 <sup>α,β</sup>	4,530	<b>5,580</b>	974	649	843	<b>1,140</b>	<b>13,600</b>	404	77.0	<b>2,908</b>	4,659
	Mercury (Hg)	mg/kg	0.486	0.17	0.0521	0.0517	0.0269	0.0187	0.0329	0.0290	0.0388	<0.0050	0.0319	0.0159
	Molybdenum (Mo)	mg/kg	-	-	6.69	5.20	3.43	1.18	1.80	11.2	3.15	0.52	4.15	3.51
	Nickel (Ni)	mg/kg	75 <sup>α,β</sup>	77	68.8	<b>80.4</b>	67.4	46.9	65.4	64.3	66.1	10.4	58.7	21.6
	Phosphorus (P)	mg/kg	2,000 <sup>α</sup>	1,958	1,040	1,130	1,140	860	870	831	707	351	866	258
	Potassium (K)	mg/kg	-	-	5,970	5,240	5,600	3,800	6,050	5,330	5,150	680	4,728	1,777
	Selenium (Se)	mg/kg	-	-	0.47	0.57	0.32	<0.20	0.30	0.30	0.38	<0.20	0.34	0.13
	Silver (Ag)	mg/kg	-	-	0.18	0.20	0.15	0.13	0.18	0.15	0.17	<0.10	0.16	0.032
	Sodium (Na)	mg/kg	-	-	320	308	277	212	317	282	294	<50	258	91
	Strontium (Sr)	mg/kg	-	-	12.2	11.4	11.5	9.20	12.5	11.7	11.0	3.88	10.4	2.82
	Sulphur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	0
	Thallium (Tl)	mg/kg	-	-	0.598	0.606	0.487	0.332	0.558	0.568	0.518	0.064	0.466	0.185
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0
	Titanium (Ti)	mg/kg	-	-	1,310	1,150	1,200	884	1,340	1,240	1,160	227	1,064	366
	Uranium (U)	mg/kg	-	-	7.61	9.91	5.74	4.92	7.08	5.86	7.75	1.27	6.27	2.54
	Vanadium (V)	mg/kg	-	-	62.0	57.1	57.6	42.3	64.5	58.0	57.7	10.7	51.2	17.6
	Zinc (Zn)	mg/kg	315	123	72.6	69.6	66.4	46.4	70.0	64.1	67.9	10.0	58.4	21.2
	Zirconium (Zr)	mg/kg	-	-	7.2	15.1	7.8	5.0	9.1	6.8	15.4	2.0	8.6	4.6

Indicates parameter concentration above Sediment Quality Guideline (SQG).

**BOLD5**

 Indicates parameter concentration above the AEMP Benchmark.

Note: "-" indicates no SQG applicable.


<sup>a</sup> 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

<sup>b</sup> AEMP Sediment Quality Benchmarks developed by Intrinsic (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: Statistical Comparison of Sediment Physical Properties Between Sheardown Lake NW and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size ( n )	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	tequal	log10	NO	0.397	Reference	5	29.6	7.5	3.4	23.4	40.4
						Sheardown NW	7	40.5	24.6	9.3	20.1	93.0
	Silt-Sized Material (%)	M-W	rank	NO	0.149	Reference	5	62.2	6.3	2.8	53.4	68.4
						Sheardown NW	7	48.6	20.5	7.7	6.4	67.1
	Clay-Sized Material (%)	M-W	rank	NO	0.149	Reference	5	8.2	3.0	1.3	6.2	13.4
						Sheardown NW	7	10.9	4.7	1.8	1.0	14.8
	Moisture (%)	M-W	rank	YES	0.015	Reference	5	87.9	4.6	2.1	80.2	92.3
						Sheardown NW	7	70.0	19.3	7.3	27.4	84.3
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.035	Reference	5	4.8	2.0	0.9	2.3	7.0
						Sheardown NW	7	2.5	1.4	0.5	0.2	4.3
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	none	NO	0.154	Reference	5	31.6	22.3	10.0	13.9	56.6
						Sheardown NW	7	17.2	9.3	3.5	8.5	35.3
	Silt-Sized Material (%)	tequal	none	NO	0.211	Reference	5	57.4	18.1	8.1	36.9	71.9
						Sheardown NW	7	68.2	9.8	3.7	49.3	78.9
	Clay-Sized Material (%)	M-W	rank	YES	0.073	Reference	5	11.0	4.3	1.9	6.3	15.1
						Sheardown NW	7	14.6	3.3	1.2	8.8	17.2
	Moisture (%)	M-W	rank	YES	0.003	Reference	5	82.6	3.6	1.6	78.3	86.6
						Sheardown NW	7	65.6	7.3	2.8	49.9	70.9
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.001	Reference	5	3.4	1.1	0.5	2.2	4.5
						Sheardown NW	7	1.4	0.5	0.2	0.4	2.0

 Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.10.

<sup>a</sup> Statistical tests included tequal (t-test assuming equal variance), tunequal (t-test assuming unequal variance), and M-W (Mann-Whitney U-test).

**Table D.27: Magnitude of Elevation in Sediment Metal Concentrations between Sheardown Lake NW and Reference Lake 3 2020 Data, and between Sheardown Lake NW 2020 and Baseline Data, Mary River Project CREMP, 2020**

Parameter	Sheardown Lake NW versus Reference Lake 3 in 2020				Sheardown Lake NW 2020 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)	16,880	0.9	21,800	0.9	11,792	1.3	17,745	1.2
Antimony (Sb)	<0.10	1.0	<0.10	1.0	1.0	0.1	1.0	0.1
Arsenic (As)	3.53	1.1	4.07	0.9	2.95	1.4	3.20	1.2
Barium (Ba)	117	0.7	122	0.9	78.1	1.1	93.2	1.2
Beryllium (Be)	0.65	1.4	0.80	1.2	1.0	0.9	1.0	1.0
Bismuth (Bi)	<0.20	1.2	<0.20	1.2	-	-	-	-
Boron (B)	12.2	2.1	14.7	2.0	2.86	9.0	3.11	9.6
Cadmium (Cd)	0.173	1.5	0.148	1.7	0.500	0.5	0.500	0.5
Calcium (Ca)	5,608	0.7	5,010	0.9	2,697	1.5	3,558	1.2
Chromium (Cr)	54.3	1.1	65.0	1.1	52.8	1.1	81.0	0.9
Cobalt (Co)	10.8	1.1	15.2	1.0	10.4	1.1	15.5	1.0
Copper (Cu)	71.4	0.5	83.8	0.5	32.6	1.2	48.3	0.9
Iron (Fe)	50,600	0.8	45,080	1.0	28,120	1.5	40,382	1.1
Lead (Pb)	13.8	1.2	16.7	1.2	12.7	1.3	20.1	1.0
Lithium (Li)	26.0	1.1	33.7	1.0	-	-	-	-
Magnesium (Mg)	11,440	0.9	14,180	0.9	7,448	1.3	11,498	1.1
Manganese (Mn)	579	0.9	1,230	4.3	756	0.7	2,164	2.4
Mercury (Hg)	0.0500	0.6	0.0583	0.6	0.100	0.3	0.100	0.3
Molybdenum (Mo)	4.44	0.7	2.52	2.1	3.40	0.9	3.55	1.5
Nickel (Ni)	40.0	1.4	45.0	1.4	49.3	1.1	68.9	0.9
Phosphorus (P)	1,167	0.7	956	0.9	863	1.0	1,400	0.6
Potassium (K)	4,100	1.0	5,338	1.0	2,681	1.6	4,612	1.1
Selenium (Se)	0.73	0.5	0.61	0.5	1.0	0.4	1.0	0.3
Silver (Ag)	0.14	1.1	0.20	0.8	0.27	0.6	0.30	0.5
Sodium (Na)	304	0.8	369	0.8	249	0.9	342	0.8
Strontium (Sr)	11.6	0.8	12.3	0.9	7.20	1.3	11.4	1.0
Sulphur (S)	1,400	0.7	1,140	0.9	-	-	-	-
Thallium (Tl)	0.379	1.1	0.594	0.9	1.0	0.4	1.0	0.5
Tin (Sn)	<2.0	1.0	<2.0	1.0	-	-	-	-
Titanium (Ti)	1,006	0.9	1,136	1.1	-	-	-	-
Uranium (U)	11.0	0.6	19.7	0.3	-	-	-	-
Vanadium (V)	54.1	0.8	63.4	0.9	37.4	1.2	57.9	1.0
Zinc (Zn)	73.1	0.7	83.8	0.8	51.1	1.0	76.0	0.8
Zirconium (Zr)	4.5	2.2	3.9	1.8	-	-	-	-



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.

**Table D.28: Field Observations of Sediment Properties at Sheardown Lake Southeast (DLO-02) Benthic Stations<sup>a</sup>, Mary River Project CREMP, August 2020**

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia <sup>b</sup>	Plant or Algal Presence
DLO-02-11	7.0	brown silt overlying dark grey silt-clay; some organics present	none detected	none observed
DLO-02-10	7.0	brown silt overlying dark grey silt-clay; some organics present	none detected	none observed
DLO-02-4	8.0	brown silt overlying dark grey silt-clay	none detected	none observed
DLO-02-9	8.5	light brown silt overlying grey silt-clay	none detected	none observed
DLO-02-1	12.1	reddish brown thin layer at surface; medium brown compact silt with some fine sand intermixed	none detected	sparse algae (mare's eggs)
DLO-02-12	11.0	brown silt overlying dark grey silt-clay	none detected	none observed
DLO-02-8	13.0	brown silt overlying grey silt-clay	none detected	sparse algae
DLO-02-13	11.0	brown silt overlying grey silt-clay	none detected	sparse algae
DLO-02-2	15.0	brown silt overlying dark grey silt-clay; some organics present	none detected	sparse algae
DLO-02-3	13.2	reddish brown thin layer over medium brown to grey-brown compact silt	none detected	sparse macrophytes (bryophytes)

<sup>a</sup> Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

<sup>b</sup> Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

**Table D.29: Observations from Sediment Cores Collected at Sheardown Lake Southeast (DLO-02), Mary River Project CREMP, August 2020**

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
DLO-02-1	11.5	Littoral	1	7.5	reddish oxidized silt overlying grey brown silt; some black streaking
			2	11.0	
			3	11.0	
			4	11.0	
DLO-02-11	7.0	Littoral	1	18.5	brown silt flocc overlying compact grey silt containing some clay
			2	15.0	
			3	15.5	
			4	11.5	
DLO-02-4	8.8	Littoral	1	13.0	brown silt flocc overlying compact grey silt containing some clay
			2	13.5	
			3	19.5	
			4	12.0	
DLO-02-2	15.4	Profundal	1	7.0	brown silt flocc overlying compact grey silt containing some clay
			2	12.5	
			3	8.0	
			4	9.0	
DLO-02-3	13.0	Profundal	1	14.0	red-brown silt overlying grey-brown to dark grey-brown silt
			2	15.0	
			3	20.0	
			4	18.0	

**Table D.30: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Sheardown Lake Southeast (DLO-02) Sediment Stations, Mary River Project CREMP, August 2020**

Parameter		Units	Sediment Quality Guideline (SQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Sheardown Lake Southeast Basin Station					Summary Statistics		
					DLO-02-1	DLO-02-11	DLO-02-4	DLO-02-2	DLO-02-3	Mean	Standard Deviation	Standard Error
					(littoral)	(littoral)	(littoral)	(profundal)	(profundal)			
Non-metals	Sand	%	-	-	21.6	5.2	6.7	20.7	20.3	14.9	8.20	3.67
	Silt	%	-	-	68.9	77.4	77.8	69.8	67.5	72.3	4.93	2.20
	Clay	%	-	-	9.4	17.5	15.5	9.5	12.2	12.8	3.61	1.62
	Moisture	%	-	-	48.9	62.6	63.7	49.0	41.9	53.2	9.52	4.26
	Total Organic Carbon	%	10 <sup>α</sup>	-	1.89	0.39	0.74	1.39	0.92	1.07	0.585	0.262
Metals	Aluminum (Al)	mg/kg	-	-	16,200	17,600	18,400	16,200	18,900	17,460	1,240	555
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0	0
	Arsenic (As)	mg/kg	17	5.9	3.48	3.49	4.05	3.11	2.94	3.41	0.428	0.191
	Barium (Ba)	mg/kg	-	-	74.2	94.6	106	68.2	79.8	84.6	15.5	6.92
	Beryllium (Be)	mg/kg	-	-	0.81	0.84	0.96	0.78	0.89	0.86	0.071	0.032
	Bismuth (Bi)	mg/kg	-	-	0.21	0.27	0.25	<0.20	0.23	0.23	0.029	0.013
	Boron (B)	mg/kg	-	-	20.4	20.4	26.2	22.3	19.3	21.7	2.73	1.22
	Cadmium (Cd)	mg/kg	3.5	1.5	0.091	0.112	0.104	0.079	0.101	0.097	0.013	0.0057
	Calcium (Ca)	mg/kg	-	-	6,540	9,250	7,200	5,870	6,110	6,994	1,359	607.6
	Chromium (Cr)	mg/kg	90	79	69.3	<b>86.5</b>	<b>83.2</b>	74.0	70.5	76.7	7.73	3.46
	Cobalt (Co)	mg/kg	-	-	13.4	13.9	13.9	12.6	14.0	13.6	0.586	0.262
	Copper (Cu)	mg/kg	110	56	25.6	29.7	29.3	24.2	27.9	27.3	2.38	1.06
	Iron (Fe)	mg/kg	40,000 <sup>α</sup>	34,400	<b>49,500</b>	<b>36,900</b>	<b>41,800</b>	<b>37,000</b>	<b>46,900</b>	<b>42,420</b>	5,710	2,554
	Lead (Pb)	mg/kg	91.3	35	15.2	18.0	18.9	14.5	16.3	16.6	1.85	0.828
	Lithium (Li)	mg/kg	-	-	30.6	33.0	34.3	30.5	33.9	32.5	1.81	0.808
	Magnesium (Mg)	mg/kg	-	-	13,600	17,700	14,900	12,800	14,800	14,760	1,861	832
	Manganese (Mn)	mg/kg	1,100 <sup>α,β</sup>	657	<b>698</b>	<b>978</b>	<b>1,100</b>	645	559	<b>796</b>	231	103
	Mercury (Hg)	mg/kg	0.486	0.17	0.0217	0.0218	0.0210	0.0162	0.0245	0.0210	0.00302	0.00135
	Molybdenum (Mo)	mg/kg	-	-	1.78	1.22	1.49	1.27	1.53	1.46	0.225	0.100
	Nickel (Ni)	mg/kg	75 <sup>α,β</sup>	66	52.0	<b>69.0</b>	63.0	56.4	51.9	58.5	7.43	3.32
	Phosphorus (P)	mg/kg	2,000 <sup>α</sup>	1,278	1,020	942	1,050	946	912	974	58	26
	Potassium (K)	mg/kg	-	-	4,060	4,250	4,720	4,050	5,080	4,432	453	203
	Selenium (Se)	mg/kg	-	-	0.21	<0.20	<0.20	<0.20	0.21	0.20	0.0055	0.0024
	Silver (Ag)	mg/kg	-	-	0.11	0.12	0.12	0.11	0.13	0.12	0.0084	0.0037
	Sodium (Na)	mg/kg	-	-	247	282	308	270	251	272	24.8	11.1
	Strontium (Sr)	mg/kg	-	-	10.3	12.0	12.8	11.2	10.1	11.3	1.14	0.509
	Sulphur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	0	0
	Thallium (Tl)	mg/kg	-	-	0.349	0.432	0.465	0.338	0.389	0.395	0.0540	0.0242
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	0	0
	Titanium (Ti)	mg/kg	-	-	1,220	1,300	1,390	1,290	1,290	1,298	60.6	27.1
	Uranium (U)	mg/kg	-	-	5.22	4.54	5.34	4.39	5.32	4.96	0.459	0.205
	Vanadium (V)	mg/kg	-	-	46.6	52.1	54.3	47.1	49.4	49.9	3.29	1.47
	Zinc (Zn)	mg/kg	315	135	56.1	56.3	59.4	50.2	59.3	56.3	3.74	1.67
	Zirconium (Zr)	mg/kg	-	-	15.7	18.0	19.2	16.6	19.1	17.7	1.54	0.689

Indicates parameter concentration above Sediment Quality Guideline (SQG).

**BOLD**

 Indicates parameter concentration above the AEMP Benchmark.

Note: "-" indicates no SQG applicable.

<sup>a</sup> 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]).

<sup>b</sup> 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: Statistical Comparison of Sediment Physical Properties Between Sheardown Lake SE and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**




Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size ( n )	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	tequal	log10	YES	0.004	Reference	5	29.6	7.5	3.4	23.4	40.4
						Sheardown SE	5	11.1	6.7	3.0	5.2	21.6
	Silt-Sized Material (%)	tequal	none	YES	0.009	Reference	5	62.2	6.3	2.8	53.4	68.4
						Sheardown SE	5	75.0	5.5	2.5	68.9	81.5
	Clay-Sized Material (%)	tequal	none	YES	0.029	Reference	5	8.2	3.0	1.3	6.2	13.4
						Sheardown SE	5	13.9	3.7	1.7	9.4	17.5
	Moisture (%)	tequal	none	YES	0.001	Reference	5	87.9	4.6	2.1	80.2	92.3
						Sheardown SE	5	60.9	7.3	3.3	48.9	68.6
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.008	Reference	5	4.8	2.0	0.9	2.3	7.0
						Sheardown SE	5	1.4	0.8	0.4	0.4	2.3
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	none	NO	0.146	Reference	5	31.6	22.3	10.0	13.9	56.6
						Sheardown SE	5	15.1	5.3	2.4	8.3	20.7
	Silt-Sized Material (%)	tequal	none	NO	0.112	Reference	5	57.4	18.1	8.1	36.9	71.9
						Sheardown SE	5	72.2	4.0	1.8	67.5	76.6
	Clay-Sized Material (%)	tequal	none	NO	0.477	Reference	5	11.0	4.3	1.9	6.3	15.1
						Sheardown SE	5	12.7	2.8	1.2	9.5	15.6
	Moisture (%)	tequal	none	YES	0.001	Reference	5	82.6	3.6	1.6	78.3	86.6
						Sheardown SE	5	55.8	11.8	5.3	41.9	70.7
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.002	Reference	5	3.4	1.1	0.5	2.2	4.5
						Sheardown SE	5	1.1	0.6	0.2	0.2	1.6

Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.10.

<sup>a</sup> Statistical tests included tequal (t-test assuming equal variance), tunequal (t-test assuming unequal variance), and M-W (Mann-Whitney U-test).

**Table D.32: Magnitude of Elevation in Sediment Metal Concentrations between Sheardown Lake SE and Reference Lake 3 2020 Data, and between Sheardown Lake SE 2020 and Baseline Data, Mary River Project CREMP, 2020**

Parameter	Sheardown Lake SE versus Reference Lake 3 in 2020				Sheardown Lake SE 2020 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)	16,880	1.0	21,800	0.8	14,950	1.2	13,133	1.3
Antimony (Sb)	<0.10	1.0	<0.10	1.0	1.0	0.1	1.0	0.1
Arsenic (As)	3.53	1.0	4.07	0.7	1.85	2.0	1.53	2.0
Barium (Ba)	117	0.8	122	0.6	80.5	1.1	64.3	1.2
Beryllium (Be)	0.65	1.3	0.80	1.0	1.0	0.9	1.0	0.8
Bismuth (Bi)	<0.20	1.2	<0.20	1.1	-	-	-	-
Boron (B)	12.2	1.8	14.7	1.4	2.50	8.9	1.35	15.4
Cadmium (Cd)	0.173	0.6	0.148	0.6	0.500	0.2	0.625	0.1
Calcium (Ca)	5,608	1.4	5,010	1.2	6,310	1.2	8,925	0.7
Chromium (Cr)	54.3	1.5	65.0	1.1	78.0	1.0	72.3	1.0
Cobalt (Co)	10.8	1.3	15.2	0.9	12.5	1.1	12.0	1.1
Copper (Cu)	71.4	0.4	83.8	0.3	29.5	1.0	24.5	1.1
Iron (Fe)	50,600	0.8	45,080	0.9	32,284	1.3	29,117	1.4
Lead (Pb)	13.8	1.3	16.7	0.9	17.0	1.0	13.8	1.1
Lithium (Li)	26.0	1.3	33.7	1.0	-	-	-	-
Magnesium (Mg)	11,440	1.3	14,180	1.0	12,634	1.2	13,742	1.0
Manganese (Mn)	579	1.6	1,230	0.5	462	2.0	410	1.5
Mercury (Hg)	0.0500	0.4	0.0583	0.3	0.100	0.2	0.100	0.2
Molybdenum (Mo)	4.44	0.3	2.52	0.6	1.5	1.0	1.0	1.4
Nickel (Ni)	40.0	1.5	45.0	1.2	61.5	1.0	62.0	0.9
Phosphorus (P)	1,167	0.9	956	1.0	1,150	0.9	950	1.0
Potassium (K)	4,100	1.1	5,338	0.9	3,947	1.1	3,317	1.4
Selenium (Se)	0.73	0.3	0.61	0.3	1.0	0.2	1.0	0.2
Silver (Ag)	0.14	0.8	0.20	0.6	0.42	0.3	0.31	0.4
Sodium (Na)	304	0.9	369	0.7	353	0.8	330	0.8
Strontium (Sr)	11.6	1.0	12.3	0.9	16.0	0.7	11.0	1.0
Sulphur (S)	1,400	0.7	1,140	0.9	-	-	-	-
Thallium (Tl)	0.379	1.1	0.594	0.6	1.0	0.4	1.0	0.4
Tin (Sn)	<2.0	1.0	<2.0	1.0	-	-	-	-
Titanium (Ti)	1,006	1.3	1,136	1.1	-	-	-	-
Uranium (U)	11.0	0.5	19.7	0.2	-	-	-	-
Vanadium (V)	54.1	0.9	63.4	0.8	52.0	1.0	44.3	1.1
Zinc (Zn)	73.1	0.8	83.8	0.7	51.0	1.1	50.8	1.1
Zirconium (Zr)	4.5	3.9	3.9	4.5	-	-	-	-

 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.

**Table D.33: Deposited Sediment Field Sampling Observations at Mary River Study Areas<sup>a</sup>, Mary River Project CREMP, August 2020**

Study Area	Station	Texture of Collected Sediment	Silt Presence <sup>b</sup>
<b>GO-09 Upstream Reference</b>	GO-09-1	medium (sized) coarse sand and gravel	precipitate and deposits (<1 mm )
	GO-09-3	medium (sized) coarse sand and gravel	precipitate and deposits (<1 mm )
	GO-09-5	medium (sized) coarse sand and gravel	precipitate and deposits (<1 mm )
<b>GO-03 Upstream</b>	GO-03-1	medium (sized) coarse sand and gravel	none observed
	GO-03-3	coarse sand and gravel	none observed
	GO-03-5	coarse sand and gravel	none observed
<b>EO-01 Upper Mine-Exposed</b>	EO-01-1	gravel	none observed
	EO-01-3	gravel and coarse sand	none observed
	EO-01-5	medium (sized) coarse sand	none observed
<b>EO-20 Middle Mine-Exposed</b>	EO-20-1	medium (sized) coarse sand	precipitate and deposits (<1 mm complex with periphyton)
	EO-20-3	medium (sized) coarse sand	none observed
	EO-20-5	medium (sized) coarse sand	none observed
<b>CO-05 Lower Mine-Exposed</b>	CO-05-1	medium (sized) coarse sand	none observed
	CO-05-3	medium (sized) coarse sand	none observed
	CO-05-5	medium (sized) coarse sand	none observed

<sup>a</sup> Sediment samples collected using a stainless steel scoop directly from the streambed or shoreline, as available.

<sup>b</sup> Silt observations described as fine material present on the surface of in-stream substrate and/or as interstitial deposits, occurring unusually.



**Table D.34: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River GO-09 Reference Stations, Mary River Project CREMP, August 2020**

Analyte	Units	SQG <sup>a</sup>	Mary River GO-09 Reference Station			Study Area Summary Statistics		
			GO-09-B1	GO-09-B3	GO-09-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	0.12	<0.10	0.12	0.11	0.012	0.0067
Aluminum (Al)	µg/g	-	3,930	1,650	2,690	2,757	1,141	659
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.45	0.26	0.43	0.38	0.10	0.060
Barium (Ba)	µg/g	-	17.7	7.61	12.4	12.6	5.05	2.91
Beryllium (Be)	µg/g	-	0.18	<0.10	0.13	0.14	0.040	0.023
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	6.3	<5.0	<5.0	5.4	0.75	0.43
Cadmium (Cd)	µg/g	3.5	<0.020	<0.020	<0.020	<0.020	0	0
Calcium (Ca)	µg/g	-	3,540	1,780	2,930	2,750	894	516
Chromium (Cr)	µg/g	90	16.8	8.68	15.4	13.6	4.34	2.51
Cobalt (Co)	µg/g	-	3.09	1.59	2.53	2.40	0.758	0.438
Copper (Cu)	µg/g	197	7.18	2.28	3.90	4.45	2.50	1.44
Iron (Fe)	µg/g	40,000 <sup>α</sup>	11,400	8,490	13,300	11,063	2,423	1,399
Lead (Pb)	µg/g	91.3	3.96	2.25	3.01	3.07	0.857	0.495
Lithium (Li)	µg/g	-	7.4	2.9	4.8	5.0	2.3	1.3
Magnesium (Mg)	µg/g	-	4,060	1,640	2,730	2,810	1,212	700
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	104	45.4	77.8	75.7	29.4	16.9
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	<0.0050	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	0.14	<0.10	<0.10	0.11	0.023	0.013
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	8.04	4.06	6.22	6.11	1.99	1.15
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	371	223	456	350	118	68
Potassium (K)	µg/g	-	1,080	440	730	750	320	185
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	91	<50	64	68	21	12
Strontium (Sr)	µg/g	-	5.61	3.62	4.92	4.72	1.01	0.583
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.093	<0.050	0.060	0.068	0.023	0.013
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	472	226	362	353	123	71
Uranium (U)	µg/g	-	1.22	0.625	0.922	0.922	0.298	0.172
Vanadium (V)	µg/g	-	20.4	14.0	24.0	19.5	5.06	2.92
Zinc (Zn)	µg/g	315	14.5	5.90	10.6	10.3	4.31	2.49
Zirconium (Zr)	µg/g	-	7.8	3.9	5.6	5.8	2.0	1.1

 Indicates parameter concentration above SQG.

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

<sup>a</sup> Canadian SQG for the protection of aquatic life probable effects level (PEL; CCME 2020) except α = Ontario Provincial Sediment Quality Guideline (PSQF) 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 GO-03 Upstream Stations, Mary River Project CREMP, August 2020**

Analyte	Units	SQG <sup>a</sup>	Mary River GO-03 Upstream Station			Study Area Summary Statistics		
			GO-03-B1	GO-03-B3	GO-03-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>a</sup>	<0.10	0.12	<0.10	0.11	0.012	0.0067
Aluminum (Al)	µg/g	-	1,480	2,780	1,740	2,000	688	397
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.400	0.470	2.42	1.10	1.15	0.662
Barium (Ba)	µg/g	-	7.35	12.9	7.92	9.4	3.05	1.76
Beryllium (Be)	µg/g	-	<0.10	0.14	<0.10	<0.10	0	0
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	<5.0	<5.0	<5.0	<5.0	0	0
Cadmium (Cd)	µg/g	3.5	<0.020	<0.020	<0.020	<0.020	0	0
Calcium (Ca)	µg/g	-	2,350	2,030	1,860	2,080	249	144
Chromium (Cr)	µg/g	90	13.1	17.5	10.6	13.7	3.49	2.02
Cobalt (Co)	µg/g	-	1.67	2.50	1.71	1.96	0.468	0.270
Copper (Cu)	µg/g	197	2.07	3.93	2.34	2.78	1.01	0.580
Iron (Fe)	µg/g	40,000 <sup>a</sup>	13,000	17,000	10,900	13,633	3,099	1,789
Lead (Pb)	µg/g	91.3	2.37	3.39	2.45	2.74	0.567	0.327
Lithium (Li)	µg/g	-	2.7	4.8	2.9	<2.0	1.2	0.67
Magnesium (Mg)	µg/g	-	1,610	2,240	1,530	1,793	389	225
Manganese (Mn)	µg/g	1,100 <sup>a,β</sup>	47.7	74.8	53.3	58.6	14.3	8.26
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	0.0051	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Nickel (Ni)	µg/g	75 <sup>a,β</sup>	4.22	6.12	4.15	4.83	1.12	0.645
Phosphorus (P)	µg/g	2,000 <sup>a</sup>	458	369	372	400	51	29
Potassium (K)	µg/g	-	360	720	440	507	189	109
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	<50	65	50	55	8.7	5.0
Strontium (Sr)	µg/g	-	3.78	4.13	4.05	3.99	0.183	0.106
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	<0.050	0.060	<0.050	<0.050	0	0
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	241	320	228	263	50	29
Uranium (U)	µg/g	-	0.732	1.05	0.684	0.822	0.199	0.115
Vanadium (V)	µg/g	-	22.8	29.2	19.5	23.8	4.93	2.85
Zinc (Zn)	µg/g	315	6.1	10.4	6.8	7.8	2.3	1.3
Zirconium (Zr)	µg/g	-	3.4	6.0	3.7	4.4	1.4	0.82

 Indicates parameter concentration above SQG.

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

<sup>a</sup> 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: 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 2020**

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	%	0.11	0.9	1.0	1.6	1.0
Aluminum (Al)	µg/g	2,757	0.7	0.9	1.5	0.9
Antimony (Sb)	µg/g	<0.10	1.0	1.0	1.0	1.0
Arsenic (As)	µg/g	0.38	2.9	1.1	1.6	1.0
Barium (Ba)	µg/g	12.6	0.7	0.9	1.6	0.8
Beryllium (Be)	µg/g	0.14	0.8	0.8	1.7	1.0
Bismuth (Bi)	µg/g	<0.20	1.0	1.2	1.5	1.0
Boron (B)	µg/g	5.4	0.9	0.9	1.2	0.9
Cadmium (Cd)	µg/g	<0.020	1.0	1.3	1.9	1.0
Calcium (Ca)	µg/g	2,750	0.8	0.9	1.0	0.7
Chromium (Cr)	µg/g	13.6	1.0	1.4	1.9	1.0
Cobalt (Co)	µg/g	2.40	0.8	1.1	1.6	1.0
Copper (Cu)	µg/g	4.45	0.6	0.9	1.7	0.7
Iron (Fe)	µg/g	11,063	1.2	1.5	1.7	0.6
Lead (Pb)	µg/g	3.07	0.9	0.9	1.4	0.7
Lithium (Li)	µg/g	5.0	0.7	0.7	1.3	1.0
Magnesium (Mg)	µg/g	2,810	0.6	0.9	1.6	1.2
Manganese (Mn)	µg/g	75.7	0.8	1.1	1.8	1.0
Mercury (Hg)	µg/g	<0.0050	1.0	1.0	1.0	1.0
Molybdenum (Mo)	µg/g	0.11	0.9	1.8	3.2	1.1
Nickel (Ni)	µg/g	6.11	0.8	1.4	2.7	2.3
Phosphorus (P)	µg/g	350	1.1	1.1	1.1	0.8
Potassium (K)	µg/g	750	0.7	0.8	1.6	0.7
Selenium (Se)	µg/g	<0.20	1.0	1.0	1.0	1.0
Silver (Ag)	µg/g	<0.10	1.0	1.0	1.3	1.0
Sodium (Na)	µg/g	68	0.8	0.7	1.0	0.8
Strontium (Sr)	µg/g	4.72	0.8	0.8	1.0	0.7
Sulphur (S)	µg/g	<1,000	1.0	1.0	1.0	1.0
Thallium (Tl)	µg/g	0.068	0.8	0.7	1.3	0.8
Tin (Sn)	µg/g	<2.0	1.0	1.0	1.0	1.0
Titanium (Ti)	µg/g	353	0.7	0.8	1.1	0.7
Uranium (U)	µg/g	0.922	0.9	0.9	1.2	0.8
Vanadium (V)	µg/g	19.5	1.2	1.2	1.3	0.5
Zinc (Zn)	µg/g	10.3	0.8	1.0	1.6	0.9
Zirconium (Zr)	µg/g	5.8	0.8	0.7	1.0	0.5



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

**Table D.37: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River EO-01 Mine-Exposed Stations, Mary River Project CREMP, August 2020**

Analyte	Units	SQG <sup>a</sup>	Mary River Mine-Exposed Area Station			Study Area Summary Statistics		
			EO-01-B1	EO-01-B3	EO-01-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	0.11	0.12	0.10	0.11	0.010	0.0058
Aluminum (Al)	µg/g	-	2,500	1,930	2,790	2,407	438	253
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.48	0.39	0.37	0.41	0.059	0.034
Barium (Ba)	µg/g	-	12.1	9.12	12.7	11.3	1.92	1.11
Beryllium (Be)	µg/g	-	0.12	<0.10	0.11	0.11	0.010	0.006
Bismuth (Bi)	µg/g	-	<0.20	0.33	<0.20	<0.20	0	0
Boron (B)	µg/g	-	<5.0	<5.0	<5.0	<5.0	0	0
Cadmium (Cd)	µg/g	3.5	<0.020	0.030	0.028	<0.020	0	0
Calcium (Ca)	µg/g	-	2,250	2,850	1,960	2,353	454	262
Chromium (Cr)	µg/g	90	31.1	11.0	14.1	18.7	10.8	6.25
Cobalt (Co)	µg/g	-	3.49	1.81	2.43	2.58	0.850	0.490
Copper (Cu)	µg/g	197	3.88	3.97	4.29	4.05	0.215	0.124
Iron (Fe)	µg/g	40,000 <sup>α</sup>	33,000	7,880	9,970	16,950	13,939	8,048
Lead (Pb)	µg/g	91.3	3.30	2.36	2.69	2.78	0.477	0.275
Lithium (Li)	µg/g	-	3.6	2.8	3.9	3.4	0.57	0.33
Magnesium (Mg)	µg/g	-	2,650	2,370	2,870	2,630	251	145
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	113	62.9	80.2	85.4	25.4	14.7
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	<0.0050	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	0.29	0.12	0.20	0.20	0.085	0.049
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	10.3	6.24	8.28	8.27	2.03	1.17
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	336	537	277	383	136	79
Potassium (K)	µg/g	-	670	470	710	617	129	74
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	<50	<50	<50	<50	0	0
Strontium (Sr)	µg/g	-	3.83	4.08	3.34	3.75	0.376	0.217
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	<0.050	<0.050	<0.050	0.050	0	0
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	317	276	290	294	21	12
Uranium (U)	µg/g	-	0.999	0.638	0.719	0.785	0.189	0.109
Vanadium (V)	µg/g	-	43.8	10.9	13.3	22.7	18.3	10.6
Zinc (Zn)	µg/g	315	11.1	9.10	10.6	10.3	1.04	0.601
Zirconium (Zr)	µg/g	-	4.1	3.2	4.0	3.8	0.49	0.28

 Indicates parameter concentration above SQG.

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

<sup>a</sup> 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: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River EO-20 Mine-Exposed Stations, Mary River Project CREMP, August 2020**

Analyte	Units	SQG <sup>a</sup>	Mary River Mine-Exposed Area Station			Study Area Summary Statistics		
			EO-20-B1	EO-20-B3	EO-20-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>α</sup>	0.30	<0.10	0.16	0.19	0.10	0.059
Aluminum (Al)	µg/g	-	6,940	2,170	3,540	4,217	2,456	1,418
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.75	0.58	0.52	0.62	0.12	0.069
Barium (Ba)	µg/g	-	30.5	11.1	20.4	20.7	9.70	5.60
Beryllium (Be)	µg/g	-	0.46	0.11	0.14	0.24	0.19	0.11
Bismuth (Bi)	µg/g	-	0.51	<0.20	<0.20	0.30	0.18	0.10
Boron (B)	µg/g	-	10.0	<5.0	<5.0	6.67	2.89	1.67
Cadmium (Cd)	µg/g	3.5	0.061	0.030	0.023	0.038	0.020	0.012
Calcium (Ca)	µg/g	-	4,210	2,270	2,180	2,887	1,147	662
Chromium (Cr)	µg/g	90	27.6	30.5	20.1	26.1	5.37	3.10
Cobalt (Co)	µg/g	-	5.26	3.04	3.33	3.88	1.21	0.697
Copper (Cu)	µg/g	197	9.65	7.44	5.11	7.40	2.27	1.31
Iron (Fe)	µg/g	40,000 <sup>α</sup>	12,900	25,700	19,100	19,233	6,401	3,696
Lead (Pb)	µg/g	91.3	5.89	2.98	3.94	4.27	1.48	0.856
Lithium (Li)	µg/g	-	11.4	3.10	4.50	6.33	4.44	2.57
Magnesium (Mg)	µg/g	-	7,380	2,170	3,770	4,440	2,669	1,541
Manganese (Mn)	µg/g	1,100 <sup>α,β</sup>	180	105	125	137	39	22
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	<0.0050	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	0.54	0.15	0.39	0.36	0.20	0.11
Nickel (Ni)	µg/g	75 <sup>α,β</sup>	23.9	12.2	14.0	16.7	6.30	3.64
Phosphorus (P)	µg/g	2,000 <sup>α</sup>	376	452	300	376	76	44
Potassium (K)	µg/g	-	1,820	520	1,160	1,167	650	375
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	0.18	<0.10	<0.10	0.13	0.046	0.027
Sodium (Na)	µg/g	-	100	<50	<50	67	29	17
Strontium (Sr)	µg/g	-	6.54	4.31	3.22	4.69	1.69	0.98
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.140	<0.050	0.068	0.086	0.048	0.027
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	549	309	330	396	133	77
Uranium (U)	µg/g	-	1.45	0.805	1.02	1.09	0.328	0.190
Vanadium (V)	µg/g	-	18.7	37.1	21.9	25.9	9.83	5.68
Zinc (Zn)	µg/g	315	25.4	9.70	15.9	17.0	7.91	4.57
Zirconium (Zr)	µg/g	-	9.2	4.9	3.1	5.7	3.1	1.8

 Indicates parameter concentration above SQG.

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

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

**Table D.39: Deposited Sediment Total Organic Carbon and Metal Concentrations at Mary River Downstream (CO-05) Stations, Mary River Project CREMP, August 2020**

Analyte	Units	SQG <sup>a</sup>	Mary River Downstream Mine-Exposed Area Station			Study Area Summary Statistics		
			CO-05-B1	CO-05-B3	CO-05-B5	Mean	Standard Deviation	Standard Error
Total Organic Carbon	%	10 <sup>a</sup>	0.12	<0.10	0.13	<0.10	0	0
Aluminum (Al)	µg/g	-	2,810	964	3,630	2,468	1,366	788
Antimony (Sb)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Arsenic (As)	µg/g	17	0.33	0.12	0.66	0.37	0.27	0.16
Barium (Ba)	µg/g	-	12.9	3.90	13.9	10.2	5.51	3.18
Beryllium (Be)	µg/g	-	0.11	<0.10	0.18	0.13	0.044	0.025
Bismuth (Bi)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Boron (B)	µg/g	-	<5.0	<5.0	<5.0	<5.0	0	0
Cadmium (Cd)	µg/g	3.5	<0.020	<0.020	<0.020	<0.020	0	0
Calcium (Ca)	µg/g	-	2,340	539	3,260	2,046	1,384	799
Chromium (Cr)	µg/g	90	12.0	4.41	25.9	14.1	10.9	6.29
Cobalt (Co)	µg/g	-	2.44	0.81	3.70	2.32	1.45	0.84
Copper (Cu)	µg/g	197	3.27	1.24	4.91	3.14	1.84	1.06
Iron (Fe)	µg/g	40,000 <sup>a</sup>	7,270	1,960	10,100	6,443	4,132	2,386
Lead (Pb)	µg/g	91.3	2.45	1.23	3.21	2.30	1.00	0.577
Lithium (Li)	µg/g	-	4.7	<2.0	7.7	4.80	2.85	1.65
Magnesium (Mg)	µg/g	-	3,380	1,010	5,750	3,380	2,370	1,368
Manganese (Mn)	µg/g	1,100 <sup>a,β</sup>	83.5	27.1	107	72.5	41.1	23.7
Mercury (Hg)	µg/g	0.486	<0.0050	<0.0050	<0.0050	<0.0050	0	0
Molybdenum (Mo)	µg/g	-	0.12	<0.10	0.15	<0.10	0	0
Nickel (Ni)	µg/g	75 <sup>a,β</sup>	9.68	4.22	28.7	14.2	12.9	7.42
Phosphorus (P)	µg/g	2,000 <sup>a</sup>	271	103	436	270	167	96
Potassium (K)	µg/g	-	630	180	740	517	297	171
Selenium (Se)	µg/g	-	<0.20	<0.20	<0.20	<0.20	0	0
Silver (Ag)	µg/g	-	<0.10	<0.10	<0.10	<0.10	0	0
Sodium (Na)	µg/g	-	<50	<50	71	<50	12	7
Strontium (Sr)	µg/g	-	3.36	1.94	4.54	3.28	1.30	0.752
Sulphur (S)	µg/g	-	<1,000	<1,000	<1,000	<1,000	0	0
Thallium (Tl)	µg/g	-	0.054	<0.050	0.062	0.055	0.0061	0.0035
Tin (Sn)	µg/g	-	<2.0	<2.0	<2.0	<2.0	0	0
Titanium (Ti)	µg/g	-	321	93.2	350	255	141	81.2
Uranium (U)	µg/g	-	0.577	0.227	1.37	0.725	0.586	0.338
Vanadium (V)	µg/g	-	10.5	3.19	14.1	9.26	5.56	3.21
Zinc (Zn)	µg/g	315	10.1	3.30	14.1	9.17	5.46	3.15
Zirconium (Zr)	µg/g	-	3.2	1.5	4.5	3.1	1.5	0.87

 Indicates parameter concentration above SQG).

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

<sup>a</sup> 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.40: Field Observations of Sediment Properties at Mary Lake (BLO) Benthic Stations<sup>a</sup>, Mary River Project CREMP, August 2020**

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia <sup>b</sup>	Plant or Algal Presence
BLO-01	10.0	brown silt on top of grey silt, some sand intermixed	none detected	none observed
BLO-11	9.3	grey-brown silt with sand intermixed	none detected	none observed
BLO-7	12.8	brown silt	none detected	none observed
BLO-6	6.7	brown silt	none detected	none observed
BLO-3	16.4	red-brown oxidized surface layer over grey-brown silty-sand	none detected	none observed
BLO-15	29.1	red-brown oxidized surface layer over grey-brown silt	none detected	none observed
BLO-14	20.0	brown silt, some sand intermixed	none detected	none observed
BLO-13	22.0	brown silt	none detected	none observed
BLO-4	22.0	brown silt	none detected	none observed
BLO-5	21.5	brown silt	none detected	none observed

<sup>a</sup> Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

<sup>b</sup> Evidence of anoxic sediments assessed visually as the presence of blackened substrate, and by smell based on presence/strength of hydrogen sulphide odour.

**Table D.41: Observations from Sediment Cores Collected at Mary Lake (BLO), Mary River Project CREMP, August 2020**

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
BLO-01	10.0	Littoral	1	7.0	brown silt floc overlying grey silt intermixed with sand; black streaking in upper layer
			2	12.0	
			3	9.5	
			4	11.5	
BLO-16	30.5	Profundal	1	31.0	reddish oxidized silt overlying medium brown silt that becomes more consolidated with depth; no black streaking
			2	36.0	
			3	25.0	
			4	33.0	
BLO-03	16.0	Profundal	1	16.0	reddish brown silty sand overlying medium brown sandy silt; possible redox boundary between layers but no black streaking
			2	19.0	
			3	21.0	
			4	20.5	
BLO-14	20.0	Profundal	1	26.0	reddish brown silt overlying medium brown silt with fine sand intermixed; black streaking present
			2	22.0	
			3	23.0	
			4	19.0	
BLO-12	20.0	Profundal	1	14.0	reddish brown silt overlying medium brown silt, possibly reduced between layers; some black streaking present
			2	10.0	
			3	22.0	
			4	11.5	
BLO-04	19.5	Profundal	1	15.0	reddish brown silt overlying grey-brown silt that becomes more consolidated with depth; some black streaking present
			2	23.5	
			3	18.5	
			4	7.0	
BLO-10	19.0	Profundal	1	11.0	light brown silt floc overlying grey-brown silt
			2	11.0	
			3	12.0	
			4	11.5	
BLO-09	29.0	Profundal	1	11.0	red-brown silt floc overlying grey-brown silt; black streaking in upper layer
			2	6.5	
			3	10.0	
			4	16.5	
BLO-08	26.0	Profundal	1	10.5	light brown silt floc overlying consolidated grey-brown silt.
			2	12.5	
			3	11.5	
			4	9.0	
BLO-06	6.0	Littoral	1	10.0	light brown silt
			2	9.5	
			3	7.5	
			4	10.5	



**Table D.42: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Mary Lake (BLO) Sediment Stations, Mary River Project CREMP, August 2020**

Analyte		Units	Sediment Quality Guideline (SQG) <sup>a</sup>	AEMP Benchmark <sup>b</sup>	Mary Lake Stations										Summary Statistics		
					BLO-01 (littoral)	BLO-16 (profundal)	BLO-03 (profundal)	BLO-14 (profundal)	BLO-12 (profundal)	BLO-04 (profundal)	BLO-10 (profundal)	BLO-09 (profundal)	BLO-08 (profundal)	BLO-06 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	21.6	22.2	91.9	21.2	24.3	23.6	4.5	5.6	2.3	6.8	22.4	26.0	8.22
	Silt	%	-	-	69.9	46.7	6.0	45.5	61.7	55.5	62.7	65.1	64.8	63.8	54.2	18.7	5.92
	Clay	%	-	-	8.5	31.1	2.1	33.2	14.0	20.9	32.8	29.4	32.9	29.4	23.4	11.43	3.62
	Moisture	%	-	-	40.9	57.5	16.6	66.8	37.8	51.3	43.5	51.1	53.5	67.3	48.6	15.0	4.74
	Total Organic Carbon	%	10 <sup>α</sup>	-	1.31	1.49	0.22	0.93	0.68	0.54	0.46	0.38	0.65	0.68	0.73	0.40	0.13
Metals	Aluminum (Al)	mg/kg	-	-	15,000	24,200	9,230	30,100	20,700	20,600	25,500	22,600	28,000	29,600	22,553	6,578	2,080
	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	0
	Arsenic (As)	mg/kg	17	5.9	4.82	4.01	1.47	4.04	2.33	2.63	3.18	3.67	3.42	3.47	3.30	0.960	0.304
	Barium (Ba)	mg/kg	-	-	79.2	99.9	36.7	110	74.8	74.5	96.4	102	96.3	104	87.4	21.8	6.90
	Beryllium (Be)	mg/kg	-	-	0.72	1.17	0.42	1.38	0.91	0.86	1.14	1.03	1.25	1.33	1.02	0.299	0.0945
	Bismuth (Bi)	mg/kg	-	-	<0.20	0.25	<0.20	0.25	0.26	0.21	0.23	0.23	0.26	0.23	0.23	0.023	0.0073
	Boron (B)	mg/kg	-	-	18.9	31.8	15.5	45.2	24.2	25.7	31.0	25.6	42.0	43.9	30.4	10.4	3.29
	Cadmium (Cd)	mg/kg	3.5	1.5	0.108	0.156	0.066	0.186	0.128	0.109	0.151	0.144	0.162	0.145	0.136	0.0340	0.0108
	Calcium (Ca)	mg/kg	-	-	7,720	3,950	1,890	4,810	4,460	4,350	4,710	4,490	5,040	5,310	4,673	1,426	451
	Chromium (Cr)	mg/kg	90	98	60.6	83.4	31.1	93.0	75.5	82.1	86.3	87.8	97.7	94.1	79.2	19.9	6.31
	Cobalt (Co)	mg/kg	-	-	14.0	16.1	6.93	19.9	14.8	14.7	17.4	17.7	18.7	18.7	15.9	3.71	1.17
	Copper (Cu)	mg/kg	110	50	27.8	37.4	11.8	39.2	28.2	28.7	35.0	32.7	37.0	36.0	31.4	8.02	2.54
	Iron (Fe)	mg/kg	40,000 <sup>α</sup>	52,400	34,500	41,000	18,800	47,000	40,000	35,200	42,300	43,400	44,400	46,600	39,320	8,352	2,641
	Lead (Pb)	mg/kg	91.3	35	14.5	23.8	8.25	26.5	17.1	18.7	24.6	21.6	24.2	25.5	20.5	5.82	1.84
	Lithium (Li)	mg/kg	-	-	29.2	45.8	15.8	51.5	33.6	35.5	46.8	39.8	47.0	50.7	39.6	11.2	3.55
	Magnesium (Mg)	mg/kg	-	-	14,500	16,500	5,870	18,800	15,400	14,900	17,200	16,200	18,500	18,700	15,657	3,777	1,194
	Manganese (Mn)	mg/kg	1,100 <sup>α,β</sup>	4,370	1,350	407	1,490	955	835	617	2,490	4,980	1,770	778	1,567	1,349	427
	Mercury (Hg)	mg/kg	0.486	0.17	0.0293	0.0823	0.0264	0.0814	0.0344	0.0393	0.0539	0.0430	0.0612	0.0541	0.0505	0.0199	0.00630
	Molybdenum (Mo)	mg/kg	-	-	0.52	0.70	0.51	0.80	1.31	0.73	1.37	1.29	1.12	0.92	0.927	0.326	0.103
	Nickel (Ni)	mg/kg	75 <sup>α,β</sup>	72	51.7	63.4	23.8	66.3	54.8	58.8	60.0	66.4	69.0	62.0	57.6	13.03	4.12
	Phosphorus (P)	mg/kg	2,000 <sup>α</sup>	1,580	1,100	1,050	449	917	876	857	791	1,020	876	849	879	181	57
	Potassium (K)	mg/kg	-	-	3,470	6,180	2,150	7,780	5,020	5,120	6,410	5,590	7,230	7,650	5,660	1,813	573
	Selenium (Se)	mg/kg	-	-	<0.20	0.26	<0.20	0.34	<0.20	<0.20	0.21	0.23	0.24	0.26	0.23	0.045	0.014
	Silver (Ag)	mg/kg	-	-	<0.10	0.17	<0.10	0.17	0.14	0.14	0.16	0.15	0.17	0.16	0.15	0.027	0.008
	Sodium (Na)	mg/kg	-	-	238	393	147	434	290	335	405	383	448	453	353	100	32
	Strontium (Sr)	mg/kg	-	-	11.1	16.5	6.70	17.1	11.2	12.4	14.3	13.4	16.4	16.7	13.6	3.33	1.052
	Sulphur (S)	mg/kg	-	-	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	0	0
	Thallium (Tl)	mg/kg	-	-	0.298	0.484	0.194	0.609	0.392	0.417	0.571	0.484	0.539	0.603	0.459	0.136	0.0429
	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	-	-	978	1,340	608	1,760	1,470	1,470	1,710	1,500	1,870	1,970	1,468	416	131
	Uranium (U)	mg/kg	-	-	3.35	7.96	3.43	9.89	6.22	6.29	8.49	6.55	8.19	8.48	6.89	2.17	0.686
	Vanadium (V)	mg/kg	-	-	48.0	68.0	26.0	80.0	55.0	57.1	69.6	63.5	74.4	78.6	62.0	16.4	5.18
	Zinc (Zn)	mg/kg	315	135	48.1	73.1	27.6	85.4	63.8	62.0	78.6	69.1	79.9	86.2	67.4	18.2	5.77
	Zirconium (Zr)	mg/kg	-	-	10.4	23.5	6.4	23.0	16.9	22.1	25.1	20.4	25.5	25.9	19.9	6.70	2.12

Indicates parameter concentration above Sediment Quality Guideline (SQG).

**BOLD** Indicates parameter concentration above the AEMP Benchmark.


Note: "-" indicates no SQG applicable.

<sup>a</sup> 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]).

<sup>b</sup> AEMP Sediment Quality Benchmarks developed by Intrinsic (2013) using sediment quality guidelines, background sediment quality data, and method detection limits. The indicated values are specific to Mary Lake.

**Table D.43: Statistical Comparison of Sediment Physical Properties Between Mary Lake and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2020**

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis <sup>a</sup>	Transformation	Significant Difference Between Areas?	P-value	Study Lake	Sample Size ( n )	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Littoral (Shallow) Stations	Sand-Sized Material (%)	tequal	log10	NO	0.310	Reference	5	29.6	7.5	3.4	23.4	40.4
						Mary	4	28.1	34.5	17.2	5.2	78.6
	Silt-Sized Material (%)	tequal	none	NO	0.459	Reference	5	62.2	6.3	2.8	53.4	68.4
						Mary	4	53.6	24.0	12.0	18.0	69.9
	Clay-Sized Material (%)	tunequal	none	NO	0.258	Reference	5	8.2	3.0	1.3	6.2	13.4
						Mary	4	18.3	14.5	7.2	3.4	32.0
	Moisture (%)	tunequal	none	YES	0.031	Reference	5	87.9	4.6	2.1	80.2	92.3
						Mary	4	50.7	19.9	10.0	27.3	67.3
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.005	Reference	5	4.8	2.0	0.9	2.3	7.0
						Mary	4	0.8	0.5	0.2	0.2	1.3
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	log10	NO	0.239	Reference	5	31.6	22.3	10.0	13.9	56.6
						Mary	11	21.6	24.7	7.4	2.3	91.9
	Silt-Sized Material (%)	M-W	rank	NO	0.743	Reference	5	57.4	18.1	8.1	36.9	71.9
						Mary	11	54.9	18.6	5.6	6.0	73.4
	Clay-Sized Material (%)	tequal	none	YES	0.025	Reference	5	11.0	4.3	1.9	6.3	15.1
						Mary	11	23.5	10.6	3.2	2.1	33.2
	Moisture (%)	tequal	none	YES	0.001	Reference	5	82.6	3.6	1.6	78.3	86.6
						Mary	11	49.2	14.3	4.3	16.6	68.4
	Total Organic Carbon (TOC) Content (%)	tunequal	none	YES	0.004	Reference	5	3.4	1.1	0.5	2.2	4.5
						Mary	11	0.7	0.3	0.1	0.2	1.5

 Highlighted values indicate significant difference between study areas based on statistical p-value less than 0.10.

<sup>a</sup> Statistical tests included tequal (t-test assuming equal variance), tunequal (t-test assuming unequal variance), and M-W (Mann-Whitney U-test).

**Table D.44: Magnitude of Elevation in Sediment Metal Concentrations between Mary Lake and Reference Lake 3 2020 Data, and between Mary Lake 2020 and Baseline Data, Mary River Project CREMP, 2020**

Parameter	Mary Lake versus Reference Lake 3 in 2020				Mary Lake 2020 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)	16,880	1.3	21,800	1.0	18,267	1.2	17,000	1.3
Antimony (Sb)	<0.10	1.0	<0.10	1.0	1.0	0.1	1.0	0.1
Arsenic (As)	3.53	1.2	4.07	0.8	2.80	1.5	3.70	0.8
Barium (Ba)	117	0.8	122	0.7	105	0.9	75.9	1.1
Beryllium (Be)	0.65	1.6	0.80	1.3	1.0	1.0	1.0	1.0
Bismuth (Bi)	<0.20	1.1	<0.20	1.2	-	-	-	-
Boron (B)	12.2	2.6	14.7	2.1	0.733	42.8	2.09	14.4
Cadmium (Cd)	0.173	0.7	0.148	0.9	0.500	0.3	0.500	0.3
Calcium (Ca)	5,608	1.2	5,010	0.8	3,130	2.1	2,934	1.4
Chromium (Cr)	54.3	1.4	65.0	1.2	81.0	1.0	76.3	1.0
Cobalt (Co)	10.8	1.5	15.2	1.0	18.3	0.9	17.8	0.9
Copper (Cu)	71.4	0.4	83.8	0.4	45.0	0.7	43.9	0.7
Iron (Fe)	50,600	0.8	45,080	0.9	36,133	1.1	35,654	1.1
Lead (Pb)	13.8	1.5	16.7	1.2	18.0	1.1	21.3	1.0
Lithium (Li)	26.0	1.5	33.7	1.2	-	-	-	-
Magnesium (Mg)	11,440	1.5	14,180	1.1	13,967	1.2	10,903	1.4
Manganese (Mn)	579	1.8	1,230	1.4	699	1.5	991	1.7
Mercury (Hg)	0.0500	0.8	0.0583	0.9	0.100	0.4	0.100	0.5
Molybdenum (Mo)	4.44	0.2	2.52	0.4	1.0	0.7	1.0	1.0
Nickel (Ni)	40.0	1.4	45.0	1.3	67.0	0.8	65.4	0.9
Phosphorus (P)	1,167	0.8	956	0.9	800	1.2	1,325	0.6
Potassium (K)	4,100	1.4	5,338	1.1	3,450	1.6	4,287	1.3
Selenium (Se)	0.728	0.3	0.614	0.4	1.0	0.2	1.0	0.2
Silver (Ag)	0.142	0.9	0.202	0.7	0.273	0.5	0.365	0.4
Sodium (Na)	304	1.1	369	1.0	279	1.2	284	1.2
Strontium (Sr)	11.6	1.2	12.3	1.1	9.3	1.5	13.3	1.0
Sulphur (S)	1,400	0.7	1,140	0.9	-	-	-	-
Thallium (Tl)	0.379	1.2	0.594	0.8	1.0	0.5	1.0	0.5
Tin (Sn)	<2.0	1.0	<2.0	1.0	-	-	-	-
Titanium (Ti)	1,006	1.5	1,136	1.3	-	-	-	-
Uranium (U)	11.0	0.5	19.7	0.4	-	-	-	-
Vanadium (V)	54.1	1.2	63.4	1.0	69.0	0.9	63.3	1.0
Zinc (Zn)	73.1	0.9	83.8	0.8	67.0	1.0	63.6	1.1
Zirconium (Zr)	4.5	4.0	3.9	5.2	-	-	-	-



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.