



**Mary River Project 2021
Core Receiving Environment Monitoring
Program Report**

**Part 2 of 2
(Appendices)**

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March 2022

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 2021 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 2021 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 ten times during the 2021 CREMP, including two during the winter lake monitoring event (April), one during the spring stream monitoring event (early July), four during the summer lake/stream monitoring event (late July/early August), and three during the fall lake/stream monitoring event (late August/early September). Of the 846 total analyses conducted on the trip blank samples, only 30 (3.5%) resulted in analyte detection above the trip blank DQO of less than five-times the laboratory reporting limit (LRL; Appendix Table A.1). Concentrations for total calcium, total magnesium, and phaeophytin included half of these exceedances. None of the parameters had concentrations 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 2021 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 679 determinations made, nine (1.3%) resulted in analyte detections above the DQO of less than five-times the laboratory LRL (Appendix Table A.2). None of the parameters had concentrations consistently elevated above the trip blank DQO among sampling events, or between total and dissolved sample fractions (metals only; Appendix Table A.2), suggesting no widespread contamination from the bottle, bottle caps, or preservative or through the transport of the samples. this looks ok

Equipment blank samples were collected a total of seven times during the 2021 CREMP, including three during the winter lake monitoring event, two during the summer lake monitoring event, and two during the fall lake monitoring event. Of the 591 determinations conducted, five (0.85%) resulted in analyte detection above the DQO of less than five-times the laboratory LRL (Appendix Table A.3). Measured concentrations that exceed the DO only occurred at site DD-HAB9-STN1 during the winter and summer lake/stream monitoring event for total calcium and total magnesium analytes. 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, 2021

Client Sample ID		Lowest LRL ^a	DL0-01-01-S03	BL0-06-S03	C0-1003 _2021-09-03	REF3-02-B03 _2021-08-31	DL0-01-02-B03 _2021-08-27	E0-2E0-0303 _2021-07-27_1025	E0-1003 _2021-07-27_1125	DL0-01-07-S03 _2021-07-23_0850	DL0-02-07-S03 _2021-07-23_1050	C0-0103 _2021-07-01_0830
Date Sampled			23-Apr-21	19-Apr-21	3-Sep-21	31-Aug-21	27-Aug-21	27-Jul-21	27-Jul-21	23-Jul-21	23-Jul-21	1-Jul-21
Time Sampled			10:25	13:55	10:40	12:20	10:50	10:25	11:25	8:50	10:50	8:30
ALS Sample ID			L2580080-5	L2578620-8	L2635750-6	L2634105-5	L2632909-7	L2619420-4	L2619420-6	L2618200-1	L2618200-7	L2609260-2
	Units		Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests												
Conductivity	umhos/cm	1	<2.0	<3.0	1.2	1.2	<1.0	1.1	1.2	1.4	<1.0	<1.0
Hardness (as CaCO ₃)	mg/L	0.500	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	pH units	-	6.73	6.10	6.25	6.27	6.08	6.41	6.38	6.09	6.29	6.03
Total Suspended Solids	mg/L	2	<2.0	<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	13	<10	<10	<10	<10	<10	12	16	18	<10
Turbidity	NTU	0.100	<0.10	<0.10	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	1.85	<0.10
Anions and Nutrients (Water)												
Alkalinity, Total (as CaCO ₃)	mg/L	1.0	<1.0	<10	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0
Ammonia, Total (as N)	mg/L	0.0050	0.0064	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.0050	<0.0050	<0.010
Bromide (Br)	mg/L	0.050	<0.050	<0.10	<0.10	<0.10	<0.050	<0.10	<0.10	<0.050	<0.050	<0.10
Chloride (Cl)	mg/L	0.500	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate and Nitrite as N	mg/L	0.0050	-	<0.021	<0.021	<0.021	-	<0.021	<0.021	-	-	<0.021
Nitrate (as N)	mg/L	0.0010	<0.0050	<0.020	<0.020	<0.020	<0.0050	<0.020	<0.020	<0.0050	<0.0050	<0.020
Nitrite (as N)	mg/L	0.00100	<0.0010	<0.0050	<0.0050	<0.0050	<0.0010	<0.0050	<0.0050	<0.0010	<0.0010	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	<0.050	<0.050	<0.050
Phosphorus, Total	mg/L	0.00200	<0.0020	<0.0030	<0.0030	0.0053	<0.0020	<0.0030	<0.0030	<0.0020	<0.0020	<0.0030
Sulfate (SO ₄)	mg/L	0.300	<0.30	<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	<0.50	<0.50	0.73	0.64	<0.50	0.75	0.82	<0.50	<0.50	<0.50
Total Organic Carbon	mg/L	0.500	<0.50	<0.50	0.52	1.28	<0.50	0.62	0.99	<0.50	<0.50	0.51
Total Metals (Water)												
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Total Metals (Water)												
Aluminum (Al)	mg/L	0.00100	0.0041	0.0103	<0.0030	<0.0030	<0.0010	<0.0030	<0.0030	0.0040	<0.0010	<0.0030
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010
Arsenic (As)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010
Barium (Ba)	mg/L	0.0000200	0.000071	0.000124	<0.000050	0.000065	0.000022	0.000186	0.000318	0.000052	0.000044	<0.000050
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.00050
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.00050
Boron (B)	mg/L	0.0050	0.0106	0.011	0.013	0.014	<0.0050	<0.010	<0.010	<0.0050	<0.0050	<0.010
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010
Calcium (Ca)	mg/L	0.0005	0.013	<0.050	<0.050	0.059	0.017	<0.050	<0.050	0.039	0.028	<0.050
Chromium (Cr)	mg/L	0.000050	<0.00010	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050
Cobalt (Co)	mg/L	0.000005	<0.0000050	<0.00010	<0.00010	<0.00010	<0.0000050	<0.00010	<0.00010	<0.0000050	<0.0000050	<0.00010
Copper (Cu)	mg/L	0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.000050	<0.000050	<0.00050
Iron (Fe)	mg/L	0.0001	0.0054	<0.030	<0.030	<0.030	<0.0010	<0.030	<0.030	0.0049	0.0011	<0.030
Lead (Pb)	mg/L	0.0000100	<0.000010	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010	0.000011	<0.000050
Lithium (Li)	mg/L	0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010
Magnesium (Mg)	mg/L	0.0002	<0.0040	<0.050	<0.050	<0.050	0.0104	<0.050	<0.050	0.0079	<0.0040	<0.050
Manganese (Mn)	mg/L	0.0000050	0.000078	0.000235	<0.000070	<0.000070	<0.000050	<0.000070	<0.000070	0.000104	0.000057	<0.000070
Molybdenum (Mo)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000200	<0.000050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.000050	<0.000050	<0.00050
Potassium (K)	mg/L	0.0200	<0.020	<0.20	<0.20	<0.20	<0.020	<0.20	<0.20	<0.020	<0.020	<0.20
Selenium (Se)	mg/L	0.00004	<0.000040	<0.0010	<0.0010	<0.0010	<0.000040	<0.0010	<0.0010	<0.000040	<0.000040	<0.0010
Silicon (Si)	mg/L	0.050	<0.050	<0.10	<0.10	<0.10	<0.050	<0.10	<0.10	<0.050	<0.050	<0.10
Silver (Ag)	mg/L	0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010
Sodium (Na)	mg/L	0.0200	0.023	<0.050	<0.050	<0.050	<0.020	<0.050	<0.050	<0.020	<0.020	<0.050
Strontium (Sr)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	0.000032	0.000031	<0.00010
Thallium (Tl)	mg/L	0.000005	<0.0000050	<0.00010	<0.00010	<0.00010	<0.0000050	<0.00010	<0.00010	<0.0000050	<0.0000050	<0.00010
Tin (Sn)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010
Titanium (Ti)	mg/L	0.0001	0.000361	<0.010	<0.010	<0.010	<0.000050	<0.010	<0.010	0.000300	<0.000050	<0.010
Uranium (U)	mg/L	0.0000010	<0.0000010	<0.000010	<0.000010	<0.000010	0.0000011	<0.000010	<0.000010	0.0000014	<0.0000010	<0.000010
Vanadium (V)	mg/L	0.00005	0.000055	<0.0010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.000050	<0.000050	<0.0010
Zinc (Zn)	mg/L	0.00050	0.00078	<0.0030	<0.0030	<0.0030	<0.00050	<0.0030	<0.0030	<0.00050	0.00065	<0.0030

Parameter concentration did not meet the data quality objective of ≤ 5x the LRL.

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

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

Table A.1: Water Sample Trip Blank Results with Reference to Data Quality Objectives, Mary River CREMP, 2021

Client Sample ID		Lowest LRL ^a	DL0-01-01-S03	BL0-06-S03	C0-1003 _2021-09-03	REF3-02-B03 _2021-08-31	DL0-01-02-B03 _2021-08-27	E0-2E0-0303 _2021-07-27_1025	E0-1003 _2021-07-27_1125	DL0-01-07-S03 _2021-07-23_0850	DL0-02-07-S03 _2021-07-23_1050	C0-0103 _2021-07-01_0830
Date Sampled			23-Apr-21	19-Apr-21	3-Sep-21	31-Aug-21	27-Aug-21	27-Jul-21	27-Jul-21	23-Jul-21	23-Jul-21	1-Jul-21
Time Sampled			10:25	13:55	10:40	12:20	10:50	10:25	11:25	8:50	10:50	8:30
ALS Sample ID			L2580080-5	L2578620-8	L2635750-6	L2634105-5	L2632909-7	L2619420-4	L2619420-6	L2618200-1	L2618200-7	L2609260-2
	Units		Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Dissolved Metals (Water)												
Aluminum (Al)	mg/L	0.00100	<0.0010	<0.0030	<0.0030	<0.0030	<0.0010	<0.0030	<0.0030	<0.0010	<0.0010	<0.0030
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010
Arsenic (As)	mg/L	0.000020	<0.000020	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010
Barium (Ba)	mg/L	0.0000200	0.000258	<0.000050	0.000054	<0.000050	<0.000020	<0.000050	<0.000050	<0.000020	<0.000020	<0.000050
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.000050	<0.0000050	<0.0000050	<0.00050
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.00050
Boron (B)	mg/L	0.0050	0.0104	0.012	0.013	0.015	<0.0050	<0.010	<0.010	<0.0050	<0.0050	<0.010
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010
Calcium (Ca)	mg/L	0.0100	0.019	<0.050	<0.050	<0.050	0.023	<0.050	<0.050	<0.010	0.018	<0.050
Chromium (Cr)	mg/L	0.000100	<0.00010	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00010	<0.00010	<0.00050
Cobalt (Co)	mg/L	0.000005	<0.0000050	<0.00010	<0.00010	<0.00010	<0.0000050	<0.00010	<0.00010	<0.0000050	<0.0000050	<0.00010
Copper (Cu)	mg/L	0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.000050	<0.000050	<0.00050
Iron (Fe)	mg/L	0.0010	<0.0010	<0.030	<0.030	<0.030	<0.0010	<0.030	<0.030	<0.0010	<0.0010	<0.030
Lead (Pb)	mg/L	0.0000100	<0.000010	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000010	<0.000010	<0.000050
Lithium (Li)	mg/L	0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010
Magnesium (Mg)	mg/L	0.0040	<0.0040	<0.050	<0.050	<0.050	0.0066	<0.050	<0.050	<0.0040	<0.0040	<0.050
Manganese (Mn)	mg/L	0.0000500	<0.000050	<0.000070	<0.000070	<0.000070	<0.000050	<0.000070	<0.000070	<0.000050	<0.000050	<0.000070
Mercury (Hg)	mg/L	0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Molybdenum (Mo)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000050	<0.000050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.000050	<0.000050	<0.00050
Potassium (K)	mg/L	0.0200	<0.020	<0.20	<0.20	<0.20	<0.020	<0.20	<0.20	<0.020	<0.020	<0.20
Selenium (Se)	mg/L	0.00004	<0.000040	<0.0010	<0.0010	<0.0010	<0.000040	<0.0010	<0.0010	<0.000040	<0.000040	<0.0010
Silicon (Si)	mg/L	0.050	<0.050	<0.10	<0.10	<0.10	<0.050	<0.10	<0.10	<0.050	<0.050	<0.10
Silver (Ag)	mg/L	0.0000050	<0.0000050	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.000010
Sodium (Na)	mg/L	0.0200	0.028	<0.050	<0.050	<0.050	<0.020	<0.050	<0.050	<0.020	<0.020	0.227
Strontium (Sr)	mg/L	0.000020	0.000035	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010
Thallium (Tl)	mg/L	0.000005	<0.0000050	<0.00010	<0.00010	<0.00010	<0.0000050	<0.00010	<0.00010	<0.0000050	<0.0000050	<0.00010
Tin (Sn)	mg/L	0.000020	0.000073	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.000020	<0.000020	<0.00010
Titanium (Ti)	mg/L	0.0001	<0.000050	<0.010	<0.010	<0.010	<0.000050	<0.010	<0.010	<0.000050	<0.000050	<0.010
Uranium (U)	mg/L	0.0000010	<0.0000010	<0.000010	<0.000010	<0.000010	<0.0000010	<0.000010	<0.000010	<0.0000010	<0.0000010	<0.000010
Vanadium (V)	mg/L	0.00005	<0.000050	<0.0010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.000050	<0.000050	<0.0010
Zinc (Zn)	mg/L	0.00050	<0.00050	0.0037	<0.0030	<0.0030	<0.00050	<0.0030	<0.0030	<0.00050	<0.00050	<0.0030
Aggregate Organics (Water)												
Phenols (4AAP)	mg/L	0.00100	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010
Plant Pigments (Water)												
Chlorophyll a	µg/L	0.100	<0.10	<0.10	0.13	0.13	0.20	0.13	0.12	0.12	0.13	0.10
Phaeophytin a	µg/L	0.100	0.25	0.20	0.54	0.54	0.53	0.51	0.51	0.48	0.53	0.44

Parameter concentration did not meet the data quality objective of ≤ 5x the LRL.

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

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

Table A.2: Water Sample Field Blank Results with Reference to Data Quality Objectives, Mary River CREMP, 2021

Client Sample ID		Lowest LRL ^a	BL0-09-S02	BL0-04-S02	MRY-REF402 _2021-09-03	BL0-03-S02 _2021-08-30	DL0-02-06-S02 _2021-08-28	BL0-05-B02 _2021-07-30 1355	BL0-01-B-S02 _2021-07-28 1440	L1-0502 _2021-06-30 0925
Date Sampled	19-Apr-21		20-Apr-21	3-Sep-21	30-Aug-21	28-Aug-21	30-Jul-21	28-Jul-21	30-Jun-21	
Time Sampled	15:20		10:45	14:30	10:15	9:35	13:55	14:40	9:25	
ALS Sample ID	L2578620-11		L2578594-4	L2635750-11	L2633477-4	L2632974-4	L2621267-9	L2619968-6	L2608765-2	
	Units	Water	Water	Water	Water	Water	Water	Water	Water	
Physical Tests										
Conductivity	umhos/cm	1	<3.0	<3.0	1.2	1.1	1.0	<1.0	1.2	<1.0
Hardness (as CaCO ₃)	mg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	pH units	-	5.93	7.58	6.19	5.84	5.99	6.22	6.50	5.98
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	10.0	<10	<10	18	<10	<10	<10	<10	<10
Turbidity	NTU	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anions and Nutrients (Water)										
Alkalinity, Total (as CaCO ₃)	mg/L	1.0	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ammonia, Total (as N)	mg/L	0.0050	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010
Bromide (Br)	mg/L	0.050	<0.10	<0.10	<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	<0.50	<0.50
Nitrate and Nitrite as N	mg/L	0.0050	<0.021	<0.021	<0.021	<0.021	-	<0.021	<0.021	<0.021
Nitrate (as N)	mg/L	0.0010	<0.020	<0.020	<0.020	<0.020	<0.0050	<0.020	<0.020	<0.020
Nitrite (as N)	mg/L	0.00100	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0050	<0.0050	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.050	<0.050	<0.050	<0.050	0.121	<0.050	<0.050	0.050	<0.050
Phosphorus, Total	mg/L	0.00200	<0.0030	<0.0030	<0.0030	<0.0030	<0.0020	<0.0030	<0.0030	<0.0030
Sulfate (SO ₄)	mg/L	0.300	<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	0.54	0.72	0.57	<0.50	<0.50	0.84	0.84	<0.50
Total Organic Carbon	mg/L	0.500	<0.50	<0.50	0.59	<0.50	<0.50	0.60	0.84	<0.50
Total Metals (Water)										
Mercury (Hg)-Total	mg/L	0.000	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Total Metals (Water)										
Aluminum (Al)	mg/L	0.00100	0.0100	<0.0030	0.0046	<0.0030	<0.0010	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000200	0.000190	<0.000050	<0.000050	<0.000050	0.000021	<0.000050	0.000063	0.000085
Beryllium (Be)	mg/L	0.000005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0050	0.011	0.011	0.013	<0.010	<0.0050	0.015	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.0005	<0.050	<0.050	<0.050	<0.050	<0.010	<0.050	<0.050	<0.050
Chromium (Cr)	mg/L	0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00050	<0.00050	<0.00050
Cobalt (Co)	mg/L	0.000005	<0.00010	<0.00010	<0.00010	<0.00010	<0.0000050	<0.00010	<0.00010	<0.00010
Copper (Cu)	mg/L	0.000050	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050
Iron (Fe)	mg/L	0.0001	<0.030	<0.030	<0.030	<0.030	0.0012	<0.030	<0.030	<0.030
Lead (Pb)	mg/L	0.0000100	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000050	<0.000050	<0.000050
Lithium (Li)	mg/L	0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010
Magnesium (Mg)	mg/L	0.0002	<0.050	<0.050	<0.050	<0.050	<0.0040	<0.050	<0.050	<0.050
Manganese (Mn)	mg/L	0.0000050	0.000221	<0.000070	<0.000070	<0.000070	<0.000050	<0.000070	<0.000070	<0.000070
Molybdenum (Mo)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000200	<0.00050	<0.00050	<0.00050	<0.00050	<0.000050	<0.00050	<0.00050	<0.00050
Potassium (K)	mg/L	0.020	<0.20	<0.20	<0.20	<0.20	<0.020	<0.20	<0.20	<0.20
Selenium (Se)	mg/L	0.00004	<0.0010	<0.0010	<0.0010	<0.0010	<0.000040	<0.0010	<0.0010	<0.0010
Silicon (Si)	mg/L	0.050	<0.10	<0.10	<0.10	<0.10	<0.050	<0.10	<0.10	<0.10
Silver (Ag)	mg/L	0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010
Sodium (Na)	mg/L	0.0200	0.075	<0.050	<0.050	<0.050	<0.020	<0.050	<0.050	<0.050
Strontium (Sr)	mg/L	0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.00010
Thallium (Tl)	mg/L	0.000005	<0.00010	<0.00010	<0.00010	<0.00010	<0.0000050	<0.00010	<0.00010	<0.00010
Tin (Sn)	mg/L	0.000020	<0.00010	<0.00010	<0.00010	<0.00010	0.000057	<0.00010	<0.00010	<0.00010
Titanium (Ti)	mg/L	0.0001	<0.010	<0.010	<0.010	<0.010	<0.000050	<0.010	<0.010	<0.010
Uranium (U)	mg/L	0.0000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000010	<0.000010	<0.000010	<0.000010
Vanadium (V)	mg/L	0.00005	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	<0.0010	<0.0010	<0.0010
Zinc (Zn)	mg/L	0.00050	<0.0030	<0.0030	<0.0030	<0.0030	<0.00050	<0.0030	<0.0030	<0.0030
Dissolved Metals (Water)										
Aluminum (Al)	mg/L	0.00100	<0.0030	<0.0030	<0.0030	<0.0030	<0.0010	<0.0030	<0.0030	<0.0030
Antimony (Sb)	mg/L	0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.00010
Arsenic (As)	mg/L	0.000020	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.00010	<0.00010	<0.00010
Barium (Ba)	mg/L	0.0000200	<0.000050	0.000059	<0.000050	0.000058	<0.000020	0.000055	<0.000050	<0.000050
Beryllium (Be)	mg/L	0.000005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)	mg/L	0.000005	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.00050	<0.00050	<0.00050
Boron (B)	mg/L	0.0050	0.012	0.011	0.013	<0.010	<0.0050	0.015	<0.010	<0.010
Cadmium (Cd)	mg/L	0.0000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000010	<0.000010
Calcium (Ca)	mg/L	0.0100	<0.050	<0.050	<0.050	<0.050	<0.010	0.056	0.052	<0.050
Chromium (Cr)										

Table A.3: Water Sample Equipment Blank Results with Reference to Data Quality Objectives, Mary River CREMP, 2021

Client Sample ID		Lowest LRL ^a	DD-HAB9-STN1- B04	REF3-03-B04 _2021-08-31	JL0-02-S04 _2021-08-26	REF3-03-B04 _2021-08- 01_0700	DD-HAB9-STN1- B04	DD-HAB9-STN- 104 _2021-07-22_0730	JL0-0204
Date Sampled			23-Apr-21	31-Aug-21	26-Aug-21	1-Aug-21	23-Apr-21	22-Jul-21	15-Apr-21
Time Sampled			14:50	13:15	9:45	7:00	14:50	7:30	13:00
ALS Sample ID			L2580080-13	L2634105-8	L2632346-2	L2621377-1	L2580080-13	L2617633-1	L2577680-1
	Units		Water	Water	Water	Water	Water	Water	Water
Physical Tests									
Conductivity	umhos/cm	1	<2.0	1.2	<1.0	1.3	<2.0	<1.0	<3.0
Hardness (as CaCO ₃)	mg/L	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	pH units	-	6.43	6.07	5.91	6.05	6.43	6.01	5.84
Total Suspended Solids	mg/L	2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Dissolved Solids	mg/L	10.0	11	<10	<10	<10	11	24	<10
Turbidity	NTU	0.100	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10
Anions and Nutrients (Water)									
Alkalinity, Total (as CaCO ₃)	mg/L	1.0	<1.0	2.9	<1.0	<1.0	<1.0	<1.0	<10
Ammonia, Total (as N)	mg/L	0.0050	<0.0050	<0.010	<0.0050	0.015	<0.0050	0.0066	0.013
Bromide (Br)	mg/L	0.050	<0.050	<0.10	<0.050	<0.10	<0.050	<0.050	<0.10
Chloride (Cl)	mg/L	0.500	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrate and Nitrite as N	mg/L	0.0050	-	<0.021	-	<0.021	-	-	<0.021
Nitrate (as N)	mg/L	0.0010	<0.0050	<0.020	<0.0050	<0.020	<0.0050	<0.0050	<0.020
Nitrite (as N)	mg/L	0.00100	<0.0010	<0.0050	<0.0010	<0.0050	<0.0010	<0.0010	<0.0050
Total Kjeldahl Nitrogen	mg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Phosphorus, Total	mg/L	0.00200	<0.0020	<0.0030	<0.0020	<0.0030	<0.0020	<0.0020	<0.0030
Sulfate (SO ₄)	mg/L	0.300	<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	<0.50	0.60	<0.50	<0.50	<0.50	<0.50	<0.50
Total Organic Carbon	mg/L	0.500	<0.50	0.84	<0.50	0.55	<0.50	<0.50	<0.50
Total Metals (Water)									
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Total Metals (Water)									
Aluminum (Al)	mg/L	0.00100	<0.0010	<0.0030	<0.0010	<0.0030	<0.0010	<0.0010	<0.0030
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.00010	<0.000020	<0.00010	<0.000020	0.000021	<0.00010
Arsenic (As)	mg/L	0.000020	<0.000020	<0.00010	<0.000020	<0.00010	<0.000020	<0.000020	<0.00010
Barium (Ba)	mg/L	0.0000200	0.000028	<0.000050	<0.000020	<0.000050	0.000028	0.000041	<0.000050
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.00050	<0.0000050	<0.00050	<0.0000050	<0.0000050	<0.00050
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.00050	<0.0000050	<0.00050	<0.0000050	<0.0000050	<0.00050
Boron (B)	mg/L	0.0050	0.0132	0.014	<0.0050	0.015	0.0132	0.0113	0.011
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.000010	<0.0000050	<0.000010	<0.0000050	<0.0000050	<0.000010
Calcium (Ca)	mg/L	0.0005	0.035	<0.050	<0.010	<0.050	0.035	0.037	<0.050
Chromium (Cr)	mg/L	0.000050	<0.00010	<0.00050	<0.00010	<0.00050	<0.00010	<0.00010	<0.00050
Cobalt (Co)	mg/L	0.000005	<0.0000050	<0.00010	<0.0000050	<0.00010	<0.0000050	<0.0000050	<0.00010
Copper (Cu)	mg/L	0.000050	<0.000050	<0.00050	<0.000050	<0.00050	<0.000050	<0.000050	<0.00050
Iron (Fe)	mg/L	0.0001	<0.0010	<0.030	<0.0010	<0.030	<0.0010	<0.0010	<0.030
Lead (Pb)	mg/L	0.0000100	<0.000010	<0.000050	<0.000010	<0.000050	<0.000010	<0.000010	<0.000050
Lithium (Li)	mg/L	0.00050	<0.00050	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010
Magnesium (Mg)	mg/L	0.0002	0.0101	<0.050	<0.0040	<0.050	0.0101	<0.0040	<0.050
Manganese (Mn)	mg/L	0.0000050	<0.000050	<0.000070	<0.000050	<0.000070	<0.000050	<0.000050	<0.000070
Molybdenum (Mo)	mg/L	0.0000500	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Nickel (Ni)	mg/L	0.000200	<0.000050	<0.00050	<0.000050	<0.00050	<0.000050	<0.000050	<0.00050
Potassium (K)	mg/L	0.020	<0.020	<0.20	<0.020	<0.20	<0.020	<0.020	<0.20
Selenium (Se)	mg/L	0.00004	<0.000040	<0.0010	<0.000040	<0.0010	<0.000040	<0.000040	<0.0010
Silicon (Si)	mg/L	0.050	<0.050	<0.10	<0.050	<0.10	<0.050	0.053	<0.10
Silver (Ag)	mg/L	0.0000050	<0.0000050	<0.000010	<0.0000050	<0.000010	<0.0000050	<0.0000050	<0.000010
Sodium (Na)	mg/L	0.0200	0.025	<0.050	<0.020	<0.050	0.025	0.047	<0.050
Strontium (Sr)	mg/L	0.000020	0.000031	<0.00010	<0.000020	<0.00010	0.000031	0.000054	<0.00010
Thallium (Tl)	mg/L	0.000005	<0.0000050	<0.00010	<0.0000050	<0.00010	<0.0000050	<0.0000050	<0.00010
Tin (Sn)	mg/L	0.000020	<0.000020	<0.00010	<0.000020	<0.00010	<0.000020	<0.000020	<0.00010
Titanium (Ti)	mg/L	0.0001	<0.000050	<0.010	<0.000050	<0.010	<0.000050	<0.000050	<0.010
Uranium (U)	mg/L	0.0000010	0.0000011	<0.000010	<0.0000010	<0.000010	0.0000011	<0.0000010	<0.000010
Vanadium (V)	mg/L	0.00005	<0.000050	<0.0010	<0.000050	<0.0010	<0.000050	<0.000050	<0.0010
Zinc (Zn)	mg/L	0.00050	<0.00050	<0.0030	<0.00050	<0.0030	<0.00050	<0.00050	<0.0030
Dissolved Metals (Water)									
Aluminum (Al)	mg/L	0.00100	<0.0010	<0.0030	<0.0010	<0.0030	<0.0010	<0.0010	<0.0030
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.00010	<0.000020	<0.00010	<0.000020	<0.000020	<0.00010
Arsenic (As)	mg/L	0.000020	<0.000020	<0.00010	<0.000020	<0.00010	<0.000020	<0.000020	<0.00010
Barium (Ba)	mg/L	0.0000200	0.000049	0.000057	<0.000020	<0.000050	0.000049	0.000040	<0.000050
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.00050	<0.0000050	<0.00050	<0.0000050	<0.0000050	<0.00050
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.00050	<0.0000050	<0.00050	<0.0000050	<0.0000050	<0.00050
Boron (B)	mg/L	0.0050	0.0131	0.015	<0.0050	0.015	0.0131	0.0112	0.012
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.000010	<0.0000050	<0.000010	<0.0000050	<0.0000050	<0.000010
Calcium (Ca)	mg/L	0.0100	0.027	<0.050	<0.010	<0.050	0.027	0.036	<0.050
Chromium (Cr)	mg/L	0.000100	<0.00010	<0.00050	<0.00010	<0.00050	<0.00010	<0.00010	<0.00050
Cobalt (Co)	mg/L	0.000005	<0.0000050	<0.00010	<0.0000050	<0.00010	<0.0000050	<0.0000050	<0.00010
Copper (Cu)	mg/L	0.000050	<0.000050	<0.00050	<0.000050	<0.00050	<0.000050	<0.000050	<0.00050
Iron (Fe)	mg/L	0.0010	<0.0010	<0.030	<0.0010	<0.030	<0.0010	<0.0010	<0.030
Lead (Pb)	mg/L	0.0000100	<0.000010	<0.000050	<0.000010	<0.000050	<0.000010	<0.000010	<0.000050
Lithium (Li)	mg/L	0.00050	<0.00050	<0.0010	<0.00050	<0.0010	<0.00050	<0.00050	<0.0010
Magnesium (Mg)	mg/L	0.0040	0.0056	<0.050	<0.0040	<0.050	0.0056	<0.0040	<0.050
Manganese (Mn)	mg/L	0.0000500	<0.000050	<0.000070	<0.000050	<0.000070	<0.000050	<0.000050	<0.000070
Mercury (Hg)	mg/L	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	<0.000050	<0.000050

Parameter did not meet the data quality objective of ≤ 5x the RD L.

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

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

A2.1.2 Precision – Field Duplicates

In total, nine field duplicates were collected over the course of the 2021 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 three during the fall stream/lake monitoring event. In general, close agreement in parameter concentrations was observed between duplicate samples, with 96% of field duplicate analyte pairs meeting the water quality field duplicate DQO of $\leq 25\%$ Relative Percent Difference (RPD) in parameter concentrations of the 759 duplicate analyses conducted (Appendix Table A.4). Of the cases in which DQO was not met, 63% of these measured concentrations in one or both duplicate samples were close to the LRL (i.e., two- to three-times the LRL) such that small differences in concentrations between duplicate samples resulted in relatively high RPD. After accounting for samples close to the LRL, the only consistent exceedance was the total aluminum concentration in the three samples collected during the summer stream/lake monitoring event. 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 63 of 68 stream samples (93%) and 50 of 50 lake samples (100%; total of 96% for the 2021 project). The sorted fraction for these samples was mainly 100% (whole; 72% of all samples), 50% (half; 19% of all samples) and 25% (quarter; 9% of all samples) of the sample material evaluated (average of 84%; Appendix Table A.5). 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.6). 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 (7 samples) and 96% for lentic samples (5 samples; Appendix Tables A.7). 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, 2021

Sample ID	Units	LRL	DL0-01-05-S	DL0-01-05-S01	RPD	BL0-01-B-B01 _2021-08-29	BL0-01-B-B _2021-08-29	RPD	D1-05 _2021-08-26	D1-0501 _2021-08-26	RPD
Date Sampled			23-Apr-2021	23-Apr-2021		29-Aug-2021	29-Aug-2021		26-Aug-2021	26-Aug-2021	
ALS Sample ID			L2580080-1	L2580080-2		L2632997-4	L2632997-5		L2632356-7	L2632356-8	
Physical Tests											
Conductivity	umhos/cm	1	194	191	1.6	183	182	0.55	245	247	0.81
Hardness (as CaCO ₃)	mg/L	0.5	93.4	92.3	1.2	83.7	84.1	0.48	107	110	2.8
pH	pH units	-	7.64	7.66	0.26	8.14	8.14	0	7.90	7.87	0.38
Total Suspended Solids	mg/L	2	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	2.0	0
Total Dissolved Solids	mg/L	10.0	122	96	24	104	97	7.0	122	128	4.8
Turbidity	NTU	0.100	0.30	<0.10	100	0.90	0.88	2.2	6.21	6.19	0.32
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO ₃)	mg/L	1.0	76.7	77.0	0.39	87.0	90.8	4.3	86.7	85.7	1.2
Ammonia, Total (as N)	mg/L	0.0050	<0.0050	<0.0050	0	<0.010	<0.010	0	<0.0050	<0.0050	0
Bromide (Br)	mg/L	0.050	<0.050	<0.050	0	<0.10	<0.10	0	<0.050	<0.050	0
Chloride (Cl)	mg/L	0.500	5.20	5.15	0.97	5.45	5.42	0.55	6.42	6.42	0
Nitrate and Nitrite as N	mg/L	0.0050	-	-	-	<0.021	<0.021	0	-	-	-
Nitrate (as N)	mg/L	0.0010	0.300	0.295	1.7	<0.020	<0.020	0	0.395	0.394	0.25
Nitrite (as N)	mg/L	0.00100	<0.0010	<0.0010	0	<0.0050	<0.0050	0	<0.0010	<0.0010	0
Total Kjeldahl Nitrogen	mg/L	0.050	0.112	0.120	6.9	0.139	0.217	44	0.136	0.207	41
Phosphorus, Total	mg/L	0.00200	<0.0020	<0.0020	0	0.0065	0.0075	14	0.0038	0.0036	5.4
Sulfate (SO ₄)	mg/L	0.300	18.1	18.0	0.55	2.58	2.55	1.2	24.0	24.0	0
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.500	1.53	1.51	1.3	3.25	3.02	7.3	1.99	1.99	0
Total Organic Carbon	mg/L	0.500	1.50	1.56	3.9	2.12	2.16	1.9	1.97	1.95	1.0
Total Metals (Water)											
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Total Metals (Water)											
Aluminum (Al)	mg/L	0.00100	0.0035	0.0020	55	0.0235	0.0249	5.8	0.123	0.140	13
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.000030	<0.000030	0
Arsenic (As)	mg/L	0.000020	0.000045	0.000069	42	<0.00010	<0.00010	0	0.000092	0.000098	6.3
Barium (Ba)	mg/L	0.0000200	0.00875	0.00870	0.57	0.00824	0.00809	1.8	0.0116	0.0119	2.6
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	0.0000130	0.0000136	4.5
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.000050	<0.000050	0
Boron (B)	mg/L	0.0050	0.0179	0.0180	0.56	<0.010	<0.010	0	0.012	0.012	0
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	0.0000383	0.0000375	2.1
Calcium (Ca)	mg/L	0.0005	17.8	17.9	0.56	16.5	16.9	2.4	-	-	-
Chromium (Cr)	mg/L	0.000050	<0.00010	<0.00010	0	<0.00050	<0.00050	0	0.00056	<0.00050	11
Cobalt (Co)	mg/L	0.000005	0.0000263	0.0000240	9.1	<0.00010	<0.00010	0	0.000140	0.000149	6.2
Copper (Cu)	mg/L	0.000050	0.000884	0.000840	5.1	0.00090	0.00094	4.3	0.00297	0.00307	3.3
Iron (Fe)	mg/L	0.0001	0.0034	0.0022	43	<0.030	<0.030	0	0.168	0.183	8.5
Lead (Pb)	mg/L	0.0000100	0.000017	<0.000010	52	<0.000050	<0.000050	0	0.000265	0.000275	3.7
Lithium (Li)	mg/L	0.00050	0.00168	0.00169	0.59	<0.0010	0.0010	0	0.00209	0.00208	0.48
Magnesium (Mg)	mg/L	0.0002	12.2	12.3	0.82	10.7	10.6	0.94	13.9	14.5	4.2
Manganese (Mn)	mg/L	0.0000050	0.000531	0.000466	13	0.00205	0.00199	3.0	0.00241	0.00254	5.3
Molybdenum (Mo)	mg/L	0.0000500	0.00114	0.00112	1.8	0.000241	0.000257	6.4	0.00684	0.00672	1.8
Nickel (Ni)	mg/L	0.000200	0.000762	0.000754	1.1	<0.00050	<0.00050	0	0.00129	0.00136	5.3
Potassium (K)	mg/L	0.020	1.62	1.60	1.2	0.95	0.96	1.0	3.16	3.26	3.1
Selenium (Se)	mg/L	0.00004	<0.000040	0.000048	18	<0.0010	<0.0010	0	<0.00020	<0.00020	0
Silicon (Si)	mg/L	0.050	0.735	0.741	0.81	0.73	0.75	2.7	1.61	1.62	0.62
Silver (Ag)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	<0.0000050	<0.0000050	0
Sodium (Na)	mg/L	0.0200	2.38	2.41	1.3	3.01	3.01	0	2.18	2.30	5.4
Strontium (Sr)	mg/L	0.000020	0.0120	0.0121	0.83	0.0120	0.0120	0	0.0237	0.0236	0.42
Thallium (Tl)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00010	<0.00010	0	0.0000133	0.0000135	1.5
Tin (Sn)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.00020	<0.00020	0
Titanium (Ti)	mg/L	0.0001	0.000107	<0.000050	73	<0.010	<0.010	0	0.00516	0.00576	11
Uranium (U)	mg/L	0.0000010	0.00157	0.00160	1.9	0.00215	0.00226	5.0	0.00998	0.0100	0.20
Vanadium (V)	mg/L	0.00005	0.000069	0.000063	9.1	<0.0010	<0.0010	0	0.00043	0.00045	4.5
Zinc (Zn)	mg/L	0.00050	0.00064	0.00051	23	<0.0030	<0.0030	0	<0.0030	<0.0030	0
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.00100	0.0018	0.0012	40	0.0068	0.0055	21	0.0121	0.0138	13
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	0.000022	<0.000020	9.5
Arsenic (As)	mg/L	0.000020	0.000050	0.000054	7.7	<0.00010	<0.00010	0	0.000051	0.000068	29
Barium (Ba)	mg/L	0.0000200	0.00851	0.00846	0.59	0.00822	0.00818	0.49	0.0108	0.0115	6.3
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.0000050	<0.0000050	0
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.0000050	<0.0000050	0
Boron (B)	mg/L	0.0050	0.0183	0.0176	3.9	<0.010	<0.010	0	0.0110	0.0113	2.7
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	0.0000307	0.0000363	17
Calcium (Ca)	mg/L	0.0100	18.2	17.5	3.9	16.5	16.7	1.2	19.8	20.4	3.0
Chromium (Cr)	mg/L	0.000100	<0.00010	<0.00010	0	<0.00050	<0.00050	0	0.00014	0.00014	0
Cobalt (Co)	mg/L	0.000005	0.0000185	0.0000182	1.6	<0.00010	<0.00010	0	0.0000645	0.0000690	6.7
Copper (Cu)	mg/L	0.000050	0.000847	0.000810	4.5	0.00088	0.00090	2.2	0.00265	0.00273	3.0
Iron (Fe)	mg/L	0.0010	0.0026	0.0011	81	<0.030	<0.030	0	0.0170	0.0180	5.7
Lead (Pb)	mg/L	0.0000100	<0.000010	<0.000010	0	<0.000050	<0.000050	0	0.000033	0.000042	24
Lithium (Li)	mg/L	0.00050	0.00172	0.00165	4.2	<0.0010	<0.0010	0	0.00187	0.00192	2.6
Magnesium (Mg)	mg/L	0.0040	11.6	11.8	1.7	10.3	10.3	0	14.0	14.4	2.8
Manganese (Mn)	mg/L	0.0000500	0.000133	0.000092	36	0.00108	0.00107	0.93	0.000438	0.000479	8.9
Mercury (Hg)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Molybdenum (Mo)	mg/L	0.0000500	0.00118	0.00114	3.4	0.000239	0.000240	0.42	0.00678	0.00684	0.88
Nickel (Ni)	mg/L	0.000050	0.000721	0.000727	0.83	<0.00050	<0.00050	0	0.000994	0.00101	1.6

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. " - " indicates no data available.

Figure A.4: Water Sample Field Duplicate Results with Reference to the Data Quality Objective, Mary River CREMP, 2021

Sample ID	Units	LRL	JL0-01-S _2021-08-26	JL0-01-S01 _2021-08-26	RPD	JL0-02-B _2021-07- 27 0940	JL0-02-B01 _2021-07- 27 0940	RPD	DL0-02-06-B _2021-07- 23 1005	DL0-02-06-B01 _2021-07- 23 1005	RPD
Date Sampled			26-Aug-2021	26-Aug-2021		27-Jul-2021	27-Jul-2021		23-Jul-2021	23-Jul-2021	
ALS Sample ID			L2632346-6	L2632346-7		L2619421-2	L2619421-3		L2618200-5	L2618200-6	
Physical Tests											
Conductivity	umhos/cm	1	155	154	0.65	157	156	0.64	122	121	0.82
Hardness (as CaCO ₃)	mg/L	0.5	70.9	69.9	1.4	71.8	74	3.0	53.6	54.5	1.7
pH	pH units	-	8.05	8.06	0.12	8.06	8.08	0.25	7.96	7.98	0.25
Total Suspended Solids	mg/L	2	<2.0	<2.0	0	<2.0	<2.0	0	<2.0	<2.0	0
Total Dissolved Solids	mg/L	10.0	41	55	29	91	87	4.5	82	76	7.6
Turbidity	NTU	0.100	0.62	0.63	1.6	1.24	1.16	6.7	2.06	2.27	9.7
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO ₃)	mg/L	1.0	67.4	67.6	0.30	57.0	57.2	0.35	46.9	47.2	0.64
Ammonia, Total (as N)	mg/L	0.0050	<0.0050	<0.0050	0	<0.010	<0.010	0	<0.0050	0.0051	2.0
Bromide (Br)	mg/L	0.050	<0.050	<0.050	0	<0.10	<0.10	0	<0.050	<0.050	0
Chloride (Cl)	mg/L	0.500	4.56	4.55	0.22	4.66	4.71	1.1	2.92	2.92	0
Nitrate and Nitrite as N	mg/L	0.0050	-	-	-	0.036	0.039	8.0	-	-	-
Nitrate (as N)	mg/L	0.0010	0.0306	0.0310	1.3	0.036	0.039	8.0	0.122	0.122	0
Nitrite (as N)	mg/L	0.00100	<0.0010	<0.0010	0	<0.0050	<0.0050	0	<0.0010	<0.0010	0
Total Kjeldahl Nitrogen	mg/L	0.050	0.101	0.098	3.0	0.120	0.120	0	0.074	0.081	9.0
Phosphorus, Total	mg/L	0.00200	0.0038	0.0036	5.4	<0.0030	<0.0030	0	<0.0020	<0.0020	0
Sulfate (SO ₄)	mg/L	0.300	4.70	4.69	0.21	4.75	4.80	1.0	8.75	8.76	0.11
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.500	1.93	1.90	1.6	2.71	2.55	6.1	1.36	1.40	2.9
Total Organic Carbon	mg/L	0.500	2.17	1.91	13	2.29	2.11	8.2	1.23	1.04	17
Total Metals (Water)											
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Total Metals (Water)											
Aluminum (Al)	mg/L	0.00100	0.0176	0.0165	6.5	0.0215	0.0292	30	0.0374	0.0497	28
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.000020	<0.000020	0
Arsenic (As)	mg/L	0.000020	0.000053	0.000070	28	0.00010	0.00010	0	0.000050	0.000054	7.7
Barium (Ba)	mg/L	0.0000200	0.00733	0.00752	2.6	0.00793	0.00802	1.1	0.00614	0.00620	0.97
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.0000050	<0.0000050	0
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.0000050	<0.0000050	0
Boron (B)	mg/L	0.0050	<0.0050	<0.0050	0	<0.010	<0.010	0	0.0108	0.0109	0.92
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.0005	13.1	13.0	0.77	14.3	14.5	1.4	10.5	10.5	0
Chromium (Cr)	mg/L	0.000050	0.00012	0.00011	8.7	<0.00050	<0.00050	0	0.00012	0.00013	8.0
Cobalt (Co)	mg/L	0.000005	0.0000230	0.0000276	18	<0.00010	<0.00010	0	0.0000424	0.0000443	4.4
Copper (Cu)	mg/L	0.000050	0.000933	0.000910	2.5	0.00096	0.00095	1.0	0.000770	0.000783	1.7
Iron (Fe)	mg/L	0.0001	0.0230	0.0217	5.8	<0.030	<0.030	0	0.0584	0.0601	2.9
Lead (Pb)	mg/L	0.0000100	0.000028	0.000027	3.6	<0.000050	<0.000050	0	0.000052	0.000053	1.9
Lithium (Li)	mg/L	0.00050	0.00118	0.00114	3.4	0.0014	0.0014	0	0.00106	0.00107	0.94
Magnesium (Mg)	mg/L	0.0002	8.82	8.90	0.90	8.92	9.15	2.5	6.80	6.60	3.0
Manganese (Mn)	mg/L	0.0000050	0.00117	0.00115	1.7	0.00210	0.00208	0.96	0.00315	0.00321	1.9
Molybdenum (Mo)	mg/L	0.0000500	0.000412	0.000405	1.7	0.000405	0.000419	3.4	0.000582	0.000575	1.2
Nickel (Ni)	mg/L	0.000200	0.000697	0.000661	5.3	0.00066	0.00069	4.4	0.000527	0.000532	0.94
Potassium (K)	mg/L	0.020	1.41	1.40	0.71	1.38	1.44	4.3	1.09	1.11	1.8
Selenium (Se)	mg/L	0.00004	<0.000040	<0.000040	0	<0.0010	<0.0010	0	<0.000040	<0.000040	0
Silicon (Si)	mg/L	0.050	0.376	0.375	0.27	0.48	0.48	0	0.546	0.554	1.5
Silver (Ag)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	<0.0000050	<0.0000050	0
Sodium (Na)	mg/L	0.0200	2.13	2.12	0.47	2.10	2.15	2.4	1.56	1.48	5.3
Strontium (Sr)	mg/L	0.000020	0.0114	0.0115	0.87	0.0115	0.0118	2.6	0.00834	0.00847	1.5
Thallium (Tl)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00010	<0.00010	0	<0.0000050	<0.0000050	0
Tin (Sn)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.000020	<0.000020	0
Titanium (Ti)	mg/L	0.0001	0.00102	0.000961	6.0	<0.010	<0.010	0	0.00300	0.00302	0.66
Uranium (U)	mg/L	0.0000010	0.00139	0.00137	1.4	0.00139	0.00137	1.4	0.000883	0.000882	0.11
Vanadium (V)	mg/L	0.00005	0.000079	0.000077	2.6	<0.0010	<0.0010	0	0.000149	0.000154	3.3
Zinc (Zn)	mg/L	0.00050	<0.00050	<0.00050	0	<0.0030	<0.0030	0	0.00056	0.00079	34
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.00100	0.0038	0.0042	10	0.0035	0.0052	39	0.0084	0.0085	1.2
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.000020	<0.000020	0
Arsenic (As)	mg/L	0.000020	0.000055	0.000060	8.7	<0.00010	<0.00010	0	0.000050	0.000043	15
Barium (Ba)	mg/L	0.0000200	0.00721	0.00730	1.2	0.00795	0.00813	2.2	0.00561	0.00573	2.1
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.0000050	<0.0000050	0
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.0000050	<0.0000050	0
Boron (B)	mg/L	0.0050	<0.0050	<0.0050	0	<0.010	<0.010	0	0.0116	0.0116	0
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	<0.0000050	<0.0000050	0
Calcium (Ca)	mg/L	0.0100	13.4	13.4	0	14.4	14.9	3.4	10.3	10.4	0.97
Chromium (Cr)	mg/L	0.000100	<0.00010	0.00011	9.5	<0.00050	<0.00050	0	<0.00010	<0.00010	0
Cobalt (Co)	mg/L	0.000005	0.0000124	0.0000123	0.81	<0.00010	<0.00010	0	0.0000152	0.0000134	13
Copper (Cu)	mg/L	0.000050	0.000898	0.000901	0.33	0.00081	0.00089	9.4	0.000662	0.000650	1.8
Iron (Fe)	mg/L	0.0010	0.0032	0.0039	20	<0.030	<0.030	0	0.0058	0.0056	3.5
Lead (Pb)	mg/L	0.0000100	<0.000010	<0.000010	0	<0.000050	<0.000050	0	<0.000010	<0.000010	0
Lithium (Li)	mg/L	0.00050	0.00112	0.00115	2.6	0.0013	0.0014	7.4	0.00108	0.00107	0.93
Magnesium (Mg)	mg/L	0.0040	9.09	8.85	2.7	8.70	8.96	2.9	6.77	6.94	2.5
Manganese (Mn)	mg/L	0.0000500	0.000117	0.000138	16	0.000202	0.000268	28	0.000215	0.000197	8.7
Mercury (Hg)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Molybdenum (Mo)	mg/L	0.0									

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. " - " indicates no data available.

Figure A.4: Water Sample Field Duplicate Results with Reference to the Data Quality Objective, Mary River CREMP, 2021

Sample ID	Units	LRL	K0-01 _2021-07- 24_ 1040	K0-0101 _2021-07- 24_ 1040	RPD	D1-00 _2021-06- 29_ 1640	D1-0001 _2021-06- 29_ 1640	RPD	JL0-01-S	JL0-01-S01	RPD
Date Sampled			24-Jul-2021	24-Jul-2021		29-Jun-2021	29-Jun-2021		17-Apr-2021	17-Apr-2021	
ALS Sample ID			L2618286-1	L2618286-2		L2608213-5	L2608213-6		L2577745-3	L2577745-4	
Physical Tests											
Conductivity	umhos/cm	1	303	300	1.00	228	227	0.44	185	188	1.6
Hardness (as CaCO ₃)	mg/L	0.5	139	138	0.72	105	103	1.9	87.6	86	1.8
pH	pH units	-	8.18	8.17	0.12	7.90	8.08	2.3	7.90	7.91	0.13
Total Suspended Solids	mg/L	2	<2.0	<2.0	0	<2.0	<2.0	0	2.7	2.7	0
Total Dissolved Solids	mg/L	10.0	177	156	13	117	118	0.85	98	97	1.0
Turbidity	NTU	0.100	0.50	0.52	3.9	2.20	1.97	11	<0.10	0.11	9.5
Anions and Nutrients (Water)											
Alkalinity, Total (as CaCO ₃)	mg/L	1.0	150	146	2.7	79.6	78.6	1.3	86	94	8.9
Ammonia, Total (as N)	mg/L	0.0050	<0.0050	0.0064	25	<0.010	<0.010	0	0.015	0.016	6.5
Bromide (Br)	mg/L	0.050	<0.050	<0.050	0	<0.10	<0.10	0	<0.10	<0.10	0
Chloride (Cl)	mg/L	0.500	8.46	8.50	0.47	6.34	6.37	0.47	5.72	5.75	0.52
Nitrate and Nitrite as N	mg/L	0.0050	-	-	-	0.298	0.303	1.7	0.041	0.041	0
Nitrate (as N)	mg/L	0.0010	0.0417	0.0393	5.9	0.298	0.303	1.7	0.041	0.041	0
Nitrite (as N)	mg/L	0.00100	<0.0010	<0.0010	0	<0.0050	<0.0050	0	<0.0050	<0.0050	0
Total Kjeldahl Nitrogen	mg/L	0.050	0.126	0.132	4.7	0.150	0.150	0	0.110	0.100	9.5
Phosphorus, Total	mg/L	0.00200	<0.0020	<0.0020	0	0.0033	<0.0030	9.5	<0.0030	0.0070	80
Sulfate (SO ₄)	mg/L	0.300	12.3	12.3	0	25.2	25.3	0.40	5.69	5.72	0.53
Organic / Inorganic Carbon (Water)											
Dissolved Organic Carbon	mg/L	0.500	2.27	2.29	0.88	2.25	2.24	0.45	2.63	2.56	2.7
Total Organic Carbon	mg/L	0.500	2.32	2.38	2.6	2.94	2.99	1.7	2.66	2.90	8.6
Total Metals (Water)											
Mercury (Hg)-Total	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Total Metals (Water)											
Aluminum (Al)	mg/L	0.00100	0.0091	0.0156	53	0.0349	0.0317	9.6	<0.0030	<0.0030	0
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.000020	0.000072	0.000082	13	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Barium (Ba)	mg/L	0.0000200	0.0154	0.0156	1.3	0.0122	0.0117	4.2	0.00916	0.00986	7.4
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Boron (B)	mg/L	0.0050	0.0064	0.0064	0	0.013	0.014	7.4	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.0000050	0	0.000011	<0.000010	9.5	<0.000010	<0.000010	0
Calcium (Ca)	mg/L	0.0005	26.7	27.5	3.0	19.5	19.6	0.51	16.0	16.3	1.9
Chromium (Cr)	mg/L	0.000050	0.00021	0.00020	4.9	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.000005	0.0000658	0.0000644	2.2	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.000050	0.00145	0.00148	2.0	0.00206	0.00204	0.98	0.00105	0.00107	1.9
Iron (Fe)	mg/L	0.0001	0.109	0.121	10	0.156	0.146	6.6	<0.030	<0.030	0
Lead (Pb)	mg/L	0.0000100	0.000017	0.000025	38	0.000065	0.000065	0	<0.000050	<0.000050	0
Lithium (Li)	mg/L	0.00050	0.00173	0.00178	2.8	0.0024	0.0024	0	<0.0010	<0.0010	0
Magnesium (Mg)	mg/L	0.0002	17.4	17.9	2.8	13.7	13.6	0.73	10.6	11.5	8.1
Manganese (Mn)	mg/L	0.0000050	0.0128	0.0137	6.8	0.00628	0.00614	2.3	0.000703	0.000421	50
Molybdenum (Mo)	mg/L	0.0000500	0.000433	0.000434	0.23	0.00241	0.00253	4.9	0.000476	0.000481	1.0
Nickel (Ni)	mg/L	0.000200	0.00166	0.00166	0	0.00120	0.00121	0.83	0.00073	0.00084	14
Potassium (K)	mg/L	0.020	2.08	2.10	0.96	2.35	2.33	0.85	1.57	1.71	8.5
Selenium (Se)	mg/L	0.00004	<0.000040	<0.000040	0	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Silicon (Si)	mg/L	0.050	0.923	0.926	0.32	1.01	0.96	5.1	0.42	0.42	0
Silver (Ag)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Sodium (Na)	mg/L	0.0200	5.64	5.76	2.1	2.29	2.27	0.88	2.45	2.67	8.6
Strontium (Sr)	mg/L	0.000020	0.0176	0.0178	1.1	0.0203	0.0202	0.49	0.0137	0.0140	2.2
Thallium (Tl)	mg/L	0.000005	0.0000098	0.0000098	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Tin (Sn)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Titanium (Ti)	mg/L	0.0001	0.000476	0.000973	69	<0.010	<0.010	0	<0.010	<0.010	0
Uranium (U)	mg/L	0.0000010	0.00227	0.00228	0.44	0.00352	0.00359	2.0	0.00163	0.00167	2.4
Vanadium (V)	mg/L	0.00005	0.000169	0.000186	9.6	<0.0010	<0.0010	0	<0.0010	<0.0010	0
Zinc (Zn)	mg/L	0.00050	<0.00050	0.00108	73	0.0048	0.0046	4.3	<0.0030	<0.0030	0
Dissolved Metals (Water)											
Aluminum (Al)	mg/L	0.00100	0.0033	0.0031	6.3	0.0146	0.0092	45	<0.0030	<0.0030	0
Antimony (Sb)	mg/L	0.000020	<0.000020	<0.000020	0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Arsenic (As)	mg/L	0.000020	0.000061	0.000064	4.8	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Barium (Ba)	mg/L	0.0000200	0.0148	0.0145	2.0	0.0117	0.0113	3.5	0.0103	0.00884	15
Beryllium (Be)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Bismuth (Bi)	mg/L	0.000005	<0.0000050	<0.0000050	0	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Boron (B)	mg/L	0.0050	0.0069	0.0068	1.5	0.013	0.013	0	<0.010	<0.010	0
Cadmium (Cd)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.000010	<0.000010	0	<0.000010	<0.000010	0
Calcium (Ca)	mg/L	0.0100	26.4	26.8	1.5	19.4	19.2	1.0	16.6	16.8	1.2
Chromium (Cr)	mg/L	0.000100	0.00012	0.00014	15	<0.00050	<0.00050	0	<0.00050	<0.00050	0
Cobalt (Co)	mg/L	0.000005	0.0000506	0.0000548	8.0	<0.00010	<0.00010	0	<0.00010	<0.00010	0
Copper (Cu)	mg/L	0.000050	0.00140	0.00142	1.4	0.00202	0.00197	2.5	0.00102	0.00095	7.1
Iron (Fe)	mg/L	0.0010	0.0475	0.0598	23	0.097	0.092	5.3	<0.030	<0.030	0
Lead (Pb)	mg/L	0.0000100	<0.000010	<0.000010	0	<0.000050	<0.000050	0	<0.000050	<0.000050	0
Lithium (Li)	mg/L	0.00050	0.00182	0.00179	1.7	0.0025	0.0024	4.1	<0.0010	<0.0010	0
Magnesium (Mg)	mg/L	0.0040	17.7	17.4	1.7	13.6	13.4	1.5	11.2	10.7	4.6
Manganese (Mn)	mg/L	0.0000500	0.0122	0.0119	2.5	0.00552	0.00523	5.4	0.000083	<0.000070	17
Mercury (Hg)	mg/L	0.0000050	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0	<0.0000050	<0.0000050	0
Molybdenum (Mo)	mg/L	0.0000500	0.000438	0.000434	0.92	0.00250	0.00248	0.80	0.000485	0.000503	3.6
Nickel (Ni)	mg/L	0.000050	0.00160	0.00167	4.3	0.00119	0.00117	1.7	0.000		

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. " - " indicates no data available.

Table A.5: Proportion of Benthic Invertebrates Samples Sorted for the 2021 CREMP

Waterbody Type	Station	Fraction Sorted (500 um)	Waterbody Type	Station	Fraction Sorted (500 um)
Lotic (Creek and River) Samples	CLTI-US-01	1/2	Lentic (Lake) Samples	REF-03-01	Whole
	CLTI-US-02	1/2		REF-03-02	1/2
	CLTI-US-03	Whole		REF-03-03	Whole
	CLTI-US-04	1/2		REF-03-04	Whole
	CLTI-US-05	1/4		REF-03-05	Whole
	CLTI-DS-01	1/2		REF-03-06	Whole
	CLTI-DS-02	Whole		REF-03-07	Whole
	CLTI-DS-03	1/2		REF-03-08	Whole
	CLTI-DS-04	Whole ^b		REF-03-09	Whole
	CLTI-DS-05	1/2		REF-03-10	Whole
	CLT2-US-01	Whole		BL0-01	Whole
	CLT2-US-02	Whole		BL0-03	1/2
	CLT2-US-03	Whole		BL0-04	Whole
	CLT2-US-04	Whole		BL0-05	1/4
	CLT2-US-05	Whole		BL0-06	Whole
	CLT2-DS-01	Whole		BL0-07	Whole
	CLT2-DS-02	Whole		BL0-11	1/4
	CLT2-DS-03	Whole		BL0-13	Whole
	CLT2-DS-04	Whole		BL0-14	Whole
	CLT2-DS-05	1/2		BL0-15	Whole
	REF-CRK-01	Whole		DL0-01-02	Whole
	REF-CRK-02	Whole		DL0-01-03	1/4
	REF-CRK-03	Whole		DL0-01-04	1/4
	REF-CRK-04	Whole		DL0-01-05	Whole
	REF-CRK-05	Whole ^{a, b}		DL0-01-09	1/4
	SDLT1-R1-01	1/2		DL0-01-10	1/2
	SDLT1-R1-02	Whole		DL0-01-11	Whole
	SDLT1-R1-03	Whole		DL0-01-12	Whole
	SDLT1-R1-04	Whole		DL0-01-14	1/2
	SDLT1-R1-05	Whole		DL0-01-15	Whole
	SDLT9-DS-01	Whole		DL0-02-01	Whole
	SDLT9-DS-02	1/4		DL0-02-02	Whole
	SDLT9-DS-03 ^a	Whole		DL0-02-03	1/2
	SDLT9-DS-04	1/4		DL0-02-04	Whole
	SDLT9-DS-05	Whole		DL0-02-08	Whole
	SDLT12-01	Whole		DL0-02-09	Whole
	SDLT12-02	Whole		DL0-02-10	1/2
	SDLT12-03	1/2		DL0-02-11	1/2
	CO-05-01	1/2		DL0-02-12	Whole ^a
	CO-05-02	1/2		DL0-02-13	Whole
	CO-05-03	Whole		JL0-01	Whole
	CO-05-04	1/2		JL0-02	1/4
	CO-05-05	Whole ^b		JL0-07	Whole
	EO-01-01	Whole		JL0-11	Whole
	EO-01-02	Whole		JL0-12	Whole
	EO-01-03	Whole		JL0-16	1/2
	EO-01-04	Whole		JL0-18	1/4
	EO-01-05	Whole		JL0-19	1/2
	EO-20-01	Whole		JL0-20	Whole
	EO-20-02	Whole		JL0-21	1/2
	EO-20-03	Whole			
	EO-20-04	Whole			
	EO-20-05	Whole			
	GO-03-01	Whole			
	GO-03-02	Whole			
	GO-03-03	Whole			
	GO-03-04	Whole			
	GO-03-05	Whole			
	GO-09-01	Whole			
	GO-09-02	Whole			
	GO-09-03	Whole			
	GO-09-04	Whole			
	GO-09-05	Whole			

^a Four quarters sorted for subsampling error.

^b Two halves sorted for subsampling error.

Table A.6: Subsampling Error for Benthic Invertebrate Community Samples, 2021 CREMP

Waterbody Type	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 ^a	Precision		Accuracy	
								% range		min	max
Lotic (Creek and River) Samples	REF-CRK-05	1	166	169	170	193	698	0.6	14.0	2.6	10.6
	CLT1-DS-04	-	149	163	-	-	312	8.6	-	4.5	-
	REF-CRK-05	1	336	362	-	-	698	7.2	-	3.7	-
	SDLT9-DS-03	-	189	193	208	229	819	2.1	17.5	1.6	11.8
	C0-05-05	-	114	118	-	-	232	3.4	-	1.7	-
Lentic (Lake) Samples	DL0-02-12	0	108	110	113	121	452	1.8	10.7	0.0	7.1
	DL0-02-12	0	218	234	-	-	452	6.8	-	3.5	-
	DL0-02-1	0	292	324	-	-	616	9.9	-	5.2	-
	DL0-02-2	0	182	189	-	-	371	3.7	-	1.9	-

Notes: min = minimum absolute % error; max = maximum absolute % error. Densities expressed per sampled area.

^a Whole large organisms excluded in calculations.

Table A.7: Percent Recovery from Benthic Invertebrate Samples, Mary River Project CREMP, 2021

Waterbody Type	Station	Number of Organisms Recovered (initial sort)	Number of Organisms in Re-sort	Percent Recovery
Lotic (Creek and River) Samples	CLT1-US-02	195	197	99.0%
	CLT1-DS-02	168	173	97.1%
	REF-CRK-03	330	333	99.1%
	SDLT9-DS-01	185	204	90.7%
	CO-05-04	358	374	95.7%
	EO-20-05	151	152	99.3%
	GO-03-01	112	112	100.0%
	Average % Recovery			97.3%
Lentic (Lake) Samples	REF-03-2	81	88	92.0%
	BL0-4	157	171	91.8%
	DL0-01-02	97	98	99.0%
	DL0-02-11	288	294	98.0%
	JL0-7	141	143	98.6%
	Average % Recovery			95.9%

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).

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 most often near the 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 2021 CREMP were considered defensible and acceptable for interpretation and derivation of conclusions with a good level of confidence.



APPENDIX B
Placeholder Only - To Be Updated

APPENDIX C
WATER QUALITY DATA

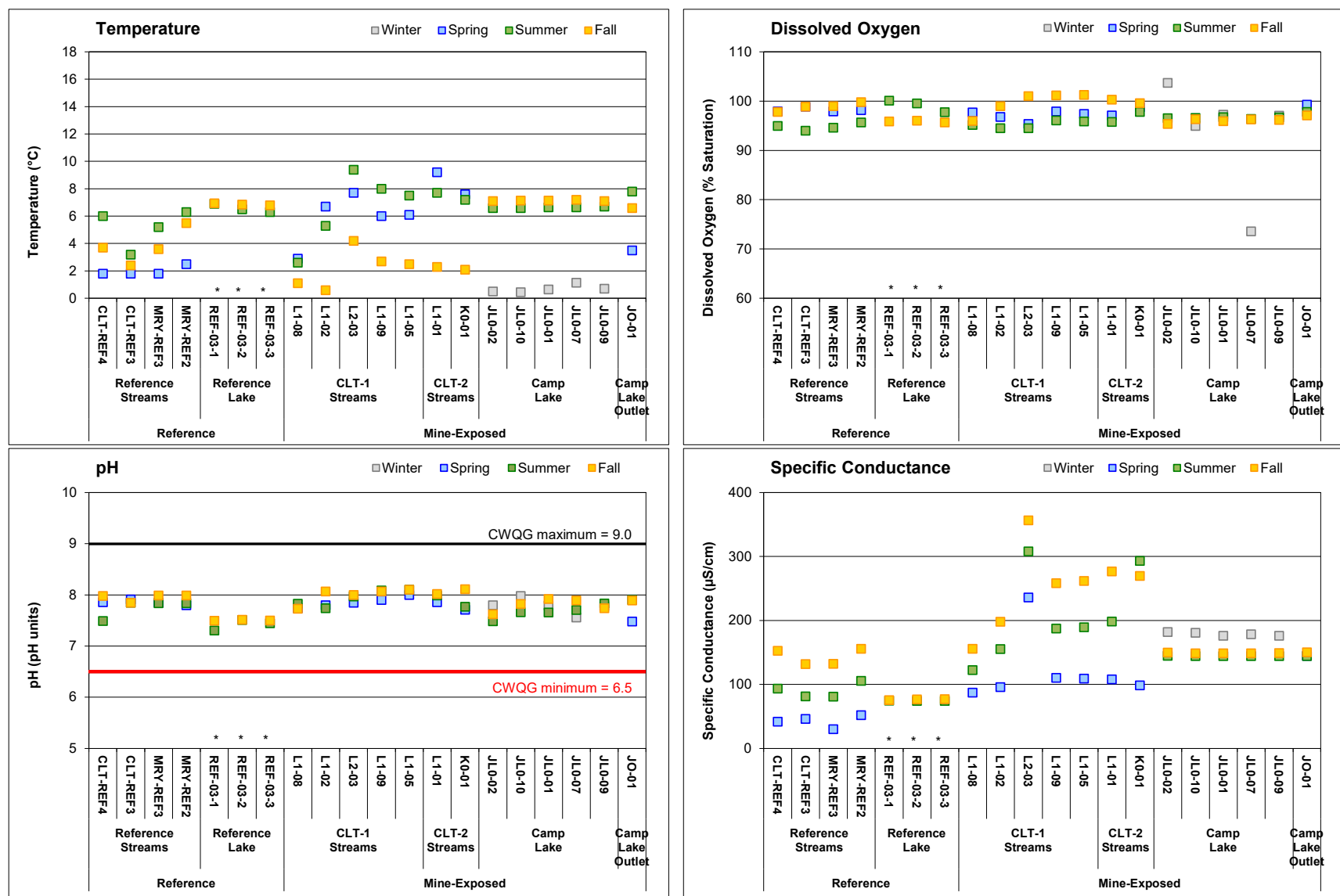


Figure C.1: Comparison of *In Situ* Water Quality Measured at Camp Lake System Water Quality Monitoring Stations in Winter, Spring, Summer, and Fall 2021, Mary River Project CREMP

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.

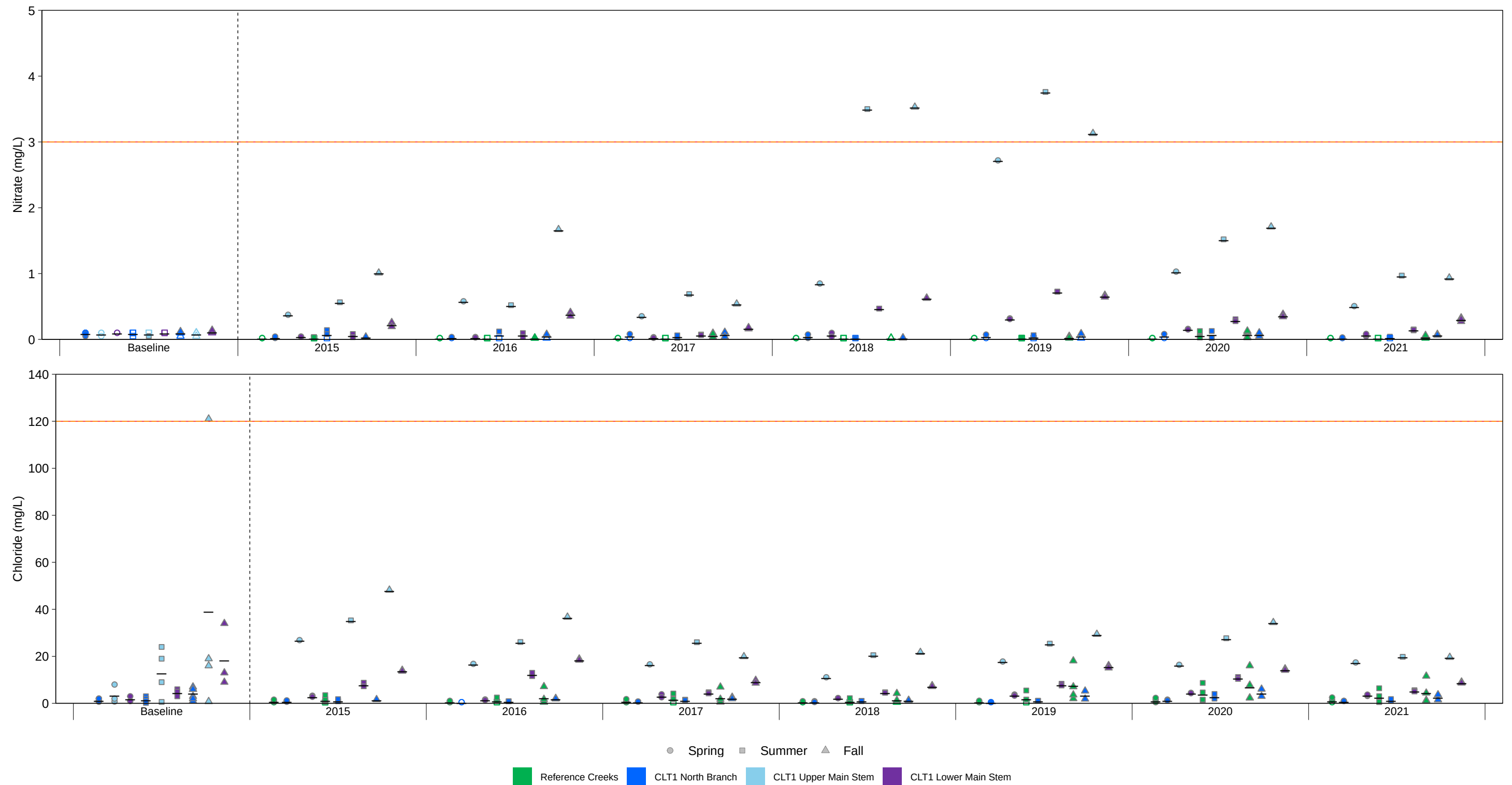


Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

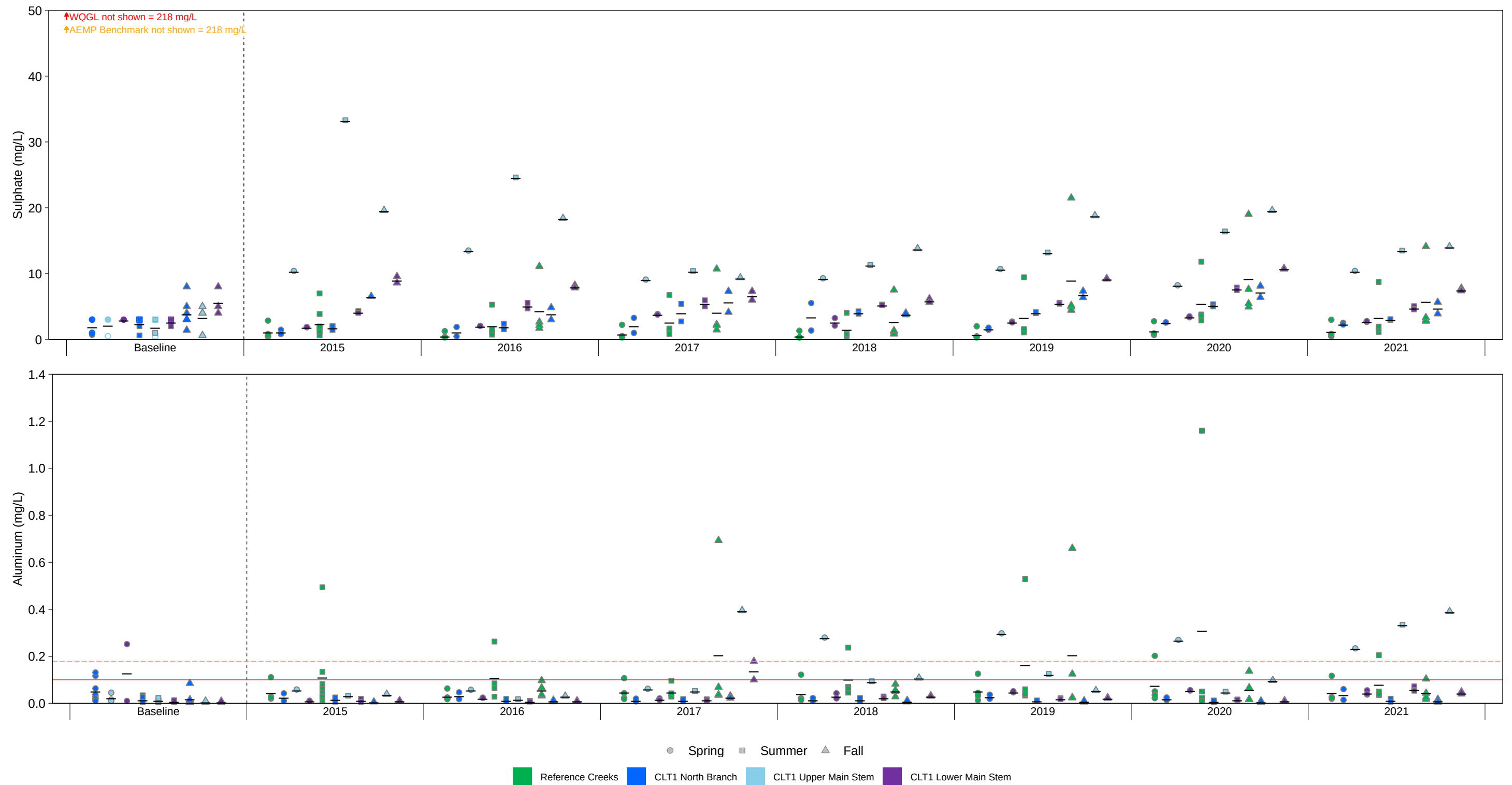


Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

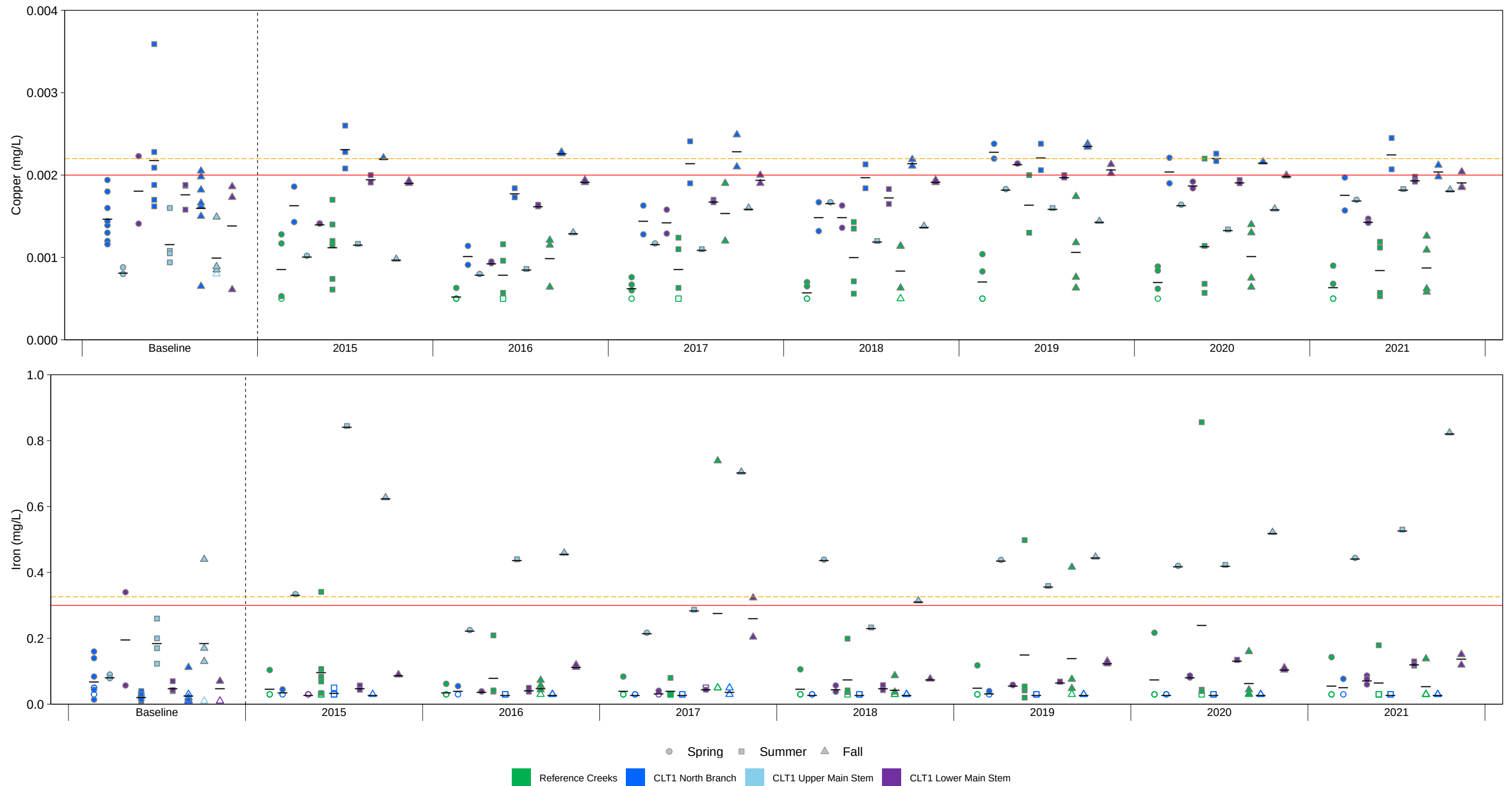


Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

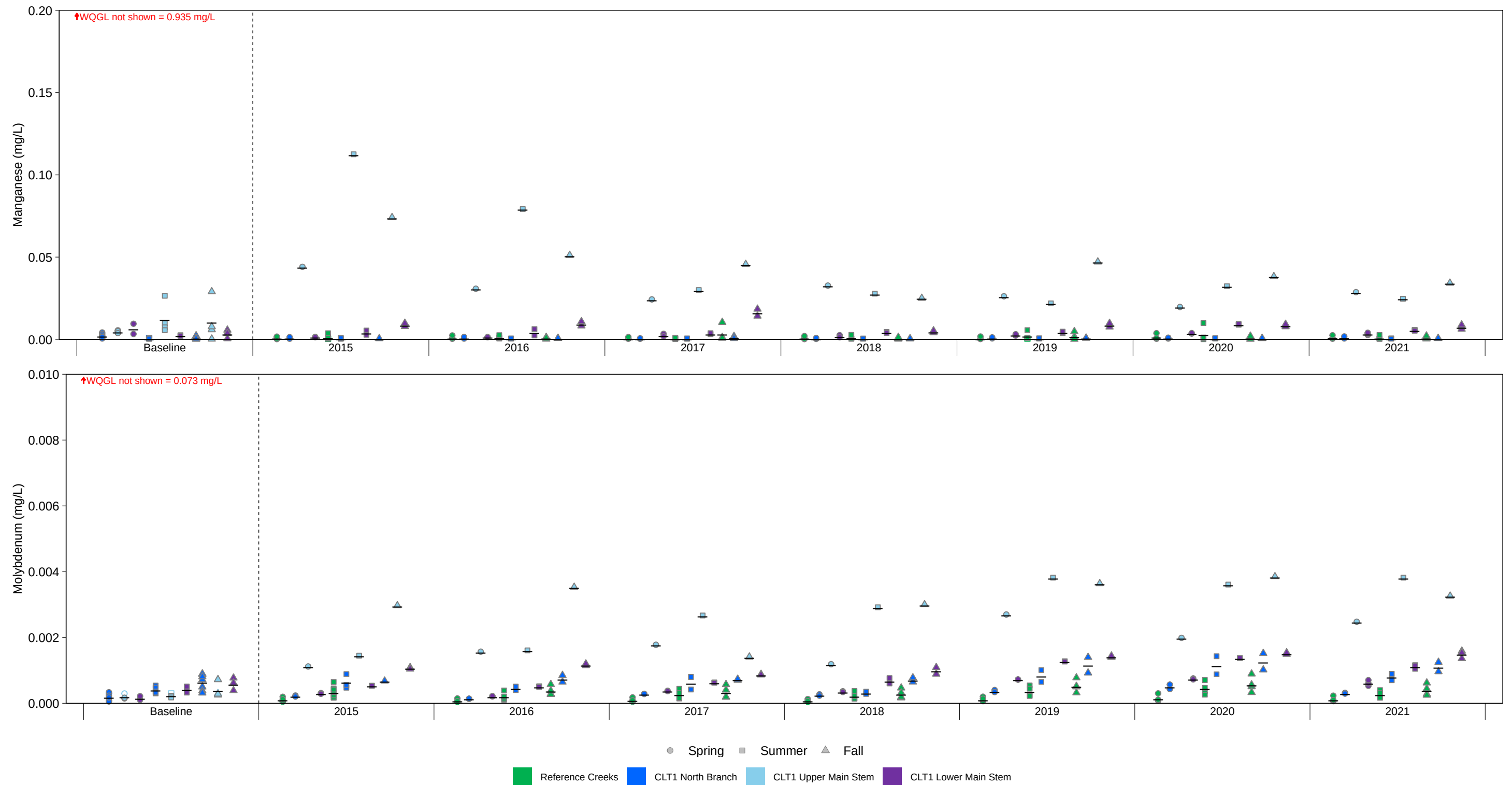


Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

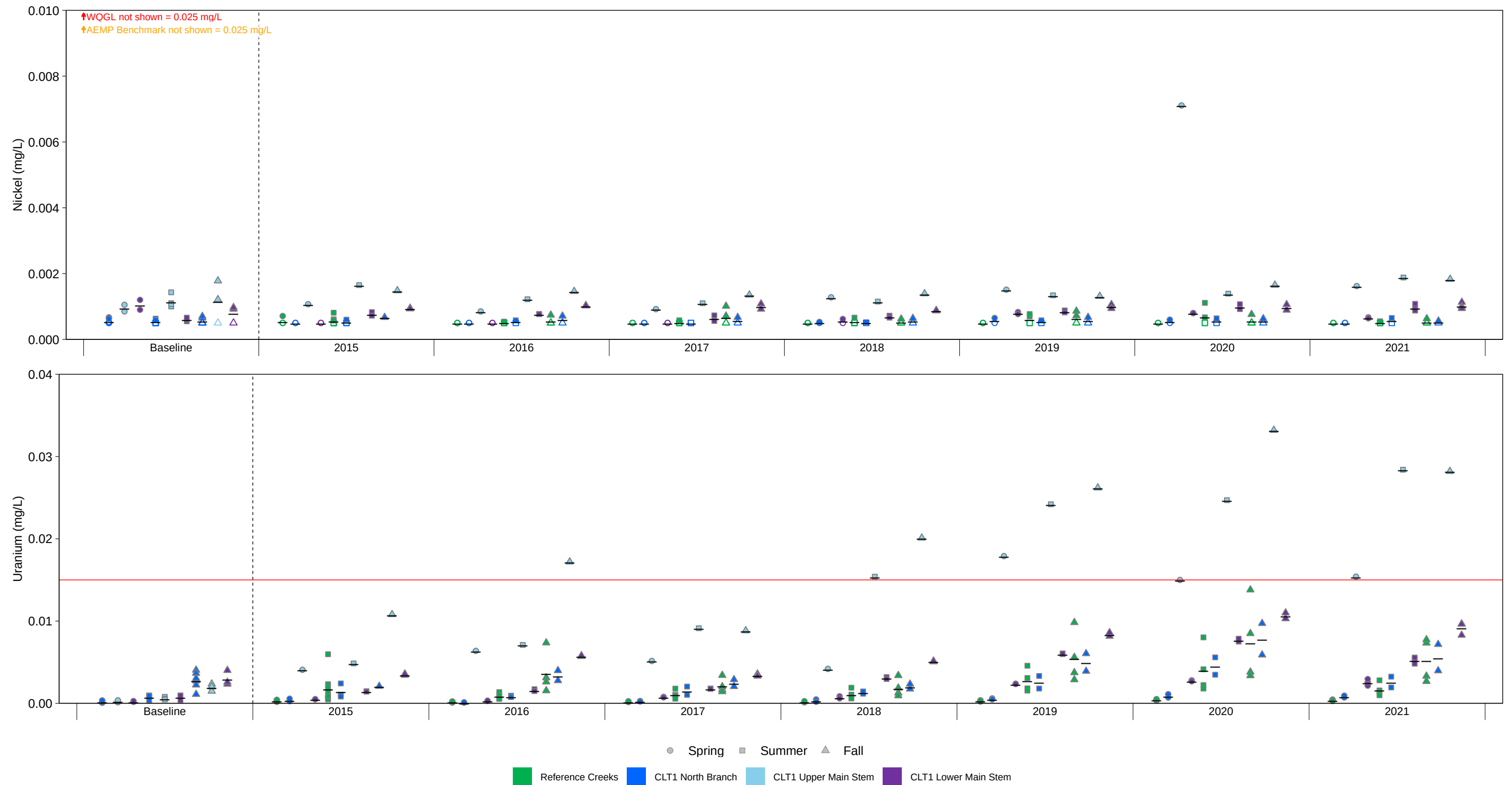


Figure C.2: Temporal Comparison of Water Chemistry at Camp Lake Tributary 1 (CLT1) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

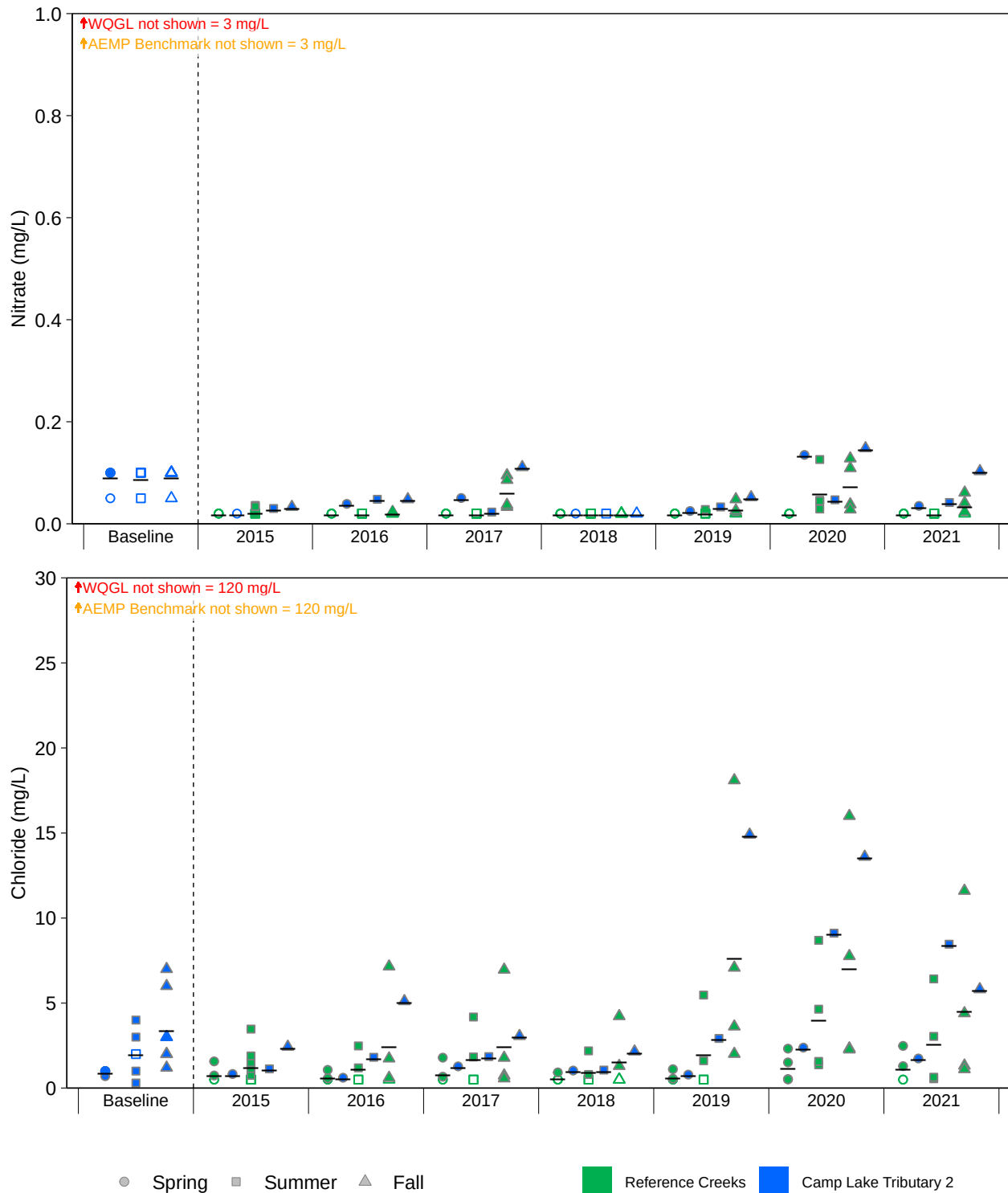


Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

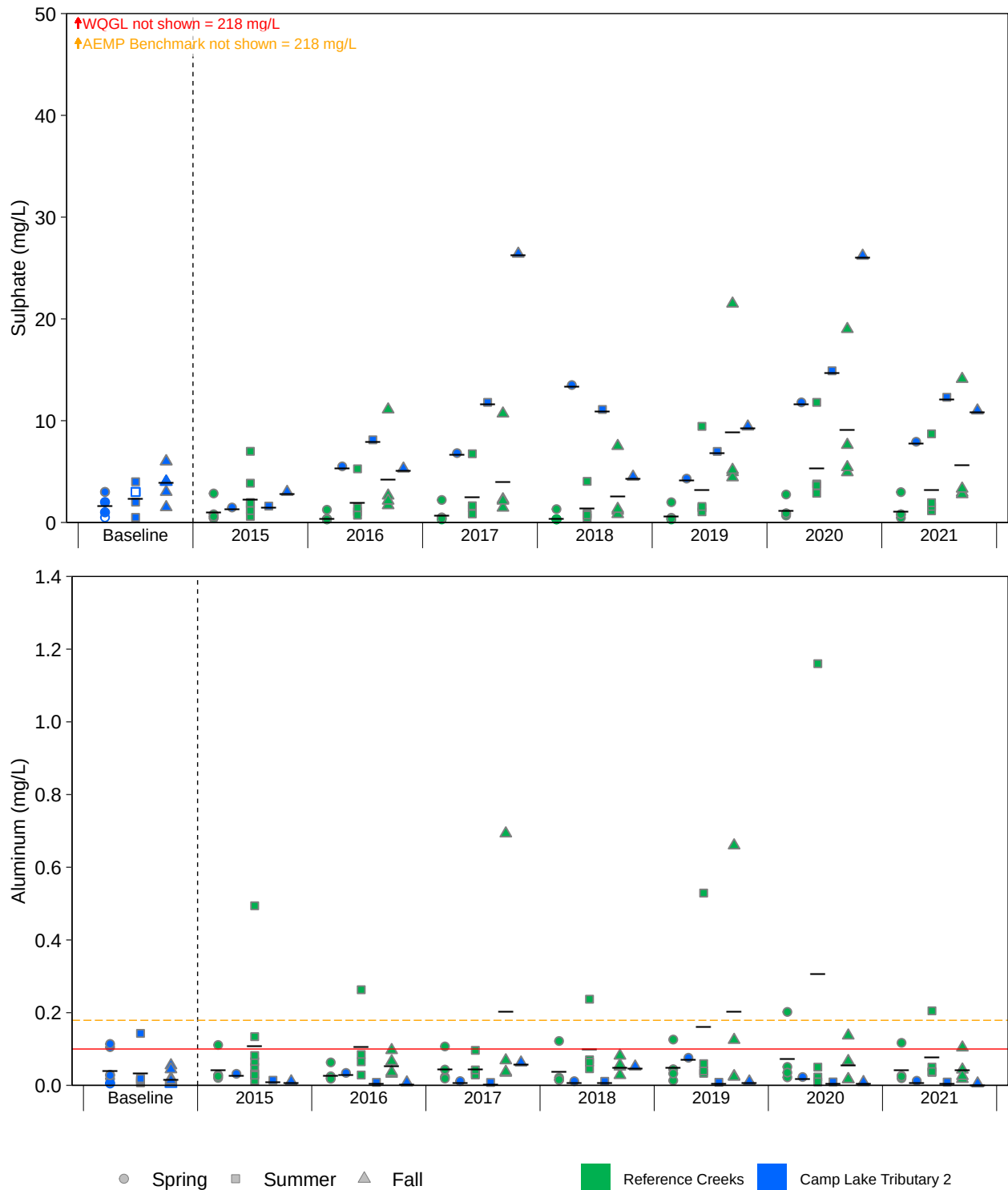


Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

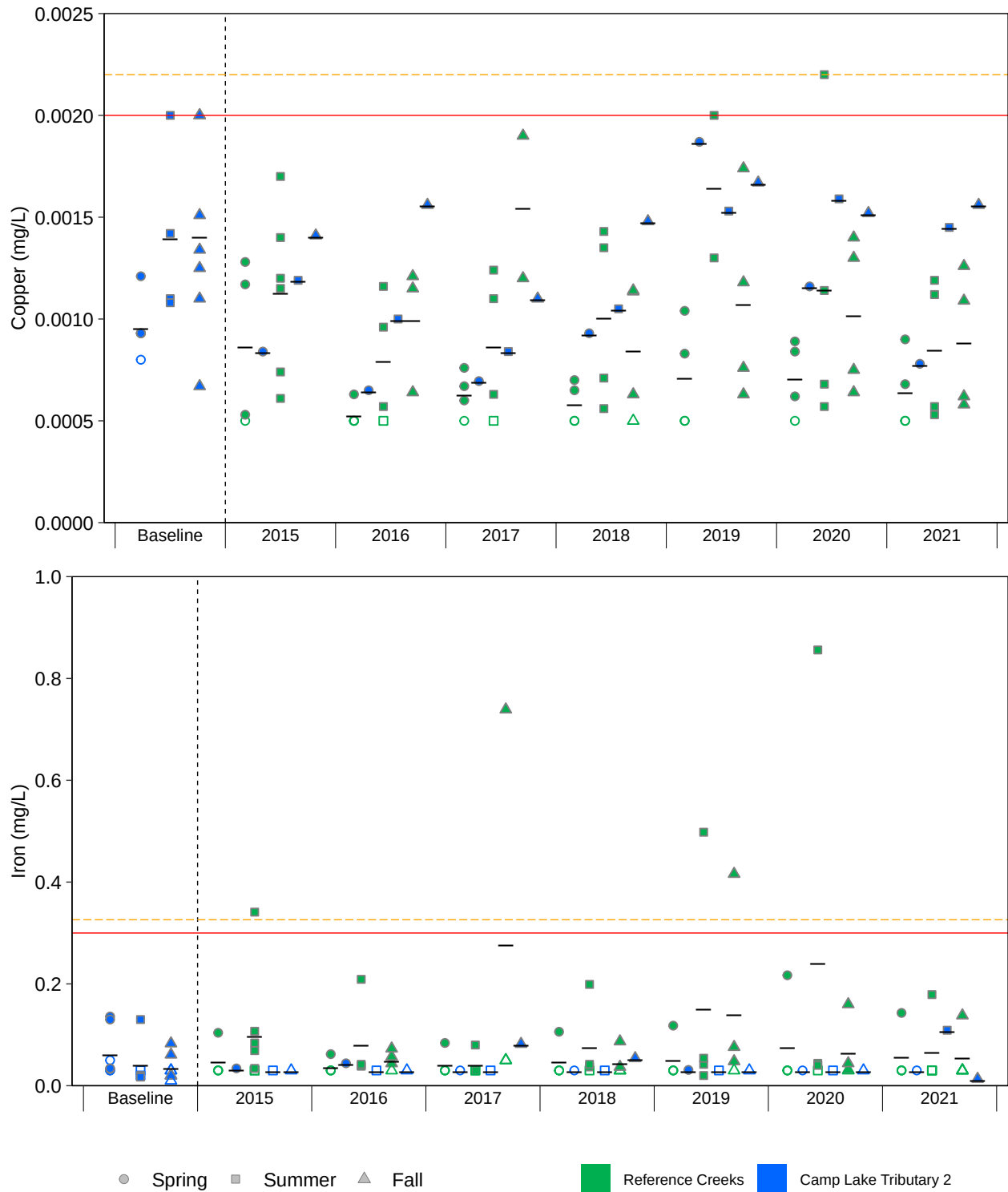


Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

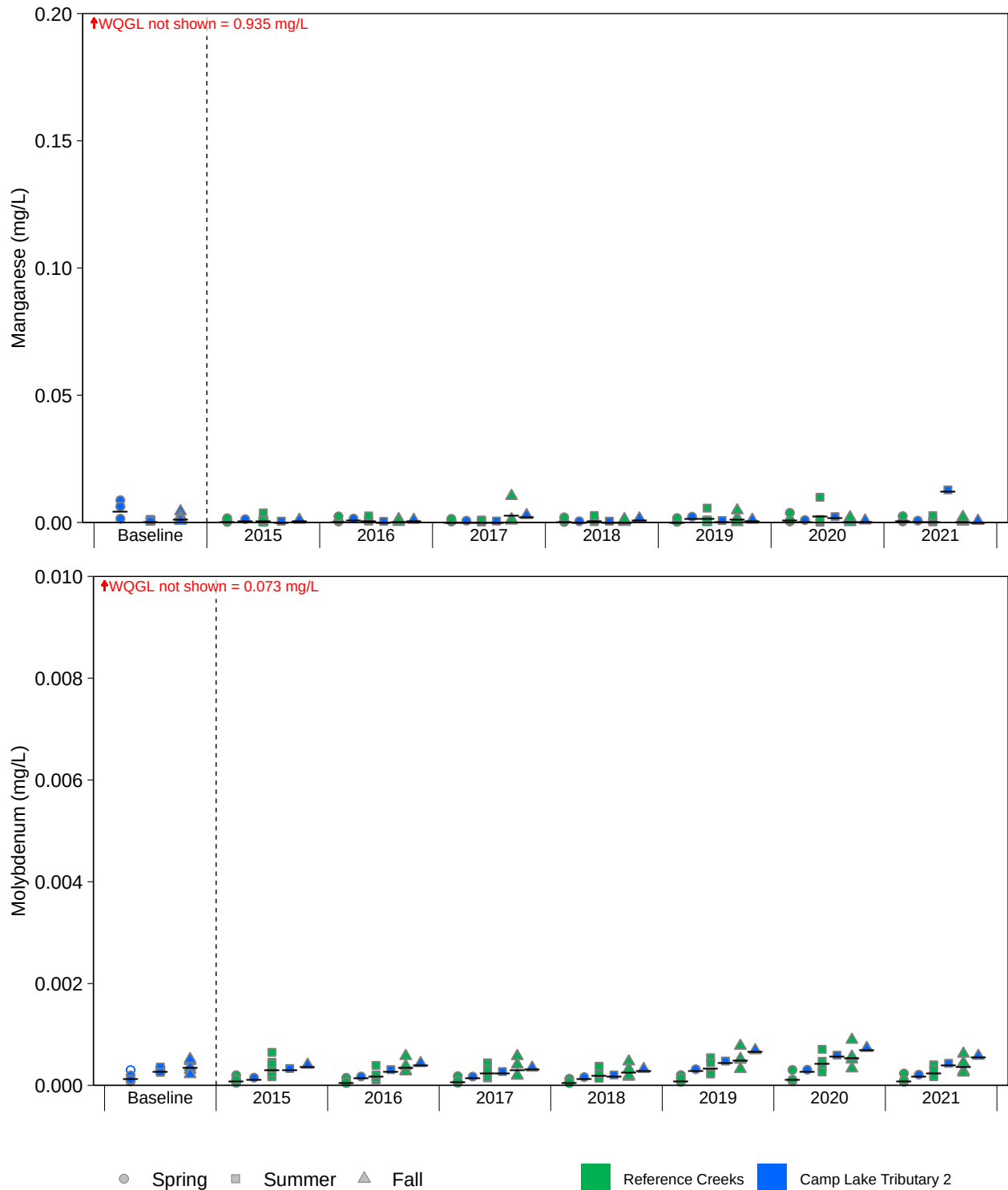


Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

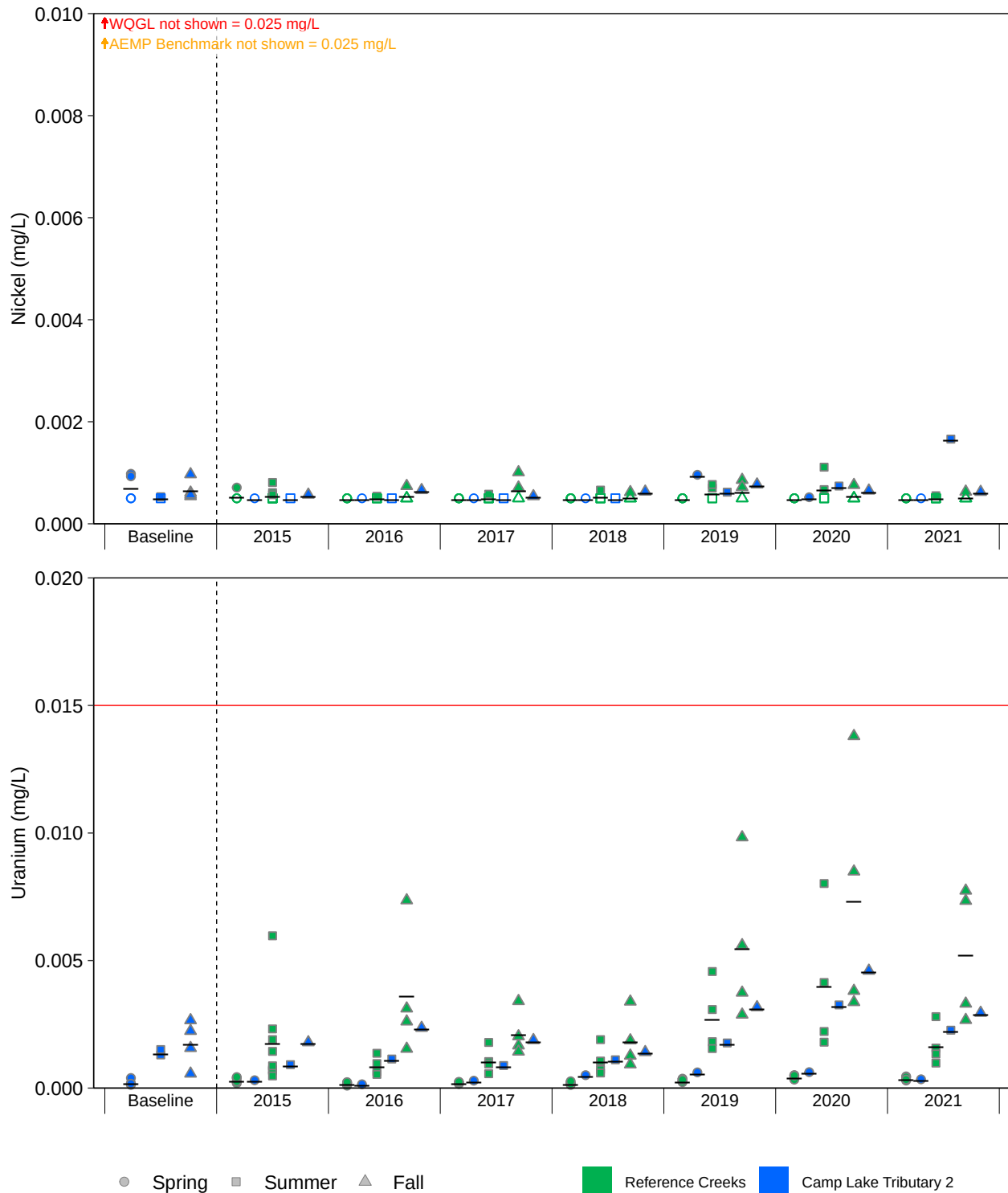


Figure C.3: Temporal Comparison of Water Chemistry at Camp Lake Tributary 2 (CLT2) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

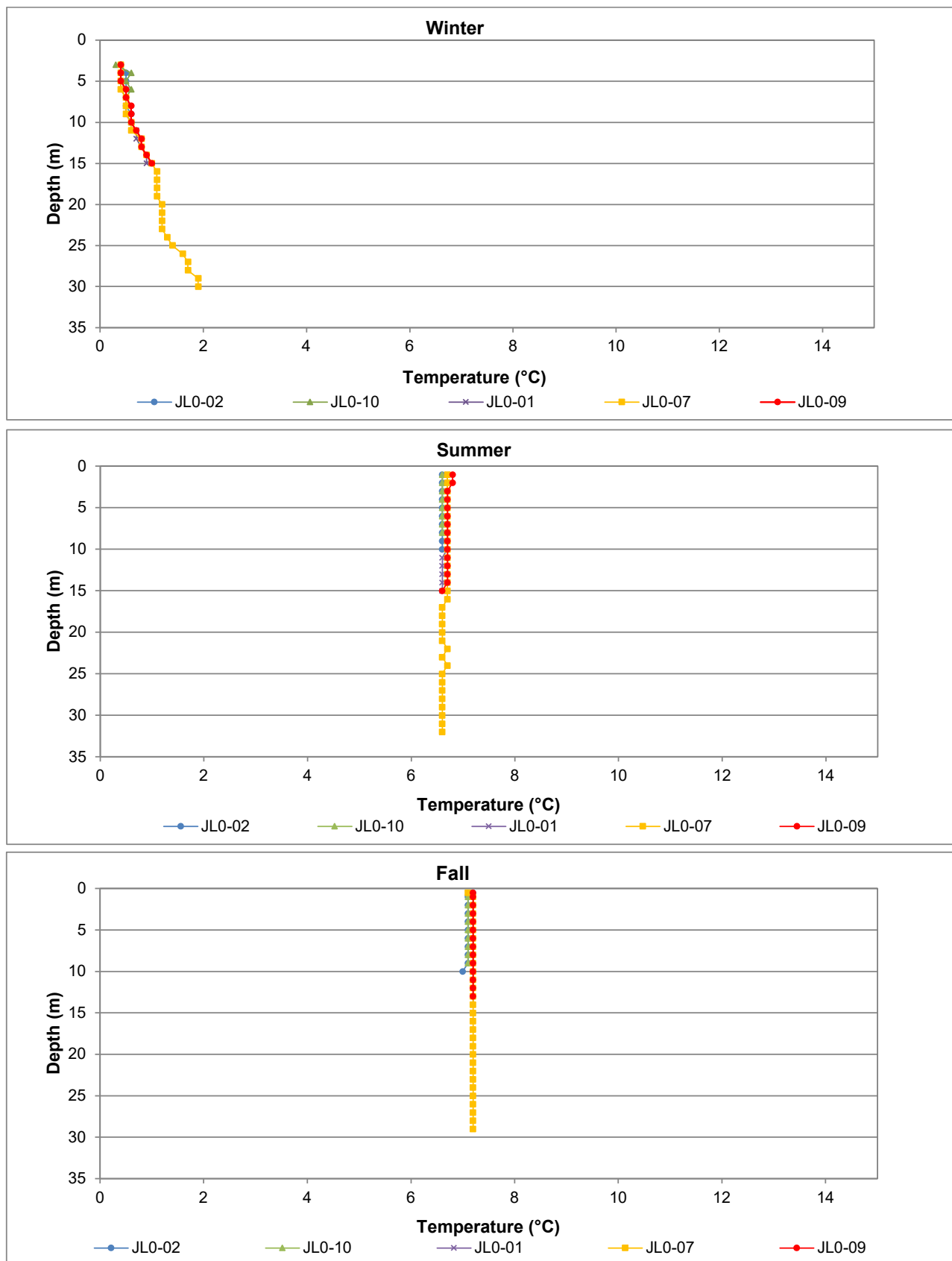


Figure C.4: Vertical Profiles of Temperature Measured at Camp Lake in Winter, Summer, and Fall, 2021

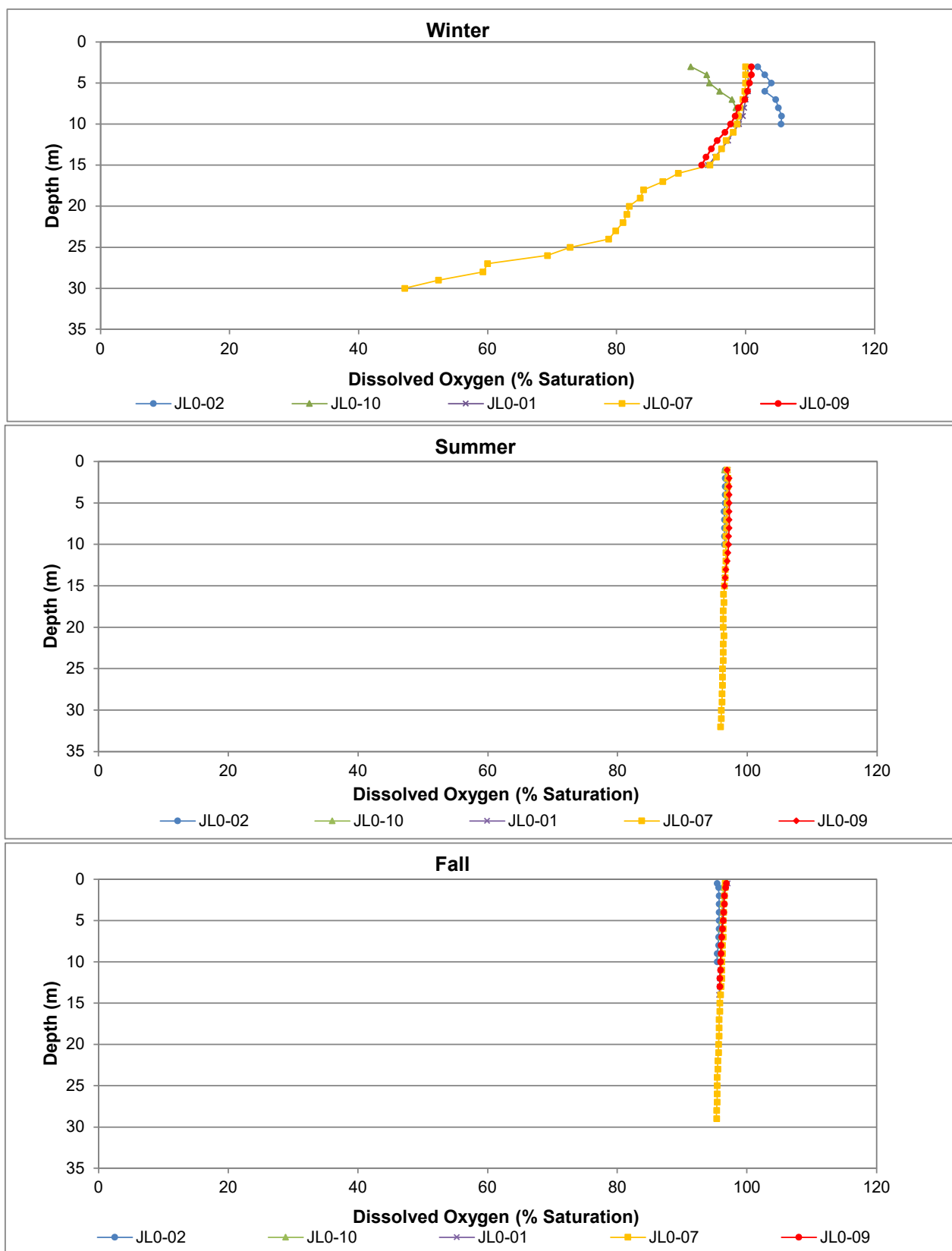


Figure C.5: Vertical Profiles of Dissolved Oxygen Measured at Camp Lake in Winter, Summer, and Fall, 2021

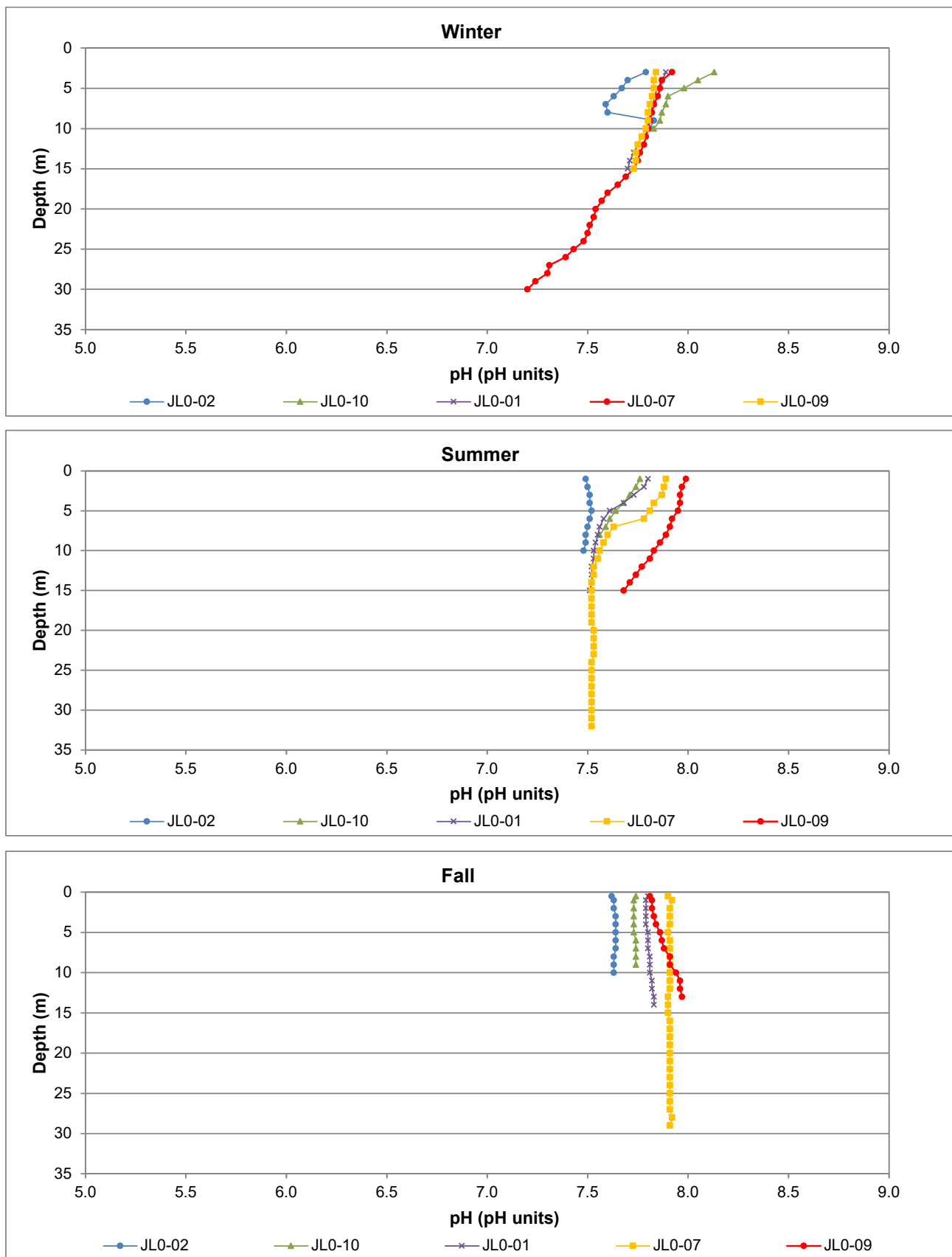


Figure C.6: Vertical Profiles of pH Measured at Camp Lake in Winter, Summer, and Fall, 2021

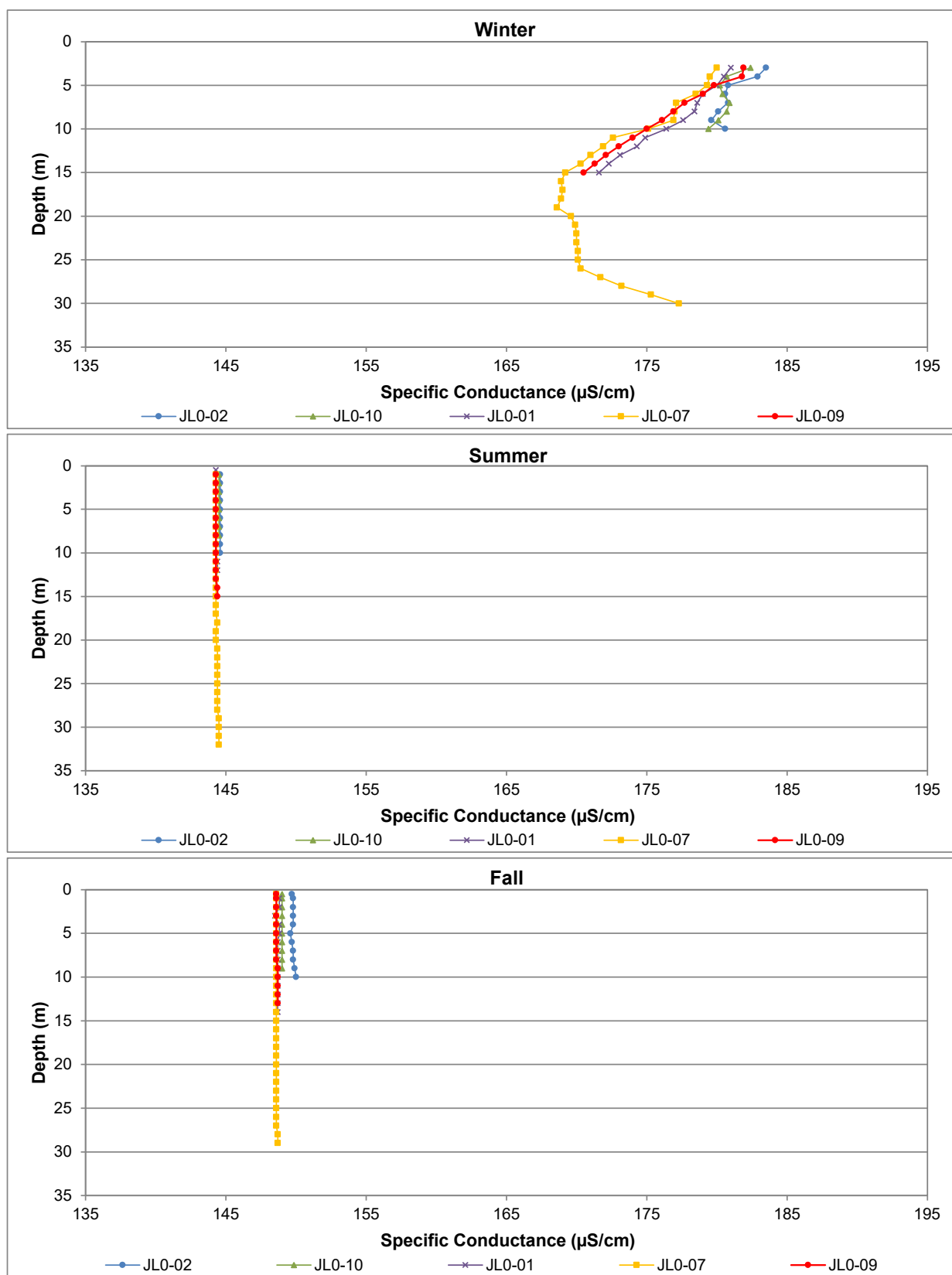


Figure C.7: Vertical Profiles of Specific Conductance Measured at Camp Lake in Winter, Summer, and Fall, 2021

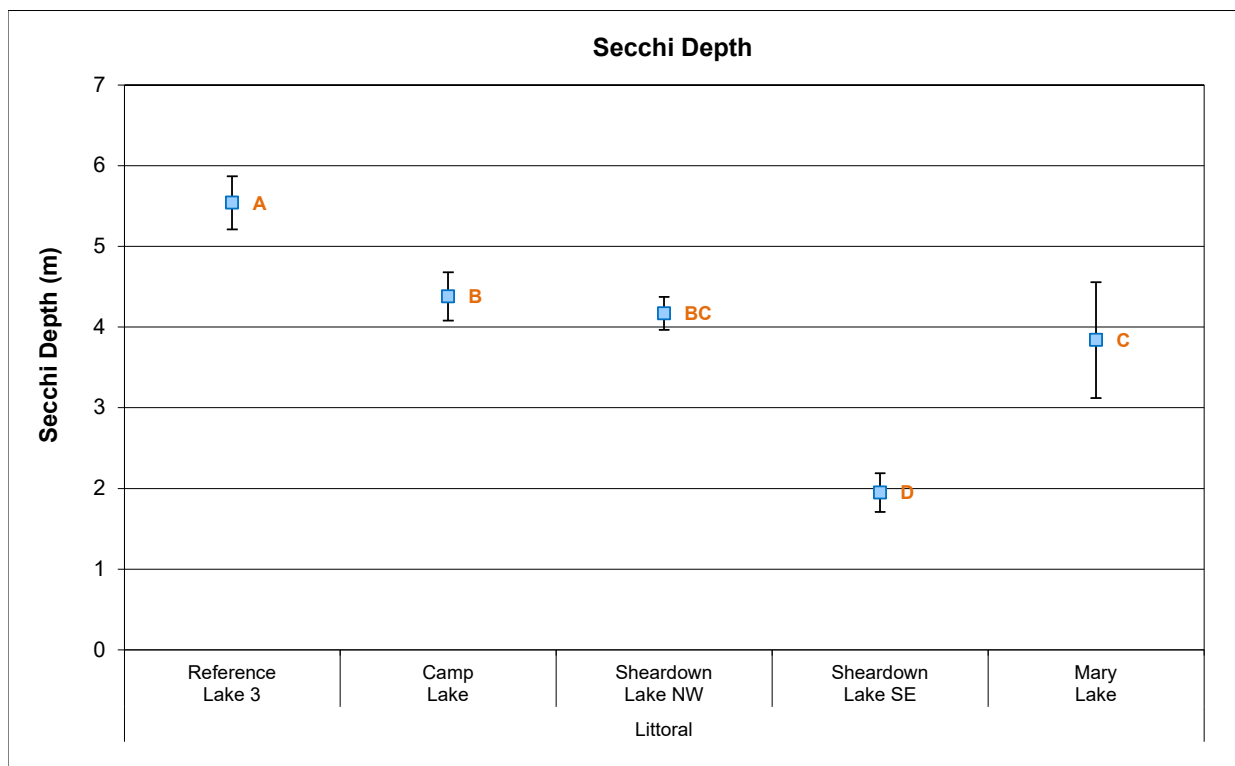


Figure C.8: Comparison of Secchi Depth (mean $\pm$ SD) Measured at the Mary River Project Lake Benthic Invertebrate Community Stations, August 2021

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.

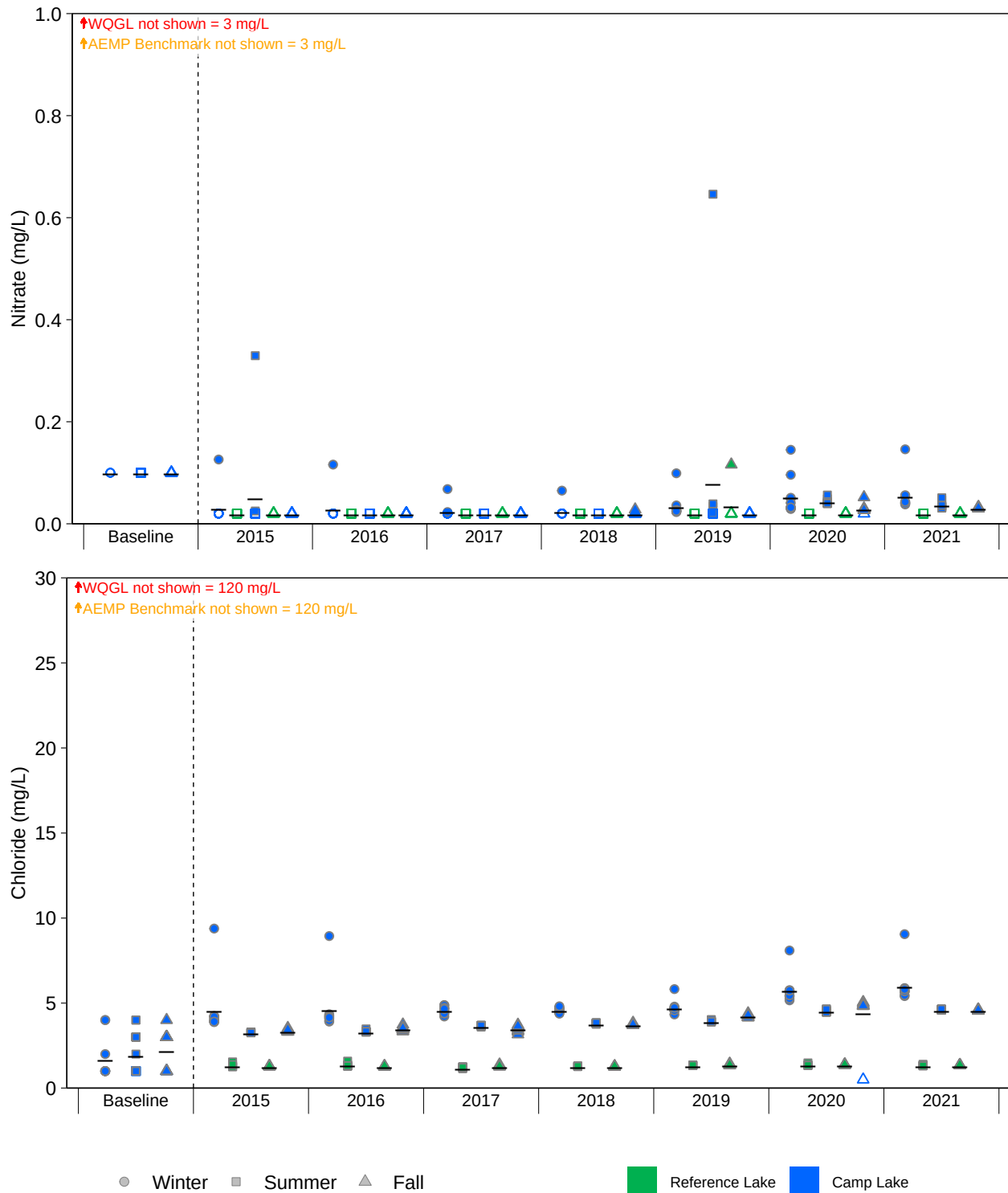


Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

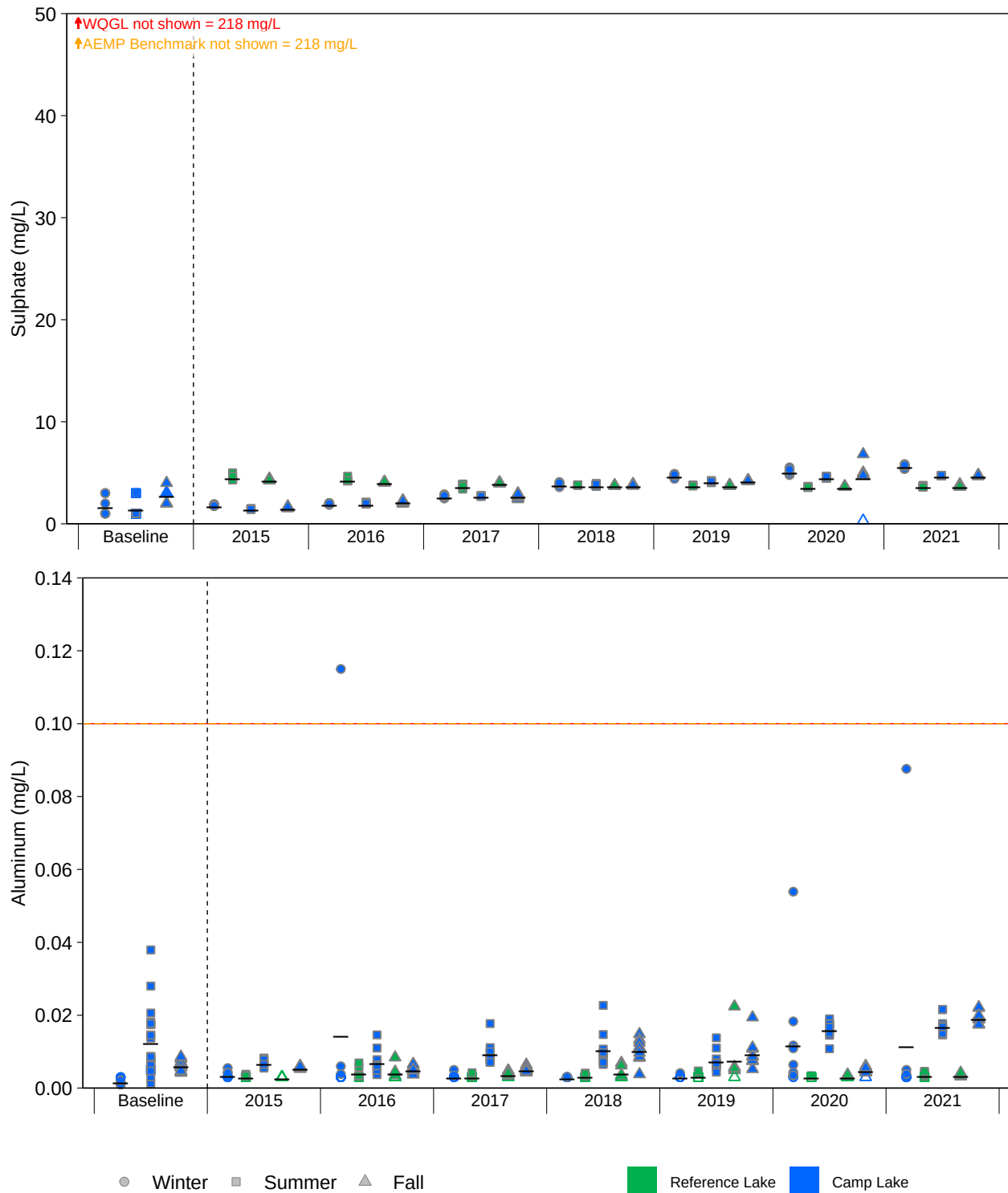


Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

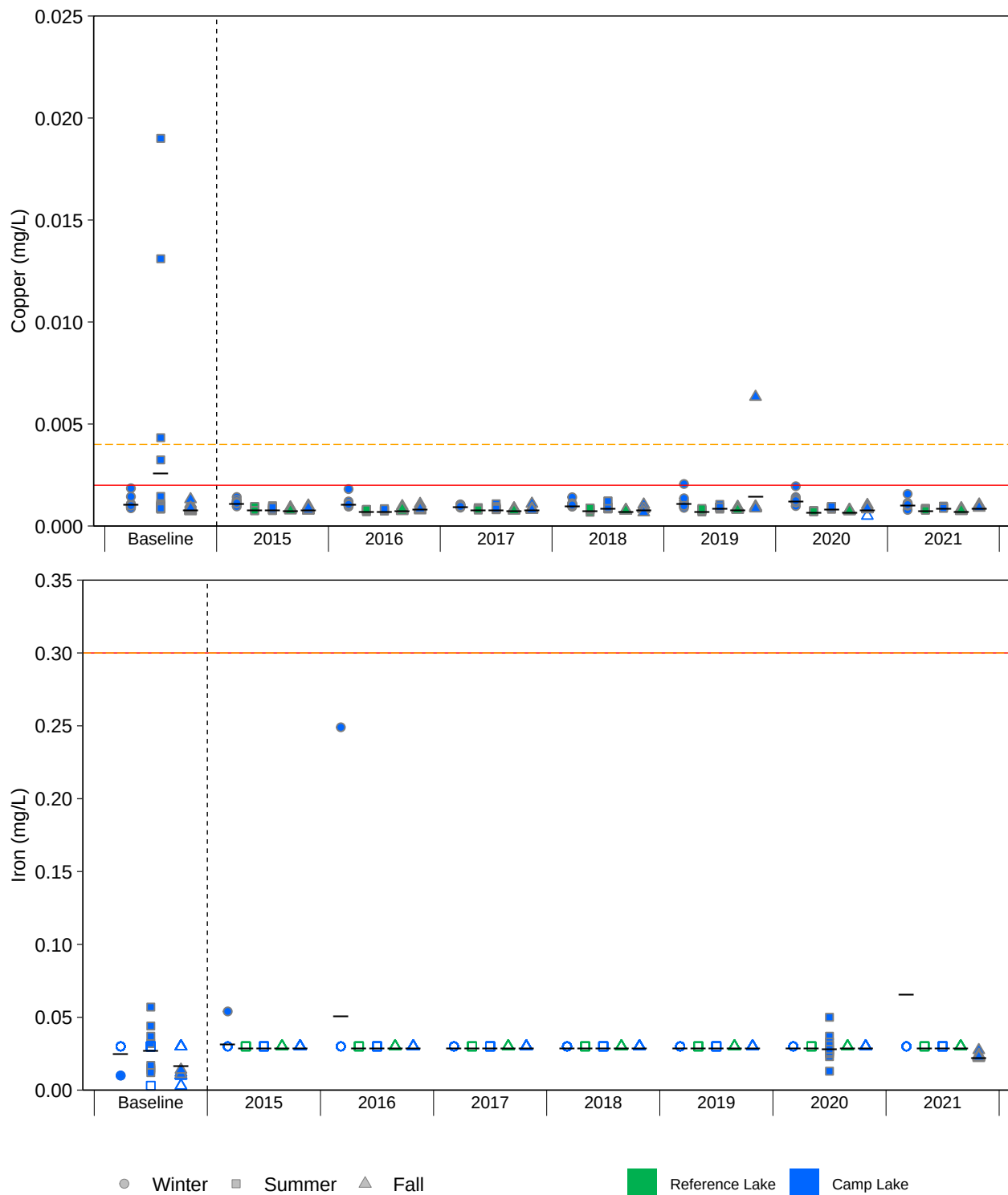


Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

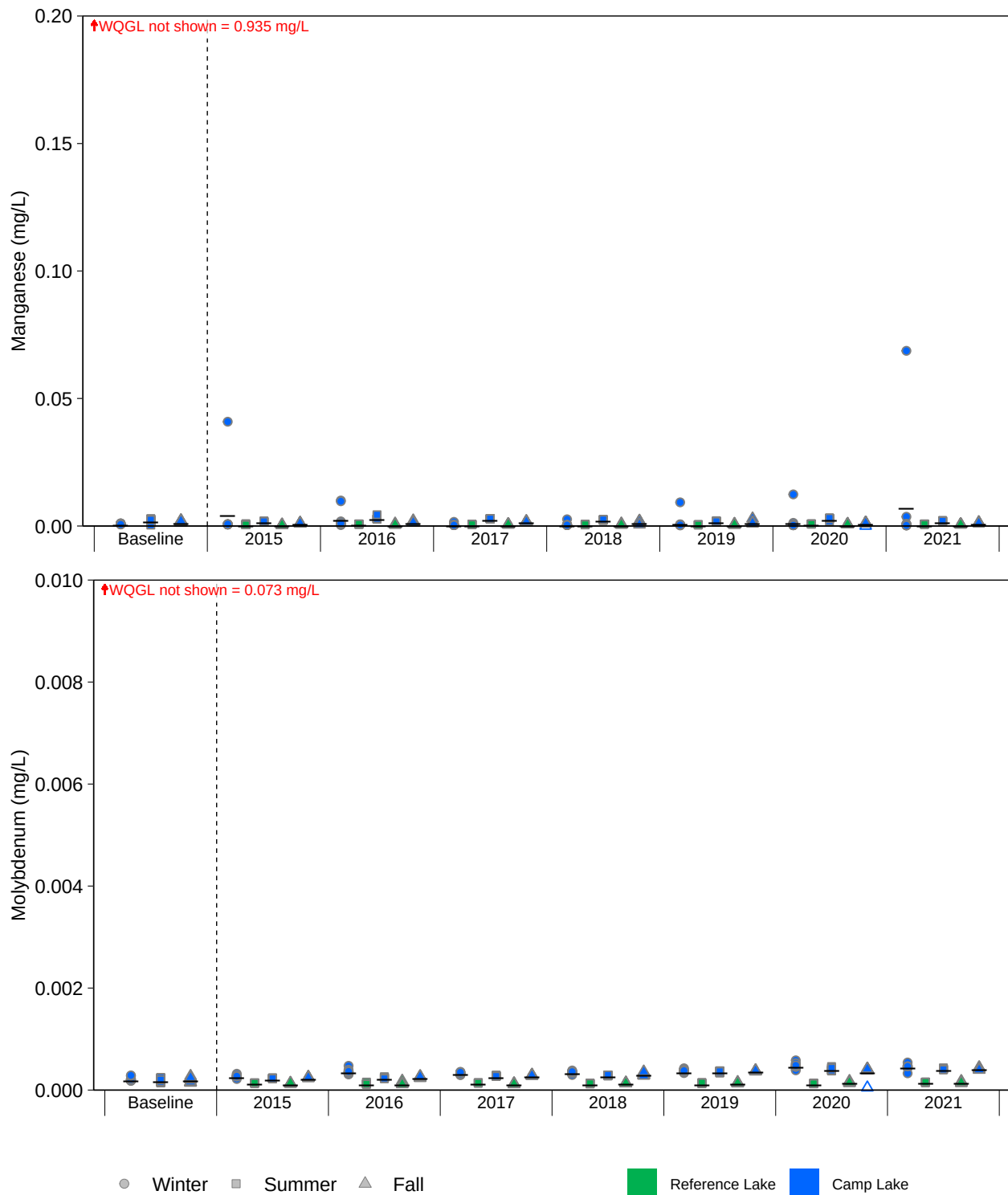


Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

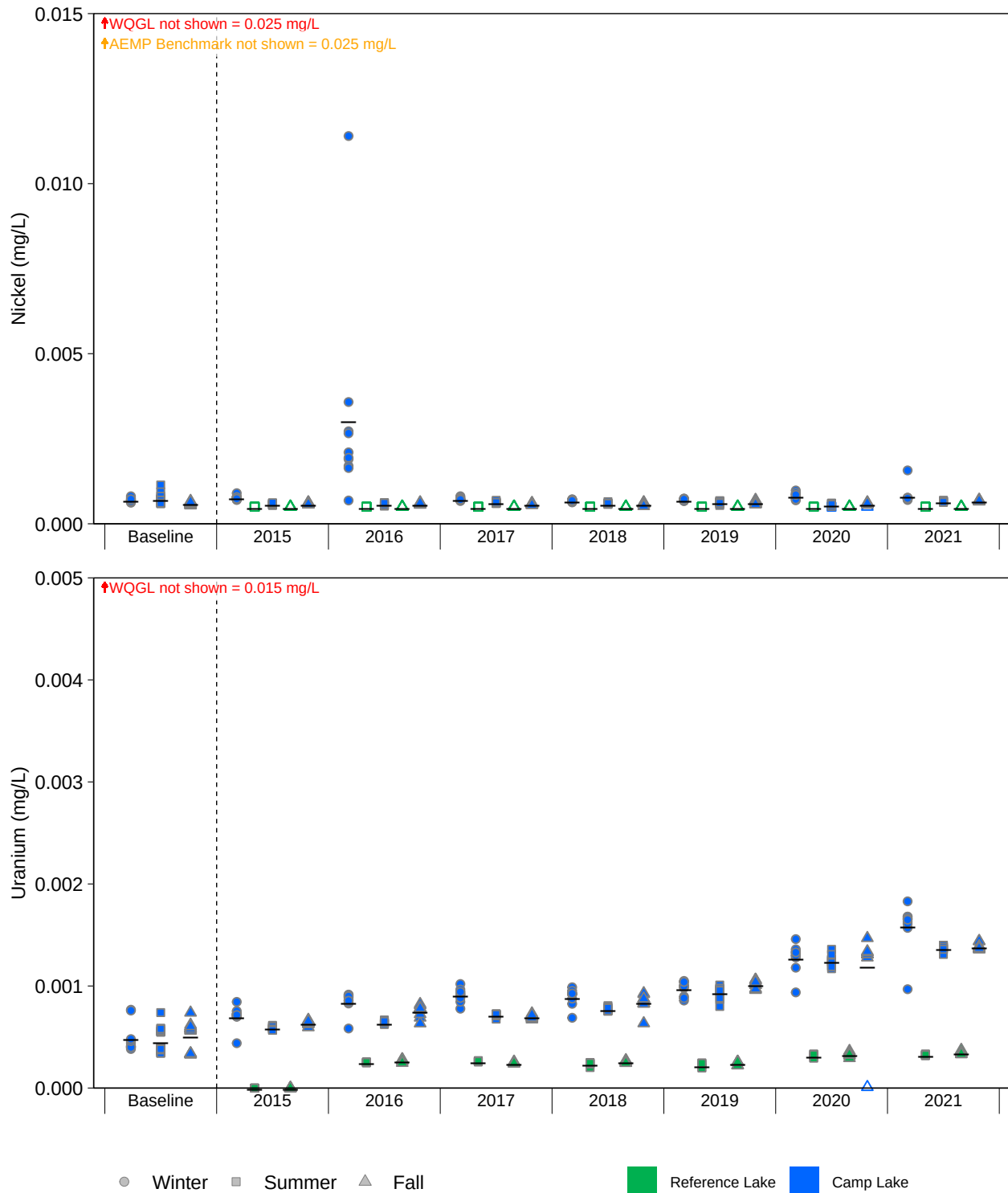


Figure C.9: Temporal Comparison of Water Chemistry at Camp Lake (JL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

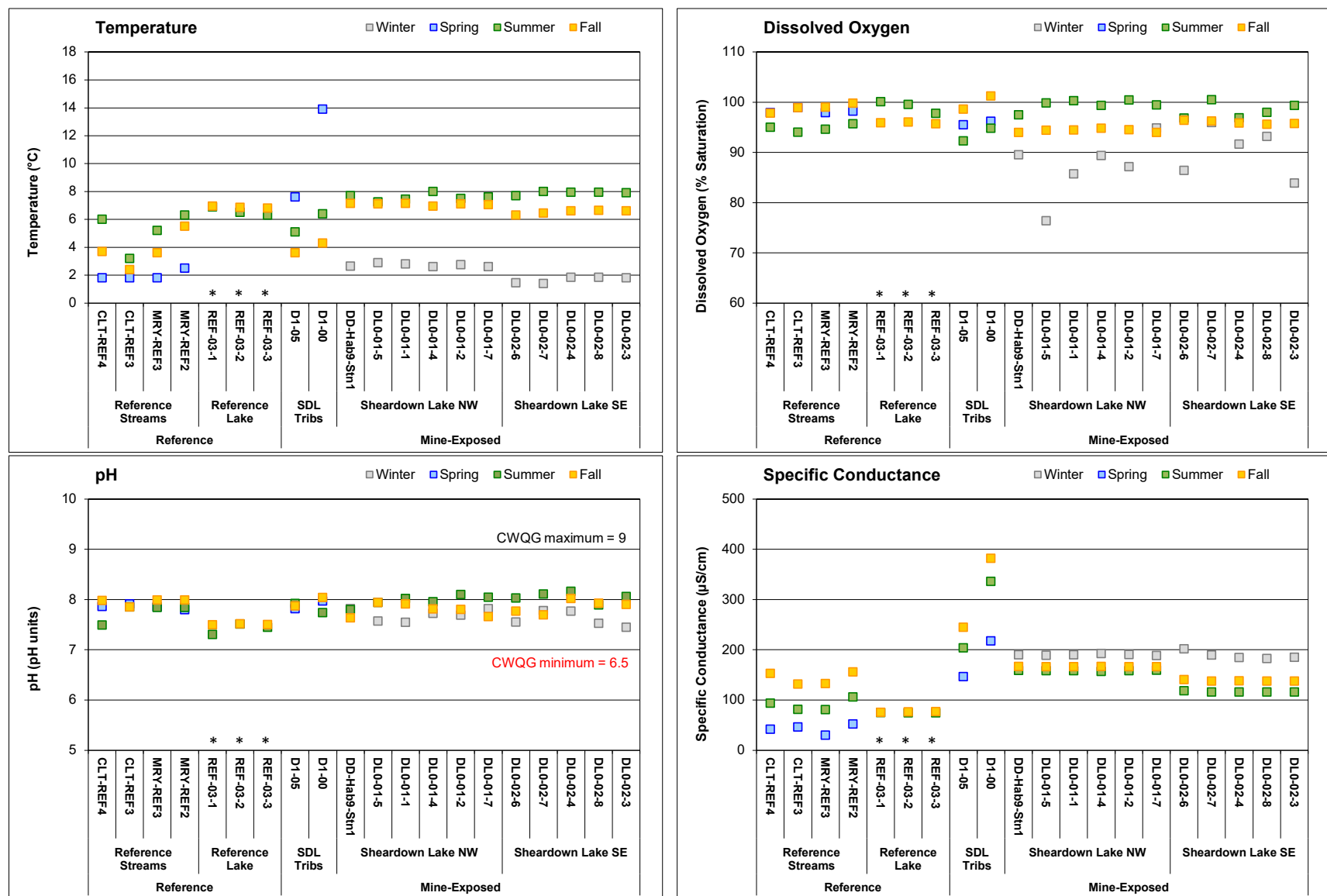


Figure C.10: Comparison of *In Situ* Water Quality Variables Measured at Sheardown Lake System Water Quality Monitoring Stations in Winter, Spring, Summer, and Fall 2021, Mary River Project CREMP

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

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

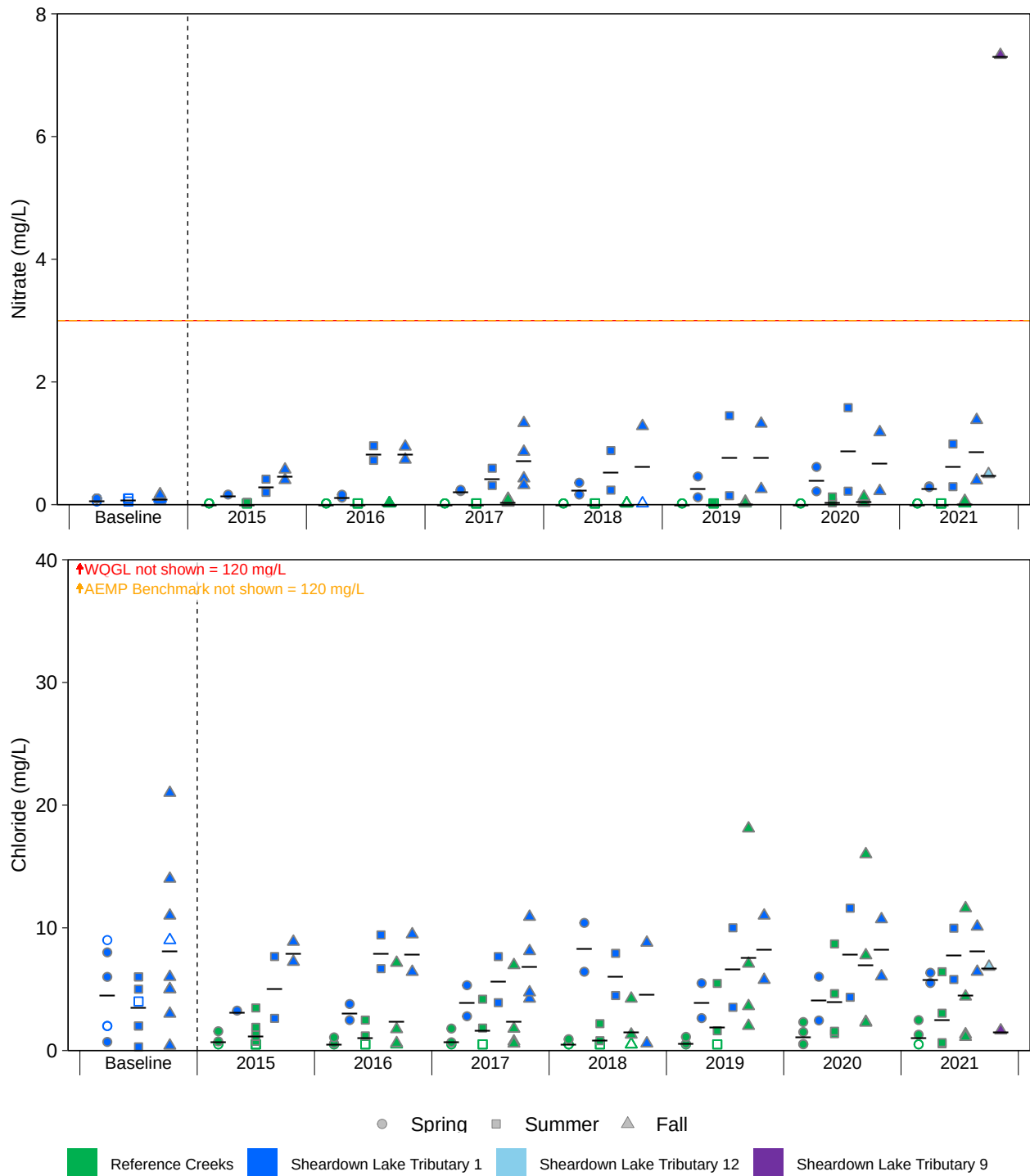


Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Sheardown Lake Tributary 12 (SDLT12/ LDFG-OUT) and Sheardown Lake Tributary 9 (SDLT9/MS-C-G) stations were added to the CREMP in fall 2021.

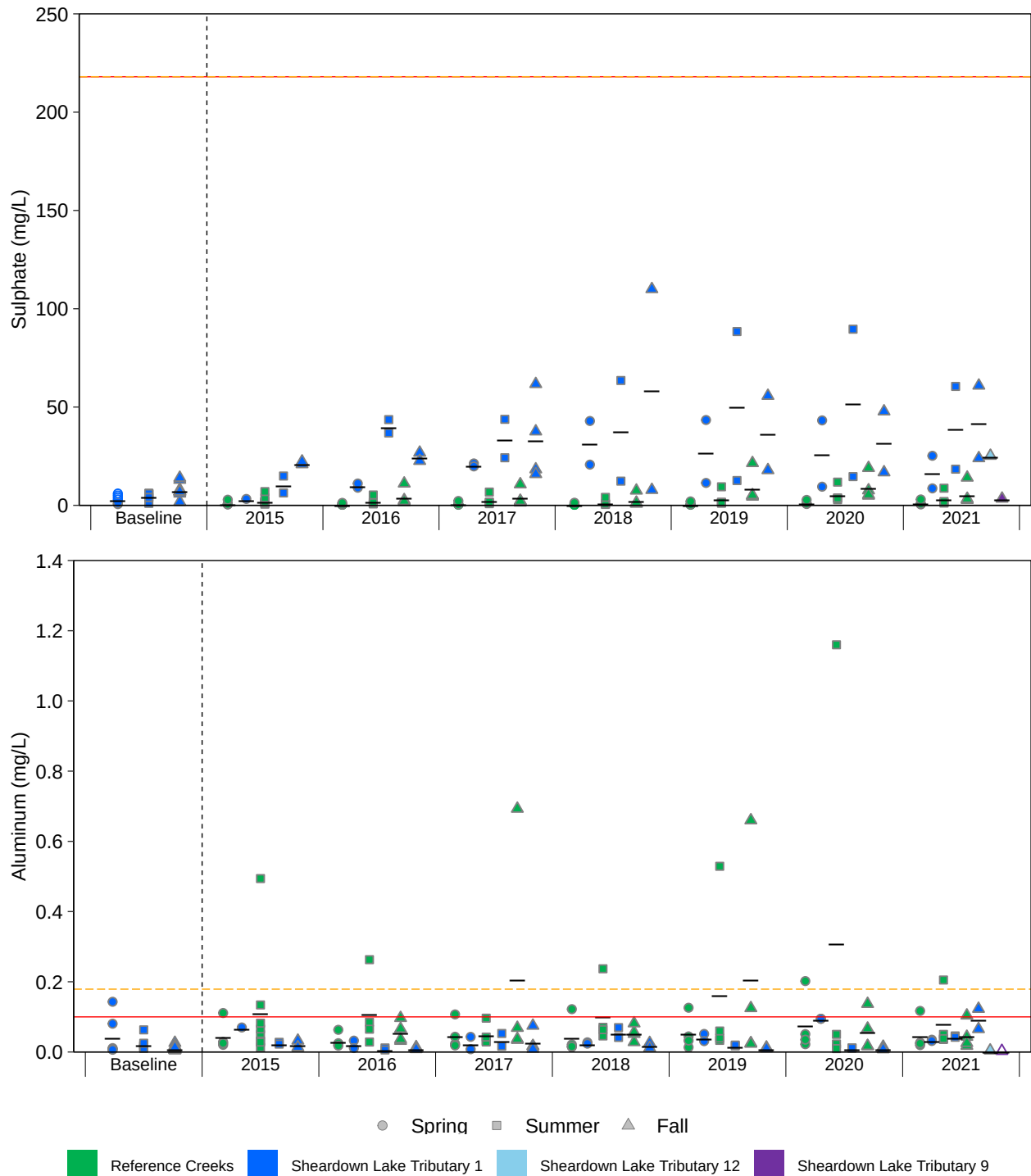


Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Sheardown Lake Tributary 12 (SDLT12/ LDFG-OUT) and Sheardown Lake Tributary 9 (SDLT9/MS-C-G) stations were added to the CREMP in fall 2021.

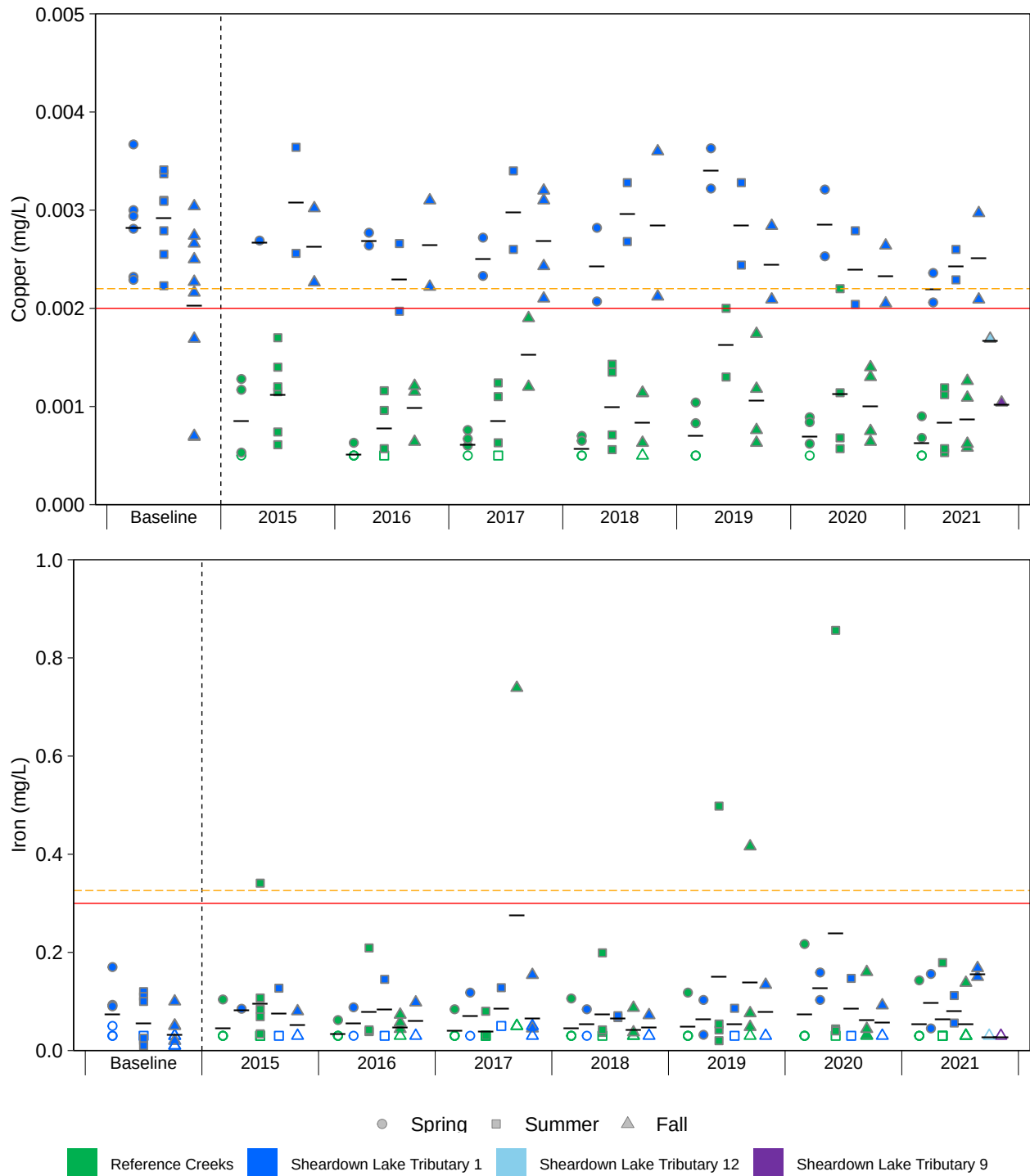


Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Sheardown Lake Tributary 12 (SDLT12/ LDFG-OUT) and Sheardown Lake Tributary 9 (SDLT9/MS-C-G) stations were added to the CREMP in fall 2021.

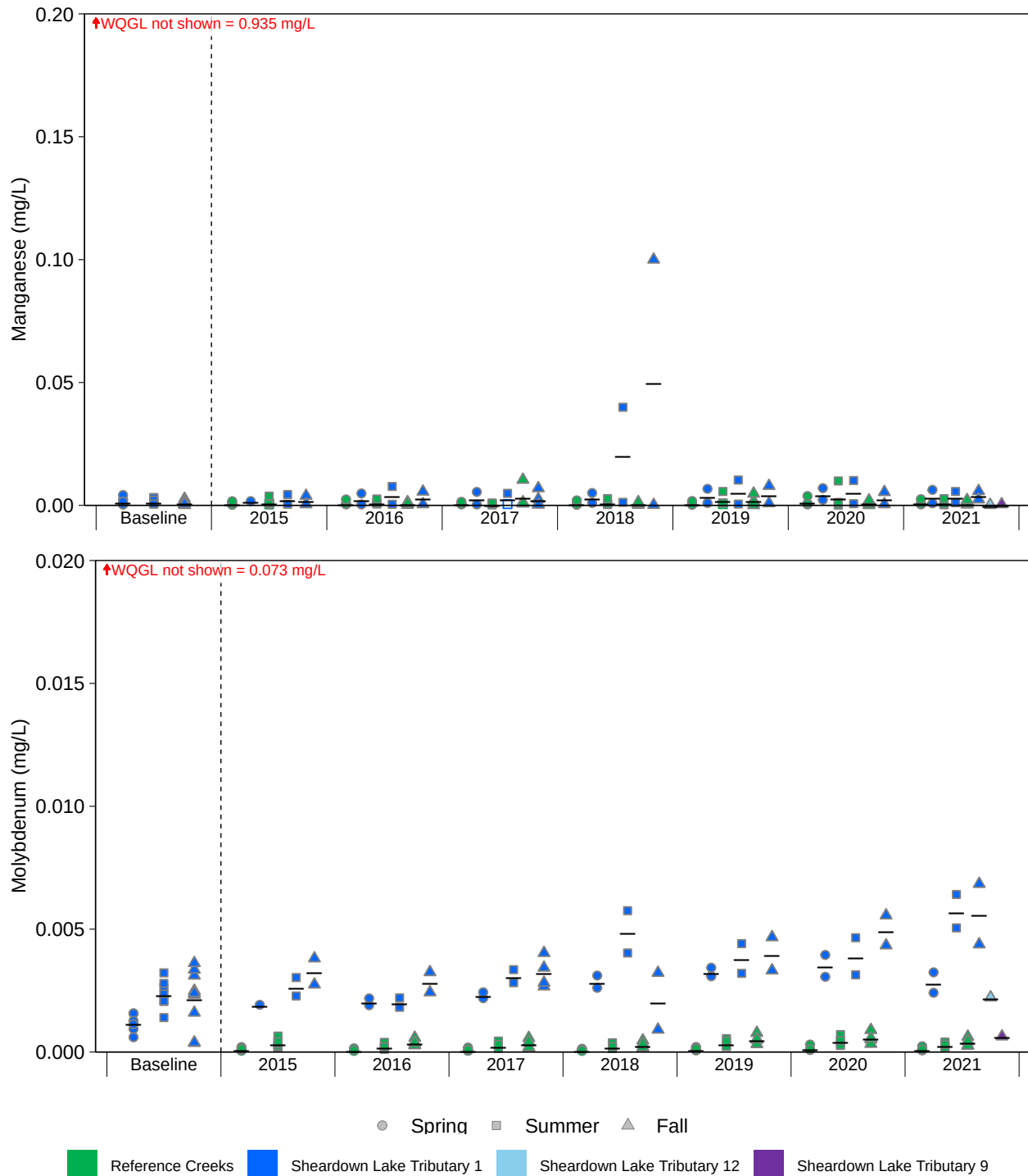


Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Sheardown Lake Tributary 12 (SDLT12/ LDFG-OUT) and Sheardown Lake Tributary 9 (SDLT9/MS-C-G) stations were added to the CREMP in fall 2021.

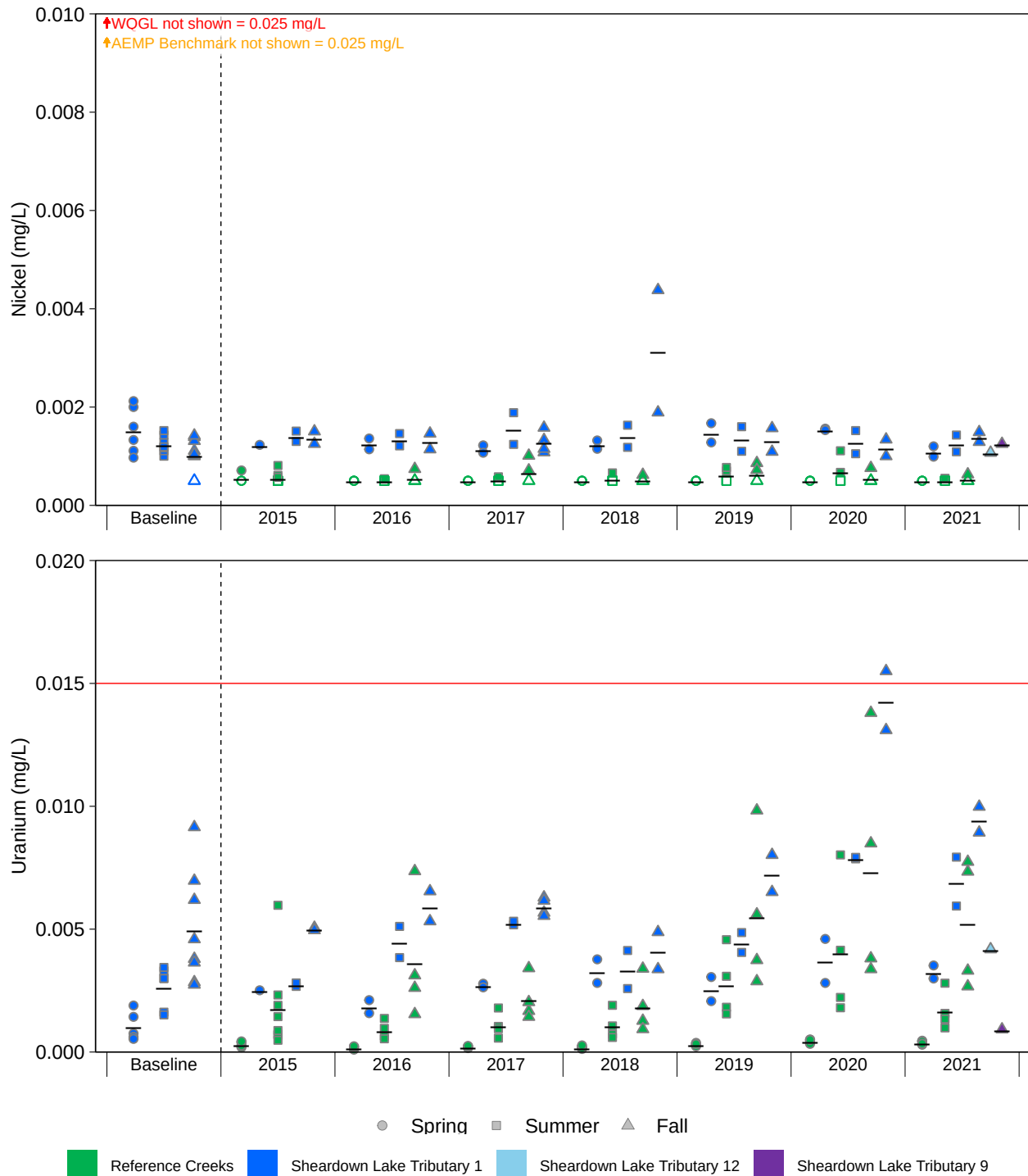


Figure C.11: Temporal Comparison of Water Chemistry at the Sheardown Lake Tributaries (SDLT1, SDLT12, SDLT9) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Sheardown Lake Tributary 12 (SDLT12/ LDFG-OUT) and Sheardown Lake Tributary 9 (SDLT9/MS-C-G) stations were added to the CREMP in fall 2021.

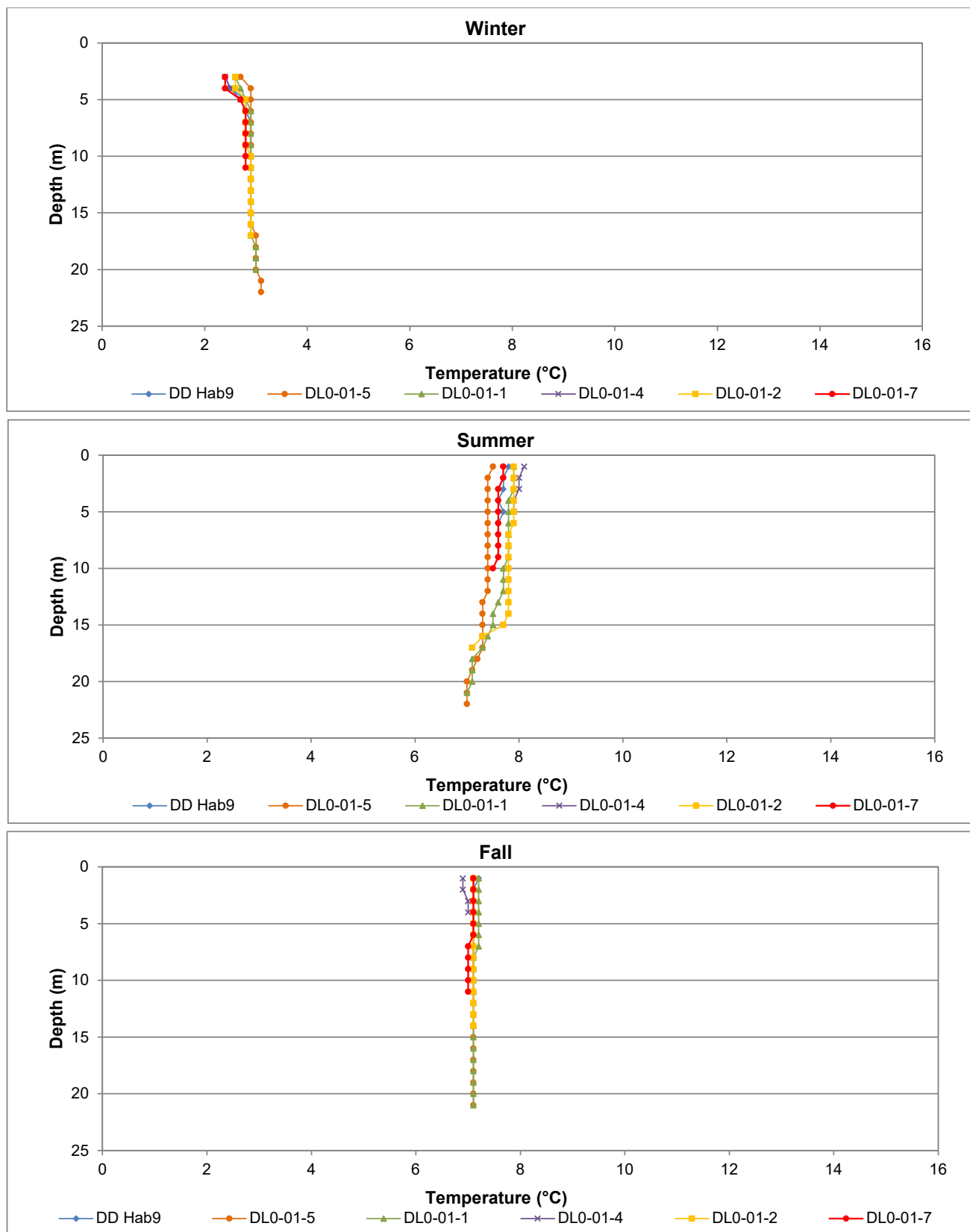


Figure C.12: Vertical Profiles of Temperature Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2021

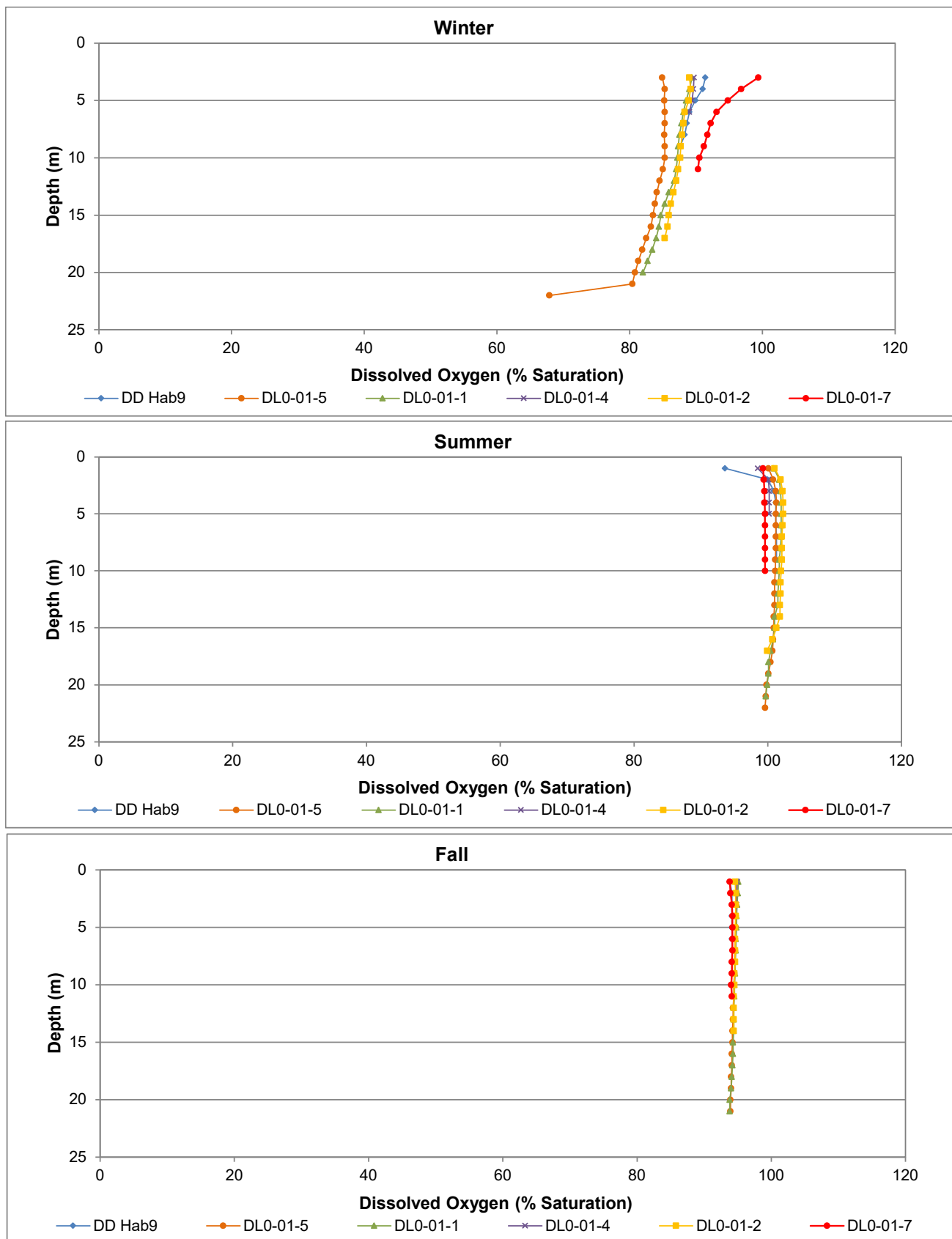


Figure C.13: Vertical Profiles of Dissolved Oxygen Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2021

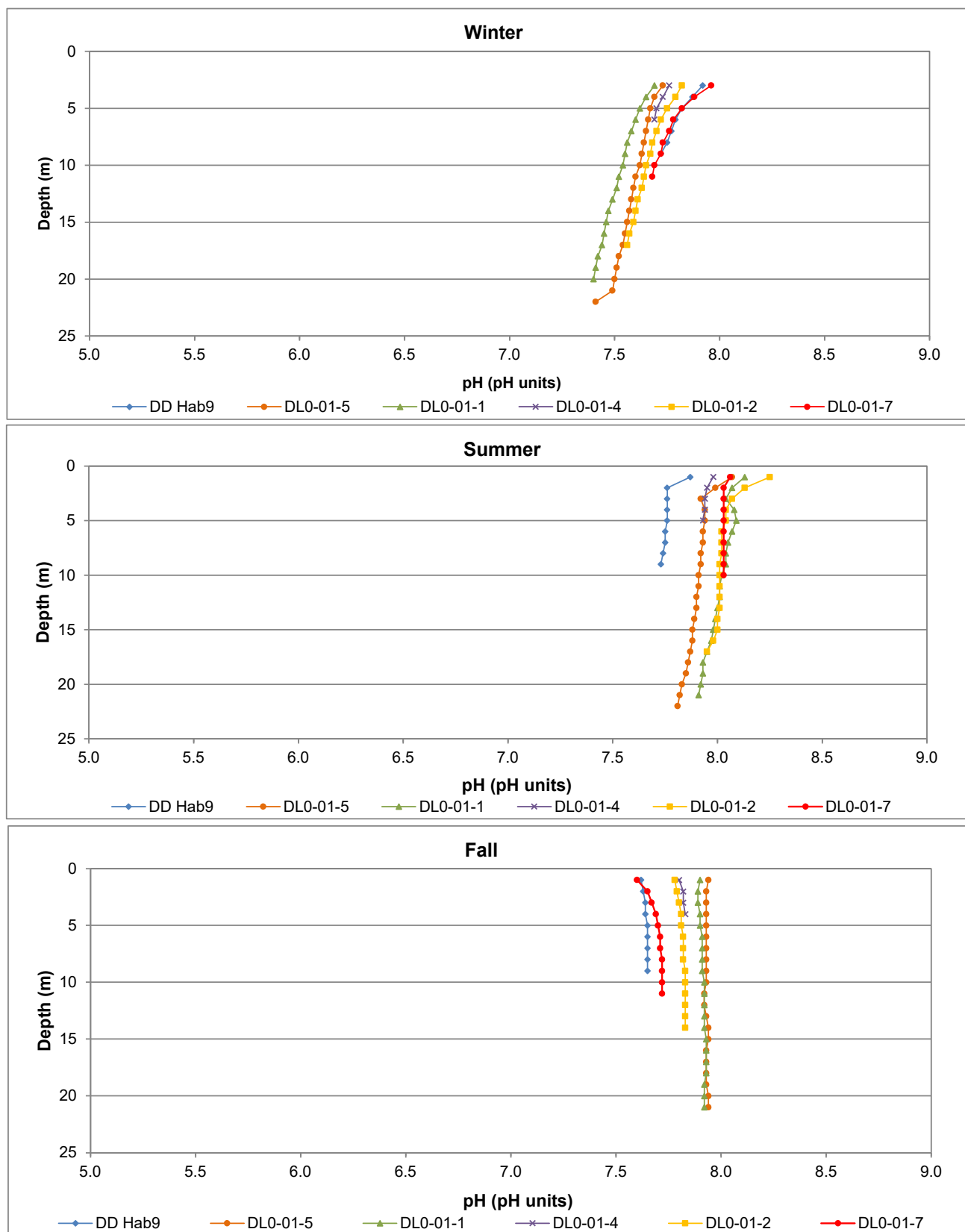


Figure C.14: Vertical Profiles of pH Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2021

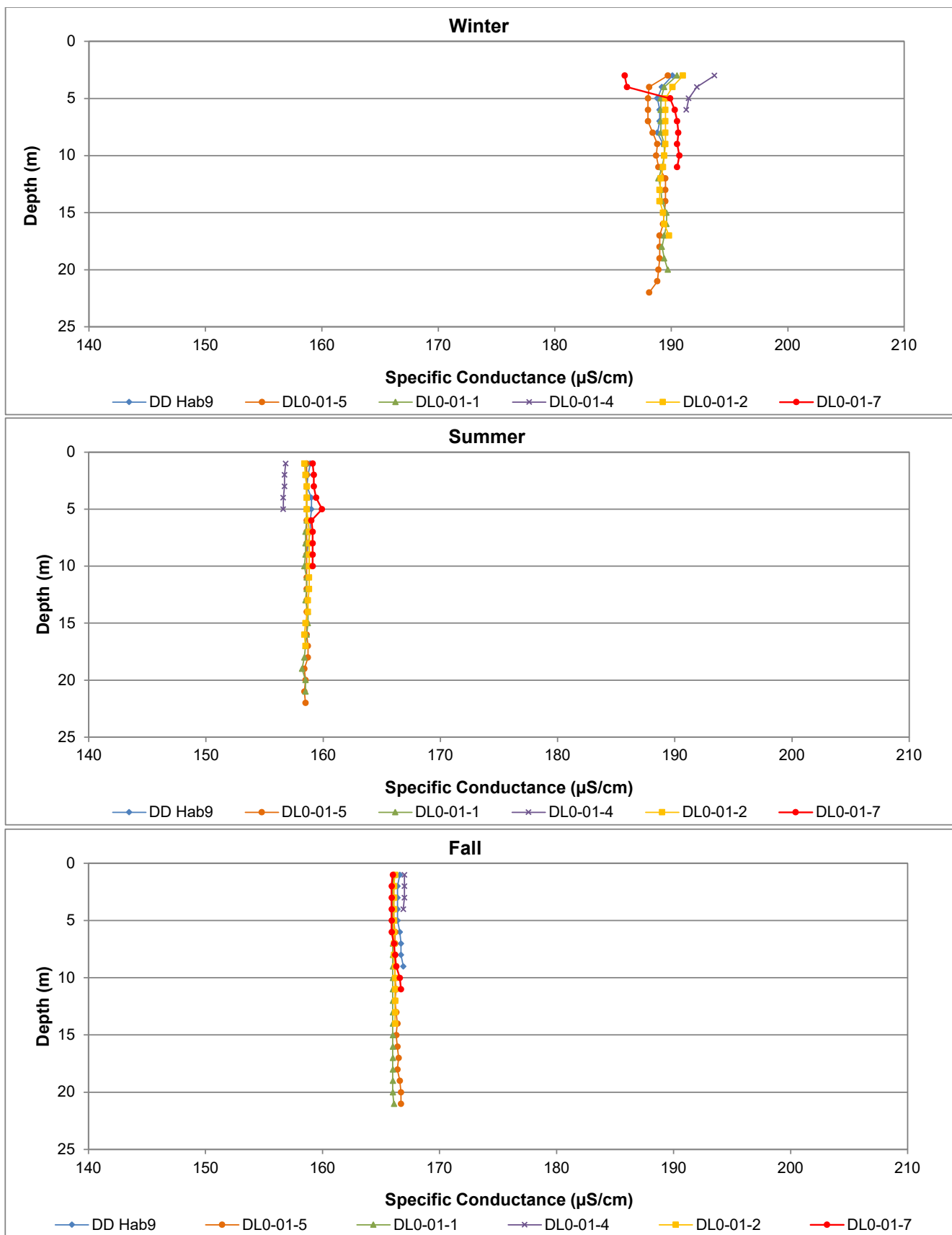


Figure C.15: Vertical Profiles of Specific Conductance Measured at Sheardown Lake NW in Winter, Summer, and Fall, 2021

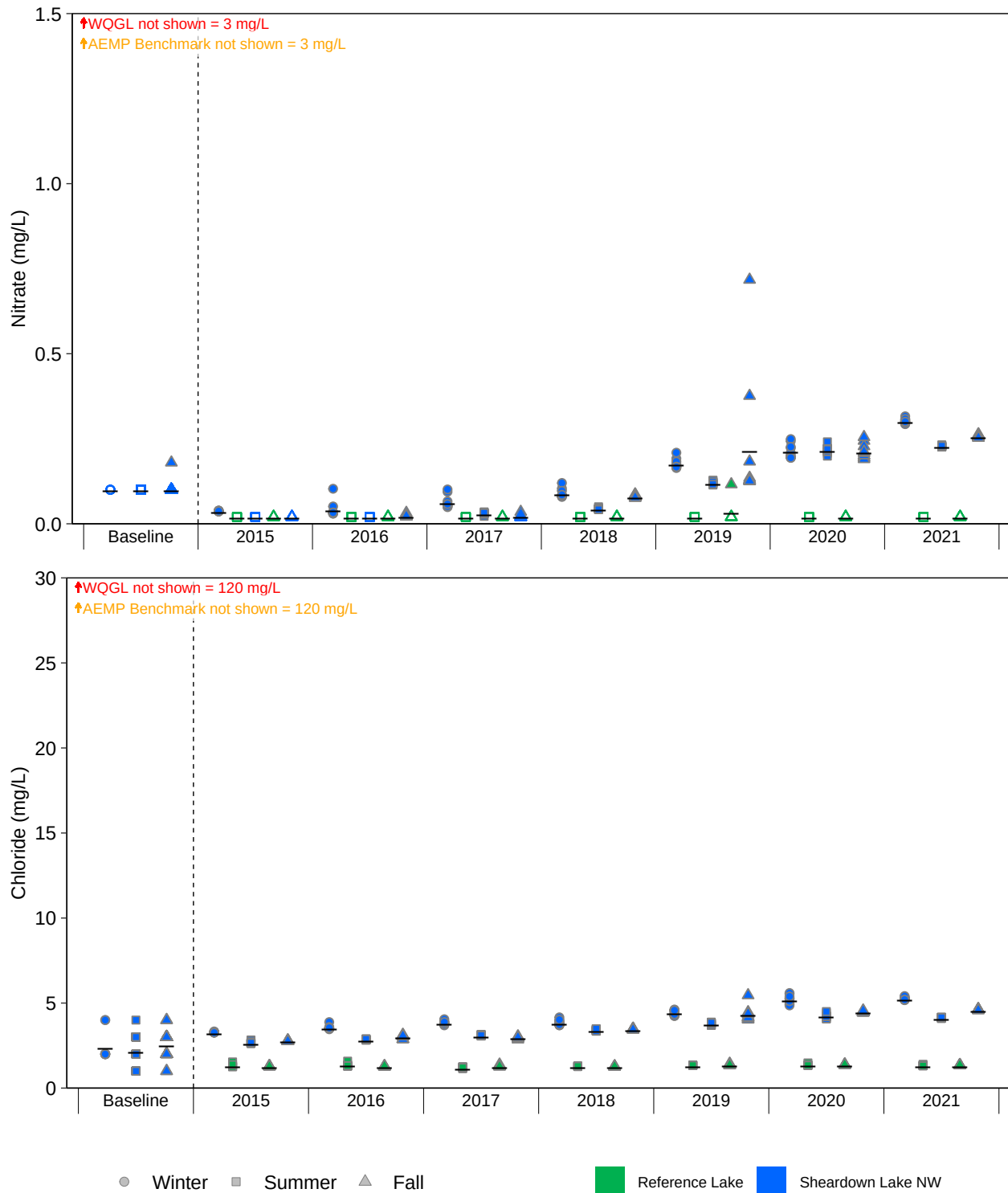


Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

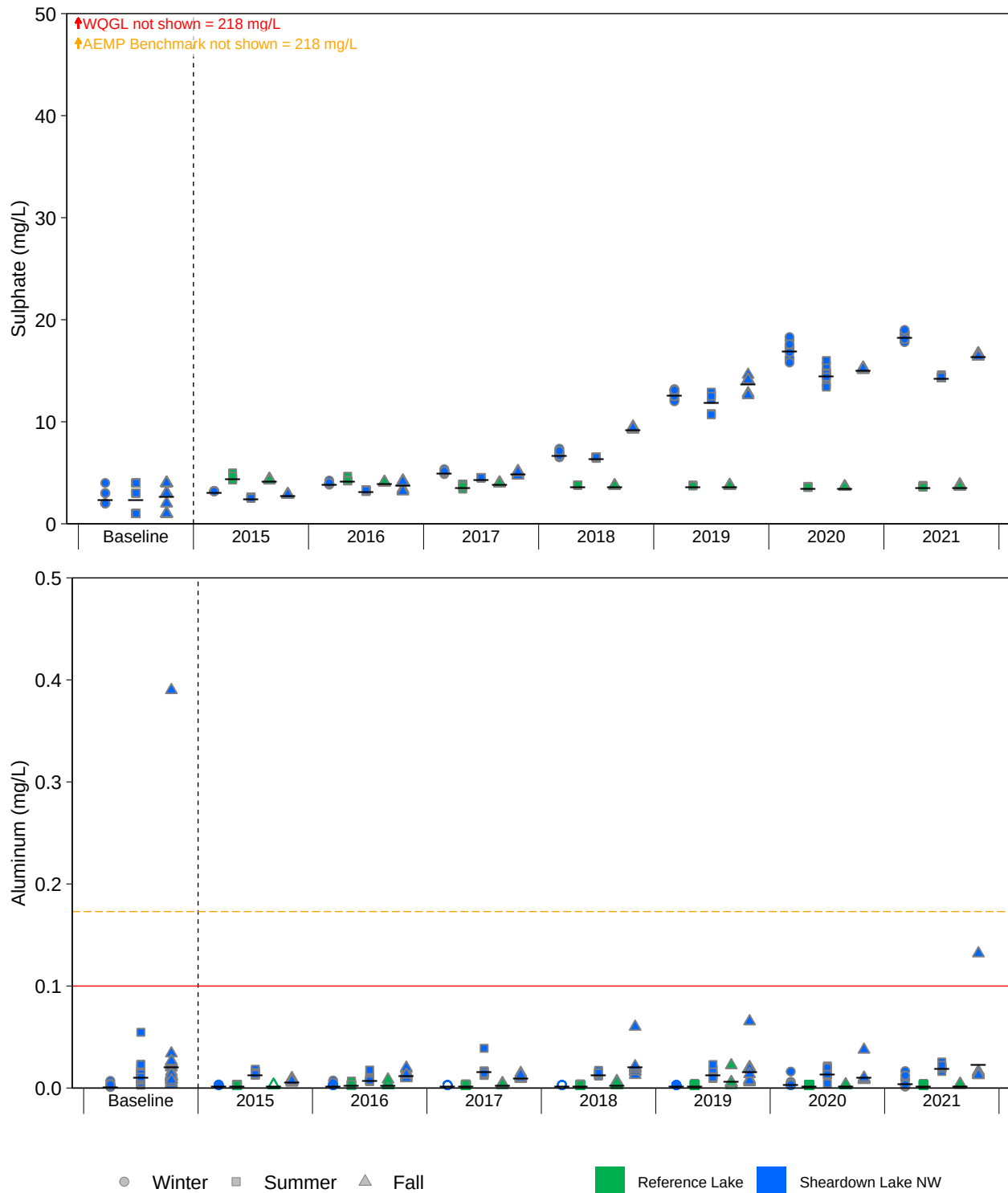


Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

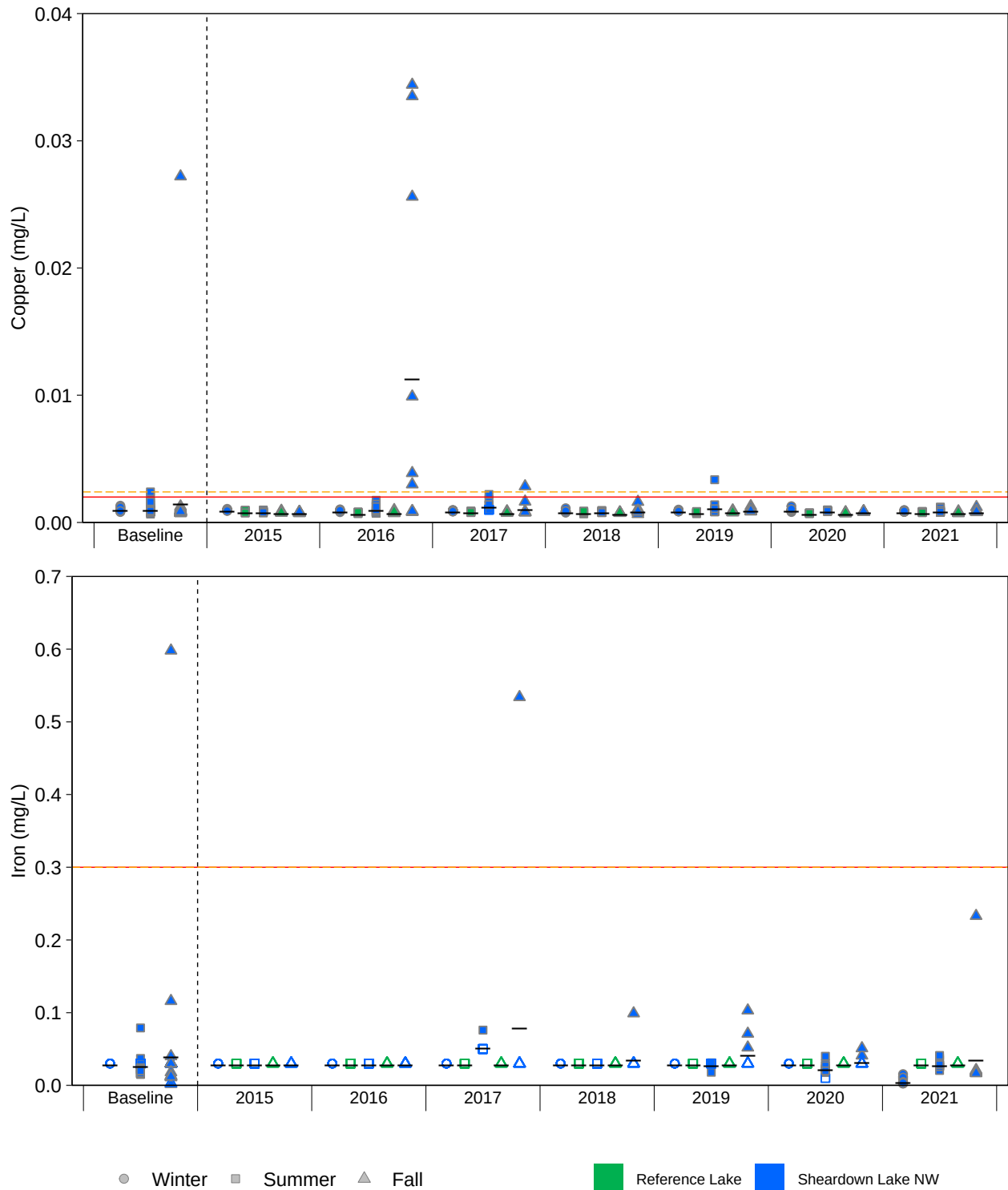


Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

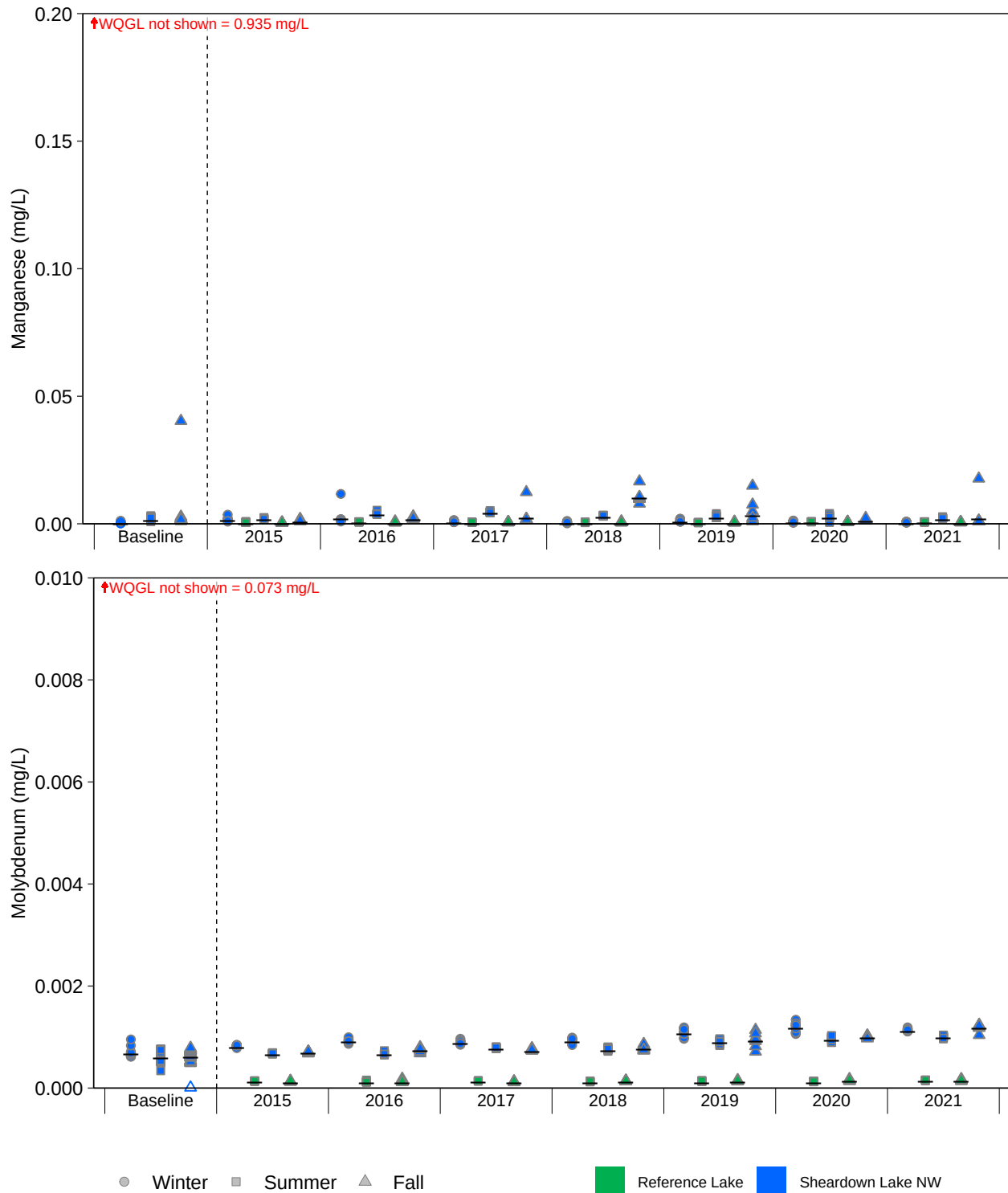


Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

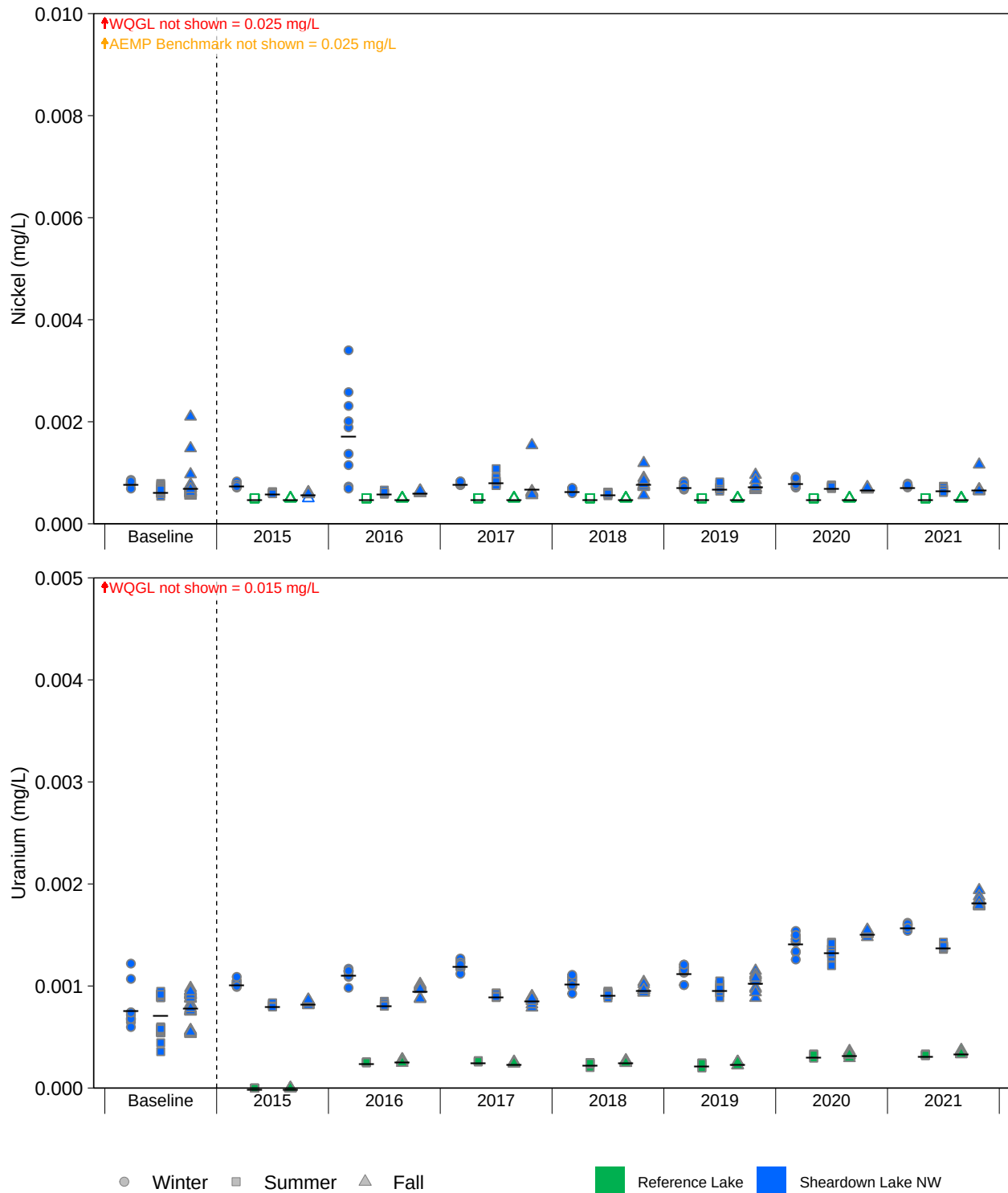


Figure C.16: Temporal Comparison of Water Chemistry at Sheardown Lake Northwest (DL0-01) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

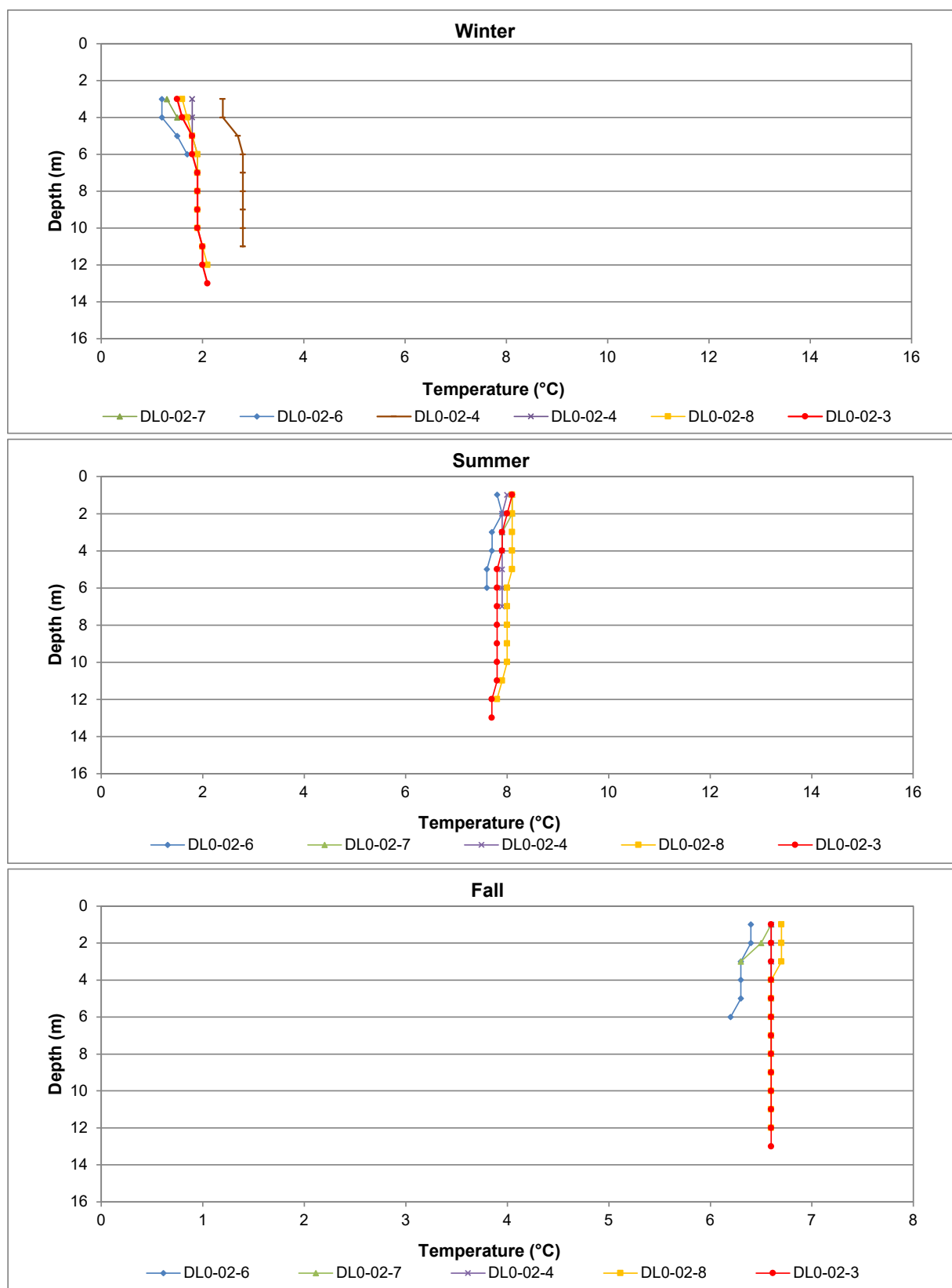


Figure C.17: Vertical Profiles of Temperature Measured at Sheardown Lake SE in Winter, Summer, and Fall, 2021

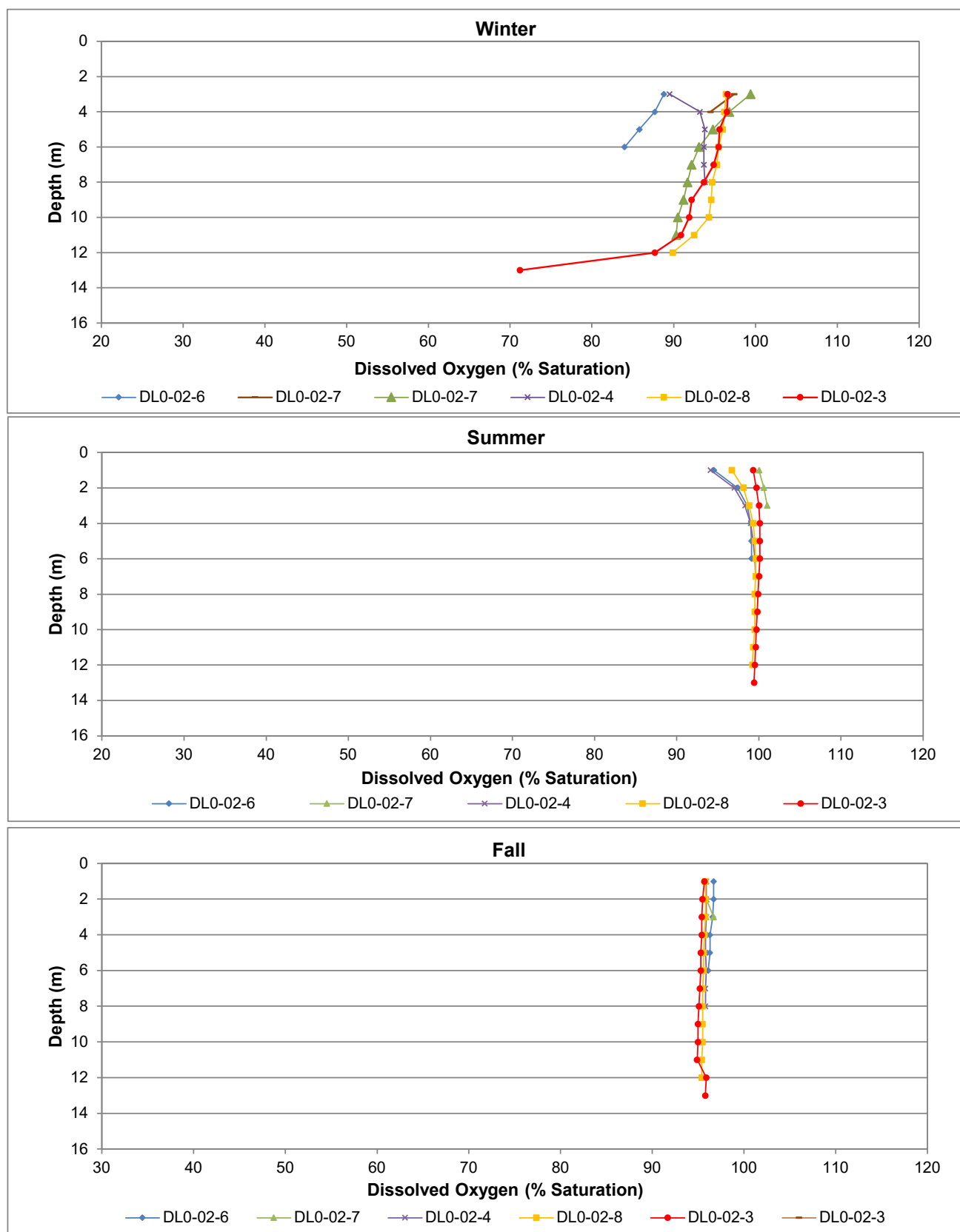


Figure C.18: Vertical Profiles of Dissolved Oxygen Measured at Sheardown Lake SE in Winter, Summer, and Fall, 2021

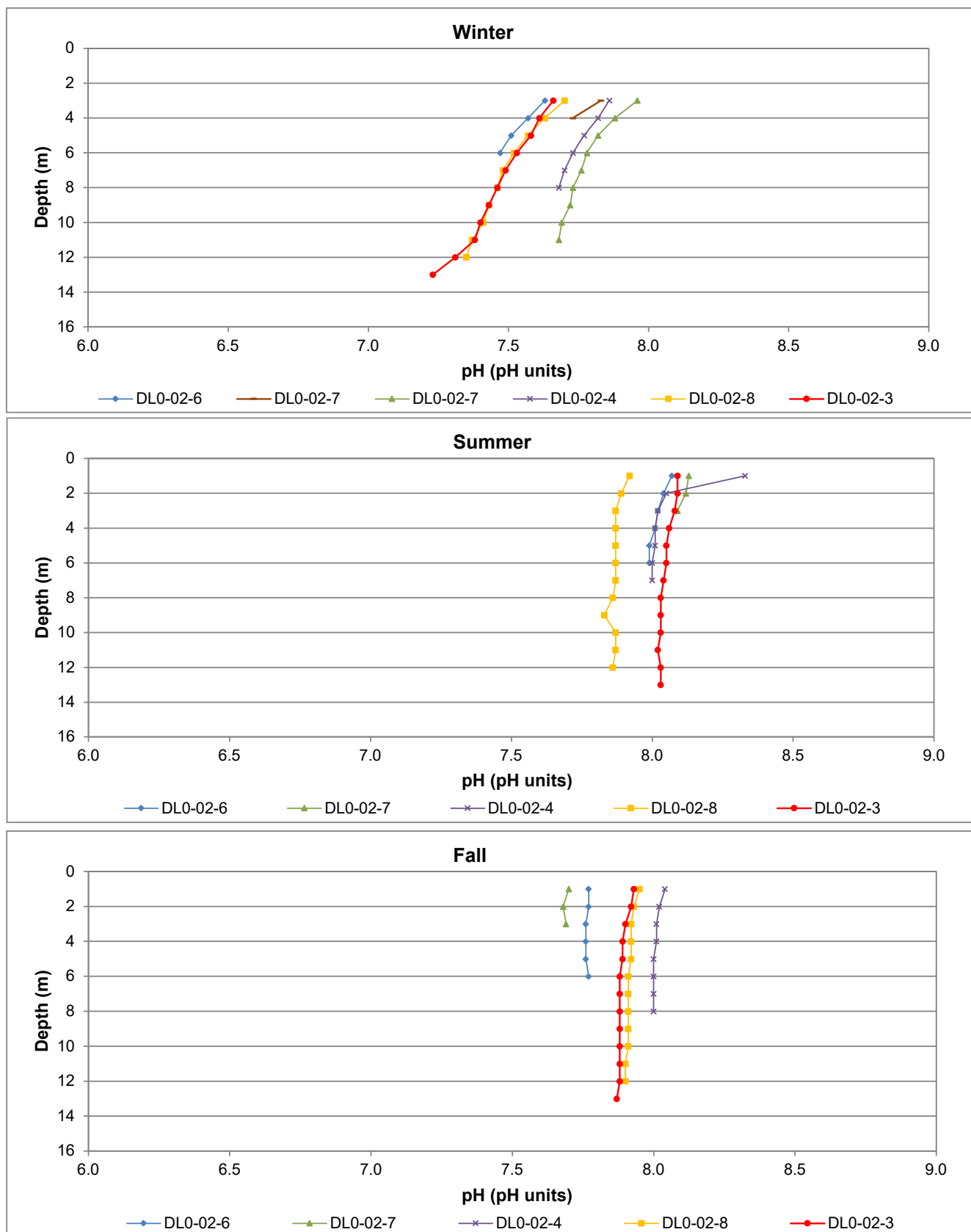


Figure C.19: Vertical Profiles of pH Measured at Sheardown Lake SE in Winter, Summer, and Fall 2021

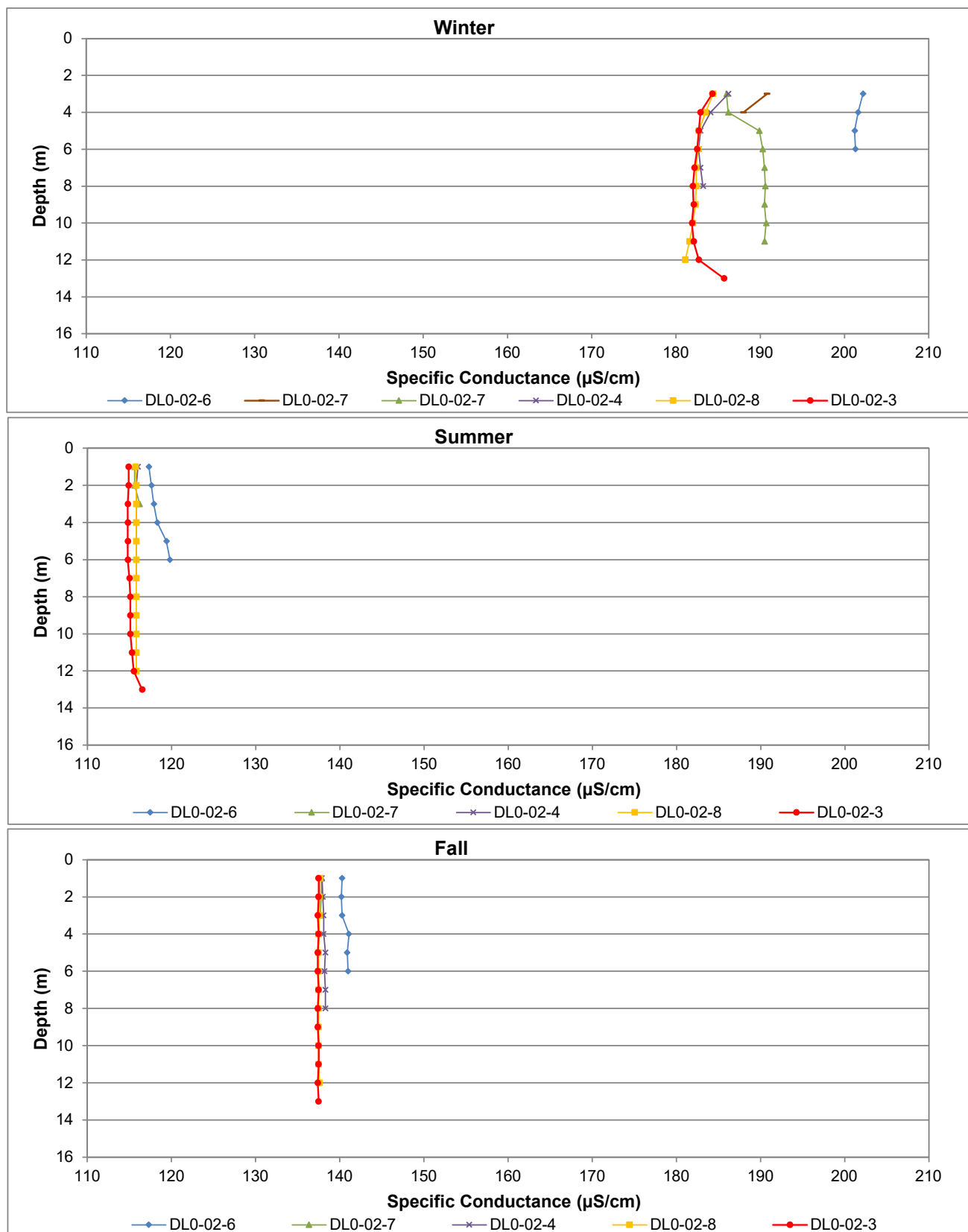


Figure C.20: Vertical Profiles of Conductivity Measured at Sheardown Lake SE in Winter, Summer, and Fall 2021

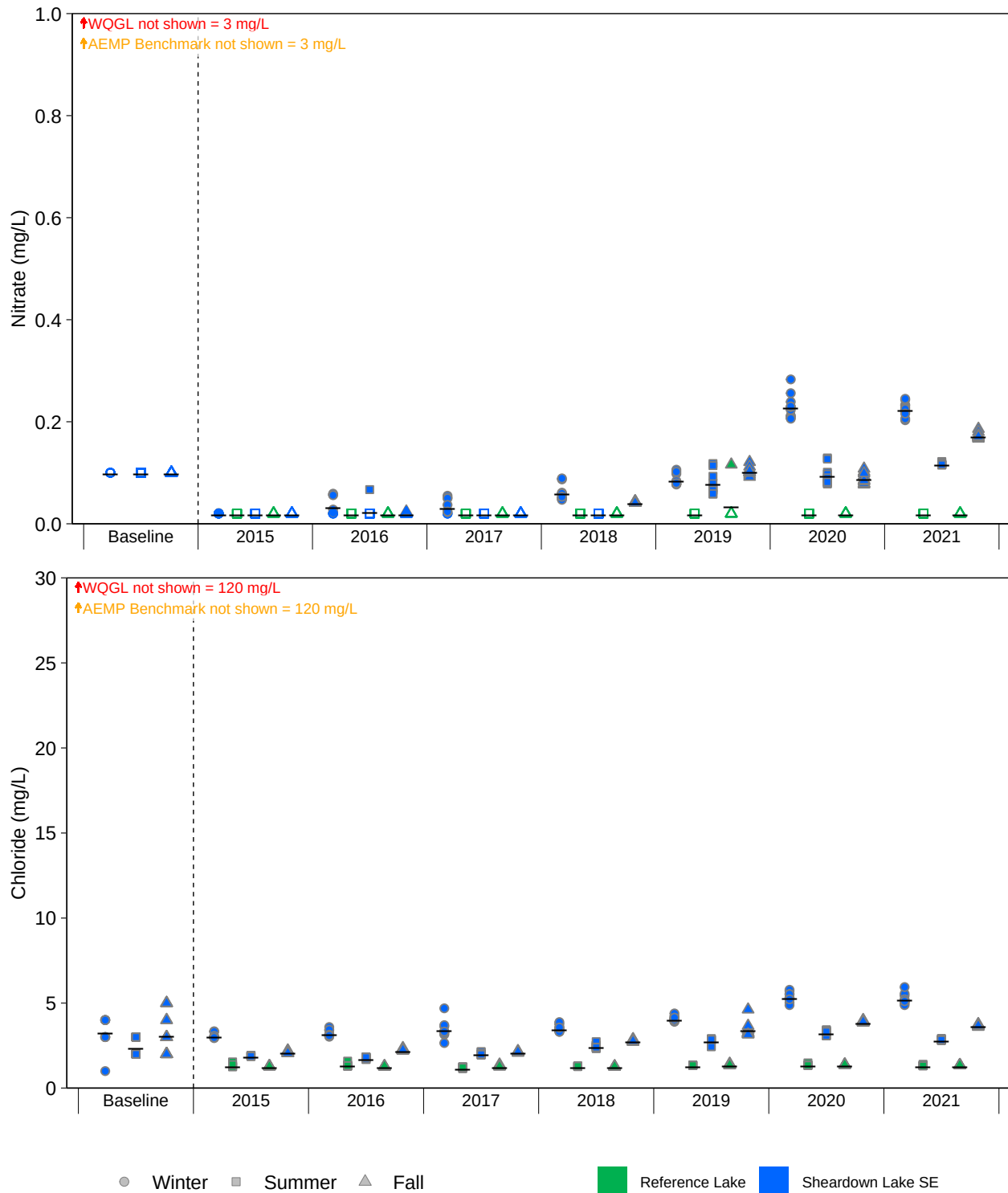


Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

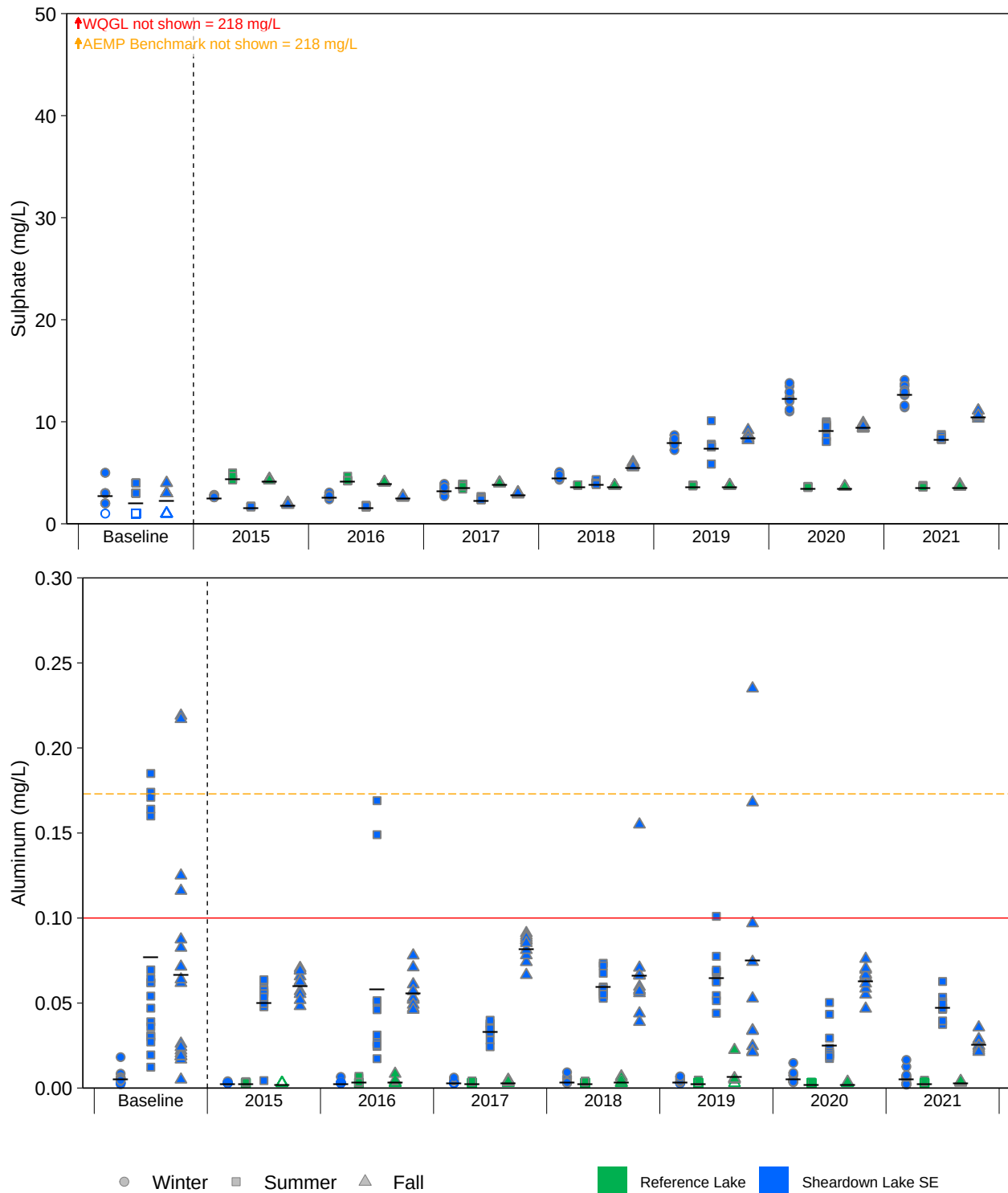


Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

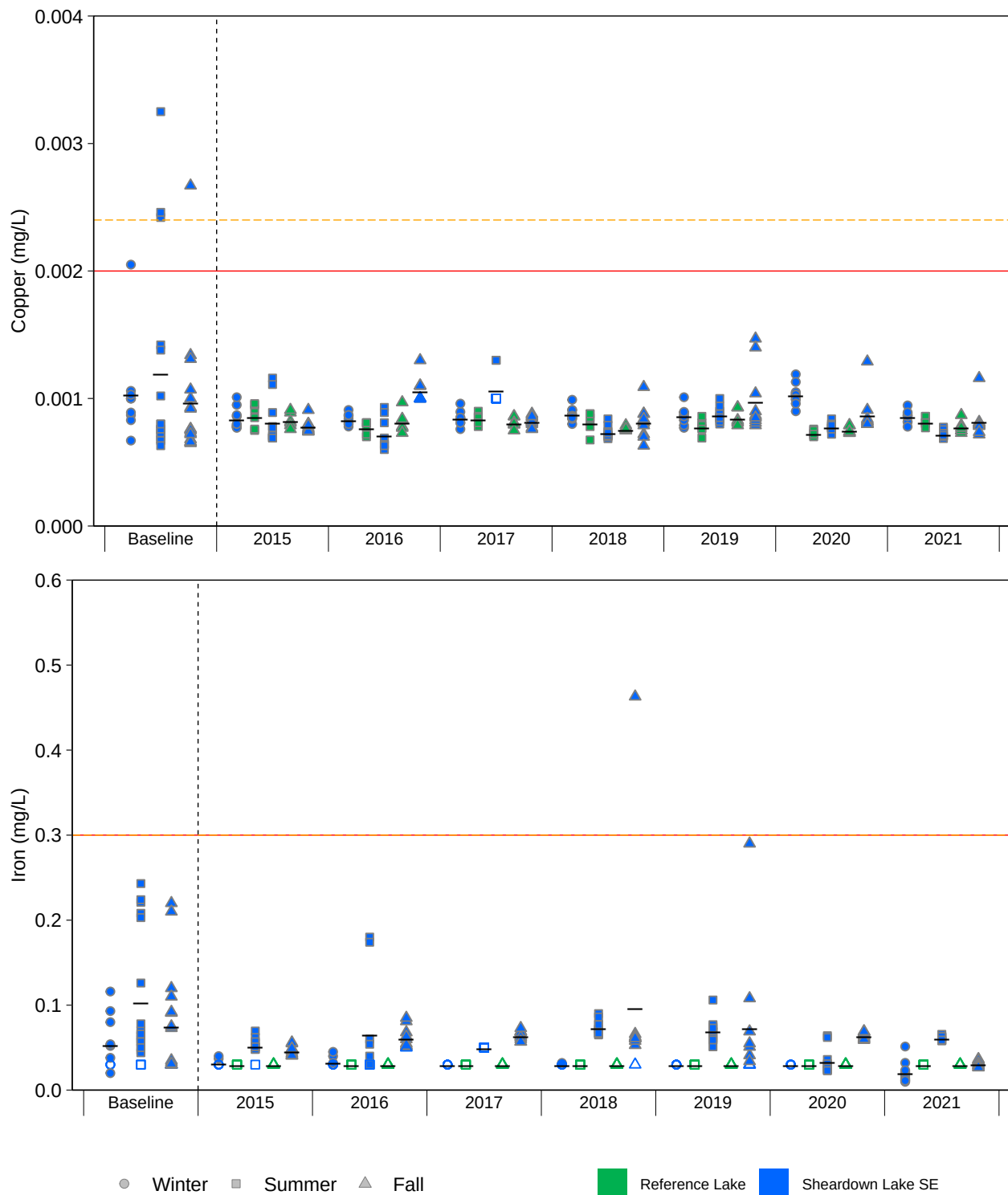


Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

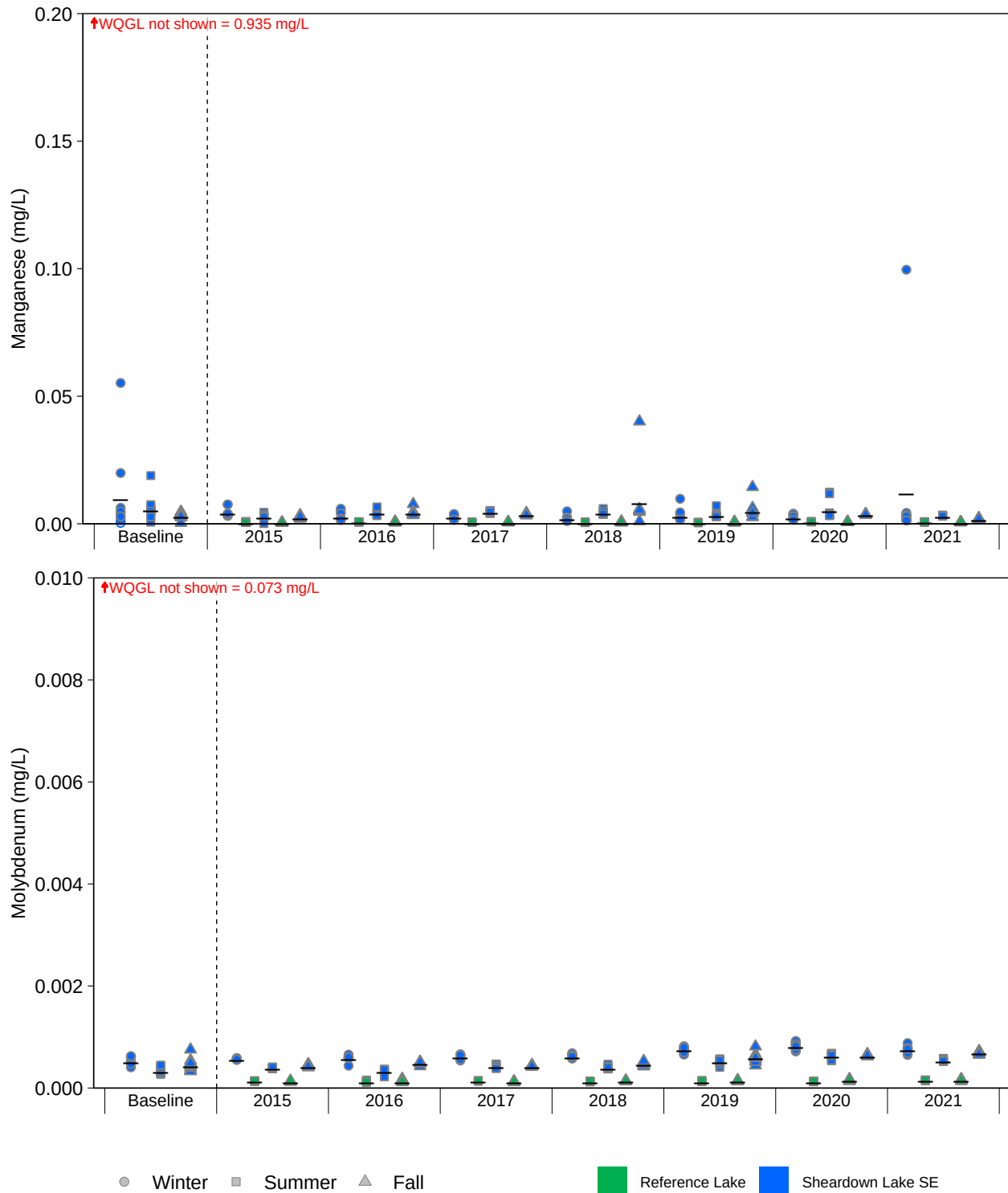


Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

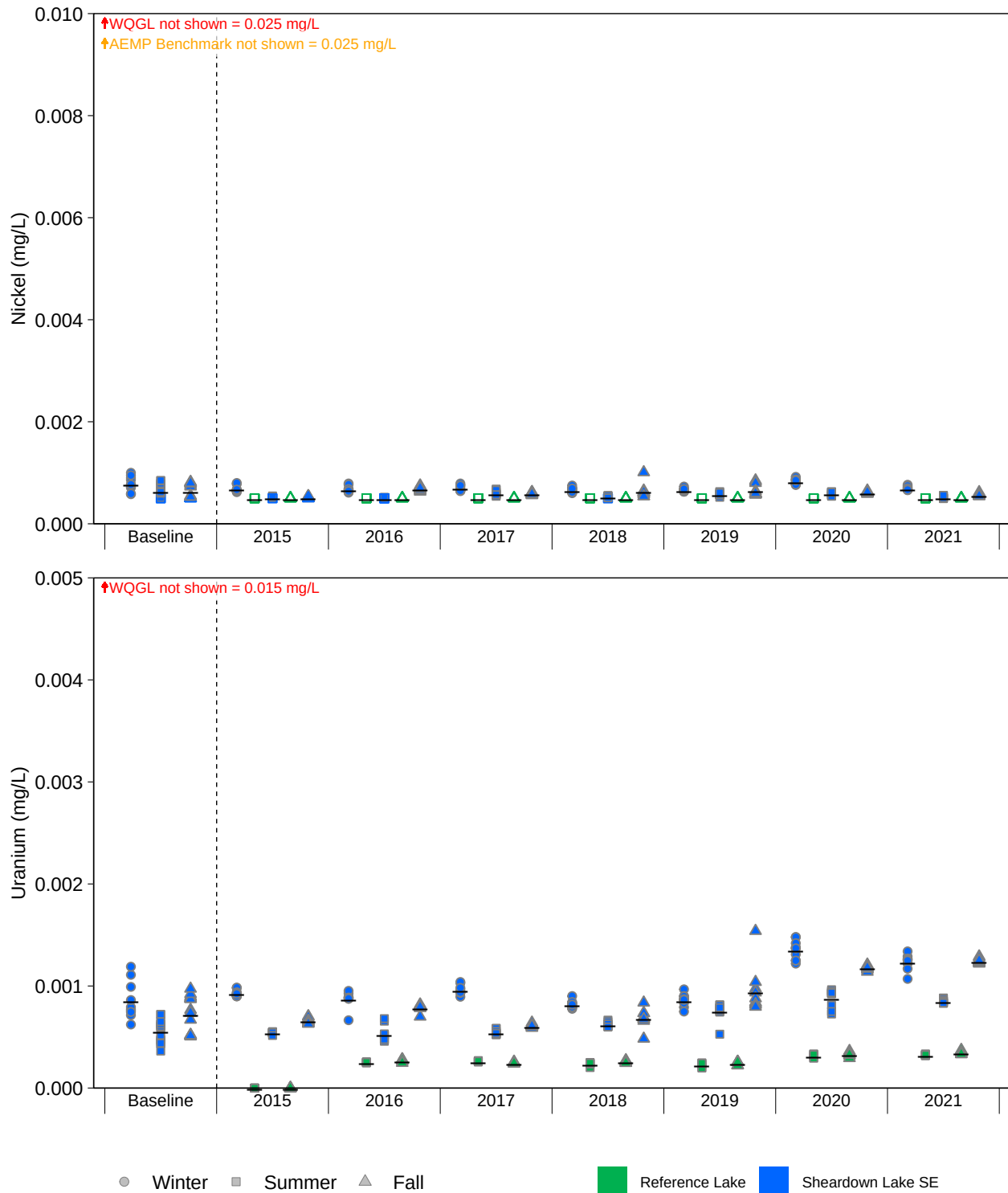


Figure C.21: Temporal Comparison of Water Chemistry at Sheardown Lake Southeast (DL0-02) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

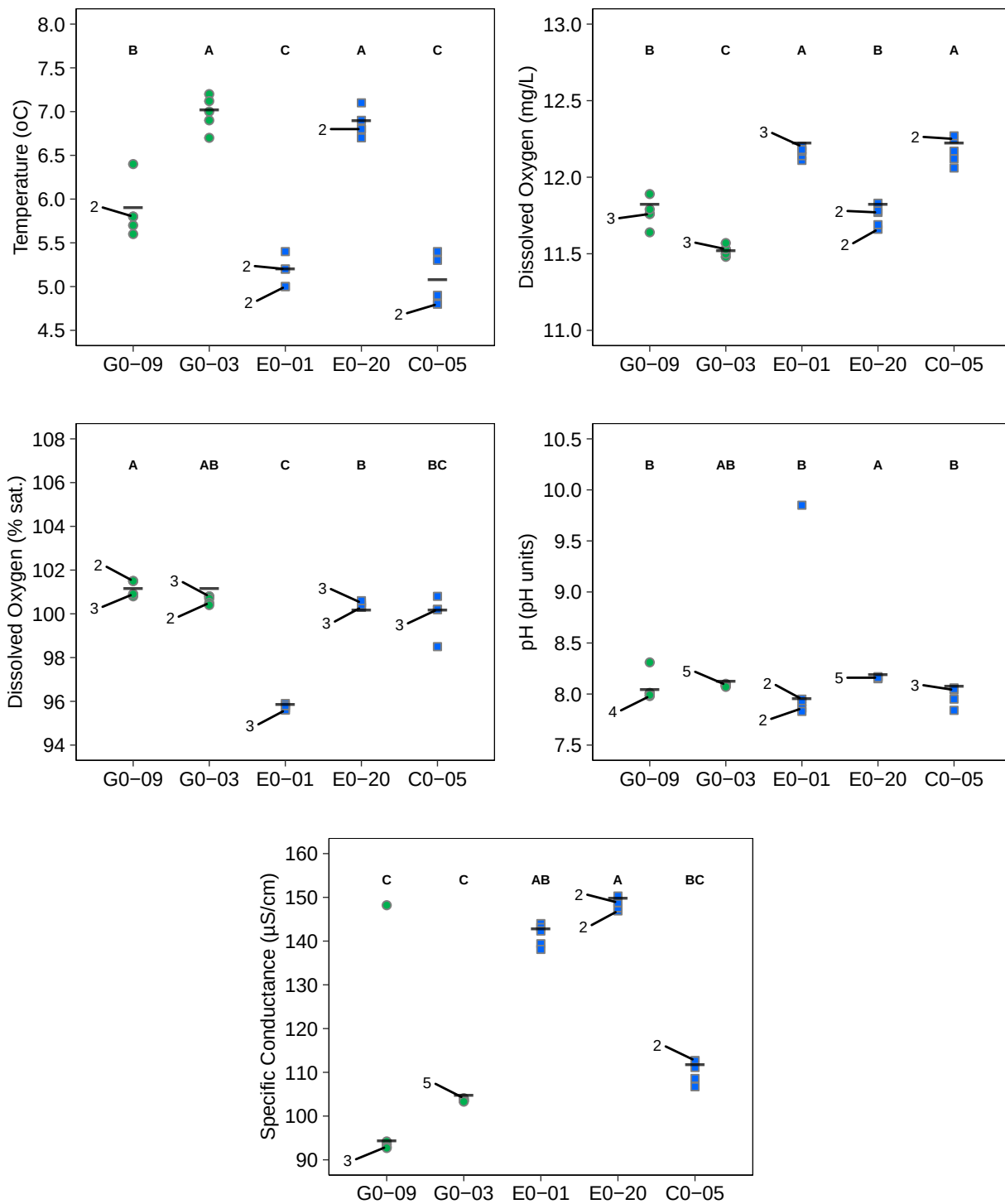


Figure C.22: *In Situ* Water Quality Measurements Collected at Mary River Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2021

Notes: Green represents upstream stations and blue represents downstream stations. Areas that share a letter are not significantly different (p -value = 0.05). Bars indicate measures of central tendency. Numbers indicate the number of overlapping points.

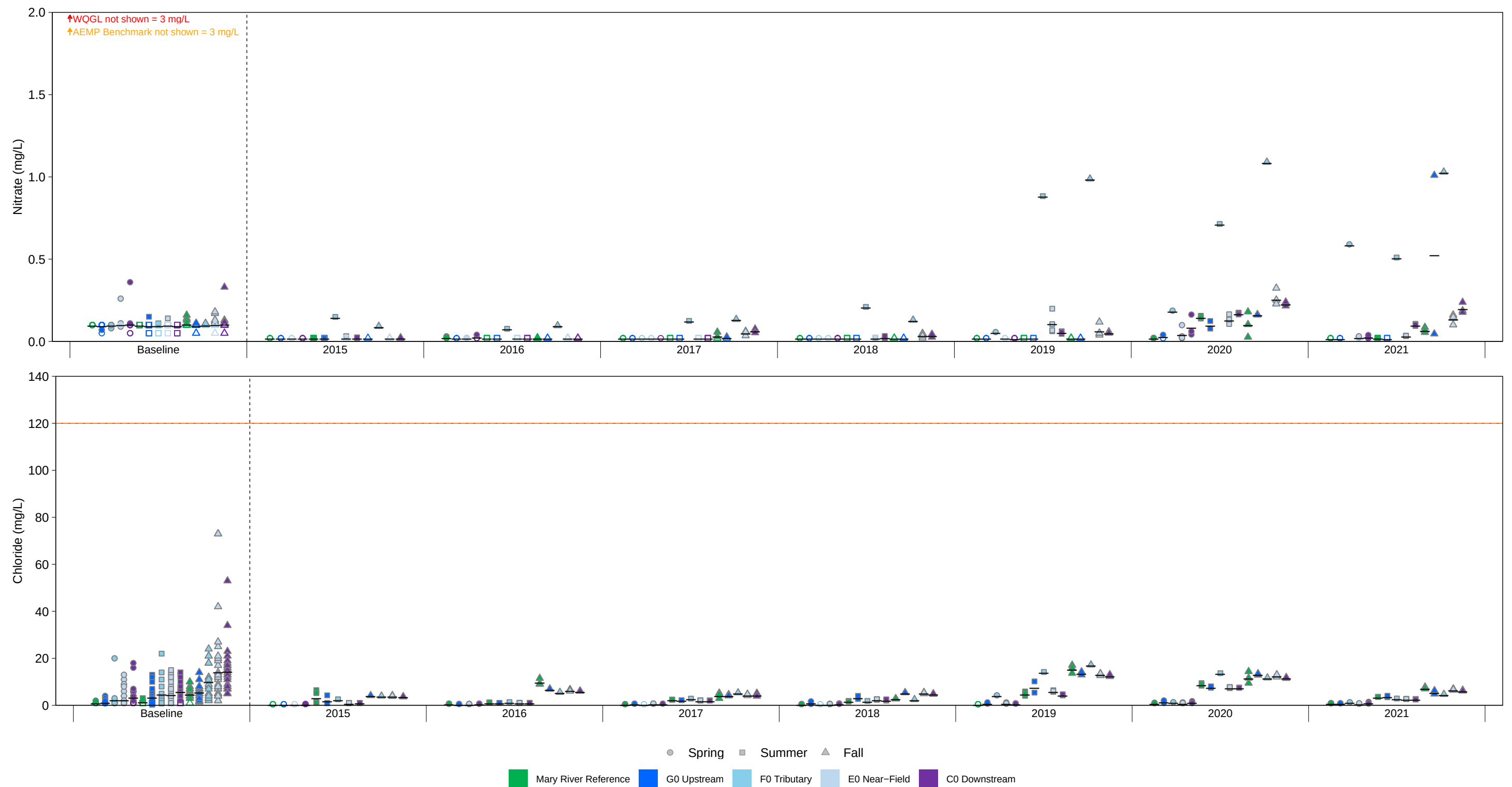


Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

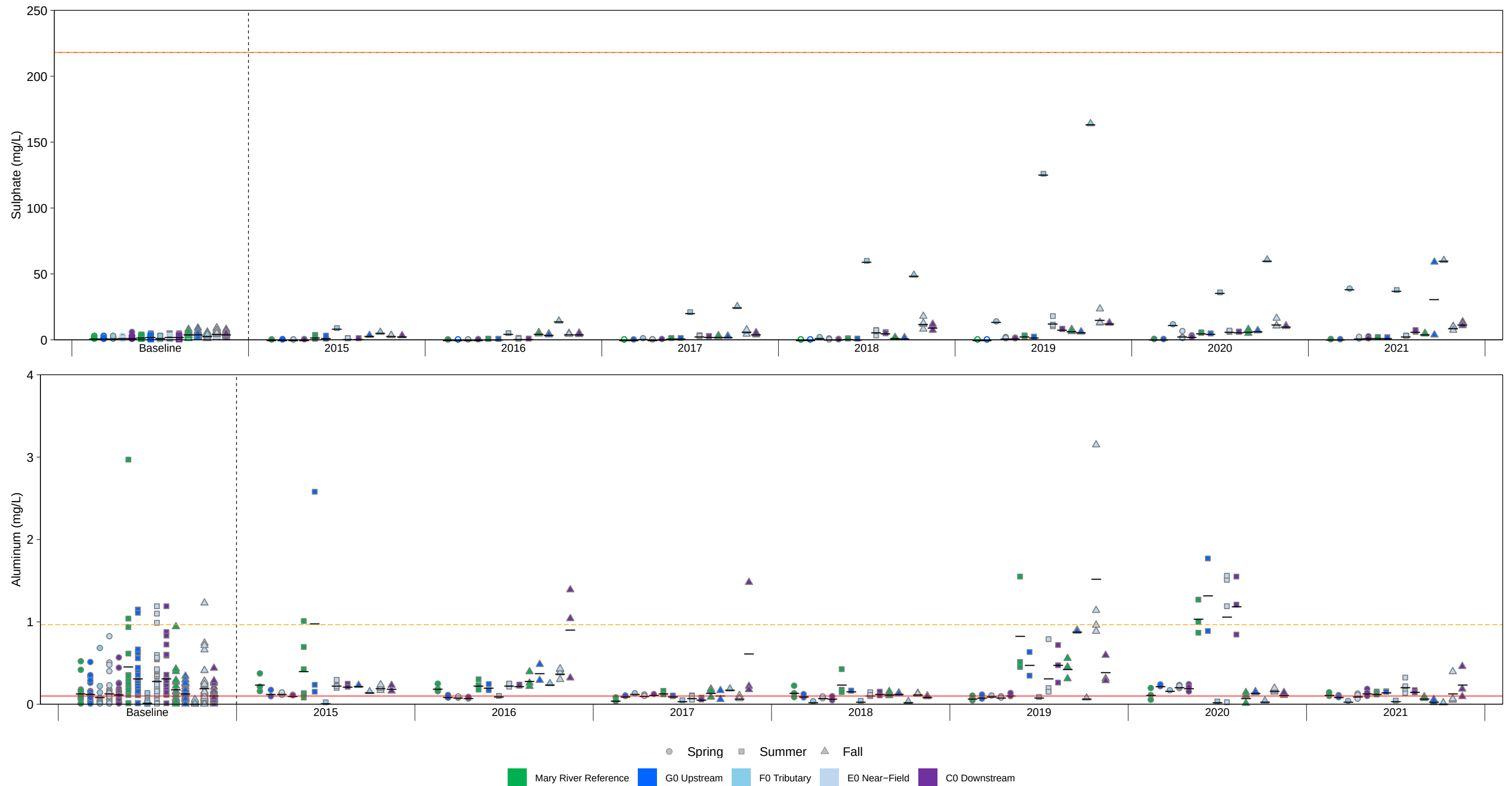


Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

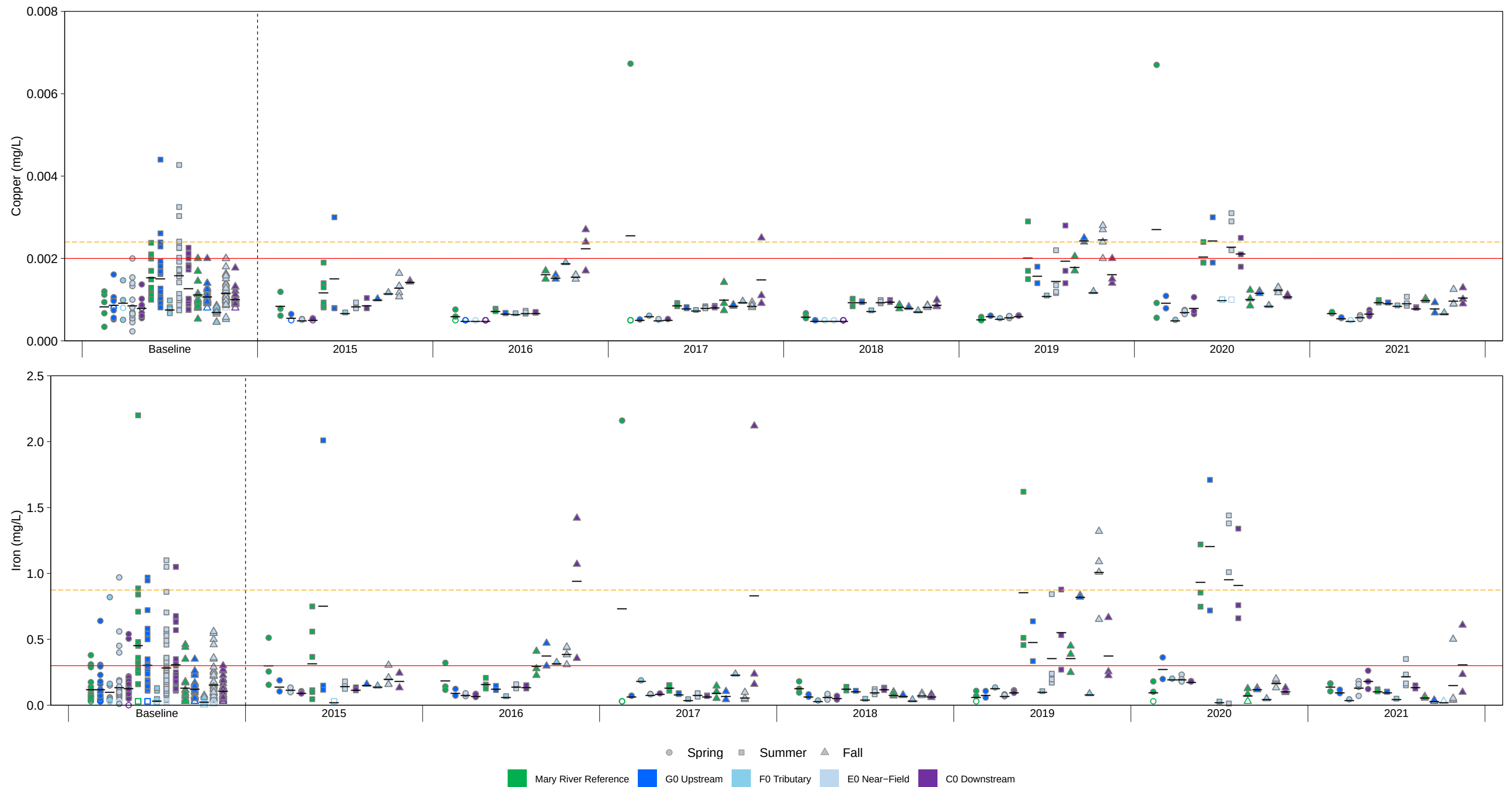


Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

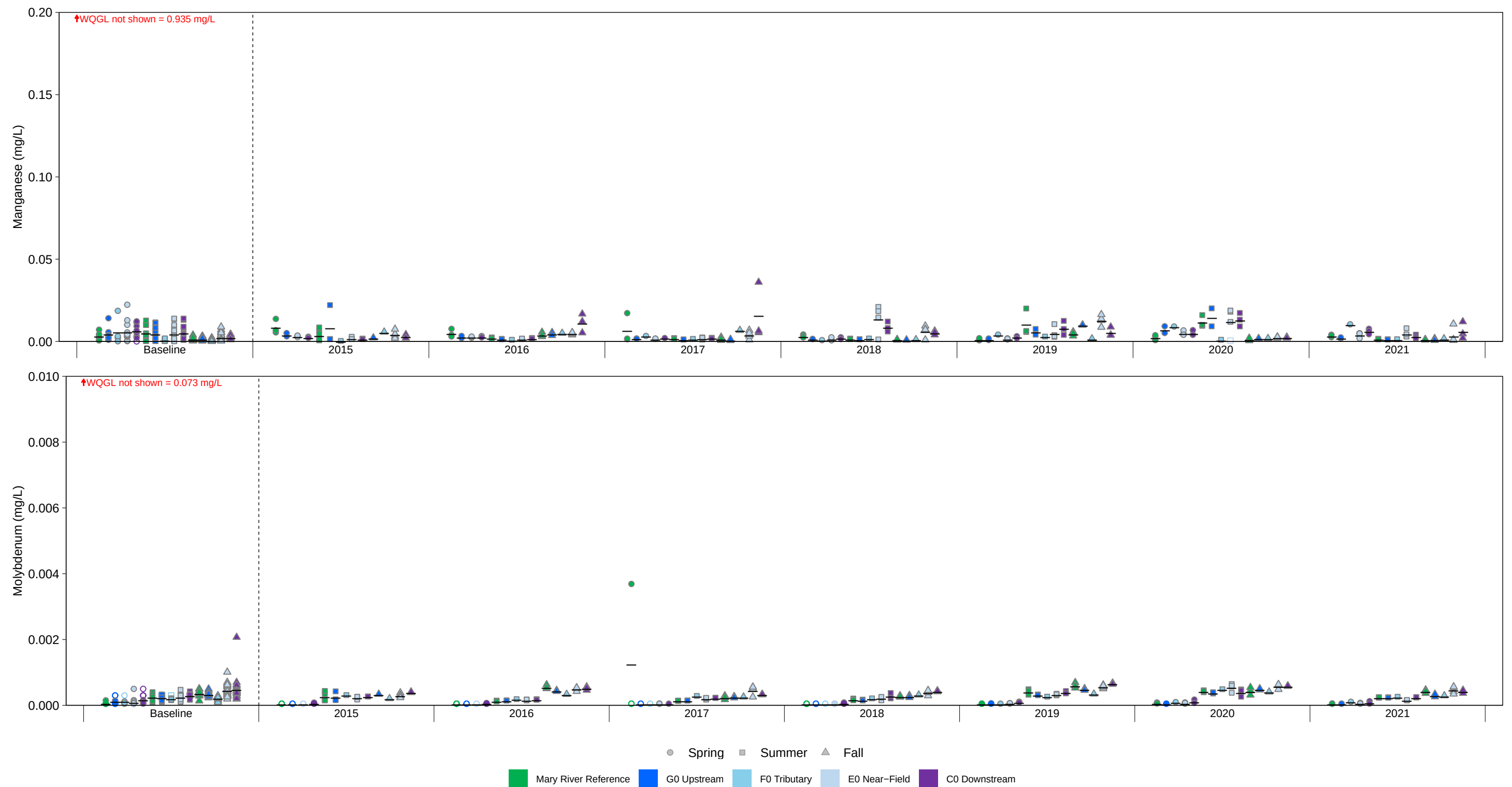


Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

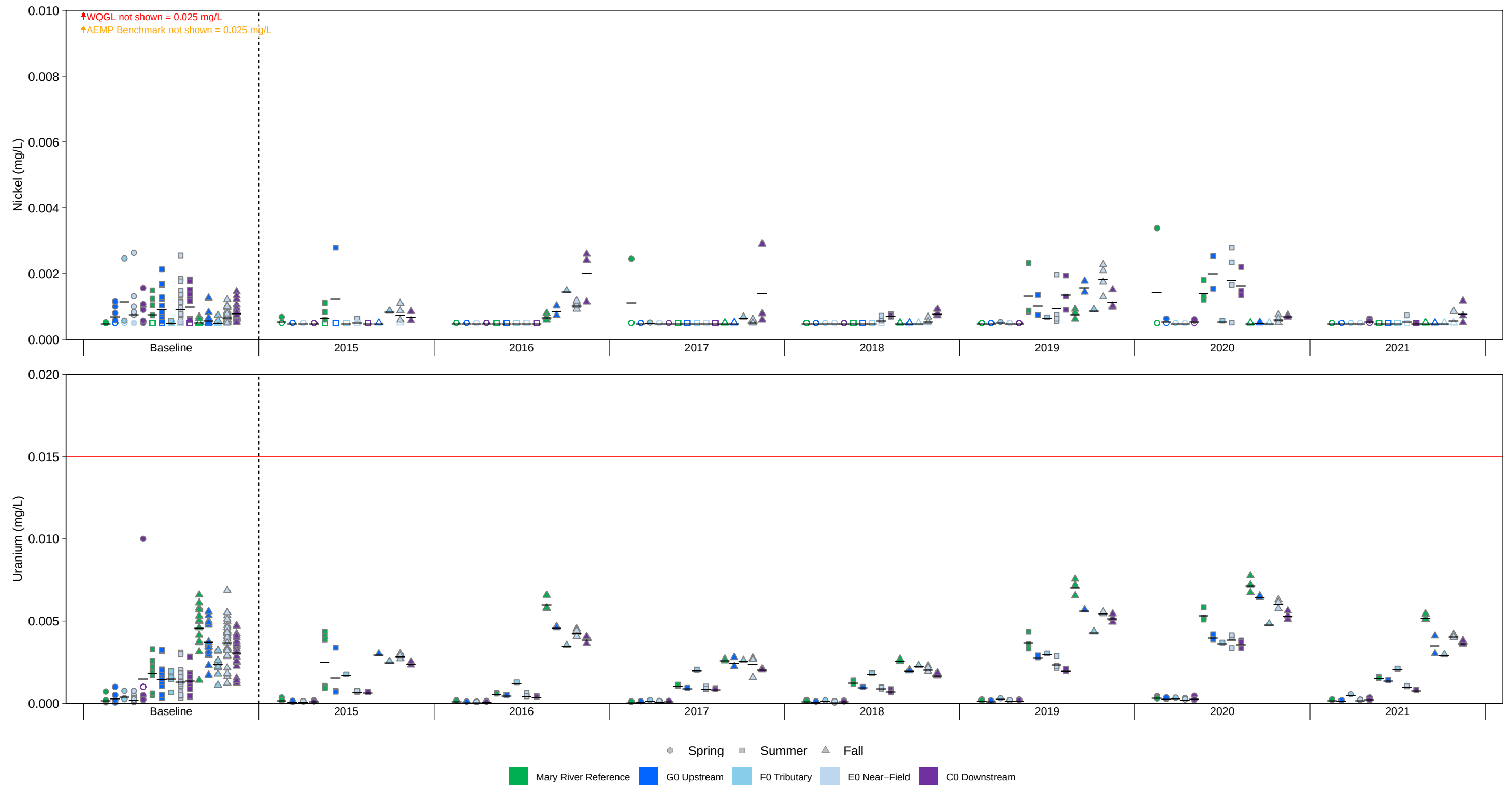


Figure C.23: Temporal Comparison of Water Chemistry at Mary River Stations Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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. Black bars indicate average of samples.

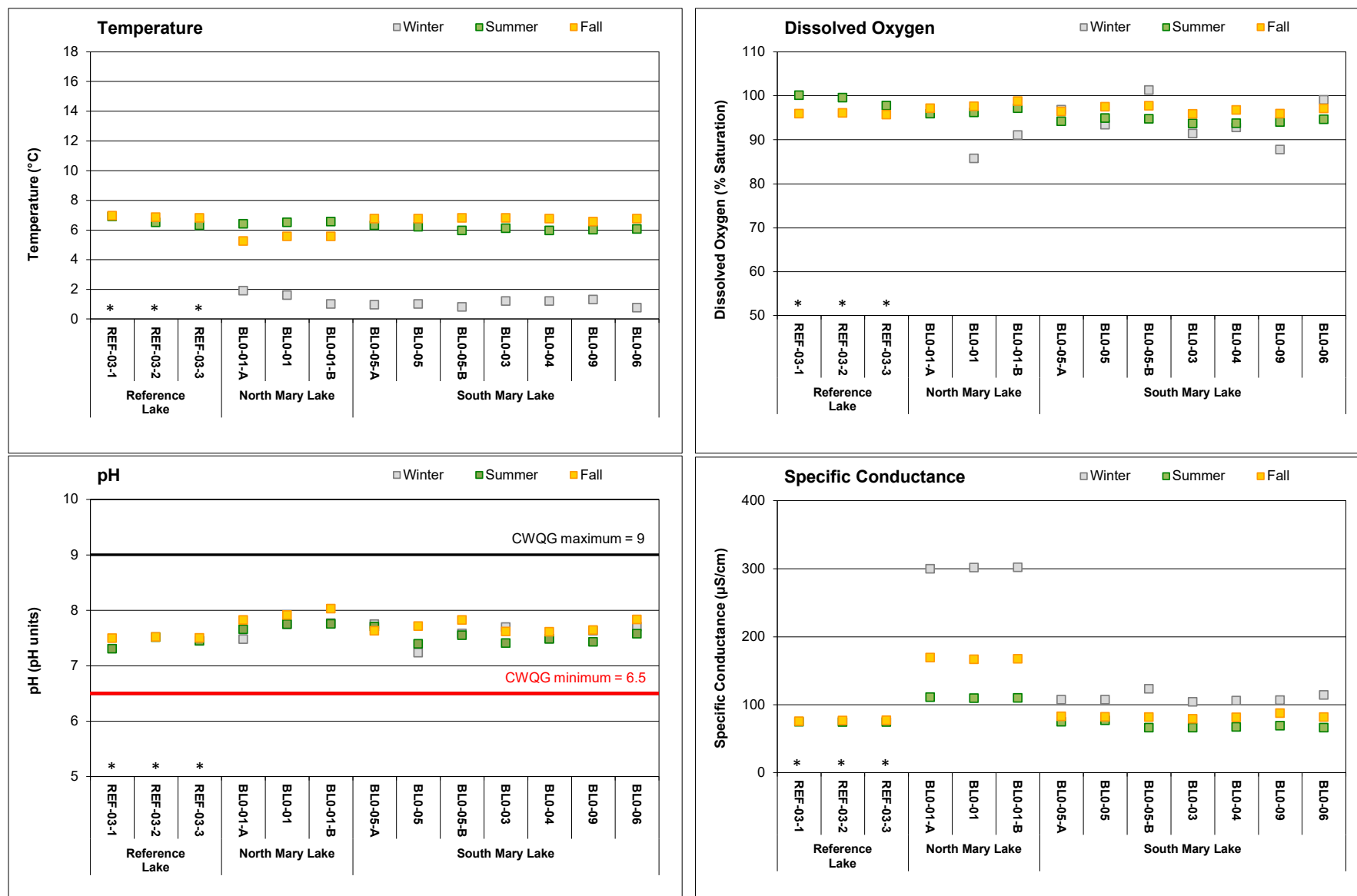


Figure C.24: Comparison of *In Situ* Water Quality Variables Measured at Mary Lake Water Quality Monitoring Stations in Winter, Summer, and Fall 2021, Mary River Project CREMP

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

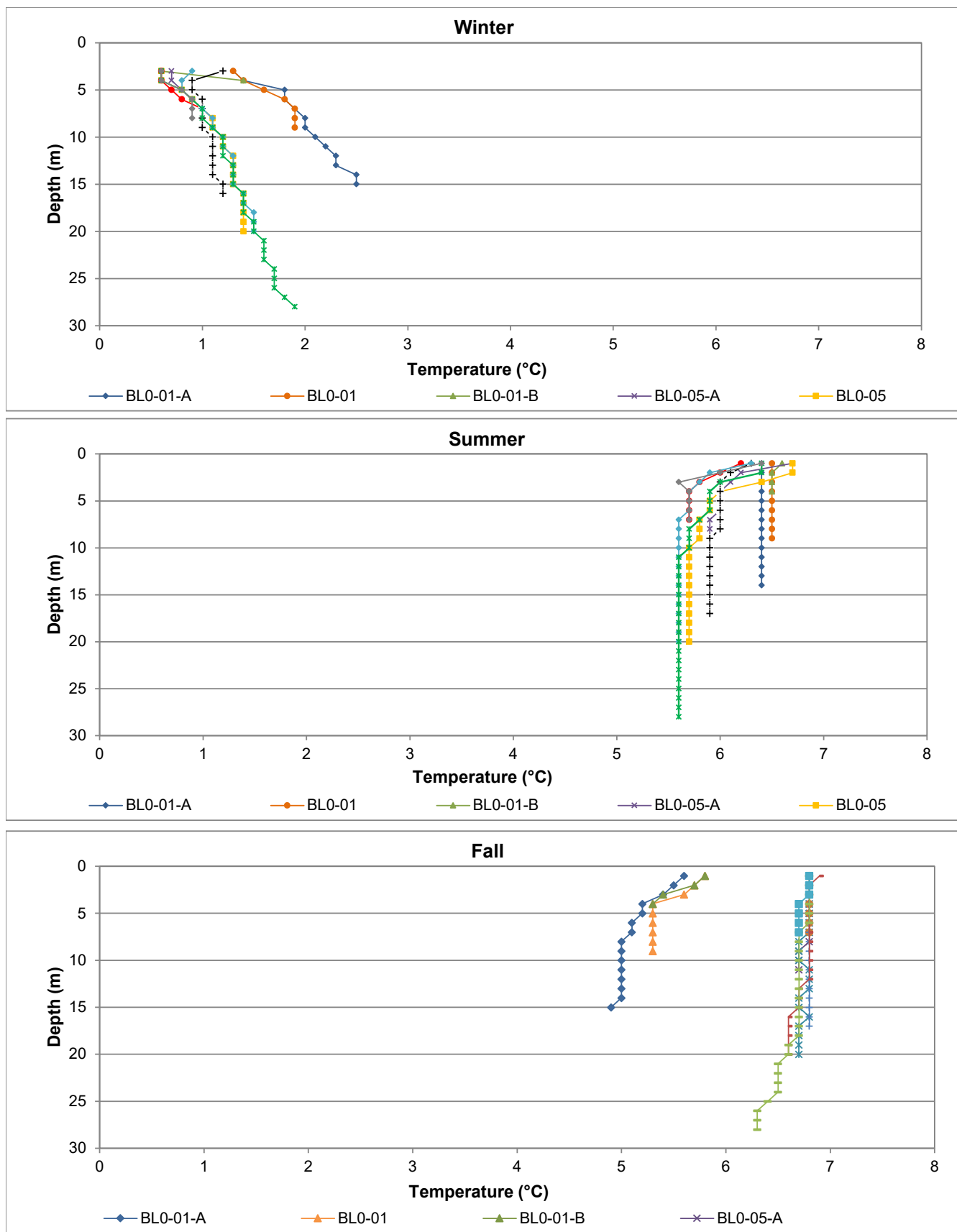


Figure C.25: Vertical Profiles of Temperature Measured at Mary Lake in Winter, Summer, and Fall, 2021

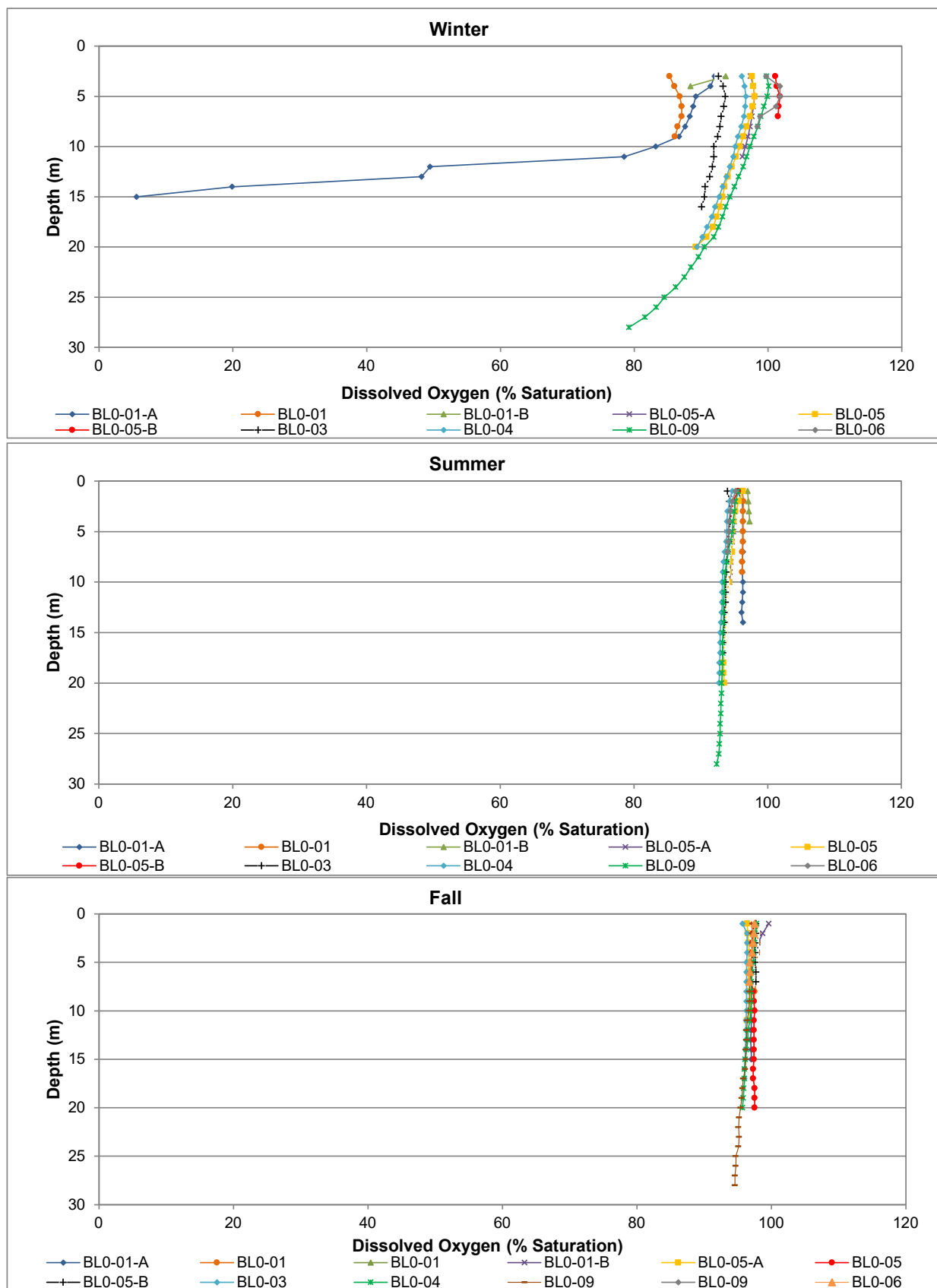


Figure C.26: Vertical Profiles of Dissolved Oxygen Measured at Mary Lake in Winter, Summer, and Fall, 2021

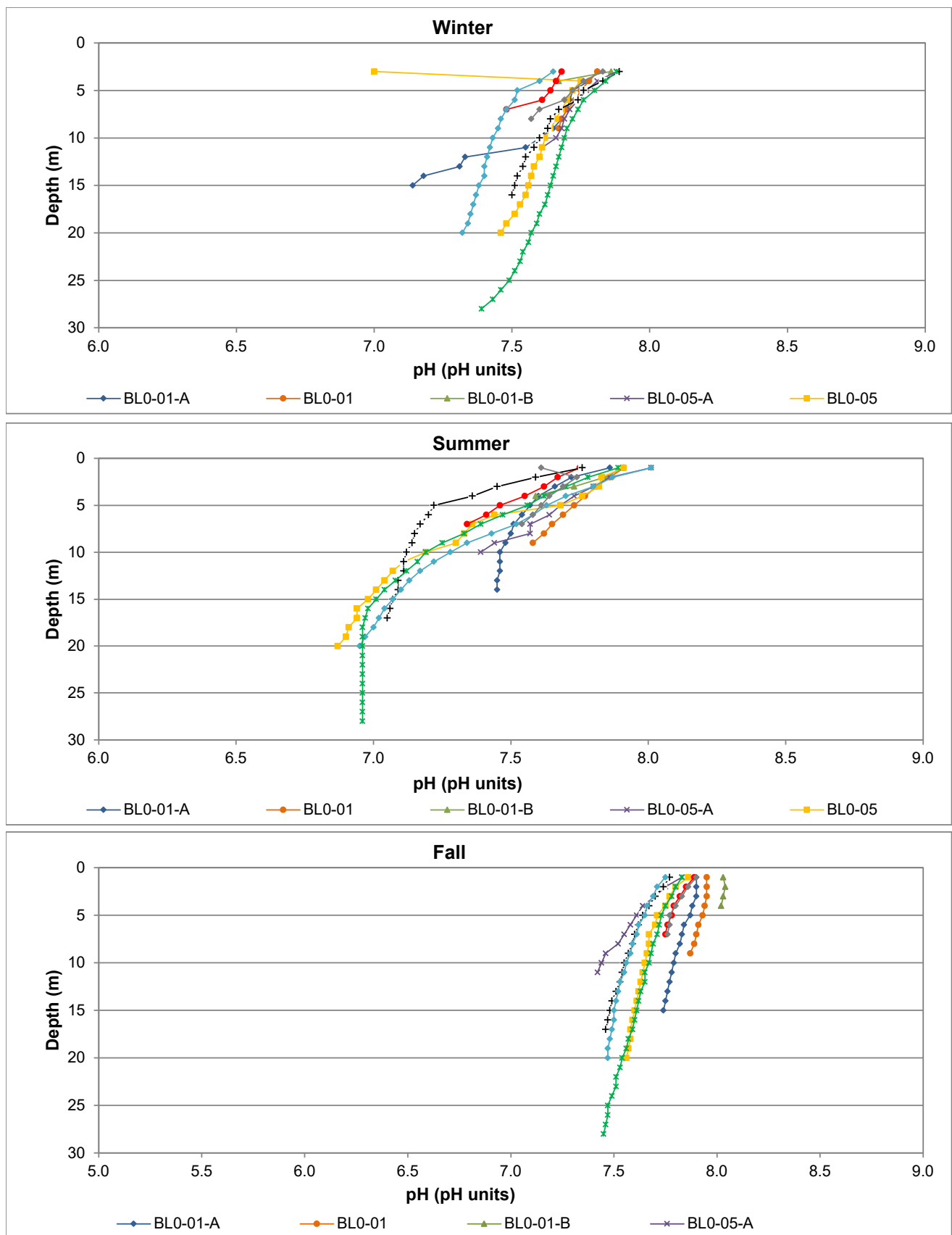


Figure C.27: Vertical Profiles of pH Measured at Mary Lake in Winter, Summer, and Fall, 2021

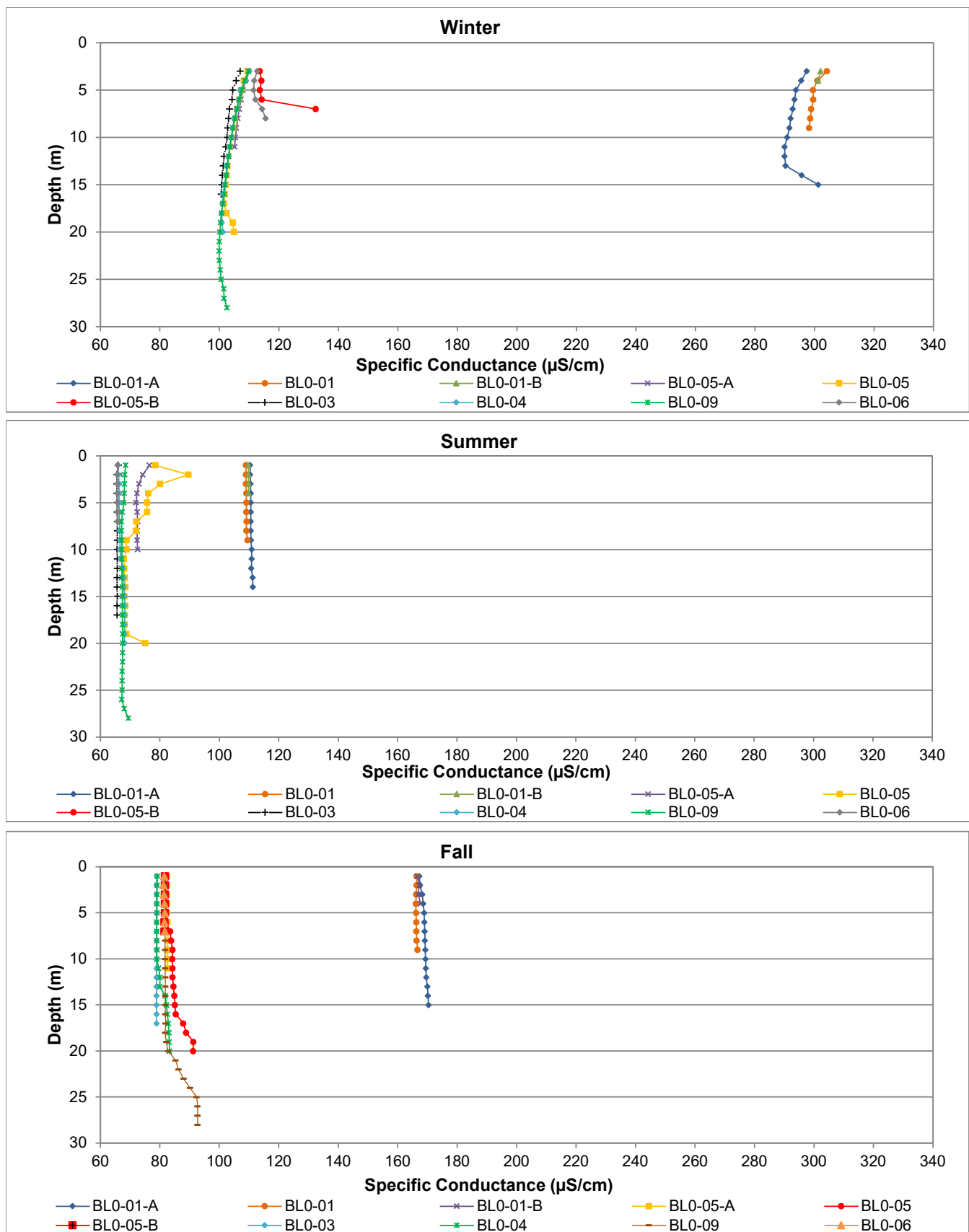


Figure C.28: Vertical Profiles of Specific Conductance Measured at Mary Lake in Winter, Summer, and Fall, 2021

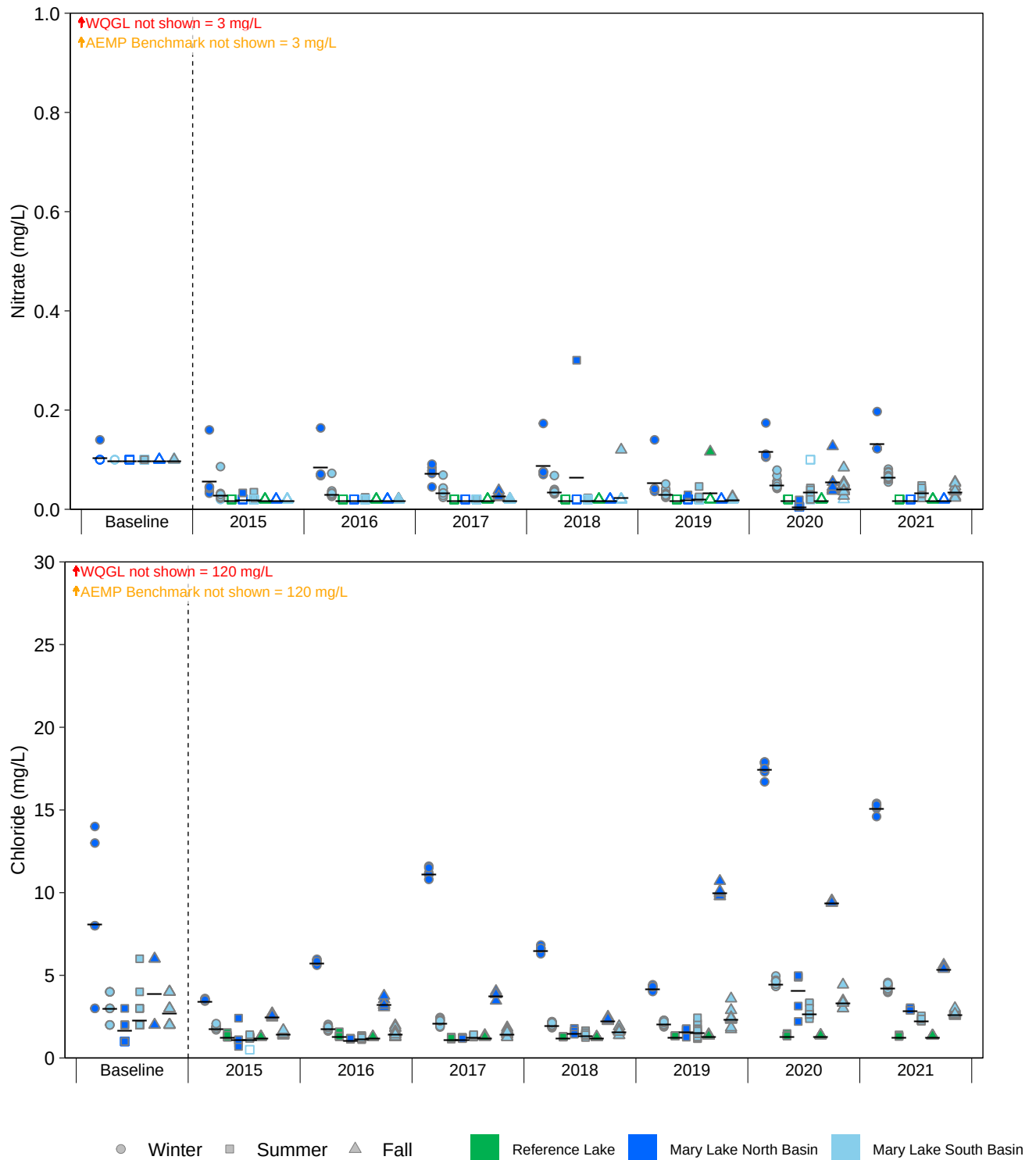


Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

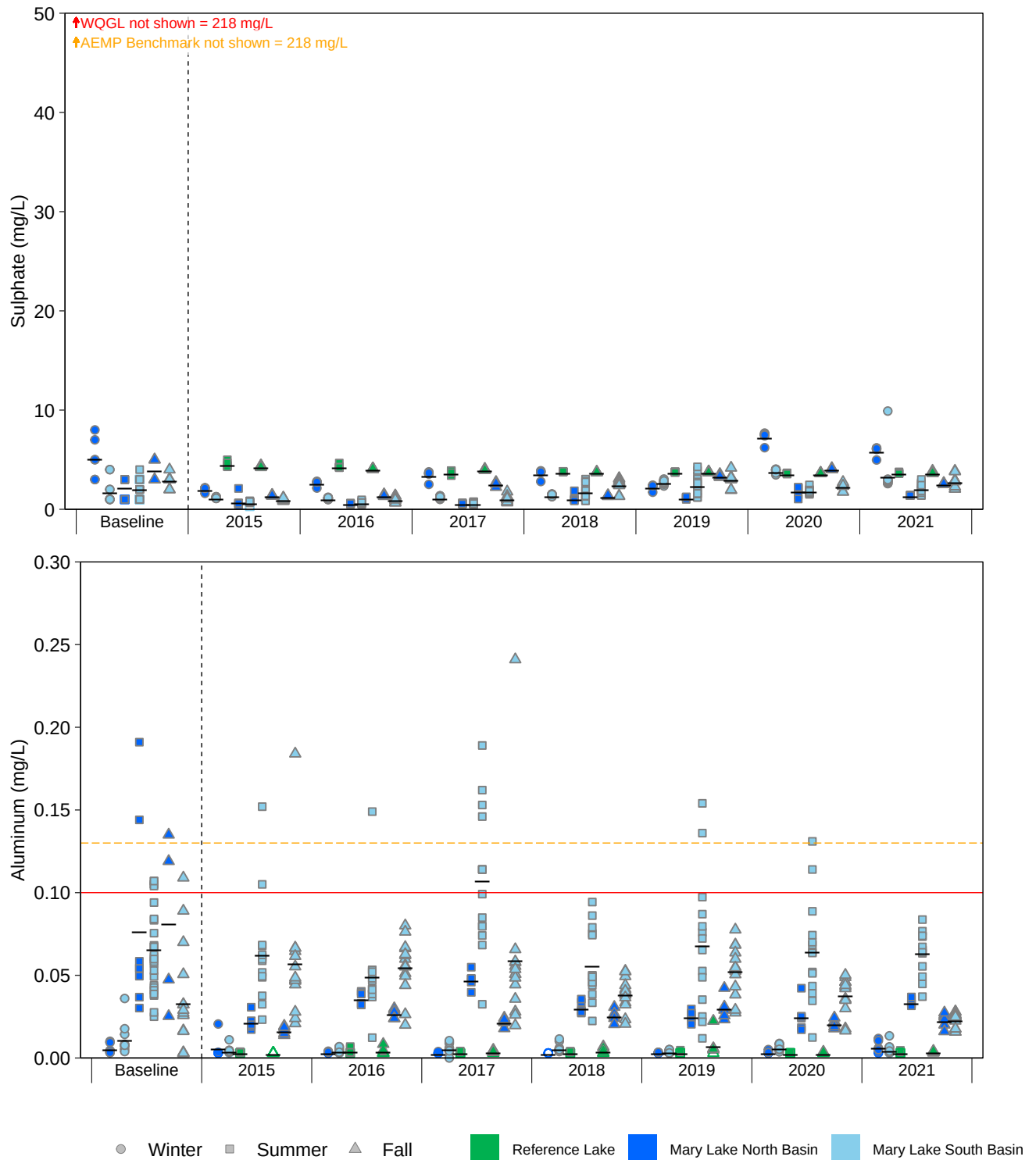


Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

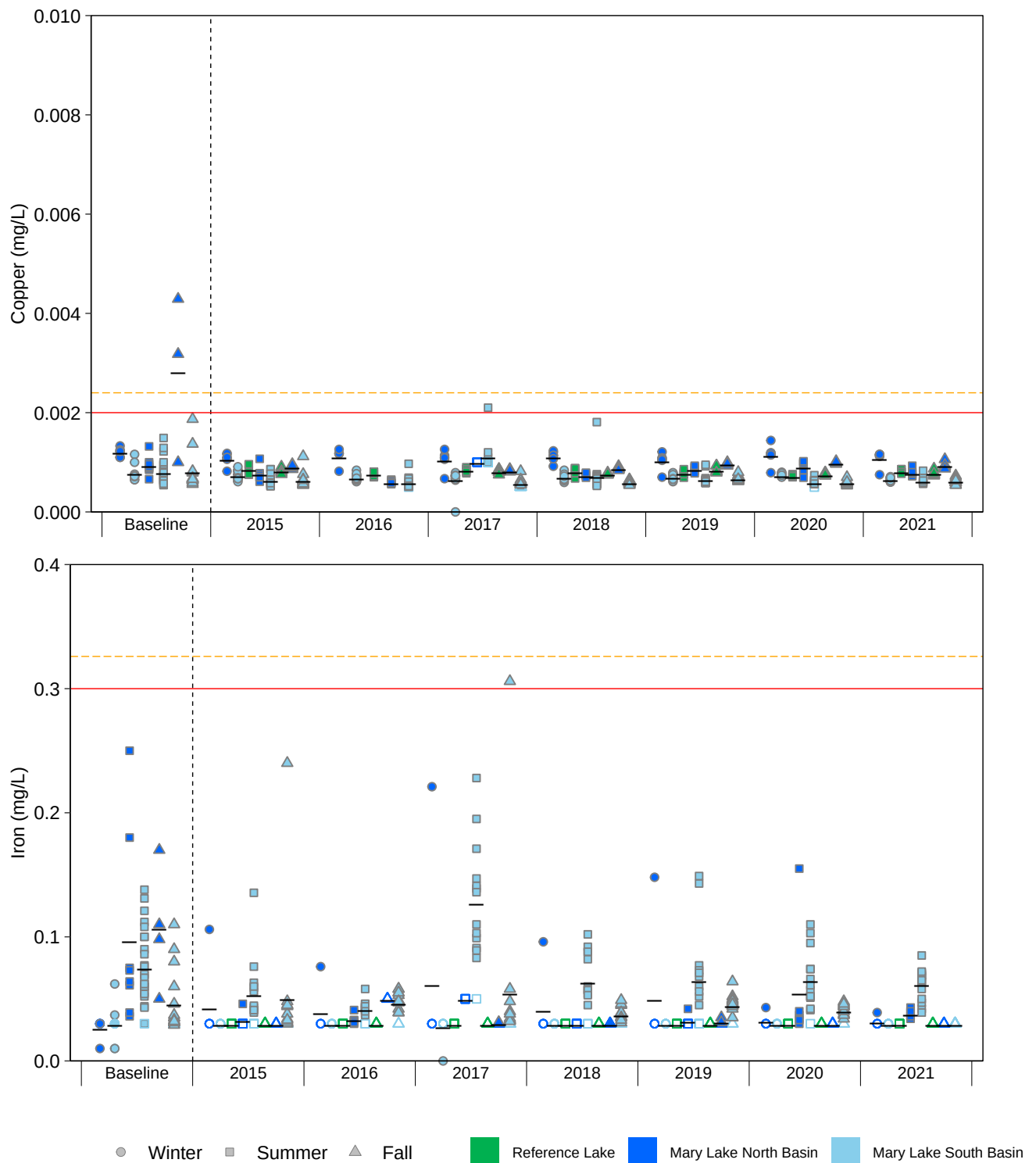


Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

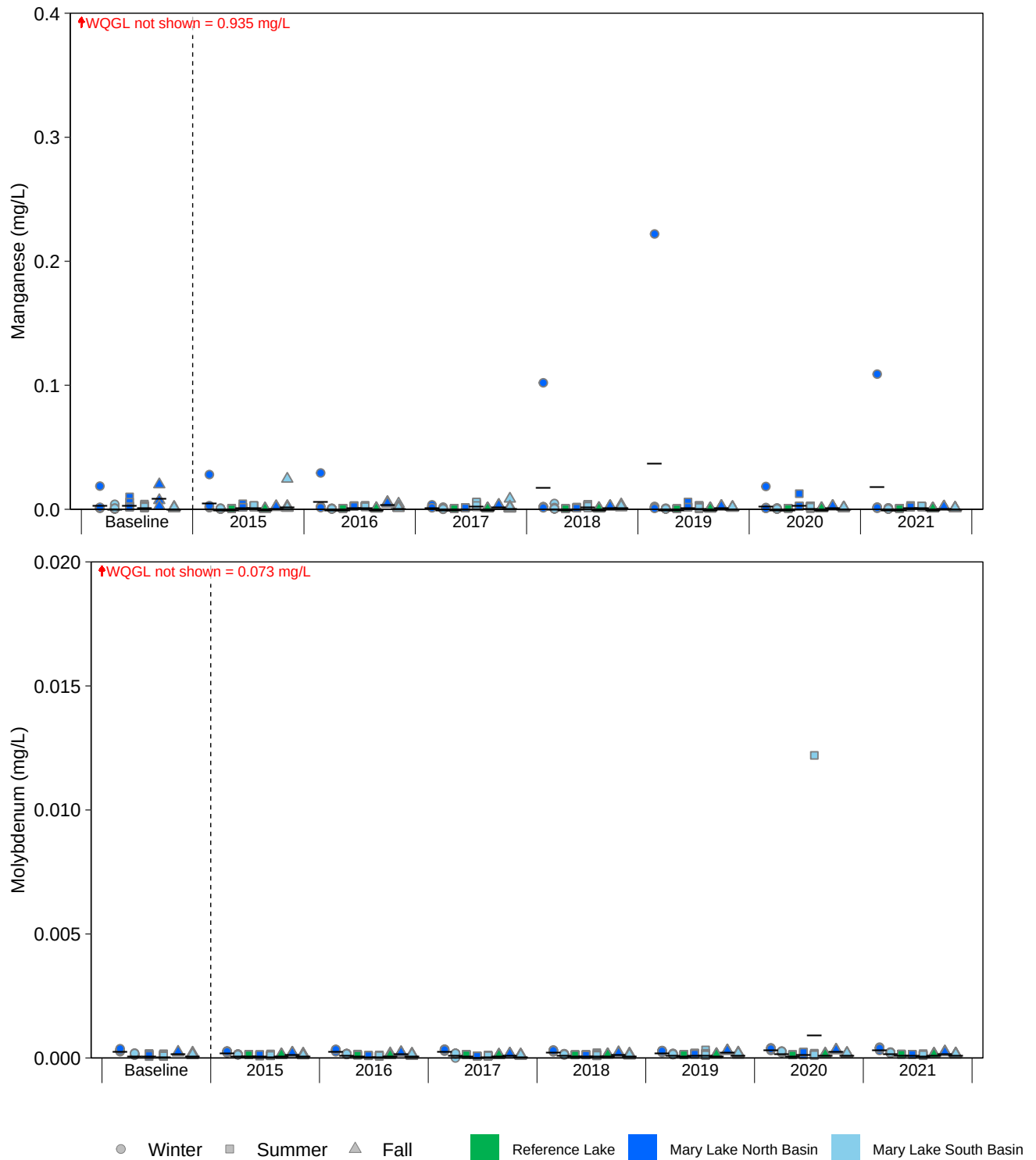


Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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.

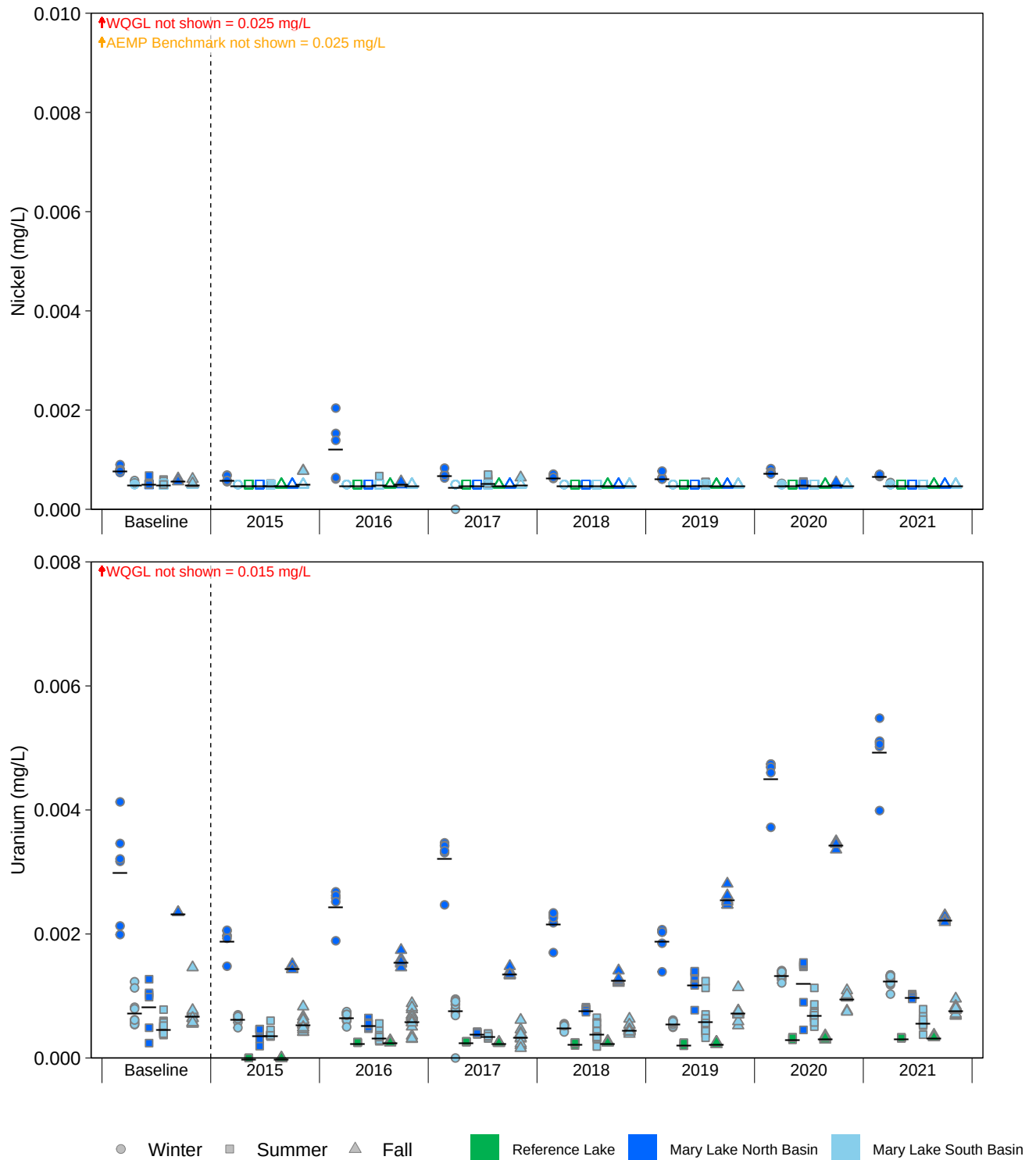


Figure C.29: Temporal Comparison of Water Chemistry at Mary Lake (BL0) Over Mine Baseline (2006 to 2013) and Operations (2015 to 2021) Periods

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 2021

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-Jul-21	1.8	97.9	13.65	7.86	41.7	0.74
		CLT-REF3	2-Jul-21	1.8	98.9	13.76	7.91	46.2	0.06
		MRY-REF3	2-Jul-21	1.8	97.9	13.64	7.85	29.9	4.10
		MRY-REF2	2-Jul-21	2.5	98.2	13.40	7.80	52.0	0.79
	CLT-1	L1-08	1-Jul-21	2.9	97.7	12.94	7.74	87.1	3.13
		L1-02	1-Jul-21	6.7	96.8	11.86	7.80	95.8	1.47
		L2-03	30-Jun-21	7.7	95.4	11.37	7.85	236.1	17.10
		L1-09	30-Jun-21	6.0	97.9	12.21	7.90	110.4	8.16
		L1-05	30-Jun-21	6.1	97.4	12.11	8.00	109.3	2.62
		L0-01	29-Jun-21	9.2	97.1	11.19	7.86	108.1	2.78
	CLT-2	K0-01	29-Jun-21	7.6	98.8	11.82	7.71	98.7	1.34
	Camp Lake	J0-01	2-Jul-21	3.5	99.3	13.20	7.48	144.9	1.23
Sheardown Lake System	SDL Tribs	D1-05	29-Jun-21	7.6	95.5	11.42	7.82	146.5	1.45
		D1-00	29-Jun-21	13.9	96.2	9.93	7.97	217.7	1.57
Mary River/Lake System	Tom River	I0-01	29-Jun-21	3.9	102.7	13.52	7.37	37.3	1.17
	Mary River	G0-09-A	2-Jul-21	1.9	95.7	13.27	7.29	26.7	7.85
		G0-09	2-Jul-21	2.1	97.0	13.37	7.97	28.3	6.93
		G0-09-B	2-Jul-21	2.2	97.2	13.40	7.91	33.2	4.73
		G0-03	2-Jul-21	1.8	97.9	13.63	7.98	31.7	3.48
		G0-01	2-Jul-21	2.8	101.6	13.49	7.61	31.5	2.80
		F0-01	2-Jul-21	2.4	100.5	13.32	7.51	163.3	0.40
		E0-10	2-Jul-21	2.6	103.8	13.72	7.57	38.4	2.85
		E0-03	1-Jul-21	3.3	98.9	13.23	7.71	30.9	7.13
		E0-20	1-Jul-21	2.8	98.8	13.37	7.91	35.2	6.41
		E0-21	1-Jul-21	2.8	98.5	13.33	7.87	31.1	7.29
		C0-10	1-Jul-21	2.7	98.3	13.38	7.94	35.0	6.65
		C0-05	1-Jul-21	2.8	94.7	12.85	7.79	53.7	7.42
		C0-01	1-Jul-21	2.3	96.2	13.25	7.91	39.1	9.02

Note: "-" indicates no data collected.

Table C.2: *In Situ* Water Quality Data Collected from Lotic Environments for the Mary River Project CREMP, Summer 2021

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	1-Aug-21	6.0	95.0	12.14	7.49	93.5	0.33
		CLT-REF3	28-Jul-21	3.2	94.0	12.62	7.85	81.4	0.59
		MRY-REF3	28-Jul-21	5.2	94.6	12.06	7.84	81.0	8.27
		MRY-REF2	28-Jul-21	6.3	95.7	11.82	7.84	105.8	0.62
	CLT-1	L1-08	1-Aug-21	2.6	95.2	12.97	7.83	122.4	0.23
		L1-02	25-Jul-21	5.3	94.5	12.08	7.74	155.5	-0.11
		L2-03	23-Jul-21	9.4	94.5	10.81	7.97	308.0	12.17
		L1-09	23-Jul-21	8.0	96.1	11.40	8.09	187.6	2.24
		L1-05	23-Jul-21	7.5	95.9	11.52	8.10	189.3	2.21
		L0-01	23-Jul-21	7.7	95.8	11.46	7.99	198.5	2.51
	CLT-2	K0-01	23-Jul-21	7.2	97.8	11.71	7.77	293.3	0.41
	Camp Lake	J0-01	1-Aug-21	7.8	97.8	11.65	7.90	144.2	0.37
Sheardown Lake System	SDL Tribs	D1-05	23-Jul-21	5.1	92.3	11.76	7.92	203.6	1.58
		D1-00	25-Jul-21	6.4	94.8	11.71	7.74	336.2	1.72
Mary River/Lake System	Tom River	I0-01	25-Jul-21	5.8	96.1	12.04	7.75	119.2	1.83
	Mary River	G0-09-A	1-Aug-21	6.1	93.8	11.66	7.91	88.8	7.08
		G0-09	1-Aug-21	6.1	94.3	11.72	7.92	89.9	7.48
		G0-09-B	1-Aug-21	6.4	95.3	11.75	7.86	98.2	5.60
		G0-03	1-Aug-21	6.4	95.3	11.75	7.90	99.7	4.07
		G0-01	1-Aug-21	6.9	96.8	11.80	7.95	101.7	4.08
		F0-01	1-Aug-21	5.5	95.9	12.10	7.81	250.1	1.83
		E0-10	26-Jul-21	4.0	95.9	12.61	7.90	88.2	6.96
		E0-03	26-Jul-21	3.9	95.4	12.56	7.79	86.3	8.41
		E0-20	26-Jul-21	3.8	94.4	12.48	7.82	86.4	11.88
		E0-21	26-Jul-21	3.8	95.0	12.56	7.81	85.7	9.04
		C0-10	25-Jul-21	5.5	95.2	12.00	7.77	92.4	5.22
		C0-05	25-Jul-21	5.7	95.2	11.93	7.79	91.4	5.35
		C0-01	25-Jul-21	6.0	93.8	11.72	7.92	91.6	4.80

Table C.3: *In Situ* Water Quality Data Collected From Lotic Environments for the Mary River Project CREMP, Fall 2021

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	03-Sep-21	3.7	97.8	12.92	7.98	152.7	-0.68
		CLT-REF3	03-Sep-21	2.4	98.9	13.51	7.85	131.7	-1.07
		MRY-REF3	03-Sep-21	3.6	99.0	13.13	7.99	132.4	3.08
		MRY-REF2	03-Sep-21	5.5	99.8	12.56	7.99	155.7	-0.97
	CLT-1	L1-08	03-Sep-21	1.1	96.0	13.61	7.73	155.7	-1.02
		L1-02	05-Sep-21	0.6	99.0	14.21	8.07	197.9	-3.35
		L2-03	26-Aug-21	4.2	101.0	12.82	8.00	356.6	19.49
		L1-09	26-Aug-21	2.7	101.2	13.35	8.07	258.3	2.61
		L1-05	26-Aug-21	2.5	101.3	13.47	8.10	261.8	2.71
		L0-01	26-Aug-21	2.3	100.3	13.45	8.02	276.9	2.02
	CLT-2	K0-01	26-Aug-21	2.1	99.6	13.44	8.11	269.6	-0.47
	Camp Lake	J0-01	03-Sep-21	6.6	97.1	11.89	7.89	150.4	-0.97
Sheardown Lake System	SDL Tribs	D1-05	26-Aug-21	3.6	98.6	12.70	7.87	244.9	6.20
		D1-00	26-aug021	4.3	101.2	12.80	8.04	382.2	3.58
Mary River/Lake System	Tom River	I0-01	27-Aug-21	3.2	99.4	13.05	8.01	186.0	-0.25
	Mary River	G0-09-A	05-Sep-21	0.2	96.7	14.05	8.02	166.1	0.16
		G0-09	05-Sep-21	0.3	96.8	14.02	8.06	172.5	-0.77
		G0-09-B	05-Sep-21	0.0	96.4	14.07	8.01	181.5	-1.47
		G0-03	05-Sep-21	0.0	98.0	14.34	8.02	174.3	-1.57
		G0-01	05-Sep-21	0.0	101.3	14.60	7.98	338.7	-2.52
		F0-01	05-Sep-21	0.0	98.4	14.37	7.93	340.5	-2.61
		E0-10	05-Sep-21	0.3	98.4	14.32	7.92	184.2	-0.68
		E0-03	04-Sep-21	2.1	98.8	13.60	7.98	191.0	-0.38
		E0-20	03-Sep-21	4.1	99.5	13.01	8.05	191.6	7.76
		E0-21	04-Sep-21	2.7	98.2	13.48	8.03	192.2	-0.43
		C0-10	03-Sep-21	3.5	99.8	13.26	8.02	192.3	0.60
		C0-05	03-Sep-21	3.8	99.5	13.17	7.89	191.7	6.81
		C0-01	03-Sep-21	3.8	99.0	13.06	8.00	192.3	3.40

Table C.4: Dissolved Metal Concentrations at Reference Creek Monitoring Stations, Mary River Project CREMP, 2021

[illegible]

Table C.5: *In Situ* Water Quality Profile Data Collected at Reference Lake 3 Water Quality Monitoring Stations in Summer 2021, 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	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21	31-Jul-21
1.0	7.3	7.2	7.9	12.05	12.24	12.13	99.4	101.4	102.1	7.99	7.89	7.47	74.3	74.6	75.1
2.0	7.0	7.1	7.8	12.28	12.25	12.16	100.9	101.3	102.3	7.86	7.78	7.36	74.2	74.5	75.2
3.0	7.0	7.1	7.5	12.28	12.27	12.21	101.0	101.2	101.3	7.81	7.72	7.36	74.2	74.6	75.4
4.0	6.9	6.9	6.9	12.29	12.29	12.24	101.0	101.0	99.7	7.77	7.65	7.26	74.2	74.5	75.0
5.0	6.8	6.8	6.4	12.28	12.29	12.28	100.8	100.4	99.3	7.73	7.58	7.26	74.3	74.4	74.7
6.0	6.3	6.3	6.2	12.32	12.35	12.30	99.7	99.8	99.3	7.69	7.49	7.21	74.2	74.3	74.6
7.0	6.1	6.1	6.2	12.34	12.34	12.29	99.4	99.5	99.1	7.64	7.41	7.20	74.2	74.2	74.6
8.0	6.0	6.1	6.0	12.33	12.34	12.30	99.1	99.4	98.9	7.60	7.37	7.19	74.2	74.2	74.4
9.0	6.0	6.0	6.0	12.30	12.33	12.29	98.8	99.1	98.8	7.54	7.37	7.19	74.2	74.2	74.4
10.0	5.9	6.0	6.0	12.27	12.31	12.28	98.4	98.9	98.6	7.48	7.29	7.17	74.2	74.2	74.3
11.0	5.9	5.9	5.9	12.26	12.29	12.26	98.2	98.6	98.3	7.43	7.26	7.16	74.2	74.2	74.3
12.0	5.9	5.9	5.9	12.25	12.26	12.25	98.1	98.2	98.2	7.38	7.21	7.16	74.2	74.2	74.3
13.0	5.9	5.9	5.9	12.24	12.24	12.24	98.0	98.0	98.0	7.32	7.21	7.15	74.2	74.2	74.3
14.0	5.8	5.9	5.9	12.24	12.23	12.25	97.9	97.9	98.1	7.26	7.16	7.14	74.2	74.2	74.2
15.0	5.8	5.8	-	12.22	12.22	-	97.8	97.8	-	7.22	7.14	-	74.2	74.2	-
16.0	5.8	5.8	-	12.21	12.21	-	97.7	97.7	-	7.17	7.13	-	74.2	74.2	-
17.0	5.8	-	-	12.20	-	-	97.6	-	-	7.13	-	-	74.2	-	-
18.0	5.8	-	-	12.19	-	-	97.4	-	-	7.09	-	-	74.2	-	-
19.0	5.8	-	-	12.18	-	-	97.4	-	-	7.05	-	-	74.2	-	-
20.0	5.8	-	-	12.17	-	-	97.2	-	-	7.02	-	-	74.2	-	-
21.0	5.8	-	-	12.16	-	-	97.1	-	-	6.98	-	-	74.2	-	-
22.0	5.7	-	-	12.15	-	-	97.0	-	-	6.93	-	-	74.2	-	-
23.0	5.7	-	-	12.15	-	-	96.9	-	-	6.92	-	-	74.2	-	-
24.0	5.7	-	-	12.14	-	-	96.9	-	-	6.92	-	-	74.2	-	-
25.0	5.0	-	-	12.13	-	-	96.8	-	-	6.91	-	-	74.2	-	-
26.0	5.7	-	-	12.13	-	-	96.8	-	-	6.91	-	-	74.2	-	-
27.0	5.7	-	-	12.12	-	-	96.8	-	-	6.91	-	-	74.2	-	-
28.0	5.7	-	-	12.12	-	-	96.7	-	-	6.91	-	-	74.2	-	-
29.0	5.7	-	-	12.10	-	-	96.6	-	-	6.91	-	-	74.2	-	-
30.0	5.7	-	-	12.05	-	-	96.1	-	-	6.90	-	-	74.2	-	-
31.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = no data / not applicable. Total depth at stations REF3-03, REF3-02, and REF3-01 was 30.2, 16.3, and 15.3 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 2021, 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	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21	31-Aug-21
1.0	6.9	7.0	7.1	11.81	11.79	11.69	97.1	97.1	96.3	7.68	7.75	7.69	75.3	75.7	76.2
2.0	6.9	7.0	7.0	11.80	11.78	11.74	97.0	97.0	96.7	7.66	7.71	7.62	75.3	75.6	76.0
3.0	6.9	7.0	7.0	11.80	11.78	11.74	97.0	96.9	96.7	7.63	7.64	7.57	75.3	75.6	76.0
4.0	6.9	7.0	7.0	11.79	11.77	11.75	96.9	96.9	96.7	7.60	7.62	7.54	75.3	75.6	76.0
5.0	6.9	7.0	7.0	11.78	11.77	11.74	96.8	96.9	96.7	7.58	7.56	7.51	75.3	75.6	76.0
6.0	6.9	7.0	7.0	11.78	11.76	11.74	96.8	96.8	96.6	7.57	7.53	7.47	75.3	75.6	76.0
7.0	6.9	7.0	7.0	11.77	11.76	11.74	96.7	96.8	96.6	7.55	7.51	7.45	75.3	75.7	76.0
8.0	6.9	7.0	7.0	11.77	11.76	11.74	96.7	96.8	96.6	7.54	7.48	7.43	75.3	75.7	76.0
9.0	6.9	7.0	7.0	11.76	11.75	11.74	96.7	96.7	96.7	7.52	7.46	7.41	75.3	75.7	76.0
10.0	6.9	7.0	7.0	11.74	11.75	11.74	96.5	96.7	96.6	7.50	7.44	7.38	75.3	75.7	76.0
11.0	6.9	7.0	7.0	11.74	11.74	11.73	96.4	96.7	96.5	7.49	7.43	7.36	75.3	75.8	76.1
12.0	6.8	7.0	6.9	11.72	11.74	11.73	96.2	96.6	96.4	7.48	7.41	7.34	75.3	75.9	76.2
13.0	6.8	7.0	6.9	11.70	11.73	11.72	95.9	96.5	96.3	7.46	7.40	7.33	75.3	76.3	76.3
14.0	6.8	6.9	6.8	11.69	11.71	11.66	95.8	96.3	95.5	7.46	7.39	7.30	75.3	76.8	77.6
15.0	6.8	6.9	-	11.69	11.70	-	95.8	96.1	-	7.49	7.38	-	75.3	76.6	-
16.0	6.8	6.8	-	11.67	11.68	-	95.6	95.9	-	7.43	7.37	-	75.3	76.5	-
17.0	6.8	6.8	-	11.64	11.66	-	98.4	95.6	-	7.41	7.35	-	75.3	76.5	-
18.0	6.8	6.8	-	11.62	11.65	-	95.1	95.4	-	7.40	7.33	-	75.3	76.6	-
19.0	6.7	6.8	-	11.61	11.65	-	95.1	95.4	-	7.39	7.33	-	75.3	76.7	-
20.0	6.7	6.7	-	11.61	11.64	-	95.0	95.3	-	7.38	7.32	-	75.4	77.1	-
21.0	6.7	6.7	-	11.60	11.63	-	95.0	95.2	-	7.38	7.31	-	75.3	77.3	-
22.0	6.7	6.7	-	11.59	11.62	-	94.9	95.1	-	7.37	7.30	-	75.4	77.3	-
23.0	6.7	6.7	-	11.58	11.62	-	94.8	95.1	-	7.36	7.30	-	75.4	77.4	-
24.0	6.7	6.7	-	11.58	11.61	-	94.7	95.0	-	7.35	7.29	-	75.4	77.4	-
25.0	6.7	6.7	-	11.57	11.60	-	94.7	95.0	-	7.35	7.28	-	75.4	77.4	-
26.0	6.7	-	-	11.56	-	-	94.6	-	-	7.34	-	-	75.4	-	-
27.0	6.7	-	-	11.55	-	-	94.5	-	-	7.33	-	-	75.4	-	-
28.0	6.7	-	-	11.53	-	-	94.3	-	-	7.33	-	-	75.4	-	-
29.0	6.7	-	-	11.54	-	-	94.4	-	-	7.33	-	-	75.4	-	-
30.0	6.7	-	-	11.53	-	-	94.3	-	-	7.32	-	-	75.4	-	-
31.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = no data / not applicable. Total depth at stations REF3-03, REF3-02, and REF3-01 was 36.9, 29.6, and 15.5 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 2021

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	17-Aug-21	12.6	5.83	colourless/clear	surface	7.4	11.70	97.2	7.68	75.4
					bottom	7.2	11.63	96.3	7.57	75.8
REF 03-2	17-Aug-21	7.7	5.9	colourless/clear	surface	7.6	11.76	98.2	7.71	74.9
					bottom	7.5	11.74	98.0	7.67	74.8
REF 03-3	18-Aug-21	9.5	5.55	colourless/clear	surface	7.4	11.77	97.9	7.65	74.9
					bottom	7.2	11.69	96.7	7.61	74.7
REF 03-4	18-Aug-21	9.1	4.85	colourless/clear	surface	7.4	11.80	98.2	7.65	74.9
					bottom	7.4	11.76	97.9	7.62	74.9
REF 03-5	18-Aug-21	12.5	5.38	colourless/clear	surface	7.3	11.73	97.3	7.24	74.6
					bottom	7.2	11.67	96.6	7.22	74.7
REF 03-6	17-Aug-21	20.4	5.8	colourless/clear	surface	7.5	11.71	97.5	7.30	75.3
					bottom	7.1	11.85	95.7	7.29	74.8
REF 03-7	17-Aug-21	22.4	5.80	colourless/clear	surface	7.4	11.73	97.5	7.44	75.1
					bottom	7.2	11.63	96.3	7.37	74.8
REF 03-8	18-Aug-21	18.2	5.58	colourless/clear	surface	7.3	11.80	98.0	7.61	74.9
					bottom	7.1	11.67	96.5	7.56	74.8
REF 03-9	18-Aug-21	20.9	5.19	colourless/clear	surface	7.3	11.77	97.8	7.39	74.8
					bottom	7.1	11.64	96.1	7.36	74.7
REF 03-10	18-Aug-21	20.4	5.55	colourless/clear	surface	7.2	11.74	97.1	7.33	74.7
					bottom	7.1	11.63	96.0	7.29	74.7

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 2021

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test ^a	Transformation	Significant Difference Between Areas?	P-value	Station Type	n	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	none	NO	0.714	Littoral	5	5.50	0.420	0.188	4.85	5.90
					Profundal	5	5.58	0.250	0.112	5.19	5.80
Temperature (°C)	tequal	none	YES	0.027	Littoral	5	7.30	0.141	0.0632	7.20	7.50
					Profundal	5	7.12	0.0447	0.0200	7.10	7.20
Dissolved Oxygen (mg/L)	M-W	rank	NO	0.458	Littoral	5	11.7	0.0526	0.0235	11.6	11.8
					Profundal	5	11.7	0.0942	0.0421	11.6	11.8
Dissolved Oxygen (% saturation)	tequal	none	YES	0.032	Littoral	5	97.1	0.791	0.354	96.3	98.0
					Profundal	5	96.1	0.303	0.136	95.7	96.5
pH (units)	tequal	none	YES	0.032	Littoral	5	7.54	0.181	0.0811	7.22	7.67
					Profundal	5	7.37	0.111	0.0495	7.29	7.56
Specific Conductance (µS/cm)	M-W	rank	NO	0.577	Littoral	5	75.0	0.466	0.208	74.7	75.8
					Profundal	5	74.8	0.0548	0.0245	74.7	74.8

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

^a 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.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, 202'

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 ^b	Conductivity (lab)	0.9	0.9	3.1	1.2	0.5	1	1	1	4.0	1.2	0.7	1.0	0.8	0.4	4.7	2.5	4.1
	pH (lab)	0.5	1.1	1.6	0.8	0.1	0.6	28	0.2	0.5	0.6	0.3	2.6	0.4	0.3	1.0	0.5	0.5
	Hardness (as CaCO ₃)	0.5	1.0	4.2	0.3	1.3	1.9	29	1.2	1.1	1.5	1.8	1.4	0.9	2.1	4.5	27	4.4
	Total Suspended Solids (TSS)	0	0	34	0	0	0	0	26	0	0	0	0	7.4	7.4	5.7	25	0
	Total Dissolved Solids (TDS)	20	3.9	3.9	14	19	6.4	6.5	6.2	3.6	14	7.4	9.5	2.2	14	14	46	9.0
	Turbidity	8.7	13	18	14	5.1	41	7.5	26	45	8.1	9.4	53	2.1	6.6	36	20	17
	Alkalinity (as CaCO ₃)	2.5	21	3.9	2.3	0.3	1.4	0.4	1.0	1.8	1.4	0.4	2.9	5.0	1.5	5.9	1.9	8.2
Nutrients and Organics	Total Ammonia	55	0	43	0	0	0	7.3	0	52	5.5	0	11	0	0	22	15	0
	Nitrate	0	0	37	18	1.1	3.0	0.9	0.5	6.3	0.8	1.4	16	0	0	12	17	17
	Nitrite	0	0	0	0	0	0	0	13	12	0	7.1	0	0	0	0	0	0
	Total Kjeldahl Nitrogen (TKN)	56	21	6.7	14	83	13	16	11	14	35	12	36	36	18	38	16	19
	Dissolved Organic Carbon	18	27	6.8	8.6	4.9	6.0	7.3	32	7.9	6.9	50	5.2	12	19	6.8	5.6	14
	Total Organic Carbon	9.7	11	9.6	7.2	9.1	7.1	3.4	11	3.6	5.5	21	1.4	1.6	2.8	7.1	4.2	4.3
	Total Phosphorus	10	8.9	31	1.3	9.9	42	3.0	32	13	16	12	25	6.3	6.2	27	18	18
	Phenols	6.1	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0
Anions	Bromide (Br)	0	0	0	0	0	33	31	0	0	0	0	0	0	0	0	0	0
	Chloride (Cl)	2.7	0.2	13	0.7	0.3	31	19	0.4	3.9	0.6	0.6	1.6	2.1	1.3	4.4	1.7	4.2
	Sulphate (SO ₄)	1.6	1.9	4.7	0.6	0.3	2.0	0.3	0.4	5.5	0.8	0.6	6.9	0.9	1.5	21	7.9	8.0
Total Metals	Aluminum (Al)	8.8	5.2	43	5.3	9.2	69	12	32	23	17	9.9	39	2.7	14	36	11	12
	Antimony (Sb)	0	0	0	0	0	0	14	3.7	0	0	0	0	0	0	0	0	0
	Arsenic (As)	0	0	17	0	23	17	28	8.2	10	14	21	5.6	0	0	0	0	0
	Barium (Ba)	1.6	1.8	6.8	2.0	1.6	1.8	1.7	4.8	3.5	2.0	1.2	1.8	0.7	1.5	3.4	5.0	3.7
	Boron (B)	0	0	0	0	0	1.4	2.1	2.4	3.0	3.4	2.4	0	0	0	0	0	0
	Cadmium (Cd)	0	0	0	0	0	0	1.0	3.0	0	0	0	0	0	0	0	1.4	0
	Calcium (Ca)	1.3	0.7	4.5	1.5	1.4	1.0	1.2	2.9	2.4	2.4	2.3	3.9	0.9	0.8	5.8	5.2	3.8
	Chromium (Cr)	0	0	0	0	11	4.6	39	19	5.5	7.2	33	0	0	0	0	0	0
	Cobalt (Co)	0	0	17	0	14	12	8.1	29	24	5.7	10	0	0	0	0	0	0
	Copper (Cu)	2.1	6.7	15	5.8	3.5	7.3	12	8.0	5.8	3.5	9.5	16	7.6	8.4	4.2	5.4	10
	Iron (Fe)	0	0	34	0	6.3	47	24	33	40	7.3	4.5	8.7	7.9	0	0	17	0
	Lead (Pb)	0	0	25	0	9.8	27	12	43	10	6.0	6.7	0	0	0	0	10	0
	Lithium (Li)	0	0	0	1.5	1.4	2.1	2.3	3.4	3.0	2.7	2.2	0	0	0	0	0	0
	Magnesium (Mg)	1.3	1.3	3.3	1.3	2.6	1.2	1.1	1.1	1.5	1.0	1.4	2.3	2.2	2.8	4.8	2.8	2.7
	Manganese (Mn)	13	4.8	91	3.0	5.1	18	7.3	65	73	6.9	3.7	86	17	1.3	44	16	10
	Mercury (Hg)	0	0	0	2.5	0	0	0	0	0	0	0	0	0	0	27	0	0
	Molybdenum (Mo)	2.2	5.1	13	2.6	6.3	2.9	2.4	5.1	9.3	1.4	23	13	1.5	0.8	7.3	5.7	5.8
	Nickel (Ni)	0	0	19	1.9	3.4	3.5	5.4	20	2.6	6.5	3.7	3.4	0	0	1.1	0	0
	Potassium (K)	2.1	1.4	3.8	0.3	0.7	1.9	2.5	34	3.1	2.2	40	3.3	3.3	1.7	5.7	2.6	2.1
	Selenium (Se)	0	0	0	1.8	1.4	20	3.5	35	8.2	0	41	0	0	0	0	0	0
	Silicon (Si)	3.9	1.4	29	0.9	3.0	7.3	2.5	41	29	1.9	44	22	3.5	1.3	10	4.3	4.2
	Silver (Ag)	0	0	0	0.9	0	0	0	33	0	0	53	0	0	0	0	0	0
	Sodium (Na)	1.3	2.7	16	1.7	2.1	2.0	2.4	34	1.9	2.7	41	3.4	3.2	2.8	4.7	3.4	2.8
	Strontium (Sr)	1.4	1.7	3.4	0	0.9	0.7	0.7	34	2.0	0.5	40	3.6	1.3	1.4	5.3	4.6	4.0
	Thallium (Tl)	0	0	0	0	0	0	0	43	0	0	40	0	0	0	0	0	0
	Tin (Sn)	0	0	0	0	5.2	0	2.1	20	8.1	0	37	0	0	0	0	0	0
	Titanium (Ti)	0	0	0	1.9	4.9	80	10	64	49	7.5	44	0	0	0	0	0	0
	Uranium (U)	2.3	3.4	14	0.1	1.0	2.0	0.8	15	5.7	0.6	2.8	11	1.9	1.8	8.0	9.5	7.0
	Vanadium (V)	0	0	0	9.6	1.2	5.4	6.9	57	6.2	3.7	38	0	0	0	0	0	0
	Zinc (Zn)	0	0	0	0	0	29	27	47	18	23	28	0	0	0	1.8	9.5	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 2021

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	08-Aug-21	6.7	11.66	98.9	8.01	115.8
	REF-CRK-B2	08-Aug-21	6.7	11.91	100.6	8.01	115.7
	REF-CRK-B3	08-Aug-21	6.6	11.74	99.2	8.01	115.9
	REF-CRK-B4	08-Aug-21	6.6	11.75	99.2	8.01	115.8
	REF-CRK-B5	08-Aug-21	6.3	11.80	99.0	8.00	115.7
Camp Lake Tributary 1 Upstream	CLT1-US-B1	09-Aug-21	4.9	12.26	95.8	8.00	156.0
	CLT1-US B2	09-Aug-21	4.9	12.24	95.7	8.01	156.8
	CLT1-US-B3	09-Aug-21	4.9	12.25	95.6	8.02	157.3
	CLT1-US-B4	09-Aug-21	4.9	12.20	95.3	7.90	157.3
	CLT1-US-B5	09-Aug-21	4.9	12.15	94.9	8.03	158.4
Camp Lake Tributary 1 L2 Mine Exposed	CLT1-L2-B1	09-Aug-21	6.1	11.66	93.9	8.07	305.4
	CLT1-L2-B2	09-Aug-21	6.1	11.65	94.0	8.05	301.7
	CLT1-L2-B3	09-Aug-21	6.1	11.62	93.7	8.04	302.9
	CLT1-L2-B4	09-Aug-21	6.1	11.63	93.8	8.05	309.6
	CLT1-L2-B5	09-Aug-21	6.2	11.62	93.8	8.03	299.8
Camp Lake Tributary 1 Downstream	CLT1-DS-B1	07-Aug-21	8.7	11.31	100.3	8.30	218.3
	CLT1-DS-B2	07-Aug-21	8.1	11.46	100.2	8.29	218.7
	CLT1-DS-B3	07-Aug-21	7.6	11.53	100.1	8.29	218.0
	CLT1-DS-B4	07-Aug-21	7.1	11.72	99.9	8.25	218.9
	CLT1-DS-B5	07-Aug-21	6.5	11.87	99.8	8.26	218.8
Camp Lake Tributary 2 Upstream	CLT2-US-B1	07-Aug-21	12.1	10.41	100.3	8.44	229.5
	CLT2-US-B2	07-Aug-21	11.7	10.46	99.8	8.43	229.3
	CLT2-US-B3	07-Aug-21	11.6	10.52	100.2	8.43	229.1
	CLT2-US-B4	07-Aug-21	10.4	10.71	100.4	8.43	229.0
	CLT2-US-B5	07-Aug-21	11.0	10.73	100.6	8.41	229.2
Camp Lake Tributary 2 Downstream	CLT2-DS-B1	07-Aug-21	9.9	10.94	99.9	8.40	231.0
	CLT2-DS-B2	07-Aug-21	9.6	11.13	100.9	8.41	231.1
	CLT2-DS-B3	07-Aug-21	9.5	11.14	100.6	8.40	231.4
	CLT2-DS-B4	07-Aug-21	9.2	11.18	100.5	8.39	231.1
	CLT2-DS-B5	07-Aug-21	9.1	11.28	101.0	8.40	231.0

Table C.12: *In Situ* Water Quality Summary Statistics for the Camp Lake Tributary Benthic Stations, Mary River Project CREMP, August 2021

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	6.58	0.164	0.0735	6.46	6.70	6.30	6.70
	CLT1-US North Branch	5	4.90	0	0	4.90	4.90	4.90	4.90
	CLT1-L2 Upper Main Stem	5	6.12	0.0447	0.0200	6.09	6.15	6.10	6.20
	CLT1-DS Lower Main Stem	5	7.60	0.854	0.382	6.97	8.23	6.50	8.70
	CLT2-US Upstream	5	11.4	0.666	0.298	10.9	11.8	10.4	12.1
	CLT2-DS Downstream	5	9.46	0.321	0.144	9.22	9.70	9.10	9.90
Dissolved Oxygen (mg/L)	REF-CRK Unnamed Reference Creek	5	11.8	0.0920	0.0412	11.7	11.8	11.7	11.9
	CLT1-US North Branch	5	12.2	0.0453	0.0202	12.2	12.2	12.2	12.3
	CLT1-L2 Upper Main Stem	5	11.6	0.0182	0.00812	11.6	11.6	11.6	11.7
	CLT1-DS Lower Main Stem	5	11.6	0.220	0.0984	11.4	11.7	11.3	11.9
	CLT2-US Upstream	5	10.6	0.146	0.0653	10.5	10.7	10.4	10.7
	CLT2-DS Downstream	5	11.1	0.124	0.0553	11.0	11.2	10.9	11.3
Dissolved Oxygen (% Saturation)	REF-CRK Unnamed Reference Creek	5	99.4	0.694	0.310	98.9	99.9	98.9	101
	CLT1-US North Branch	5	95.5	0.365	0.163	95.2	95.7	94.9	95.8
	CLT1-L2 Upper Main Stem	5	93.8	0.114	0.0510	93.8	93.9	93.7	94.0
	CLT1-DS Lower Main Stem	5	100	0.207	0.0927	99.9	100	99.8	100
	CLT2-US Upstream	5	100	0.297	0.133	100	100	99.8	101
	CLT2-DS Downstream	5	101	0.432	0.193	100	101	99.9	101
pH (units)	REF-CRK Unnamed Reference Creek	5	8.01	0.00447	0.00200	8.00	8.01	8.00	8.01
	CLT1-US North Branch	5	7.99	0.0526	0.0235	7.95	8.03	7.90	8.03
	CLT1-L2 Upper Main Stem	5	8.05	0.0148	0.00663	8.04	8.06	8.03	8.07
	CLT1-DS Lower Main Stem	5	8.28	0.0217	0.00970	8.26	8.29	8.25	8.30
	CLT2-US Upstream	5	8.43	0.0110	0.00490	8.42	8.44	8.41	8.44
	CLT2-DS Downstream	5	8.40	0.00707	0.00316	8.39	8.41	8.39	8.41
Specific Conductance (µS/cm)	REF-CRK Unnamed Reference Creek	5	116	0.0837	0.0374	116	116	116	116
	CLT1-US North Branch	5	157	0.873	0.391	157	158	156	158
	CLT1-L2 Upper Main Stem	5	304	3.79	1.69	301	307	300	310
	CLT1-DS Lower Main Stem	5	219	0.378	0.169	218	219	218	219
	CLT2-US Upstream	5	229	0.192	0.0860	229	229	229	230
	CLT2-DS Downstream	5	231	0.164	0.0735	231	231	231	231

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 2021

Metric	Overall 3-group Comparison				Pair-wise, <i>post hoc</i> comparisons ^a			
	Statistical Test ^a	Transformation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Water Temperature (°C)	K-W	rank	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	YES	0.003
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	NO	0.117
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.358
					CLT1 North Branch	CLT1 Upper Main Stem	NO	0.176
					CLT1 North Branch	CLT1 Lower Main Stem	YES	<0.001
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	0.013
Dissolved Oxygen (mg/L)	ANOVA	none	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	NO	0.324
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.094
					CLT1 North Branch	CLT1 Upper Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Lower Main Stem	YES	<0.001
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.874
Dissolved Oxygen (% saturation)	K-W	rank	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.109
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.003
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.422
					CLT1 North Branch	CLT1 Upper Main Stem	NO	0.181
					CLT1 North Branch	CLT1 Lower Main Stem	YES	0.016
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	<0.001
pH (units)	K-W	rank	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.893
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.04
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	<0.001
					CLT1 North Branch	CLT1 Upper Main Stem	NO	0.056
					CLT1 North Branch	CLT1 Lower Main Stem	YES	0.001
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.169
Specific Conductance (µS/cm)	K-W	rank	YES	0.001	REF-CRK Unnamed Reference Creek	CLT1 North Branch	NO	0.181
					REF-CRK Unnamed Reference Creek	CLT1 Upper Main Stem	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT1 Lower Main Stem	YES	0.007
					CLT1 North Branch	CLT1 Upper Main Stem	YES	0.007
					CLT1 North Branch	CLT1 Lower Main Stem	NO	0.181
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.181

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

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

Table C.14: Water Chemistry at Lotic Camp Lake Tributary (CLT) Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Spring Sampling Event						
					CLT1 North Branch		CLT1 Upper Main Stem	CLT1 Lower Main Stem			CLT2
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					01-Jul-21	01-Jul-21	30-Jun-21	30-Jun-21	30-Jun-21	29-Jun-21	29-Jun-21
Conventionals	Conductivity (lab)	µS/cm	-	-	92.9	103.0	116.0	116.0	115.0	114.0	103.0
	pH (lab)	pH	6.5 - 9.0	-	7.80	7.80	6.01	6.01	7.71	7.92	7.75
	Hardness (as CaCO ₃)	mg/L	-	-	43.6	46.8	51.3	51.3	50.2	50.7	46.1
	Total Suspended Solids (TSS)	mg/L	-	-	2.0	<2.0	6.6	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	20	41	146	74	68	63	63
	Turbidity	NTU	-	-	2.36	1.48	19.9	3.82	3.24	3.22	1.09
	Alkalinity (as CaCO ₃)	mg/L	-	-	43.8	48.2	88.6	50.5	50.5	50.3	41.2
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.027	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.029	<0.020	0.506	0.083	0.069	0.047	0.035
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.180	0.180	0.270	0.100	0.130	0.110	0.070
	Dissolved Organic Carbon	mg/L	-	-	1.54	1.57	4.41	2.08	2.10	1.75	0.90
	Total Organic Carbon	mg/L	-	-	2.10	2.57	4.67	2.32	2.44	2.32	1.50
	Total Phosphorus	mg/L	0.030 ^α	-	0.0045	<0.0030	0.0208	0.0035	0.0036	<0.0030	<0.0030
	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	1.02	1.05	17.4	3.71	3.58	3.16	1.74
	Sulphate (SO ₄)	mg/L	218 ^β	218	2.25	2.51	10.40	2.78	2.68	2.68	7.9
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0604	0.0148	0.234	0.0395	0.0554	0.0376	0.0126
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	0.00018	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00642	0.00663	0.0123	0.00678	0.00683	0.00670	0.00585
	Beryllium (Be)	mg/L	0.011 ^α	-	<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	-	-	8.56	9.35	19.1	10.4	9.99	10.1	8.93
	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 ^α	0.004	<0.00010	<0.00010	0.00028	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00197	0.00157	0.00170	0.00142	0.00143	0.00147	0.00078
	Iron (Fe)	mg/L	0.30	0.326	0.077	<0.030	0.444	0.077	0.087	0.060	<0.030
	Lead (Pb)	mg/L	0.001	0.001	0.000108	<0.000050	0.000855	0.000121	0.000110	0.000096	<0.000050
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.0045	0.0013	0.0013	0.0012	<0.0010
	Magnesium (Mg)	mg/L	-	-	5.38	5.79	12.1	6.23	6.13	6.29	5.68
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00179	0.000556	0.0287	0.00403	0.00342	0.00265	0.000730
	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	-	0.000296	0.000320	0.00248	0.000704	0.000606	0.000533	0.000211
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	<0.00050	0.00162	0.00064	0.00067	0.00065	<0.00050
	Potassium (K)	mg/L	-	-	1.13	1.13	3.42	1.41	1.39	1.33	0.89
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	0.79	0.63	1.06	0.56	0.63	0.59	0.40
	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	-	-	0.435	0.637	9.09	2.12	2.01	1.92	1.31
	Strontium (Sr)	mg/L	-	-	0.00511	0.00524	0.0245	0.00822	0.00790	0.00760	0.00598
	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	-	0.000933	0.000712	0.0154	0.00295	0.00257	0.00215	0.000345
	Vanadium (V)	mg/L	0.006 ^α	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.

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

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

Table C.14: Water Chemistry at Lotic Camp Lake Tributary (CLT) Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Summer Sampling Event						
					CLT1 North Branch		CLT1 Upper Main Stem	CLT1 Lower Main Stem			CLT2
					L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					01-Aug-21	26-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21
Conventionals	Conductivity (lab)	µS/cm	-	-	128.0	172.0	314.0	193.0	194.0	205.0	303.0
	pH (lab)	pH	6.5 - 9.0	-	7.96	8.18	8.15	8.17	8.18	8.18	8.18
	Hardness (as CaCO ₃)	mg/L	-	-	62.7	81.6	120	85.8	88.8	92.1	139
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	8.7	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	53	72	158	96	104	106	177
	Turbidity	NTU	-	-	0.52	0.40	16.8	2.96	2.72	2.63	0.50
	Alkalinity (as CaCO ₃)	mg/L	-	-	66.8	69.6	119.0	88.1	88.3	94.1	150.0
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.014	<0.010	0.263	0.0337	0.0321	0.0228	<0.0050
	Nitrate	mg/L	3	3	0.041	<0.020	0.969	0.145	0.151	0.137	0.0417
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	0.0056	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.130	0.090	0.724	0.173	0.169	0.159	0.126
	Dissolved Organic Carbon	mg/L	-	-	2.50	2.67	4.28	2.77	2.77	2.96	2.27
	Total Organic Carbon	mg/L	-	-	2.07	2.82	4.79	3.09	2.93	2.96	2.32
	Total Phosphorus	mg/L	0.030 ^α	-	0.0055	<0.0030	0.0047	<0.0020	0.0025	<0.0020	<0.0020
	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	0.066	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	1.11	1.82	19.8	5.05	5.20	5.59	8.46
	Sulphate (SO ₄)	mg/L	218 ^β	218	2.07	3.07	13.5	4.56	4.63	5.05	12.3
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0198	0.0071	0.335	0.0536	0.0573	0.0722	0.0091
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.00010	<0.00010	0.000060	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	0.000160	0.000069	0.000068	0.000077	0.000072
	Barium (Ba)	mg/L	-	-	0.00869	0.0106	0.0143	0.0106	0.0105	0.0111	0.0154
	Beryllium (Be)	mg/L	0.011 ^α	-	<0.00050	<0.00050	0.0000215	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	0.0000154	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.0210	0.0077	0.0073	0.0071	0.0064
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	0.0000074	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	12.2	15.9	24.4	17.4	17.6	17.7	26.7
	Chromium (Cr)	mg/L	0.0089	0.000856	<0.00050	<0.00050	0.00063	0.00050	0.00016	0.00023	0.00021
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	<0.00010	<0.00010	0.000288	0.0000652	0.0000678	0.0000755	0.0000658
	Copper (Cu)	mg/L	0.002	0.0022	0.00245	0.00207	0.00183	0.00192	0.00194	0.00198	0.00145
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	0.530	0.121	0.117	0.130	0.109
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	0.000770	0.000121	0.000118	0.000118	0.000017
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.00427	0.00175	0.00173	0.00181	0.00173
	Magnesium (Mg)	mg/L	-	-	7.89	10.0	15.6	10.7	10.9	11.6	17.4
	Manganese (Mn)	mg/L	0.935 ^β	-	0.000635	0.000440	0.0247	0.00525	0.00574	0.00569	0.0128
	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	-	0.000896	0.000705	0.00382	0.00115	0.00116	0.00105	0.000433
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00065	0.00188	0.000876	0.000939	0.00108	0.00166
	Potassium (K)	mg/L	-	-	1.92	1.81	4.35	2.38	2.39	2.36	2.08
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	0.000128	0.000045	0.000061	0.000044	<0.000040
	Silicon (Si)	mg/L	-	-	0.79	0.81	1.33	0.862	0.883	0.941	0.923
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	0.0000051	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	-	-	0.585	1.42	13.5	3.66	3.72	3.85	5.64
	Strontium (Sr)	mg/L	-	-	0.00860	0.00933	0.0274	0.0145	0.0152	0.0169	0.0176
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	0.0000148	0.0000090	0.0000091	0.0000090	0.0000098
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	0.0149	0.00251	0.00263	0.00396	0.000476
	Uranium (U)	mg/L	0.015	-	0.00324	0.00193	0.0284	0.00557	0.00539	0.00482	0.00227
	Vanadium (V)	mg/L	0.006 ^α	0.006	<0.0010	<0.0010	0.000719	0.000296	0.000285	0.000288	0.000169
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	0.00231	0.00059	0.00096	0.00155	<0.00050

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.14: Water Chemistry at Lotic Camp Lake Tributary (CLT) Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Fall Sampling Event						
					CLT1 North Branch		CLT1 Upper Main Stem	CLT1 Lower Main Stem			CLT2
					LI-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
					3-Sep-21	5-Sep-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21
Conventionals	Conductivity (lab)	µS/cm	-	-	160	203	356	259	261	265	265
	pH (lab)	pH	6.5 - 9.0	-	8.02	8.16	8.05	8.10	8.13	8.13	8.19
	Hardness (as CaCO ₃)	mg/L	-	-	80	98.3	140	112	112	115	120
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	4.5	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	94	95	180	125	138	136	119
	Turbidity	NTU	-	-	0.42	0.23	18.6	2.81	2.66	2.17	0.23
	Alkalinity (as CaCO ₃)	mg/L	-	-	83	104	140	115	116	119	122
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	0.0336	0.0116	0.0104	0.0086	<0.0050
	Nitrate	mg/L	3	3	0.078	0.065	0.935	0.306	0.328	0.273	0.103
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	0.0044	0.0017	0.0016	0.0011	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.122	0.117	0.349	0.153	0.171	0.148	0.123
	Dissolved Organic Carbon	mg/L	-	-	3.35	2.58	4.02	2.44	2.61	2.86	1.82
	Total Organic Carbon	mg/L	-	-	2.72	2.52	3.84	2.21	2.41	2.59	2.05
	Total Phosphorus	mg/L	0.030 ^α	-	0.0194	<0.0030	0.0098	0.0031	0.0032	0.0025	<0.0020
	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	0.086	0.0116	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	1.54	3.67	19.6	<0.050	8.91	9.08	5.81
	Sulphate (SO ₄)	mg/L	218 ^β	218	3.89	5.64	14.1	7.4	7.5	7.8	11.0
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0171	0.0058	0.391	0.0470	0.0494	0.0400	0.0052
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.00010	<0.00010	0.000065	<0.000030	<0.000030	<0.000030	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	0.000142	0.000077	0.000088	0.000072	0.000055
	Barium (Ba)	mg/L	-	-	0.0103	0.0120	0.0147	0.0119	0.0123	0.0122	0.0129
	Beryllium (Be)	mg/L	0.011 ^α	-	<0.00050	<0.00050	0.0000210	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.000050	<0.000050	<0.000050	<0.000050	<0.0000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	0.019	<0.010	<0.010	<0.010	<0.0050
	Cadmium (Cd)	mg/L	0.00012	0.00008	<0.000010	<0.000010	0.0000077	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	15.8	18.4	-	-	-	-	23.3
	Chromium (Cr)	mg/L	0.0089	0.000856	<0.00050	<0.00050	0.00075	<0.00050	<0.00050	<0.00050	0.00011
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	<0.00010	<0.00010	0.000348	0.000079	0.000073	0.000063	0.0000364
	Copper (Cu)	mg/L	0.002	0.0022	0.00212	0.00198	0.00182	0.00185	0.00204	0.00186	0.00156
	Iron (Fe)	mg/L	0.30	0.326	<0.030	<0.030	0.824	0.151	0.151	0.119	0.0134
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	0.000547	0.000083	0.000080	0.000066	<0.000010
	Lithium (Li)	mg/L	-	-	<0.0010	<0.0010	0.00478	0.00213	0.00223	0.00212	0.00156
	Magnesium (Mg)	mg/L	-	-	10.2	13.0	18.2	14.2	14.7	14.7	16.3
	Manganese (Mn)	mg/L	0.935 ^β	-	0.000646	0.000573	0.0342	0.00883	0.00777	0.00628	0.000638
	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	-	0.00125	0.000963	0.00326	0.00154	0.00159	0.00136	0.000579
	Nickel (Ni)	mg/L	0.025	0.025	<0.00050	0.00056	0.00183	0.00094	0.00100	0.00113	0.000625
	Potassium (K)	mg/L	-	-	2.20	2.08	4.12	2.57	2.68	2.49	1.99
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.00020	<0.00020	<0.00020	<0.00020	0.000042
	Silicon (Si)	mg/L	-	-	0.87	0.97	1.77	1.14	1.17	1.16	0.853
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	-	-	0.700	2.23	11.7	5.38	5.77	5.28	3.97
	Strontium (Sr)	mg/L	-	-	0.0121	0.0116	0.0373	0.0204	0.0213	0.0215	0.0173
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	0.0000141	0.0000077	0.0000082	0.0000078	0.0000050
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00020	<0.00020	<0.00020	<0.00020	<0.000020
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	0.0182	0.00188	0.00208	0.00167	0.000270
	Uranium (U)	mg/L	0.015	-	0.00717	0.00397	0.0282	0.00963	0.00966	0.00829	0.00295
	Vanadium (V)	mg/L	0.006 ^α	0.006	<0.0010	<0.0010	0.00076	0.00030	0.00032	0.00027	0.000146
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	0.0032	<0.0030	0.0032	<0.0030	0.00063

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.15: Magnitude of Elevation in Seasonal Average Water Chemistry (Total Metal Concentration Data Provided) Between the Camp Lake Tributaries (CLT1 and CLT2) and Average Reference Creek Stations, Mary River Project CREMP, 2021

Parameter	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01	North Branch (L1-08, L1-02)	Upper Main Stem (L2-03)	Lower Main Stem (L1-09, L1-05, L0-01)	Station K0-01
Conductivity (lab)	2.2	2.6	2.5	2.3	1.5	3.2	2.0	3.1	1.2	2.4	1.8	1.8
pH (lab)	1.0	0.8	1.0	1.0	1.0	1.1	1.1	1.1	1.0	1.0	1.0	1.0
Hardness (as CaCO ₃)	2.3	2.6	2.6	2.3	1.7	2.8	2.0	3.2	1.3	2.0	1.6	1.7
Total Suspended Solids (TSS)	0.6	2.1	0.6	0.6	1.0	4.2	1.0	1.0	0.9	2.0	0.9	0.9
Total Dissolved Solids (TDS)	1.3	6.3	3.0	2.7	1.2	3.1	2.0	3.5	1.1	2.1	1.5	1.4
Turbidity	0.9	9.7	1.7	0.5	0.1	5.4	0.9	0.2	0.1	6.3	0.9	0.1
Alkalinity (as CaCO ₃)	2.3	4.3	2.5	2.0	1.7	3.0	2.2	3.7	1.4	2.1	1.7	1.8
Total Ammonia	1.0	2.7	1.0	1.0	1.2	26	3.0	0.5	1.0	3.4	1.0	0.5
Nitrate	1.2	25	3.3	1.8	1.5	48	7.2	2.1	2.0	26	8.3	2.8
Nitrite	1.0	1.0	1.0	1.0	1.0	1.1	0.2	0.2	1.0	0.9	0.3	0.2
Total Kjeldahl Nitrogen (TKN)	1.4	2.2	0.9	0.6	1.1	7.2	1.7	1.3	1.1	3.3	1.5	1.2
Dissolved Organic Carbon	1.5	4.3	1.9	0.9	0.9	1.6	1.0	0.8	1.1	1.5	1.0	0.7
Total Organic Carbon	1.4	2.8	1.4	0.9	1.4	2.7	1.7	1.3	1.2	1.8	1.1	1.0
Total Phosphorus	0.8	4.4	0.7	0.6	0.9	1.0	0.5	0.4	2.4	2.1	0.6	0.4
Phenols	1.0	1.0	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	0.7	0.5	0.5	1.0	0.9	0.4	0.5
Chloride (Cl)	0.9	15	2.9	1.5	0.6	7.4	2.0	3.2	0.6	4.3	1.3	1.3
Sulphate (SO ₄)	1.9	8.3	2.2	6.3	0.8	4.0	1.4	3.7	0.8	2.4	1.3	1.9
Aluminum (Al)	0.8	5.0	0.9	0.3	0.2	4.1	0.7	0.1	0.2	8.2	1.0	0.1
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	0.6	0.2	0.2	1.0	0.7	0.3	0.2
Arsenic (As)	1.0	1.8	1.0	1.0	1.0	1.6	0.7	0.7	1.0	1.4	0.8	0.6
Barium (Ba)	2.2	4.2	2.3	2.0	1.6	2.4	1.8	2.6	1.4	1.8	1.5	1.6
Beryllium (Be)	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Bismuth (Bi)	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	0.1	0.1	0.0
Boron (B)	1.0	1.7	1.0	1.0	1.0	2.1	0.7	0.6	1.0	1.9	1.0	0.5
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.0	0.7	0.5	0.5	1.0	0.8	0.5	0.5
Calcium (Ca)	2.2	4.7	2.5	2.2	1.6	2.7	1.9	3.0	1.3	0.0	0.0	1.8
Chromium (Cr)	1.0	1.0	1.0	1.0	1.0	1.3	0.6	0.4	1.0	1.5	1.0	0.2
Cobalt (Co)	1.0	2.8	1.0	1.0	1.0	2.9	0.7	0.7	1.0	3.5	0.7	0.4
Copper (Cu)	2.7	2.6	2.2	1.2	2.7	2.1	2.3	1.7	2.3	2.1	2.2	1.8
Iron (Fe)	0.9	7.6	1.3	0.5	0.4	7.9	1.8	1.6	0.5	14	2.5	0.2
Lead (Pb)	0.8	9.0	1.1	0.5	0.5	7.0	1.1	0.2	0.6	6.1	0.9	0.1
Lithium (Li)	1.0	4.5	1.3	1.0	1.0	4.3	1.8	1.7	1.0	4.8	2.2	1.6
Magnesium (Mg)	2.4	5.1	2.6	2.4	1.8	3.1	2.2	3.4	1.4	2.1	1.7	1.9
Manganese (Mn)	1.1	27	3.2	0.7	0.5	25	5.5	13	0.6	36	8.1	0.7
Mercury (Hg)	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum (Mo)	2.6	21	5.2	1.8	3.0	14	4.1	1.6	2.8	8.2	3.8	1.5
Nickel (Ni)	1.0	3.2	1.3	1.0	1.1	3.7	1.9	3.2	1.0	3.4	1.9	1.2
Potassium (K)	3.2	9.6	3.9	2.5	2.8	6.4	3.5	3.1	2.4	4.7	2.9	2.3
Selenium (Se)	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.0	1.0	0.2	0.2	0.0
Silicon (Si)	1.3	2.0	1.1	0.8	0.9	1.4	1.0	1.0	1.0	1.9	1.2	0.9
Silver (Ag)	1.0	1.0	1.0	1.0	1.0	1.0	0.8	0.5	1.0	0.5	0.5	0.5
Sodium (Na)	0.8	13	3.0	1.9	0.6	8.1	2.3	3.4	0.6	4.5	2.1	1.5
Strontium (Sr)	1.3	6.0	1.9	1.5	0.9	2.8	1.6	1.8	0.8	2.5	1.4	1.2
Thallium (Tl)	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	1.0	0.1	0.1	0.1
Tin (Sn)	1.0	1.0	1.0	1.0	1.0	0.2	0.2	0.2	1.0	2.0	2.0	0.2
Titanium (Ti)	1.0	1.0	1.0	1.0	1.0	1.5	0.3	0.0	1.0	1.8	0.2	0.0
Uranium (U)	2.2	41	6.7	0.9	1.5	17	3.1	1.4	1.1	5.4	1.7	0.6
Vanadium (V)	1.0	1.0	1.0	1.0	1.0	0.7	0.3	0.2	1.0	0.8	0.3	0.1
Zinc (Zn)	1.0	1.0	1.0	1.0	1.0	0.8	0.3	0.2	1.0	1.1	1.0	0.2

- Denotes parameter with an AEMP benchmark.
- 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.16: Dissolved Metal Concentrations at Camp Lake Tributary Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Spring Sampling Event							Summer Sampling Event							Fall Sampling Event						
			L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	LI-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01
			01-Jul-21	01-Jul-21	30-Jun-21	30-Jun-21	30-Jun-21	29-Jun-21	29-Jun-21	01-Aug-21	26-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	03-Sep-21	05-Sep-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0139	0.0079	0.0247	0.0103	0.0096	0.0117	0.0046	0.0078	0.0043	0.0245	0.0121	0.0096	0.0155	0.0033	0.0074	0.0035	0.0123	0.0061	0.0087	0.0061	0.0021
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000057	<0.000020	<0.000020	<0.000020	<0.000020	<0.00010	<0.00010	0.000056	0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000103	0.000063	0.000064	0.000057	0.000061	<0.00010	<0.00010	0.000100	0.000076	0.000057	0.000062	0.000052
	Barium (Ba)	mg/L	0.00619	0.00647	0.0107	0.00666	0.00639	0.00643	0.00597	0.00869	0.0110	0.0115	0.00984	0.00983	0.0103	0.0148	0.0100	0.0118	0.0124	0.0120	0.0125	0.0123	0.0126
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Boron (B)	mg/L	<0.010	<0.010	0.017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.0205	0.0075	0.0076	0.0075	0.0069	<0.010	<0.010	0.0170	0.0086	0.0085	0.0077	<0.0050
	Cadmium (Cd)	mg/L	<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	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	8.69	9.35	19.0	9.96	9.92	10.0	9.01	12.1	16.2	22.9	16.6	17.3	17.7	26.4	15.2	18.2	26.6	21.4	20.9	21.5	22.6
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00013	<0.00010	0.00017	0.00012	0.00012	<0.00050	<0.00050	0.00033	0.00014	0.00012	0.00012	0.00064
	Cobalt (Co)	mg/L	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000111	0.0000373	0.0000384	0.0000408	0.0000506	<0.00010	<0.00010	0.000121	0.0000596	0.0000535	0.0000500	0.0000330
	Copper (Cu)	mg/L	0.00185	0.00159	0.00124	0.00140	0.00136	0.00132	0.00078	0.00239	0.00201	0.00141	0.00191	0.00189	0.00184	0.00140	0.00201	0.00198	0.00127	0.00186	0.00186	0.00185	0.00149
	Iron (Fe)	mg/L	<0.030	<0.030	0.076	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.0640	0.0319	0.0322	0.0317	0.0475	<0.030	<0.030	0.0855	0.0467	0.0444	0.0382	0.0157
	Lead (Pb)	mg/L	<0.000050	<0.000050	0.000086	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000089	0.000031	0.000034	0.000029	<0.000010	<0.000050	<0.000050	0.000048	0.000020	0.000021	0.000018	<0.000010
	Lithium (Li)	mg/L	<0.0010	<0.0010	0.0043	0.0013	0.0012	0.0012	<0.0010	<0.0010	<0.0010	0.00380	0.00163	0.00172	0.00179	0.00182	<0.0010	<0.0010	0.00429	0.00210	0.00209	0.00204	0.00146
	Magnesium (Mg)	mg/L	5.32	5.69	12.1	6.42	6.17	6.25	5.73	7.91	9.99	15.2	10.8	11.1	11.6	17.7	10.2	12.8	17.9	14.2	14.6	15.0	15.4
	Manganese (Mn)	mg/L	0.000436	0.000318	0.0230	0.00319	0.00195	0.00147	0.000431	0.000302	0.000326	0.0147	0.00334	0.00271	0.0032	0.0122	0.000393	0.000416	0.0240	0.00779	0.00646	0.00531	0.000569
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.000322	0.000321	0.00264	0.000661	0.000621	0.000525	0.000213	0.000891	0.000729	0.00399	0.00114	0.00112	0.001030	0.000438	0.00117	0.000939	0.00343	0.00157	0.00158	0.00134	0.000554
	Nickel (Ni)	mg/L	<0.00050	<0.00050	0.00107	0.00058	0.00058	0.00060	<0.00050	<0.00050	0.00065	0.00126	0.000814	0.000861	0.00094	0.00160	<0.00050	0.00054	0.00121	0.000874	0.000916	0.00107	0.000648
	Potassium (K)	mg/L	1.14	1.12	3.33	1.43	1.36	1.31	0.90	1.94	1.80	3.99	2.26	2.27	2.23	2.09	2.17	2.09	4.01	2.66	2.64	2.57	1.90
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.000130	<0.000040	0.000047	<0.000040	<0.000040	<0.0010	<0.0010	0.000158	0.000066	0.000054	0.000050	0.000052
	Silicon (Si)	mg/L	0.67	0.63	0.67	0.51	0.51	0.53	0.39	0.75	0.81	0.802	0.793	0.857	0.910	0.970	0.86	0.96	1.11	1.06	1.02	1.03	0.823
	Silver (Ag)	mg/L	<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	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	0.453	0.658	9.33	2.18	2.02	1.90	1.33	0.596	1.40	13.2	3.66	3.67	3.76	5.80	0.688	2.26	11.9	5.72	5.81	5.40	3.79
	Strontium (Sr)	mg/L	0.00507	0.00519	0.0241	0.00786	0.00789	0.00745	0.00592	0.00854	0.00950	0.0271	0.0140	0.0144	0.0164	0.0176	0.0112	0.0115	0.0362	0.0213	0.0210	0.0211	0.0163
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0000093	0.0000080	0.0000073	0.0000076	0.0000096	<0.00010	<0.00010	0.0000068	0.0000074	0.0000071	0.0000072	<0.0000050
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.00010	<0.00010	0.000041	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.00100	0.000305	0.000333	0.000636	0.000091	<0.010	<0.010	0.000294	0.000168	0.000318	0.000217	0.000071
	Uranium (U)	mg/L	0.000917	0.000697	0.0157	0.00282	0.00251	0.00213	0.000350	0.00321	0.00193	0.0278	0.00542	0.00514	0.00476	0.00226	0.00662	0.00403	0.0270	0.00965	0.00934	0.00793	0.00292
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.000139	0.000204	0.000192	0.000181	0.000136	<0.0010	<0.0010	0.000098	0.000177	0.000175	0.000157	0.000146
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.00061	0.00091	0.00073	0.00098	<0.00050	<0.0030	<0.0030	0.00066	<0.00050	<0.00050	0.00071	0.00064

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, 2021

Parameter	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station K0-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station K0-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station K0-01
Aluminum (Al)	0.7	0.9	0.7	0.3	0.2	0.9	0.5	0.1	0.3	0.8	0.4	0.1
Antimony (Sb)	1.0	1.0	1.0	1.0	1.0	0.6	0.2	0.2	1.0	0.6	0.2	0.2
Arsenic (As)	1.0	1.1	1.0	1.0	1.0	1.0	0.6	0.6	1.0	1.0	0.7	0.5
Barium (Ba)	2.5	1.9	2.5	2.3	1.8	2.1	1.8	2.7	1.4	1.6	1.6	1.6
Beryllium (Be)	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Bismuth (Bi)	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Boron (B)	1.0	1.7	1.0	1.0	1.0	2.1	0.8	0.7	1.0	1.7	0.8	0.5
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	0.5
Calcium (Ca)	2.2	2.1	2.4	2.2	1.6	2.5	1.9	2.9	1.2	2.0	1.6	1.7
Chromium (Cr)	1.0	1.0	1.0	1.0	1.0	0.3	0.3	0.2	1.0	0.7	0.3	1.3
Cobalt (Co)	1.0	1.0	1.0	1.0	1.0	1.1	0.4	0.5	1.0	1.2	0.5	0.3
Copper (Cu)	2.9	1.6	2.3	1.3	2.9	1.8	2.4	1.8	2.5	1.6	2.3	1.9
Iron (Fe)	1.0	2.4	1.0	1.0	1.0	2.0	1.0	1.5	1.0	2.9	1.4	0.5
Lead (Pb)	1.0	1.7	1.0	1.0	1.0	1.8	0.6	0.2	1.0	1.0	0.4	0.2
Lithium (Li)	1.0	4.3	1.2	1.0	1.0	3.8	1.7	1.8	1.0	4.3	2.1	1.5
Magnesium (Mg)	2.4	2.4	2.7	2.5	1.8	3.0	2.2	3.5	1.4	2.1	1.7	1.8
Manganese (Mn)	1.0	78	6.1	1.2	1.1	50	10	41	1.1	65	18	1.5
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)	2.6	9.5	4.8	1.7	2.9	14	3.9	1.6	2.6	8.3	3.6	1.3
Nickel (Ni)	1.0	2.1	1.2	1.0	1.2	2.5	1.7	3.2	1.0	2.3	1.8	1.2
Potassium (K)	3.3	5.1	4.0	2.6	2.9	6.2	3.5	3.2	2.5	4.6	3.0	2.2
Selenium (Se)	1.0	1.0	1.0	1.0	1.0	0.1	0.0	0.0	1.0	0.2	0.1	0.1
Silicon (Si)	1.4	0.8	1.1	0.8	1.0	1.0	1.1	1.2	1.0	1.2	1.2	0.9
Silver (Ag)	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	0.5
Sodium (Na)	0.8	5.7	3.1	2.0	0.6	8.0	2.2	3.5	0.6	4.6	2.2	1.5
Strontium (Sr)	1.3	2.5	1.9	1.5	0.9	2.8	1.5	1.8	0.8	2.4	1.4	1.1
Thallium (Tl)	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	1.0	0.1	0.1	0.1
Tin (Sn)	1.0	1.0	1.0	1.0	1.0	0.2	0.2	0.2	1.0	0.4	0.2	0.2
Titanium (Ti)	1.0	1.0	1.0	1.0	1.0	0.1	0.0	0.0	1.0	0.0	0.0	0.0
Uranium (U)	2.3	9.7	7.2	1.0	1.6	17	3.2	1.4	1.0	5.2	1.7	0.6
Vanadium (V)	1.0	1.0	1.0	1.0	1.0	0.1	0.2	0.1	1.0	0.1	0.2	0.1
Zinc (Zn)	1.0	1.0	1.0	1.0	1.0	0.2	0.3	0.2	1.0	0.2	0.2	0.2

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.

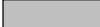
Table C.18: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations at the Camp Lake Tributaries between 2021 and Mine Baseline (2005 to 2013) Periods

Variable	Spring				Summer				Fall			
	CLT1			CLT2	CLT1			CLT2	CLT1			CLT2
	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station K0-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station K0-01	North Branch	Upper Main Stem L2-03	Lower Main Stem	Station K0-01
Aluminum (Al)	1.5	7.8	1.4	0.8	1.2	3.5	3.0	0.7	1.4	4.6	2.6	0.6
Antimony (Sb)	0.5	1.0	1.0	0.6	0.7	0.6	0.2	0.1	0.7	0.6	0.2	0.1
Arsenic (As)	1.0	1.1	1.0	1.0	1.0	1.0	0.6	0.6	1.0	1.0	0.7	0.5
Barium (Ba)	2.0	2.4	1.7	1.1	1.5	1.3	1.1	1.8	1.1	0.7	0.9	1.2
Beryllium (Be)	0.3	5.0	5.0	0.4	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Bismuth (Bi)	1.1	1.0	1.0	1.1	1.1	0.0	0.0	0.0	1.1	0.0	0.0	0.0
Boron (B)	0.5	1.7	1.0	0.6	0.6	2.1	0.8	0.7	1.0	1.7	0.8	0.5
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	0.5	0.5
Calcium (Ca)	2.1	1.6	1.5	1.2	1.4	1.1	1.2	1.9	1.0	0.6	0.8	1.1
Chromium (Cr)	-	-	-	-	-	-	-	0.1	-	-	-	-
Cobalt (Co)	0.6	1.0	1.0	0.6	0.8	1.0	0.4	0.3	0.8	1.2	0.5	0.2
Copper (Cu)	1.8	2.0	1.4	1.0	1.3	1.6	1.2	1.4	1.2	1.8	1.1	0.6
Iron (Fe)	1.2	2.2	1.2	1.1	1.6	0.3	1.1	2.2	1.8	0.8	1.0	0.7
Lead (Pb)	0.5	1.7	1.0	0.6	0.7	1.8	0.6	0.1	0.7	1.0	0.4	0.1
Lithium (Li)	0.7	4.2	2.3	0.5	0.4	1.1	0.7	0.7	0.4	0.7	0.6	0.5
Magnesium (Mg)	2.0	1.8	1.6	1.3	1.4	1.3	1.4	2.2	1.1	0.9	1.0	1.2
Manganese (Mn)	0.4	8.1	0.8	0.1	1.0	1.2	1.4	18	1.0	1.7	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)	1.8	18	4.1	1.4	2.0	19	2.6	1.5	1.6	13	2.4	1.3
Nickel (Ni)	0.8	1.4	0.8	0.2	1.0	1.2	1.5	0.8	0.9	1.0	1.1	0.4
Potassium (K)	1.8	4.2	2.0	1.5	1.5	4.1	1.7	2.1	1.3	2.7	1.4	1.4
Selenium (Se)	-	-	-	-	-	-	-	-	-	-	-	0.0
Silicon (Si)	1.7	1.1	1.2	0.9	1.4	0.9	1.3	1.6	1.2	0.9	1.0	1.3
Silver (Ag)	0.3	-	-	0.2	0.5	-	-	0.1	0.6	-	-	0.1
Sodium (Na)	1.6	9.2	3.4	3.5	1.6	7.4	3.3	5.2	1.4	3.5	2.5	2.1
Strontium (Sr)	2.3	1.9	1.3	1.7	1.7	0.8	1.2	2.3	1.4	0.3	0.4	1.4
Thallium (Tl)	1.3	10.0	10.0	1.3	1.4	0.2	0.2	0.1	1.6	0.2	0.2	0.0
Tin (Sn)	0.3	1.0	1.0	0.0	0.4	0.2	0.2	0.0	0.4	0.4	0.2	0.0
Titanium (Ti)	1.3	1.0	1.0	1.2	1.1	0.1	0.0	0.0	1.1	0.0	0.0	0.0
Uranium (U)	5.0	71	14	2.3	4.3	49	6.8	3.3	2.1	16	3.4	1.6
Vanadium (V)	1.0	1.0	1.0	1.0	0.8	0.1	0.2	0.1	0.9	0.1	0.2	0.1
Zinc (Zn)	2.1	2.1	1.5	1.9	2.2	0.3	0.3	0.2	2.2	0.3	0.4	0.5

	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 2021

Metric	Overall 3-group Comparison				Pair-wise, <i>post hoc</i> comparisons ^a			
	Statistical Test ^a	Transformation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Water Temperature (°C)	ANOVA	none	YES	0.001	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
Dissolved Oxygen (mg/L)	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
Dissolved Oxygen (% saturation)	ANOVA	none	YES	0.007	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	0.042
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	YES	0.007
					CLT2 Upstream	CLT2 Downstream	NO	0.586
pH (units)	K-W	rank	YES	0.002	REF-CRK Unnamed Reference Creek	CLT2 Upstream	YES	<0.001
					REF-CRK Unnamed Reference Creek	CLT2 Downstream	NO	0.067
					CLT2 Upstream	CLT2 Downstream	NO	0.084
Specific Conductance (µS/cm)	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

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

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

Table C.20: *In Situ* Water Quality Profile Data Collected at Camp Lake Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2021

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09
Date Collected	16-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	16-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	16-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	16-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	16-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.0	0.4	0.3	0.4	0.4	0.4	14.40	13.02	14.17	14.14	14.29	101.9	91.5	100.3	100.0	100.9	7.79	8.13	7.89	7.92	7.84	183.5	182.4	181.0	180.0	181.9
4.0	0.5	0.6	0.4	0.4	0.4	14.56	13.22	14.19	14.14	14.28	103.0	94.0	100.4	100.0	100.9	7.70	8.05	7.87	7.87	7.83	182.9	180.7	180.5	179.5	181.8
5.0	0.5	0.5	0.4	0.4	0.4	14.70	13.37	14.18	14.13	14.23	104.0	94.4	100.4	100.0	100.6	7.67	7.98	7.85	7.86	7.83	180.8	180.2	180.0	179.3	179.8
6.0	0.5	0.6	0.4	0.4	0.5	14.74	13.51	14.16	14.11	14.17	103.0	96.0	100.4	99.9	100.3	7.63	7.90	7.83	7.85	7.82	180.6	180.4	179.0	178.5	179.0
7.0	0.5	0.5	0.5	0.5	0.5	14.81	13.79	14.08	14.04	14.08	104.7	97.9	100.0	99.6	99.9	7.59	7.89	7.83	7.83	7.81	180.8	180.9	178.6	177.1	177.7
8.0	0.5	0.5	0.5	0.5	0.6	14.82	13.86	14.04	13.96	13.93	105.1	98.5	99.8	99.1	98.9	7.60	7.87	7.81	7.82	7.80	180.1	180.7	178.4	177.0	176.9
9.0	0.6	0.5	0.5	0.5	0.6	14.86	13.84	14.01	13.93	13.85	105.6	98.8	99.6	98.9	98.4	7.83	7.86	7.81	7.81	7.80	179.6	180.1	177.6	176.9	176.1
10.0	0.6	0.6	0.6	0.6	0.6	14.85	13.83	13.89	13.86	13.73	105.5	98.5	99.0	98.7	97.7	7.81	7.83	7.79	7.80	7.79	180.6	179.4	176.4	175.1	175.0
11.0	-	-	0.7	0.6	0.7	-	-	13.72	13.72	13.57	-	-	98.1	98.1	96.8	-	-	7.77	7.79	7.77	-	-	174.9	172.6	174.0
12.0	-	-	0.7	0.8	0.8	-	-	13.60	13.56	13.35	-	-	97.3	97.0	95.6	-	-	7.75	7.78	7.75	-	-	174.3	171.9	173.0
13.0	-	-	0.8	0.8	0.8	-	-	13.43	13.44	13.22	-	-	96.3	96.3	94.7	-	-	7.73	7.76	7.74	-	-	173.1	171.0	172.1
14.0	-	-	0.9	0.9	0.9	-	-	13.22	13.32	13.10	-	-	95.3	95.5	93.9	-	-	7.71	7.75	7.74	-	-	172.3	170.3	171.3
15.0	-	-	0.9	1.0	1.0	-	-	13.10	13.09	12.97	-	-	94.2	94.5	93.2	-	-	7.70	7.73	7.73	-	-	171.6	169.2	170.5
16.0	-	-	-	1.1	-	-	-	-	12.39	-	-	-	-	89.6	-	-	-	-	7.69	-	-	-	-	168.9	-
17.0	-	-	-	1.1	-	-	-	-	12.08	-	-	-	-	87.2	-	-	-	-	7.65	-	-	-	-	169.0	-
18.0	-	-	-	1.1	-	-	-	-	11.66	-	-	-	-	84.2	-	-	-	-	7.60	-	-	-	-	168.9	-
19.0	-	-	-	1.1	-	-	-	-	11.59	-	-	-	-	83.7	-	-	-	-	7.57	-	-	-	-	168.6	-
20.0	-	-	-	1.2	-	-	-	-	11.34	-	-	-	-	82.0	-	-	-	-	7.54	-	-	-	-	169.6	-
21.0	-	-	-	1.2	-	-	-	-	11.29	-	-	-	-	81.6	-	-	-	-	7.53	-	-	-	-	169.9	-
22.0	-	-	-	1.2	-	-	-	-	11.19	-	-	-	-	81.0	-	-	-	-	7.51	-	-	-	-	170.0	-
23.0	-	-	-	1.2	-	-	-	-	11.02	-	-	-	-	79.9	-	-	-	-	7.50	-	-	-	-	170.0	-
24.0	-	-	-	1.3	-	-	-	-	10.85	-	-	-	-	78.8	-	-	-	-	7.48	-	-	-	-	170.1	-
25.0	-	-	-	1.4	-	-	-	-	10.00	-	-	-	-	72.8	-	-	-	-	7.43	-	-	-	-	170.1	-
26.0	-	-	-	1.6	-	-	-	-	9.47	-	-	-	-	69.3	-	-	-	-	7.39	-	-	-	-	170.3	-
27.0	-	-	-	1.7	-	-	-	-	8.18	-	-	-	-	60.0	-	-	-	-	7.31	-	-	-	-	171.7	-
28.0	-	-	-	1.7	-	-	-	-	8.08	-	-	-	-	59.3	-	-	-	-	7.30	-	-	-	-	173.2	-
29.0	-	-	-	1.9	-	-	-	-	7.08	-	-	-	-	52.4	-	-	-	-	7.24	-	-	-	-	175.3	-
30.0	-	-	-	1.9	-	-	-	-	6.37	-	-	-	-	47.2	-	-	-	-	7.20	-	-	-	-	177.3	-
31.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = data not available / data not applicable. Total depth at stations JL0-02, JL0-10, JL0-01, JL0-07, and JL0-09 was 11.6, -, 16.1, 39.6, and 16.9 m, respectively, at the time of winter sampling. Ice thickness at stations JL0-02, JL0-10, JL0-01, JL0-07, and JL0-09 was 1.86, 1.87, 1.7, 1.54 and 1.8 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 2021

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09
Date Collected	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21
1.0	6.6	6.6	6.7	6.7	6.8	11.83	11.83	11.86	11.85	11.84	96.6	96.5	97.0	96.9	96.9	7.49	7.76	7.80	7.89	7.99	144.6	144.5	144.3	144.3	144.3
2.0	6.6	6.6	6.7	6.7	6.8	11.84	11.86	11.87	11.86	11.87	96.6	96.8	97.0	97.0	97.2	7.50	7.74	7.78	7.88	7.97	144.6	144.5	144.3	144.3	144.3
3.0	6.6	6.6	6.7	6.7	6.7	11.84	11.86	11.87	11.86	11.88	96.6	96.8	97.0	97.0	97.2	7.51	7.71	7.73	7.87	7.96	144.6	144.5	144.3	144.3	144.3
4.0	6.6	6.6	6.7	6.7	6.7	11.84	11.85	11.87	11.86	11.88	96.6	96.8	97.0	96.9	97.2	7.51	7.68	7.68	7.83	7.96	144.6	144.5	144.3	144.3	144.3
5.0	6.6	6.6	6.7	6.7	6.7	11.83	11.85	11.86	11.86	11.87	96.6	96.8	97.0	96.9	97.2	7.52	7.64	7.61	7.81	7.95	144.6	144.5	144.3	144.3	144.3
6.0	6.6	6.6	6.7	6.7	6.7	11.81	11.85	11.86	11.85	11.88	96.4	96.8	96.9	96.8	97.2	7.51	7.61	7.58	7.78	7.92	144.6	144.5	144.3	144.3	144.3
7.0	6.6	6.6	6.7	6.7	6.7	11.82	11.85	11.85	11.85	11.88	96.5	96.7	96.9	96.8	97.2	7.50	7.59	7.56	7.63	7.91	144.6	144.5	144.3	144.3	144.3
8.0	6.6	6.6	6.7	6.7	6.7	11.82	11.85	11.85	11.84	11.87	96.5	96.7	96.9	96.8	97.2	7.49	7.56	7.55	7.60	7.89	144.6	144.5	144.3	144.3	144.3
9.0	6.6	-	6.7	6.7	6.7	11.82	-	11.84	11.84	11.87	96.5	-	96.8	96.7	97.1	7.49	-	7.54	7.58	7.86	144.6	-	144.3	144.3	144.3
10.0	6.6	-	6.7	6.7	6.7	11.82	-	11.84	11.83	11.86	96.5	-	96.7	96.7	97.1	7.48	-	7.53	7.56	7.83	144.6	-	144.3	144.3	144.3
11.0	-	-	6.6	6.7	6.7	-	-	11.84	11.83	11.85	-	-	96.7	96.7	97.0	-	-	7.53	7.55	7.81	-	-	144.3	144.3	144.3
12.0	-	-	6.6	6.7	6.7	-	-	11.83	11.83	11.85	-	-	96.7	96.7	96.9	-	-	7.52	7.53	7.77	-	-	144.4	144.3	144.3
13.0	-	-	6.6	6.7	6.7	-	-	11.82	11.82	11.84	-	-	96.6	96.6	96.7	-	-	7.52	7.53	7.74	-	-	144.4	144.3	144.3
14.0	-	-	6.6	6.7	6.7	-	-	11.82	11.82	11.82	-	-	96.5	96.6	96.6	-	-	7.52	7.52	7.71	-	-	144.3	144.3	144.4
15.0	-	-	6.6	6.7	6.6	-	-	11.81	11.82	11.81	-	-	96.5	96.5	96.5	-	-	7.51	7.52	7.68	-	-	144.3	144.3	144.4
16.0	-	-	-	6.7	-	-	-	-	11.81	-	-	-	-	96.4	-	-	-	-	7.52	-	-	-	-	144.3	-
17.0	-	-	-	6.6	-	-	-	-	11.80	-	-	-	-	96.4	-	-	-	-	7.52	-	-	-	-	144.3	-
18.0	-	-	-	6.6	-	-	-	-	11.80	-	-	-	-	96.3	-	-	-	-	7.52	-	-	-	-	144.4	-
19.0	-	-	-	6.6	-	-	-	-	11.79	-	-	-	-	96.3	-	-	-	-	7.52	-	-	-	-	144.3	-
20.0	-	-	-	6.6	-	-	-	-	11.79	-	-	-	-	96.3	-	-	-	-	7.53	-	-	-	-	144.3	-
21.0	-	-	-	6.6	-	-	-	-	11.80	-	-	-	-	96.4	-	-	-	-	7.53	-	-	-	-	144.4	-
22.0	-	-	-	6.7	-	-	-	-	11.79	-	-	-	-	96.3	-	-	-	-	7.53	-	-	-	-	144.4	-
23.0	-	-	-	6.6	-	-	-	-	11.79	-	-	-	-	96.3	-	-	-	-	7.53	-	-	-	-	144.4	-
24.0	-	-	-	6.7	-	-	-	-	11.78	-	-	-	-	96.3	-	-	-	-	7.52	-	-	-	-	144.4	-
25.0	-	-	-	6.6	-	-	-	-	11.78	-	-	-	-	96.2	-	-	-	-	7.52	-	-	-	-	144.4	-
26.0	-	-	-	6.6	-	-	-	-	11.77	-	-	-	-	96.2	-	-	-	-	7.52	-	-	-	-	144.4	-
27.0	-	-	-	6.6	-	-	-	-	11.77	-	-	-	-	96.2	-	-	-	-	7.52	-	-	-	-	144.4	-
28.0	-	-	-	6.6	-	-	-	-	11.77	-	-	-	-	96.1	-	-	-	-	7.52	-	-	-	-	144.4	-
29.0	-	-	-	6.6	-	-	-	-	11.76	-	-	-	-	96.1	-	-	-	-	7.52	-	-	-	-	144.5	-
30.0	-	-	-	6.6	-	-	-	-	11.76	-	-	-	-	96.0	-	-	-	-	7.52	-	-	-	-	144.5	-
31.0	-	-	-	6.6	-	-	-	-	11.75	-	-	-	-	96.0	-	-	-	-	7.52	-	-	-	-	144.5	-
32.0	-	-	-	6.6	-	-	-	-	11.75	-	-	-	-	95.9	-	-	-	-	7.52	-	-	-	-	144.5	-

Notes: "-" = no data / not applicable. Total depth at stations JL0-02, JL0-10, JL0-01, JL0-07, and JL0-09 was 10.6, 10.3, 15.8, 32.8, and 16.8 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 2021

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	JL0-02	JL0-10	JL0-01	JL0-07	JL0-09
Date Collected	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21
1.0	7.2	7.1	7.1	7.1	7.2	11.54	11.67	11.72	11.7	11.68	95.4	96.5	97.0	96.6	96.8	7.62	7.74	7.82	7.93	7.81	149.70	149.00	148.6	148.6	148.6
2.0	7.1	7.1	7.2	7.2	7.2	11.57	11.66	11.68	11.66	11.66	95.6	96.4	96.7	96.6	96.7	7.63	7.73	7.79	7.92	7.82	149.8	149.0	148.8	148.6	148.6
3.0	7.1	7.1	7.2	7.2	7.2	11.58	11.64	11.66	11.65	11.65	95.7	96.3	96.5	96.5	96.5	7.63	7.73	7.79	7.91	7.82	149.8	149.0	148.8	148.6	148.6
4.0	7.1	7.1	7.2	7.2	7.2	11.58	11.63	11.64	11.65	11.64	95.7	96.2	96.3	96.4	96.5	7.64	7.73	7.79	7.91	7.83	149.8	149.0	148.5	148.6	148.6
5.0	7.1	7.1	7.2	7.2	7.2	11.59	11.63	11.63	11.64	11.63	95.7	96.2	96.2	96.4	96.4	7.64	7.73	7.79	7.91	7.84	149.8	149.0	148.8	148.6	148.6
6.0	7.1	7.1	7.2	7.2	7.2	11.58	11.62	11.63	11.63	11.62	95.7	96.1	96.2	96.3	96.3	7.64	7.73	7.80	7.90	7.86	149.6	149.0	148.8	148.6	148.6
7.0	7.1	7.1	7.2	7.2	7.2	11.58	11.61	11.62	11.63	11.61	95.7	96.0	96.1	96.3	96.2	7.64	7.74	7.80	7.91	7.87	149.7	149.0	148.7	148.6	148.6
8.0	7.1	7.1	7.2	7.2	7.2	11.58	11.61	11.61	11.63	11.60	95.6	96.0	96.1	96.3	96.1	7.64	7.74	7.80	7.91	7.88	149.8	149.0	148.7	148.6	148.6
9.0	7.1	7.1	7.2	7.2	7.2	11.57	11.61	11.61	11.62	11.59	95.6	96.0	96.0	96.2	96.0	7.63	7.74	7.81	7.91	7.91	149.8	149.0	148.7	148.6	148.6
10.0	7.1	7.1	7.2	7.2	7.2	11.57	11.60	11.60	11.62	11.59	95.4	95.9	96.0	96.2	96.0	7.63	7.74	7.81	7.91	7.91	149.9	149.0	148.7	148.6	148.7
11.0	7.0	-	7.2	7.2	7.2	11.56	-	11.59	11.61	11.58	95.4	-	95.9	96.1	95.9	7.63	-	7.81	7.91	7.94	150.0	-	148.7	148.6	148.7
12.0	-	-	7.2	7.2	7.2	-	-	11.59	11.60	11.57	-	-	95.9	96.1	95.9	-	-	7.82	7.91	7.96	-	-	148.7	148.6	148.7
13.0	-	-	7.2	7.2	7.2	-	-	11.58	11.60	11.57	-	-	95.8	96.1	95.8	-	-	7.82	7.91	7.96	-	-	148.7	148.6	148.7
14.0	-	-	7.2	7.2	7.2	-	-	11.58	11.59	11.56	-	-	95.8	96.0	95.8	-	-	7.83	7.90	7.97	-	-	148.7	148.6	148.7
15.0	-	-	7.2	7.2	-	-	-	11.57	11.58	-	-	-	95.7	95.9	-	-	-	7.83	7.90	-	-	-	148.7	148.6	-
16.0	-	-	-	7.2	-	-	-	-	11.58	-	-	-	-	95.8	-	-	-	-	7.90	-	-	-	-	148.6	-
17.0	-	-	-	7.2	-	-	-	-	11.57	-	-	-	-	95.8	-	-	-	-	7.91	-	-	-	-	148.6	-
18.0	-	-	-	7.2	-	-	-	-	11.56	-	-	-	-	95.7	-	-	-	-	7.91	-	-	-	-	148.6	-
19.0	-	-	-	7.2	-	-	-	-	11.56	-	-	-	-	95.7	-	-	-	-	7.91	-	-	-	-	148.6	-
20.0	-	-	-	7.2	-	-	-	-	11.55	-	-	-	-	95.7	-	-	-	-	7.91	-	-	-	-	148.6	-
21.0	-	-	-	7.2	-	-	-	-	11.54	-	-	-	-	95.6	-	-	-	-	7.91	-	-	-	-	148.6	-
22.0	-	-	-	7.2	-	-	-	-	11.54	-	-	-	-	95.6	-	-	-	-	7.91	-	-	-	-	148.6	-
23.0	-	-	-	7.2	-	-	-	-	11.54	-	-	-	-	95.5	-	-	-	-	7.91	-	-	-	-	148.6	-
24.0	-	-	-	7.2	-	-	-	-	11.53	-	-	-	-	95.5	-	-	-	-	7.91	-	-	-	-	148.6	-
25.0	-	-	-	7.2	-	-	-	-	11.53	-	-	-	-	95.4	-	-	-	-	7.91	-	-	-	-	148.6	-
26.0	-	-	-	7.2	-	-	-	-	11.52	-	-	-	-	95.4	-	-	-	-	7.91	-	-	-	-	148.6	-
27.0	-	-	-	7.2	-	-	-	-	11.52	-	-	-	-	95.4	-	-	-	-	7.91	-	-	-	-	148.6	-
28.0	-	-	-	7.2	-	-	-	-	11.52	-	-	-	-	95.4	-	-	-	-	7.91	-	-	-	-	148.6	-
29.0	-	-	-	7.2	-	-	-	-	11.51	-	-	-	-	95.3	-	-	-	-	7.92	-	-	-	-	148.7	-
30.0	-	-	-	7.2	-	-	-	-	11.51	-	-	-	-	95.3	-	-	-	-	7.91	-	-	-	-	148.7	-

Notes: "-" = no data / not applicable. Total depth at Stations JL0-02, JL0-10, JL0-01, JL0-07, and JL0-09 was 11.4, 10.2, 15.5, 32.6, and 17.0 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 2021

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	JL0-02	08-Aug-21	11.6	4.15	green/blue, clear	surface	7.9	11.49	96.2	7.95	145.9
						bottom	7.9	11.40	96.0	7.93	145.9
	JL0-21	10-Aug-21	9.9	4.48	green/blue, clear	surface	7.7	11.85	99.3	8.02	146.4
						bottom	7.4	11.83	98.4	7.97	148.0
	JL0-20	10-Aug-21	7.3	4.18	green/blue, clear	surface	7.7	11.80	98.9	7.93	146.6
						bottom	7.4	11.84	98.5	7.92	146.5
	JL0-19	10-Aug-21	7.4	4.65	green/clear	surface	7.7	11.79	99.0	7.96	146.3
						bottom	7.4	11.84	98.6	7.95	146.9
	JL0-18	10-Aug-21	12.6	5.00	green/clear	surface	7.6	11.75	97.8	7.67	146.0
						bottom	7.4	11.78	98.0	7.68	146.5
Profundal (Deep) Stations	JL0-01	08-Aug-21	17.5	3.98	green/blue, clear	surface	7.7	11.44	95.6	8.01	145.6
						bottom	7.6	11.39	95.2	7.98	145.6
	JL0-07	08-Aug-21	32.7	4.25	Blue/clear	surface	7.5	11.38	95.0	7.66	145.5
						bottom	7.4	11.28	93.8	7.66	145.7
	JL0-16	10-Aug-21	15.4	4.60	green/clear	surface	7.7	11.63	97.1	7.72	147.9
						bottom	7.3	11.72	97.5	7.53	146.1
	JL0-11	08-Aug-21	29.1	4.23	Blue/clear	surface	7.5	11.44	95.5	7.96	145.6
						bottom	7.4	11.32	94.3	7.89	145.6
	JL0-12	08-Aug-21	15.8	4.33	Blue/clear	surface	7.4	11.39	94.7	7.95	145.5
						bottom	7.4	11.39	94.8	7.92	145.5

Table C.24: Statistical Comparison of Bottom *In Situ* Water Quality Between Camp Lake Littoral and Profundal Stations, Mary River Project CREMP, August 2021

Parameter	Statistical Test Results				Summary Statistics					
	Statistical Test ^a	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	0.284	Littoral	4.49	0.354	0.158	4.15	5.00
					Profundal	4.28	0.224	0.100	3.98	4.60
Temperature (°C)	M-W	rank	NO	0.607	Littoral	7.50	0.224	0.100	7.40	7.90
					Profundal	7.42	0.110	0.0490	7.30	7.60
Dissolved Oxygen (mg/L)	tequal	none	YES	0.025	Littoral	11.7	0.191	0.0852	11.4	11.8
					Profundal	11.4	0.174	0.0779	11.3	11.7
Dissolved Oxygen (% saturation)	tequal	none	YES	0.009	Littoral	97.9	1.09	0.486	96.0	98.6
					Profundal	95.1	1.43	0.640	93.8	97.5
pH (units)	tequal	none	NO	0.379	Littoral	7.89	0.119	0.0532	7.68	7.97
					Profundal	7.80	0.192	0.0858	7.53	7.98
Specific Conductance (µS/cm)	tequal	none	YES	0.020	Littoral	147	0.780	0.349	146	148
					Profundal	146	0.235	0.105	146	146

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

^a 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 2021

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	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	0.729	Reference	5	10.3	2.18	0.974	7.70	12.6
						Camp	5	9.76	2.40	1.07	7.30	12.6
	Secchi Depth (m)	tequal	none	YES	0.003	Reference	5	5.50	0.420	0.188	4.85	5.90
						Camp	5	4.49	0.354	0.158	4.15	5.00
	Temperature (°C)	M-W	rank	NO	0.175	Reference	5	7.30	0.141	0.0632	7.20	7.50
						Camp	5	7.50	0.224	0.100	7.40	7.90
	Dissolved Oxygen (mg/L)	M-W	rank	NO	0.142	Reference	5	11.7	0.0526	0.0235	11.6	11.8
						Camp	5	11.7	0.191	0.0852	11.4	11.8
	Dissolved Oxygen (% saturation)	tequal	none	NO	0.220	Reference	5	97.1	0.791	0.354	96.3	98.0
						Camp	5	97.9	1.09	0.486	96.0	98.6
	pH (units)	M-W	rank	YES	0.008	Reference	5	7.54	0.181	0.0811	7.22	7.67
						Camp	5	7.89	0.119	0.0532	7.68	7.97
	Specific Conductance (µS/cm)	tequal	none	YES	0.001	Reference	5	75.0	0.466	0.208	74.7	75.8
						Camp	5	147	0.780	0.349	146	148
Profundal (Deep) Stations	Station Depth (m)	tequal	none	NO	0.671	Reference	5	20.5	1.51	0.673	18.2	22.4
						Camp	5	22.1	8.17	3.65	15.4	32.7
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	5.58	0.250	0.112	5.19	5.80
						Camp	5	4.28	0.224	0.100	3.98	4.60
	Temperature (°C)	M-W	rank	YES	0.009	Reference	5	7.12	0.0447	0.0200	7.10	7.20
						Camp	5	7.42	0.110	0.0490	7.30	7.60
	Dissolved Oxygen (mg/L)	M-W	rank	NO	0.093	Reference	5	11.7	0.0942	0.0421	11.6	11.8
						Camp	5	11.4	0.174	0.0779	11.3	11.7
	Dissolved Oxygen (% saturation)	tequal	none	NO	0.165	Reference	5	96.1	0.303	0.136	95.7	96.5
						Camp	5	95.1	1.43	0.640	93.8	97.5
	pH (units)	tequal	none	YES	0.003	Reference	5	7.37	0.111	0.0495	7.29	7.56
						Camp	5	7.80	0.192	0.0858	7.53	7.98
	Specific Conductance (µS/cm)	tequal	log10	YES	0.001	Reference	5	74.8	0.0548	0.0245	74.7	74.8
						Camp	5	146	0.235	0.105	146	146

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

^a 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 (JL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Winter Sampling Event								Spring Sampling Event	Summer Sampling Event							
					JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface
					15-Apr-21	15-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	02-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21
Conventional	Conductivity (lab)	µmho/cm	-	-	184	189	186	189	179	185	189	186	180	192	154	157	155	157	157	155	155
	pH (lab)	pH	6.5 - 9.0	-	7.87	7.83	7.92	7.93	7.83	7.90	7.91	7.90	7.79	7.31	8.06	8.06	8.02	8.04	8.06	8.04	8.01
	Hardness (as CaCO ₃)	mg/L	-	-	85.4	85.7	84.9	85.4	79	87.6	79.7	85.6	83.9	86.3	72.3	71.8	71.5	72.4	71.9	71.8	72.4
	Total Suspended Solids (TSS)	mg/L	-	-	3.8	6.2	5.3	<2.0	<2.0	2.7	<2.0	<2.0	3.3	3.3	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	96	102	99	101	92	98	99	95	96	97	79	91	73	87	82	85	88
	Turbidity	NTU	-	-	<0.10	0.12	0.25	0.13	<0.10	<0.10	0.11	<0.10	<0.10	<0.10	<0.10	1.71	1.24	1.20	1.03	1.20	1.00
Nutrients and Organics	Alkalinity (as CaCO ₃)	mg/L	-	-	80.0	82.0	92.0	93.0	92.0	86.0	85.0	91.0	92.0	90.0	66.2	57.0	57.3	58.1	57.9	59.2	57.6
	Total Ammonia	mg/L	-	0.855	0.030	0.018	0.017	0.016	<0.010	0.015	<0.010	0.020	<0.010	0.017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.038	0.040	0.039	0.043	0.055	0.041	0.146	0.041	0.056	0.043	0.098	0.036	0.035	0.031	0.036	0.047	0.032
	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	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	<0.050	0.050	0.140	0.120	0.110	0.110	0.100	0.120	0.110	0.110	0.160	0.120	0.120	0.180	0.110	0.360	0.120
	Dissolved Organic Carbon	mg/L	-	-	2.53	2.47	2.89	2.55	2.37	2.63	2.27	2.43	2.56	2.61	2.17	2.71	2.54	2.61	2.53	2.47	2.51
	Total Organic Carbon	mg/L	-	-	2.69	2.82	3.25	2.70	2.46	2.66	2.44	2.35	2.51	2.87	2.21	2.29	2.07	2.38	2.10	2.15	2.24
	Total Phosphorus	mg/L	0.020 ^a	-	<0.0030	<0.0030	0.0107	0.0076	0.0081	<0.0030	0.0054	0.0042	0.0031	<0.0030	0.0049	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0032
Anions	Phenols	mg/L	0.004 ^a	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	5.67	5.86	5.69	5.81	5.41	5.72	9.05	5.68	5.46	5.88	4.65	4.66	4.64	4.58	4.64	4.61	4.58
Total Metals	Sulphate (SO ₄)	mg/L	218 ^b	218	5.65	5.85	5.66	5.76	5.38	5.69	5.37	5.66	5.40	5.81	4.67	4.75	4.72	4.68	4.75	4.70	4.69
	Aluminum (Al)	mg/L	0.100	0.1	<0.0030	<0.0030	0.0876	<0.0030	0.0031	<0.0030	<0.0030	<0.0030	0.0050	0.0039	0.123	0.0215	0.0216	0.0171	0.0168	0.0146	0.0151
	Antimony (Sb)	mg/L	0.020 ^a	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<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	0.00018	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00900	0.00953	0.0110	0.00943	0.00871	0.00916	0.00903	0.00921	0.00900	0.00955	0.00853	0.00793	0.00804	0.00784	0.00783	0.00783	0.00790
	Beryllium (Be)	mg/L	0.011 ^a	-	<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
	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	<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	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	16.2	16.7	15.9	16.4	15.4	16.0	14.5	15.9	15.6	16.1	15.7	14.3	14.3	14.2	14.2	14.3	14.3
	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	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 ^a	0.004	<0.00010	<0.00010	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.004	0.00107	0.00113	0.00157	0.00105	0.00111	0.00105	0.00079	0.00100	0.00101	0.00104	0.00110	0.00096	0.00091	0.00097	0.00088	0.00092	0.00090
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	0.397	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.362	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	0.000225	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000150	<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	0.0015	0.0014	0.0014	0.0014	0.0013	0.0014	0.0014
	Magnesium (Mg)	mg/L	-	-	10.8	11.3	10.6	10.8	10.2	10.6	10.5	10.6	10.5	11.1	9.04	8.92	9.03	8.94	8.82	8.82	8.84
	Manganese (Mn)	mg/L	0.935 ^b	-	0.000259	0.000230	0.0687	0.000245	0.000479	0.000703	0.00363	0.000757	0.000402	0.000871	0.00774	0.00210	0.00214	0.00201	0.00199	0.00180	0.00179
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	&								

Table C.26: Water Chemistry at Camp Lake (JL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Summer Sampling Event					Fall Sampling Event									
					JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09
					bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	01-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21
Conventional	Conductivity (lab)	umho/cm	-	-	160	156	153	156	151	156	156	154	154	154	155	153	154	156	154
	pH (lab)	pH	6.5 - 9.0	-	8.06	8.07	8.08	8.07	7.92	8.03	8.02	8.06	8.06	8.06	8.05	8.06	8.06	8.06	8.04
	Hardness (as CaCO ₃)	mg/L	-	-	73.5	71.9	72.2	72.2	71.3	70.4	70.0	71.1	69.5	71	70.9	68.8	70	68.8	70
	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	-	-	69	100	76	74	55	47	62	50	59	60	41	54	62	54	54
	Turbidity	NTU	-	-	1.03	0.77	0.97	0.81	0.84	0.68	0.72	0.73	0.75	0.66	0.62	0.63	0.67	0.65	0.62
	Alkalinity (as CaCO ₃)	mg/L	-	-	56.50	57.80	56.60	59.90	69.90	68.2	68.3	67.6	67.8	67.1	67.4	67.1	66.9	67.6	67.5
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.034	0.034	0.031	0.051	0.025	0.0329	0.0322	0.0310	0.0309	0.0309	0.0306	0.0306	0.0311	0.0304	0.0302
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.120	0.110	0.120	0.120	0.140	0.097	0.129	0.104	0.093	0.123	0.101	0.110	0.089	0.121	0.110
	Dissolved Organic Carbon	mg/L	-	-	2.38	2.98	2.12	2.33	2.39	1.94	2.02	2.05	1.99	2.02	1.93	1.98	1.93	2.00	1.95
	Total Organic Carbon	mg/L	-	-	2.22	2.28	2.06	2.20	2.19	2.08	2.18	2.05	1.87	1.77	2.17	1.80	1.90	1.79	1.90
	Total Phosphorus	mg/L	0.020 ^α	-	<0.0030	<0.0030	<0.0030	<0.0030	0.0034	0.0033	0.0039	0.0041	0.0039	0.0045	0.0038	0.0037	0.0034	0.0036	0.0037
	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<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	4.61	4.60	4.58	4.62	4.47	4.62	4.61	4.57	4.58	4.56	4.56	4.55	4.56	4.58	4.55
	Sulphate (SO ₄)	mg/L	218 ^β	218	4.70	4.72	4.69	4.71	4.64	4.77	4.76	4.70	4.72	4.69	4.7	4.69	4.7	4.71	4.69
Total Metals	Aluminum (Al)	mg/L	0.100	0.1	0.0163	0.0156	0.0150	0.0177	0.0131	0.0220	0.0189	0.0175	0.0174	0.0192	0.0176	0.0188	0.0222	0.0189	0.0199
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000091	0.000057	0.000064	0.000073	0.000065	0.000053	0.000071	0.000052	0.000062	0.000060
	Barium (Ba)	mg/L	-	-	0.00826	0.00774	0.00793	0.00801	0.00753	0.00760	0.00739	0.00743	0.00745	0.00730	0.00733	0.00743	0.00769	0.00729	0.00738
	Beryllium (Be)	mg/L	0.011 ^α	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Boron (B)	mg/L	1.5	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010
	Calcium (Ca)	mg/L	-	-	15.1	14.3	14.4	14.7	14.0	13.1	13.1	13.4	13.0	13.2	13.1	13.6	13.3	13.6	13.5
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00013	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	0.00011	<0.00010	<0.00010
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0000263	0.0000272	0.0000257	0.0000236	0.0000267	0.0000230	0.0000232	0.0000292	0.0000224	0.0000275
	Copper (Cu)	mg/L	0.002	0.004	0.00097	0.00087	0.00095	0.00094	0.00092	0.000996	0.000996	0.000905	0.000907	0.000914	0.000933	0.00105	0.000949	0.000944	0.000897
	Iron (Fe)	mg/L	0.30	0.300	<0.030	<0.030	<0.030	<0.030	0.084	0.0274	0.0226	0.0230	0.0227	0.0234	0.0230	0.0243	0.0232	0.0220	0.0231
	Lead (Pb)	mg/L	0.001	0.001	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000030	0.000029	0.000029	0.000026	0.000026	0.000028	0.000031	0.000028	0.000027	0.000032
	Lithium (Li)	mg/L	-	-	0.0014	0.0014	0.0014	0.0014	0.0014	0.00119	0.00118	0.00115	0.00116	0.00115	0.00118	0.00118	0.00119	0.00119	<0.0010
	Magnesium (Mg)	mg/L	-	-	9.09	8.81	8.90	8.86	8.93	8.71	9.14	9.07	8.86	8.88	8.82	8.74	8.99	8.84	9.07
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00204	0.00187	0.00197	0.00203	0.00312	0.00146	0.00127	0.00120	0.00116	0.00122	0.00117	0.00120	0.00115	0.00117	0.00117
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<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	-	0.000437	0.000414	0.000413	0.000406	0.000383	0.000433	0.000398	0.000444	0.000400	0.000428	0.000412	0.000413	0.000441	0.000415	0.000424
	Nickel (Ni)	mg/L	0.025	0.025	0.00068	0.00063	0.00068	0.00067	0.00079	0.000703	0.000674	0.000681	0.000673	0.000666	0.000697	0.000661	0.000671	0.000655	0.000692
	Potassium (K)	mg/L	-	-	1.43	1.38	1.41	1.41	1.33	1.40	1.42	1.42	1.41	1.41	1.41	1.40	1.42	1.41	1.33
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000040	<0.000040	<0.000040	0.000043	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.0010
	Silicon (Si)	mg/L	-	-	0.46	0.43	0.45	0.45	0.43	0.377	0.356	0.385	0.397	0.372	0.376	0.360	0.370	0.377	0.386
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010
	Sodium (Na)	mg/L	-	-	2.13	2.07	2.09	2.09	2.07	2.15	2.20	2.18	2.12	2.16	2.13	2.12	2.15	2.14	2.08
	Strontium (Sr)	mg/L	-	-	0.0122	0.0115	0.0116	0.0118	0.0111	0.0117	0.0116	0.0117	0.0113	0.0114	0.0114	0.0116	0.0116	0.0116	0.0111
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000026	<0.000020	<0.000020	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.010	<0.010	<0.010	0.00118	0.00110	0.00111	0.00101	0.00101	0.00102	0.00105	0.000999	0.00103	<0.010
	Uranium (U)	mg/L	0.015	-	0.00140	0.00137	0.00137	0.00131	0.00136	0.00144	0.00144	0.00139	0.00137	0.00137	0.00139	0.00136	0.00138	0.00137	0.00136
	Vanadium (V)	mg/L	0.006 ^α	0.006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.000081	0.000081	0.000080	0.000079	0.000082	0.000079	0.000083	0.000084	0.000083	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	<0.0030	0.0049	<0.0030	<0.0030	<0.00050	0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD

 Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.27: Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between Camp Lake and Reference Lake 3 in 2021, and Between Camp Lake 2021 and Baseline (2005 to 2013) Data, Mary River Project CREMP

Parameter	Camp Lake vs Reference Lake 3 in 2021		Camp Lake 2021 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	2.0	1.9	1.5	1.4	1.3
Hardness (as CaCO ₃)	2.0	1.8	1.3	1.3	1.2
Total Suspended Solids (TSS)	1.0	1.0	1.6	1.0	1.0
Total Dissolved Solids (TDS)	3.1	1.3	1.2	1.1	0.7
Turbidity	4.4	3.9	0.6	1.9	2.2
Alkalinity (as CaCO ₃)	1.6	1.4	1.4	1.0	1.2
Total Ammonia	0.7	0.5	0.3	0.1	0.2
Nitrate	1.8	1.6	0.5	0.4	0.3
Nitrite	1.0	0.2	1.9	0.2	0.2
Total Kjeldahl Nitrogen (TKN)	0.7	0.6	0.6	0.7	0.3
Dissolved Organic Carbon	0.8	0.5	1.3	1.3	1.1
Total Organic Carbon	0.6	0.5	1.4	1.1	1.1
Total Phosphorus	0.7	1.2	0.8	0.7	0.7
Phenols	0.9	1.0	1.0	0.8	1.0
Bromide (Br)	1.0	0.5	1.1	0.4	0.2
Chloride (Cl)	3.5	3.4	4.3	2.3	2.0
Sulphate (SO ₄)	1.3	1.3	4.0	3.2	1.7
Aluminum (Al)	4.8	5.2	7.2	1.3	3.1
Antimony (Sb)	1.0	0.2	1.0	1.0	0.2
Arsenic (As)	1.0	0.6	1.1	1.0	0.6
Barium (Ba)	1.2	1.1	1.6	1.5	1.3
Beryllium (Be)	1.0	0.0	1.1	1.3	0.0
Cadmium (Cd)	1.0	0.5	0.6	0.8	0.4
Calcium (Ca)	2.0	1.8	1.3	1.2	1.1
Chromium (Cr)	1.0	0.2	4.8	1.0	1.0
Cobalt (Co)	1.0	0.3	1.2	1.0	0.2
Copper (Cu)	1.1	1.2	1.0	0.3	1.1
Iron (Fe)	1.0	0.8	2.4	1.1	1.3
Lead (Pb)	1.0	0.6	0.9	0.6	0.6
Lithium (Li)	1.4	1.2	0.2	0.3	
Magnesium (Mg)	1.9	1.9	1.4	1.3	1.3
Manganese (Mn)	2.7	2.0	9.2	1.0	0.8
Mercury (Hg)	1.0	-	-	-	-
Molybdenum (Mo)	2.7	2.7	2.2	2.1	2.1
Nickel (Ni)	1.3	1.4	1.2	0.9	1.1
Potassium (K)	1.5	1.5		1.7	1.6
Selenium (Se)	1.0	0.0	-	12.6	0.5
Silicon (Si)	0.9	0.8	1.1	1.0	0.9
Silver (Ag)	1.0	0.5	1.1	1.6	1.3
Sodium (Na)	2.1	2.3		2.3	2.1
Strontium (Sr)	1.3	1.4	2.0	1.6	1.5
Thallium (Tl)	1.0	0.1	1.1	1.3	0.2
Tin (Sn)	1.0	0.2	0.1	0.2	0.0
Titanium (Ti)	1.0	0.1	1.0	1.0	0.1
Uranium (U)	4.2	4.0	3.6	3.0	2.7
Vanadium (V)	1.0	0.1	1.0	1.0	0.1
Zinc (Zn)	1.1	0.2	2.4	1.3	0.2

- Denotes parameter with an AEMP benchmark.
- Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference or baseline period value).
- Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference or baseline period value).
- Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2021 and baseline data, or Camp Lake and Reference Lake, precluding an evaluation of magnitude of elevation.

Table C.28: Dissolved Metal Concentrations at Camp Lake Water Quality Monitoring Stations, Mary River Project CREMP, 2021

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
			15-Apr-21	15-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	2-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21
Dissolved Metals	Aluminum (Al)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0060	0.0035	0.0037	0.0031	0.0039	0.0034	0.0037
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00882	0.00913	0.00894	0.00897	0.00837	0.0103	0.00885	0.00898	0.00887	0.00936	0.00737	0.00795	0.00799	0.00799	0.00797	0.00787	0.00791
	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	<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	<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
	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	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	16.8	16.5	16.3	16.5	15.4	16.6	15.6	16.5	16.3	16.6	15.3	14.4	14.3	14.4	14.5	14.3	14.5
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00102	0.00102	0.00101	0.00099	0.00097	0.00102	0.00090	0.00098	0.00096	0.00096	0.00089	0.00081	0.00086	0.00086	0.00083	0.00091	0.00086
	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	<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
	Lithium (Li)	mg/L	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0014	0.0013	0.0013	0.0012	0.0012	0.0012	0.0013
	Magnesium (Mg)	mg/L	10.5	10.8	10.8	10.8	9.85	11.2	9.92	10.8	10.5	10.9	8.30	8.70	8.68	8.83	8.69	8.73	8.79
	Manganese (Mn)	mg/L	0.000110	0.000077	0.000308	<0.000070	0.000119	0.000083	0.00536	<0.000070	<0.000070	<0.000070	0.00133	0.000202	0.000234	0.000154	0.000143	0.000120	0.000151
	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	0.000473	0.000497	0.000465	0.000486	0.000419	0.000485	0.000373	0.000485	0.000467	0.000484	0.000408	0.000427	0.000408	0.000417	0.000425	0.000426	0.000418
	Nickel (Ni)	mg/L	0.00071	0.00076	0.00075	0.00072	0.00069	0.00075	0.00070	0.00074	0.00072	0.00073	0.00066	0.00061	0.00065	0.00060	0.00060	0.00060	0.00062
	Potassium (K)	mg/L	1.54	1.61	1.59	1.58	1.45	1.65	1.46	1.58	1.53	1.59	1.28	1.37	1.37	1.37	1.35	1.38	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	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.42	0.41	0.42	0.41	0.44	0.42	1.55	0.42	0.43	0.42	0.45	0.43	0.43	0.44	0.43	0.42	0.43
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	2.43	2.48	2.49	2.50	2.27	2.59	4.05	2.49	2.43	2.48	1.92	2.04	2.04	2.06	2.03	2.07	2.06
	Strontium (Sr)	mg/L	0.0137	0.0141	0.0142	0.0140	0.0133	0.0139	0.0150	0.0138	0.0135	0.0140	0.0120	0.0118	0.0116	0.0117	0.0118	0.0117	0.0117
	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	<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
	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	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.00166	0.00172	0.00168	0.00174	0.00158	0.00173	0.00117	0.00172	0.00166	0.00175	0.00143	0.00139	0.00139	0.00138	0.00139	0.00138	0.00139
	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	<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	<0.0030	<0.0030	<0.0030

Table C.28: Dissolved Metal Concentrations at Camp Lake Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Summer Sampling Event					Fall Sampling Event												
			JL0-07	JL0-07	JL0-09	JL0-09	J0-01	JL0-02	JL0-02	JL0-10	JL0-10	JL0-01	JL0-01	JL0-07	JL0-07	JL0-09	JL0-09	J0-01		
			bottom	surface	bottom	surface	outlet	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	outlet
			27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	1-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	3-Sep-21	
Dissolved Metals	Aluminum (Al)	mg/L	0.0040	0.0040	0.0034	0.0033	0.0035	0.0039	0.0048	0.0037	0.0037	0.0042	0.0038	0.0041	0.0045	0.0060	0.0033	0.0087		
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.00010		
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.000106	0.000082	0.000076	0.000062	0.000053	0.000055	0.000068	0.000061	0.000059	0.000062	<0.00010		
	Barium (Ba)	mg/L	0.00809	0.00790	0.00798	0.00795	0.00750	0.00716	0.00733	0.00730	0.00730	0.00726	0.00721	0.00719	0.00728	0.00729	0.00729	0.00767		
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00050		
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00050		
	Boron (B)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.010		
	Cadmium (Cd)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010		
	Calcium (Ca)	mg/L	14.7	14.4	14.5	14.5	13.9	13.3	13.2	13.3	13.0	13.4	13.4	13.2	13.3	13.3	13.4	13.5		
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00010	<0.00010	<0.00010	<0.00010	0.00030	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00050		
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0000110	0.0000115	0.0000134	0.0000132	0.0000148	0.0000124	0.0000124	0.0000124	0.0000124	0.0000119	0.0000142	<0.00010	
	Copper (Cu)	mg/L	0.00091	0.00086	0.00089	0.00086	0.00087	0.00106	0.000985	0.000954	0.000900	0.000938	0.000898	0.000939	0.000910	0.000882	0.000836	0.00087		
	Iron (Fe)	mg/L	<0.030	<0.030	<0.030	<0.030	<0.030	0.0031	0.0039	0.0030	0.0033	0.0066	0.0032	0.0034	0.0042	0.0045	0.0025	0.042		
	Lead (Pb)	mg/L	<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	<0.000050		
	Lithium (Li)	mg/L	0.0013	0.0013	0.0013	0.0013	0.0014	0.00113	0.00113	0.00112	0.00111	0.00113	0.00112	0.00113	0.00118	0.00114	0.00115	<0.0010		
	Magnesium (Mg)	mg/L	8.92	8.76	8.76	8.74	8.88	9.00	9.02	9.19	9.02	9.12	9.09	8.71	8.90	8.68	8.85	9.45		
	Manganese (Mn)	mg/L	0.000176	0.000133	0.000129	0.000138	0.00146	0.000137	0.000167	0.000109	0.000132	0.000134	0.000117	0.000110	0.000143	0.000132	0.000105	0.00187		
	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	0.000442	0.000410	0.000426	0.000419	0.000398	0.000414	0.000402	0.000418	0.000426	0.000408	0.000421	0.000398	0.000398	0.000410	0.000412	0.000418		
	Nickel (Ni)	mg/L	0.00063	0.00061	0.00061	0.00063	0.00070	0.000600	0.000632	0.000652	0.000610	0.000647	0.000659	0.000588	0.000648	0.000617	0.000615	0.00071		
	Potassium (K)	mg/L	1.40	1.37	1.37	1.36	1.32	1.39	1.40	1.41	1.42	1.38	1.39	1.39	1.42	1.39	1.40	1.34		
	Selenium (Se)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.0010		
	Silicon (Si)	mg/L	0.44	0.43	0.44	0.42	0.40	0.345	0.362	0.356	0.354	0.344	0.334	0.359	0.354	0.350	0.335	0.39		
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.000010		
	Sodium (Na)	mg/L	2.10	2.05	2.05	2.05	2.06	2.16	2.16	2.16	2.15	2.13	2.08	2.17	2.18	2.13	2.07	2.17		
	Strontium (Sr)	mg/L	0.0121	0.0116	0.0117	0.0118	0.0111	0.0113	0.0110	0.0113	0.0115	0.0114	0.0113	0.0114	0.0114	0.0115	0.0115	0.0114		
	Thallium (Tl)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.00010		
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000021	<0.000020	<0.000020	<0.000020	<0.00010		
	Titanium (Ti)	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.000050	0.000098	0.000063	0.000079	0.000083	0.000070	0.000066	0.000087	0.000098	0.000057	<0.010		
	Uranium (U)	mg/L	0.00135	0.00136	0.00135	0.00139	0.00134	0.00143	0.00142	0.00139	0.00139	0.00138	0.00138	0.00137	0.00141	0.00137	0.00134	0.00140		
	Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.000050	0.000051	<0.000050	0.000050	0.000053	0.000051	0.000051	0.000053	0.000054	0.000051	<0.0010		
	Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.00050	0.00109	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0030		

Table C.29: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Camp Lake and Reference Lake 3 in 2021, and Between Camp Lake 2021 and Baseline (2005 to 2013) Data, Mary River Project CREMP

Parameter	Camp Lake vs Reference Lake 3 in 2021		Camp Lake 2021 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	1.1	1.0	0.0	0.8	1.4
Antimony (Sb)	1.0	0.2	0.0	0.0	0.2
Arsenic (As)	1.0	0.7	1.0	0.8	0.7
Barium (Ba)	1.2	1.1	0.0	1.5	1.3
Beryllium (Be)	1.0	0.0	1.2	1.2	0.0
Bismuth (Bi)	1.0	0.0	1.0	0.3	0.0
Boron (B)	1.0	0.5	1.0	1.0	0.5
Cadmium (Cd)	1.0	0.5	0.4	0.0	0.4
Calcium (Ca)	2.0	1.8	1.2	1.3	1.1
Chromium (Cr)	1.0	0.2	-	-	1.2
Cobalt (Co)	1.0	0.1	1.0	1.0	0.1
Copper (Cu)	1.1	1.2	0.8	0.6	1.1
Iron (Fe)	1.0	0.1	1.2	1.2	0.2
Lead (Pb)	1.0	0.2	0.6	1.0	0.2
Lithium (Li)	1.3	1.1	0.3	0.0	0.5
Magnesium (Mg)	1.9	1.9	1.2	1.3	1.3
Manganese (Mn)	0.7	0.8	0.4	0.0	0.2
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	2.8	2.7	2.0	0.0	2.0
Nickel (Ni)	1.2	1.3	1.0	0.7	1.1
Potassium (K)	1.5	1.5	0.9	1.2	1.2
Selenium (Se)	1.0	0.0	-	-	0.3
Silicon (Si)	0.8	0.7	0.9	1.1	0.9
Silver (Ag)	1.0	0.5	1.2	1.8	1.4
Sodium (Na)	2.1	2.3	1.4	1.6	1.7
Strontium (Sr)	1.4	1.4	1.7	1.6	1.5
Thallium (Tl)	1.0	0.1	1.2	1.3	0.1
Tin (Sn)	1.0	0.2	0.1	0.2	0.0
Titanium (Ti)	1.0	0.0	1.0	1.0	0.0
Uranium (U)	4.2	4.0	-	-	2.8
Vanadium (V)	1.0	0.1	1.0	1.0	0.1
Zinc (Zn)	1.0	0.2	1.5	1.0	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 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 2021

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	08-Aug-21	6.7	11.66	98.9	8.01	115.8
	REF-CRK-B2	08-Aug-21	6.7	11.91	100.6	8.01	115.7
	REF-CRK-B3	08-Aug-21	6.6	11.74	99.2	8.01	115.9
	REF-CRK-B4	08-Aug-21	6.6	11.75	99.2	8.01	115.8
	REF-CRK-B5	08-Aug-21	6.3	11.80	99.0	8.00	115.7
Sheardown Lake Tributary 1 Reach 1	SDLT-1-R1-B1	09-Aug-21	5.6	11.77	98.6	8.15	378.4
	SDLT-1-R1-B2	09-Aug-21	5.5	11.79	98.7	8.16	373.4
	SDLT-1-R1-B3	09-Aug-21	5.5	11.84	99.0	8.18	359.0
	SDLT-1-R1-B4	09-Aug-21	5.4	11.86	99.0	8.20	389.6
	SDLT-1-R1-B5	09-Aug-21	5.4	11.78	98.3	8.20	409.3
Sheardown Lake Tributary 12 Downstream	SDLT-12-DS-B1	09-Aug-21	6.0	11.53	97.8	8.23	279.1
	SDLT-12-DS-B2	09-Aug-21	6.0	11.66	98.8	8.29	276.9
	SDLT-12-DS-B3	09-Aug-21	5.2	11.04	91.5	8.11	288.0
Sheardown Lake Tributary 9 Upstream	SDLT-9-DS-B1	11-Aug-21	8.5	10.89	93.2	8.13	190.6
	SDLT-9-DS-B2	11-Aug-21	7.7	8.90	74.8	7.65	236.2
	SDLT-9-DS-B3	11-Aug-21	7.6	9.91	82.9	7.74	225.8
	SDLT-9-DS-B4	11-Aug-21	7.6	10.24	88.1	7.76	224.3
	SDLT-9-DS-B5	11-Aug-21	7.9	10.61	89.4	7.82	222.6

Table C.31: *In Situ* Water Quality Summary Statistics for the Sheardown Lake Tributary Benthic Stations, Mary River Project CREMP, August 2021

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	6.58	0.164	0.0735	6.46	6.70	6.30	6.70
	Sheardown Lake Tributary 1 (SDLT1)	5	5.48	0.0837	0.0374	5.42	5.54	5.40	5.60
	Sheardown Lake Tributary 12 (SDLT12)	3	5.73	0.462	0.267	5.29	6.17	5.20	6.00
	Sheardown Lake Tributary 9 (SDLT9)	5	7.86	0.378	0.169	7.58	8.14	7.60	8.50
Dissolved Oxygen (mg/L)	Unnamed Reference Creek	5	11.8	0.0920	0.0412	11.7	11.8	11.7	11.9
	Sheardown Lake Tributary 1 (SDLT1)	5	11.8	0.0396	0.0177	11.8	11.8	11.8	11.9
	Sheardown Lake Tributary 12 (SDLT12)	3	11.4	0.327	0.189	11.1	11.7	11.0	11.7
	Sheardown Lake Tributary 9 (SDLT9)	5	10.1	0.771	0.345	9.54	10.7	8.90	10.9
Dissolved Oxygen (% Saturation)	Unnamed Reference Creek	5	99.4	0.694	0.310	98.9	99.9	98.9	101
	Sheardown Lake Tributary 1 (SDLT1)	5	98.7	0.295	0.132	98.5	98.9	98.3	99.0
	Sheardown Lake Tributary 12 (SDLT12)	3	96.0	3.96	2.28	92.3	99.8	91.5	98.8
	Sheardown Lake Tributary 9 (SDLT9)	5	85.7	7.11	3.18	80.5	90.9	74.8	93.2
pH (units)	Unnamed Reference Creek	5	8.01	0.00447	0.00200	8.00	8.01	8.00	8.01
	Sheardown Lake Tributary 1 (SDLT1)	5	8.18	0.0228	0.0102	8.16	8.19	8.15	8.20
	Sheardown Lake Tributary 12 (SDLT12)	3	8.21	0.0917	0.0529	8.12	8.30	8.11	8.29
	Sheardown Lake Tributary 9 (SDLT9)	5	7.82	0.184	0.0822	7.68	7.96	7.65	8.13
Specific Conductance (µS/cm)	Unnamed Reference Creek	5	116	0.0837	0.0374	116	116	116	116
	Sheardown Lake Tributary 1 (SDLT1)	5	382	18.8	8.42	368	396	359	409
	Sheardown Lake Tributary 12 (SDLT12)	3	281	5.88	3.39	276	287	277	288
	Sheardown Lake Tributary 9 (SDLT9)	5	220	17.2	7.70	207	233	191	236

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 2021

Metric	Overall 4-group Comparison				Pair-wise, <i>post hoc</i> comparisons ^a			
	Statistical Test ^a	Transformation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Water Temperature (°C)	ANOVA	none	YES	0.001	Unnamed Reference Creek	Sheardown Tributary 1	YES	0.006
					Unnamed Reference Creek	Sheardown Tributary 12	YES	0.006
					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
Dissolved Oxygen (mg/L)	K-W	rank	YES	0.003	Unnamed Reference Creek	Sheardown Tributary 1	NO	0.171
					Unnamed Reference Creek	Sheardown Tributary 12	NO	0.171
					Unnamed Reference Creek	Sheardown Tributary 9	YES	0.005
					Sheardown Tributary 1	Sheardown Tributary 12	NO	0.285
					Sheardown Tributary 1	Sheardown Tributary 9	NO	0.285
					Sheardown Tributary 12	Sheardown Tributary 9	NO	0.285
Dissolved Oxygen (% saturation)	K-W	rank	YES	0.003	Unnamed Reference Creek	Sheardown Tributary 1	YES	0.047
					Unnamed Reference Creek	Sheardown Tributary 12	YES	0.047
					Unnamed Reference Creek	Sheardown Tributary 9	YES	<0.001
					Sheardown Tributary 1	Sheardown Tributary 12	NO	0.251
					Sheardown Tributary 1	Sheardown Tributary 9	NO	0.251
					Sheardown Tributary 12	Sheardown Tributary 9	NO	0.251
pH (units)	K-W	rank	YES	0.005	Unnamed Reference Creek	Sheardown Tributary 1	YES	0.039
					Unnamed Reference Creek	Sheardown Tributary 12	YES	0.039
					Unnamed Reference Creek	Sheardown Tributary 9	NO	0.404
					Sheardown Tributary 1	Sheardown Tributary 12	YES	0.005
					Sheardown Tributary 1	Sheardown Tributary 9	YES	0.005
					Sheardown Tributary 12	Sheardown Tributary 9	YES	0.005
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 0.05.

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

Table C.33: Water Chemistry at Sheardown Lake Tributaries (SDLT1, SDLT12, and SDLT9) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Spring Sampling Event		Summer Sampling Event		Fall Sampling Event			
					Sheardown Lake Tributary 1		Sheardown Lake Tributary 1		Sheardown Lake Tributary 1		Sheardown Lake Tributary 12	Sheardown Lake Tributary 9
					D1-05	D1-00	D1-05	D1-00	D1-05	D1-00	LDFG-OUT ^d	MS-C-G ^d
					29-Jun-21	29-Jun-21	24-Jul-21	26-Jul-21	26-Aug-21	26-Aug-21	03-Sep-21	03-Sep-21
Conventionals	Conductivity (lab)	umho/cm	-	-	154	228	211	366	245	382	276	341
	pH (lab)	pH	6.5 - 9.0	-	7.80	7.90	7.88	8.10	7.90	8.06	7.81	7.84
	Hardness (as CaCO ₃)	mg/L	-	-	68.1	105	93.1	165	107	172	131	174
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	2.1	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	88	117	113	194	122	208	173	197
	Turbidity	NTU	-	-	2.12	2.20	2.06	2.25	6.21	3.08	<0.10	0.17
	Alkalinity (as CaCO ₃)	mg/L	-	-	58.4	79.6	76.6	89.1	86.7	115	118	157
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.0050	<0.010	<0.0050	<0.0050	1.82	<0.010
	Nitrate	mg/L	3	3	0.284	0.298	0.292	0.989	0.395	1.38	7.330	0.497
	Nitrite	mg/L	0.06	0.06	<0.0050	<0.0050	<0.0010	<0.0050	<0.0010	0.0015	0.043	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.140	0.150	0.147	0.230	0.136	0.298	1.710	0.223
	Dissolved Organic Carbon	mg/L	-	-	1.76	2.25	2.41	3.30	1.99	2.29	3.40	3.81
	Total Organic Carbon	mg/L	-	-	2.48	2.94	2.62	3.58	1.97	2.20	3.43	3.58
	Total Phosphorus	mg/L	0.030 ^a	-	<0.0030	0.0033	<0.0020	<0.0030	0.0038	0.0030	<0.0030	0.0032
Anions	Phenols	mg/L	0.004 ^a	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.050	<0.10	<0.050	0.064	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	5.50	6.34	5.79	9.97	6.42	10.1	1.64	6.83
	Sulphate (SO ₄)	mg/L	218 ^β	218	8.62	25.2	18.4	60.5	24.0	60.9	3.4	25.2
Total Metals	Aluminum (Al)	mg/L	0.100	0.179	0.0314	0.0349	0.0457	0.0420	0.123	0.0653	<0.0030	0.0043
	Antimony (Sb)	mg/L	0.020 ^a	-	<0.00010	<0.00010	<0.000020	<0.00010	<0.000030	<0.000030	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	0.000048	<0.00010	0.000092	0.000077	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00843	0.0122	0.0106	0.0164	0.0116	0.0148	0.0171	0.0176
	Beryllium (Be)	mg/L	0.011 ^a	-	<0.00050	<0.00050	<0.0000050	<0.00050	0.0000130	0.0000066	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	-	-	<0.00050	<0.00050	<0.0000050	<0.00050	<0.000050	<0.000050	<0.00050	<0.00050
	Boron (B)	mg/L	1.5	-	0.011	0.013	0.0110	0.014	0.012	0.015	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.00012	0.00008	0.000033	0.000011	0.0000307	0.000017	0.0000383	0.0000154	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	13.2	19.5	17.6	29.9	0	0	25.4	30.9
	Chromium (Cr)	mg/L	0.0089	0.00856	<0.00050	<0.00050	0.00021	<0.00050	0.00056	0.00076	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 ^a	0.004	<0.00010	<0.00010	0.0000708	0.00012	0.000140	0.000146	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0022	0.00236	0.00206	0.00260	0.00229	0.00297	0.00209	0.00104	0.00169
	Iron (Fe)	mg/L	0.30	0.326	0.045	0.056	0.0560	0.112	0.168	0.150	<0.030	<0.030
	Lead (Pb)	mg/L	0.001	0.001	0.000131	0.000065	0.000096	0.000074	0.000265	0.000110	<0.000050	<0.000050
	Lithium (Li)	mg/L	-	-	0.0021	0.0024	0.00196	0.0027	0.00209	0.00261	0.0014	0.0020
	Magnesium (Mg)	mg/L	-	-	8.57	13.7	12.2	22.7	13.9	23.4	16.5	22.6
	Manganese (Mn)	mg/L	0.935 ^β	-	0.000831	0.00628	0.00104	0.00564	0.00241	0.00581	0.00044	0.00015
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.00324	0.00241	0.00641	0.00505	0.00684	0.00438	0.00063	0.00222
	Nickel (Ni)	mg/L	0.025	0.025	0.00099	0.00120	0.00109	0.00143	0.00129	0.00149	0.00125	0.00107
	Potassium (K)	mg/L	-	-	2.08	2.35	3.19	3.21	3.16	3.19	1.77	2.05
	Selenium (Se)	mg/L	0.001	-	<0.0010	<0.0010	0.000043	<0.0010	<0.00020	<0.00020	<0.0010	<0.0010
	Silicon (Si)	mg/L	-	-	1.11	1.01	1.50	1.53	1.61	1.52	1.08	1.45
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.0000050	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.36	2.29	1.73	4.22	2.18	4.35	1.88	2.94
	Strontium (Sr)	mg/L	-	-	0.0211	0.0203	0.0196	0.0263	0.0237	0.0279	0.0152	0.0185
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.00010	<0.00010	0.0000118	<0.00010	0.0000133	0.0000095	<0.00010	<0.00010
	Tin (Sn)	mg/L	-	-	<0.00010	<0.00010	<0.000020	<0.00010	<0.00020	<0.00020	<0.00010	<0.00010
	Titanium (Ti)	mg/L	-	-	<0.010	<0.010	<0.0021	<0.010	0.00516	0.00287	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00299	0.00352	0.00594	0.00793	0.00998	0.00893	0.00092	0.00418
	Vanadium (V)	mg/L	0.006 ^a	0.006	<0.0010	<0.0010	0.000244	<0.0010	0.00043	0.00028	<0.0010	<0.0010
	Zinc (Zn)	mg/L	0.030	0.030	<0.0030	0.0048	0.00089	0.0046	<0.0030	0.0040	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

^c Stations D1 CUSI-A, D1-CUSI-B, D1-CUSI-C, MS-C-F, MS-C-B, and MS-C-A were sampled in fall 2021 as part of a special investigation in elevated copper concentrations (see Section 2.5.2).

^d Stations LDFG-OUT and MS-C-G were added to the CREMP in fall 2021, and therefore were not sampled in earlier seasons. There stations will be sampled in spring, summer, and fall in future years.

Table C.34: Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between SDLT1, SDLT12, and SDLT9 and Reference Creek Stations in 2021, and at SDLT1 Between 2021 and the Baseline Period

Parameter	SDLT1 2021 vs Reference Creek 2021			SDLT12 2021 vs Reference Creek 2021	SDLT9 2021 vs Reference Creek 2021	SDLT1 2021 vs Baseline		
	Spring	Summer	Fall	Fall	Fall	Spring	Summer	Fall
Conductivity (lab)	4.2	2.9	2.1	1.9	2.3	2.5	1.7	1.4
Hardness (as CaCO ₃)	4.4	3.0	2.0	1.9	2.5	2.2	1.5	1.2
Total Suspended Solids (TSS)	0.6	1.0	0.9	0.9	0.9	1.0	1.0	1.0
Total Dissolved Solids (TDS)	4.5	3.0	1.9	2.0	2.3	2.1	1.4	1.1
Turbidity	1.1	0.7	1.6	0.0	0.1	1.8	4.6	14
Alkalinity (as CaCO ₃)	3.4	2.1	1.5	1.7	2.3	2.0	1.1	1.0
Total Ammonia	1.0	0.8	0.5	182	1.0	0.1	0.1	0.1
Nitrate	15	32	24	202	14	3.1	6.5	7.9
Nitrite	1.0	0.6	0.3	8.6	1.0	1.0		0.2
Total Kjeldahl Nitrogen (TKN)	1.2	1.9	2.1	16	2.1	0.9	1.3	1.8
Dissolved Organic Carbon	1.9	1.0	0.8	1.3	1.4	0.5	1.1	0.9
Total Organic Carbon	1.6	1.8	1.0	1.6	1.7	0.7	1.1	0.9
Total Phosphorus	0.7	0.5	0.7	0.6	0.7	0.3	0.5	0.8
Phenols	1.0	1.0	1.0	1.0	1.0			
Bromide (Br)	1.0	0.8	0.6	1.0	1.0	0.4		
Chloride (Cl)	5.0	3.0	1.8	0.4	1.5	1.3	1.9	1.0
Sulphate (SO ₄)	13	12	7.3	0.6	4.4	31	7.5	4.7
Aluminum (Al)	0.7	0.5	2.0	0.1	0.1	0.6	2.5	8.8
Antimony (Sb)	1.0	0.6	0.3	1.0	1.0	0.8	0.6	0.3
Arsenic (As)	1.0	0.7	0.8	1.0	1.0	1.0	0.7	0.8
Barium (Ba)	3.5	2.3	1.6	2.1	2.2	2.1	1.4	1.2
Beryllium (Be)	1.0	0.5	0.0	1.0	1.0	-		
Bismuth (Bi)	1.0	0.5	0.1	1.0	1.0	1.0		
Boron (B)	1.2	1.3	1.4	1.0	1.0	1.1	0.8	0.9
Cadmium (Cd)	2.2	2.4	2.7	1.0	1.0	0.9	0.9	1.1
Calcium (Ca)	4.0	2.6	0.0	1.9	2.3	2.2	1.4	0.0
Chromium (Cr)	1.0	0.7	1.3	1.0	1.0	2.0	1.4	4.6
Cobalt (Co)	1.0	1.0	1.4	1.0	1.0	0.7	0.9	1.3
Copper (Cu)	3.4	2.9	2.9	1.2	1.9	0.7	0.9	1.2
Iron (Fe)	1.7	1.2	2.8	0.5	0.5	0.9	1.6	4.9
Lead (Pb)	1.0	0.8	2.1	0.6	0.6	0.3	1.1	2.8
Lithium (Li)	2.3	2.3	2.4	1.4	2.0	4.5	2.2	2.3
Magnesium (Mg)	4.7	3.4	2.2	1.9	2.7	2.3	1.6	1.4
Manganese (Mn)	3.4	3.3	4.4	0.5	0.2	1.2	1.8	4.3
Mercury (Hg)	1.0	1.0	1.0	1.0	1.0	0.5		
Molybdenum (Mo)	24	21	14	1.6	5.6	2.8	2.6	2.4
Nickel (Ni)	2.2	2.5	2.6	2.3	2.0	0.6	1.0	1.3
Potassium (K)	6.2	4.7	3.6	2.0	2.3	2.4	1.9	1.8
Selenium (Se)	1.0	0.5	0.2	1.0	1.0			
Silicon (Si)	2.0	1.6	1.7	1.1	1.5	1.1	1.2	1.2
Silver (Ag)	1.0	0.8	0.5	1.0	1.0	0.9		
Sodium (Na)	2.7	1.8	1.2	0.7	1.1	4.6	2.6	1.5
Strontium (Sr)	5.1	2.4	1.7	1.0	1.2	5.1	2.4	2.0
Thallium (Tl)	1.0	0.6	0.1	1.0	1.0	-	-	-
Tin (Sn)	1.0	0.6	2.0	1.0	1.0	1.0		
Titanium (Ti)	1.0	0.6	0.4	1.0	1.0	1.0		
Uranium (U)	8.6	4.1	1.8	0.2	0.8	5.2	2.7	1.7
Vanadium (V)	1.0	0.6	0.4	1.0	1.0	1.0		
Zinc (Zn)	1.3	0.9	1.2	1.0	1.0	3.5	0.7	1.4

- Denotes parameter with an AEMP benchmark.
- Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference or baseline period value).
- Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference or baseline period value).
- Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2021 and reference area or baseline data, precluding an evaluation of magnitude of elevation.

Table C.35: Dissolved Metal Concentrations at Sheardown Lake Tributary 1 (SDLT1), Sheardown Lake Tributary 9 (SDLT9), and Sheardown Lake Tributary 12 (SDLT12) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Spring Sampling Event		Summer Sampling Event		Fall Sampling Event			
			Sheardown Lake Tributary 1		Sheardown Lake Tributary 1		Sheardown Lake Tributary 1		Sheardown Lake Tributary 9 ^a	Sheardown Lake Tributary 12 ^a
			D1-05	D1-00	D1-05	D1-00	D1-05	D1-00	LDFG-OUT	MS-C-G
			29-Jun-21	29-Jun-21	24-Jul-21	26-Jul-21	26-Aug-21	26-Aug-21	03-Sep-21	03-Sep-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0112	0.0146	0.0091	0.0060	0.0121	0.0052	<0.0030	<0.0030
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.000020	<0.00010	0.000022	<0.000020	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	0.000052	<0.00010	0.000051	0.000063	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00821	0.0117	0.0100	0.0164	0.0108	0.0152	0.0166	0.0176
	Beryllium (Be)	mg/L	<0.00050	<0.00050	<0.0000050	<0.00050	<0.0000050	<0.0000050	<0.00050	<0.00050
	Bismuth (Bi)	mg/L	<0.00050	<0.00050	<0.0000050	<0.00050	<0.0000050	<0.0000050	<0.00050	<0.00050
	Boron (B)	mg/L	0.011	0.013	0.011	0.014	0.0110	0.0139	<0.010	<0.010
	Cadmium (Cd)	mg/L	0.000029	<0.000010	0.000026	0.000014	0.0000307	0.0000171	<0.000010	<0.000010
	Calcium (Ca)	mg/L	13.2	19.4	17.3	29.5	19.8	29.0	25.2	32.6
	Chromium (Cr)	mg/L	<0.00050	<0.00050	0.00018	<0.00050	0.00014	0.00014	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	0.0000507	0.00010	0.0000645	0.000112	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00230	0.00202	0.00260	0.00217	0.00265	0.00203	0.00108	0.00165
	Iron (Fe)	mg/L	<0.030	0.097	0.0133	0.051	0.0170	0.0371	<0.030	<0.030
	Lead (Pb)	mg/L	<0.000050	<0.000050	0.000024	<0.000050	0.000033	0.000024	<0.000050	<0.000050
	Lithium (Li)	mg/L	0.0021	0.0025	0.0019	0.0025	0.00187	0.00256	0.00130	0.00210
	Magnesium (Mg)	mg/L	8.50	13.6	12.1	22.2	14.0	24.1	16.4	22.5
	Manganese (Mn)	mg/L	0.000401	0.00552	0.000489	0.00467	0.000438	0.00460	0.000348	<0.000070
	Mercury (Hg)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.00323	0.00250	0.00642	0.00498	0.00678	0.00441	0.00063	0.00223
	Nickel (Ni)	mg/L	0.00097	0.00119	0.00101	0.00134	0.000994	0.00135	0.001280	0.00104
	Potassium (K)	mg/L	2.06	2.31	3.00	3.20	3.16	3.30	1.75	2.04
	Selenium (Se)	mg/L	<0.0010	<0.0010	0.000063	<0.0010	0.000091	0.000161	<0.0010	<0.0010
	Silicon (Si)	mg/L	1.04	0.96	1.37	1.44	1.37	1.41	1.10	1.46
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.0000050	<0.000010	<0.0000050	<0.0000050	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.36	2.28	1.75	4.13	2.17	4.50	1.78	2.95
	Strontium (Sr)	mg/L	0.0211	0.0203	0.0194	0.0262	0.0238	0.0285	0.0150	0.0188
	Thallium (Tl)	mg/L	<0.00010	<0.00010	0.0000109	<0.00010	0.0000107	0.0000085	<0.00010	<0.00010
	Tin (Sn)	mg/L	<0.00010	<0.00010	<0.000020	<0.00010	<0.000020	<0.000020	<0.00010	<0.00010
	Titanium (Ti)	mg/L	<0.010	<0.010	0.000334	<0.010	0.000336	0.000143	<0.010	<0.010
	Uranium (U)	mg/L	0.00297	0.00349	0.00018	0.00784	0.00952	0.00897	0.00096	0.00415
	Vanadium (V)	mg/L	<0.0010	<0.0010	0.00055	<0.0010	0.000175	0.000105	<0.0010	<0.0010
	Zinc (Zn)	mg/L	<0.0030	0.0043		0.0041	<0.00050	0.00351	<0.0030	<0.0030

^a Stations LDFG-OUT and MS-C-G were added to the CREMP in fall 2021, and therefore were not sampled in earlier seasons. These stations will be sampled in spring, summer, and fall in future years.

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 2021

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
Date Collected	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.0	2.4	2.7	2.6	2.4	2.6	2.4	12.19	11.27	11.86	11.98	11.85	13.05	91.4	84.9	89.4	89.7	89.0	99.4
4.0	2.5	2.9	2.7	2.5	2.6	2.4	12.08	11.25	11.79	11.93	11.85	12.67	91.0	85.3	89.0	89.6	89.2	96.8
5.0	2.8	2.9	2.8	2.7	2.8	2.7	11.85	11.25	11.69	11.83	11.74	12.35	89.9	85.2	88.5	89.4	88.9	94.8
6.0	2.8	2.9	2.9	2.8	2.8	2.8	11.74	11.25	11.36	11.77	11.67	12.13	89.0	85.3	88.1	89.0	88.3	93.1
7.0	2.9	2.9	2.9	-	2.8	2.8	11.70	11.25	11.58	-	11.64	12.02	88.6	85.3	87.8	-	88.1	92.2
8.0	2.9	2.9	2.9	-	2.8	2.8	11.65	11.24	11.56	-	11.61	11.95	88.3	85.2	87.5	-	87.9	91.7
9.0	2.9	2.9	2.9	-	2.8	2.8	11.55	11.26	11.53	-	11.59	11.89	87.6	85.3	87.3	-	87.7	91.2
10.0	-	2.9	2.9	-	2.9	2.8	-	11.26	11.52	-	11.59	11.80	-	85.3	87.2	-	87.6	90.5
11.0	-	2.9	2.9	-	2.9	2.8	-	11.20	11.49	-	11.53	11.76	-	85.0	87.0	-	87.3	90.3
12.0	-	2.9	2.9	-	2.9	-	-	11.15	11.42	-	11.47	-	-	84.5	86.7	-	87.0	-
13.0	-	2.9	2.9	-	2.9	-	-	11.10	11.31	-	11.41	-	-	84.1	85.9	-	86.6	-
14.0	-	2.9	2.9	-	2.9	-	-	11.05	11.24	-	11.36	-	-	83.8	85.3	-	86.2	-
15.0	-	2.9	2.9	-	2.9	-	-	11.02	11.16	-	11.32	-	-	83.5	84.7	-	85.9	-
16.0	-	2.9	2.9	-	2.9	-	-	10.96	11.12	-	11.29	-	-	83.2	84.4	-	85.7	-
17.0	-	3.0	2.9	-	2.9	-	-	10.85	11.06	-	11.25	-	-	82.5	84.0	-	85.3	-
18.0	-	3.0	3.0	-	-	-	-	10.77	10.96	-	-	-	-	81.9	83.4	-	-	-
19.0	-	3.0	3.0	-	-	-	-	10.68	10.87	-	-	-	-	81.3	82.7	-	-	-
20.0	-	3.0	3.0	-	-	-	-	10.62	10.78	-	-	-	-	80.8	82.0	-	-	-
21.0	-	3.1	-	-	-	-	-	10.56	-	-	-	-	-	80.4	-	-	-	-
22.0	-	3.1	-	-	-	-	-	8.90	-	-	-	-	-	67.9	-	-	-	-

Notes: "-" indicates no available data. Total depth at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 9.8, 23.0, 20.3, 6.5, 17.8 and - m, respectively, at the time of winter sampling. Ice thickness at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 1.48, 1.36, 1.41, 1.60, 1.52, and - 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 2021

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
Date Collected	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-	-	-
3.0	7.92	7.73	7.69	7.76	7.82	7.96	190.1	189.7	190.5	193.7	191.0	186.0
4.0	7.87	7.69	7.65	7.73	7.79	7.88	189.2	188.1	189.4	192.2	190.1	186.2
5.0	7.82	7.67	7.62	7.70	7.75	7.82	188.8	188.0	189.1	191.5	189.5	189.9
6.0	7.79	7.66	7.60	7.69	7.72	7.78	189.0	188.0	189.1	191.3	189.5	190.3
7.0	7.77	7.65	7.58	-	7.70	7.76	189.0	188.0	189.1	-	189.5	190.5
8.0	7.75	7.64	7.56	-	7.68	7.73	188.8	188.4	189.1	-	189.5	190.6
9.0	7.72	7.63	7.55	-	7.67	7.72	189.3	188.8	189.4	-	189.5	190.5
10.0	-	7.62	7.54	-	7.65	7.69	-	188.7	189.4	-	189.4	190.7
11.0	-	7.60	7.52	-	7.64	7.68	-	188.9	189.2	-	189.3	190.5
12.0	-	7.59	7.51	-	7.63	-	-	189.5	188.9	-	189.1	-
13.0	-	7.58	7.49	-	7.61	-	-	189.5	189.1	-	189.0	-
14.0	-	7.57	7.47	-	7.60	-	-	189.5	189.2	-	189.0	-
15.0	-	7.56	7.46	-	7.59	-	-	189.4	189.6	-	189.3	-
16.0	-	7.55	7.45	-	7.57	-	-	189.3	189.6	-	189.4	-
17.0	-	7.54	7.44	-	7.56	-	-	189.0	189.4	-	189.8	-
18.0	-	7.52	7.42	-	-	-	-	189.0	189.2	-	-	-
19.0	-	7.51	7.41	-	-	-	-	189.0	189.4	-	-	-
20.0	-	7.50	7.40	-	-	-	-	188.9	189.7	-	-	-
21.0	-	7.49	-	-	-	-	-	188.8	-	-	-	-
22.0	-	7.41	-	-	-	-	-	188.1	-	-	-	-

Notes: "-" indicates no available data. Total depth at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 9.8, 23.0, 20.3, 6.5, 17.8 and - m, respectively, at the time of winter sampling. Ice thickness at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 1.48, 1.36, 1.41, 1.60, 1.52, and - 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 2021

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
Date Collected	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21
1.0	7.8	7.5	7.9	8.1	7.9	7.7	10.91	11.64	11.62	11.68	11.61	11.50	93.6	100.1	100.9	98.5	101.0	99.3
2.0	7.7	7.4	7.9	8.0	7.9	7.7	11.55	11.71	11.69	11.85	11.71	11.52	100.0	100.8	101.7	100.1	101.9	99.4
3.0	7.7	7.4	7.9	8.0	7.9	7.6	11.66	11.76	11.72	11.86	11.75	11.54	100.9	101.2	101.9	100.2	102.2	99.5
4.0	7.6	7.4	7.8	7.9	7.9	7.6	11.69	11.78	11.73	11.88	11.75	11.56	101.2	101.3	102.0	100.2	102.3	99.5
5.0	7.7	7.4	7.8	7.9	7.9	7.6	11.70	11.78	11.74	11.89	11.76	11.58	101.2	101.2	102.0	100.2	102.3	99.6
6.0	7.6	7.4	7.8	-	7.9	7.6	11.71	11.78	11.74	-	11.76	11.56	101.2	101.2	102.0	-	102.2	99.6
7.0	7.6	7.4	7.8	-	7.8	7.6	11.72	11.78	11.74	-	11.76	11.57	101.3	101.2	102.0	-	102.1	99.6
8.0	7.6	7.4	7.8	-	7.8	7.6	11.72	11.77	11.74	-	11.75	11.57	101.3	101.2	101.9	-	102.1	99.6
9.0	7.6	7.4	7.8	-	7.8	7.6	11.72	11.77	11.74	-	11.75	11.57	101.3	101.1	101.7	-	102.1	99.6
10.0	-	7.4	7.7	-	7.8	7.5	-	11.77	11.74	-	11.74	11.57	-	101.1	101.7	-	102.0	99.6
11.0	-	7.4	7.7	-	7.8	-	-	11.76	11.78	-	11.74	-	-	101.0	101.6	-	101.9	-
12.0	-	7.4	7.7	-	7.8	-	-	11.76	11.78	-	11.73	-	-	101.0	101.5	-	101.9	-
13.0	-	7.3	7.6	-	7.8	-	-	11.76	11.78	-	11.73	-	-	101.0	101.5	-	101.8	-
14.0	-	7.3	7.5	-	7.8	-	-	11.75	11.78	-	11.73	-	-	100.9	101.0	-	101.8	-
15.0	-	7.3	7.5	-	7.7	-	-	11.75	11.78	-	11.70	-	-	100.9	101.0	-	101.3	-
16.0	-	7.3	7.4	-	7.3	-	-	11.75	11.78	-	11.73	-	-	100.8	100.8	-	100.7	-
17.0	-	7.3	7.3	-	7.1	-	-	11.74	11.75	-	11.74	-	-	100.7	100.4	-	99.9	-
18.0	-	7.2	7.1	-	-	-	-	11.73	11.73	-	-	-	-	100.4	100.1	-	-	-
19.0	-	7.1	7.1	-	-	-	-	11.73	11.72	-	-	-	-	100.1	100.1	-	-	-
20.0	-	7.0	7.1	-	-	-	-	11.72	11.72	-	-	-	-	99.8	99.9	-	-	-
21.0	-	7.0	7.0	-	-	-	-	11.70	11.71	-	-	-	-	99.7	99.7	-	-	-
22.0	-	7.0	-	-	-	-	-	11.70	-	-	-	-	-	99.6	-	-	-	-

Notes: "-" = no data / not applicable. Total depth at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 9.9, 20.3, 22.7, 6.9, 15.0, and 11.4 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 2021

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
Date Collected	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21
1.0	7.87	8.07	8.13	7.98	8.25	8.06	158.9	158.6	158.5	156.8	158.4	159.1
2.0	7.76	7.99	8.07	7.95	8.13	8.03	158.7	158.6	158.5	156.7	158.5	159.2
3.0	7.76	7.92	8.04	7.94	8.07	8.03	158.6	158.6	158.6	156.7	158.6	159.2
4.0	7.76	7.94	8.08	7.94	8.04	8.03	159.0	158.6	158.6	156.6	158.6	159.4
5.0	7.76	7.94	8.09	7.93	8.04	8.03	159.0	158.6	158.6	156.6	158.6	159.9
6.0	7.75	7.93	8.07	-	8.02	8.03	158.9	158.6	158.6	-	158.7	159.0
7.0	7.75	7.93	8.05	-	8.02	8.03	158.9	158.6	158.5	-	158.8	159.1
8.0	7.74	7.92	8.04	-	8.02	8.03	158.7	158.6	158.5	-	158.8	159.1
9.0	7.73	7.92	8.04	-	8.01	8.03	158.6	158.6	158.5	-	158.8	159.1
10.0	-	7.91	8.02	-	8.01	8.03	-	158.6	158.4	-	158.8	159.1
11.0	-	7.91	8.01	-	8.01	-	-	158.6	158.6	-	158.8	-
12.0	-	7.90	8.01	-	8.01	-	-	158.6	158.6	-	158.8	-
13.0	-	7.90	8.00	-	8.01	-	-	158.6	158.5	-	158.7	-
14.0	-	7.89	7.99	-	8.00	-	-	158.6	158.7	-	158.7	-
15.0	-	7.88	7.98	-	8.00	-	-	158.6	158.7	-	158.5	-
16.0	-	7.88	7.97	-	7.98	-	-	158.6	158.6	-	158.4	-
17.0	-	7.87	7.95	-	7.95	-	-	158.7	158.5	-	158.5	-
18.0	-	7.86	7.93	-	-	-	-	158.7	158.4	-	-	-
19.0	-	7.85	7.93	-	-	-	-	158.4	158.2	-	-	-
20.0	-	7.83	7.92	-	-	-	-	158.5	158.5	-	-	-
21.0	-	7.82	7.91	-	-	-	-	158.4	158.5	-	-	-
22.0	-	7.81	-	-	-	-	-	158.5	-	-	-	-

Notes: "-" = no data / not applicable. Total depth at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 9.9, 20.3, 22.7, 6.9, 15.0, and 11.4 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 2021

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
Date Collected	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21
1.0	7.2	7.1	7.2	6.9	7.1	7.1	11.35	11.48	11.49	11.53	11.45	11.36	93.8	94.9	95.1	94.9	94.6	93.8
2.0	7.1	7.1	7.2	6.9	7.1	7.1	11.38	11.47	11.48	11.52	11.46	11.38	94.1	94.8	95.0	94.8	94.7	93.9
3.0	7.1	7.1	7.2	7.0	7.1	7.1	11.38	11.46	11.47	11.51	11.46	11.40	94.1	94.7	94.9	94.8	94.7	94.1
4.0	7.1	7.1	7.2	7.0	7.1	7.1	11.38	11.45	11.46	11.51	11.46	11.41	94.1	94.7	94.8	94.7	94.7	94.2
5.0	7.1	7.1	7.2	-	7.1	7.1	11.38	11.45	11.45	-	11.45	11.42	94.1	94.7	94.8	-	94.6	94.2
6.0	7.1	7.1	7.2	-	7.1	7.1	11.39	11.44	11.45	-	11.45	11.42	94.1	94.6	94.7	-	94.6	94.2
7.0	7.1	7.1	7.2	-	7.1	7.0	11.39	11.43	11.45	-	11.45	11.41	94.2	94.6	94.7	-	94.6	94.2
8.0	7.1	7.1	7.1	-	7.1	7.0	11.39	11.43	11.44	-	11.44	11.42	94.1	94.5	94.6	-	94.6	94.1
9.0	7.1	7.1	7.1	-	7.1	7.0	11.38	11.42	11.44	-	11.44	11.42	94.1	94.5	94.6	-	94.5	94.1
10.0	-	7.1	7.1	-	7.1	7.0	-	11.42	11.43	-	11.44	11.42	-	94.4	94.5	-	94.5	94.0
11.0	-	7.1	7.1	-	7.1	7.0	-	11.42	11.43	-	11.43	11.42	-	94.4	94.5	-	94.4	94.1
12.0	-	7.1	7.1	-	7.1	-	-	11.41	11.42	-	11.43	-	-	94.3	94.4	-	94.4	-
13.0	-	7.1	7.1	-	7.1	-	-	11.40	11.42	-	11.43	-	-	94.3	94.4	-	94.4	-
14.0	-	7.1	7.1	-	7.1	-	-	11.39	11.41	-	11.42	-	-	94.2	94.4	-	94.4	-
15.0	-	7.1	7.1	-	-	-	-	11.39	11.41	-	-	-	-	94.2	94.3	-	-	-
16.0	-	7.1	7.1	-	-	-	-	11.39	11.41	-	-	-	-	94.1	94.3	-	-	-
17.0	-	7.1	7.1	-	-	-	-	11.38	11.40	-	-	-	-	94.1	94.2	-	-	-
18.0	-	7.1	7.1	-	-	-	-	11.38	11.39	-	-	-	-	94.0	94.1	-	-	-
19.0	-	7.1	7.1	-	-	-	-	11.37	11.38	-	-	-	-	94.0	94.0	-	-	-
20.0	-	7.1	7.1	-	-	-	-	11.37	11.36	-	-	-	-	93.9	93.8	-	-	-
21.0	-	7.1	7.1	-	-	-	-	11.37	11.36	-	-	-	-	93.9	93.8	-	-	-

Notes: "-" indicates no available data. Total depth at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 10.3, 23.3, 21.6, 5.0 , 14.0, and 12.0 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 2021

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	DD Hab9	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7
Date Collected	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21
1.0	7.62	7.94	7.90	7.80	7.78	7.60	166.6	166.1	166.1	167.0	166.2	166.0
2.0	7.63	7.93	7.89	7.82	7.79	7.65	166.4	166.1	166.0	167.0	166.1	165.9
3.0	7.64	7.93	7.89	7.82	7.80	7.67	166.4	166.1	166.0	167.0	166.1	165.9
4.0	7.64	7.93	7.90	7.83	7.81	7.69	166.4	166.1	166.0	166.9	166.1	165.9
5.0	7.65	7.93	7.90	-	7.81	7.70	166.4	166.1	166.0	-	166.1	165.9
6.0	7.65	7.93	7.91	-	7.82	7.71	166.6	166.2	166.0	-	166.1	165.9
7.0	7.65	7.93	7.91	-	7.82	7.71	166.7	166.2	166.0	-	166.1	166.1
8.0	7.65	7.93	7.91	-	7.82	7.72	166.7	166.1	166.0	-	166.1	166.2
9.0	7.65	7.93	7.91	-	7.83	7.72	166.9	166.2	166.0	-	166.2	166.3
10.0	-	7.93	7.92	-	7.83	7.72	-	166.2	166.0	-	166.2	166.6
11.0	-	7.92	7.92	-	7.83	7.72	-	166.3	166.0	-	166.2	166.7
12.0	-	7.92	7.92	-	7.83	-	-	166.2	166.0	-	166.2	-
13.0	-	7.93	7.92	-	7.83	-	-	166.3	166.0	-	166.2	-
14.0	-	7.94	7.92	-	7.83	-	-	166.4	166.0	-	166.2	-
15.0	-	7.94	7.93	-	-	-	-	166.3	166.0	-	-	-
16.0	-	7.93	7.93	-	-	-	-	166.4	166.0	-	-	-
17.0	-	7.93	7.93	-	-	-	-	166.5	166.0	-	-	-
18.0	-	7.93	7.93	-	-	-	-	166.4	166.0	-	-	-
19.0	-	7.93	7.92	-	-	-	-	166.6	166.0	-	-	-
20.0	-	7.94	7.92	-	-	-	-	166.7	166.0	-	-	-
21.0	-	7.94	7.92	-	-	-	-	166.7	166.1	-	-	-

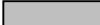
Notes: "-" indicates no available data. Total depth at stations DD Hab9, DL0-01-5, DL0-01-1, DL0-01-4, DL0-01-2, and DL0-01-7 was 10.3, 23.3, 21.6, 5.0 , 14.0, and 12.0 m, respectively, at the time of fall sampling.

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 2021

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	DL0-01-9	12-Aug-2021	7.6	3.70	colourless/clear	surface	8.0	11.40	96.4	8.01	160.8
						bottom	8.0	11.39	96.1	8.01	160.7
	DL0-01-4	12-Aug-2021	6.6	4.05	colourless/clear	surface	8.0	11.40	96.3	8.02	160.8
						bottom	8.0	11.21	94.1	8.00	160.7
	DL0-01-3	11-Aug-2021	8.2	4.23	Slightly turbid, blueish green hue	surface	7.9	11.47	96.9	7.98	159.9
						bottom	7.8	11.42	96.2	7.97	159.7
	DL0-01-11	11-Aug-2021	8.2	4.19	Slightly turbid, blueish green hue	surface	7.8	11.45	96.3	7.97	160.1
						bottom	7.8	11.37	95.5	7.93	160.6
Profundal (Deep) Stations	DL0-01-10	11-Aug-2021	7.9	4.28	Slightly turbid, blueish green hue	surface	7.8	11.46	96.4	7.98	159.7
						bottom	7.8	11.40	95.7	7.96	159.7
	DL0-01-5	11-Aug-2021	23.7	4.25	Slightly turbid, blueish green hue	surface	8.1	11.51	97.4	7.89	159.9
						bottom	7.9	11.34	95.6	7.90	159.8
	DL0-01-14	11-Aug-2021	22.0	4.10	Slightly turbid, blueish green hue	surface	8.1	11.45	96.8	7.83	159.8
						bottom	7.9	11.13	93.9	7.74	159.7
	DL0-01-15	11-Aug-2021	21.0	4.50	Slightly turbid, blueish green hue	surface	8.1	11.44	96.8	7.60	159.8
						bottom	7.8	11.32	95.1	7.57	159.9
	DL0-01-2	11-Aug-2021	17.5	4.22	Slightly turbid, blueish green hue	surface	7.9	11.49	96.8	7.96	159.8
						bottom	7.8	11.36	95.5	7.92	160.0
	DL0-01-12	11-Aug-2021	14.0	4.22	Slightly turbid, blueish green hue	surface	7.9	11.48	96.6	8.00	159.9
						bottom	7.8	11.38	95.7	7.98	159.9

Table C.40: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake NW Littoral and Profundal Stations, Mary River Project CREMP, August 2021

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test ^a	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	none	NO	0.214	Littoral	5	4.09	0.233	0.104	3.70	4.28
					Profundal	5	4.25	0.147	0.0657	4.10	4.50
Temperature (°C)	M-W	rank	NO	0.722	Littoral	5	7.88	0.110	0.0490	7.80	8.00
					Profundal	5	7.84	0.0548	0.0245	7.80	7.90
Dissolved Oxygen (mg/L)	M-W	rank	NO	0.151	Littoral	5	11.4	0.0847	0.0379	11.2	11.4
					Profundal	5	11.3	0.101	0.0451	11.1	11.4
Dissolved Oxygen (% saturation)	M-W	rank	NO	0.293	Littoral	5	95.5	0.844	0.377	94.1	96.2
					Profundal	5	95.2	0.740	0.331	93.9	95.7
pH (units)	tequal	none	NO	0.080	Littoral	5	7.97	0.0321	0.0144	7.93	8.01
					Profundal	5	7.82	0.166	0.0745	7.57	7.98
Specific Conductance (umho/cm)	tequal	none	NO	0.122	Littoral	5	160	0.531	0.237	160	161
					Profundal	5	160	0.114	0.0510	160	160

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

^a 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 2021

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	Transform-ation	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	0.035	Reference	5	10.3	2.18	0.974	7.70	12.6
						SDNW	5	7.70	0.663	0.297	6.60	8.20
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	5.50	0.420	0.188	4.85	5.90
						SDNW	5	4.09	0.233	0.104	3.70	4.28
	Temperature (°C)	M-W	rank	YES	0.010	Reference	5	7.30	0.141	0.0632	7.20	7.50
						SDNW	5	7.88	0.110	0.0490	7.80	8.00
	Dissolved Oxygen (mg/L)	tequal	none	YES	0.001	Reference	5	11.7	0.0526	0.0235	11.6	11.8
						SDNW	5	11.4	0.0847	0.0379	11.2	11.4
	Dissolved Oxygen (% saturation)	tequal	none	YES	0.016	Reference	5	97.1	0.791	0.354	96.3	98.0
						SDNW	5	95.5	0.844	0.377	94.1	96.2
Profundal (Deep) Stations	Station Depth (m)	tequal	none	NO	0.671	Reference	5	20.5	1.51	0.673	18.2	22.4
						SDNW	5	19.6	3.88	1.74	14.0	23.7
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	5.58	0.250	0.112	5.19	5.80
						SDNW	5	4.25	0.147	0.0657	4.10	4.50
	Temperature (°C)	M-W	rank	YES	0.009	Reference	5	7.12	0.0447	0.0200	7.10	7.20
						SDNW	5	7.84	0.0548	0.0245	7.80	7.90
	Dissolved Oxygen (mg/L)	tequal	none	YES	0.001	Reference	5	11.7	0.0942	0.0421	11.6	11.8
						SDNW	5	11.3	0.101	0.0451	11.1	11.4
	Dissolved Oxygen (% saturation)	tequal	none	YES	0.028	Reference	5	96.1	0.303	0.136	95.7	96.5
						SDNW	5	95.2	0.740	0.331	93.9	95.7
	pH (units)	tequal	none	YES	0.001	Reference	5	7.37	0.111	0.0495	7.29	7.56
						SDNW	5	7.82	0.166	0.0745	7.57	7.98
	Specific Conductance (µS/cm)	tequal	none	YES	0.001	Reference	5	74.8	0.0548	0.0245	74.7	74.8
						SDNW	5	160	0.114	0.0510	160	160

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

^a 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, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	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
					23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21	21-Apr-21
Conventional	Conductivity (lab)	umho/cm	-	-	189	192	191	194	192	196	194	196	190	192	193	195
	pH (lab)	pH	6.5 - 9.0	-	7.73	7.64	7.53	7.64	7.67	7.70	7.67	7.66	7.61	7.64	7.73	7.72
	Hardness (as CaCO ₃)	mg/L	-	-	92.4	94.7	90.8	93.4	92.9	93.6	95.3	96	93.2	95	92.4	94.9
	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	-	-	110	114	107	122	102	110	112	127	115	115	107	109
	Turbidity	NTU	-	-	<0.10	0.15	<0.10	0.30	<0.10	<0.10	0.32	<0.10	0.10	<0.10	<0.10	<0.10
	Alkalinity (as CaCO ₃)	mg/L	-	-	71.8	73.2	75.8	76.7	75.7	76.9	73.9	76.3	74.5	74.9	78.0	78.2
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.299	0.316	0.308	0.300	0.307	0.301	0.303	0.298	0.293	0.305	0.294	0.301
	Nitrite	mg/L	0.06	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.109	0.095	0.096	0.112	0.100	0.112	0.106	0.105	0.100	0.109	0.111	0.148
	Dissolved Organic Carbon	mg/L	-	-	1.46	1.49	1.34	1.53	1.42	1.45	1.49	1.69	1.42	1.48	1.53	1.50
	Total Organic Carbon	mg/L	-	-	1.48	1.45	1.40	1.50	1.41	1.85	1.55	1.47	1.51	1.51	1.49	1.51
	Total Phosphorus	mg/L	0.020 ^c	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0226	<0.0020	<0.0020	<0.0020	0.0048	<0.0020	<0.0020
	Phenols	mg/L	0.004 ^d	-	<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	-	-	<0.050	<0.050	5.17	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	5.21	5.35	0.308	5.20	5.35	5.29	5.28	5.41	5.23	5.29	5.26	5.18
	Sulphate (SO ₄)	mg/L	218 ^e	218	18.4	18.8	17.8	18.1	18.8	18.3	18.6	19.0	18.4	18.7	18.0	18.3
	Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 ^c	0.0029	0.0019	0.0023	0.0035	0.0024	0.0080	0.0122	0.0014	0.0093	0.0167	0.0023
Antimony (Sb)		mg/L	0.020 ^c	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Arsenic (As)		mg/L	0.005	0.005	0.000074	0.000054	0.000054	0.000045	0.000058	0.000056	0.000063	0.000050	0.000058	0.000073	0.000062	0.000060
Barium (Ba)		mg/L	-	-	0.00879	0.00854	0.00895	0.00875	0.00875	0.00903	0.00899	0.00893	0.00894	0.00911	0.00882	0.00884
Beryllium (Be)		mg/L	0.011 ^c	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Bismuth (Bi)		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
Boron (B)		mg/L	1.5	-	0.0187	0.0184	0.0179	0.0179	0.0183	0.0187	0.0187	0.0185	0.0183	0.0184	0.0182	0.0188
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	-	-	18.4	17.9	17.6	17.8	17.8	18.1	18.3	18.2	18.0	18.0	18.2	18.2
Chromium (Cr)		mg/L	0.0089	0.0089	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	0.00010	0.00011	0.00010	<0.00010
Cobalt (Co)		mg/L	0.0009 ^c	0.004	0.0000231	0.0000225	0.0000218	0.0000263	0.0000214	0.0000265	0.0000259	0.0000220	0.0000259	0.0000249	0.0000201	0.0000220
Copper (Cu)		mg/L	0.002	0.0024	0.000898	0.000831	0.000848	0.000884	0.000865	0.000970	0.000902	0.000883	0.000965	0.000844	0.000883	0.000838
Iron (Fe)		mg/L	0.30	0.300	0.0035	0.0029	0.0047	0.0034	0.0039	0.0087	0.0108	0.0026	0.0123	0.0155	0.0027	0.0025
Lead (Pb)		mg/L	0.001	0.001	<0.000010	<0.000010	<0.000010	0.000017	<0.000010	0.000012	0.000016	<0.000010	0.000016	<0.000010	<0.000010	<0.000010
Lithium (Li)		mg/L	-	-	0.00173	0.00171	0.00166	0.00168	0.00170	0.00174	0.00176	0.00174	0.00170	0.00175	0.00167	0.00174
Magnesium (Mg)		mg/L	-	-	12.4	12.3	12.4	12.2	12.5	12.7	12.6	12.6	12.4	12.5	12.1	12.4
Manganese (Mn)		mg/L	0.935 ^e	-	0.000522	0.000570	0.000807	0.000531	0.000719	0.000640	0.000758	0.000543	0.000832	0.000806	0.000505	0.000463
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	-	0.00116	0.00111	0.00112	0.00114	0.00113	0.00119	0.00115	0.00116	0.00112	0.00113	0.00111	0.00116
Nickel (Ni)		mg/L	0.025	0.025	0.000732	0.000712	0.000736	0.000762	0.000746	0.000789	0.000766	0.000726	0.000749	0.000729	0.000738	0.000746
Potassium (K)		mg/L	-	-	1.61	1.61	1.62	1.62	1.61	1.70	1.68	1.66	1.62	1.67	1.64	1.61
Selenium (Se)		mg/L	0.001	-	0.000057	<0.000040	0.000045	<0.000040	0.000054	<0.000040	0.000046	<0.000040	<0.000040	<0.000040	0.000053	<0.000040
Silicon (Si)		mg/L	-	-	0.755	0.749	0.921	0.735	0.893	0.761	0.777	0.787	0.813	0.790	0.723	0.728
Silver (Ag)		mg/L	0.00025	0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Sodium (Na)		mg/L	-	-	2.42	2.39	2.49	2.38	2.41	2.54	2.47	2.47	2.43	2.44	2.39	2.41
Strontium (Sr)		mg/L	-	-	0.0123	0.0121	0.0119	0.0120	0.0123	0.0124	0.0123	0.0123	0.0121	0.0121	0.0120	0.0119
Thallium (Tl)		mg/L	0.0008	0.0008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
Tin (Sn)		mg/L	-	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Titanium (Ti)		mg/L	-	-	0.000107	<0.000050	0.000119	0.000107	0.000067	0.000537	0.000740	<0.000050	0.000620	0.00123	<0.000050	<0.000050
Uranium (U)		mg/L	0.015	-	0.00160	0.00159	0.00154	0.00157	0.00155	0.00160	0.00158	0.00161	0.00156	0.00161	0.00162	0.00160
Vanadium (V)		mg/L	0.006 ^c	0.006	0.000063	0.000063	0.000061	0.000069	0.000065	0.000068	0.000077	0.000068	0.000075	0.000075	0.000060	0.000058
Zinc (Zn)		mg/L	0.030	0.030	0.00052	<0.00050	<0.00050	0.00064	<0.00050	0.00130	0.00064	<0.00050	0.00058	0.00076	0.00053	0.00051

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

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

Table C.42: Water Chemistry at Sheardown Lake NW (DLO-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	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
					22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	23-Jul-21	23-Jul-21
Conventional	Conductivity (lab)	umho/cm	-	-	164	162	162	162	161	162	162	163	163	162	162	163
	pH (lab)	pH	6.5 - 9.0	-	7.95	7.93	7.93	7.97	7.91	8.08	8.06	8.12	8.01	7.99	8.03	8.09
	Hardness (as CaCO ₃)	mg/L	-	-	77.7	76.5	77	77.4	73.8	77.2	74.7	76.5	73.9	76.3	71.6	72
	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	-	-	98	90	100	96	92	97	90	101	101	100	86	94
	Turbidity	NTU	-	-	1.60	1.74	1.54	1.74	1.62	1.59	1.51	1.56	1.58	1.61	1.42	1.19
Nutrients and Organics	Alkalinity (as CaCO ₃)	mg/L	-	-	58.9	58.6	58.6	58.6	58.4	58.2	59.1	59.1	58.4	59.0	58.7	59.0
	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	0.0078	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.230	0.226	0.229	0.229	0.226	0.229	0.231	0.232	0.227	0.226	0.226	0.229
	Nitrite	mg/L	0.06	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.086	0.099	0.100	0.090	0.109	0.113	0.137	0.127	0.108	0.118	0.186	0.109
	Dissolved Organic Carbon	mg/L	-	-	1.36	1.71	1.29	1.31	1.39	1.42	1.34	1.37	1.52	1.32	1.60	1.58
Anions	Total Organic Carbon	mg/L	-	-	1.27	1.21	1.30	1.30	1.22	1.31	1.38	1.35	1.34	1.39	1.40	1.44
	Total Phosphorus	mg/L	0.020 ^a	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0024	<0.0020	<0.0020
	Phenols	mg/L	0.004 ^a	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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	4.18	4.14	4.14	4.14	4.13	4.14	4.15	4.13	4.13	4.09	4.15	4.15
	Sulphate (SO ₄)	mg/L	218 ^b	218	14.6	14.3	14.3	14.3	14.3	14.3	14.4	14.4	14.3	14.3	14.4	14.4
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 ^c	0.0204	0.0193	0.0256	0.0202	0.0193	0.0212	0.0163	0.0203	0.0190	0.0203	0.0213	0.0223
	Antimony (Sb)	mg/L	0.020 ^a	-	<0.000020	0.000048	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	0.000179	0.000156	0.000161	0.000073	0.000071	0.000063	0.000057	0.000045	0.000053	0.000067	0.000049	0.000061
	Barium (Ba)	mg/L	-	-	0.00756	0.00738	0.00761	0.00760	0.00762	0.00742	0.00777	0.00770	0.00759	0.00765	0.00733	0.00758
	Beryllium (Be)	mg/L	0.011 ^a	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	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
	Boron (B)	mg/L	1.5	-	0.0159	0.0164	0.0166	0.0164	0.0158	0.0165	0.0162	0.0166	0.0162	0.0161	0.0154	0.0155
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	0.0000053	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	14.6	14.2	14.5	14.7	14.2	14.2	14.4	14.6	14.2	14.1	13.4	13.3
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00013	0.00020	0.00011	0.00010	0.00094	0.00010	<0.00010	0.00010	0.00010	0.00010	0.00015	0.00012
	Cobalt (Co)	mg/L	0.0009 ^a	0.004	0.0000373	0.0000372	0.0000379	0.0000407	0.0000398	0.0000334	0.0000359	0.0000376	0.0000337	0.0000383	0.0000347	0.0000325
	Copper (Cu)	mg/L	0.002	0.0024	0.00121	0.000993	0.00115	0.000886	0.000974	0.000867	0.000896	0.000849	0.000788	0.000824	0.000802	0.000833
	Iron (Fe)	mg/L	0.30	0.300	0.0266	0.0258	0.0354	0.0257	0.0377	0.0263	0.0205	0.0282	0.0261	0.0284	0.0285	0.0411
	Lead (Pb)	mg/L	0.001	0.001	0.000049	0.000037	0.000042	0.000036	0.000034	0.000034	0.000034	0.000038	0.000034	0.000033	0.000032	0.000038
	Lithium (Li)	mg/L	-	-	0.00163	0.00167	0.00167	0.00171	0.00161	0.00166	0.00164	0.00171	0.00166	0.00163	0.00148	0.00148
	Magnesium (Mg)	mg/L	-	-	10.0	9.70	9.48	9.60	9.82	9.76	9.86	9.71	9.60	9.59	9.11	9.14
	Manganese (Mn)	mg/L	0.935 ^b	-	0.00221	0.00222	0.00277	0.00215	0.00228	0.00214	0.00212	0.00216	0.00223	0.00208	0.00210	0.00217
	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	-	0.00103	0.00100	0.000999	0.00102	0.00104	0.00101	0.00102	0.000990	0.00101	0.00103	0.000964	0.000980
	Nickel (Ni)	mg/L	0.025	0.025	0.000680	0.000736	0.000689	0.000664	0.000714	0.000682	0.000668	0.000638	0.000615	0.000641	0.000669	0.000620
	Potassium (K)	mg/L	-	-	1.46	1.41	1.43	1.45	1.42	1.43	1.49	1.44	1.47	1.43	1.51	1.56
	Selenium (Se)	mg/L	0.001	-	0.000044	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	0.000045	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040
	Silicon (Si)	mg/L	-	-	0.676	0.682	0.716	0.711	0.720	0.676	0.665	0.657	0.674	0.692	0.667	0.647
	Silver (Ag)	mg/L	0.00025	0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	-	-	2.05	1.96	1.97	1.96	1.96	2.03	2.01	2.01	1.90	1.96	1.99	2.05
	Strontium (Sr)	mg/L	-	-	0.0112	0.0111	0.0112	0.0111	0.0111	0.0112	0.0115	0.0114	0.0113	0.0114	0.0109	0.0109
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Tin (Sn)	mg/L	-	-	0.000026	0.000024	0.000021	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	-	-	0.00115	0.00117	0.00163	0.00115	0.00108	0.00115	0.000918	0.00102	0.00120	0.00114	0.00118	0.00122
	Uranium (U)	mg/L	0.015	-	0.00143	0.00140	0.00137	0.00137	0.00139	0.00140	0.00136	0.00137	0.00138	0.00139	0.00140	0.00139
	Vanadium (V)	mg/L	0.006 ^a	0.006	0.000081	0.000078	0.000094	0.000082	0.000092	0.000081	0.000076	0.000074	0.000081	0.000077	0.000086	0.000089
	Zinc (Zn)	mg/L	0.030	0.030	0.00118	0.00113	0.00069	0.00075	0.00059	0.00076	0.00076	0.00078	0.00150	0.00053	0.00089	0.00117

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD

 Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

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

Table C.42: Water Chemistry at Sheardown Lake NW (DLO-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	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
					27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21
Conventional	Conductivity (lab)	umho/cm	-	-	174	174	173	174	174	175	175	174	173	175	174	175
	pH (lab)	pH	6.5 - 9.0	-	8.03	8.02	8.03	8.05	8.06	8.05	8.06	8.02	8.04	8.06	8.07	8.06
	Hardness (as CaCO ₃)	mg/L	-	-	78	76	77.4	76.8	76.7	76.1	77.1	76.8	76.8	78.7	76.7	76.6
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	17.2	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	94	86	84	92	86	89	87	94	85	87	87	92
	Turbidity	NTU	-	-	0.80	0.76	0.79	1.02	0.80	0.72	0.76	0.82	2.16	0.80	0.98	0.82
Nutrients and Organics	Alkalinity (as CaCO ₃)	mg/L	-	-	62.1	62.9	61.8	62.5	61.9	61.9	62.7	62.7	62.7	60.9	61.7	62
	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.259	0.257	0.259	0.256	0.255	0.254	0.262	0.263	0.257	0.258	0.253	0.253
	Nitrite	mg/L	0.06	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0020
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.105	0.107	0.123	0.126	0.131	0.141	0.127	0.154	0.115	0.099	0.124	0.101
	Dissolved Organic Carbon	mg/L	-	-	2.69	2.15	1.57	1.54	1.62	4.43	1.37	1.33	1.47	1.53	2.13	4.36
	Total Organic Carbon	mg/L	-	-	2.27	2.45	1.40	1.38	1.54	2.28	1.53	1.36	1.42	1.42	2.29	2.51
	Total Phosphorus	mg/L	0.020 ^α	-	0.0020	<0.0020	0.0024	0.0028	0.0029	0.0024	0.0027	0.0024	0.0082	<0.0020	0.0025	<0.0020
Anions	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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	4.61	4.61	4.62	4.58	4.62	4.60	4.62	4.64	4.63	4.63	4.60	4.58
	Sulphate (SO ₄)	mg/L	218 ^β	218	16.6	16.5	16.6	16.4	16.6	16.5	16.7	16.7	16.6	16.6	16.4	16.4
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 ^c	0.0163	0.0148	0.0164	0.0158	0.0136	0.0155	0.0149	0.0139	0.132	0.0154	0.0128	0.0127
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.000020	0.000025	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	0.000056	0.000071	0.000053	0.000050	0.000047	0.000044	0.000048	0.000050	0.000063	0.000061	0.000055	0.000052
	Barium (Ba)	mg/L	-	-	0.00769	0.00790	0.00783	0.00781	0.00784	0.00806	0.00780	0.00800	0.00912	0.00767	0.00767	0.00793
	Beryllium (Be)	mg/L	0.011 ^α	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000078	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	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
	Boron (B)	mg/L	1.5	-	0.0168	0.0163	0.0162	0.0166	0.0161	0.0166	0.0166	0.0164	0.0171	0.0165	0.0166	0.0164
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000060	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	14.0	13.9	13.5	14.2	13.9	14.0	13.6	14.1	14.5	13.8	13.8	14.1
	Chromium (Cr)	mg/L	0.0089	0.0089	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	0.00033	<0.00010	<0.00010	<0.00010
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	0.0000307	0.0000326	0.0000307	0.0000335	0.0000357	0.0000305	0.0000301	0.0000300	0.000170	0.0000321	0.0000293	0.0000309
	Copper (Cu)	mg/L	0.002	0.0024	0.000881	0.000862	0.000924	0.000854	0.000831	0.000849	0.000813	0.000835	0.00121	0.000872	0.000843	0.000839
	Iron (Fe)	mg/L	0.30	0.300	0.0197	0.0210	0.0203	0.0193	0.0183	0.0192	0.0190	0.0179	0.233	0.0182	0.0171	0.0166
	Lead (Pb)	mg/L	0.001	0.001	0.000021	0.000026	0.000020	0.000021	0.000019	0.000030	0.000019	0.000019	0.000445	0.000019	0.000019	0.000018
	Lithium (Li)	mg/L	-	-	0.00162	0.00157	0.00155	0.00161	0.00158	0.00158	0.00156	0.00156	0.00178	0.00157	0.00155	0.00156
	Magnesium (Mg)	mg/L	-	-	10.1	9.93	9.95	9.92	9.95	9.69	9.95	10.0	10.2	10.2	9.93	9.80
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00111	0.00108	0.00108	0.00106	0.00104	0.00107	0.00104	0.00112	0.0177	0.00110	0.00101	0.000985
	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	-	0.00120	0.00119	0.00118	0.00120	0.00119	0.00123	0.00122	0.00121	0.00104	0.00122	0.00124	0.00122
	Nickel (Ni)	mg/L	0.025	0.025	0.000665	0.000673	0.000641	0.000645	0.000640	0.000669	0.000672	0.000651	0.00116	0.000641	0.000647	0.000645
	Potassium (K)	mg/L	-	-	1.55	1.53	1.54	1.54	1.53	1.56	1.53	1.55	1.61	1.56	1.53	1.53
	Selenium (Se)	mg/L	0.001	-	<0.000040	<0.000040	<0.000040	0.000041	<0.000040	<0.000040	0.000042	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040
	Silicon (Si)	mg/L	-	-	0.578	0.556	0.554	0.635	0.567	0.534	0.560	0.561	0.705	0.550	0.550	0.527
	Silver (Ag)	mg/L	0.00025	0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	-	-	2.09	2.01	2.07	2.10	2.03	2.04	2.06	2.09	2.12	2.09	2.07	2.06
	Strontium (Sr)	mg/L	-	-	0.0118	0.0119	0.0120	0.0119	0.0119	0.0122	0.0120	0.0119	0.0120	0.0120	0.0120	0.0119
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000091	<0.0000050	<0.0000050	<0.0000050
	Tin (Sn)	mg/L	-	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	-	-	0.000887	0.000731	0.000753	0.000769	<0.00070	0.000785	0.000691	0.000682	0.00973	0.000691	0.000637	0.000591
	Uranium (U)	mg/L	0.015	-	0.00185	0.00184	0.00180	0.00179	0.00180	0.00183	0.00181	0.00188	0.00194	0.00178	0.00184	0.00179
	Vanadium (V)	mg/L	0.006 ^α	0.006	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000322	<0.000050	<0.000050	<0.000050
	Zinc (Zn)	mg/L	0.030	0.030	0.00051	0.00057	0.00053	0.00055	<0.00050	0.00060	<0.00050	<0.00050	0.00134	<0.00050	<0.00050	<0.00050

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

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

Table C.43: 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 2021, and at the Sheardown Lake Basins Between 2021 and the Baseline Period

Variable	Sheardown Lake NW					Sheardown Lake SE				
	2021 vs Reference Lake 3		2021 vs Baseline			2021 vs Reference Lake 3		2021 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	2.1	2.1	1.4	1.4	1.4	1.5	1.7	1.2	1.2	1.3
Hardness (as CaCO ₃)	2.0	2.0	1.4	1.3	1.3	1.4	1.7	1.2	1.1	1.2
Total Suspended Solids (TSS)	1.0	1.6	1.0	0.5	1.2	1.0	1.0	0.9	0.8	0.8
Total Dissolved Solids (TDS)	3.5	2.1	1.2	1.3	1.1	2.6	1.7	1.0	1.1	1.0
Turbidity	6.7	5.5	0.6	2.0	1.7	9.1	5.3	0.4	1.3	0.5
Alkalinity (as CaCO ₃)	1.6	1.3	1.1	1.0	1.1	1.2	1.2	1.1	1.0	1.1
Total Ammonia	0.4	0.5	0.0	0.1	0.1	0.4	0.5	0.1	0.2	0.2
Nitrate	11	13	3.0	2.3	2.5	5.9	8.7	2.2	1.2	1.7
Nitrite	0.2	0.2	0.3	0.0	0.2	0.2	0.2	0.3	0.1	0.2
Total Kjeldahl Nitrogen (TKN)	0.5	0.7	0.5	0.7	0.8	0.5	0.7	0.8	0.7	0.5
Dissolved Organic Carbon	0.5	0.6	0.8	0.8	1.3	0.4	0.6	0.9	0.8	1.6
Total Organic Carbon	0.4	0.5	0.8	0.7	1.0	0.3	0.4	0.8	0.7	1.0
Total Phosphorus	0.5	0.9	1.1	0.3	0.5	0.5	0.8	0.5	0.3	0.5
Phenols	0.9	1.0	1.0	1.0	1.0	0.9	1.0	1.0	1.0	1.0
Bromide (Br)	0.5	0.5	-	0.2	0.2	0.5	0.5	0.3	0.2	0.2
Chloride (Cl)	3.1	3.4	1.5	1.7	1.7	2.1	2.7	1.6	1.2	1.2
Sulphate (SO ₄)	3.9	4.5	5.6	5.3	5.5	2.3	2.9	4.4	3.8	4.4
Aluminum (Al)	5.7	6.7	1.8	1.4	1.2	13	7.2	1.1	0.6	0.4
Antimony (Sb)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Arsenic (As)	0.9	0.5	0.6	0.9	0.5	0.5	0.6	0.7	0.5	0.6
Barium (Ba)	1.1	1.2	1.5	1.5	1.5	0.9	1.1	1.4	1.1	1.2
Beryllium (Be)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bismuth (Bi)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Boron (B)	1.6	1.7	1.7	1.6	1.7	1.0	1.3	1.6	1.0	1.3
Cadmium (Cd)	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4
Calcium (Ca)	1.9	1.9	1.3	1.2	1.2	1.4	1.6	1.2	1.1	1.1
Chromium (Cr)	0.4	0.2	0.7	1.6	0.5	0.3	0.3	0.7	1.2	0.6
Cobalt (Co)	0.4	0.4	0.2	0.4	0.4	0.4	0.3	0.2	0.4	0.3
Copper (Cu)	1.1	1.1	0.9	0.9	0.7	0.9	1.1	0.8	0.6	0.8
Iron (Fe)	1.0	1.2	0.2	1.0	1.0	2.0	1.0	0.4	0.6	0.4
Lead (Pb)	0.7	1.1	0.2	0.7	0.1	1.1	0.5	0.1	0.5	0.3
Lithium (Li)	1.6	1.6	0.7	0.5	0.0	1.1	1.3	0.5	0.2	0.3
Magnesium (Mg)	2.1	2.1	1.4	1.4	1.4	1.4	1.7	1.3	1.2	1.3
Manganese (Mn)	3.1	4.0	1.0	1.2	1.1	4.4	3.2	1.1	0.6	0.6
Mercury (Hg)	1.0	1.0	0.5	0.4	0.1	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	6.5	7.7	1.4	1.6	1.8	3.5	4.5	1.4	1.6	1.6
Nickel (Ni)	1.3	1.4	1.0	1.0	1.0	1.0	1.1	0.9	0.8	0.9
Potassium (K)	1.5	1.7	1.6	1.8	1.8	1.1	1.3	1.5	1.7	1.6
Selenium (Se)	0.0	0.0	0.4	0.5	0.5	0.0	0.0	0.4	0.4	0.4
Silicon (Si)	1.3	1.2	1.0	1.1	0.9	1.1	1.1	0.7	0.8	0.7
Silver (Ag)	0.5	0.5	1.3	0.5	0.6	0.5	0.5	0.8	0.7	0.8
Sodium (Na)	2.0	2.2	1.7	1.8	1.8	1.5	1.9	1.9	2.3	2.0
Strontium (Sr)	1.3	1.4	1.3	1.5	1.5	0.9	1.2	1.1	1.0	1.1
Thallium (Tl)	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
Tin (Sn)	0.2	0.2	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0
Titanium (Ti)	0.1	0.1	0.0	0.1	0.1	0.3	0.1	0.0	0.3	0.1
Uranium (U)	4.3	5.3	1.7	1.9	2.2	2.6	3.6	1.4	1.5	1.7
Vanadium (V)	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1
Zinc (Zn)	0.3	0.2	0.2	0.4	0.2	0.2	0.2	0.2	0.4	0.3

- Denotes parameter with an AEMP benchmark.
- Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference or baseline period value).
- Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference or baseline period value).
- Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2021 and Reference Lake 3 or 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, 2021

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
			23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21	21-Apr-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0014	0.0015	0.0012	0.0018	0.0013	0.0012	0.0015	0.0012	0.0013	0.0012	0.0017	0.0025	0.0030	0.0027	0.0027	0.0032	0.0032	0.0034
	Antimony (Sb)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.000052	0.000055	0.000055	0.000050	0.000061	0.000064	0.000059	0.000056	0.000069	0.000060	0.000059	0.000059	0.000124	0.000079	0.000052	0.000067	0.000070	0.000060
	Barium (Ba)	mg/L	0.00834	0.00856	0.00866	0.00851	0.00829	0.00865	0.00838	0.00877	0.00830	0.00843	0.00852	0.00902	0.00736	0.00725	0.00764	0.00728	0.00740	0.00736
	Beryllium (Be)	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
	Bismuth (Bi)	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
	Boron (B)	mg/L	0.0179	0.0183	0.0180	0.0183	0.0181	0.0181	0.0180	0.0185	0.0180	0.0188	0.0181	0.0179	0.0166	0.0159	0.0161	0.0164	0.0159	0.0170
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	17.6	18.2	17.5	18.2	17.8	17.6	18.0	18.1	17.8	18.4	17.5	17.9	15.0	14.3	14.5	14.5	14.0	14.8
	Chromium (Cr)	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	0.00011	<0.00010	<0.00010
	Cobalt (Co)	mg/L	0.0000184	0.0000232	0.0000199	0.0000185	0.0000188	0.0000222	0.0000209	0.0000231	0.0000187	0.0000212	0.0000186	0.0000212	0.0000187	0.0000145	0.0000164	0.0000158	0.0000165	0.0000162
	Copper (Cu)	mg/L	0.000806	0.000811	0.000803	0.000847	0.000808	0.000868	0.000839	0.000857	0.000830	0.000881	0.000916	0.000857	0.000921	0.000788	0.000751	0.000789	0.000815	0.000767
	Iron (Fe)	mg/L	<0.0010	0.0014	<0.0010	0.0026	0.0012	0.0017	0.0029	<0.0010	<0.0010	0.0013	0.0017	0.0020	0.0023	0.0024	0.0019	0.0022	0.0023	0.0026
	Lead (Pb)	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	0.000020
	Lithium (Li)	mg/L	0.00166	0.00168	0.00165	0.00172	0.00168	0.00169	0.00168	0.00173	0.00167	0.00173	0.00169	0.00171	0.00170	0.00168	0.00170	0.00170	0.00163	0.00178
	Magnesium (Mg)	mg/L	11.8	11.9	11.4	11.6	11.8	12.1	12.2	12.3	11.9	11.9	11.8	12.2	9.77	9.90	9.89	10.0	9.42	9.78
	Manganese (Mn)	mg/L	0.000086	0.000190	0.000101	0.000133	0.000084	0.000088	0.000132	0.000167	0.000093	0.000111	0.000091	0.000109	0.000155	0.000142	0.000071	0.000120	0.000078	0.000168
	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	0.00111	0.00115	0.00111	0.00118	0.00111	0.00119	0.00113	0.00118	0.00114	0.00117	0.00111	0.00116	0.00104	0.00101	0.000974	0.00104	0.00104	0.00102
	Nickel (Ni)	mg/L	0.000744	0.000719	0.000701	0.000721	0.000696	0.000765	0.000703	0.000732	0.000698	0.000734	0.000706	0.000745	0.000626	0.000608	0.000611	0.000735	0.000602	0.000602
	Potassium (K)	mg/L	1.59	1.60	1.52	1.56	1.55	1.58	1.60	1.61	1.57	1.61	1.55	1.64	1.48	1.48	1.48	1.47	1.42	1.47
	Selenium (Se)	mg/L	0.000041	0.000045	0.000043	0.000052	0.000046	0.000043	0.000049	<0.000040	0.000043	<0.000040	<0.000040	0.000041	0.000052	0.000057	<0.000040	<0.000040	<0.000040	0.000045
	Silicon (Si)	mg/L	0.752	0.755	0.904	0.731	0.916	0.751	0.746	0.750	0.844	0.766	0.752	0.769	0.676	0.671	0.686	0.708	0.667	0.673
	Silver (Ag)	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
	Sodium (Na)	mg/L	2.39	2.36	2.24	2.31	2.36	2.34	2.42	2.40	2.35	2.37	2.32	2.38	2.02	2.03	2.04	2.01	1.93	1.97
	Strontium (Sr)	mg/L	0.0118	0.0120	0.0118	0.0122	0.0118	0.0121	0.0119	0.0122	0.0121	0.0122	0.0119	0.0121	0.0111	0.0112	0.0112	0.0113	0.0113	0.0112
	Thallium (Tl)	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
	Tin (Sn)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	<0.000050	<0.000050	<0.000050	0.000072	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000082	<0.000050	<0.000050	<0.000050	<0.000050	0.000055	0.000074
	Uranium (U)	mg/L	0.00157	0.00161	0.00153	0.00158	0.00149	0.00158	0.00159	0.00163	0.00157	0.00160	0.00158	0.00166	0.00142	0.00140	0.00138	0.00140	0.00138	0.00141
	Vanadium (V)	mg/L	0.000056	0.000057	0.000055	0.000055	0.000055	0.000056	0.000057	0.000055	0.000053	0.000054	0.000056	0.000058	0.000053	0.000057	0.000057	0.000056	0.000056	0.000056
	Zinc (Zn)	mg/L	0.00051	<0.00050	<0.00050	0.00059	<0.00050	0.00068	<0.00050	<0.00050	<0.00050	0.00063	<0.00050	0.00067	<0.00050	0.00058	<0.00050	0.00064	0.00119	0.00056

Table C.44: Dissolved Metal Concentrations at Sheardown Lake NW Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Summer Sampling Event						Fall Sampling Event											
			DL0-01-4	DL0-01-4	DL0-01-2	DL0-01-2	DL0-01-7	DL0-01-7	DD-HAB9-STN1	DD-HAB9-STN1	DL0-01-1	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
			22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	23-Jul-21	23-Jul-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0050	0.0071	0.0030	0.0028	0.0028	0.0033	0.0200	0.0172	0.0029	0.0030	0.0037	0.0034	0.0034	0.0036	0.0026	0.0029	0.0035	0.0028
	Antimony (Sb)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.000057	0.000054	0.000066	0.000046	0.000059	0.000070	0.000073	0.000063	0.000063	0.000054	0.000072	0.000064	0.000068	0.000056	0.000054	0.000063	0.000071	0.000072
	Barium (Ba)	mg/L	0.00750	0.00738	0.00742	0.00748	0.00701	0.00699	0.00783	0.00776	0.00761	0.00759	0.00755	0.00764	0.00754	0.00792	0.00734	0.00768	0.00753	0.00757
	Beryllium (Be)	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
	Bismuth (Bi)	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
	Boron (B)	mg/L	0.0159	0.0155	0.0153	0.0159	0.0163	0.0160	0.0174	0.0170	0.0171	0.0169	0.0175	0.0173	0.0168	0.0166	0.0171	0.0173	0.0172	0.0170
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	14.0	14.3	13.8	14.4	13.7	13.7	15.0	14.5	14.7	14.6	14.8	15.0	14.6	14.4	14.9	15.0	14.6	14.7
	Chromium (Cr)	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
	Cobalt (Co)	mg/L	0.0000201	0.0000196	0.0000147	0.0000178	0.0000183	0.0000170	0.0000314	0.0000297	0.0000194	0.0000196	0.0000225	0.0000175	0.0000267	0.0000184	0.0000190	0.0000202	0.0000202	0.0000218
	Copper (Cu)	mg/L	0.000810	0.000892	0.000800	0.000774	0.000790	0.000779	0.000916	0.000819	0.000809	0.000782	0.000808	0.000762	0.000810	0.000784	0.000741	0.000795	0.000784	0.000762
	Iron (Fe)	mg/L	0.0030	0.0035	0.0025	0.0021	0.0020	0.0022	0.0242	0.0296	0.0021	0.0023	0.0026	0.0021	0.0043	0.0030	0.0026	0.0022	0.0032	0.0023
	Lead (Pb)	mg/L	<0.000010	0.000012	<0.000010	<0.000010	<0.000010	<0.000010	0.000025	0.000020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Lithium (Li)	mg/L	0.00165	0.00163	0.00158	0.00162	0.00151	0.00151	0.00173	0.00172	0.00168	0.00166	0.00169	0.00171	0.00167	0.00166	0.00168	0.00170	0.00167	0.00167
	Magnesium (Mg)	mg/L	9.68	9.90	9.58	9.80	9.06	9.18	9.84	9.65	9.71	9.64	9.81	9.56	9.83	9.92	9.60	10.0	9.78	9.67
	Manganese (Mn)	mg/L	0.000187	0.000241	0.000123	0.000153	0.000160	0.000175	0.00122	0.00105	0.000085	0.000098	0.000089	0.000083	0.000161	0.000125	0.000101	0.000111	0.000135	0.000092
	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	0.00104	0.00102	0.000993	0.00105	0.000986	0.000991	0.00131	0.00121	0.00125	0.00122	0.00123	0.00124	0.00126	0.00124	0.00126	0.00127	0.00124	0.00122
	Nickel (Ni)	mg/L	0.000608	0.000627	0.000616	0.000643	0.000594	0.000618	0.000668	0.000604	0.000604	0.000591	0.000611	0.000593	0.000605	0.000581	0.000613	0.000610	0.000635	0.000630
	Potassium (K)	mg/L	1.44	1.47	1.41	1.44	1.46	1.47	1.53	1.48	1.50	1.49	1.49	1.49	1.51	1.50	1.47	1.51	1.51	1.46
	Selenium (Se)	mg/L	<0.000040	<0.000040	<0.000040	<0.000040	0.000042	<0.000040	<0.000040	0.000054	<0.000040	0.000042	0.000056	<0.000040	<0.000040	<0.000040	<0.000040	0.000068	<0.000040	<0.000040
	Silicon (Si)	mg/L	0.643	0.654	0.667	0.647	0.651	0.650	0.584	0.591	0.572	0.599	0.596	0.605	0.556	0.603	0.555	0.610	0.582	0.593
	Silver (Ag)	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
	Sodium (Na)	mg/L	2.02	2.01	1.96	1.98	1.97	1.97	2.13	2.07	2.14	2.07	2.09	2.09	2.15	2.10	1.99	2.12	2.08	2.05
	Strontium (Sr)	mg/L	0.0113	0.0113	0.0109	0.0115	0.0108	0.0107	0.0123	0.0119	0.0120	0.0119	0.0121	0.0121	0.0122	0.0121	0.0121	0.0121	0.0120	0.0119
	Thallium (Tl)	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
	Tin (Sn)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000030	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	0.000059	0.000069	<0.000050	<0.000050	<0.000050	<0.000050	0.00103	0.000810	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000087	<0.000050	<0.000050	0.000088	<0.000050
	Uranium (U)	mg/L	0.00138	0.00134	0.00137	0.00140	0.00137	0.00140	0.00190	0.00186	0.00184	0.00187	0.00187	0.00187	0.00188	0.00188	0.00186	0.00187	0.00186	0.00187
	Vanadium (V)	mg/L	0.000051	0.000055	0.000051	0.000054	0.000057	0.000055	0.000061	0.000055	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Zinc (Zn)	mg/L	<0.00050	0.00062	<0.00050	<0.00050	<0.00050	<0.00050	0.00062	0.00055	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	<0.00050	0.00058	<0.00050

Table C.45: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Sheardown Lake Northwest and Reference Lake 3 in 2021, and at Sheardown Lake Northwest Between 2021 and the Baseline Period

Dissolved Metal	Sheardown Lake NW				
	2021 vs Reference Lake 3 2021		2021 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	1.1	1.4	0.0	0.8	1.9
Antimony (Sb)	0.2	0.2	0.0	0.0	0.2
Arsenic (As)	0.7	0.6	0.6	0.6	0.6
Barium (Ba)	1.1	1.2	0.0	1.4	1.3
Beryllium (Be)	0.0	0.0	0.0	0.0	0.0
Bismuth (Bi)	0.0	0.0	0.0	0.0	0.0
Boron (B)	1.6	1.7	1.8	1.7	1.7
Cadmium (Cd)	0.5	0.5	0.2	0.0	0.4
Calcium (Ca)	2.0	2.0	1.4	1.3	1.2
Chromium (Cr)	0.2	0.2	1.0	0.9	1.0
Cobalt (Co)	0.2	0.2	0.2	0.2	0.2
Copper (Cu)	1.0	1.0	0.7	0.5	1.0
Iron (Fe)	0.1	0.2	0.1	0.1	0.4
Lead (Pb)	0.2	0.2	0.1	0.2	0.2
Lithium (Li)	1.6	1.7	0.4	0.0	0.7
Magnesium (Mg)	2.1	2.1	1.5	1.5	1.4
Manganese (Mn)	0.7	1.7	0.2	0.0	0.4
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	6.7	8.2	5.0	0.0	6.2
Nickel (Ni)	1.2	1.2	1.0	0.7	1.1
Potassium (K)	1.6	1.6	1.0	1.3	1.2
Selenium (Se)	0.0	0.0	0.4	0.4	0.3
Silicon (Si)	1.3	1.2	1.6	1.7	1.5
Silver (Ag)	0.5	0.5	0.6	0.9	1.4
Sodium (Na)	2.0	2.2	1.4	1.6	1.6
Strontium (Sr)	1.3	1.4	1.6	1.6	1.6
Thallium (Tl)	0.1	0.1	0.1	0.1	0.1
Tin (Sn)	0.2	0.2	0.0	0.0	0.0
Titanium (Ti)	0.0	0.0	0.0	0.0	0.0
Uranium (U)	4.2	5.4	3.2	3.1	3.7
Vanadium (V)	0.1	0.1	0.1	0.1	0.1
Zinc (Zn)	0.2	0.2	0.3	0.2	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.46: *In Situ* Water Quality Profile Data Collected at Sheardown Lake SE Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2021

Depth (m)	Temperature (°C)						Dissolved Oxygen (mg/L)						Dissolved Oxygen (% Saturation)					
	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3
Date Collected	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.0	1.2	1.3	2.4	1.8	1.6	1.5	12.06	13.18	13.05	12.08	13.01	13.07	88.8	97.4	99.4	89.5	96.4	96.6
4.0	1.2	1.5	2.4	1.8	1.7	1.6	11.88	12.76	12.67	12.58	12.98	12.99	87.7	94.5	96.8	93.2	96.2	96.5
5.0	1.5	-	2.7	1.8	1.8	1.8	11.56	-	12.35	12.63	12.91	12.87	85.8	-	94.8	93.8	96.0	95.6
6.0	1.7	-	2.8	1.9	1.9	1.8	11.25	-	12.13	12.60	12.83	12.80	84.0	-	93.1	93.7	95.5	95.5
7.0	-	-	2.8	1.9	1.9	1.9	-	-	12.02	12.60	12.73	12.71	-	-	92.2	93.7	95.3	94.9
8.0	-	-	2.8	1.9	1.9	1.9	-	-	11.95	12.63	12.71	12.53	-	-	91.7	93.8	94.7	93.7
9.0	-	-	2.8	-	1.9	1.9	-	-	11.89	-	12.69	12.34	-	-	91.2	-	94.6	92.2
10.0	-	-	2.8	-	1.9	1.9	-	-	11.80	-	12.63	12.28	-	-	90.5	-	94.3	91.9
11.0	-	-	2.8	-	2.0	2.0	-	-	11.76	-	12.31	12.12	-	-	90.3	-	92.5	90.9
12.0	-	-	-	-	2.1	2.0	-	-	-	-	11.9	10.90	-	-	-	-	89.9	87.7
13.0	-	-	-	-	-	2.1	-	-	-	-	-	9.35	-	-	-	-	-	71.2

Notes: "-" indicates no available data. Total depth at stations DL0-02-6, DL0-02-7, DL0-02-7, DL0-02-4, DL0-02-8, and DL0-02-3 was 6.9, 4.2, 11.7, 8.4, 12.7, and 14.1 m, respectively, at the time of winter sampling. Ice thickness at stations DL0-02-6, DL0-02-7, DL0-02-7, DL0-02-4, DL0-02-8, and DL0-02-3 was 1.26, 1.60, 1.40, 1.96, 1.75 and 1.66 m, respectively, at the time of winter sampling.

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 2021

Depth (m)	pH (pH units)						Specific Conductance (µS/cm)					
	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3
Date Collected	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-	-	-
3.0	7.63	7.83	7.96	7.86	7.70	7.66	202.2	190.8	186.0	186.2	184.4	184.3
4.0	7.57	7.73	7.88	7.82	7.63	7.61	201.6	188.0	186.2	184.1	183.5	182.9
5.0	7.51	-	7.82	7.77	7.57	7.58	201.2	-	189.9	182.9	182.7	182.7
6.0	7.47	-	7.78	7.73	7.52	7.53	201.3	-	190.3	182.7	182.6	182.5
7.0	-	-	7.76	7.70	7.48	7.49	-	-	190.5	182.9	182.4	182.2
8.0	-	-	7.73	7.68	7.46	7.46	-	-	190.6	183.2	182.4	182.0
9.0	-	-	7.72	-	7.43	7.43	-	-	190.5	-	182.3	182.1
10.0	-	-	7.69	-	7.41	7.40	-	-	190.7	-	182.0	181.9
11.0	-	-	7.68	-	7.37	7.38	-	-	190.5	-	181.6	182.1
12.0	-	-	-	-	7.35	7.31	-	-	-	-	181.1	182.7
13.0	-	-	-	-	-	7.23	-	-	-	-	-	185.7

Notes: "-" indicates no available data. Total depth at stations DL0-02-6, DL0-02-7, DL0-02-7, DL0-02-4, DL0-02-8, and DL0-02-3 was 6.9, 4.2, 11.7, 8.4, 12.7, and 14.1 m, respectively, at the time of winter sampling. Ice thickness at stations DL0-02-6, DL0-02-7, DL0-02-7, DL0-02-4, DL0-02-8, and DL0-02-3 was 1.26, 1.60, 1.40, 1.96, 1.75 and 1.66 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 2021

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3
Date Collected	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21
1.0	7.8	8.1	8.0	8.1	8.1	10.95	11.46	10.82	11.08	11.40	94.5	100.0	94.1	96.7	99.3	8.07	8.13	8.33	7.92	8.09	117.3	115.6	116.0	115.7	114.9
2.0	7.9	8.1	7.9	8.1	8.0	11.32	11.56	11.14	11.21	11.47	97.4	100.6	97.0	98.1	99.7	8.04	8.12	8.05	7.89	8.09	117.6	115.6	115.8	115.8	114.9
3.0	7.7	7.9	7.9	8.1	7.9	11.43	11.63	11.26	11.29	11.54	98.6	101.0	98.3	98.8	100.0	8.02	8.09	8.02	7.87	8.08	117.9	116.2	115.8	115.8	114.8
4.0	7.7	-	7.9	8.1	7.9	11.48	-	11.34	11.34	11.55	99.0	-	99.0	99.3	100.1	8.01	-	8.01	7.87	8.06	118.3	-	115.8	115.8	114.8
5.0	7.6	-	7.9	8.1	7.8	11.50	-	11.37	11.37	11.56	99.1	-	99.3	99.5	100.1	7.99	-	8.01	7.87	8.05	119.4	-	115.8	115.8	114.8
6.0	7.6	-	7.9	8.0	7.8	11.50	-	11.39	11.39	11.56	99.1	-	99.5	99.6	100.1	7.99	-	8.00	7.87	8.05	119.8	-	115.8	115.8	114.8
7.0	-	-	7.9	8.0	7.8	-	-	11.40	11.39	11.56	-	-	99.6	99.6	100.0	-	-	8.00	7.87	8.04	-	-	115.8	115.8	115.0
8.0	-	-	-	8.0	7.8	-	-	-	11.39	11.54	-	-	-	99.5	99.9	-	-	-	7.86	8.03	-	-	-	115.8	115.1
9.0	-	-	-	8.0	7.8	-	-	-	11.39	11.52	-	-	-	99.5	99.8	-	-	-	7.83	8.03	-	-	-	115.8	115.1
10.0	-	-	-	8.0	7.8	-	-	-	11.39	11.32	-	-	-	99.5	99.7	-	-	-	7.87	8.03	-	-	-	115.8	115.1
11.0	-	-	-	7.9	7.8	-	-	-	11.39	11.51	-	-	-	99.3	99.6	-	-	-	7.87	8.02	-	-	-	115.8	115.3
12.0	-	-	-	7.8	7.7	-	-	-	11.39	11.51	-	-	-	99.2	99.5	-	-	-	7.86	8.03	-	-	-	115.8	115.5
13.0	-	-	-	-	7.7	-	-	-	-	11.51	-	-	-	-	99.4	-	-	-	-	8.03	-	-	-	-	116.5

Notes: "-" indicates no available data. Total depth at stations DL0-02-6, DL0-02-7, DL0-02-4, DL0-02-8, and DL0-02-3 was 6.7, 4.1, 8.2, 12.8, and 13.4 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 2021

Depth (m)	Temperature (°C)					Dissolved Oxygen (mg/L)					Dissolved Oxygen (% Saturation)					pH (pH units)					Specific Conductance (µS/cm)				
	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3	DL0-02-6	DL0-02-7	DL0-02-4	DL0-02-8	DL0-02-3
Date Collected	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21
1.0	6.4	6.6	6.6	6.7	6.6	11.92	11.75	11.75	11.73	11.71	96.7	95.8	95.9	95.8	95.7	7.77	7.70	8.04	7.95	7.93	140.3	137.9	137.9	137.7	137.5
2.0	6.4	6.5	6.6	6.7	6.6	11.92	11.80	11.75	11.73	11.69	96.7	95.9	95.9	95.8	95.5	7.77	7.68	8.02	7.93	7.92	140.2	137.8	138.0	137.6	137.5
3.0	6.3	6.3	6.6	6.7	6.6	11.91	11.97	11.75	11.72	11.68	96.6	96.7	95.9	95.8	95.4	7.76	7.69	8.01	7.92	7.90	140.3	137.7	138.1	137.6	137.4
4.0	6.3	-	6.6	6.6	6.6	11.90	-	11.75	11.72	11.67	96.3	-	95.8	95.7	95.4	7.76	-	8.01	7.92	7.89	141.1	-	138.1	137.5	137.5
5.0	6.3	-	6.6	6.6	6.6	11.90	-	11.75	11.71	11.67	96.3	-	95.8	95.6	95.3	7.76	-	8.00	7.92	7.89	140.9	-	138.3	137.5	137.4
6.0	6.2	-	6.6	6.6	6.6	11.92	-	11.76	11.71	11.66	96.1	-	95.9	95.6	95.3	7.77	-	8.00	7.91	7.88	141.0	-	138.2	137.5	137.4
7.0	-	-	6.6	6.6	6.6	-	-	11.76	11.70	11.66	-	-	95.8	95.5	95.2	-	-	8.00	7.91	7.88	-	-	138.3	137.5	137.5
8.0	-	-	6.6	6.6	6.6	-	-	11.76	11.70	11.65	-	-	95.8	95.5	95.1	-	-	8.00	7.91	7.88	-	-	138.3	137.5	137.4
9.0	-	-	-	6.6	6.6	-	-	-	11.69	11.64	-	-	-	95.5	95.0	-	-	-	7.91	7.88	-	-	-	137.5	137.4
10.0	-	-	-	6.6	6.6	-	-	-	11.69	11.64	-	-	-	95.5	95.0	-	-	-	7.91	7.88	-	-	-	137.5	137.5
11.0	-	-	-	6.6	6.6	-	-	-	11.68	11.63	-	-	-	95.4	94.9	-	-	-	7.90	7.88	-	-	-	137.5	137.5
12.0	-	-	-	6.6	6.6	-	-	-	11.68	11.63	-	-	-	95.4	95.9	-	-	-	7.90	7.88	-	-	-	137.6	137.4
13.0	-	-	-	-	6.6	-	-	-	-	11.62	-	-	-	-	95.8	-	-	-	-	7.87	-	-	-	-	137.5

Notes: "-" indicates no available data. Total depth at stations DL0-02-6, DL0-02-7, DL0-02-4, DL0-02-8, and DL0-02-3 was 6.5, 4.0, 8.4, 12.7, and 13.8 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 2021

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	DL0-02-1	12-Aug-21	10.4	2.40	colourless/clear	surface	7.9	11.46	96.6	7.98	130.7
						bottom	7.9	11.44	96.3	7.96	130.4
	DL0-02-11	12-Aug-21	7.5	1.90	green/turbid	surface	7.8	11.71	125.2	7.89	125.3
						bottom	7.8	11.68	98.1	7.84	125.4
	DL0-02-10	12-Aug-21	6.9	1.75	green/turbid	surface	7.8	11.73	98.6	7.92	126.0
						bottom	7.8	11.70	98.4	7.89	126.2
	DL0-02-4	12-Aug-21	8.5	1.65	green/turbid	surface	7.8	11.74	98.7	7.85	126.1
						bottom	7.8	11.70	98.3	7.81	125.9
	DL0-02-9	12-Aug-21	8.6	1.85	green/turbid	surface	7.8	11.75	98.7	7.82	125.9
						bottom	7.8	11.70	98.3	7.78	125.9
Profundal (Deep) Stations	DL0-02-12	14-Aug-21	10.9	1.95	green/turbid	surface	7.5	11.22	93.6	7.93	128.6
						bottom	7.5	11.12	92.9	7.69	128.6
	DL0-02-8	14-Aug-21	12.9	2.10	green/turbid	surface	7.5	11.33	94.6	7.87	128.4
						bottom	7.5	11.28	94.2	7.84	128.4
	DL0-02-13	12-Aug-21	11.4	2.10	colourless/clear	surface	8.0	11.45	96.6	7.96	126.5
						bottom	7.9	11.39	96.1	7.93	126.2
	DL0-02-2	13-Aug-21	14.2	1.65	green/turbid	surface	7.5	11.33	94.6	7.93	128.4
						bottom	7.5	11.28	94.2	7.89	128.4
	DL0-02-3	14-Aug-21	13.2	2.15	green/turbid	surface	7.6	11.33	94.7	7.92	128.3
						bottom	7.5	11.28	94.3	7.91	128.4

Table C.50: Statistical Comparison of Bottom *In Situ* Water Quality Between Sheardown Lake SE Littoral and Profundal Stations, Mary River Project CREMP, August 2021

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test ^a	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	0.628	Littoral	5	1.91	0.290	0.130	1.65	2.40
					Profundal	5	1.99	0.204	0.0914	1.65	2.15
Temperature (°C)	M-W	rank	NO	0.094	Littoral	5	7.82	0.0447	0.0200	7.80	7.90
					Profundal	5	7.58	0.179	0.0800	7.50	7.90
Dissolved Oxygen (mg/L)	M-W	rank	YES	0.01	Littoral	5	11.6	0.114	0.0511	11.4	11.7
					Profundal	5	11.3	0.0964	0.0431	11.1	11.4
Dissolved Oxygen (% saturation)	tequal	none	YES	0.001	Littoral	5	97.9	0.890	0.398	96.3	98.4
					Profundal	5	94.3	1.14	0.510	92.9	96.1
pH (units)	tequal	none	NO	0.942	Littoral	5	7.86	0.0709	0.0317	7.78	7.96
					Profundal	5	7.85	0.0965	0.0432	7.69	7.93
Specific Conductance (umho/cm)	tequal	none	NO	0.260	Littoral	5	127	2.05	0.919	125	130
					Profundal	5	128	1.01	0.452	126	129

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

^a 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 2021

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	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	0.135	Reference	5	10.3	2.18	0.974	7.70	12.6
						SDSE	5	8.38	1.33	0.596	6.90	10.4
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	5.50	0.420	0.188	4.85	5.90
						SDSE	5	1.91	0.290	0.130	1.65	2.40
	Temperature (°C)	tequal	none	YES	0.001	Reference	5	7.30	0.141	0.0632	7.20	7.50
						SDSE	5	7.82	0.0447	0.0200	7.80	7.90
	Dissolved Oxygen (mg/L)	M-W	rank	NO	0.833	Reference	5	11.7	0.0526	0.0235	11.6	11.8
						SDSE	5	11.6	0.114	0.0511	11.4	11.7
	Dissolved Oxygen (% saturation)	tequal	none	NO	0.181	Reference	5	97.1	0.791	0.354	96.3	98.0
						SDSE	5	97.9	0.890	0.398	96.3	98.4
Profundal (Deep) Stations	Station Depth (m)	tequal	none	YES	0.001	Reference	5	7.54	0.181	0.0811	7.22	7.67
						SDSE	5	7.86	0.0709	0.0317	7.78	7.96
	Specific Conductance (µS/cm)	M-W	rank	YES	0.012	Reference	5	75.0	0.466	0.208	74.7	75.8
						SDSE	5	127	2.05	0.919	125	130
	Station Depth (m)	tequal	none	YES	0.001	Reference	5	20.5	1.51	0.673	18.2	22.4
						SDSE	5	12.5	1.35	0.604	10.9	14.2
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	5.58	0.250	0.112	5.19	5.80
						SDSE	5	1.99	0.204	0.0914	1.65	2.15
	Temperature (°C)	M-W	rank	YES	0.007	Reference	5	7.12	0.0447	0.0200	7.10	7.20
						SDSE	5	7.58	0.179	0.0800	7.50	7.90
	Dissolved Oxygen (mg/L)	tequal	none	YES	0.001	Reference	5	11.7	0.0942	0.0421	11.6	11.8
						SDSE	5	11.3	0.0964	0.0431	11.1	11.4
	Dissolved Oxygen (% saturation)	tequal	none	YES	0.010	Reference	5	96.1	0.303	0.136	95.7	96.5
						SDSE	5	94.3	1.14	0.510	92.9	96.1
	pH (units)	tequal	none	YES	0.001	Reference	5	7.37	0.111	0.0495	7.29	7.56
						SDSE	5	7.85	0.0965	0.0432	7.69	7.93
	Specific Conductance (µS/cm)	M-W	rank	YES	0.010	Reference	5	74.8	0.0548	0.0245	74.7	74.8
						SDSE	5	128	1.01	0.452	126	129

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

^a 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.52: Water Chemistry at Sheardown Lake SE (DLO-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Winter Sampling Event									
					DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21
Conventional	Conductivity (lab)	umho/cm	-	-	201	205	195	193	183	207	180	187	185	187
	pH (lab)	pH	6.5 - 9.0	-	7.42	7.47	7.50	7.51	7.58	7.54	7.59	7.59	7.51	7.58
	Hardness (as CaCO ₃)	mg/L	-	-	99.9	100	95.4	95.2	90.7	92.5	89.8	92.4	91.8	91.4
	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	-	-	113	115	107	104	91	99	97	101	97	98
	Turbidity	NTU	-	-	0.21	0.13	0.22	0.15	0.10	0.13	0.14	<0.10	0.23	<0.10
	Alkalinity (as CaCO ₃)	mg/L	-	-	88.1	88.5	82.1	83.7	77.1	79.9	78.7	79.6	82.6	81.0
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	0.0264	0.0085	0.0076	0.0118	0.0121	0.0057	0.0118	0.0142	0.0095
	Nitrate	mg/L	3	3	0.233	0.243	0.228	0.225	0.203	0.206	0.245	0.203	0.232	0.219
	Nitrite	mg/L	0.06	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	0.0015
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.119	0.1160	0.126	0.126	0.203	0.206	0.203	0.216	0.121	0.219
	Dissolved Organic Carbon	mg/L	-	-	1.62	1.71	1.66	2.01	1.52	1.49	1.40	1.52	1.40	1.47
	Total Organic Carbon	mg/L	-	-	1.60	1.60	1.59	1.50	1.51	1.65	1.49	1.52	1.49	1.47
	Total Phosphorus	mg/L	0.020 ^α	-	<0.0020	0.0029	0.0027	0.0024	<0.0020	<0.0020	<0.0020	<0.0020	0.0024	<0.0020
	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
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	5.44	5.55	5.94	5.22	4.96	5.10	4.88	4.96	5.05	5.07
	Sulphate (SO ₄)	mg/L	218 ^β	218	13.7	14.1	13.5	13.1	12.6	12.8	11.6	12.6	11.4	12.8
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 ^c	0.0032	0.0022	0.0020	0.0023	0.0065	0.0051	0.0066	0.0076	0.0126	0.0166
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	0.000070	0.000076	0.000067	0.000078	0.000077	0.000075	0.000067	0.000077	0.000063	0.000070
	Barium (Ba)	mg/L	-	-	0.00987	0.0100	0.00926	0.00941	0.00900	0.00885	0.00843	0.00922	0.00904	0.00941
	Beryllium (Be)	mg/L	0.011 ^α	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	mg/L	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Boron (B)	mg/L	1.5	-	0.0190	0.0193	0.0176	0.0176	0.0168	0.0167	0.0161	0.0171	0.0162	0.0173
	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	-	-	19.2	19.8	18.3	18.5	17.6	18.2	17.9	18.3	18.7	18.3
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	0.0000234	0.0000214	0.0000222	0.0000184	0.0000230	0.0000180	0.0000183	0.0000196	0.0000406	0.0000219
	Copper (Cu)	mg/L	0.002	0.0024	0.000817	0.000864	0.000779	0.000862	0.000869	0.000818	0.000946	0.000891	0.000884	0.000871
	Iron (Fe)	mg/L	0.30	0.300	0.0321	0.0164	0.03214	0.0233	0.0118	0.0098	0.0137	0.0112	0.0513	0.0196
	Lead (Pb)	mg/L	0.001	0.001	<0.000010	<0.000010	<0.000010	<0.000010	0.000010	<0.000010	<0.000010	<0.000010	0.000017	<0.000010
	Lithium (Li)	mg/L	-	-	0.00165	0.00169	0.00157	0.00158	0.00151	0.00153	0.00149	0.00154	0.00149	0.00160
	Magnesium (Mg)	mg/L	-	-	13.2	13.1	12.3	12.2	11.9	12.0	11.8	12.2	11.9	12.1
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00430	0.00226	0.00302	0.00339	0.00151	0.00129	0.00299	0.00130	0.0996	0.00145
	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	-	0.000789	0.000883	0.000781	0.000785	0.000730	0.000763	0.000687	0.000765	0.000649	0.000791
	Nickel (Ni)	mg/L	0.025	0.025	0.000765	0.000745	0.000665	0.000696	0.000665	0.000676	0.000658	0.000667	0.000723	0.000703
	Potassium (K)	mg/L	-	-	1.70	1.73	1.57	1.59	1.52	1.56	1.50	1.58	1.51	1.58
	Selenium (Se)	mg/L	0.001	-	<0.000040	<0.000040	0.000050	<0.000040	<0.000040	0.000041	<0.000040	<0.000040	<0.000040	0.000047
	Silicon (Si)	mg/L	-	-	0.757	0.695	0.555	0.550	0.477	0.486	0.727	0.488	1.41	0.518
	Silver (Ag)	mg/L	0.00025	0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	-	-	2.64	2.66	2.48	2.44	2.39	2.43	2.39	2.48	2.43	2.47
	Strontium (Sr)	mg/L	-	-	0.0136	0.0139	0.0129	0.0130	0.0127	0.0129	0.0125	0.0129	0.0127	0.0130
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Tin (Sn)	mg/L	-	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000029	0.000027	0.000028	<0.000020
	Titanium (Ti)	mg/L	-	-	0.000132	<0.000050	0.000084	0.000076	0.000330	0.000172	0.000349	0.000402	0.000523	0.00109
	Uranium (U)	mg/L	0.015	-	0.00129	0.00134	0.00127	0.00126	0.00122	0.00123	0.00117	0.00125	0.00107	0.00126
	Vanadium (V)	mg/L	0.006 ^α	0.006	0.000060	<0.000050	0.000058	0.000057	0.000067	0.000071	0.000067	0.000068	0.000083	0.000080
	Zinc (Zn)	mg/L	0.030	0.030	0.00057	0.00089	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00064	0.00062	<0.00050

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

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

Table C.52: Water Chemistry at Sheardown Lake SE (DLO-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Summer Sampling Event									
					DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					23-Jul-21	23-Jul-21	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21	23-Jul-21
Conventionals	Conductivity (lab)	umho/cm	-	-	122	121	118	117	119	118	120	118	119	117
	pH (lab)	pH	6.5 - 9.0	-	7.96	7.99	8.01	7.97	7.92	7.88	7.91	7.79	7.96	7.93
	Hardness (as CaCO ₃)	mg/L	-	-	53.6	52.2	52.9	52.1	51.6	51.1	51.8	50.6	52.7	51.1
	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	-	-	82	62	66	80	68	68	63	69	80	71
	Turbidity	NTU	-	-	2.06	1.97	1.85	1.98	2.09	2.11	2.07	2.17	2.21	2.80
	Alkalinity (as CaCO ₃)	mg/L	-	-	46.9	45.7	45.7	45.0	45.4	44.9	46.0	45.4	45.1	45.3
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	0.0066	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.122	0.120	0.116	0.116	0.116	0.116	0.117	0.116	0.117	0.115
	Nitrite	mg/L	0.06	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.074	0.111	0.085	0.071	0.084	0.266	0.093	0.090	0.069	0.075
	Dissolved Organic Carbon	mg/L	-	-	1.36	1.29	1.35	1.29	1.32	1.37	1.29	1.40	1.18	1.34
	Total Organic Carbon	mg/L	-	-	1.23	1.15	1.16	1.11	1.18	1.09	1.26	1.18	1.15	1.13
	Total Phosphorus	mg/L	0.020 ^α	-	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0049	0.0030	0.0027	<0.0020
	Phenols	mg/L	0.001 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	2.92	2.88	2.84	2.85	2.82	2.82	2.82	2.83	2.82	2.80
	Sulphate (SO ₄)	mg/L	218 ^β	218	8.75	8.60	8.39	8.31	8.32	8.32	8.32	8.35	8.31	8.24
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 ^c	0.0374	0.0534	0.0507	0.0395	0.0475	0.0468	0.0496	0.0627	0.0463	0.0469
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	0.000050	0.000050	0.000063	0.000053	0.000063	0.000044	0.000055	0.000049	0.000056	0.000054
	Barium (Ba)	mg/L	-	-	0.00614	0.00623	0.00604	0.00608	0.00598	0.00603	0.00624	0.00623	0.00607	0.00566
	Beryllium (Be)	mg/L	0.011 ^α	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	mg/L	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Boron (B)	mg/L	1.5	-	0.0108	0.0105	0.0107	0.0104	0.0102	0.0105	0.0106	0.0100	0.0107	0.0104
	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	-	-	10.5	10.0	10.2	9.83	9.77	10.1	10.1	10.1	10.1	10.1
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00012	0.00013	0.00015	0.00014	0.00016	0.00017	0.00014	0.00013	0.00014	0.00013
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	0.0000424	0.0000393	0.0000447	0.0000413	0.0000393	0.0000401	0.0000451	0.0000432	0.0000479	0.0000449
	Copper (Cu)	mg/L	0.002	0.0024	0.000770	0.000715	0.000775	0.000756	0.000727	0.000686	0.000703	0.000711	0.000701	0.000705
	Iron (Fe)	mg/L	0.30	0.300	0.0584	0.0635	0.0656	0.0581	0.0620	0.0615	0.0631	0.0589	0.0634	0.0584
	Lead (Pb)	mg/L	0.001	0.001	0.000052	0.000056	0.000056	0.000052	0.000052	0.000052	0.000054	0.000050	0.000056	0.000052
	Lithium (Li)	mg/L	-	-	0.00106	0.00105	0.00109	0.00104	0.00103	0.00104	0.00105	0.00100	0.00109	0.00107
	Magnesium (Mg)	mg/L	-	-	6.80	6.71	6.59	6.54	6.69	6.79	6.76	6.70	6.75	6.72
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00315	0.00323	0.00332	0.00306	0.00320	0.00326	0.00334	0.00305	0.00336	0.00296
	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	-	0.000582	0.000582	0.000531	0.000537	0.000536	0.000554	0.000544	0.000534	0.000527	0.000522
	Nickel (Ni)	mg/L	0.025	0.025	0.000527	0.000510	0.000550	0.000498	0.000494	0.000505	0.000507	0.000556	0.000509	0.000550
	Potassium (K)	mg/L	-	-	1.09	1.12	1.09	1.08	1.10	1.09	1.11	1.07	1.08	1.05
	Selenium (Se)	mg/L	0.001	-	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040
	Silicon (Si)	mg/L	-	-	0.546	0.557	0.533	0.531	0.535	0.560	0.550	0.540	0.569	0.566
	Silver (Ag)	mg/L	0.00025	0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	-	-	1.56	1.52	1.43	1.49	1.44	1.47	1.49	1.54	1.47	1.49
	Strontium (Sr)	mg/L	-	-	0.00834	0.00838	0.00823	0.00818	0.00821	0.00831	0.00826	0.00824	0.00824	0.00823
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Tin (Sn)	mg/L	-	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	-	-	0.00300	0.00324	0.00334	0.00297	0.00309	0.00307	0.00322	0.00286	0.00318	0.00300
	Uranium (U)	mg/L	0.015	-	0.000883	0.000874	0.000856	0.000855	0.000846	0.000842	0.000832	0.000835	0.000840	0.000832
	Vanadium (V)	mg/L	0.006 ^α	0.006	0.000149	0.000164	0.000163	0.000154	0.000156	0.000157	0.000160	0.000157	0.000163	0.000162
	Zinc (Zn)	mg/L	0.030	0.030	0.00056	0.00063	0.00097	0.00064	<0.00050	0.00062	0.00105	0.00069	<0.00050	<0.00050

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

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

Table C.52: Water Chemistry at Sheardown Lake SE (DLO-02) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Fall Sampling Event									
					DL0-02-6	DL0-02-6	DL0-02-7	DL0-02-7	DL0-02-4	DL0-02-4	DL0-02-8	DL0-02-8	DL0-02-3	DL0-02-3
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					28-Aug-21	28-Aug-21	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21
Conventionals	Conductivity (lab)	umho/cm	-	-	150	148	146	146	144	144	142	144	144	145
	pH (lab)	pH	6.5 - 9.0	-	8.01	8.02	8.02	7.96	8.05	8.04	8.03	7.99	8.01	8.02
	Hardness (as CaCO ₃)	mg/L	-	-	65.1	65.4	63	64.3	63.3	65	62.8	64.7	63.8	64.2
	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	-	-	72	63	67	71	67	73	71	76	77	79
	Turbidity	NTU	-	-	0.92	0.77	0.82	0.81	0.86	0.90	0.99	0.87	1.01	1.12
	Alkalinity (as CaCO ₃)	mg/L	-	-	56.7	56.6	56.0	56.1	55.5	55.4	54.8	55.1	54.4	54.0
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrate	mg/L	3	3	0.172	0.172	0.171	0.171	0.186	0.180	0.169	0.173	0.167	0.169
	Nitrite	mg/L	0.06	0.06	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	0.0013	<0.0010
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.135	0.113	0.119	0.126	0.113	0.115	0.136	0.103	0.117	0.109
	Dissolved Organic Carbon	mg/L	-	-	1.52	1.60	1.63	4.69	1.51	7.96	1.20	1.31	1.22	1.18
	Total Organic Carbon	mg/L	-	-	1.78	1.92	1.68	1.48	1.33	2.92	1.30	1.26	1.20	1.27
	Total Phosphorus	mg/L	0.020 ^α	-	0.0021	<0.0020	0.0020	0.0023	0.0025	0.0027	0.0024	0.0029	0.0028	0.0032
	Phenols	mg/L	0.001 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl)	mg/L	120	120	3.74	3.76	3.67	3.67	3.68	3.67	3.66	3.69	3.60	3.65
	Sulphate (SO ₄)	mg/L	218 ^β	218	11.1	11.1	10.6	10.6	10.6	10.6	10.5	10.6	10.3	10.5
Total Metals	Aluminum (Al)	mg/L	0.100	0.179, 0.173 ^c	0.0235	0.0248	0.0223	0.0213	0.0285	0.0357	0.0288	0.0249	0.0283	0.0276
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.005	0.005	0.000084	0.000064	0.000086	0.000077	0.000043	0.000047	0.000063	0.000044	0.000055	0.000068
	Barium (Ba)	mg/L	-	-	0.00728	0.00723	0.00703	0.00701	0.00728	0.00722	0.00736	0.00721	0.00725	0.00709
	Beryllium (Be)	mg/L	0.011 ^α	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Bismuth (Bi)	mg/L	-	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Boron (B)	mg/L	1.5	-	0.0139	0.0138	0.0135	0.0130	0.0130	0.0134	0.0135	0.0129	0.0133	0.0133
	Cadmium (Cd)	mg/L	0.00012	0.00009	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	-	-	12.7	12.6	12.6	12.4	11.6	11.9	12.0	11.6	12.1	11.7
	Chromium (Cr)	mg/L	0.0089	0.0089	0.00012	<0.00010	<0.00010	<0.00010	0.00013	0.00011	0.00014	0.00012	0.00010	0.00037
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	0.0000299	0.0000289	0.0000348	0.0000269	0.0000247	0.0000264	0.0000321	0.0000300	0.0000317	0.0000292
	Copper (Cu)	mg/L	0.002	0.0024	0.000786	0.00116	0.000718	0.000737	0.000806	0.000798	0.000816	0.000797	0.000785	0.000808
	Iron (Fe)	mg/L	0.30	0.300	0.0271	0.0290	0.0287	0.0267	0.0340	0.0350	0.0300	0.0312	0.0364	0.0358
	Lead (Pb)	mg/L	0.001	0.001	0.000024	0.000026	0.000028	0.000026	0.000026	0.000028	0.000028	0.000028	0.000030	0.000027
	Lithium (Li)	mg/L	-	-	0.00134	0.00131	0.00132	0.00130	0.00119	0.00123	0.00124	0.00120	0.00123	0.00122
	Magnesium (Mg)	mg/L	-	-	8.67	8.45	8.23	8.33	8.23	8.25	8.34	8.40	8.35	8.16
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00191	0.00187	0.00191	0.00184	0.00193	0.00203	0.00183	0.00192	0.00225	0.00216
	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	-	0.000709	0.000723	0.000693	0.000663	0.00068	0.000678	0.000721	0.000677	0.000652	0.000685
	Nickel (Ni)	mg/L	0.025	0.025	0.000540	0.000568	0.000552	0.000547	0.000591	0.000619	0.000565	0.000562	0.000560	0.000549
	Potassium (K)	mg/L	-	-	1.22	1.22	1.17	1.17	1.200000	1.21	1.21	1.21	1.21	1.19
	Selenium (Se)	mg/L	0.001	-	<0.000040	0.000042	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040
	Silicon (Si)	mg/L	-	-	0.519	0.569	0.547	0.532	0.502	0.572	0.535	0.504	0.531	0.524
	Silver (Ag)	mg/L	0.00025	0.0001	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0000097	<0.0000050	<0.0000050	<0.0000050
	Sodium (Na)	mg/L	-	-	1.80	1.81	1.76	1.76	1.79	1.78	1.84	1.86	1.79	1.75
	Strontium (Sr)	mg/L	-	-	0.0105	0.0105	0.0105	0.0104	0.01	0.0103	0.0103	0.0103	0.0104	0.0104
	Thallium (Tl)	mg/L	0.0008	0.0008	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Tin (Sn)	mg/L	-	-	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000040	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	-	-	0.00118	0.00128	0.00129	0.00118	0.00138	0.00173	0.00139	0.00143	0.00153	0.00148
	Uranium (U)	mg/L	0.015	-	0.00129	0.00128	0.00125	0.00125	0.00124	0.00123	0.00124	0.00125	0.00122	0.00123
	Vanadium (V)	mg/L	0.006 ^α	0.006	0.000080	0.000082	0.000086	0.000082	0.00008	0.000090	0.000088	0.000084	0.000091	0.000088
	Zinc (Zn)	mg/L	0.030	0.030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

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

Table C.53: Dissolved Metal Concentrations at Sheardown Lake SE Water Quality Monitoring Stations, Mary River Project CREMP, 2021

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
			21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	23-Jul-21	23-Jul-21	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0012	0.0030	0.0015	0.0013	<0.0010	<0.0010	0.0013	0.0010	<0.0010	0.0012	0.0084	0.0109	0.0099	0.0053	0.0085	0.0061
	Antimony (Sb)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.000062	0.000079	0.000076	0.000077	0.000080	0.000070	0.000063	0.000060	0.000083	0.000069	0.000050	0.000035	0.000039	0.000051	0.000053	0.000046
	Barium (Ba)	mg/L	0.00944	0.00979	0.00935	0.00935	0.00879	0.00894	0.00849	0.00938	0.00932	0.00918	0.00561	0.00559	0.00566	0.00549	0.00546	0.00548
	Beryllium (Be)	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
	Bismuth (Bi)	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
	Boron (B)	mg/L	0.0192	0.0195	0.0179	0.0176	0.0161	0.0166	0.0153	0.0170	0.0154	0.0172	0.0116	0.0111	0.0109	0.0109	0.0104	0.0103
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	19.5	19.8	18.9	18.5	17.1	18.1	17.1	17.6	17.9	17.9	10.3	9.98	9.98	10.1	9.75	9.78
	Chromium (Cr)	mg/L	<0.00010	<0.00010	0.00019	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Cobalt (Co)	mg/L	0.0000163	0.0000187	0.0000190	0.0000158	0.0000157	0.0000166	0.0000140	0.0000178	0.0000171	0.0000153	0.0000152	0.0000131	0.0000126	0.0000126	0.0000117	0.0000115
	Copper (Cu)	mg/L	0.000750	0.000786	0.000824	0.000852	0.000816	0.000809	0.000783	0.000824	0.000688	0.000777	0.000662	0.000669	0.000642	0.000628	0.000653	0.000650
	Iron (Fe)	mg/L	0.0032	0.0021	0.0050	0.0029	0.0012	0.0014	0.0014	0.0010	0.0028	0.0013	0.0058	0.0061	0.0064	0.0046	0.0051	0.0041
	Lead (Pb)	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
	Lithium (Li)	mg/L	0.00167	0.00168	0.00156	0.00155	0.00143	0.00147	0.00137	0.00151	0.00141	0.00155	0.00108	0.00104	0.00103	0.00104	0.00097	0.00095
	Magnesium (Mg)	mg/L	12.4	12.4	11.7	11.9	11.7	11.5	11.4	11.8	11.5	11.3	6.77	6.62	6.79	6.55	6.61	6.47
	Manganese (Mn)	mg/L	0.000318	0.000192	0.00121	0.00140	0.000087	0.000117	0.000360	0.000070	0.0465	0.000070	0.000215	0.000222	0.000219	0.000274	0.000162	0.000158
	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	0.000759	0.000858	0.000786	0.000777	0.000749	0.000745	0.000679	0.000793	0.000657	0.000785	0.000549	0.000535	0.000566	0.000548	0.000526	0.000563
	Nickel (Ni)	mg/L	0.000661	0.000700	0.000681	0.000651	0.000654	0.000662	0.000612	0.000673	0.000652	0.000649	0.000451	0.000437	0.000420	0.000412	0.000427	0.000446
	Potassium (K)	mg/L	1.59	1.64	1.54	1.56	1.45	1.49	1.46	1.55	1.45	1.49	1.08	1.08	1.06	1.04	1.03	0.979
	Selenium (Se)	mg/L	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	0.000043	0.000041	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040
	Silicon (Si)	mg/L	0.751	0.696	0.575	0.589	0.459	0.454	0.685	0.474	1.30	0.464	0.503	0.506	0.509	0.508	0.489	0.466
	Silver (Ag)	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
	Sodium (Na)	mg/L	2.42	2.49	2.37	2.40	2.26	2.31	2.33	2.41	2.35	2.33	1.49	1.48	1.47	1.43	1.42	1.39
	Strontium (Sr)	mg/L	0.0136	0.0139	0.0131	0.0130	0.0127	0.0127	0.0123	0.0129	0.0125	0.0129	0.00827	0.00801	0.00809	0.00786	0.00785	0.00810
	Thallium (Tl)	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
	Tin (Sn)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	<0.000050	<0.000050	0.000051	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000188	0.000229	0.000240	0.000177	0.000186	0.000116
	Uranium (U)	mg/L	0.00128	0.00132	0.00127	0.00127	0.00123	0.00127	0.00118	0.00128	0.00106	0.00126	0.000895	0.000873	0.000854	0.000837	0.000834	0.000840
	Vanadium (V)	mg/L	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	<0.000050	<0.000050	0.000079	0.000077	0.000079	0.000077	0.000077	0.000070
	Zinc (Zn)	mg/L	<0.00050	<0.00050	0.00128	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00077	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050

Table C.53: Dissolved Metal Concentrations at Sheardown Lake SE Water Quality Monitoring Stations, Mary River Project CREMP, 2021

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
			24-Jul-21	24-Jul-21	23-Jul-21	23-Jul-21	28-Aug-21	28-Aug-21	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0084	0.0073	0.0058	0.0090	0.0064	0.0072	0.0063	0.0260	0.0060	0.0230	0.0073	0.0053	0.0072	0.0068
	Antimony (Sb)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Arsenic (As)	mg/L	0.000057	0.000046	0.000040	0.000045	0.000054	0.000057	0.000065	0.000068	0.000055	0.000062	0.000059	0.000066	0.000059	0.000060
	Barium (Ba)	mg/L	0.00539	0.00559	0.00558	0.00538	0.00691	0.00687	0.00684	0.00704	0.00689	0.00707	0.00669	0.00694	0.00690	0.00671
	Beryllium (Be)	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
	Bismuth (Bi)	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
	Boron (B)	mg/L	0.0102	0.0101	0.0105	0.0101	0.0139	0.0137	0.0130	0.0131	0.0131	0.0135	0.0133	0.0133	0.0130	0.0132
	Cadmium (Cd)	mg/L	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Calcium (Ca)	mg/L	9.81	9.78	10.2	9.74	12.8	12.7	12.4	12.5	12.4	12.6	12.2	12.7	12.2	12.6
	Chromium (Cr)	mg/L	<0.00010	<0.00010	<0.00010	0.00037	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	0.00053	<0.00010	0.00014
	Cobalt (Co)	mg/L	0.0000137	0.0000125	0.0000119	0.0000144	0.0000165	0.0000124	0.0000183	0.0000273	0.0000121	0.0000280	0.0000142	0.0000168	0.0000127	0.0000167
	Copper (Cu)	mg/L	0.000685	0.000659	0.000787	0.000619	0.000728	0.000701	0.000696	0.000738	0.000692	0.000743	0.000700	0.000683	0.000664	0.000688
	Iron (Fe)	mg/L	0.0067	0.0059	0.0049	0.0100	0.0042	0.0051	0.0043	0.0293	0.0041	0.0280	0.0051	0.0089	0.0041	0.0056
	Lead (Pb)	mg/L	<0.000010	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	0.000027	<0.000010	0.000026	<0.000010	<0.000010	<0.000010	<0.000010
	Lithium (Li)	mg/L	0.00095	0.00094	0.00100	0.00099	0.00132	0.00131	0.00125	0.00129	0.00123	0.00127	0.00121	0.00126	0.00123	0.00127
	Magnesium (Mg)	mg/L	6.64	6.36	6.64	6.50	8.05	8.18	7.79	8.04	7.86	8.17	7.86	7.99	8.11	7.93
	Manganese (Mn)	mg/L	0.000167	0.000197	0.000170	0.000294	0.000228	0.000184	0.000186	0.00185	0.000216	0.00178	0.000187	0.000219	0.000165	0.000171
	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	0.000538	0.000525	0.000550	0.000527	0.000717	0.000699	0.000663	0.000637	0.000691	0.000701	0.000682	0.000704	0.000696	0.000665
	Nickel (Ni)	mg/L	0.000408	0.000427	0.000414	0.000438	0.000502	0.000496	0.000484	0.000515	0.000490	0.000560	0.000479	0.000513	0.000508	0.000464
	Potassium (K)	mg/L	1.01	1.01	1.04	1.04	1.17	1.16	1.13	1.16	1.15	1.18	1.13	1.14	1.15	1.13
	Selenium (Se)	mg/L	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040	<0.000040
	Silicon (Si)	mg/L	0.474	0.457	0.506	0.508	0.452	0.497	0.464	0.540	0.511	0.514	0.497	0.494	0.544	0.519
	Silver (Ag)	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
	Sodium (Na)	mg/L	1.43	1.42	1.42	1.44	1.74	1.72	1.71	1.71	1.72	1.75	1.70	1.71	1.74	1.72
	Strontium (Sr)	mg/L	0.00795	0.00789	0.00797	0.00795	0.0104	0.0104	0.0102	0.0100	0.0104	0.0106	0.0102	0.0103	0.0104	0.0104
	Thallium (Tl)	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
	Tin (Sn)	mg/L	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Titanium (Ti)	mg/L	0.000226	0.000191	0.000165	0.000252	0.000114	0.000153	0.000134	0.00130	0.000126	0.00136	0.000146	0.000110	0.000128	0.000151
	Uranium (U)	mg/L	0.000833	0.000869	0.000842	0.000818	0.00128	0.00125	0.00123	0.00122	0.00128	0.00127	0.00125	0.00114	0.00125	0.00125
	Vanadium (V)	mg/L	0.000077	0.000079	0.000078	0.000090	<0.000050	0.000053	0.000053	0.000088	0.000052	0.000086	0.000055	0.000058	0.000058	0.000055
	Zinc (Zn)	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

Table C.54: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Sheardown Lake Southeast and Reference Lake 3 in 2021, and at Sheardown Lake Southeast Between 2021 and the Baseline Period

Dissolved Metal	Sheardown Lake SE				
	2021 vs Reference Lake 3 2021		2021 vs Baseline		
	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	2.5	2.5	0.0	1.7	3.4
Antimony (Sb)	0.2	0.2	0.0	0.0	0.2
Arsenic (As)	0.5	0.6	0.7	0.4	0.6
Barium (Ba)	0.8	1.1	0.0	1.1	1.2
Beryllium (Be)	0.0	0.0	0.0	0.0	0.0
Bismuth (Bi)	0.0	0.0	0.0	0.0	0.0
Boron (B)	1.1	1.3	1.7	1.1	1.3
Cadmium (Cd)	0.5	0.5	0.2	0.0	0.4
Calcium (Ca)	1.4	1.7	1.4	0.9	1.1
Chromium (Cr)	0.3	0.3	1.1	1.1	1.5
Cobalt (Co)	0.1	0.2	0.2	0.1	0.2
Copper (Cu)	0.9	0.9	0.7	0.4	0.9
Iron (Fe)	0.2	0.3	0.1	0.2	0.5
Lead (Pb)	0.2	0.3	0.1	0.2	0.3
Lithium (Li)	1.0	1.3	0.4	0.0	0.5
Magnesium (Mg)	1.4	1.7	1.5	1.0	1.1
Manganese (Mn)	1.0	3.1	8.7	0.0	0.8
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	3.6	4.5	3.3	0.0	3.4
Nickel (Ni)	0.9	1.0	0.9	0.5	0.9
Potassium (K)	1.1	1.3	1.0	0.9	1.0
Selenium (Se)	0.0	0.0	0.4	0.4	0.3
Silicon (Si)	1.0	1.0	1.3	1.2	1.2
Silver (Ag)	0.5	0.5	0.6	0.9	1.4
Sodium (Na)	1.5	1.9	1.4	1.1	1.3
Strontium (Sr)	0.9	1.2	1.7	1.1	1.4
Thallium (Tl)	0.1	0.1	0.1	0.1	0.1
Tin (Sn)	0.2	0.2	0.0	0.0	0.0
Titanium (Ti)	0.0	0.0	0.0	0.0	0.0
Uranium (U)	2.6	3.6	2.5	1.9	2.5
Vanadium (V)	0.1	0.1	0.1	0.1	0.1
Zinc (Zn)	0.2	0.2	0.3	0.2	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.55: *In Situ* Water Quality Measurements Collected at Mary River Benthic Invertebrate Community Stations, Mary River Project CREMP, August 2021

Study Area	Station	Date Sampled	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	pH (pH units)	Specific Conductance (µS/cm)
Mary River Upstream	G0-09 B1	10-Aug-21	5.8	11.76	100.9	7.98	93.6
	G0-09 B2	10-Aug-21	5.8	11.76	100.8	8.01	94.2
	G0-09 B3	10-Aug-21	5.7	11.79	100.9	8.01	93.0
	G0-09 B4	10-Aug-21	5.6	11.89	101.5	7.99	92.7
	G0-09 B5	10-Aug-21	6.4	11.64	101.5	8.31	148.2
Mary River Upstream	G0-03 B1	10-Aug-21	7.2	11.48	100.8	8.09	104.1
	G0-03 B2	10-Aug-21	7.1	11.50	100.8	8.10	103.9
	G0-03 B3	10-Aug-21	7.0	11.53	100.7	8.09	103.6
	G0-03 B4	10-Aug-21	6.9	11.53	100.5	8.08	103.5
	G0-03 B5	10-Aug-21	6.7	11.57	100.4	8.07	103.3
Mary River Downstream	E0-01 B1	11-Aug-21	5.4	12.11	95.9	7.95	144.0
	E0-01 B2	11-Aug-21	5.2	12.14	95.6	7.92	143.1
	E0-01 B3	11-Aug-21	5.2	12.17	95.7	7.86	142.3
	E0-01 B4	11-Aug-21	5.0	12.20	95.6	9.85	139.4
	E0-01 B5	11-Aug-21	5.0	12.18	95.8	7.83	138.1
Mary River Downstream	E0-20 B1	8-Aug-21	7.1	11.66	100.5	8.16	146.9
	E0-20 B2	8-Aug-21	6.9	11.69	100.3	8.17	147.6
	E0-20 B3	8-Aug-21	6.8	11.77	100.3	8.15	148.8
	E0-20 B4	8-Aug-21	6.8	11.78	100.4	8.16	148.8
	E0-20 B5	8-Aug-21	6.7	11.83	100.6	8.16	150.3
Mary River Downstream	C0-05 B1	10-Aug-21	5.4	12.17	100.8	8.04	112.7
	C0-05 B2	10-Aug-21	5.3	12.12	100.2	8.06	112.6
	C0-05 B3	10-Aug-21	4.9	12.25	100.2	8.05	111.1
	C0-05 B4	10-Aug-21	4.8	12.27	100.2	7.95	108.6
	C0-05 B5	10-Aug-21	4.8	12.06	98.5	7.84	106.7

Table C.56: *In Situ* Water Quality Summary for Mary River Benthic Invertebrate Community Study Areas, Mary River Project CREMP, August 2021

Metric	Station	Sample Size	Mean	Standard Deviation	Standard Error	95% Confidence Interval		Minimum	Maximum
						Lower Bound	Upper Bound		
Temperature (°C)	G0-09	5	5.86	0.31	0.14	5.63	6.09	5.6	6.4
	G0-03	5	6.98	0.20	0.09	6.84	7.13	6.7	7.2
	E0-01	5	5.16	0.17	0.07	5.04	5.28	5.0	5.4
	E0-20	5	6.86	0.15	0.07	6.75	6.97	6.7	7.1
	C0-05	5	5.04	0.29	0.13	4.83	5.25	4.8	5.4
Dissolved Oxygen (mg/L)	G0-09	5	11.8	0.09	0.04	11.7	11.8	11.6	11.9
	G0-03	5	11.5	0.03	0.02	11.5	11.6	11.5	11.6
	E0-01	5	12.2	0.04	0.02	12.1	12.2	12.1	12.2
	E0-20	5	11.8	0.07	0.03	11.7	11.8	11.7	11.8
	C0-05	5	12.2	0.09	0.04	12.1	12.2	12.1	12.3
Dissolved Oxygen (% saturation)	G0-09	5	101	0.3	0.2	101	101	101	102
	G0-03	5	101	0.2	0.1	101	101	100	101
	E0-01	5	95.7	0.1	0.1	95.6	95.8	95.6	95.9
	E0-20	5	100	0.1	0.1	100	101	100	101
	C0-05	5	100	0.9	0.4	99.3	101	98.5	101
pH (pH units)	G0-09	5	8.06	0.14	0.06	7.96	8.16	7.98	8.31
	G0-03	5	8.09	0.01	0.01	8.08	8.09	8.07	8.10
	E0-01	5	8.28	0.88	0.39	7.64	8.93	7.83	9.85
	E0-20	5	8.16	0.01	0.00	8.15	8.17	8.15	8.17
	C0-05	5	7.99	0.09	0.04	7.92	8.06	7.84	8.06
Specific Conductance (µS/cm)	G0-09	5	104	25	11	86.3	122	92.7	148
	G0-03	5	104	0.3	0.1	103	104	103	104
	E0-01	5	141	3	1	140	143	138	144
	E0-20	5	148	1	1	148	149	147	150
	C0-05	5	110	3	1	108	112	107	113

Table C.57: Statistical Comparison of *In Situ* Water Quality Variables Among Mary River Benthic Invertebrate Community Study Areas, Mary River Project CREMP, August 2021

<i>In Situ</i> Variable	Overall 5-group Comparison				Pair-wise, <i>post hoc</i> comparisons ^a			
	Statistical Test ^a	Transform-ation	Significant Difference Between Areas?	P-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Temperature (°C)	ANOVA	none	YES	0.001	G0-09	G0-03	YES	<0.001
					G0-09	E0-01	YES	0.001
					G0-09	E0-20	YES	<0.001
					G0-09	C0-05	YES	<0.001
					G0-03	E0-01	YES	<0.001
					G0-03	E0-20	NO	0.914
					G0-03	C0-05	YES	<0.001
					E0-01	E0-20	YES	<0.001
					E0-01	C0-05	NO	0.923
					E0-20	C0-05	YES	<0.001
Dissolved Oxygen (mg/L)	ANOVA	none	YES	0.001	G0-09	G0-03	YES	<0.001
					G0-09	E0-01	YES	<0.001
					G0-09	E0-20	NO	0.985
					G0-09	C0-05	YES	<0.001
					G0-03	E0-01	YES	<0.001
					G0-03	E0-20	YES	<0.001
					G0-03	C0-05	YES	<0.001
					E0-01	E0-20	YES	<0.001
					E0-01	C0-05	NO	0.997
					E0-20	C0-05	YES	<0.001
Dissolved Oxygen (% Saturation)	K-W	rank	YES	0.001	G0-09	G0-03	NO	0.188
					G0-09	E0-01	YES	<0.001
					G0-09	E0-20	YES	0.033
					G0-09	C0-05	YES	0.006
					G0-03	E0-01	YES	0.003
					G0-03	E0-20	NO	0.412
					G0-03	C0-05	NO	0.148
					E0-01	E0-20	YES	0.035
					E0-01	C0-05	NO	0.137
					E0-20	C0-05	NO	0.532
pH (pH units)	K-W	rank	YES	0.024	G0-09	G0-03	NO	0.344
					G0-09	E0-01	NO	0.401
					G0-09	E0-20	YES	0.043
					G0-09	C0-05	NO	0.533
					G0-03	E0-01	NO	0.074
					G0-03	E0-20	NO	0.282
					G0-03	C0-05	NO	0.116
					E0-01	E0-20	YES	0.004
					E0-01	C0-05	NO	0.830
					E0-20	C0-05	YES	0.008
Specific Conductance (uS/cm)	K-W	rank	YES	0.002	G0-09	G0-03	NO	0.897
					G0-09	E0-01	YES	0.023
					G0-09	E0-20	YES	<0.001
					G0-09	C0-05	NO	0.229
					G0-03	E0-01	YES	0.032
					G0-03	E0-20	YES	<0.001
					G0-03	C0-05	NO	0.283
					E0-01	E0-20	NO	0.229
					E0-01	C0-05	NO	0.283
					E0-20	C0-05	YES	0.023

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

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

Table C.58: Water Chemistry at Mary River Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Spring Sampling Event												
					G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
					02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21
Conventional	Conductivity (lab)	umho/cm	-	-	28.9	30.9	35.1	33.5	33.5	170	41.0	33.5	33.6	37.3	37.8	57.2	41.9
	pH (lab)	pH	6.5 - 9.0	-	7.40	7.40	7.50	7.50	7.52	7.89	7.48	7.41	7.42	7.47	7.45	7.54	7.47
	Hardness (as CaCO ₃)	mg/L	-	-	12	12.8	15.8	15.8	14.6	77.2	17.8	15.1	14.5	16.4	16.4	25.2	18.5
	Total Suspended Solids (TSS)	mg/L	-	-	6.8	4.2	2.1	<2.0	<2.0	<2.0	<2.0	6.5	5.5	6.5	6.5	6.9	14.0
	Total Dissolved Solids (TDS)	mg/L	-	-	23	20	21	20	19	100	21	16	222	24	33	41	23
	Turbidity	NTU	-	-	9.75	8.77	6.24	4.78	4.60	1.10	4.32	5.84	5.43	5.04	4.94	5.25	7.31
	Alkalinity (as CaCO ₃)	mg/L	-	-	11.6	12.3	14.8	14.4	14.1	43.8	15.1	13.3	14.0	15.0	15.1	24.4	19.2
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	0.019	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	<0.020	<0.020	<0.020	<0.020	<0.020	0.590	0.031	0.023	<0.020	<0.020	<0.020	0.039	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	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (TKN)	mg/L	-	-	0.150	0.050	0.070	0.110	0.070	0.120	0.100	0.120	0.140	0.060	0.070	0.080	0.100
	Dissolved Organic Carbon	mg/L	-	-	1.02	1.18	1.30	1.22	1.18	0.77	1.16	0.81	0.92	1.07	1.02	1.11	0.98
	Total Organic Carbon	mg/L	-	-	1.38	1.28	1.40	1.50	1.36	0.96	1.46	1.57	1.63	1.55	1.61	1.93	1.85
	Total Phosphorus	mg/L	0.030 ^α	-	0.0152	0.0107	0.0068	0.0061	0.0045	<0.0030	0.0051	0.0132	0.0126	0.0151	0.0103	0.0129	0.0115
	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	0.92	0.94	0.96	0.91	0.90	1.33	0.89	0.76	0.75	0.77	0.79	1.47	0.98
	Sulphate (SO ₄)	mg/L	218 ^β	218	0.52	0.53	0.52	0.46	0.49	38.9	2.29	1.18	1.09	1.08	1.14	2.70	1.34
	Aluminum (Al)	mg/L	0.100	0.966	0.115	0.145	0.101	0.0854	0.110	0.0410	0.0678	0.104	0.113	0.130	0.101	0.141	0.186
Total Metals	Antimony (Sb)	mg/L	0.020 ^α	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00336	0.00344	0.00348	0.00311	0.00313	0.00618	0.00313	0.00335	0.00324	0.00368	0.00351	0.00486	0.00506
	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	-	-	2.58	2.76	3.21	3.07	3.07	13.0	3.59	3.09	3.01	3.48	3.53	5.08	3.93
	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 ^α	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00015	<0.00010	0.00014	0.00011	0.00011	<0.00010	0.00011	0.00015
	Copper (Cu)	mg/L	0.002	0.0024	0.00069	0.00070	0.00067	0.00057	0.00055	<0.00050	0.00053	0.00062	0.00058	0.00062	0.00060	0.00068	0.00075
	Iron (Fe)	mg/L	0.30	0.874	0.166	0.163	0.106	0.118	0.091	0.045	0.071	0.139	0.160	0.183	0.123	0.180	0.262
	Lead (Pb)	mg/L	0.001	0.001	0.000204	0.000194	0.000133	0.000115	0.000108	<0.000050	0.000112	0.000197	0.000198	0.000212	0.000181	0.000215	0.000300
	Magnesium (Mg)	mg/L	-	-	1.50	1.59	2.00	1.77	1.76	11.0	2.16	1.86	1.82	2.13	2.11	3.21	2.45
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00407	0.00362	0.00262	0.00244	0.00177	0.0104	0.00191	0.00486	0.00478	0.00501	0.00437	0.00636	0.00767
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000050	0.000059	<0.000050	0.000052	<0.000050	0.000109	0.000054	<0.000050	0.000071	0.000075	0.000055	0.000128	0.000067
	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	0.00057	0.00063
	Potassium (K)	mg/L	-	-	0.37	0.38	0.41	0.35	0.36	0.71	0.37	0.33	0.33	0.37	0.37	0.54	0.46
	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	-	-	0.52	0.59	0.58	0.50	0.59	0.52	0.48	0.48	0.51	0.56	0.51	0.65	0.64
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	0.507	0.520	0.587	0.476	0.505	0.565	0.501	0.400	0.385	0.418	0.444	0.702	0.522
	Strontium (Sr)	mg/L	-	-	0.00312	0.00335	0.00341	0.00317	0.00315	0.0124	0.00361	0.00304	0.00299	0.00319	0.00331	0.00456	0.00377
	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	<0.010	0.010	<0.010	<0.010	0.013
	Uranium (U)	mg/L	0.015	-	0.000227	0.000236	0.000215	0.000189	0.000185	0.000549	0.000215	0.000223	0.000206	0.000221	0.000206	0.000356	0.000279
	Vanadium (V)	mg/L	0.006 ^α	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	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.58: Water Chemistry at Mary River Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	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
					01-Aug-21	01-Aug-21	01-Aug-21	01-Aug-21	01-Aug-21	01-Aug-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	26-Jul-21	26-Jul-21	26-Jul-21
Conventional	Conductivity (lab)	umho/cm	-	-	92.9	95.1	102.0	105.0	107.0	263.0	95.4	93.8	92.8	93.4	101.0	101.0	101.0
	pH (lab)	pH	6.5 - 9.0	-	7.90	7.91	7.96	7.99	7.91	8.16	7.80	7.86	7.81	7.81	7.78	7.82	7.86
	Hardness (as CaCO ₃)	mg/L	-	-	40.7	41.3	45.7	46.9	48.1	129	42.3	41.2	41.4	41.2	43.5	43.1	43.3
	Total Suspended Solids (TSS)	mg/L	-	-	2.8	<2.0	<2.0	2.1	<2.0	<2.0	6.6	5.8	10.0	14.1	5.8	3.3	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	41	47	42	38	47	113	40	64	54	55	59	49	62
	Turbidity	NTU	-	-	9.02	8.59	7.33	5.57	5.21	1.52	8.87	9.74	11.4	13.5	6.96	7.46	6.00
	Alkalinity (as CaCO ₃)	mg/L	-	-	42.5	43.7	47.8	48.7	50.8	94.7	40.6	38.7	34.7	34.4	32.2	42.9	33.3
Nutrients and Organics	Total Ammonia	mg/L	-	0.855	0.014	0.012	0.012	0.011	0.011	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Nitrate	mg/L	3	3	0.022	<0.020	<0.020	<0.020	<0.020	0.510	0.032	0.034	0.034	0.034	0.102	0.107	0.094
	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	-	-	0.090	0.050	0.070	0.050	<0.050	0.130	0.100	0.120	0.110	0.100	<0.50	0.060	0.080
	Dissolved Organic Carbon	mg/L	-	-	1.31	1.47	1.36	1.60	1.74	1.71	1.76	1.85	1.75	1.94	1.24	1.45	1.33
	Total Organic Carbon	mg/L	-	-	1.45	1.18	1.29	1.57	1.39	1.42	1.56	1.52	1.68	1.88	1.38	1.88	1.75
	Total Phosphorus	mg/L	0.020 ^α	-	0.0082	0.0074	0.0095	0.0050	0.0068	0.0034	0.0095	0.0103	0.0140	0.0133	0.0040	0.0052	0.0060
Anions	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	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	3.56	3.58	3.60	4.08	3.46	2.92	2.73	2.73	2.72	2.64	2.47	2.69	2.69
	Sulphate (SO ₄)	mg/L	218 ^β	218	1.97	1.97	1.99	1.90	1.98	37.8	3.26	2.99	3.01	3.11	7.46	6.72	5.99
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.154	0.118	0.139	0.150	0.158	0.0450	0.189	0.137	0.218	0.324	0.144	0.172	0.161
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.00739	0.00701	0.00735	0.00790	0.00789	0.0118	0.00728	0.00702	0.00747	0.00880	0.00696	0.00750	0.00733
	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	-	-	8.40	8.53	9.39	9.61	9.73	21.0	8.59	8.32	8.35	8.94	8.48	8.51	8.64
	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	0.00061	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	0.00019	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.002	0.0024	0.00099	0.00094	0.00093	0.00093	0.00093	0.00086	0.00085	0.00090	0.00091	0.00107	0.00080	0.00082	0.00080
	Iron (Fe)	mg/L	0.30	0.874	0.121	0.105	0.107	0.101	0.104	0.050	0.166	0.151	0.233	0.351	0.127	0.151	0.144
	Lead (Pb)	mg/L	0.001	0.001	0.000166	0.000146	0.000138	0.000117	0.000116	<0.000050	0.000200	0.000203	0.000253	0.000404	0.000146	0.000164	0.000166
	Magnesium (Mg)	mg/L	-	-	4.90	4.94	5.50	5.65	5.94	18.6	5.16	5.01	4.99	5.25	5.38	5.48	5.34
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00163	0.00137	0.00131	0.00116	0.00132	0.00134	0.00293	0.00330	0.00427	0.00800	0.00188	0.00296	0.00411
	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	-	0.000242	0.000249	0.000230	0.000233	0.000246	0.000262	0.000151	0.000157	0.000162	0.000157	0.000253	0.000238	0.000247
	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	0.00073	<0.00050	0.00051	0.00051
	Potassium (K)	mg/L	-	-	0.92	0.90	0.93	0.92	0.95	1.29	0.74	0.73	0.76	0.82	0.78	0.83	0.84
	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	-	-	0.94	0.86	0.94	0.98	1.02	0.68	1.08	0.92	1.08	1.27	0.86	0.94	0.95
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	2.18	2.15	2.26	2.07	2.11	1.60	1.45	1.43	1.43	1.41	1.47	1.59	1.61
	Strontium (Sr)	mg/L	-	-	0.0107	0.0106	0.0109	0.0108	0.0106	0.0217	0.00907	0.00878	0.00894	0.00910	0.00940	0.00941	0.00938
	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	0.011	<0.010	0.014	0.021	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.015	-	0.00159	0.00154	0.00163	0.00142	0.00141	0.00211	0.00107	0.00104	0.00103	0.00104	0.000826	0.000803	0.000840
	Vanadium (V)	mg/L	0.006 ^α	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	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.58: Water Chemistry at Mary River Water Quality Monitoring Stations, Mary River Project CREMP, 2020

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Fall Sampling Event												
					G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
					05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	04-Sep-21	04-Sep-21	03-Sep-21	03-Sep-21	03-Sep-21	03-Sep-21
Conventional	Conductivity (lab)	umho/cm	-	-	170	177	186	177	344	348	186	197	198	197	199	198	198
	pH (lab)	pH	6.5 - 9.0	-	8.08	8.06	8.12	8.08	8.22	8.19	8.01	8.14	8.12	8.18	8.21	8.07	8.12
	Hardness (as CaCO ₃)	mg/L	-	-	75.1	77	85.3	81.7	174	172	86.2	89.4	90.6	93.8	92.4	89	91.1
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	2.1	3.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	13.9	2.1	14.9	3.3
	Total Dissolved Solids (TDS)	mg/L	-	-	95	91	107	88	189	189	89	108	102	118	122	117	118
	Turbidity	NTU	-	-	3.22	2.81	2.99	1.84	0.58	0.58	2.67	1.74	1.93	12.4	2.76	14.8	5.79
	Alkalinity (as CaCO ₃)	mg/L	-	-	75.5	81.2	87.2	84.4	117.0	116.0	84.8	86.8	93.0	87.7	88.2	87.2	84.8
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	<0.010	<0.010
	Nitrate	mg/L	3	3	0.086	0.067	0.055	0.046	1.01	1.03	0.101	0.142	0.148	0.161	0.177	0.187	0.238
	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	-	-	0.103	0.115	0.113	0.104	0.170	0.144	0.170	0.194	0.132	0.147	0.101	0.128	0.156
	Dissolved Organic Carbon	mg/L	-	-	1.86	1.64	1.95	1.80	1.50	1.88	3.84	2.49	2.89	2.95	2.74	2.59	3.04
	Total Organic Carbon	mg/L	-	-	2.45	2.42	2.89	1.89	1.49	1.63	1.88	1.77	1.77	2.04	2.24	2.50	2.33
	Total Phosphorus	mg/L	0.020 ^α	-	0.0049	0.0061	0.0086	<0.0030	<0.0030	<0.0030	0.0043	<0.0030	0.0033	0.0134	0.0152	0.0046	0.0051
	Phenols	mg/L	0.004 ^α	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	7.82	7.04	7.21	6.31	4.84	4.69	6.70	6.97	6.95	6.49	6.18	6.47	6.19
	Sulphate (SO ₄)	mg/L	218 ^β	218	4.98	4.52	4.62	3.75	59.0	60.3	7.3	9.7	9.9	10.3	10.8	11.6	13.7
Total Metals	Aluminum (Al)	mg/L	0.100	0.966	0.0926	0.0697	0.0734	0.0587	0.0209	0.0186	0.0669	0.0494	0.0633	0.396	0.0932	0.459	0.185
	Antimony (Sb)	mg/L	0.020 ^α	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	0.005	0.005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	-	-	0.0109	0.0108	0.0112	0.0105	0.0133	0.0135	0.0109	0.0117	0.0114	0.0154	0.0119	0.0167	0.0131
	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	-	-	15.1	16.0	16.8	16.3	25.2	25.5	16.1	16.9	17.0	17.0	17.3	16.7	17.0
	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	0.00052	<0.00050	0.00075	<0.00050
	Cobalt (Co)	mg/L	0.0009 ^α	0.004	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	0.00014	<0.00010	<0.00010	<0.00010	0.00027	<0.00010	0.00030	0.00013
	Copper (Cu)	mg/L	0.002	0.0024	0.00103	0.00100	0.00098	0.00093	0.00068	0.00068	0.00090	0.00089	0.00090	0.00125	0.00090	0.00129	0.00101
	Iron (Fe)	mg/L	0.30	0.874	0.067	0.054	0.065	0.040	<0.030	<0.030	0.053	0.038	0.042	0.501	0.099	0.608	0.234
	Lead (Pb)	mg/L	0.001	0.001	0.000079	0.000061	0.000079	<0.000050	<0.000050	<0.000050	0.000056	<0.000050	<0.000050	0.000299	0.000077	0.000440	0.000143
	Magnesium (Mg)	mg/L	-	-	9.32	9.98	10.4	10.3	26.5	26.7	11.1	11.7	11.8	12.1	12.1	12.3	12.2
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00108	0.000917	0.00125	0.000668	0.00181	0.00165	0.00121	0.000705	0.000766	0.0106	0.00199	0.0120	0.00460
	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	-	0.000472	0.000432	0.000366	0.000342	0.000262	0.000294	0.000346	0.000544	0.000565	0.000420	0.000462	0.000369	0.000448
	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	0.00085	0.00051	0.00117	0.00072
	Potassium (K)	mg/L	-	-	1.29	1.18	1.19	1.10	1.37	1.36	1.13	1.20	1.22	1.43	1.20	1.46	1.28
	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	-	-	1.06	1.02	1.08	1.02	0.81	0.81	0.97	0.94	0.95	1.45	0.98	1.50	1.06
	Silver (Ag)	mg/L	0.00025	0.0001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	4.34	4.03	3.98	3.22	2.12	2.14	3.27	3.33	3.48	3.31	3.23	3.25	3.15
	Strontium (Sr)	mg/L	-	-	0.0203	0.0195	0.0193	0.0171	0.0276	0.0270	0.0179	0.0195	0.0194	0.0191	0.0183	0.0187	0.0192
	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	<0.010	0.029	<0.010	0.032	0.012
	Uranium (U)	mg/L	0.015	-	0.00543	0.00512	0.00511	0.00410	0.00301	0.00297	0.00402	0.00419	0.00414	0.00401	0.00382	0.00362	0.00361
	Vanadium (V)	mg/L	0.006 ^α	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	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.59: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between Mary River Mine-Exposed and Reference (G0-09) Stations in 2021, and Between Mary River 2021 and Mine Baseline (2005 to 2013) Periods

Variable	2021 vs Reference (G0-09) 2021																													
	Spring										Summer										Fall									
	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
Conductivity (lab)	1.1	1.1	5.4	1.3	1.1	1.1	1.2	1.2	1.8	1.3	1.1	1.1	2.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.9	2.0	1.0	1.1	1.1	1.1	1.1	1.1	1.1
Hardness (as CaCO ₃)	1.2	1.1	5.7	1.3	1.1	1.1	1.2	1.2	1.9	1.4	1.1	1.1	3.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.2	2.2	1.1	1.1	1.1	1.2	1.2	1.1	1.2
Total Suspended Solids (TSS)	0.5	0.5	0.5	0.5	1.5	1.3	1.5	1.5	1.6	3.2	0.9	0.9	0.9	2.9	2.6	4.4	6.2	2.6	1.5	0.9	0.8	0.8	0.8	0.8	0.8	0.8	5.6	0.8	6.0	1.3
Total Dissolved Solids (TDS)	0.9	0.9	4.7	1.0	0.8	10	1.1	1.5	1.9	1.1	0.9	1.1	2.6	0.9	1.5	1.2	1.3	1.4	1.1	1.4	0.9	1.9	1.9	0.9	1.1	1.0	1.2	1.2	1.2	1.2
Turbidity	0.6	0.6	0.1	0.5	0.7	0.7	0.6	0.6	0.6	0.9	0.7	0.6	0.2	1.1	1.2	1.4	1.6	0.8	0.9	0.7	0.6	0.2	0.2	0.9	0.6	0.6	4.1	0.9	4.9	1.9
Alkalinity (as CaCO ₃)	1.1	1.1	3.4	1.2	1.0	1.1	1.2	1.2	1.9	1.5	1.1	1.1	2.1	0.9	0.9	0.8	0.8	0.7	1.0	0.7	1.0	1.4	1.4	1.0	1.1	1.1	1.1	1.1	1.1	1.0
Total Ammonia	1.0	1.0	1.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Nitrate	1.0	1.0	30	1.6	1.2	1.0	1.0	1.0	2.0	1.1	1.0	1.0	25	1.5	1.6	1.6	1.6	4.9	5.2	4.5	0.7	15	15	1.5	2.0	2.1	2.3	2.6	2.7	3.4
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	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total Kjeldahl Nitrogen (TKN)	1.2	0.8	1.3	1.1	1.3	1.6	0.7	0.8	0.9	1.1	0.7	0.7	1.9	1.4	1.7	1.6	1.4	7.1	0.9	1.1	0.9	1.5	1.3	1.5	1.8	1.2	1.3	0.9	1.2	1.4
Dissolved Organic Carbon	1.0	1.0	0.7	1.0	0.7	0.8	0.9	0.9	1.0	0.8	1.2	1.3	1.2	1.3	1.3	1.3	1.4	0.9	1.1	1.0	1.0	0.8	1.0	2.1	1.4	1.6	1.6	1.5	1.4	1.7
Total Organic Carbon	1.1	1.0	0.7	1.1	1.2	1.2	1.1	1.2	1.4	1.4	1.2	1.1	1.1	1.2	1.2	1.3	1.4	1.1	1.4	1.3	0.7	0.6	0.6	0.7	0.7	0.7	0.8	0.9	1.0	0.9
Total Phosphorus	0.6	0.4	0.3	0.5	1.2	1.2	1.4	0.9	1.2	1.1	0.6	0.8	0.4	1.1	1.2	1.7	1.6	0.5	0.6	0.7	0.5	0.5	0.5	0.7	0.5	0.5	2.1	2.3	0.7	0.8
Phenols	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
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	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Chloride (Cl)	1.0	1.0	1.4	0.9	0.8	0.8	0.8	0.8	1.6	1.0	1.1	1.0	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.9	0.7	0.6	0.9	0.9	0.9	0.9	0.8	0.9	0.8
Sulphate (SO ₄)	0.9	0.9	74	4.4	2.3	2.1	2.1	2.2	5.2	2.6	1.0	1.0	19	1.6	1.5	1.5	1.6	3.8	3.4	3.0	0.8	13	13	1.6	2.1	2.1	2.2	2.3	2.5	2.9
Aluminum (Al)	0.7	0.9	0.3	0.6	0.9	0.9	1.1	0.8	1.2	1.5	1.1	1.2	0.3	1.4	1.0	1.6	2.4	1.1	1.3	1.2	0.7	0.3	0.2	0.9	0.6	0.8	5.0	1.2	5.8	2.4
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	1.1	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	1.8	0.9	1.0	0.9	1.1	1.0	1.4	1.5	1.1	1.1	1.6	1.0	1.0	1.0	1.2	1.0	1.0	1.0	1.0	1.2	1.2	1.0	1.1	1.0	1.4	1.1	1.5	1.2
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	1.0	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
Calcium (Ca)	1.1	1.1	4.6	1.3	1.1	1.1	1.2	1.2	1.8	1.4	1.1	1.1	2.4	1.0	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.6	1.6	1.0	1.1	1.1	1.1	1.1	1.0	1.1
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	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0
Cobalt (Co)	1.0	1.0	1.5	1.0	1.4	1.1	1.1	1.0	1.1	1.5	1.0	1.0	1.0	1.0	1.0	1.1	1.9	1.0	1.0	1.0	1.0	1.4	1.4	1.0	1.0	1.0	2.7	1.0	3.0	1.3
Copper (Cu)	0.8	0.8	0.7	0.8	0.9	0.8	0.9	0.9	1.0	1.1	1.0	1.0	0.9	0.9	0.9	1.0	1.1	0.8	0.9	0.8	0.9	0.7	0.7	0.9	0.9	0.9	1.2	0.9	1.3	1.0
Iron (Fe)	0.8	0.6	0.3	0.5	1.0	1.1	1.3	0.8	1.2	1.8	0.9	0.9	0.5	1.5	1.4	2.1	3.2	1.1	1.4	1.3	0.6	0.5	0.5	0.9	0.6	0.7	8.1	1.6	9.8	3.8
Lead (Pb)	0.6	0.6	0.3	0.6	1.1	1.1	1.2	1.0	1.2	1.7	0.8	0.8	0.3	1.3	1.4	1.7	2.7	1.0	1.1	1.1	0.7	0.7	0.7	0.8	0.7	0.7	4.1	1.1	6.0	2.0
Lithium (Li)	1.0	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Magnesium (Mg)	1.0	1.0	6.5	1.3	1.1	1.1	1.3	1.2	1.9	1.4	1.1	1.2	3.6	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0	2.7	2.7	1.1	1.2	1.2	1.2	1.2	1.2	1.2
Manganese (Mn)	0.7	0.5	3.0	0.6	1.4	1.4	1.5	1.3	1.9	2.2	0.8	0.9	0.9	2.0	2.3	3.0	5.6	1.3	2.1	2.9	0.6	1.7	1.5	1.1	0.7	0.7	9.8	1.8	11	4.3
Mercury (Hg)																														

Table C.59: Summary of the Magnitude of Elevation in Seasonal Average Parameter Concentrations (Total Metal Concentration Data Provided) Between Mary River Mine-Exposed and Reference (G0-09) Stations in 2021, and Between Mary River 2021 and Mine Baseline (2005 to 2013) Periods

Variable	2021 vs Baseline (2005 to 2013)																											
	Spring									Summer									Fall									
	G0-03	G0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	
Conductivity (lab)	1.4	0.8	0.8	0.7	1.5	1.3	0.6	0.7	0.9	1.2	1.4	1.1	1.1	1.1	1.0	1.2	1.3	1.1	1.1	2.3	1.1	0.9	1.1	1.1	1.0	1.1	1.1	
Hardness (as CaCO ₃)	1.4	0.7	0.8	0.7	1.3	1.3	0.5	0.7	0.8	0.9	1.3	1.0	1.0	1.0	1.0	1.0	1.2	0.9	0.9	2.4	1.0	0.9	1.1	1.1	1.0	1.0	1.1	
Total Suspended Solids (TSS)	0.2	1.0	0.2	0.8	0.3	0.5	0.9	3.5	1.6	0.5	0.7	2.5	1.3	5.0	7.1	1.5	0.9	0.3	0.8	0.8	0.7	0.8	0.6	6.0	1.0	7.5	1.1	
Total Dissolved Solids (TDS)	1.3	0.6	0.6	0.5	15	1.3	0.8	0.8	0.6	0.7	0.9	0.7	1.1	1.0	0.9	1.1	1.0	1.1	0.8	1.9	0.8	0.8	0.8	1.0	1.0	1.0	1.1	
Turbidity	3.2	3.7	1.6	2.6	1.7	1.5	2.9	3.3	4.8	0.6	0.7	1.4	1.1	1.8	2.5	0.8	0.7	0.7	0.5	0.1	0.5	0.4	0.3	3.0	0.8	3.8	2.0	
Alkalinity (as CaCO ₃)	1.4	0.7	0.7	0.8	1.6	1.3	0.5	0.8	0.9	1.3	1.4	1.0	1.1	0.9	0.8	0.9	1.2	0.8	1.2	1.7	1.1	1.2	1.2	1.1	1.2	1.2	1.3	
Total Ammonia	0.1	0.1	0.2	0.1	0.2	0.0	0.1	0.5	0.0	0.1	0.2	0.3	0.2	0.3	0.1	0.1	0.2	0.1	0.1	0.2	0.3	0.2	0.3	0.4	0.1	0.2	0.1	
Nitrate		0.3		0.2	0.2		0.2		0.2		0.1	0.1	0.2						0.4	9.2	0.7	1.1			1.4	1.6	0.7	
Nitrite	2.5	2.5		2.5			0.8	1.3	2.5	1.7	0.6	0.7	0.6			0.8	0.8	0.6	0.6	0.9	0.6	0.7	0.7	0.7	0.7		0.4	
Total Kjeldahl Nitrogen (TKN)	0.2	0.3	0.9	1.0	1.0	0.1	0.1	0.3	0.2	0.4	0.4	0.7	0.8	0.9	0.5	3.2	0.3	0.5	1.0	1.5	1.2	1.5	1.2	1.3	0.6	0.7	1.2	
Dissolved Organic Carbon	0.6	0.4	0.6	0.4	0.6	0.6	0.4	0.4	0.4	1.5	1.6	1.5	1.8	2.2	2.0	1.1	1.4	1.2	1.5	1.2	3.0	1.9	2.5	2.6	1.8	1.8	2.1	
Total Organic Carbon	0.7	0.4	0.7	0.7	0.9	0.9	0.6	0.6	0.8	1.5	1.3	1.3	1.4	2.1	1.8	1.1	1.8	1.4	1.5	1.1	1.5	1.3	1.5	1.7	1.5	1.6	1.5	
Total Phosphorus	0.7	0.6	0.3	1.3	0.7	1.1	0.1	1.7	1.1	0.4	0.7	0.9	0.8	1.4	2.2	0.2	0.7	0.3	0.4	0.3	0.5	0.2	0.4	2.4	1.9	0.6	0.9	
Phenols	0.5						0.5									1.0		0.7										
Bromide (Br)				0.9			0.4						1.4									0.2			1.3			
Chloride (Cl)	0.9	0.5	0.3	0.1	0.8	0.8	0.1	0.2	0.4	0.9	1.6	1.2	0.5	1.1	1.1	0.5	0.9	0.6	1.2	0.8	1.0	0.3	0.8	0.8	0.4	0.5	0.5	
Sulphate (SO ₄)	0.3	0.3	1.0	0.6	0.4	0.4	0.5	1.8	0.6	0.8	1.0	1.5	1.4	0.9	0.9	3.3	3.4	2.3	0.9	13	1.6	2.0	1.4	1.5	2.4	2.1	3.3	
Aluminum (Al)	0.6	2.2	0.4	0.8	0.4	2.5	1.7	2.7	1.6	0.5	0.6	0.9	0.5	0.7	1.6	0.5	0.8	0.6	0.5	0.1	0.3	0.3	0.2	2.1	0.8	3.0	2.0	
Antimony (Sb)				1.0						0.7			0.8															
Arsenic (As)			0.6							0.8			0.8		0.9	0.7		0.5	0.7	0.6	0.9	0.8	1.0		0.8		0.1	
Barium (Ba)	1.3	1.6	0.8	1.1	0.9	1.7	1.2	0.9	1.3	0.9	0.9	0.9	0.8	1.0	1.3	0.7	1.2	0.9	1.0	1.3	1.1	0.8	0.9	1.3	1.0	1.5	1.3	
Boron (B)	1.0	0.2		0.2					0.2	0.9	0.9	0.8	0.6			0.4			0.9	0.8	0.9	0.8	0.9	0.9	0.8	0.8	0.9	
Cadmium (Cd)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.9	1.0	0.9	1.0	1.0	1.0	1.0	1.0	0.8	1.0	1.0	0.9	1.0	1.0	0.9	0.9	1.0	
Calcium (Ca)	1.4	0.8	0.8	0.6	1.4	1.4	0.5	0.6	0.8	1.1	1.3	1.0	0.9	1.0	1.0	0.9	1.1	1.0	1.0	1.6	0.9	0.7	1.0	1.0	0.8	0.9	0.9	
Chromium (Cr)	1.3	0.9	1.0	1.6	0.6	2.0	1.9	5.0	1.6	0.7	1.2	1.6	0.9	0.0	1.4	0.9	5.0	1.0	1.7	1.0	0.1	0.8	0.7	1.3	1.6	1.5	3.2	
Cobalt (Co)	0.3	0.3	0.3	0.5	0.3	0.6	0.3	0.4	0.5	0.4	0.4	0.3	0.3	0.8	0.9	0.3	0.3	0.3	0.3	0.5	0.4	0.3	0.5	1.1	0.3	1.2	0.5	
Copper (Cu)	0.9	0.6	0.6	0.6	0.8	1.5	0.8	1.0	1.1	0.6	0.6	0.5	0.6	0.4	0.9	0.6	0.9	0.6	0.9	0.6	0.8	0.8	0.6	1.3	0.9	1.2	1.0	
Iron (Fe)	0.9	1.8	0.4	1.1	0.5	3.7	1.6	1.3	1.7	0.3	0.4	0.9	0.5	0.5	2.0	0.5	0.7	0.5	0.4	0.2	0.3	0.2	0.2	2.9	0.9	3.8	2.1	
Lead (Pb)	0.5	0.5	0.2	0.7	0.7	2.8	0.8	1.8	1.1	0.4	0.3	0.9	0.6	1.2	2.5	0.4	1.0	0.6	0.4	0.4	0.5	0.3	0.3	2.4	0.8	3.2	1.2	
Lithium (Li)	1.6		1.0	2.0	1.5	2.0	1.3			1.2	1.2	1.0	1.1	1.2	1.3	1.6		1.9	0.9	1.6	1.0	0.8	1.0	0.5	0.8		1.1	
Magnesium (Mg)	1.3	0.7	0.8	0.8	1.3	1.4	0.7	0.7	1.1	1.2	1.4	1.1	1.1	1.0	1.0	1.2	1.3	1.1	1.1	3.0	1.1	1.1	1.1	1.0	1.1	1.6	1.3	
Manganese (Mn)	0.4	0.5	0.2	0.9	0.6	1.5	0.8	0.7	0.8	0.3	0.3	0.8	0.6	0.8	3.5	0.3	0.8	0.9	0.5	1.0	0.8	0.3	0.3	2.2	0.9	3.9	1.8	
Mercury (Hg)	0.5			0.5	0.5	0.5																						
Molybdenum (Mo)	0.5	0.2	1.1	0.3	1.3	1.2	0.2	1.3	0.5	1.1	1.1	0.7	0.6	0.5	0.6	0.8	1.1	0.9	1.0	0.8	1.1	1.0	1.0	1.0	0.8	0.9	1.2	
Nickel (Ni)	0.7		0.4	0.7	0.6	1.0	0.0	0.5	0.6	0.5	0.6	0.5	0.5	0.5	1.2	0.5	0.9	0.6	0.8	0.9	0.9	0.7	0.7	1.0	0.6	1.4	1.0	
Potassium (K)	0.9	0.8	0.9	0.7	0.9	1.2	0.8	0.9	1.1	1.2	1.3	1.1	1.0	0.9	1.0	1.1	1.2	1.1	1.1	1.4	1.2	1.1	0.8	1.1	1.2	1.1	1.2	
Selenium (Se)				-			0.0		-																			
Silicon (Si)	0.8		0.5	0.8	0.7	1.8	1.0	0.8	0.8	0.7	0.6	0.8	0.6	0.9	1.3	0.5	1.2	0.7	0.9	0.7	0.9	0.8	0.8	1.2	0.9	1.3	1.0	
Silver (Ag)				0.2			0.0		-	0.5	0.5		0.6			0.5		0.3				0.8						
Sodium (Na)	1.3	1.5	1.3	1.0	0.8	0.9	1.1	1.0	1.2	1.9	2.4	1.8	1.5	1.1	1.0	1.7	1.7	1.7	1.4	1.1	1.6	1.3	1.1	1.0	1.7	1.3	1.5	
Strontium (Sr)	1.4	1.0	1.0	0.3	1.2	1.3	0.3	0.5	0.6	1.3	1.5	1.2	0.6	1.1	1.1	0.7	1.0	0.8	1.2	1.9	1.2	0.4	1.2	0.7	0.5	0.8	0.7	
Thallium (Tl)	-		-	-	-	-			-	-			-	-	-				-			-	-					
Tin (Sn)									1.0	0.3	0.6	0.6	0.4			0.6		0.9				0.9						
Titanium (Ti)	0.2		0.2	0.6	0.3		120		0.4	0.3	0.4	0.3	0.3	0.5	1.1	0.3	1.0	0.4	0.7	0.8	0.6	0.4	0.4	1.5	0.6	1.6	0.9	
Uranium (U)	0.5		1.0	1.4	1.0	1.3	0.1	1.4	0.5	1.1	1.0	0.8	0.8	1.1	1.3	0.6	1.2	0.7	1.1	0.8	1.1	1.1	1.1	1.2	1.1	1.1	1.3	
Vanadium (V)	0.8		0.5	1.0	0.8	1.0	0.8			0.6	0.8	0.8	0.6			0.6		0.6		1.0	1.0	0.9	0.9					
Zinc (Zn)																												

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

Table C.60: Dissolved Metal Concentrations at Mary River Water Quality Monitoring Stations, Mary River Project CREMP, 2021

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
			02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	02-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21	01-Jul-21	01-Aug-21	01-Aug-21	01-Aug-21	01-Aug-21	01-Aug-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0411	0.0416	0.0464	0.0161	0.0185	0.0039	0.0294	0.0201	0.0246	0.0159	0.0122	0.0153	0.0314	0.0631	0.0459	0.0633	0.0573	0.0428	0.0070
	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	0.00233	0.00244	0.00279	0.00242	0.00241	0.00589	0.00267	0.00228	0.00234	0.00230	0.00238	0.00343	0.00278	0.00606	0.00611	0.00674	0.00718	0.00697	0.0114
	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	<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	<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
	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	2.48	2.63	3.19	3.05	3.02	13.0	3.55	3.21	2.91	3.33	3.35	4.98	3.76	8.38	8.45	9.27	9.53	9.73	21.1
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013	<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
	Copper (Cu)	mg/L	<0.00050	<0.00050	0.00051	<0.00050	<0.00050	<0.00050	0.00051	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00077	0.00077	0.00078	0.00078	0.00078	0.00071
	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	<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	<0.000050
	Lithium (Li)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0020
	Magnesium (Mg)	mg/L	1.42	1.52	1.91	1.71	1.71	10.8	2.17	1.73	1.76	1.97	2.01	3.10	2.20	4.79	4.91	5.49	5.61	5.78	18.5
	Manganese (Mn)	mg/L	0.00119	0.00114	0.00103	0.000641	0.000636	0.00939	0.000970	0.00237	0.00168	0.00124	0.00160	0.00233	0.00169	0.000339	0.000264	0.000322	0.000277	0.000229	0.000194
	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	0.000060	0.000058	0.000060	0.000058	0.000061	0.000106	0.000063	0.000068	0.000089	0.000088	0.000083	0.000176	0.000105	0.000276	0.000264	0.000271	0.000242	0.000253	0.000273
	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	<0.00050
	Potassium (K)	mg/L	0.33	0.34	0.37	0.32	0.32	0.69	0.35	0.29	0.30	0.30	0.32	0.47	0.37	0.88	0.87	0.91	0.89	0.89	1.27
	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	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.40	0.41	0.46	0.40	0.39	0.47	0.43	0.35	0.36	0.37	0.40	0.45	0.42	0.77	0.69	0.79	0.78	0.77	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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	0.497	0.515	0.571	0.474	0.495	0.543	0.497	0.414	0.393	0.402	0.435	0.693	0.509	2.15	2.16	2.24	2.05	2.09	1.60
	Strontium (Sr)	mg/L	0.00303	0.00306	0.00332	0.00309	0.00296	0.0122	0.00355	0.00298	0.00293	0.00302	0.00312	0.00436	0.00345	0.0104	0.0106	0.0107	0.0107	0.0103	0.0216
	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	<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
	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	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)	mg/L	0.000151	0.000163	0.000178	0.000154	0.000153	0.000533	0.000174	0.000137	0.000138	0.000154	0.000152	0.000293	0.000181	0.00148	0.00149	0.00159	0.00139	0.00138	0.00210
	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	<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	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

Table C.60: Dissolved Metal Concentrations at Mary River Water Quality Monitoring Stations, Mary River Project CREMP, 2021

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
			27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	26-Jul-21	26-Jul-21	26-Jul-21	05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	05-Sep-21	04-Sep-21	04-Sep-21	03-Sep-21	03-Sep-21	03-Sep-21	03-Sep-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0432	0.0467	0.0368	0.0455	0.0359	0.0453	0.0399	0.0186	0.0170	0.0138	0.0131	0.0040	0.0254	0.0156	0.0103	0.0137	0.0145	0.0076	0.0112	0.0124
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00580	0.00579	0.00574	0.00565	0.00632	0.00656	0.00650	0.00989	0.0100	0.0108	0.0105	0.0129	0.0134	0.0106	0.0109	0.0115	0.0106	0.0110	0.0107	0.0111
	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	<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	<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	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	8.57	8.37	8.32	8.40	8.58	8.51	8.79	14.6	14.6	16.7	15.9	25.8	25.5	16.8	16.7	16.7	17.9	17.0	16.5	16.7
	Chromium (Cr)	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)	mg/L	0.00076	0.00061	0.00062	0.00061	0.00063	0.00064	0.00064	0.00093	0.00090	0.00089	0.00088	0.00068	0.00071	0.00079	0.00082	0.00086	0.00085	0.00077	0.00080	0.00084
	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	<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	<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	0.0015	0.0017	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Magnesium (Mg)	mg/L	5.07	4.93	5.00	4.92	5.36	5.31	5.19	9.39	9.83	10.5	10.2	26.5	26.4	10.8	11.6	11.9	11.9	12.1	11.6	12.0
	Manganese (Mn)	mg/L	0.000442	0.000473	0.000530	0.000618	0.000472	0.00140	0.00247	0.000194	0.000175	0.000221	0.000223	0.000185	0.00155	0.000282	0.000192	0.000200	0.000618	0.000504	0.00156	0.000905
	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	0.000167	0.000185	0.000190	0.000197	0.000266	0.000276	0.000294	0.000492	0.000443	0.000387	0.000369	0.000278	0.000280	0.000350	0.000551	0.000562	0.000498	0.000456	0.000452	0.000476
	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	0.00055	0.00054
	Potassium (K)	mg/L	0.72	0.68	0.69	0.67	0.73	0.76	0.76	1.24	1.17	1.17	1.09	1.37	1.39	1.10	1.18	1.23	1.20	1.16	1.21	1.19
	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	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)	mg/L	0.82	0.80	0.77	0.80	0.66	0.73	0.70	0.91	0.93	0.96	0.93	0.78	0.80	0.87	0.86	0.86	0.89	0.83	0.87	0.78
	Silver (Ag)	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	1.45	1.43	1.46	1.40	1.45	1.52	1.57	4.23	3.86	4.11	3.17	2.11	2.23	3.25	3.37	3.49	3.26	3.25	3.26	3.18
	Strontium (Sr)	mg/L	0.00897	0.00891	0.00872	0.00873	0.00924	0.00935	0.00950	0.0199	0.0191	0.0192	0.0168	0.0269	0.0261	0.0177	0.0194	0.0188	0.0189	0.0177	0.0182	0.0177
	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	<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	<0.010	<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
	Uranium (U)	mg/L	0.00100	0.000975	0.000944	0.000883	0.000787	0.000735	0.000796	0.00515	0.00507	0.00513	0.00405	0.00301	0.00300	0.00405	0.00415	0.00418	0.00374	0.00377	0.00341	0.00349
	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	<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	0.0057	<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 (G0-09) Stations in 2021

Variable	Spring										Summer										Fall									
	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
Aluminum (Al)	0.4	0.4	0.1	0.7	0.5	0.6	0.4	0.3	0.4	0.7	1.0	0.7	0.1	0.8	0.8	0.6	0.8	0.6	0.8	0.7	0.8	0.2	1.5	0.9	0.6	0.8	0.9	0.5	0.7	0.8
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	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
Barium (Ba)	1.0	1.0	2.3	1.1	0.9	0.9	0.9	0.9	1.4	1.1	1.1	1.1	1.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.3	1.3	1.0	1.1	1.1	1.0	1.1	1.0	1.1
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	1.0	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
Calcium (Ca)	1.1	1.1	4.7	1.3	1.2	1.1	1.2	1.2	1.8	1.4	1.1	1.1	2.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.7	1.7	1.1	1.1	1.1	1.2	1.1	1.1	1.1
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	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
Cobalt (Co)	1.0	1.0	1.3	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	1.0	1.0	1.0	1.2	1.4	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Copper (Cu)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	1.0	0.8	0.8	0.8	0.8	0.8	0.8	1.0	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.9	0.9
Iron (Fe)	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
Lead (Pb)	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
Lithium (Li)	1.0	1.0	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Magnesium (Mg)	1.1	1.1	6.7	1.3	1.1	1.1	1.2	1.2	1.9	1.4	1.1	1.1	3.7	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	2.7	2.7	1.1	1.2	1.2	1.2	1.2	1.2	1.2
Manganese (Mn)	0.6	0.6	8.4	0.9	2.1	1.5	1.1	1.4	2.1	1.5	0.9	0.7	0.6	1.4	1.5	1.7	2.0	1.5	4.5	8.0	1.1	0.9	7.9	1.4	1.0	1.0	3.1	2.6	7.9	4.6
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)	1.0	1.0	1.8	1.1	1.1	1.5	1.5	1.4	3.0	1.8	0.9	0.9	1.0	0.6	0.7	0.7	0.7	1.0	1.0	1.1	0.8	0.6	0.6	0.8	1.3	1.3	1.1	1.0	1.0	1.1
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	1.0	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	1.1
Potassium (K)	0.9	0.9	2.0	1.0	0.8	0.9	0.9	0.9	1.4	1.1	1.0	1.0	1.4	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.1	1.2	0.9	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	1.0	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
Silicon (Si)	0.9	0.9	1.1	1.0	0.8	0.9	0.9	0.9	1.1	1.0	1.0	1.0	0.8	1.1	1.1	1.0	1.1	0.9	1.0	0.9	1.0	0.8	0.9	0.9	0.9	1.0	0.9	0.9	0.9	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	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sodium (Na)	0.9	0.9	1.0	0.9	0.8	0.7	0.8	0.8	1.3	1.0	0.9	1.0	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.8	0.5	0.5	0.8	0.8	0.9	0.8	0.8	0.8	0.8
Strontium (Sr)	1.0	0.9	3.9	1.1	1.0	0.9	1.0	1.0	1.4	1.1	1.0	1.0	2.0	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.4	1.3	0.9	1.0	1.0	1.0	0.9	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	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
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	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
Uranium (U)	0.9	0.9	3.3	1.1	0.8	0.8	0.9	0.9	1.8	1.1	0.9	0.9	1.4	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.8	0.6	0.6	0.8	0.8	0.8	0.7	0.7	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	1.0	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
Zinc (Zn)	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	1.9	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).

Table C.62: *In Situ* Water Quality Profile Data Collected at Mary Lake Water Quality Monitoring Stations in Winter, Mary River Project CREMP, April 2021

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	19-Apr-21	19-Apr-21	19-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.0	1.3	1.3	0.6	0.7	0.6	0.6	1.2	0.9	0.6	0.6	12.76	11.86	13.03	13.74	13.74	14.27	12.92	13.47	14.15	14.15
4.0	1.4	1.4	1.4	0.7	0.6	0.6	0.9	0.8	0.6	0.6	12.64	11.94	12.17	13.79	13.81	14.30	13.09	13.57	14.15	14.39
5.0	1.8	1.6	-	0.8	0.8	0.7	0.9	0.8	0.8	0.8	12.20	11.96		13.75	31.74	14.32	13.11	13.54	14.04	14.29
6.0	1.8	1.8	-	0.9	0.9	0.8	1.0	0.9	0.9	0.9	12.14	11.95	-	13.70	13.67	14.25	13.06	13.51	13.94	14.21
7.0	1.9	1.9	-	1.0	1.0	1.0	1.0	1.0	1.0	0.9	12.05	11.90	-	13.63	13.58	14.06	13.00	13.45	13.85	13.86
8.0	2.0	1.9	-	1.1	1.1	-	1.0	1.1	1.0	0.9	11.92	11.82	-	13.55	13.48	-	12.96	13.38	13.76	13.80
9.0	2.0	1.9	-	1.1	1.1	-	1.0	1.1	1.1	-	11.71	11.75	-	13.49	13.39	-	12.91	13.29	13.66	-
10.0	2.1	-	-	1.2	1.2	-	1.1	1.2	1.2	-	11.21	-	-	13.42	13.30	-	12.83	13.22	13.55	-
11.0	2.2	-	-	1.2	1.2	-	1.1	1.2	1.2	-	10.55	-	-	13.36	13.20	-	12.81	13.16	13.48	-
12.0	2.3	-	-	-	1.3	-	1.1	1.3	1.2	-	6.68	-	-	-	13.11	-	12.77	13.07	13.38	-
13.0	2.3	-	-	-	1.3	-	1.1	1.3	1.3	-	6.48	-	-	-	13.00	-	12.71	13.01	13.28	-
14.0	2.5	-	-	-	1.3	-	1.1	1.3	1.3	-	2.60	-	-	-	12.94	-	12.65	12.90	13.19	-
15.0	2.5	-	-	-	1.3	-	1.2	1.3	1.3	-	0.74	-	-	-	12.88	-	12.59	12.82	13.08	-
16.0	-	-	-	-	1.4	-	1.2	1.4	1.4	-	-	-	-	-	12.81	-	12.53	12.71	12.99	-
17.0	-	-	-	-	1.4	-	-	1.4	1.4	-	-	-	-	-	12.73	-	-	12.63	12.91	-
18.0	-	-	-	-	1.4	-	-	1.5	1.4	-	-	-	-	-	12.65	-	-	12.52	12.62	-
19.0	-	-	-	-	1.4	-	-	1.5	1.5	-	-	-	-	-	12.52	-	-	12.42	12.57	-
20.0	-	-	-	-	1.4	-	-	1.5	1.5	-	-	-	-	-	12.29	-	-	12.30	12.48	-
21.0	-	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	-	-	12.34	-
22.0	-	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	-	-	12.19	-
23.0	-	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	-	-	12.02	-
24.0	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	-	-	-	-	11.84	-
25.0	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	-	-	-	-	11.58	-
26.0	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	-	-	-	-	11.41	-
27.0	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	-	-	-	11.11	-
28.0	-	-	-	-	-	-	-	-	1.9	-	-	-	-	-	-	-	-	-	10.78	-
29.0									2.0										10.29	

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.2, 9.4, 4.8, 11.5, 20.6, 7.3, 17.1, 20.7, 29.3, and 8.0 m, respectively, at the time of winter sampling. Ice thickness at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 1.25, 1.40, 1.45, 1.62, 1.44, 1.58, 1.55, 1.33, 1.30, and 1.69 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 2021

Depth (m)	Dissolved Oxygen (% Saturation)										pH (pH units)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	19-Apr-21	19-Apr-21	19-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.0	92.0	85.3	93.7	97.4	97.6	101.1	92.6	96.1	99.8	99.7	7.81	7.81	7.86	7.88	7.00	7.68	7.89	7.65	7.88	7.83
4.0	91.4	86.0	88.4	97.8	97.8	101.3	93.3	96.5	100.1	101.8	7.78	7.78	7.67	7.81	7.75	7.66	7.83	7.60	7.84	7.76
5.0	89.2	86.8	-	98.0	98.0	101.8	93.6	96.7	99.9	101.8	7.72	7.75	-	7.77	7.72	7.64	7.76	7.52	7.80	7.72
6.0	88.8	87.1	-	97.8	97.7	101.6	93.4	96.6	99.4	101.2	7.71	7.73	-	7.74	7.70	7.61	7.74	7.51	7.76	7.69
7.0	88.3	87.1	-	97.6	97.3	101.5	93.0	96.4	98.9	98.8	7.70	7.70	-	7.71	7.68	7.48	7.67	7.48	7.74	7.60
8.0	87.6	86.5	-	97.3	96.8	-	92.8	96.0	98.5	98.4	7.68	7.68	-	7.69	7.66	-	7.64	7.46	7.72	7.57
9.0	86.7	86.1	-	97.0	96.3	-	92.5	95.5	97.9	-	7.65	7.67	-	7.68	7.64	-	7.63	7.45	7.70	-
10.0	83.2	-	-	96.6	95.8	-	91.9	95.1	97.3	-	7.60	-	-	7.66	7.62	-	7.60	7.43	7.69	-
11.0	78.5	-	-	96.2	95.2	-	91.9	94.8	96.8	-	7.55	-	-	7.61	7.61	-	7.58	7.42	7.68	-
12.0	49.5	-	-	-	94.6	-	91.7	94.3	96.3	-	7.33	-	-	-	7.60	-	7.55	7.41	7.67	-
13.0	48.2	-	-	-	94.0	-	91.3	93.8	95.6	-	7.31	-	-	-	7.58	-	7.54	7.40	7.66	-
14.0	19.9	-	-	-	93.5	-	90.6	93.2	95.0	-	7.18	-	-	-	7.57	-	7.52	7.40	7.65	-
15.0	5.6	-	-	-	93.2	-	90.5	92.7	94.3	-	7.14	-	-	-	7.56	-	7.51	7.38	7.64	-
16.0	-	-	-	-	92.8	-	90.1	92.1	93.7	-	-	-	-	-	7.55	-	7.50	7.37	7.63	-
17.0	-	-	-	-	92.3	-	-	91.6	93.2	-	-	-	-	-	7.53	-	-	7.36	7.62	-
18.0	-	-	-	-	91.8	-	-	90.9	92.6	-	-	-	-	-	7.51	-	-	7.35	7.60	-
19.0	-	-	-	-	90.8	-	-	90.2	91.9	-	-	-	-	-	7.48	-	-	7.34	7.59	-
20.0	-	-	-	-	89.2	-	-	89.4	90.5	-	-	-	-	-	7.46	-	-	7.32	7.57	-
21.0	-	-	-	-	-	-	-	-	89.6	-	-	-	-	-	-	-	-	-	7.56	-
22.0	-	-	-	-	-	-	-	-	88.5	-	-	-	-	-	-	-	-	-	7.54	-
23.0	-	-	-	-	-	-	-	-	87.5	-	-	-	-	-	-	-	-	-	7.53	-
24.0	-	-	-	-	-	-	-	-	86.2	-	-	-	-	-	-	-	-	-	7.51	-
25.0	-	-	-	-	-	-	-	-	84.5	-	-	-	-	-	-	-	-	-	7.49	-
26.0	-	-	-	-	-	-	-	-	83.3	-	-	-	-	-	-	-	-	-	7.46	-
27.0	-	-	-	-	-	-	-	-	81.6	-	-	-	-	-	-	-	-	-	7.43	-
28.0	-	-	-	-	-	-	-	-	79.2	-	-	-	-	-	-	-	-	-	7.39	-
									75.7										7.37	

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.2, 9.7, 4.8, 11.5, 20.6, 7.3, 17.1, 20.7, 29.3, and 8.0 m, respectively, at the time of winter sampling. Ice thickness at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 1.25, 1.40, 1.45, 1.62, 1.44, 1.58, 1.55, 1.33, 1.30, and 1.69 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 2021

Depth (m)	Specific Conductance (µS/cm)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	19-Apr-21	19-Apr-21	19-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21
1.0	-	-	-	-	-	-	-	-	-	-
2.0	-	-	-	-	-	-	-	-	-	-
3.0	297.4	304.2	302.1	109.5	109.5	113.6	107.0	110.1	109.8	112.7
4.0	295.6	301.0	301.2	108.7	108.2	114.1	105.7	109.0	108.5	111.7
5.0	293.8	299.5	-	107.9	107.4	113.6	104.5	107.0	107.6	111.5
6.0	293.3	299.6	-	107.3	106.6	114.2	104.3	106.5	106.7	112.1
7.0	292.7	298.9	-	106.7	105.8	132.4	103.4	105.8	106.0	114.4
8.0	292.0	298.6	-	106.2	105.2	-	103.1	105.0	105.3	115.5
9.0	291.6	298.2	-	105.7	104.7	-	102.8	104.5	104.5	-
10.0	290.8	-	-	105.4	104.1	-	102.6	104.1	104.0	-
11.0	290.0	-	-	105.1	103.5	-	102.2	103.5	103.6	-
12.0	290.0	-	-	-	103.0	-	101.6	103.1	103.1	-
13.0	290.3	-	-	-	102.7	-	101.3	102.5	102.7	-
14.0	295.7	-	-	-	102.5	-	101.0	102.3	102.3	-
15.0	301.3	-	-	-	102.1	-	100.8	101.7	101.9	-
16.0	-	-	-	-	101.8	-	100.6	101.2	101.7	-
17.0	-	-	-	-	101.6	-	-	101.0	101.2	-
18.0	-	-	-	-	102.4	-	-	100.8	100.7	-
19.0	-	-	-	-	104.5	-	-	100.8	100.4	-
20.0	-	-	-	-	104.9	-	-	101.2	100.2	-
21.0	-	-	-	-	-	-	-	-	100.0	-
22.0	-	-	-	-	-	-	-	-	99.9	-
23.0	-	-	-	-	-	-	-	-	100.0	-
24.0	-	-	-	-	-	-	-	-	100.3	-
25.0	-	-	-	-	-	-	-	-	100.6	-
26.0	-	-	-	-	-	-	-	-	101.5	-
27.0	-	-	-	-	-	-	-	-	101.6	-
28.0	-	-	-	-	-	-	-	-	102.6	-
									102.9	

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.2, 9.7, 4.8, 11.5, 20.6, 7.3, 17.1, 20.7, 29.3, and 8.0 m, respectively, at the time of winter sampling. Ice thickness at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 1.25, 1.40, 1.45, 1.62, 1.44, 1.58, 1.55, 1.33, 1.30, and 1.69 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 2021

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	28-Jul-21	28-Jul-21	28-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	28-Jul-21	28-Jul-21	28-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21
1.0	6.4	6.5	6.6	6.7	6.7	6.2	6.3	6.3	6.4	6.4	11.78	11.82	11.91	11.59	11.78	11.84	11.65	11.72	11.81	11.79
2.0	6.4	6.5	6.5	6.2	6.7	6.0	6.1	5.9	6.4	6.0	11.85	11.83	11.93	11.80	11.77	11.86	11.75	11.79	11.85	11.83
3.0	6.4	6.5	6.5	6.1	6.4	5.8	6.0	5.8	6.0	5.6	11.86	11.83	11.93	11.81	11.78	11.85	11.73	11.79	11.84	11.82
4.0	6.4	6.5	6.5	6.0	6.0	5.7	6.0	5.7	5.9	5.7	11.86	11.83	11.93	11.81	11.80	11.83	11.73	11.79	11.84	11.81
5.0	6.4	6.5	-	6.0	5.9	5.7	6.0	5.7	5.9	5.7	11.87	11.83	-	11.82	11.81	11.80	11.73	11.78	11.84	11.80
6.0	6.4	6.5	-	6.0	5.9	5.7	6.0	5.7	5.9	5.7	11.87	11.83	-	11.80	11.79	11.79	11.73	11.77	11.82	11.80
7.0	6.4	6.5	-	5.9	5.8	5.7	6.0	5.6	5.8	5.7	11.86	11.82	-	11.79	11.80	11.79	11.71	11.76	11.79	11.79
8.0	6.4	6.5	-	5.9	5.8	-	6.0	5.6	5.7	-	11.86	11.82	-	11.78	11.79	-	11.70	11.75	11.77	-
9.0	6.4	6.5	-	5.9	5.8	-	5.9	5.6	5.7	-	11.85	11.82	-	11.77	11.78	-	11.69	11.75	11.76	-
10.0	6.4	-	-	5.9	5.7	-	5.9	5.6	5.7	-	11.88	-	-	11.77	11.78	-	11.68	11.73	11.75	-
11.0	6.4	-	-	-	5.7	-	5.9	5.6	5.6	-	11.87	-	-	-	11.77	-	11.68	11.73	11.74	-
12.0	6.4	-	-	-	5.7	-	5.9	5.6	5.6	-	11.86	-	-	-	11.76	-	11.67	11.72	11.74	-
13.0	6.4	-	-	-	5.7	-	5.9	5.6	5.6	-	11.85	-	-	-	11.75	-	11.66	11.71	11.73	-
14.0	6.4	-	-	-	5.7	-	5.9	5.6	5.6	-	11.88	-	-	-	11.74	-	11.66	11.70	11.73	-
15.0	-	-	-	-	5.7	-	5.9	5.6	5.6	-	-	-	-	-	11.73	-	11.65	11.69	11.72	-
16.0	-	-	-	-	5.7	-	5.9	5.6	5.6	-	-	-	-	-	11.73	-	11.64	11.69	11.72	-
17.0	-	-	-	-	5.7	-	5.9	5.6	5.6	-	-	-	-	-	11.73	-	11.64	11.68	11.72	-
18.0	-	-	-	-	5.7	-	-	5.6	5.6	-	-	-	-	-	11.72	-	-	11.68	11.71	-
19.0	-	-	-	-	5.7	-	-	5.6	5.6	-	-	-	-	-	11.72	-	-	11.67	11.71	-
20.0	-	-	-	-	5.7	-	-	5.6	5.6	-	-	-	-	-	11.72	-	-	11.67	11.70	-
21.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.70	-
22.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.69	-
23.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.68	-
24.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.68	-
25.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.67	-
26.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.67	-
27.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.65	-
28.0	-	-	-	-	-	-	-	-	5.6	-	-	-	-	-	-	-	-	-	11.62	-

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.3, 9.7, 4.3, 12.1, not recorded, 7.8, 18.8, 21.1, 28.9, and 10.0 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 2021

Depth (m)	Dissolved Oxygen (% Saturation)										pH (pH units)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	28-Jul-21	28-Jul-21	28-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	28-Jul-21	28-Jul-21	28-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21
1.0	95.5	96.2	97.0	94.1	96.3	95.6	94.0	94.7	95.6	95.2	7.86	7.91	7.91	8.01	7.91	7.75	7.76	8.01	7.89	7.61
2.0	96.2	96.4	97.1	95.1	95.7	94.8	94.3	94.3	95.2	94.7	7.72	7.86	7.84	7.86	7.83	7.67	7.59	7.87	7.78	7.74
3.0	96.3	96.3	97.2	95.1	95.2	94.7	94.4	94.0	95.0	94.4	7.66	7.81	7.73	7.80	7.82	7.62	7.45	7.80	7.70	7.69
4.0	96.3	96.3	97.3	95.0	94.9	94.3	94.4	93.9	94.8	94.2	7.60	7.77	7.59	7.73	7.76	7.55	7.36	7.70	7.62	7.64
5.0	96.3	96.3	-	94.9	94.7	94.0	94.2	93.9	94.7	94.2	7.57	7.73	-	7.68	7.68	7.46	7.22	7.63	7.56	7.61
6.0	96.3	96.3	-	94.7	94.6	94.0	94.2	93.8	94.4	94.1	7.54	7.69	-	7.64	7.44	7.41	7.20	7.58	7.47	7.58
7.0	96.3	96.2	-	94.6	94.7	93.9	94.0	93.6	94.1	94.0	7.51	7.65	-	7.57	7.36	7.34	7.17	7.52	7.39	7.54
8.0	96.2	96.2	-	94.5	94.4	-	93.8	93.4	93.9	-	7.50	7.62	-	7.57	7.33	-	7.15	7.43	7.33	-
9.0	96.2	96.2	-	94.4	94.2	-	93.8	93.3	93.6	-	7.48	7.58	-	7.44	7.30	-	7.14	7.34	7.25	-
10.0	96.3	-	-	94.3	94.2	-	93.7	93.2	93.5	-	7.46	-	-	7.39	7.19	-	7.12	7.28	7.19	-
11.0	96.3	-	-	-	93.9	-	93.7	93.2	93.5	-	7.46	-	-	-	7.11	-	7.11	7.22	7.16	-
12.0	96.2	-	-	-	93.8	-	93.7	93.2	93.4	-	7.46	-	-	-	7.07	-	7.11	7.17	7.12	-
13.0	96.1	-	-	-	93.7	-	93.5	93.1	93.4	-	7.45	-	-	-	7.04	-	7.09	7.13	7.08	-
14.0	96.3	-	-	-	93.7	-	93.5	93.0	93.4	-	7.45	-	-	-	7.01	-	7.09	7.10	7.04	-
15.0	-	-	-	-	93.6	-	93.4	92.9	93.3	-	-	-	-	-	6.98	-	7.07	7.07	7.01	-
16.0	-	-	-	-	93.5	-	93.3	92.9	93.3	-	-	-	-	-	6.94	-	7.06	7.04	6.98	-
17.0	-	-	-	-	93.4	-	93.3	92.9	93.3	-	-	-	-	-	6.94	-	7.05	7.02	6.97	-
18.0	-	-	-	-	93.4	-	-	92.8	93.2	-	-	-	-	-	6.91	-	-	7.00	6.96	-
19.0	-	-	-	-	93.4	-	-	92.8	93.2	-	-	-	-	-	6.90	-	-	6.97	6.96	-
20.0	-	-	-	-	93.5	-	-	92.7	93.1	-	-	-	-	-	6.87	-	-	6.95	6.96	-
21.0	-	-	-	-	-	-	-	-	93.1	-	-	-	-	-	-	-	-	-	6.96	-
22.0	-	-	-	-	-	-	-	-	93.0	-	-	-	-	-	-	-	-	-	6.96	-
23.0	-	-	-	-	-	-	-	-	93.0	-	-	-	-	-	-	-	-	-	6.96	-
24.0	-	-	-	-	-	-	-	-	92.9	-	-	-	-	-	-	-	-	-	6.96	-
25.0	-	-	-	-	-	-	-	-	92.9	-	-	-	-	-	-	-	-	-	6.96	-
26.0	-	-	-	-	-	-	-	-	92.8	-	-	-	-	-	-	-	-	-	6.96	-
27.0	-	-	-	-	-	-	-	-	92.7	-	-	-	-	-	-	-	-	-	6.96	-
28.0	-	-	-	-	-	-	-	-	92.4	-	-	-	-	-	-	-	-	-	6.96	-

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.3, 9.7, 4.3, 12.1, not recorded, 7.8, 18.8, 21.1, 28.9, and 10.0 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 2021

Depth (m)	Specific Conductance (µS/cm)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	28-Jul-21	28-Jul-21	28-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21
1.0	110.4	109.0	109.8	76.5	78.5	66.0	66.1	65.9	68.5	65.8
2.0	110.4	109.0	109.8	74.2	89.6	66.2	65.5	66.1	68.2	65.6
3.0	110.5	109.0	109.9	73.0	80.1	66.1	65.5	66.3	68.1	65.7
4.0	110.6	109.1	109.8	72.3	76.1	66.1	65.5	66.3	68.0	65.7
5.0	110.6	109.1	-	72.0	75.7	66.1	65.6	66.3	67.9	65.8
6.0	110.6	109.1	-	72.4	5.7	66.1	65.6	66.3	67.4	65.7
7.0	110.6	109.2	-	72.5	72.1	66.1	65.7	66.4	67.1	65.8
8.0	110.6	109.1	-	72.4	72.0	-	65.7	66.5	67.1	-
9.0	110.7	109.5	-	72.4	68.8	-	65.7	66.6	67.2	-
10.0	110.9	-	-	72.5	68.8	-	65.6	66.6	67.2	-
11.0	110.9	-	-	-	67.9	-	65.7	66.9	67.2	-
12.0	110.8	-	-	-	68.0	-	65.7	67.6	67.2	-
13.0	111.2	-	-	-	68.2	-	65.6	67.9	67.2	-
14.0	111.3	-	-	-	68.4	-	65.6	67.9	67.4	-
15.0	-	-	-	-	68.1	-	65.7	68.1	67.4	-
16.0	-	-	-	-	68.4	-	65.6	68.2	67.4	-
17.0	-	-	-	-	68.2	-	65.6	68.2	67.4	-
18.0	-	-	-	-	68.2	-	-	68.1	67.4	-
19.0	-	-	-	-	68.7	-	-	68.1	67.5	-
20.0	-	-	-	-	75.1	-	-	68.1	67.5	-
21.0	-	-	-	-	-	-	-	-	67.5	-
22.0	-	-	-	-	-	-	-	-	67.5	-
23.0	-	-	-	-	-	-	-	-	67.3	-
24.0	-	-	-	-	-	-	-	-	67.3	-
25.0	-	-	-	-	-	-	-	-	67.3	-
26.0	-	-	-	-	-	-	-	-	67.2	-
27.0	-	-	-	-	-	-	-	-	68.0	-
28.0	-	-	-	-	-	-	-	-	69.4	-

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.3, 9.7, 4.3, 12.1, not recorded, 7.8, 18.8, 21.1, 28.9, and 10.0 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 2021

Depth (m)	Temperature (°C)										Dissolved Oxygen (mg/L)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	29-Aug-21	29-Aug-21	29-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	29-Aug-21	29-Aug-21	29-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21
1.0	5.6	5.8	5.8	6.8	6.8	6.8	6.8	6.9	6.8	6.8	12.26	12.26	12.48	11.76	11.87	11.90	11.69	11.92	11.87	11.88
2.0	5.5	5.7	5.7	6.8	6.8	6.8	6.8	6.8	6.8	6.8	12.27	12.30	12.41	11.77	11.87	11.90	11.76	11.90	11.86	11.88
3.0	5.4	5.6	5.4	6.8	6.8	6.8	6.8	6.8	6.8	6.8	12.29	12.37	12.40	11.79	11.86	11.90	11.76	11.89	11.86	11.87
4.0	5.2	5.3	5.3	6.8	6.8	6.8	6.8	6.8	6.8	6.7	12.33	12.39	12.42	11.80	11.86	11.90	11.76	11.88	11.85	11.86
5.0	5.2	5.3	-	6.8	6.8	6.8	6.8	6.8	6.8	6.7	12.35	12.38	-	11.79	11.85	11.90	11.76	11.87	11.85	11.84
6.0	5.1	5.3	-	6.8	6.8	6.8	6.8	6.8	6.8	6.7	12.37	12.37	-	11.79	11.85	11.91	11.76	11.85	11.84	11.84
7.0	5.1	5.3	-	6.8	6.8	6.8	6.8	6.8	6.7	6.7	12.37	12.37	-	11.79	11.85	11.91	11.75	11.84	11.83	11.82
8.0	5.0	5.3	-	6.8	6.7	-	6.8	6.8	6.7	-	12.37	12.36	-	11.83	11.88	-	11.75	11.84	11.82	-
9.0	5.0	5.3	-	6.7	6.7	-	6.8	6.8	6.7	-	12.37	12.35	-	11.82	11.90	-	11.75	11.84	11.81	-
10.0	5.0	-	-	6.7	6.7	-	6.8	6.8	6.7	-	12.37	-	-	11.81	11.91	-	11.75	11.83	11.80	-
11.0	5.0	-	-	6.7	6.8	-	6.8	6.8	6.7	-	12.38	-	-	11.79	11.90	-	11.75	11.82	11.79	-
12.0	5.0	-	-	-	6.8	-	6.8	6.8	6.7	-	12.38	-	-	-	11.89	-	11.74	11.80	11.78	-
13.0	5.0	-	-	-	6.8	-	6.8	6.7	6.7	-	12.38	-	-	-	11.89	-	11.75	11.79	11.77	-
14.0	5.0	-	-	-	6.7	-	6.8	6.7	6.7	-	12.39	-	-	-	11.89	-	11.74	11.78	11.77	-
15.0	4.9	-	-	-	6.7	-	6.8	6.7	6.7	-	12.40	-	-	-	11.89	-	11.73	11.77	11.76	-
16.0	-	-	-	-	6.8	-	6.8	6.6	6.7	-	-	-	-	-	11.88	-	11.73	11.76	11.75	-
17.0	-	-	-	-	6.7	-	6.8	6.6	6.7	-	-	-	-	-	11.89	-	11.72	11.75	11.72	-
18.0	-	-	-	-	6.7	-	-	6.6	6.7	-	-	-	-	-	11.91	-	-	11.74	11.71	-
19.0	-	-	-	-	6.7	-	-	6.6	6.6	-	-	-	-	-	11.93	-	-	11.74	11.70	-
20.0	-	-	-	-	6.7	-	-	6.6	6.6	-	-	-	-	-	11.93	-	-	11.73	11.68	-
21.0	-	-	-	-	-	-	-	-	6.5	-	-	-	-	-	-	-	-	-	11.67	-
22.0	-	-	-	-	-	-	-	-	6.5	-	-	-	-	-	-	-	-	-	11.68	-
23.0	-	-	-	-	-	-	-	-	6.5	-	-	-	-	-	-	-	-	-	11.70	-
24.0	-	-	-	-	-	-	-	-	6.5	-	-	-	-	-	-	-	-	-	11.69	-
25.0	-	-	-	-	-	-	-	-	6.4	-	-	-	-	-	-	-	-	-	11.67	-
26.0	-	-	-	-	-	-	-	-	6.3	-	-	-	-	-	-	-	-	-	11.68	-
27.0	-	-	-	-	-	-	-	-	6.3	-	-	-	-	-	-	-	-	-	11.67	-
28.0	-	-	-	-	-	-	-	-	6.3	-	-	-	-	-	-	-	-	-	11.68	-
29.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.3, 9.6, 4.7, 12.2, 20.7, 8.1, 16.5, 20.9, 30.7 and 6.6 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)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	29-Aug-21	29-Aug-21	29-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	29-Aug-21	29-Aug-21	29-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21
1.0	97.3	97.8	99.6	96.4	97.4	97.7	95.7	97.8	97.2	97.5	7.90	7.95	8.03	7.83	7.86	7.89	7.77	7.75	7.83	7.90
2.0	97.4	98.0	98.7	96.5	97.3	97.7	96.4	97.6	97.1	97.4	7.90	7.95	8.04	7.75	7.80	7.85	7.74	7.71	7.80	7.86
3.0	97.1	98.0	98.0	96.6	97.2	97.6	96.4	97.5	97.1	97.3	7.90	7.95	8.03	7.70	7.77	7.82	7.70	7.69	7.78	7.83
4.0	97.1	97.9	97.9	96.7	97.2	97.6	96.4	97.4	97.1	97.1	7.88	7.94	8.02	7.64	7.75	7.79	7.67	7.66	7.75	7.80
5.0	97.1	97.8	-	96.6	97.1	97.6	96.3	97.3	97.0	96.8	7.87	7.93	-	7.61	7.71	7.78	7.64	7.65	7.73	7.77
6.0	97.1	97.7	-	96.6	97.1	97.7	96.3	97.1	96.9	96.8	7.84	7.91	-	7.58	7.70	7.76	7.62	7.62	7.72	7.77
7.0	97.0	97.7	-	96.6	97.0	97.7	96.3	97.0	96.8	96.7	7.83	7.90	-	7.55	7.67	7.75	7.60	7.61	7.71	7.76
8.0	97.0	97.5	-	96.8	97.3	-	96.3	97.0	96.7	-	7.82	7.89	-	7.52	7.67	-	7.59	7.59	7.69	-
9.0	97.0	97.4	-	96.8	97.4	-	96.3	97.0	96.7	-	7.80	7.87	-	7.46	7.66	-	7.57	7.58	7.68	-
10.0	97.0	-	-	96.7	97.5	-	96.3	96.9	96.6	-	7.79	-	-	7.44	7.65	-	7.55	7.56	7.67	-
11.0	97.0	-	-	96.4	97.4	-	96.2	96.8	96.4	-	7.78	-	-	7.42	7.64	-	7.54	7.55	7.65	-
12.0	97.0	-	-	-	97.4	-	96.2	96.5	96.3	-	7.77	-	-	-	7.63	-	7.53	7.53	7.65	-
13.0	96.9	-	-	-	97.4	-	96.2	96.5	96.3	-	7.76	-	-	-	7.62	-	7.51	7.52	7.63	-
14.0	97.0	-	-	-	97.4	-	96.1	96.3	96.2	-	7.75	-	-	-	7.61	-	7.49	7.51	7.62	-
15.0	97.0	-	-	-	97.4	-	96.1	96.1	96.2	-	7.74	-	-	-	7.60	-	7.48	7.50	7.61	-
16.0	-	-	-	-	97.3	-	96.0	96.0	96.1	-	-	-	-	-	7.59	-	7.47	7.50	7.60	-
17.0	-	-	-	-	97.3	-	96.0	96.0	95.8	-	-	-	-	-	7.58	-	7.46	7.49	7.59	-
18.0	-	-	-	-	97.5	-	-	95.9	95.7	-	-	-	-	-	7.58	-	-	7.48	7.57	-
19.0	-	-	-	-	97.5	-	-	95.8	95.6	-	-	-	-	-	7.57	-	-	7.47	7.56	-
20.0	-	-	-	-	97.5	-	-	95.7	95.4	-	-	-	-	-	7.56	-	-	7.47	7.54	-
21.0	-	-	-	-	-	-	-	-	95.2	-	-	-	-	-	-	-	-	-	7.53	-
22.0	-	-	-	-	-	-	-	-	95.1	-	-	-	-	-	-	-	-	-	7.51	-
23.0	-	-	-	-	-	-	-	-	95.2	-	-	-	-	-	-	-	-	-	7.51	-
24.0	-	-	-	-	-	-	-	-	95.1	-	-	-	-	-	-	-	-	-	7.49	-
25.0	-	-	-	-	-	-	-	-	94.7	-	-	-	-	-	-	-	-	-	7.47	-
26.0	-	-	-	-	-	-	-	-	94.7	-	-	-	-	-	-	-	-	-	7.47	-
27.0	-	-	-	-	-	-	-	-	94.6	-	-	-	-	-	-	-	-	-	7.46	-
28.0	-	-	-	-	-	-	-	-	94.6	-	-	-	-	-	-	-	-	-	7.45	-
29.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.3, 9.6, 4.7, 12.2, 20.7, 8.1, 16.5, 20.9, 30.7 and 6.6 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 2021

Depth (m)	Specific Conductance (µS/cm)									
	BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06
Date Collected	29-Aug-21	29-Aug-21	29-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21
1.0	167.3	166.4	166.6	82.5	81.8	81.7	79.0	79.2	81.8	81.5
2.0	167.5	166.4	167.3	82.5	81.8	81.7	78.9	79.1	81.8	81.3
3.0	168.3	166.2	166.9	82.4	82.0	81.7	78.9	79.1	81.8	81.4
4.0	168.6	166.1	167.7	82.5	82.0	81.7	78.9	79.1	81.8	81.6
5.0	168.9	166.2	-	82.4	82.0	81.7	78.9	79.1	81.8	81.7
6.0	169.0	166.3	-	82.6	82.0	81.6	78.9	79.0	81.8	81.6
7.0	169.1	166.3	-	82.7	83.5	81.6	78.9	79.0	81.8	81.7
8.0	169.2	166.4	-	82.7	83.8	-	78.9	79.0	81.8	-
9.0	169.3	166.7	-	82.6	84.3	-	78.9	79.1	81.8	-
10.0	169.4	-	-	82.7	84.2	-	78.9	79.0	81.8	-
11.0	169.5	-	-	82.6	84.3	-	78.9	79.6	81.8	-
12.0	169.6	-	-	-	84.3	-	78.9	80.1	81.9	-
13.0	170.0	-	-	-	84.6	-	78.9	80.0	81.9	-
14.0	170.2	-	-	-	84.9	-	78.9	81.8	81.9	-
15.0	170.4	-	-	-	85.1	-	78.9	82.3	81.9	-
16.0	-	-	-	-	85.4	-	78.9	82.6	81.9	-
17.0	-	-	-	-	87.9	-	78.9	82.9	82.0	-
18.0	-	-	-	-	88.9	-	-	83.1	81.8	-
19.0	-	-	-	-	91.3	-	-	83.2	82.2	-
20.0	-	-	-	-	81.8	-	-	83.3	82.8	-
21.0	-	-	-	-	-	-	-	-	85.3	-
22.0	-	-	-	-	-	-	-	-	86.3	-
23.0	-	-	-	-	-	-	-	-	88.0	-
24.0	-	-	-	-	-	-	-	-	90.2	-
25.0	-	-	-	-	-	-	-	-	92.4	-
26.0	-	-	-	-	-	-	-	-	92.7	-
27.0	-	-	-	-	-	-	-	-	92.7	-
28.0	-	-	-	-	-	-	-	-	92.7	-
29.0	-	-	-	-	-	-	-	-	-	-
30.0	-	-	-	-	-	-	-	-	-	-

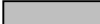
Notes: "-" = no data / not applicable. Total depth at stations BL0-01-A, BL0-01, BL0-01-B, BL0-05-A, BL0-05, BL0-05-B, BL0-03, BL0-04, BL0-09, and BL0-06 was 15.3, 9.6, 4.7, 12.2, 20.7, 8.1, 16.5, 20.9, 30.7 and 6.6 m, respectively, at the time of fall sampling.

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 2021

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	BL0-01	10-Aug-21	9.8	4.63	blue, clear	surface	7.9	11.66	98.3	7.88	133.2
						bottom	7.0	11.79	97.1	7.55	138.3
	BL0-11	14-Aug-21	9.3	3.29	colourless, clear	surface	6.8	11.76	96.5	7.24	73.8
						bottom	6.8	11.77	96.6	7.23	73.8
	BL0-07	14-Aug-21	12.8	3.29	colourless, clear	surface	6.8	11.72	96.2	7.36	73.6
						bottom	6.8	11.68	95.7	7.18	73.9
	BL0-06	14-Aug-21	6.7	3.24	colourless, clear	surface	6.9	11.75	96.5	7.16	73.2
						bottom	6.8	11.73	96.2	7.14	73.7
Profundal (Deep) Stations	BL0-03	14-Aug-21	16.4	4.58	colourless, clear	surface	7.2	11.71	97.0	7.64	72.0
						bottom	7.2	11.70	97.0	7.60	71.9
	BL0-15	15-Aug-21	29.1	4.80	colourless, clear	surface	7.2	11.69	96.9	7.66	72.2
						bottom	7.2	11.72	97.0	7.58	71.9
	BL0-14	14-Aug-21	19.5	4.54	colourless, clear	surface	7.1	11.52	95.5	7.79	72.2
						bottom	7.0	11.27	93.1	7.58	72.3
	BL0-05	14-Aug-21	21.5	2.90	colourless, clear	surface	6.9	11.72	96.4	7.25	74.2
						bottom	6.8	11.68	95.7	7.28	99.2
	BL0-13	15-Aug-21	21.5	3.38	blue, clear	surface	6.9	11.79	96.9	7.67	74.8
						bottom	6.8	11.66	95.6	7.55	80.5
	BL0-04	15-Aug-21	21.6	3.75	colourless, clear	surface	7.0	11.75	96.9	7.41	74.1
						bottom	6.8	11.69	95.7	7.31	77.9

Table C.66: Statistical Comparison of Bottom *In Situ* Water Quality Between Mary Lake Littoral and Profundal Stations, Mary River Project CREMP, August 2021

Parameter	Statistical Test Results				Summary Statistics						
	Statistical Test ^a	Transformation	Significant Difference Between Areas?	P-value	Lake Zone	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Secchi Depth (m)	tequal	none	NO	0.446	Littoral	4	3.61	0.677	0.339	3.23	4.62
					Profundal	6	3.99	0.764	0.312	2.90	4.80
Temperature (°C)	tequal	none	NO	0.311	Littoral	4	6.85	0.100	0.0500	6.80	7.00
					Profundal	6	6.97	0.197	0.0803	6.80	7.20
Dissolved Oxygen (mg/L)	M-W	rank	NO	0.087	Littoral	4	11.7	0.0486	0.0243	11.7	11.8
					Profundal	6	11.6	0.173	0.0705	11.3	11.7
Dissolved Oxygen (% saturation)	tequal	none	NO	0.376	Littoral	4	96.4	0.594	0.297	95.7	97.1
					Profundal	6	95.7	1.42	0.582	93.1	97.0
pH (units)	tequal	none	NO	0.083	Littoral	4	7.28	0.187	0.0935	7.14	7.55
					Profundal	6	7.48	0.147	0.0600	7.28	7.60
Specific Conductance (umho/cm)	M-W	rank	NO	0.593	Littoral	4	89.9	32.2	16.1	73.7	138
					Profundal	6	79.0	10.6	4.31	71.9	99.2

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

^a 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 2021

Lake Zone	Parameter	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	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	0.698	Reference	5	10.3	2.2	1.0	7.7	12.6
						Mary Lake	4	9.7	2.5	1.3	6.7	12.8
	Secchi Depth (m)	tequal	none	YES	0.001	Reference	5	5.5	0.4	0.2	4.9	5.9
						Mary Lake	4	3.6	0.7	0.3	3.2	4.6
	Temperature (°C)	M-W	rank	YES	0.016	Reference	5	7.30	0.14	0.06	7.20	7.50
						Mary Lake	4	6.85	0.10	0.05	6.80	7.00
	Dissolved Oxygen (mg/L)	tequal	none	NO	0.234	Reference	5	11.7	0.1	0.0	11.6	11.8
						Mary Lake	4	11.7	0.0	0.0	11.7	11.8
	Dissolved Oxygen (% saturation)	tequal	none	NO	0.187	Reference	5	97.1	0.8	0.4	96.3	98.0
						Mary Lake	4	96.4	0.6	0.3	95.7	97.1
Profundal (Deep) Stations	Station Depth (m)	tequal	log10	NO	0.653	Reference	5	20.5	1.5	0.7	18.2	22.4
						Mary Lake	6	21.6	4.2	1.7	16.4	29.1
	Secchi Depth (m)	tunequal	none	YES	0.003	Reference	5	5.6	0.3	0.1	5.2	5.8
						Mary Lake	6	4.0	0.8	0.3	2.9	4.8
	Temperature (°C)	tunequal	none	NO	0.117	Reference	5	7.12	0.04	0.02	7.10	7.20
						Mary Lake	6	6.97	0.20	0.08	6.80	7.20
	Dissolved Oxygen (mg/L)	M-W	rank	NO	0.522	Reference	5	11.7	0.1	0.0	11.6	11.8
						Mary Lake	6	11.6	0.2	0.1	11.3	11.7
	Dissolved Oxygen (% saturation)	M-W	rank	NO	0.518	Reference	5	96.1	0.3	0.1	95.7	96.5
						Mary Lake	6	95.7	1.4	0.6	93.1	97.0
	pH (units)	tequal	none	NO	0.205	Reference	5	7.37	0.11	0.05	7.29	7.56
						Mary Lake	6	7.48	0.15	0.06	7.28	7.60
	Specific Conductance (µS/cm)	M-W	rank	NO	1.000	Reference	5	74.8	0.1	0.0	74.7	74.8
						Mary Lake	6	79.0	10.6	4.3	71.9	99.2

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

^a 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.68: Water Chemistry at Mary Lake North Basin (BL0-01) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameter		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Winter Sampling Event						Summer Sampling Event						Fall Sampling Event					
					BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B	BL0-01-A	BL0-01-A	BL0-01	BL0-01	BL0-01-B	BL0-01-B	BLO-01-A	BLO-01-A	BLO-01	BLO-01	BLO-01-B	BLO-01-B
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	28-Jul-21	28-Jul-21	28-Jul-21	28-Jul-21	28-Jul-21	28-Jul-21	29-Aug-21	29-Aug-21	29-Aug-21	29-Aug-21	29-Aug-21	29-Aug-21
Conventional	Conductivity (lab)	umho/cm	-	-	293	295	300	304	298	301	121.0	118	118	118	119	119	184	183	181	181	182	183
	pH (lab)	pH	6.5 - 9.0	-	7.27	7.73	7.74	7.71	7.65	7.74	7.98	7.96	7.99	7.97	7.93	7.98	8.12	8.07	8.15	8.14	8.14	8.16
	Hardness (as CaCO ₃)	mg/L	-	-	139	139	139	142	141	144	55.8	55.5	55.2	56.2	55.3	55.1	86.7	82.7	81.9	80.6	80.6	80.5
	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	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	127	144	154	139	145	137	67	67	64	60	64	64	107	88	119	96	97	96
	Turbidity	NTU	-	-	0.91	<0.10	<0.10	<0.10	<0.10	<0.10	0.94	0.92	1.01	0.98	0.95	0.96	0.73	0.72	0.79	0.82	0.88	0.76

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 2021, and at Mary Lake Between 2021 and the Baseline Period

Parameter	Mary Lake North Basin					Mary Lake South Basin				
	2021 vs Reference Lake 3 2021		2021 vs Baseline			2021 vs Reference Lake 3 2021		2021 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Conductivity (lab)	1.9	2.2	1.2	1.1	1.1	0.9	1.1	1.1	1.1	1.1
Hardness (as CaCO ₃)	2.0	2.2	1.2	1.0	1.0	0.8	1.1	1.1	0.9	1.1
Total Suspended Solids (TSS)	2.4	1.0	1.0	1.0	1.1	2.0	1.0	1.0	1.2	1.0
Total Dissolved Solids (TDS)	1.9	2.4	0.9	0.9	0.9	1.5	1.0	1.0	0.9	0.8
Turbidity	2.2	4.6	1.1	0.4	0.9	8.7	4.8	0.2	1.1	0.7
Alkalinity (as CaCO ₃)	1.7	1.9	1.2	0.9	1.1	0.9	1.0	1.1	1.1	1.3
Total Ammonia	2.2	1.0	0.1	0.1	0.1	0.8	1.0	0.1	0.2	0.1
Nitrate	1.4	1.0	1.2	0.2	0.2	1.8	1.9	0.7	0.4	0.4
Nitrite	2.5	1.0	1.2	1.2	0.8	1.0	1.0	1.6	0.3	1.1
Total Kjeldahl Nitrogen (TKN)	1.4	1.0	0.6	0.4	0.7	0.4	0.9	0.6	0.5	0.9
Dissolved Organic Carbon	1.7	0.8	1.4	1.6	1.8	0.5	0.5	1.3	1.1	1.5
Total Organic Carbon	2.1	0.6	1.3	1.1	1.2	0.6	0.5	1.2	1.3	1.2
Total Phosphorus	1.4	1.8	0.5	0.4	0.8	1.3	1.6	1.1	1.0	0.8
Phenols	2.5	1.0	1.0	1.0	1.0	0.9	1.0	1.2	1.0	1.0
Bromide (Br)	2.5	1.0	0.5	0.5	0.7	1.0	1.0	0.9	0.4	0.4
Chloride (Cl)	1.7	4.0	1.7	1.7	1.4	1.7	2.0	1.4	1.0	1.0
Sulphate (SO ₄)	1.6	0.7	1.1	0.6	0.6	0.6	0.7	1.9	1.0	0.9
Aluminum (Al)	2.5	6.3	1.2	0.4	0.3	18	6.3	0.4	1.0	0.7
Antimony (Sb)	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Arsenic (As)	2.4	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.9
Barium (Ba)	2.0	1.3	1.3	0.9	0.9	0.7	0.7	1.2	1.0	1.0
Beryllium (Be)	2.5	1.0	1.5	1.5	1.0	1.0	1.0	1.1	1.5	2.0
Bismuth (Bi)	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Boron (B)	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cadmium (Cd)	2.5	1.0	0.8	0.9	0.7	1.0	1.0	0.2	0.9	0.8
Calcium (Ca)	1.9	2.2	1.1	1.0	1.0	0.9	1.1	1.1	1.0	1.0
Chromium (Cr)	2.5	1.0	1.4	0.9	0.7	1.0	1.0	1.2	1.1	1.1
Cobalt (Co)	2.5	1.0	1.0	0.8	0.7	1.0	1.0	1.0	0.9	0.9
Copper (Cu)	2.0	1.2	0.9	0.8	0.3	0.8	0.8	0.8	0.8	0.8
Iron (Fe)	2.5	1.0	1.2	0.4	0.3	2.1	1.0	1.0	0.8	0.6
Lead (Pb)	2.5	1.0	0.9	0.7	0.7	1.3	1.0	0.9	0.8	0.9
Lithium (Li)	2.5	1.0	0.3	0.3	0.2	1.0	1.0	0.2	0.3	0.4
Magnesium (Mg)	1.9	2.2	1.2	1.1	1.0	0.9	1.1	1.1	1.1	1.2
Manganese (Mn)	0.2	3.3	3.1	0.5	0.2	3.2	1.5	0.5	1.1	0.8
Mercury (Hg)	2.5	1.0	0.5	0.5	0.5	-	-	-	-	-
Molybdenum (Mo)	1.6	1.6	1.3	1.1	1.1	0.8	1.0	1.5	1.2	1.1
Nickel (Ni)	2.5	1.0	0.9	0.9	0.8	1.0	1.0	1.0	1.0	1.0
Potassium (K)	2.0	1.0	1.2	1.2	1.2	0.6	0.7	1.1	1.2	1.2
Selenium (Se)	2.5	1.0	2.8	2.4	1.8	1.0	1.0	1.2	1.4	1.9
Silicon (Si)	1.8	1.5	1.1	1.0	0.8	1.0	0.8	1.0	1.0	0.9
Silver (Ag)	2.5	1.0	1.6	1.8	1.8	1.0	1.0	1.2	1.9	2.3
Sodium (Na)	1.7	3.2	1.5	2.1	1.5	1.2	1.5	1.5	1.6	1.4
Strontium (Sr)	1.9	1.4	1.4	1.1	1.0	0.7	0.8	1.0	0.9	0.9
Thallium (Tl)	2.5	1.0	1.6	1.5	1.0	1.0	1.0	1.1	1.5	2.1
Tin (Sn)	2.5	1.0	0.1	0.0	0.0	1.0	1.0	0.2	0.1	0.1
Titanium (Ti)	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Uranium (U)	1.3	6.5	1.6	1.2	1.0	1.8	2.3	1.7	1.2	1.1
Vanadium (V)	2.5	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0
Zinc (Zn)		1.0	1.6	1.6	3.0	1.1	1.0	1.7	1.5	1.4

- Denotes parameter with an AEMP benchmark.
- Denotes slight elevation (mean concentration 3 to 5 times higher than respective mean reference or baseline period value).
- Denotes moderate elevation (mean concentration 5 to 10 times higher than respective mean reference or baseline period value).
- Denotes highly elevated concentration (mean concentration greater than 10 times higher than respective mean reference or baseline period value).
- Denotes differences in method detection limit between the 2021 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, 2021

[illegible]

Table C.71: Magnitude of Elevation in Seasonal Average Dissolved Metal Concentrations Between Mary Lake and Reference Lake 3 in 2021, and at Mary Lake Between 2021 and the Baseline Period

Dissolved Metal	Mary Lake North Basin					Mary Lake South Basin				
	2021 vs Reference Lake 3 2021		2021 vs Baseline			2021 vs Reference Lake 3 2021		2021 vs Baseline		
	Summer	Fall	Winter	Summer	Fall	Summer	Fall	Winter	Summer	Fall
Aluminum (Al)	2.9	2.5	0.3	0.8	2.2	5.4	2.2	0.3	1.5	1.9
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	0.9	0.9	1.0	1.0	1.0	0.8	0.9	1.0
Barium (Ba)	0.9	1.3	1.6	0.6	1.8	0.6	0.7	0.7	0.5	1.0
Beryllium (Be)	1.0	1.0	1.0	1.4	2.1	1.0	1.0	1.0	1.4	2.1
Bismuth (Bi)	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
Cadmium (Cd)	1.0	1.0	0.8	0.5	1.0	1.0	1.0	0.8	0.5	1.0
Calcium (Ca)	1.5	2.2	1.6	0.6	1.1	0.9	1.1	0.6	0.4	0.5
Chromium (Cr)	1.0	1.0	1.3	1.7	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)	1.0	1.2	0.7	0.6	1.2	0.7	0.8	0.4	0.4	0.8
Iron (Fe)	1.0	1.0	0.9	1.0	1.8	1.0	1.0	0.9	1.0	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	1.0	0.2	0.3	0.4	1.0	1.0	0.2	0.3	0.4
Magnesium (Mg)	1.5	2.2	1.7	0.7	1.1	0.9	1.1	0.6	0.4	0.6
Manganese (Mn)	5.0	7.8	4.2	0.7	0.3	3.6	1.0	0.2	0.5	0.0
Mercury (Hg)	1.0	1.0	0.5	0.5	0.5	1.0	1.0	0.5	0.5	0.5
Molybdenum (Mo)	1.0	1.6	1.6	0.6	1.4	0.9	1.0	0.9	0.6	0.9
Nickel (Ni)	1.0	1.0	1.0	0.7	0.9	1.0	1.0	0.8	0.7	0.9
Potassium (K)	0.7	1.0	1.8	0.8	1.2	0.6	0.7	0.9	0.6	0.8
Selenium (Se)	1.0	1.0	-	-	-	1.0	1.0	-	-	-
Silicon (Si)	1.2	1.5	1.4	0.7	0.8	0.8	0.8	0.5	0.5	0.4
Silver (Ag)	1.0	1.0	0.2	1.8	2.5	1.0	1.0	0.2	1.8	2.5
Sodium (Na)	1.8	3.2	3.8	0.8	1.4	1.2	1.5	1.2	0.5	0.7
Strontium (Sr)	0.9	1.4	2.0	0.7	1.2	0.7	0.8	0.9	0.5	0.7
Thallium (Tl)	1.0	1.0	1.0	1.4	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)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Uranium (U)	3.0	6.4	2.5	0.4	1.4	1.8	2.3	0.6	0.3	0.5
Vanadium (V)	1.0	1.0	0.8	0.9	1.0	1.0	1.0	0.8	0.9	1.0
Zinc (Zn)	1.0	1.0	1.6	1.3	1.2	1.0	1.0	1.6	1.3	1.2

	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 2021 and baseline data, precluding an evaluation of magnitude of elevation.

Table C.72: Water Chemistry at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Winter Sampling Event													
					BL0-05-A	BL0-05-A	BL0-05	BL0-05	BL0-05-B	BL0-05-B	BL0-03	BL0-03	BL0-04	BL0-04	BL0-09	BL0-09	BL0-06	BL0-06
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21
Conventional	Conductivity (lab)	umho/cm	-	-	103.0	108.0	103.0	107.0	114.0	113.0	102.0	105	99.5	110.0	102.0	112.0	115.0	116.0
	pH (lab)	pH	6.5 - 9.0	-	7.62	7.62	7.50	7.57	7.55	7.57	7.56	7.60	7.55	7.58	7.35	7.58	7.49	7.63
	Hardness (as CaCO ₃)	mg/L	-	-	50.2	51.8	49.3	52	53.2	54.1	48.4	50.1	48	52.7	47.6	51	52.3	53.1
	Total Suspended Solids (TSS)	mg/L	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	3.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
	Total Dissolved Solids (TDS)	mg/L	-	-	73	74	71	73	73	65	57	59	63	68	43	57	58	37
	Turbidity	NTU	-	-	<0.10	<0.10	0.21	<0.10	<0.10	<0.10	<0.10	<0.10	0.19	<0.10	0.11	<0.10	0.33	<0.10
	Alkalinity (as CaCO ₃)	mg/L	-	-	46.0	48.0	46.0	48.0	51.0	49.0	45.0	47.0	44.0	49.0	64.0	71.0	66.0	64.0
Nutrients and Organics	Total Ammonia	mg/L	variable ^c	0.855	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.026	<0.010	<0.010	<0.010	0.020	<0.010
	Nitrate	mg/L	3	3	0.068	0.076	0.074	0.068	0.066	0.065	0.055	0.060	0.071	0.063	0.081	0.062	0.073	0.063
	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	-	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.130	<0.050	<0.050	0.180	0.180	0.090
	Dissolved Organic Carbon	mg/L	-	-	1.96	2.08	2.04	2.08	2.01	2.04	1.95	1.83	2.04	2.17	1.62	1.88	2.24	2.01
	Total Organic Carbon	mg/L	-	-	1.93	1.88	1.77	1.88	1.91	1.85	1.77	1.74	1.91	1.88	1.47	1.71	1.68	2.04
	Total Phosphorus	mg/L	0.020 ^d	-	<0.0030	0.0032	0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0102	<0.0030	0.0048	<0.0030	<0.0030	0.0039
	Phenols	mg/L	0.004 ^a	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0035	<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	4.18	4.33	4.19	4.38	4.57	4.50	4.00	4.17	4.07	4.40	3.97	4.34	4.47	4.48
	Sulphate (SO ₄)	mg/L	218 ^β	218	2.77	2.89	2.81	2.89	3.04	2.99	2.59	9.90	2.67	2.89	2.61	2.88	2.95	2.96
Total Metals	Aluminum (Al)	mg/L	0.100	0.130	0.0030	<0.0030	0.0050	0.0067	0.0033	0.0042	0.0050	0.0063	0.0033	<0.0030	0.0134	0.0045	0.0066	0.0034
	Antimony (Sb)	mg/L	0.020 ^d	-	<0.00010	<0.00010	<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	-	-	0.00592	0.00598	0.00598	0.00636	0.00659	0.00674	0.00584	0.00596	0.00559	0.00618	0.00632	0.00627	0.00652	0.00644
	Beryllium (Be)	mg/L	0.011 ^d	-	<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	-	-	9.96	10.4	9.89	11.1	10.9	11.0	9.74	10.3	9.49	10.7	9.58	10.2	10.5	10.5
	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 ^d	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	0.00060	0.00063	0.00063	0.00071	0.00069	0.00069	0.00061	0.00063	0.00061	0.00064	0.00069	0.00068	0.00068	0.00066
	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	-	-	5.96	6.12	5.92	6.26	6.56	6.69	5.78	6.04	5.61	6.20	5.66	6.15	6.25	6.31
	Manganese (Mn)	mg/L	0.935 ^β	-	0.000331	0.000312	0.00117	0.000465	0.000374	0.000310	0.000375	0.000465	0.000401	0.000293	0.00105	0.000365	0.000559	0.000334
	Mercury (Hg)	mg/L	0.000026	-	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	0.000160	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)	mg/L	0.073	-	0.000205	0.000228	0.000217	0.000239	0.000212	0.000215	0.000199	0.000218	0.000210	0.000222	0.000191	0.000214	0.000225	0.000217
	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	0.00054	<0.00050	<0.00050	<0.00050
	Potassium (K)	mg/L	-	-	0.75	0.78	0.75	0.82	0.83	0.86	0.73	0.77	0.71	0.79	0.74	0.80	0.81	0.81
	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	-	-	0.44	0.43	0.48	0.46	0.46	0.47	0.43	0.45	0.46	0.45	0.80	0.45	0.46	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	-	-	2.01	2.08	1.97	2.15	2.22	2.28	1.95	2.04	1.90	2.09	2.03	2.09	2.11	2.14
	Strontium (Sr)	mg/L	-	-	0.00927	0.00960	0.00912	0.0101	0.0102	0.0101	0.00900	0.00937	0.00877	0.00988	0.00898	0.00949	0.00987	0.0100
	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	-	0.00127	0.00133	0.00121	0.00132	0.00131	0.00132	0.00118	0.00122	0.00120	0.00134	0.00103	0.00131	0.00129	0.00134
	Vanadium (V)	mg/L	0.006 ^a	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	0.0034	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.72: Water Chemistry at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Summer Sampling Event													
					BL0-05-A	BL0-05-A	BL0-05	BL0-05	BL0-05-B	BL0-05-B	BL0-03	BL0-03	BL0-04	BL0-04	BL0-09	BL0-09	BL0-06	BL0-06
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21
Conventionals	Conductivity (lab)	umho/cm	-	-	76.7	78.2	80.9	86.4	69.9	70.6	69.3	69.2	71.9	69.1	75.2	72.1	69.5	69.5
	pH (lab)	pH	6.5 - 9.0	-	7.69	7.70	7.71	7.78	7.61	7.53	7.63	7.64	7.58	7.62	7.64	7.64	7.64	7.59
	Hardness (as CaCO ₃)	mg/L	-	-	33.8	34.6	35.9	38.6	30.8	31.1	31.1	31.5	32	31.6	33.1	31.8	30.4	30.4
	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	-	-	37	29	64	32	40	46	40	39	33	46	51	44	49	58
	Turbidity	NTU	-	-	2.43	2.47	2.38	2.72	2.09	1.77	1.31	1.10	2.27	1.44	2.58	1.96	2.16	1.81
	Alkalinity (as CaCO ₃)	mg/L	-	-	35.0	36.7	37.0	38.9	32.2	32.3	33.9	33.8	33.1	33.3	34.0	33.4	32.3	32.1
Nutrients and Organics	Total Ammonia	mg/L	variable ^c	0.855	0.013	0.012	0.012	<0.010	0.011	0.011	0.012	0.010	0.013	0.011	0.013	0.010		0.013
	Nitrate	mg/L	3	3	0.038	0.035	0.038	0.040	0.034	0.034	0.023	0.048	0.034	0.032	0.043	0.034	0.031	0.032
	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	-	-	0.060	0.060	0.070	0.070	0.140	0.110	0.070	0.050	0.080	0.090	0.090	0.140	0.070	0.070
	Dissolved Organic Carbon	mg/L	-	-	1.54	1.43	1.55	1.58	1.60	1.52	1.68	1.57	1.53	1.82	1.57	1.57	1.51	1.50
	Total Organic Carbon	mg/L	-	-	1.95	1.98	2.00	2.10	1.91	1.89	2.06	1.95	1.94	2.12	1.92	1.98	2.04	1.95
	Total Phosphorus	mg/L	0.020 ^d	-	0.0067	0.0059	0.0045	0.0038	0.0072	0.0058	0.0056	0.0031	0.0053	0.0062	0.0082	0.0082	0.0062	0.0063
	Phenols	mg/L	0.004 ^d	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.37	2.39	2.44	2.55	2.27	2.26	2.23	2.24	2.29	2.25	2.36	2.28	2.25	2.24
	Sulphate (SO ₄)	mg/L	218 ^β	218	2.60	2.58	2.71	3.01	1.95	1.99	1.39	1.41	2.18	1.68	2.43	2.16	1.92	1.87
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.0734	0.0739	0.0767	0.0837	0.0653	0.0656	0.0448	0.0371	0.0633	0.0554	0.0739	0.0672	0.0639	0.0492
	Antimony (Sb)	mg/L	0.020 ^d	-	<0.00010	<0.00010	<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	-	-	0.00467	0.00487	0.00500	0.00539	0.00446	0.00440	0.00413	0.00397	0.00441	0.00466	0.00462	0.00432	0.00438	0.00412
	Beryllium (Be)	mg/L	0.011 ^d	-	<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	0.000011	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)	mg/L	-	-	6.78	6.90	7.22	7.72	6.24	6.37	6.36	6.38	6.37	8.00	6.50	6.39	6.22	6.14
	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 ^d	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	0.00062	0.00062	0.00067	0.00068	0.00061	0.00062	0.00059	0.00058	0.00068	0.00083	0.00063	0.00057	0.00057	0.00059
	Iron (Fe)	mg/L	0.30	0.326	0.070	0.071	0.068	0.072	0.064	0.058	0.042	0.039	0.069	0.047	0.085	0.064	0.065	0.050
	Lead (Pb)	mg/L	0.001	0.001	0.000071	0.000062	0.000074	0.000069	0.000064	0.000061	<0.000050	<0.000050	0.000077	0.000075	0.000081	0.000063	0.000064	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	-	-	4.21	4.35	4.45	4.80	3.84	3.98	3.88	3.89	3.98	3.93	4.07	3.95	3.82	3.80
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00241	0.00234	0.00241	0.00199	0.00260	0.00219	0.00228	0.00187	0.00256	0.00228	0.00267	0.00222	0.00246	0.00202
	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
	Molybdenum (Mo)	mg/L	0.073	-	0.000147	0.000149	0.000158	0.000175	0.000123	0.000120	0.000107	0.000115	0.000120	0.000106	0.000130	0.000137	0.000119	0.000120
	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	-	-	0.61	0.61	0.63	0.67	0.56	0.58	0.54	0.54	0.58	0.60	0.59	0.57	0.57	0.56
	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	0.54	0.58	0.61	0.53	0.54	0.43	0.42	0.52	0.50	0.57	0.54	0.51	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	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)	mg/L	-	-	1.25	1.28	1.31	1.41	1.18	1.22	1.17	1.17	1.21	1.29	1.23	1.19	1.16	1.17
	Strontium (Sr)	mg/L	-	-	0.00623	0.00628	0.00659	0.00717	0.00548	0.00566	0.00535	0.00532	0.00576	0.00654	0.00604	0.00570	0.00545	0.00543
	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	-	0.000641	0.000652	0.000727	0.000787	0.000559	0.000549	0.000520	0.000532	0.000591	0.000376	0.000618	0.000578	0.000545	0.000535
	Vanadium (V)	mg/L	0.006 ^d	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	0.0060	<0.0030	<0.0030	<0.0030	<0.0030

Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

Table C.72: Water Chemistry at Mary Lake South Basin (BL0) Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Fall Sampling Event													
					BL0-05-A	BL0-05-A	BL0-05	BL0-05	BL0-05-B	BL0-05-B	BL0-03	BL0-03	BL0-04	BL0-04	BL0-09	BL0-09	BL0-06	BL0-06
					bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface	bottom	surface
					30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21
Conventionals	Conductivity (lab)	umho/cm	-	-	91.8	90.4	97.7	89.4	89.5	89.5	87.3	86.4	92.5	88.7	102	89.7	89.1	88.9
	pH (lab)	pH	6.5 - 9.0	-	7.81	7.7	7.87	7.82	7.85	7.79	7.77	7.8	7.85	7.84	7.84	7.83	7.82	7.83
	Hardness (as CaCO ₃)	mg/L	-	-	40.7	39.4	42.3	39.5	39.6	40	38.5	39.4	40.5	38.0	44.2	39.9	39.5	39.9
	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	-	-	43	50	46	38	41	40	47	42	44	50	45	44	42	42
	Turbidity	NTU	-	-	0.98	0.89	0.89	0.78	0.89	0.91	0.68	0.59	0.95	0.55	0.78	0.98	0.83	0.89
	Alkalinity (as CaCO ₃)	mg/L	-	-	50.6	52.0	48.2	51.3	51.4	44.6	50.6	52.3	47.4	46.2	52.6	57.5	51	42
Nutrients and Organics	Total Ammonia	mg/L	variable ^c	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	0.037	0.039	0.055	0.038	0.036	0.036	0.026	0.023	0.037	0.036	0.053	0.037	0.036	0.046
	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	-	-	0.146	0.186	0.150	0.166	0.160	0.122	0.191	0.180	0.123	0.156	0.130	0.125	0.145	0.213
	Dissolved Organic Carbon	mg/L	-	-	2.14	2.70	1.78	1.68	1.65	1.67	1.98	2.09	1.87	2.10	1.82	2.35	2.37	1.79
	Total Organic Carbon	mg/L	-	-	1.70	1.72	1.92	1.91	1.90	2.01	1.70	1.85	1.69	1.78	1.71	1.87	1.84	1.84
	Total Phosphorus	mg/L	0.020 ^d	-	0.0097	0.0075	0.0036	0.0036	0.0035	<0.0030	0.0084	0.0097	0.0035	<0.0030	0.0038	0.0035	<0.0030	0.0048
	Phenols	mg/L	0.004 ^d	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Anions	Bromide (Br)	mg/L	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Chloride (Cl)	mg/L	120	120	2.72	2.75	2.90	2.67	2.66	2.65	2.55	2.54	2.69	2.60	3.01	2.66	2.64	2.74
	Sulphate (SO ₄)	mg/L	218 ^β	218	2.90	2.90	3.87	2.85	2.84	2.84	2.07	2.06	2.90	2.29	2.85	2.85	2.80	2.84
Total Metals	Aluminum (Al)	mg/L	0.100	0.13	0.0254	0.0263	0.0278	0.0264	0.0225	0.0177	0.0158	0.0158	0.0281	0.0178	0.0257	0.0248	0.0249	0.0255
	Antimony (Sb)	mg/L	0.020 ^d	-	<0.00010	<0.00010	<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	-	-	0.00506	0.00478	0.00513	0.00481	0.00476	0.00486	0.00440	0.00447	0.00492	0.00456	0.00482	0.00479	0.00479	0.00471
	Beryllium (Be)	mg/L	0.011 ^d	-	<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	-	-	7.94	7.75	8.48	7.76	7.71	7.65	7.64	7.58	7.88	7.70	7.93	7.67	7.57	8.19
	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 ^d	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	0.00070	0.00063	0.00063	0.00059	0.00066	0.00060	0.00055	0.00059	0.00073	0.00061	0.00054	0.00063	0.00064	0.00060
	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	-	-	5.18	4.96	5.43	5.00	5.02	5.08	4.93	5.01	5.01	4.90	5.10	5.16	5.02	5.01
	Manganese (Mn)	mg/L	0.935 ^β	-	0.00113	0.00103	0.000955	0.000872	0.000893	0.000844	0.000759	0.000841	0.00110	0.000878	0.000831	0.000923	0.000970	0.00102
	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
	Molybdenum (Mo)	mg/L	0.073	-	0.000154	0.000158	0.000179	0.000166	0.000167	0.000148	0.000130	0.000140	0.000157	0.000144	0.000149	0.000152	0.000159	0.000160
	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	0.62	0.66	0.63	0.62	0.62	0.57	0.58	0.62	0.58	0.62	0.62	0.62	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	<0.0010
	Silicon (Si)	mg/L	-	-	0.41	0.42	0.43	0.41	0.42	0.39	0.38	0.37	0.42	0.39	0.42	0.41	0.41	0.42
	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	-	-	1.52	1.45	1.53	1.48	1.46	1.45	1.37	1.37	1.48	1.39	1.46	1.45	1.49	1.43
	Strontium (Sr)	mg/L	-	-	0.00684	0.00688	0.00756	0.00674	0.00678	0.00674	0.00609	0.00625	0.00686	0.00634	0.00674	0.00673	0.00669	0.00701
	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	-	0.000817	0.000793	0.000956	0.000774	0.000791	0.000794	0.000678	0.000688	0.000827	0.000711	0.000784	0.000803	0.000789	0.000837
	Vanadium (V)	mg/L	0.006 ^d	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.

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

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

Table C.73: Dissolved Metal Concentrations at Mary Lake South Basin Water Quality Monitoring Stations, Mary River Project CREMP, 2021

Parameters		Units	Winter Sampling Event													
			BL0-05-A bottom	BL0-05-A surface	BL0-05 bottom	BL0-05 surface	BL0-05-B bottom	BL0-05-B surface	BL0-03 bottom	BL0-03 surface	BL0-04 bottom	BL0-04 surface	BL0-09 bottom	BL0-09 surface	BL0-06 bottom	BL0-06 surface
			20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21	19-Apr-21
Dissolved Metals	Aluminum (Al)	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
	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	0.00587	0.00613	0.00593	0.00665	0.00627	0.00636	0.00568	0.00592	0.00565	0.00617	0.00596	0.00612	0.00634	0.00642
	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	10.2	10.4	9.93	10.4	10.9	10.9	9.72	10.0	9.65	10.6	9.72	10.4	10.7	10.7
	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	0.00062	0.00064	0.00060	0.00065	0.00065	0.00064	0.00059	0.00061	0.00064	0.00064	0.00061	0.00064	0.00067	0.00067
	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	6.01	6.24	5.96	6.29	6.31	6.54	5.86	6.07	5.81	6.36	5.67	6.08	6.20	6.40
	Manganese (Mn)	mg/L	0.000195	0.000185	0.000838	0.000182	0.000246	0.000158	0.000178	0.000190	0.000215	0.000189	0.000272	0.000173	0.000331	0.000188
	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	0.000212	0.000220	0.000203	0.000219	0.000219	0.000238	0.000195	0.000207	0.000205	0.000228	0.000203	0.000225	0.000220	0.000234
	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	0.75	0.79	0.76	0.80	0.80	0.82	0.73	0.74	0.72	0.81	0.71	0.78	0.78	0.82
	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	0.43	0.45	0.47	0.45	0.45	0.46	0.44	0.44	0.47	0.45	0.80	0.45	0.46	0.45
	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	2.01	2.11	1.99	2.14	2.14	2.20	1.97	2.03	1.95	2.15	2.01	2.05	2.08	2.15
	Strontium (Sr)	mg/L	0.00947	0.00968	0.00911	0.00968	0.0101	0.0101	0.00894	0.00913	0.00883	0.00970	0.00889	0.00953	0.00992	0.00986
	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	0.00132	0.00135	0.00122	0.00132	0.00137	0.00139	0.00119	0.00125	0.00120	0.00132	0.00103	0.00136	0.00131	0.00139
	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, 2021

Parameters		Units	Summer Sampling Event													
			BL0-05-A bottom 30-Jul-21	BL0-05-A surface 30-Jul-21	BL0-05 bottom 30-Jul-21	BL0-05 surface 30-Jul-21	BL0-05-B bottom 30-Jul-21	BL0-05-B surface 30-Jul-21	BL0-03 bottom 30-Jul-21	BL0-03 surface 30-Jul-21	BL0-04 bottom 30-Jul-21	BL0-04 surface 30-Jul-21	BL0-09 bottom 30-Jul-21	BL0-09 surface 30-Jul-21	BL0-06 bottom 30-Jul-21	BL0-06 surface 30-Jul-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0110	0.0190	0.0223	0.0239	0.0154	0.0152	0.0112	0.0160	0.0173	0.0189	0.0188	0.0194	0.0185	0.0158
	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	0.00439	0.00434	0.00471	0.00502	0.00402	0.00411	0.00369	0.00382	0.00424	0.00390	0.00424	0.00414	0.00402	0.00401
	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	6.66	6.93	7.25	7.75	6.25	6.21	6.24	6.30	6.40	6.38	6.60	6.39	6.23	6.08
	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	0.00057	0.00053	0.00063	0.00060	<0.00050	0.00051	0.00056	0.00056	0.00054	0.00054	0.00056	0.00051	0.00052	0.00053
	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	4.16	4.20	4.33	4.68	3.68	3.78	3.76	3.86	3.90	3.81	4.03	3.85	3.79	3.69
	Manganese (Mn)	mg/L	0.000792	0.000887	0.000792	0.000757	0.000725	0.000852	0.000607	0.000697	0.000796	0.000788	0.000799	0.000815	0.000735	0.000751
	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	0.000151	0.000139	0.000158	0.000195	0.000131	0.000127	0.000113	0.000108	0.000139	0.000113	0.000151	0.000142	0.000129	0.000131
	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	0.57	0.58	0.61	0.65	0.53	0.54	0.51	0.53	0.55	0.53	0.57	0.55	0.54	0.54
	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	0.43	0.46	0.49	0.52	0.42	0.41	0.37	0.38	0.44	0.42	0.46	0.43	0.41	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	1.23	1.24	1.30	1.37	1.14	1.16	1.15	1.16	1.19	1.16	1.21	1.16	1.16	1.14
	Strontium (Sr)	mg/L	0.00616	0.00628	0.00659	0.00718	0.00549	0.00545	0.00508	0.00526	0.00572	0.00534	0.00596	0.00565	0.00553	0.00544
	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	0.000618	0.000628	0.000674	0.000780	0.000533	0.000536	0.000511	0.000510	0.000547	0.000524	0.000594	0.000563	0.000540	0.000524
	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, 2021

Parameters		Units	Fall Sampling Event													
			BL0-05-A bottom 30-Aug-21	BL0-05-A surface 30-Aug-21	BL0-05 bottom 30-Aug-21	BL0-05 surface 30-Aug-21	BL0-05-B bottom 30-Aug-21	BL0-05-B surface 30-Aug-21	BL0-03 bottom 30-Aug-21	BL0-03 surface 30-Aug-21	BL0-04 bottom 30-Aug-21	BL0-04 surface 30-Aug-21	BL0-09 bottom 30-Aug-21	BL0-09 surface 30-Aug-21	BL0-06 bottom 30-Aug-21	BL0-06 surface 30-Aug-21
Dissolved Metals	Aluminum (Al)	mg/L	0.0052	0.0098	0.0101	0.0108	0.0094	0.0066	0.0056	0.0083	0.0117	0.0087	0.0114	0.0092	0.0096	0.0108
	Antimony (Sb)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Barium (Ba)	mg/L	0.00476	0.00467	0.00510	0.00467	0.00463	0.00458	0.00429	0.00423	0.00471	0.00428	0.00526	0.00463	0.00464	0.00459
	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	8.08	7.71	8.07	7.75	7.63	7.71	7.46	7.66	7.78	7.40	8.49	7.75	7.58	7.54
	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	0.00057	0.00055	0.00058	0.00056	0.00055	0.00057	0.00054	0.00054	0.00089	0.00056	0.00061	0.00056	0.00054	0.00059
	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	4.97	4.89	5.38	4.89	4.99	5.04	4.83	4.92	5.10	4.75	5.58	4.99	5.00	5.11
	Manganese (Mn)	mg/L	0.000322	0.000205	0.000244	0.000170	0.000147	0.000121	0.000098	0.000126	0.000163	0.000140	0.000216	0.000124	0.000150	0.000195
	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	0.000169	0.000181	0.000175	0.000160	0.000163	0.000132	0.000119	0.000168	0.000134	0.000200	0.000150	0.000149	0.000162
	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	0.61	0.62	0.65	0.60	0.61	0.61	0.57	0.58	0.61	0.58	0.67	0.60	0.61	0.63
	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	0.38	0.38	0.39	0.37	0.38	0.36	0.34	0.36	0.39	0.36	0.44	0.38	0.37	0.38
	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	1.47	1.48	1.50	1.39	1.41	1.41	1.34	1.31	1.42	1.36	1.65	1.37	1.42	1.47
	Strontium (Sr)	mg/L	0.00698	0.00683	0.00751	0.00666	0.00660	0.00667	0.00609	0.00625	0.00696	0.00635	0.00777	0.00662	0.00677	0.00661
	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	0.000817	0.000794	0.000934	0.000776	0.000774	0.000747	0.000676	0.000682	0.000798	0.000698	0.00104	0.000766	0.000780	0.000753
	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

APPENDIX D

SEDIMENT QUALITY DATA

Table D.1: Field Observations of Sediment Properties at Reference Lake 3 (REF-03) Benthic Stations^a, Mary River Project CREMP, August 2021

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia ^b	Plant or Algal Presence
REF-03-1	12.6	brown fines	none detected	none observed
REF-03-2	7.7	light brown flocculent	none detected	sparse algae
REF-03-3	9.5	brown fines	none detected	sparse algae
REF-03-4	9.1	brown fines, red top layer	hydrogen sulphide odour	none observed
REF-03-5	12.5	brown fines	hydrogen sulphide odour	none observed
REF-03-6	20.4	brown fines	none detected	none observed
REF-03-7	22.4	brown fines	none detected	none observed
REF-03-8	18.2	light brown fines	none detected	sparse algae
REF-03-9	20.9	brown fines, red brown top layer	none detected	none observed
REF-03-10	20.4	brown fines	none detected	none observed

^a Sediment particle size and benthic invertebrate community samples were collected using a petite Ponar.

^b 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.2: Observations from Sediment Cores Collected at Reference Lake 3 (REF-03), Mary River Project CREMP, August 2021

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
REF-03-6	19.7	Profundal	1	10.5	dark brown silt and clay.
			2	15.5	
			3	7.0	
REF-03-7	23.0	Profundal	1	13.0	dark brown silt and clay overlaying grey silt and clay.
			2	22.0	
			3	13.0	
			4	13.0	
REF-03-3	9.9	Littoral	1	25.0	brown silt and clay overlaying grey silt and clay.
			2	6.0	
			3	11.0	
REF-03-8	16.5	Profundal	1	17.0	brown silt and clay overlaying grey silt and clay with some sand.
			2	14.0	
			3	21.0	
REF-03-10	19.7	Profundal	1	20.0	brown silt and clay.
			2	21.0	
			3	18.0	
			4	16.0	
REF-03-1	15.4	Littoral	1	20.0	brown silt overlaying grey silt and clay.
			2	13.5	
			3	17.5	
			4	14.5	
REF-03-2	8.7	Littoral	1	37.0	brown silt overlaying grey silt and clay.
			2	33.0	
			3	27.0	
			4	33.0	
REF-03-4	9.0	Littoral	1	24.0	brown silt with black silt and clay underneath, overlaying grey silt and clay.
			2	26.0	
			3	20.0	
			4	30.0	
REF-03-9	21.5	Profundal	1	18.0	brown silt and clay.
			2	14.0	
			3	21.0	
REF-03-5	12.5	Littoral	1	16.5	brown silt overlaying grey silt and clay.
			2	21.0	
			3	19.0	

Table D.3: Statistical Comparison of Substrate Physical Properties between Littoral and Profundal Sediment Stations of Individual Study Lakes, Mary River Project CREMP, August 2021

Lake	Habitat Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis ^a	Transformation	Significant Difference Between Areas?	P-value	Station Type	N	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Camp Lake	Sand (% by weight)	tequal	log10	NO	0.126	Littoral	5	56.3	18.0	8.03	38.8	79.7
						Profundal	9	40.6	23.3	7.76	22.7	81.1
	Silt (% by weight)	M-W	rank	NO	0.298	Littoral	5	39.7	16.2	7.25	18.9	56.9
						Profundal	9	50.2	20.0	6.66	16.2	69.6
	Clay (% by weight)	tequal	none	YES	0.034	Littoral	5	3.92	2.10	0.940	1.30	6.60
						Profundal	9	9.21	4.61	1.54	2.40	15.0
	TOC (%)	tequal	none	NO	0.747	Littoral	5	1.64	0.655	0.293	1.07	2.68
						Profundal	9	1.49	0.869	0.290	0.280	2.84
Sheardown Lake NW	Sand (% by weight)	tequal	none	NO	0.085	Littoral	7	46.0	21.6	8.15	19.0	88.9
						Profundal	7	25.1	20.0	7.56	9.30	61.9
	Silt (% by weight)	tequal	none	NO	0.11	Littoral	7	45.5	18.1	6.83	10.4	69.8
						Profundal	7	60.9	15.1	5.69	34.6	75.3
	Clay (% by weight)	M-W	rank	YES	0.038	Littoral	7	8.53	4.39	1.66	1.00	14.9
						Profundal	7	14.0	5.40	2.04	3.50	20.1
	TOC (%)	tequal	none	YES	0.035	Littoral	7	2.90	1.69	0.637	0.220	5.41
						Profundal	7	1.31	0.528	0.200	0.650	2.08
Sheardown Lake SE	Sand (% by weight)	tequal	none	NO	0.757	Littoral	5	11.4	5.88	2.63	7.30	21.3
						Profundal	5	12.4	4.04	1.81	8.00	16.5
	Silt (% by weight)	M-W	rank	NO	0.402	Littoral	5	74.6	5.54	2.48	67.8	78.9
						Profundal	5	72.5	3.75	1.67	69.2	76.7
	Clay (% by weight)	M-W	rank	NO	0.139	Littoral	5	14.0	3.94	1.76	9.30	20.1
						Profundal	5	15.1	0.477	0.214	14.3	15.4
	TOC (%)	tequal	none	NO	0.155	Littoral	5	1.06	0.218	0.0976	0.850	1.40
						Profundal	5	0.880	0.146	0.0651	0.740	1.11
Mary Lake	Sand (% by weight)	tequal	log10	NO	0.917	Littoral	4	27.1	34.5	17.2	5.10	77.9
						Profundal	11	22.7	24.8	7.47	4.70	91.7
	Silt (% by weight)	M-W	rank	NO	0.412	Littoral	4	56.4	24.5	12.2	19.9	72.5
						Profundal	11	52.9	19.2	5.78	6.10	74.1
	Clay (% by weight)	tequal	none	NO	0.334	Littoral	4	16.6	13.3	6.64	2.20	29.7
						Profundal	11	24.4	13.3	4.02	2.20	45.6
	TOC (%)	tequal	none	NO	0.425	Littoral	4	0.943	0.348	0.174	0.540	1.31
						Profundal	11	0.825	0.202	0.0609	0.340	1.06

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

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

Table D.4: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Reference Lake 3 (REF-03) Sediment Stations, Mary River Project CREMP, August 2021

Analyte		Units	Sediment Quality Guideline (SQG) ^a	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	%	-	38.6	48.8	35.9	44.0	32.5	39.3	48.7	49.8	36.3	35.7	41.0	6.36	2.01
	Silt	%	-	48.5	39.2	53.0	49.3	58.2	47.4	39.2	45.5	50.6	53.1	48.4	6.00	1.90
	Clay	%	-	12.9	12.0	11.1	6.8	9.3	13.2	12.1	4.7	13.1	11.3	10.7	2.87	0.908
	Moisture	%	-	63.8	62.5	49.1	49.5	49.3	55.1	69.4	53.9	52.1	54.1	55.9	7.00	2.21
	Total Organic Carbon	%	10 ^α	4.80	7.32	1.92	4.00	3.82	3.48	4.32	2.48	3.65	3.78	3.96	1.45	0.458
Metals	Aluminum (Al)	mg/kg	-	23,600	15,700	15,500	22,600	16,800	23,000	24,600	16,500	25,100	24,800	20,820	4,129	1,306
	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	-	-
	Arsenic (As)	mg/kg	17	6.68	3.81	4.26	5.64	4.67	5.69	6.02	4.40	6.07	6.12	5.34	0.97	0.306
	Barium (Ba)	mg/kg	-	148	135.0	84	130	99.1	130	147.0	107	137	143	126	21.8	6.88
	Beryllium (Be)	mg/kg	-	0.97	0.67	0.62	0.84	0.62	0.79	0.92	0.66	0.93	0.95	0.80	0.14	0.045
	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	-	-
	Boron (B)	mg/kg	-	16.4	14.2	11.8	16.1	12.3	15.1	16.0	12.2	17.9	18.2	15.0	2.33	0.737
	Cadmium (Cd)	mg/kg	3.5	0.184	0.249	0.067	0.147	0.144	0.146	0.162	0.125	0.165	0.169	0.156	0.0459	0.0145
	Calcium (Ca)	mg/kg	-	6,000	5,870	3,790	5,120	4,670	5,030	5,120	4,200	5,550	5,710	5,106	722	228
	Chromium (Cr)	mg/kg	90	81.2	53.5	44.6	72.7	59.5	69.1	75.4	52.7	75.1	75.0	65.9	12.34	3.90
	Cobalt (Co)	mg/kg	-	18.0	8.4	11.00	15.3	11.4	16.1	17.2	12.3	16.50	16.8	14.3	3.27	1.03
	Copper (Cu)	mg/kg	197	103.0	83.0	41.4	84.1	63.5	92.5	102.0	69.2	96.3	96.4	83.1	19.7	6.24
	Iron (Fe)	mg/kg	40,000 ^α	52,600	22,200	32,100	49,100	38,000	47,000	50,100	37,000	49,000	49,200	42,630	9,896	3,129
	Lead (Pb)	mg/kg	91.3	19.6	13.9	13.7	17.5	14.9	17.4	19.6	13.3	18.8	18.9	16.8	2.56	0.81
	Lithium (Li)	mg/kg	-	38.8	28.2	30.3	34.6	27.5	35.1	38.0	28.0	38.7	40.8	34.0	5.10	1.61
	Magnesium (Mg)	mg/kg	-	15,800	10,600	10,100	13,800	11,500	14,700	15,600	9,890	15,800	15,600	13,339	2,531	801
	Manganese (Mn)	mg/kg	1,100 ^{α,β}	1,340	294	401	889	680	1,150	1,250	956	1,120	1,120	920	356	113
	Mercury (Hg)	mg/kg	0.486	0.0687	0.0467	0.0117	0.0377	0.0500	0.0487	0.0694	0.0339	0.0621	0.0593	0.0488	0.0177	0.0056
	Molybdenum (Mo)	mg/kg	-	3.94	1.56	3.67	3.53	2.98	3.07	2.97	2.73	2.59	2.55	2.96	0.68	0.214
	Nickel (Ni)	mg/kg	75 ^{α,β}	55.7	41.7	32.0	50.6	40.0	49.3	53.1	35.9	52.1	52.1	46.3	8.18	2.59
	Phosphorus (P)	mg/kg	2,000 ^α	1,130	719	741	982	880	955	954	876	1,070	978	929	130	41
	Potassium (K)	mg/kg	-	5,850	3,930	4,150	5,330	4,060	5,180	5,760	4,180	5,880	5,690	5,001	824	261
	Selenium (Se)	mg/kg	-	0.87	0.59	<0.20	0.66	0.67	0.48	0.72	0.35	0.68	0.69	0.59	0.20	0.062
	Silver (Ag)	mg/kg	-	0.25	0.15	<0.10	0.13	0.14	0.21	0.27	0.13	0.25	0.24	0.19	0.063	0.020
	Sodium (Na)	mg/kg	-	464	333	286	373	332	379	428	284	458	442	378	68	22
	Strontium (Sr)	mg/kg	-	15.5	13.1	10.8	13.7	11.6	13.1	14.5	11.0	14.9	14.9	13.3	1.70	0.538
	Sulphur (S)	mg/kg	-	1,800	2,100	<1000	1,500	1,200	1,100	1,400	<1000	1,300	1200	1,360	357	113
	Thallium (Tl)	mg/kg	-	0.758	0.389	0.291	0.548	0.472	0.646	0.733	0.481	0.714	0.714	0.575	0.162	0.0514
	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	-	-
	Titanium (Ti)	mg/kg	-	1,100	908	1,280	1,170	1,120	1,150	1,160	960	1,360	1,290	1,150	141	45
	Uranium (U)	mg/kg	-	30.3	11.2	11.2	12.3	15.2	27.5	28.40	23.7	25.0	26.7	21.2	7.75	2.45
	Vanadium (V)	mg/kg	-	73.0	49.3	49.4	66.4	53.1	66.5	69.7	52.2	70.6	69.2	61.9	9.67	3.06
	Zinc (Zn)	mg/kg	315	104.0	77.8	62.9	93.6	74.6	96.1	101.0	72.1	97.5	98.0	87.8	14.45	4.57
	Zirconium (Zr)	mg/kg	-	4.2	6.8	7.0	4.1	5.0	4.6	4.8	3.4	4.8	4.4	4.9	1.1	0.36

 Indicates parameter concentration above Sediment Quality Guideline (SQG).

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

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

Table D.5: Field Observations of Sediment Properties at Camp Lake (JL0) Benthic Stations^a, Mary River Project CREMP, August 2021

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia ^b	Plant or Algal Presence
JL0-02	11.6	dark brown silt and sand on top of dark grey silt and sand	none detected	none observed
JL0-01	17.5	beige brown silt and clay	none detected	none observed
JL0-21	9.9	brown silt and sand on top of grey silt and sand	none detected	common algae
JL0-20	7.3	brown silt and sand on top of grey silt and sand	none detected	sparse algae
JL0-19	7.4	grey silt and sand, brown silt on top	none detected	sparse algae
JL0-07	32.7	brown, orange brown, and some grey silt and clay	none detected	none observed
JL0-18	12.6	dark grey sand and silt with degraded organics	none detected	sparse algae
JL0-16	15.4	beige grey silt and sand with some small degraded organics	none detected	none observed
JL0-11	29.1	brown silt on top of light grey silt with some clay and sand	none detected	none observed
JL0-12	15.8	brown silt and clay with some sand	none detected	none observed

^a Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

^b 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.6: Observations from Sediment Cores Collected at Camp Lake (JL0), Mary River Project CREMP, August 2021

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
JL0-14	26.4	Profundal	1	11.0	brown floccy and sandy material ontop of more consolidated brown sandy sediment, with grey and fine sediment at the bottom consisting of some sand.
			2	27.0	
			3	17.5	
JL0-16	16.1	Profundal	1	5.0	light brown fines and sand with some organic debris overlaying grey sand and slight clay content.
			2	5.0	
			3	8.0	
JL0-15	16.9	Profundal	1	11.0	brown floccy material with some sand ontop of light brown grey sand and clay materials.
			2	15.0	
			3	17.0	
JL0-12	16.7	Profundal	1	8.0	dark brown orange sand, unconsolidated material over grey brown sand and clay.
			2	7.0	
			3	4.0	
JL0-11	28.5	Profundal	1	22.0	light brown unconsolidated sediment with very low organic debris content overlaying grey material with streaks of fine black with a slight clay consistency occurring at 1-5 cm depth.
			2	25.0	
			3	25.0	
JL0-13	16.9	Profundal	1	27.0	orange brown unconsolidated sandy sediment ontop of light brown sandy and clay sediment, all overlaying light grey fines and clay material.
			2	7.0	
			3	25.5	
JL0-07	33.7	Profundal	1	30.0	unconsolidated light brown sediment ontop of a light grey fines and clay layer with some black spots at 1-5 cm depth, there was a sulphite smell present.
			2	28.0	
			3	14.0	
JL0-01	17.1	Profundal	1	9.0	dark brown silt, unconsolidated material over orange brown silt consolidated layer ontop if orange grey silt and clay.
			2	10.0	
			3	10.5	
JL0-17	15.8	Profundal	1	10.0	unconsolidated brown silt with some algae balls present on the surface overlaying a consolidated brown grey silt layer ontop of light grey silt and clay.
			2	10.0	
			3	18.5	
JL0-02	11.4	Littoral	1	12.5	brown orange floccy silt with some algal and plant growth present ontop of grey silt and clay.
			2	13.5	
			3	16.0	

Table D.7: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Camp Lake (JL0) Sediment Stations, Mary River Project CREMP, August 2021

Analyte		Units	Sediment Quality Guideline (SQG) ^a	AEMP Benchmark ^b	Camp Lake Stations										Summary Statistics		
					JL0-02 (littoral)	JL0-01 (profundal)	JL0-14 (profundal)	JL0-17 (profundal)	JL0-07 (profundal)	JL0-16 (profundal)	JL0-15 (profundal)	JL0-11 (profundal)	JL0-13 (profundal)	JL0-12 (profundal)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	45.9	22.7	23.4	24.5	28.2	79.0	43.1	36.1	27.6	81.1	41.2	22.0	6.96
	Silt	%	-	-	49.0	66.6	65.6	69.6	56.8	18.5	47.7	50.2	60.2	16.2	50.0	18.8	5.96
	Clay	%	-	-	5.0	10.8	11.0	5.9	15.0	2.4	9.2	13.7	12.3	2.6	8.79	4.55	1.44
	Moisture	%	-	-	78.5	65.0	73.0	75.0	75.2	35.4	56.7	74.7	70.2	33.4	63.7	16.7	5.27
	Total Organic Carbon	%	10 ^α	-	2.68	1.31	1.82	2.15	2.84	0.28	0.90	2.23	1.52	0.36	1.61	0.901	0.285
Metals	Aluminum (Al)	mg/kg	-	-	17,700	16,900	18,400	16,300	22,000	6,620	15,200	18,200	17,500	5,120	15,394	5,333	1,686
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	0.14	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-
	Arsenic (As)	mg/kg	17	5.9	4.45	5.35	8.11	11.70	4.20	1.44	4.31	3.01	5.52	1.62	4.97	3.06	0.969
	Barium (Ba)	mg/kg	-	-	94.0	71.1	196.0	222.0	81.8	28.0	56.4	72.0	96.1	23.8	94.1	65.5	20.7
	Beryllium (Be)	mg/kg	-	-	0.83	0.96	0.98	0.85	1.10	0.31	0.80	0.97	0.98	0.25	0.80	0.29	0.092
	Bismuth (Bi)	mg/kg	-	-	0.32	0.25	0.31	0.28	0.36	0.23	0.21	0.32	0.26	<0.20	0.27	0.053	0.017
	Boron (B)	mg/kg	-	-	17.7	23.6	23.4	19.8	28.9	9.4	18.6	23.1	22.5	6.6	19.4	6.79	2.15
	Cadmium (Cd)	mg/kg	3.5	1.5	0.178	0.150	0.259	0.245	0.232	0.063	0.119	0.234	0.178	0.031	0.169	0.0784	0.0248
	Calcium (Ca)	mg/kg	-	-	4,540	4,090	4,740	4,900	5,570	16,000	3,680	5,050	4,200	1,610	5,438	3,864	1,222
	Chromium (Cr)	mg/kg	90	98	74.8	74.1	77.9	69.6	87.5	41.6	65.7	78.7	71.1	26.6	66.8	18.53	5.86
	Cobalt (Co)	mg/kg	-	-	16.40	17.50	24.60	21.50	16.90	7.25	15.40	14.00	19.30	5.80	15.9	5.80	1.84
	Copper (Cu)	mg/kg	197	50	44.7	41.3	50.6	46.9	60.9	17.6	36.4	55.3	44.2	11.3	40.9	15.6	4.95
	Iron (Fe)	mg/kg	40,000 ^α	52,400	39,800	32,300	60,500	57,600	35,100	16,600	30,000	31,300	37,100	15,200	35,550	14,765	4,669
	Lead (Pb)	mg/kg	91.3	35	18.80	20.70	23.80	20.70	26.50	6.60	16.10	22.10	20.70	4.99	18.1	7.05	2.23
	Lithium (Li)	mg/kg	-	-	28.0	30.3	31.8	27.3	36.8	11.1	25.9	33.3	30.8	8.2	26.4	9.36	2.96
	Magnesium (Mg)	mg/kg	-	-	15,300	12,600	13,600	13,100	16,900	15,800	11,800	15,200	12,700	4,590	13,159	3,427	1,084
	Manganese (Mn)	mg/kg	1,100 ^{α,β}	4,370	697	909	6,040	6,160	302	188	718	277	5,890	734	2,192	2,660	841
	Mercury (Hg)	mg/kg	0.486	0.17	0.0347	0.0257	0.0485	0.0437	0.0577	<0.0050	0.0154	0.0546	0.0296	<0.0050	0.0320	0.0193	0.0061
	Molybdenum (Mo)	mg/kg	-	-	1.16	0.72	2.76	4.10	0.96	0.28	0.57	0.69	2.04	0.25	1.35	1.25	0.395
	Nickel (Ni)	mg/kg	75 ^{α,β}	72	66.8	63.8	78.0	74.3	74.7	41.8	58.8	67.0	69.5	22.8	61.8	17.10	5.41
	Phosphorus (P)	mg/kg	2,000 ^α	1,580	930	941	2,040	2,110	959	541	885	831	897	513	1,065	556	176
	Potassium (K)	mg/kg	-	-	4,250	4,870	4,820	4,250	5,930	1,820	3,750	4,740	4,570	1,360	4,036	1,411	446
	Selenium (Se)	mg/kg	-	-	0.37	0.24	0.54	0.44	0.56	<0.20	<0.20	0.47	0.32	<0.20	0.35	0.14	0.045
	Silver (Ag)	mg/kg	-	-	0.11	0.11	0.15	0.12	0.22	<0.10	<0.10	0.18	0.12	<0.10	0.13	0.040	0.013
	Sodium (Na)	mg/kg	-	-	188	203	243	194	448	98	169	302	200	67	211	106	34
	Strontium (Sr)	mg/kg	-	-	9.26	13.30	14.80	10.90	23.50	10.10	10.90	12.10	13.00	4.79	12.3	4.80	1.52
	Sulphur (S)	mg/kg	-	-	<1000	<1000	<1000	<1000	3,800	<1000	<1000	<1000	<1000	<1000	1,280	885	280
	Thallium (Tl)	mg/kg	-	-	0.457	0.494	0.685	0.657	0.532	0.139	0.370	0.454	0.541	0.111	0.444	0.192	0.0608
	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	-	-
	Titanium (Ti)	mg/kg	-	-	1,070	910	936	873	1,090	489	843	1,010	892	373	849	236	75
	Uranium (U)	mg/kg	-	-	5.69	5.08	7.83	6.53	8.33	1.410	4.28	6.48	5.58	1.25	5.2	2.39	0.76
	Vanadium (V)	mg/kg	-	-	62.3	60.8	66.2	57.7	66.7	24.4	53.2	62.9	60.3	20.4	53.5	16.87	5.33
	Zinc (Zn)	mg/kg	315	135	60.4	53.3	61.4	55.1	72.3	24.0	47.5	64.5	55.6	16.7	51.1	17.62	5.57
	Zirconium (Zr)	mg/kg	-	-	8.9	5.4	4.6	4.6	10.3	5.7	4.8	11.5	4.8	1.6	6.2	3.0	0.96

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

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

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

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

Table D.8: 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 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis ^a	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	NO	0.092	Reference	5	40.0	6.49	2.90	32.5	48.8
						Camp	5	56.3	18.0	8.03	38.8	79.7
	Silt-Sized Material (%)	tequal	none	NO	0.244	Reference	5	49.6	6.98	3.12	39.2	58.2
						Camp	5	39.7	16.2	7.25	18.9	56.9
	Clay-Sized Material (%)	tequal	none	YES	0.002	Reference	5	10.4	2.42	1.08	6.80	12.9
						Camp	5	3.92	2.10	0.940	1.30	6.60
	Moisture (%)	tequal	none	NO	0.648	Reference	5	54.8	7.60	3.40	49.1	63.8
						Camp	5	58.4	15.1	6.75	37.5	78.5
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.018	Reference	5	4.37	1.96	0.875	1.92	7.32
						Camp	5	1.64	0.655	0.293	1.07	2.68
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	log10	NO	0.549	Reference	5	42.0	6.80	3.04	35.7	49.8
						Camp	9	40.6	23.3	7.76	22.7	81.1
	Silt-Sized Material (%)	M-W	rank	NO	0.298	Reference	5	47.2	5.32	2.38	39.2	53.1
						Camp	9	50.2	20.0	6.66	16.2	69.6
	Clay-Sized Material (%)	tequal	none	NO	0.498	Reference	5	10.9	3.54	1.58	4.70	13.2
						Camp	9	9.21	4.61	1.54	2.40	15.0
	Moisture (%)	M-W	rank	NO	0.19	Reference	5	56.9	7.06	3.16	52.1	69.4
						Camp	9	62.1	16.8	5.60	33.4	75.2
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.001	Reference	5	3.54	0.672	0.300	2.48	4.32
						Camp	9	1.49	0.869	0.290	0.280	2.84

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

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

Table D.9: Magnitude of Elevation in Mean Sediment Metal Concentrations between Camp Lake and Reference Lake 3 2021 Data, and between Camp Lake 2021 and Baseline Data, Mary River Project CREMP, 2021

Parameter	Camp Lake 2021 versus Reference Lake 3 2021				Camp Lake 2021 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)	21,120	0.8	20,520	0.7	18,267	1.0	15,175	1.0
Antimony (Sb)	<0.10	1.0	<0.10	1.0	1.0	0.1	1.0	0.1
Arsenic (As)	5.54	0.8	5.13	1.0	2.80	1.6	3.5	1.4
Barium (Ba)	123	0.8	129	0.7	105	0.9	68	1.4
Beryllium (Be)	0.81	1.0	0.78	1.0	1.0	0.8	1.0	0.8
Bismuth (Bi)	<0.20	1.6	<0.20	1.3	-	-	-	-
Boron (B)	14.9	1.2	15.2	1.3	1.0	17.7	2.0	9.8
Cadmium (Cd)	0.144	1.2	0.167	1.0	0.5	0.4	0.5	0.3
Calcium (Ca)	5,026	0.9	5,186	1.1	3,130	1.5	2,857	1.9
Chromium (Cr)	67.2	1.1	64.6	1.0	81.0	0.9	71	0.9
Cobalt (Co)	14.8	1.1	13.8	1.1	18.0	0.9	17	0.9
Copper (Cu)	81.2	0.6	85.0	0.5	45.0	1.0	40	1.0
Iron (Fe)	44,360	0.9	40,900	0.9	36,133	1.1	33,206	1.1
Lead (Pb)	17.3	1.1	16.2	1.1	18.0	1.0	19	0.9
Lithium (Li)	34.7	0.8	33.3	0.8	-	-	-	-
Magnesium (Mg)	13,760	1.1	12,918	1.0	13,967	1.1	10,113	1.3
Manganese (Mn)	958	0.7	882	2.7	699	1.0	942	2.5
Mercury (Hg)	0.0524	0.7	0.0453	0.7	0.1	0.3	0.1	0.3
Molybdenum (Mo)	3.23	0.4	2.69	0.5	1.0	1.2	1.0	1.4
Nickel (Ni)	46.6	1.4	45.9	1.3	67.0	1.0	63	1.0
Phosphorus (P)	955	1.0	902	1.2	800	1.2	1,125	1.0
Potassium (K)	5,140	0.8	4,862	0.8	3,450	1.2	3,771	1.1
Selenium (Se)	0.63	0.6	0.55	0.6	1.0	0.4	1.0	0.4
Silver (Ag)	0.20	0.5	0.17	0.8	0.30	0.4	0.3	0.4
Sodium (Na)	394	0.5	362	0.6	279	0.7	254	0.8
Strontium (Sr)	13.5	0.7	13.2	1.0	9.30	1.0	12	1.0
Sulphur (S)	1,340	0.7	1,380	1.0	-	-	-	-
Thallium (Tl)	0.594	0.8	0.556	0.8	1.0	0.5	1.0	0.4
Tin (Sn)	<2.0	1.0	<2.0	1.0	-	-	-	-
Titanium (Ti)	1,204	0.9	1,096	0.8	-	-	-	-
Uranium (U)	22.0	0.3	20.3	0.3	-	-	-	-
Vanadium (V)	63.2	1.0	60.7	0.9	69.0	0.9	57	0.9
Zinc (Zn)	88.0	0.7	87.5	0.6	67.0	0.9	57	0.9
Zirconium (Zr)	5.2	1.7	4.7	1.3	-	-	-	-

 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 parameter not measured, and therefore magnitude of elevation could not be determined.

Table D.10: Field Observations of Sediment Properties at Sheardown Lake Northwest (DL0-01) Benthic Stations^a, Mary River Project CREMP, August 2021

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia ^b	Plant or Algal Presence
DL0-01-9	7.6	brown red top layer, grey brown below	none detected	common algae, sparse macrophytes
DL0-01-4	6.6	reddish brown fines top layer, grey brown fines below	none detected	sparse algae, sparse macrophytes
DL0-01-3	8.2	reddish brown silt, lots of moss, rotting smell to substrate	hydrogen sulphide odour	common algae, abundant macrophytes
DL0-01-11	8.1	reddish silt/dust over medium brown silt, anoxia substrate intermixed and not as a distinct layer	hydrogen sulphide odour and blackened substrate	sparse algae
DL0-01-10	7.9	brown medium coarse sand	none detected	sparse algae
DL0-01-5	23.7	thin reddish oxide layer over medium brown to brown grey silt	some blackened substrate	none observed
DL0-01-14	22.0	medium brown grey with thin layer of iron oxide at surface	blackened substrate	common algae
DL0-01-15	21.0	medium reddish brown silt with some fine sand intermixed	none detected	sparse algae
DL0-01-2	17.5	reddish brown oxide layer over red brown silt	blackened substrate	none observed
DL0-01-12	14.0	medium brown fine sandy silt with some medium coarse sand	none detected	none observed

^a Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

^b 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.11: Observations from Sediment Cores Collected at Sheardown Lake NW (DL0-01), Mary River Project CREMP, August 2021

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
DL0-01	21.2	Profundal	1	11.0	dark brown orange silt and clay over light brown silt and clay.
			2	12.0	
			3	12.0	
DL0-01-05	22.5	Profundal	1	6.0	orange brown silt over top of dark grey silt and clay with some streaks of black.
			2	16.0	
			3	17.0	
DL0-01-13	19.0	Profundal	1	9.0	flocculent orange brown silt over beige brown silt and clay.
			2	19.0	
			3	17.5	
DL0-01-08	11.1	Littoral	1	18.0	orange brown silt over brown silt and clay on top of grey brown silt and clay.
			2	21.0	
			3	12.2	
DL0-01-2	19.1	Profundal	1	14.0	orange brown silt over brown silt and clay.
			2	15.0	
			3	17.0	
DD-HAB 9-STN2	10.5	Littoral	1	17.0	orange brown silt with some degraded vegetation over grey dark brown silt and clay.
			2	19.0	
			3	18.5	
DL0-01-9	7.8	Littoral	1	20.0	very unconsolidated orange brown silt with some organics and algae present over brown silt and clay on top of grey silt and clay.
			2	24.0	
			3	18.0	
			4	21.0	
DL0-01-10	7.9	Littoral	1	11.0	unconsolidated orange brown silt with algae present over brown silt and very sandy on top of grey silt and very sandy.
			2	10.0	
			3	14.5	

Table D.12: Sediment Particle Size, Total Organic Carbon, Metal Concentrations at Sheardown Lake Northwest (DL0-01) Sediment Stations, Mary River Project CREMP, August 2021

Analyte		Units	Sediment Quality Guideline (SQG) ^a	AEMP Benchmark ^b	Sheardown Lake Northwest Stations								Summary Statistics		
					DL0-01-5 (profundal)	DD-HAB 9-STN2 (littoral)	DL0-01-8 (littoral)	DL0-01 (profundal)	DL0-01-13 (profundal)	DL0-01-2 (profundal)	DL0-01-9 (littoral)	DL0-01-10 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	9.3	51.0	19.0	31.5	15.4	9.4	36.1	88.9	32.6	26.95	9.53
	Silt	%	-	-	74.3	42.0	69.8	56.4	66.7	75.3	49.0	10.4	55.5	21.83	7.72
	Clay	%	-	-	16.4	7.0	11.1	12.1	17.8	15.2	14.9	<1.0	11.9	5.59	1.975
	Moisture	%	-	-	69.2	75.2	81.7	44.1	64.9	66.3	84.5	27.0	64.1	19.48	6.89
	Total Organic Carbon	%	10 ^α	-	1.90	3.37	1.97	1.15	1.33	1.30	5.41	0.22	2.08	1.62	0.572
Metals	Aluminum (Al)	mg/kg	-	-	26,600	17,100	20,400	20,100	23,000	22,300	20,600	2,570	19,084	7,210	2,549
	Antimony (Sb)	mg/kg	-	-	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-
	Arsenic (As)	mg/kg	17	6.2	3.78	10.10	5.47	4.72	4.82	4.68	6.01	0.59	5.02	2.63	0.930
	Barium (Ba)	mg/kg	-	-	101.0	206.0	103.0	86.8	91.5	93.0	102.0	11.4	99	52.6	18.61
	Beryllium (Be)	mg/kg	-	-	1.13	0.77	1.00	1.03	1.15	1.03	1.00	0.13	0.91	0.33	0.118
	Bismuth (Bi)	mg/kg	-	-	0.32	0.33	0.24	0.24	0.26	0.25	0.27	<0.20	0.26	0.043	0.015
	Boron (B)	mg/kg	-	-	32.9	22.2	29.4	25.5	32.5	30.2	33.6	<5.0	26.4	9.50	3.357
	Cadmium (Cd)	mg/kg	3.5	1.5	0.299	0.392	0.308	0.250	0.237	0.228	0.484	0.025	0.278	0.1340	0.0474
	Calcium (Ca)	mg/kg	-	-	4,410	4,440	4,010	4,140	4,540	4,300	5,920	1,050	4,101	1,366	483
	Chromium (Cr)	mg/kg	90	97	91.1	63.3	76.8	72.8	81.2	83.4	73.7	12.4	69.3	24.43	8.64
	Cobalt (Co)	mg/kg	-	-	16.7	16.2	16.3	15.1	16.5	16.7	15.5	2.06	14.4	5.01	1.77
	Copper (Cu)	mg/kg	197	58	54.7	50.2	45.7	50.4	49.1	46.5	66.3	4.69	45.9	17.9	6.33
	Iron (Fe)	mg/kg	40,000 ^α	52,200	44,300	87,000	53,000	36,800	40,700	41,000	61,300	7,800	46,488	22,558	7,975
	Lead (Pb)	mg/kg	91.3	35	24.6	20.0	21.4	21.0	23.0	21.9	20.0	3.15	19.4	6.74	2.38
	Lithium (Li)	mg/kg	-	-	40.2	23.6	33.9	34.7	41.5	37.4	35.2	4.3	31.4	12.20	4.31
	Magnesium (Mg)	mg/kg	-	-	16,800	12,200	12,900	12,100	14,200	14,500	13,100	2,060	12,233	4,385	1,550
	Manganese (Mn)	mg/kg	1,100 ^{α,β}	4,530	396	2,410	741	1,090	1,170	1,090	419	80.9	925	717	254
	Mercury (Hg)	mg/kg	0.486	0.17	0.0553	0.0449	0.0328	0.0282	0.0346	0.0291	0.0554	<0.0050	0.0357	0.0165	0.0058
	Molybdenum (Mo)	mg/kg	-	-	1.94	9.51	6.70	1.84	1.70	1.75	6.93	0.38	3.84	3.35	1.183
	Nickel (Ni)	mg/kg	75 ^{α,β}	77	76.8	75.3	74.4	62.8	67.0	69.5	91.6	10.5	66.0	24.00	8.49
	Phosphorus (P)	mg/kg	2,000 ^α	1,958	751	1,280	947	777	831	890	851	294	828	272	96
	Potassium (K)	mg/kg	-	-	6,520	4,370	5,260	4,770	5,710	5,640	5,220	630	4,765	1,791	633
	Selenium (Se)	mg/kg	-	-	0.44	0.53	0.43	0.24	0.29	0.30	0.67	<0.20	0.39	0.16	0.056
	Silver (Ag)	mg/kg	-	-	0.22	0.17	0.16	0.18	0.18	0.16	0.20	<0.10	0.17	0.035	0.012
	Sodium (Na)	mg/kg	-	-	410	276	299	255	364	323	308	57	287	105	37
	Strontium (Sr)	mg/kg	-	-	12.90	9.62	11.60	11.30	12.60	12.30	11.80	3.85	10.7	2.96	1.048
	Sulphur (S)	mg/kg	-	-	<1000	1300	<1000	<1000	<1000	<1000	1900	<1000	1,150	321	101
	Thallium (Tl)	mg/kg	-	-	0.563	0.504	0.561	0.535	0.595	0.563	0.577	0.058	0.495	0.178	0.0631
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	-
	Titanium (Ti)	mg/kg	-	-	1,520	969	1,230	1,040	1,280	1,330	1,210	234	1,102	389	138
	Uranium (U)	mg/kg	-	-	8.84	9.77	5.97	9.54	8.80	8.07	12.60	0.95	8.07	3.42	1.21
	Vanadium (V)	mg/kg	-	-	69.3	46.7	59.9	55.3	63.3	63.2	59.4	8.9	53.2	19.11	6.76
	Zinc (Zn)	mg/kg	315	123	85.2	68.5	71.1	67.6	74.9	76.4	73.6	9.3	65.8	23.49	8.31
	Zirconium (Zr)	mg/kg	-	-	17.5	10.1	9.6	7.8	9.8	9.4	20.2	3.2	11.0	5.4	1.9

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

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

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

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

Table D.13: 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 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis ^a	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	0.786	Reference	5	40.0	6.49	2.90	32.5	48.8
						Sheardown NW	7	46.0	21.6	8.15	19.0	88.9
	Silt-Sized Material (%)	tequal	none	NO	0.643	Reference	5	49.6	6.98	3.12	39.2	58.2
						Sheardown NW	7	45.5	18.1	6.83	10.4	69.8
	Clay-Sized Material (%)	M-W	rank	NO	0.464	Reference	5	10.4	2.42	1.08	6.80	12.9
						Sheardown NW	7	8.53	4.39	1.66	1.00	14.9
	Moisture (%)	M-W	rank	YES	0.048	Reference	5	54.8	7.60	3.40	49.1	63.8
						Sheardown NW	7	70.4	19.7	7.44	27.0	84.5
	Total Organic Carbon (TOC) Content (%)	tequal	none	NO	0.193	Reference	5	4.37	1.96	0.875	1.92	7.32
						Sheardown NW	7	2.90	1.69	0.637	0.220	5.41
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	none	NO	0.104	Reference	5	42.0	6.80	3.04	35.7	49.8
						Sheardown NW	7	25.1	20.0	7.56	9.30	61.9
	Silt-Sized Material (%)	tequal	none	NO	0.083	Reference	5	47.2	5.32	2.38	39.2	53.1
						Sheardown NW	7	60.9	15.1	5.69	34.6	75.3
	Clay-Sized Material (%)	tequal	none	NO	0.294	Reference	5	10.9	3.54	1.58	4.70	13.2
						Sheardown NW	7	14.0	5.40	2.04	3.50	20.1
	Moisture (%)	tequal	none	NO	0.753	Reference	5	56.9	7.06	3.16	52.1	69.4
						Sheardown NW	7	58.9	12.3	4.64	42.5	72.5
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.001	Reference	5	3.54	0.672	0.300	2.48	4.32
						Sheardown NW	7	1.31	0.528	0.200	0.650	2.08

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

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

Table D.14: Magnitude of Elevation in Mean Sediment Metal Concentrations between Sheardown Lake NW and Reference Lake 3 2021 Data, and between Sheardown Lake NW 2021 and Baseline Data, Mary River Project CREMP, 2021

Analyte	Sheardown Lake NW versus Reference Lake 3 in 2021				Sheardown Lake NW 2021 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)	21,120	0.7	20,520	1.1	11,792	1.3	17,745	1.3
Antimony (Sb)	<0.10	1.0	<0.10	1.0	1.0	0.1	1	0.1
Arsenic (As)	5.54	1.0	5.13	0.9	3.0	1.8	3.2	1.4
Barium (Ba)	123	0.9	129	0.7	78	1.4	93	1.0
Beryllium (Be)	0.81	0.9	0.78	1.4	1.0	0.7	1.0	1.1
Bismuth (Bi)	<0.20	1.3	<0.20	1.3	-	-	-	-
Boron (B)	14.9	1.5	15.2	2.0	3.0	7.5	3.0	10.1
Cadmium (Cd)	0.144	2.1	0.167	1.5	0.5	0.6	0.5	0.5
Calcium (Ca)	5,026	0.8	5,186	0.8	2,697	1.4	3,558	1.2
Chromium (Cr)	67.2	0.8	64.6	1.3	53	1.1	81	1.0
Cobalt (Co)	14.8	0.8	13.8	1.2	10	1.3	15	1.1
Copper (Cu)	81.2	0.5	85.0	0.6	33	1.3	48	1.0
Iron (Fe)	44,360	1.2	40,900	1.0	28,120	1.9	40,382	1.0
Lead (Pb)	17.3	0.9	16.2	1.4	13	1.2	20	1.1
Lithium (Li)	34.7	0.7	33.3	1.2	-	-	-	-
Magnesium (Mg)	13,760	0.7	12,918	1.1	7,448	1.4	11,498	1.3
Manganese (Mn)	958	1.0	882	1.1	756	1.2	2,164	0.4
Mercury (Hg)	0.0520	0.7	0.0450	0.8	0.1	0.4	0.1	0.4
Molybdenum (Mo)	3.23	1.8	2.69	0.7	3.4	1.7	3.5	0.5
Nickel (Ni)	46.6	1.4	45.9	1.5	49	1.3	69	1.0
Phosphorus (P)	955	0.9	902	0.9	863	1.0	1,400	0.6
Potassium (K)	5,140	0.8	4,862	1.2	2,681	1.4	4,612	1.2
Selenium (Se)	0.63	0.7	0.55	0.6	1.0	0.5	1.0	0.3
Silver (Ag)	0.20	0.8	0.17	1.1	0.3	0.5	0.3	0.6
Sodium (Na)	394	0.6	362	0.9	249	0.9	342	1.0
Strontium (Sr)	13.5	0.7	13.2	0.9	7.2	1.3	11.4	1.1
Sulphur (S)	1,340	1.0	1,380	0.7	-	-	-	-
Thallium (Tl)	0.594	0.7	0.556	1.0	1.0	0.4	1.0	0.6
Tin (Sn)	<2.00	1.0	<2.00	1.0	-	-	-	-
Titanium (Ti)	1,204	0.8	1,096	1.2	-	-	-	-
Uranium (U)	22.0	0.3	20.3	0.4	-	-	-	-
Vanadium (V)	63.2	0.7	60.7	1.0	37	1.2	58	1.1
Zinc (Zn)	88.0	0.6	87.5	0.9	51	1.1	76	1.0
Zirconium (Zr)	5.2	2.1	4.7	2.4	-	-	-	-

 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.15: Field Observations of Sediment Properties at Sheardown Lake Southeast (DL0-02) Benthic Stations^a, Mary River Project CREMP, August 2021

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia ^b	Plant or Algal Presence
DL0-02-11	7.5	brown silt on top of grey silt, some degraded organics	none detected	none observed
DL0-02-10	6.9	brown orange silt on grey silt clay, degraded organics	none detected	sparse algae
DL0-02-4	8.5	brown and orange silt on grey silt clay, some degraded organics present	none detected	sparse algae
DL0-02-9	8.6	-	-	sparse algae
DL0-02-1	10.4	grey brown clay and fines	none detected	none observed
DL0-02-12	10.9	brown orange silt on grey silt clay, some degraded organics	none detected	none observed
DL0-02-8	12.9	brown silt in grey silt clay	none detected	none observed
DL0-02-13	11.4	grey brown clay and fines	none detected	none observed
DL0-02-2	14.2	brown silt on top of grey silt clay, degraded organics present	none detected	none observed
DL0-02-3	13.2	orange brown silt on grey silt clay, some degraded organics present	none detected	none observed

^a Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

^b 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.16: Observations from Sediment Cores Collected at Sheardown Lake Southeast (DL0-02), Mary River Project CREMP, August 2021

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
DL0-02-3	13.7	Profundal	1	9.5	orange brown silt over grey silt and clay.
			2	9.0	
			3	7.0	
DL0-02-1	11.2	Littoral	1	7.0	orange brown silt over grey silt and clay.
			2	9.5	
			3	9.5	
DL0-02-2	14.6	Profundal	1	9.5	orange brown silt over grey silt and clay.
			2	12.5	
			3	9.0	
DL0-02-4	8.4	Littoral	1	14.0	orange brown silt over grey silt and clay.
			2	17.0	
			3	19.0	
DL0-02-11	7.5	Littoral	1	19.0	orange brown silt over grey silt and clay.
			2	17.0	
			3	16.0	

Table D.17: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Sheardown Lake Southeast (DL0-02) Sediment Stations, Mary River Project CREMP, August 2021

Parameter		Units	Sediment Quality Guideline (SQG) ^a	AEMP Benchmark ^b	Sheardown Lake Southeast Basin Station					Summary Statistics		
					DL0-02-1	DL0-02-11	DL0-02-4	DL0-02-2	DL0-02-3	Mean	Standard Deviation	Standard Error
					(littoral)	(littoral)	(littoral)	(profundal)	(profundal)			
Non-metals	Sand	%	-	-	21.3	7.3	7.4	16.5	15.7	13.6	6.1	2.74
	Silt	%	-	-	69.4	78.5	78.6	69.2	69.2	73.0	5.1	2.27
	Clay	%	-	-	9.3	14.2	14.0	14.3	15.2	13.40	2.34	1.05
	Moisture	%	-	-	48.5	62.6	59.4	49.2	49.9	53.9	6.6	2.94
	Total Organic Carbon	%	10 ^α	-	0.85	1.10	1.08	0.89	0.77	0.94	0.145	0.065
Metals	Aluminum (Al)	mg/kg	-	-	14,800	20,300	21,200	19,700	19,500	19,100	2,493	1,115
	Antimony (Sb)	mg/kg	-	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-
	Arsenic (As)	mg/kg	17	5.9	2.67	4.59	5.05	3.48	4.07	3.97	0.93	0.418
	Barium (Ba)	mg/kg	-	-	72.3	118.0	133	89.7	96.1	102	23.9	10.7
	Beryllium (Be)	mg/kg	-	-	0.71	0.89	0.91	0.80	0.79	0.82	0.08	0.036
	Bismuth (Bi)	mg/kg	-	-	<0.20	0.25	0.22	0.2	0.23	0.22	0.021	0.009
	Boron (B)	mg/kg	-	-	18.4	23.3	26.7	23.4	22.3	22.8	2.98	1.33
	Cadmium (Cd)	mg/kg	3.5	1.5	0.088	0.118	0.120	0.116	0.108	0.110	0.0131	0.0059
	Calcium (Ca)	mg/kg	-	-	8,180	5,920	4,760	6,670	6,170	6,340	1,245	557
	Chromium (Cr)	mg/kg	90	79	76.6	86.6	83.3	82.6	80.7	82.0	3.68	1.64
	Cobalt (Co)	mg/kg	-	-	12.5	15.2	15.6	15.5	15.7	14.9	1.35	0.61
	Copper (Cu)	mg/kg	110	56	25.3	33.4	32.6	30.5	30.5	30.5	3.2	1.41
	Iron (Fe)	mg/kg	40,000 ^α	34,400	31,000	44,500	46,700	37,600	44,800	40,920	6,533	2,922
	Lead (Pb)	mg/kg	91.3	35	14.6	19.2	19.6	16.9	17.1	17.5	2.01	0.90
	Lithium (Li)	mg/kg	-	-	27.5	34.5	35.5	30.9	30.9	31.9	3.20	1.43
	Magnesium (Mg)	mg/kg	-	-	14,700	15,500	14,500	15,600	15,800	15,220	581	260
	Manganese (Mn)	mg/kg	1,100 ^{α,β}	657	383	1,330	1,300	712	1,250	995	426	190
	Mercury (Hg)	mg/kg	0.486	0.17	0.0176	0.0236	0.0249	0.0225	0.0227	0.0223	0.0028	0.0012
	Molybdenum (Mo)	mg/kg	-	-	0.99	1.77	1.97	1.13	1.73	1.52	0.43	0.193
	Nickel (Ni)	mg/kg	75 ^{α,β}	66	62.8	71.0	63.5	67.7	63.7	65.7	3.51	1.57
	Phosphorus (P)	mg/kg	2,000 ^α	1,278	861	1,040	1,150	1,020	1,060	1,026	105	47
	Potassium (K)	mg/kg	-	-	3,690	4,830	5,390	4,650	4,600	4,632	613	274
	Selenium (Se)	mg/kg	-	-	<0.20	<0.20	0.24	<0.20	<0.20	0.21	0.02	0.008
	Silver (Ag)	mg/kg	-	-	0.11	0.13	0.12	0.11	0.12	0.12	0.008	0.004
	Sodium (Na)	mg/kg	-	-	359	320	369	330	312	338	25	11
	Strontium (Sr)	mg/kg	-	-	11.8	12.2	13.7	12.8	12.2	12.5	0.74	0.33
	Sulphur (S)	mg/kg	-	-	<1000	<1000	<1000	<1000	<1000	<1000	-	-
	Thallium (Tl)	mg/kg	-	-	0.343	0.468	0.485	0.398	0.402	0.419	0.058	0.0258
	Tin (Sn)	mg/kg	-	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	-	-
	Titanium (Ti)	mg/kg	-	-	1,230	1,390	1,540	1,550	1,490	1,440	133	60
	Uranium (U)	mg/kg	-	-	4.51	5.61	6.08	5.50	5.50	5.4	0.57	0.26
	Vanadium (V)	mg/kg	-	-	46.8	57.0	61.5	57.8	55.1	55.6	5.46	2.44
	Zinc (Zn)	mg/kg	315	135	51.2	64.9	69.7	62.5	63.4	62.3	6.82	3.05
	Zirconium (Zr)	mg/kg	-	-	19.0	20.1	21.7	23.6	20.7	21.0	1.74	0.779

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD

 Indicates parameter concentration above the AEMP Benchmark.

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

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

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

Table D.18: 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 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis ^a	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	0.001	Reference	5	40.0	6.49	2.90	32.5	48.8
						Sheardown SE	5	11.4	5.88	2.63	7.30	21.3
	Silt-Sized Material (%)	tequal	none	YES	0.001	Reference	5	49.6	6.98	3.12	39.2	58.2
						Sheardown SE	5	74.6	5.54	2.48	67.8	78.9
	Clay-Sized Material (%)	tequal	none	NO	0.124	Reference	5	10.4	2.42	1.08	6.80	12.9
						Sheardown SE	5	14.0	3.94	1.76	9.30	20.1
	Moisture (%)	M-W	rank	NO	0.69	Reference	5	54.8	7.60	3.40	49.1	63.8
						Sheardown SE	5	54.7	6.60	2.95	47.6	62.6
	Total Organic Carbon (TOC) Content (%)	tequal	log10	YES	0.001	Reference	5	4.37	1.96	0.875	1.92	7.32
						Sheardown SE	5	1.06	0.218	0.0976	0.850	1.40
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	none	YES	0.001	Reference	5	42.0	6.80	3.04	35.7	49.8
						Sheardown SE	5	12.4	4.04	1.81	8.00	16.5
	Silt-Sized Material (%)	tequal	none	YES	0.001	Reference	5	47.2	5.32	2.38	39.2	53.1
						Sheardown SE	5	72.5	3.75	1.67	69.2	76.7
	Clay-Sized Material (%)	M-W	rank	YES	0.011	Reference	5	10.9	3.54	1.58	4.70	13.2
						Sheardown SE	5	15.1	0.477	0.214	14.3	15.4
	Moisture (%)	M-W	rank	NO	0.295	Reference	5	56.9	7.06	3.16	52.1	69.4
						Sheardown SE	5	51.6	2.97	1.33	49.2	55.2
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.001	Reference	5	3.54	0.672	0.300	2.48	4.32
						Sheardown SE	5	0.880	0.146	0.0651	0.740	1.11

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

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

Table D.19: Magnitude of Elevation in Mean Sediment Metal Concentrations between Sheardown Lake SE and Reference Lake 3 2021 Data, and between Sheardown Lake SE 2021 and Baseline Data, Mary River Project CREMP, 2021

Parameter	Sheardown Lake SE versus Reference Lake 3 in 2021				Sheardown Lake SE 2021 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)	21,120	0.9	20,520	1.0	14,950	1.3	13,133	1.5
Antimony (Sb)	<0.10	1.0	<0.10	1.0	1.0	0.1	1.0	0.1
Arsenic (As)	5.54	0.7	5.13	0.7	1.9	2.2	1.5	2.5
Barium (Ba)	123	0.9	129	0.7	81	1.3	64	1.5
Beryllium (Be)	0.81	1.0	0.78	1.0	1.0	0.8	1.0	0.8
Bismuth (Bi)	<0.20	1.1	<0.20	1.1	-	-	-	-
Boron (B)	14.9	1.5	15.2	1.5	2.5	9.1	1.4	16.3
Cadmium (Cd)	0.144	0.8	0.167	0.7	0.5	0.2	0.6	0.2
Calcium (Ca)	5,026	1.3	5,186	1.2	6,310	1.0	8,925	0.7
Chromium (Cr)	67.2	1.2	64.6	1.3	78	1.1	72	1.1
Cobalt (Co)	14.8	1.0	13.8	1.1	13	1.1	12	1.3
Copper (Cu)	81.2	0.4	85.0	0.4	30	1.0	25	1.2
Iron (Fe)	44,360	0.9	40,900	1.0	32,284	1.3	29,117	1.4
Lead (Pb)	17.3	1.0	16.2	1.0	17	1.0	14	1.2
Lithium (Li)	34.7	0.9	33.3	0.9	-	-	-	-
Magnesium (Mg)	13,760	1.1	12,918	1.2	12,634	1.2	13,742	1.1
Manganese (Mn)	958	1.0	882	1.1	462	2.2	410	2.4
Mercury (Hg)	0.0520	0.4	0.0450	0.5	0.1	0.2	0.1	0.2
Molybdenum (Mo)	3.23	0.5	2.69	0.5	1.5	1.1	1	1.4
Nickel (Ni)	46.6	1.4	45.9	1.4	62	1.1	62	1.1
Phosphorus (P)	955	1.1	902	1.2	1,150	0.9	950	1.1
Potassium (K)	5,140	0.9	4,862	1.0	3,947	1.2	3,317	1.4
Selenium (Se)	0.63	0.3	0.55	0.4	1.0	0.2	1.0	0.2
Silver (Ag)	0.20	0.6	0.17	0.7	0.4	0.3	0.3	0.4
Sodium (Na)	394	0.9	362	0.9	353	1.0	330	1.0
Strontium (Sr)	13.5	0.9	13.2	0.9	16	0.8	11	1.1
Sulphur (S)	1,340	0.7	1,380	0.7	-	-	-	-
Thallium (Tl)	0.594	0.7	0.556	0.7	1.0	0.4	1.0	0.4
Tin (Sn)	<2.00	1.0	<2.00	1.0	-	-	-	-
Titanium (Ti)	1,204	1.2	1,096	1.4	-	-	-	-
Uranium (U)	22.0	0.2	20.3	0.3	-	-	-	-
Vanadium (V)	63.2	0.9	60.7	0.9	52	1.1	44	1.3
Zinc (Zn)	88.0	0.7	87.5	0.7	51	1.2	51	1.2
Zirconium (Zr)	5.2	3.9	4.7	4.8	-	-	-	-

 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 parameter not measured, and therefore magnitude of elevation could not be determined.

Table D.20: Field Observations of Sediment Properties at Mary Lake (BL0) Benthic Stations^a, Mary River Project CREMP, August 2021

Station	Station Depth (m)	Colour and Texture Observations	Evidence of Anoxia ^b	Plant or Algal Presence
BL0-01	9.8	brown silt and clay on top of grey silt and clay	none detected	none observed
BL0-11	9.3	grey brown fines, some sand, and some organic detritus	none detected	none observed
BL0-7	12.8	brown grey fines	none detected	none observed
BL0-6	6.7	light brown fines	none detected	none observed
BL0-3	16.4	sandy brown	none detected	none observed
BL0-15	29.1	brown grey fines	none detected	none observed
BL0-14	19.5	light brown fines	none detected	none observed
BL0-13	21.5	brown silt on grey silt and clay	none detected	none observed
BL0-4	21.6	light brown copper colour, silty clay	none detected	none observed
BL0-5	21.5	grey brown fines and some sand	none detected	none observed

^a Sediment particle size and benthic invertebrate community samples were collected using a petite-Ponar.

^b 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.21: Observations from Sediment Cores Collected at Mary Lake (BL0), Mary River Project CREMP, August 2021

Sample Station	Station Depth (m)	Station Type	Core Number	Core Length (cm)	Surficial Substrate Texture Description
BL0-01	9.8	Littoral	1	10.0	unconsolidated light brown silt over light grey silt and clay.
			2	11.0	
			3	11.0	
BL0-06	16.3	Littoral	1	10.0	light brown silt and clay.
			2	9.5	
			3	11.0	
BL0-08	27.5	Profundal	1	13.0	brown silt overlaying grey silt and clay.
			2	11.0	
			3	11.0	
BL0-09	30.5	Profundal	1	13.5	brown silt overlaying grey silt and clay.
			2	8.5	
			3	9.5	
BL0-10	19.5	Profundal	1	9.0	orange brown silt overlaying brown silt and clay.
			2	11.0	
			3	15.0	
BL0-12	22.2	Profundal	1	24.0	orange brown silt overlaying dark grey silt and clay.
			2	21.0	
			3	20.0	
BL0-04	20.8	Profundal	1	24.0	orange brown silt overlaying beige brown silt and clay.
			2	24.0	
			3	22.5	
BL0-14	20.0	Profundal	1	34.0	brown silt and clay.
			2	29.0	
			3	30.0	
BL0-03	17.4	Profundal	1	19.0	mix of brown, black, and grey sand and silt, station was near a sand bar.
			2	7.0	
			3	24.0	
BL0-16	31.1	Profundal	1	32.0	brown silt overlaying grey silt and clay.
			2	43.0	
			3	39.0	

Table D.22: Sediment Particle Size, Total Organic Carbon, and Metal Concentrations at Mary Lake (BL0) Sediment Stations, Mary River Project CREMP, August 2021

Parameter		Units	Sediment Quality Guideline (SQG) ^a	AEMP Benchmark ^b	Mary Lake Stations										Summary Statistics		
					BL0-01 (littoral)	BL0-16 (profundal)	BL0-03 (profundal)	BL0-14 (profundal)	BL0-12 (profundal)	BL0-04 (profundal)	BL0-10 (profundal)	BL0-09 (profundal)	BL0-08 (profundal)	BL0-06 (littoral)	Mean	Standard Deviation	Standard Error
Non-metals	Sand	%	-	-	18.9	17.8	91.7	16.4	29.7	11.7	4.7	9.7	6.5	6.3	21.3	25.9	8.18
	Silt	%	-	-	72.5	40.5	6.1	38.0	56.1	64.8	65.3	65.6	65.1	67.8	54.2	20.5	6.47
	Clay	%	-	-	8.6	41.6	2.2	45.6	14.2	23.5	29.9	24.7	28.4	25.9	24.46	13.50	4.27
	Moisture	%	-	-	51.8	63.8	24.1	62.3	56.0	48.2	46.2	46.3	42.9	46.3	48.8	11.2	3.55
	Total Organic Carbon	%	10 ^α	-	1.14	1.02	0.34	0.74	0.83	0.69	0.78	0.81	0.84	0.78	0.80	0.209	0.066
Metals	Aluminum (Al)	mg/kg	-	-	19,500	26,300	4,690	27,600	19,700	22,400	25,200	26,000	27,600	26,800	22,579	6,980	2,207
	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	-	-
	Arsenic (As)	mg/kg	17	5.9	7.16	5.35	1.53	4.54	4.39	3.87	4.31	5.22	4.62	3.82	4.48	1.42	0.448
	Barium (Ba)	mg/kg	-	-	102.0	122.0	22.4	114	85.9	81.4	105.0	124	108.0	106	97.1	29.6	9.3
	Beryllium (Be)	mg/kg	-	-	0.80	1.19	0.23	1.32	0.88	1.03	1.22	1.19	1.29	1.24	1.04	0.33	0.105
	Bismuth (Bi)	mg/kg	-	-	0.2	0.24	<0.20	0.24	0.20	0.21	0.24	0.27	0.29	0.22	0.23	0.031	0.010
	Boron (B)	mg/kg	-	-	21.7	34.3	7.5	38.2	24.4	26.7	30.2	34.5	35.6	36.2	28.9	9.32	2.95
	Cadmium (Cd)	mg/kg	3.5	1.5	0.121	0.147	0.029	0.129	0.115	0.116	0.132	0.144	0.173	0.092	0.120	0.0387	0.0122
	Calcium (Ca)	mg/kg	-	-	8,240	3,460	1,030	4,250	4,440	4,620	4,540	5,140	5,060	4,560	4,534	1,761	557
	Chromium (Cr)	mg/kg	90	98	84.4	88.3	18.7	89.3	79.2	85.4	90.7	97.5	102.0	84.8	82.0	23.21	7.34
	Cobalt (Co)	mg/kg	-	-	18.0	17.1	3.93	17.3	15.1	15.9	17.4	18.6	19.2	16.5	15.9	4.38	1.38
	Copper (Cu)	mg/kg	110	50	36.3	36.5	6.4	35.8	27.5	30.8	35.4	36.4	39.6	33.2	31.8	9.6	3.02
	Iron (Fe)	mg/kg	40,000 ^α	52,400	42,800	46,900	14,200	44,000	38,900	38,600	43,300	48,900	44,300	40,500	40,240	9,710	3,071
	Lead (Pb)	mg/kg	91.3	35	17.1	24.4	4.70	24.3	17.9	20.7	24.0	24.4	26.2	22.5	20.6	6.34	2.00
	Lithium (Li)	mg/kg	-	-	32.0	45.5	8.4	48.9	34.7	39.6	46.0	46.4	49.5	48.5	40.0	12.65	4.00
	Magnesium (Mg)	mg/kg	-	-	18,000	16,100	3,220	16,700	13,900	15,500	16,800	17,000	18,400	16,000	15,162	4,383	1,386
	Manganese (Mn)	mg/kg	1,100 ^{α,β}	4,370	1,670	583	456	692	2,040	1,130	680	5,350	2,530	645	1,578	1,501	475
	Mercury (Hg)	mg/kg	0.486	0.17	0.0216	0.0610	0.0088	0.0433	0.0318	0.0295	0.0482	0.0496	0.0652	0.0219	0.0381	0.0183	0.0058
	Molybdenum (Mo)	mg/kg	-	-	0.62	0.66	0.31	0.65	1.06	0.74	0.76	1.69	1.14	0.68	0.83	0.38	0.120
	Nickel (Ni)	mg/kg	75 ^{α,β}	72	68.9	62.6	14.4	57.9	57.6	59.7	61.0	69.7	74.4	57.3	58.4	16.53	5.23
	Phosphorus (P)	mg/kg	2,000 ^α	1,580	1,380	996	337	765	1,210	905	771	1,200	894	765	922	296	94
	Potassium (K)	mg/kg	-	-	4,630	6,950	1,240	7,470	4,910	5,570	6,680	6,630	7,030	6,510	5,762	1,843	583
	Selenium (Se)	mg/kg	-	-	0.21	0.25	<0.20	0.24	0.2	<0.20	0.23	0.26	0.28	<0.20	0.23	0.03	0.009
	Silver (Ag)	mg/kg	-	-	<0.10	0.16	<0.10	0.15	0.12	0.13	0.16	0.16	0.17	0.11	0.14	0.027	0.009
	Sodium (Na)	mg/kg	-	-	340	466	82	421	326	385	430	462	466	411	379	115	37
	Strontium (Sr)	mg/kg	-	-	14.3	17.7	4.20	18.1	14.2	14.2	15.8	17.4	17.1	15.6	14.9	4.03	1.27
	Sulphur (S)	mg/kg	-	-	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	-	-
	Thallium (Tl)	mg/kg	-	-	0.366	0.537	0.108	0.600	0.441	0.489	0.582	0.597	0.612	0.585	0.492	0.157	0.0496
	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	-	-
	Titanium (Ti)	mg/kg	-	-	1,330	1,570	370	1,730	1,480	1,670	1,780	1,720	1,740	1,690	1,508	423	134
	Uranium (U)	mg/kg	-	-	4.46	8.74	2.11	8.75	7.46	7.87	9.70	8.85	9.90	6.20	7.4	2.48	0.79
	Vanadium (V)	mg/kg	-	-	64.2	72.5	15.5	74.6	56.6	64.1	71.9	71.1	74.5	70.5	63.6	17.81	5.63
	Zinc (Zn)	mg/kg	315	135	63.8	79.2	15.9	84.0	64.7	72.1	82.9	82.5	89.2	80.4	71.5	21.23	6.71
	Zirconium (Zr)	mg/kg	-	-	10.8	28.5	4.6	25.5	16.5	23.2	28.8	24.9	26.9	21.9	21.2	8.07	2.55

Indicates parameter concentration above Sediment Quality Guideline (SQG).

BOLD Indicates parameter concentration above the AEMP Benchmark.

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

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

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

Table D.23: 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 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Analysis ^a	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	0.119	Reference	5	40.0	6.49	2.90	32.5	48.8
						Mary	4	27.1	34.5	17.2	5.10	77.9
	Silt-Sized Material (%)	tequal	none	NO	0.572	Reference	5	49.6	6.98	3.12	39.2	58.2
						Mary	4	56.4	24.5	12.2	19.9	72.5
	Clay-Sized Material (%)	tunequal	none	NO	0.423	Reference	5	10.4	2.42	1.08	6.80	12.9
						Mary	4	16.6	13.3	6.64	2.20	29.7
	Moisture (%)	tequal	none	NO	0.137	Reference	5	54.8	7.60	3.40	49.1	63.8
						Mary	4	43.5	12.6	6.29	25.0	51.8
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.011	Reference	5	4.37	1.96	0.875	1.92	7.32
						Mary	4	0.943	0.348	0.174	0.540	1.31
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	log10	YES	0.026	Reference	5	42.0	6.80	3.04	35.7	49.8
						Mary	11	22.7	24.8	7.47	4.70	91.7
	Silt-Sized Material (%)	M-W	rank	NO	0.221	Reference	5	47.2	5.32	2.38	39.2	53.1
						Mary	11	52.9	19.2	5.78	6.10	74.1
	Clay-Sized Material (%)	tunequal	none	YES	0.008	Reference	5	10.9	3.54	1.58	4.70	13.2
						Mary	11	24.4	13.3	4.02	2.20	45.6
	Moisture (%)	tequal	none	NO	0.103	Reference	5	56.9	7.06	3.16	52.1	69.4
						Mary	11	47.2	11.4	3.44	24.1	63.8
	Total Organic Carbon (TOC) Content (%)	M-W	rank	YES	0.001	Reference	5	3.54	0.672	0.300	2.48	4.32
						Mary	11	0.825	0.202	0.0609	0.340	1.06

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

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

Table D.24: Magnitude of Elevation in Mean Sediment Metal Concentrations between Mary Lake and Reference Lake 3 2021 Data, and between Mary Lake 2021 and Baseline Data, Mary River Project CREMP, 2021

Parameter	Mary Lake versus Reference Lake 3 in 2021				Mary Lake 2021 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)	21,120	1.1	20,520	1.1	18,267	1.3	17,000	1.3
Antimony (Sb)	<0.10	1.0	<0.10	1.0	1.0	0.1	1.0	0.1
Arsenic (As)	5.54	1.0	5.13	0.8	2.8	2.0	3.7	1.1
Barium (Ba)	123	0.8	129	0.7	105	1.0	76	1.3
Beryllium (Be)	0.81	1.3	0.78	1.3	1.0	1.0	1.0	1.0
Bismuth (Bi)	<0.20	1.1	<0.20	1.2	-	-	-	-
Boron (B)	14.9	1.9	15.2	1.9	1.0	29.0	2.0	14.5
Cadmium (Cd)	0.144	0.7	0.167	0.7	0.5	0.2	0.5	0.2
Calcium (Ca)	5,026	1.3	5,186	0.8	3,130	2.0	2,934	1.4
Chromium (Cr)	67.2	1.3	64.6	1.3	81	1.0	76	1.1
Cobalt (Co)	14.8	1.2	13.8	1.1	18	1.0	18	0.9
Copper (Cu)	81.2	0.4	85.0	0.4	45	0.8	44	0.7
Iron (Fe)	44,360	0.9	40,900	1.0	36,133	1.2	35,654	1.1
Lead (Pb)	17.3	1.1	16.2	1.3	18	1.1	21	1.0
Lithium (Li)	34.7	1.2	33.3	1.2	-	-	-	-
Magnesium (Mg)	13,760	1.2	12,918	1.1	13,967	1.2	10,903	1.3
Manganese (Mn)	958	1.2	882	1.9	699	1.7	991	1.7
Mercury (Hg)	0.0520	0.4	0.0450	0.9	0.1	0.2	0.1	0.4
Molybdenum (Mo)	3.23	0.2	2.69	0.3	1.0	0.7	1.0	0.9
Nickel (Ni)	46.6	1.4	45.9	1.2	67	0.9	65	0.9
Phosphorus (P)	955	1.1	902	1.0	800	1.3	1,325	0.7
Potassium (K)	5,140	1.1	4,862	1.2	3,450	1.6	4,287	1.4
Selenium (Se)	0.628	0.3	0.554	0.4	1.0	0.2	1.0	0.2
Silver (Ag)	0.202	0.5	0.172	0.8	0.3	0.4	0.4	0.4
Sodium (Na)	394	1.0	362	1.0	279	1.3	284	1.3
Strontium (Sr)	13.5	1.1	13.2	1.1	9.3	1.6	13.3	1.1
Sulphur (S)	1,340	0.7	1,380	0.7	-	-	-	-
Thallium (Tl)	0.594	0.8	0.556	0.9	1.0	0.5	1.0	0.5
Tin (Sn)	<2.00	1.0	<2.00	1.0	-	-	-	-
Titanium (Ti)	1,204	1.3	1,096	1.4	-	-	-	-
Uranium (U)	22.0	0.2	20.3	0.4	-	-	-	-
Vanadium (V)	63.2	1.1	60.7	1.0	69	1.0	63	1.0
Zinc (Zn)	88.0	0.8	87.5	0.8	67	1.1	64	1.1
Zirconium (Zr)	5.2	3.2	4.7	4.8	-	-	-	-

 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 parameter not measured, and therefore magnitude of elevation could not be determined.

APPENDIX E
PHYTOPLANKTON DATA

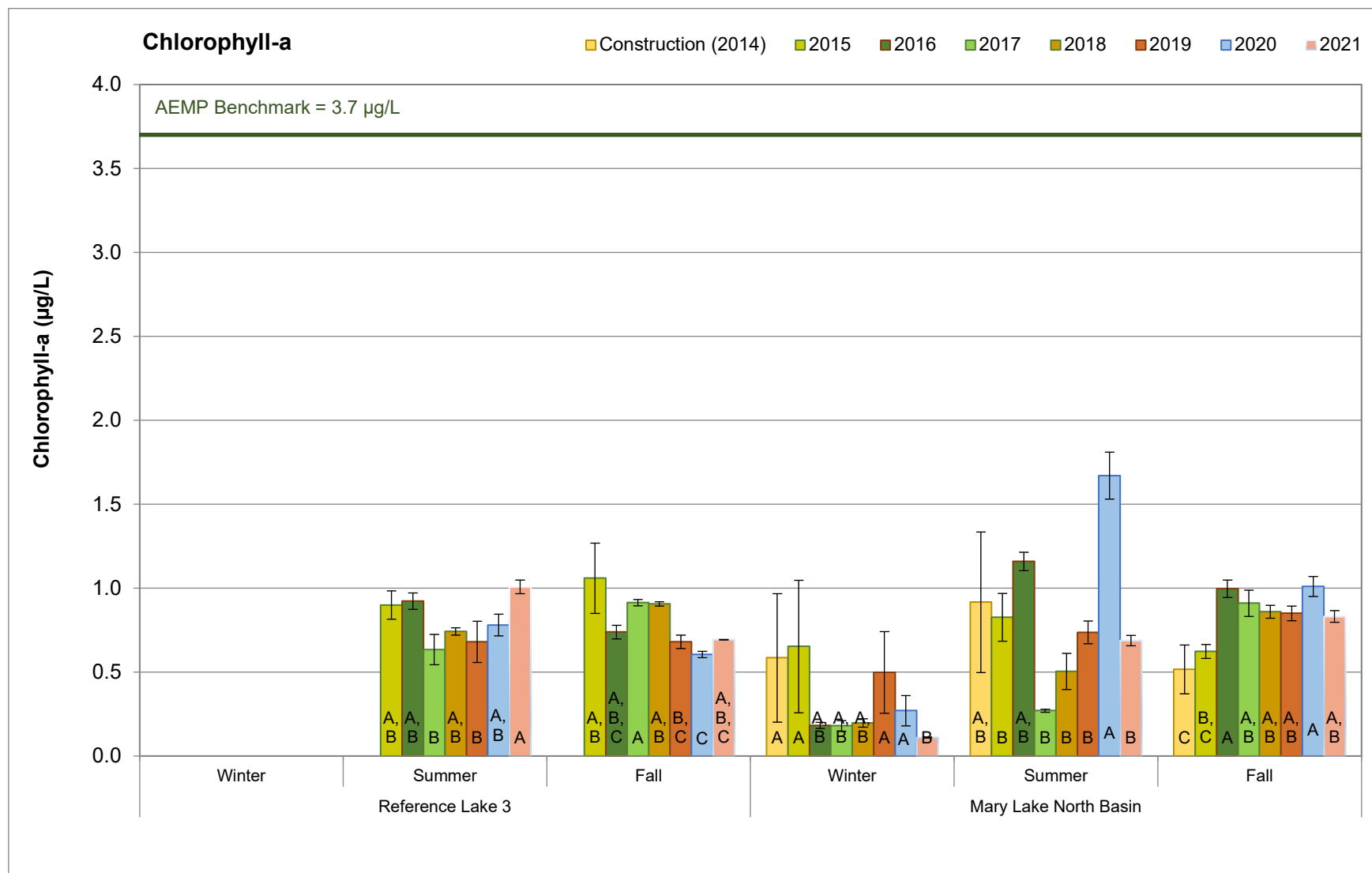


Figure E.1: Temporal Comparison of Chlorophyll-a Concentrations Among Seasons between the Mary Lake North Basin and Reference Lake 3 for Mine Construction (2014) and Operational (2015 to 2021) Periods (mean ± SE)

Note: Bars with the same letter at the base do not differ significantly between years for the applicable season.

Table E.1: Phytoplankton Monitoring Data (i.e., chlorophyll-a and phaeophytin-a concentrations) Collected at Lotic Reference Stations, Camp Lake Tributaries, Sheardown Lake Tributary 1, and Tom River, Mary River Project 2021 CREMP

Station		Reference Creek Stations				Camp Lake Tributary 1 (CLT1)						Camp Lake Tributary 2	Camp Lake Outlet	Sheardown Lake Tributary 1 (SDLT1)		Tom River
						North Branch		Main Stem						D1-05	D1-00	
		CLT-REF4	CLT-REF3	MRY-REF3	MRY-REF2	L1-08	L1-02	L2-03	L1-09	L1-05	L0-01	K0-01	J0-01			D1-05
Sample Collection Date	Spring	2-Jul-21	2-Jul-21	2-Jul-21	2-Jul-21	1-Jul-21	1-Jul-21	30-Jun-21	30-Jun-21	30-Jun-21	29-Jun-21	29-Jun-21	2-Jul-21	29-Jun-21	29-Jun-21	29-Jun-21
	Summer	1-Aug-21	28-Jul-21	28-Jul-21	28-Jul-21	1-Aug-21	26-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	24-Jul-21	1-Aug-21	24-Jul-21	26-Jul-21	26-Jul-21
	Fall	3-Sep-21	3-Sep-21	3-Sep-21	3-Sep-21	3-Sep-21	5-Sep-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	3-Sep-21	26-Aug-21	26-Aug-21	27-Aug-21
Chlorophyll-a (µg/L)	Spring	0.34	0.26	0.26	0.40	0.20	0.28	1.18	0.43	0.39	0.36	0.28	0.62	0.34	0.38	0.19
	Summer	0.66	0.38	0.36	0.54	0.23	0.45	0.71	0.52	0.50	0.42	0.38	1.34	0.25	0.56	0.40
	Fall	0.56	0.42	0.49	0.64	0.22	0.43	0.79	0.52	0.52	0.50	0.43	1.34	0.39	0.50	0.34
	Average	0.52	0.35	0.37	0.53	0.22	0.39	0.89	0.49	0.47	0.43	0.36	1.10	0.33	0.48	0.31
	Standard Deviation	0.16	0.08	0.12	0.12	0.02	0.09	0.25	0.05	0.07	0.07	0.08	0.42	0.07	0.09	0.11
	Standard Error	0.09	0.05	0.07	0.07	0.01	0.05	0.15	0.03	0.04	0.04	0.04	0.24	0.04	0.05	0.06
Phaeophytin-a (µg/L)	Spring	0.69	0.61	0.57	0.70	0.69	0.69	1.23	0.64	0.60	0.46	0.39	0.82	0.57	0.50	0.24
	Summer	0.85	0.66	0.78	0.77	0.63	0.80	1.07	0.84	0.79	0.72	0.83	1.11	0.64	0.85	0.86
	Fall	84.00	0.71	0.82	0.77	0.62	0.72	0.97	0.79	0.80	0.79	0.68	1.15	0.74	0.72	0.75
	Average	28.51	0.66	0.72	0.75	0.65	0.74	1.09	0.76	0.73	0.66	0.63	1.03	0.65	0.69	0.62
	Standard Deviation	48.05	0.05	0.13	0.04	0.04	0.06	0.13	0.10	0.11	0.17	0.22	0.18	0.09	0.18	0.33
	Standard Error	27.74	0.03	0.08	0.02	0.02	0.03	0.08	0.06	0.07	0.10	0.13	0.10	0.05	0.10	0.19

Table E.2: Chlorophyll-a Concentration (µg/L) Data Summary and Statistical Comparison Results between Camp Lake Tributary 1 Main Stem Stations and Lotic Reference Creek Stations for Spring, Summer and Fall Sampling Events in 2021

Season	Two-Area Comparison			Study Area	Sample Size	Mean	Standard Deviation	Standard Error	Minimum	Maximum
	Significant Difference between Areas?	P-value	Statistical Test ^a							
Spring	NO	0.699	tequal	Reference	4	0.315	0.0681	0.0340	0.260	0.400
				CLT1 Main Stem	5	0.492	0.406	0.181	0.100	1.18
Summer	NO	0.596	tequal	Reference	4	0.485	0.142	0.0709	0.360	0.660
				CLT1 Main Stem	4	0.537	0.123	0.0614	0.420	0.710
Fall	NO	0.536	tequal	Reference	4	0.527	0.0943	0.0471	0.420	0.640
				CLT1 Main Stem	4	0.583	0.139	0.0693	0.500	0.790

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

^a Statistical test was T-test (tequal) for comparisons between Lotic Reference Creek and Camp Lake Tributary 1 Main Stem Stations within a season.

Table E.3: Phytoplankton Monitoring Data (i.e., chlorophyll-a and phaeophytin-a concentrations) Collected at Reference Lake 3 (REF-03), Mary River Project 2021 CREMP

Analyte		Chlorophyll-a (µg/L)						Phaeophytin-a (µg/L)					
Station		REF3-01	REF3-02	REF3-03	Average	Standard Deviation	Standard Error	REF3-01	REF3-02	REF3-03	Average	Standard Deviation	Standard Error
Sample Collection Date	Summer	31-Jul-21			-	-	-	31-Jul-21			-	-	-
	Fall	31-Aug-21			-	-	-	31-Aug-21			-	-	-
Summer	Surface	0.75	0.75	0.93	0.81	0.10	0.06	1.02	1.04	1.1	1.05	0.04	0.02
	Bottom	1.11	1.31	1.2	1.21	0.10	0.06	1.20	1.18	1.06	1.15	0.08	0.04
	Average	0.93	1.03	1.07	1.01	0.07	0.04	1.11	1.11	1.08	1.10	0.02	0.01
Fall	Surface	0.68	0.66	0.68	0.67	0.01	0.01	1.11	1.20	1.21	1.17	0.06	0.03
	Bottom	0.71	0.73	0.70	0.71	0.02	0.01	1.16	1.28	1.15	1.20	0.07	0.04
	Average	0.70	0.70	0.69	0.69	0.00	0.00	1.14	1.24	1.18	1.19	0.05	0.03

Note: "-" indicates date not applicable.

Table E.4: Statistical Comparison of Chlorophyll-a Concentrations at the Reference Lake 3 Among Years of Mine Operation (2015 to 2021)

Season	Data Transformation	Overall 7-group Comparison			Summary				Pairwise Comparison ^{b,c}
		Significant Difference Among Years?	P-value	Statistical Treatment ^a	Year	Sample Size (n)	Mean Concentration (µg/L)	Standard Deviation (µg/L)	
Summer	none	YES	0.006	ANOVA	2015	3	0.899	0.146	AB
					2016	3	0.922	0.0845	AB
					2017	3	0.634	0.0899	B
					2018	3	0.742	0.0660	AB
					2019	3	0.680	0.213	B
					2020	6	0.780	0.0744	AB
					2021	3	1.01	0.0701	A
Fall	rank	YES	0.002	K-W	2015	3	1.06	0.363	AB
					2016	3	0.738	0.0708	ABC
					2017	3	0.913	0.0189	A
					2018	3	0.907	0.0388	AB
					2019	3	0.680	0.0695	BC
					2020	6	0.605	0.00894	C
					2021	3	0.693	0.00289	ABC
Annual	log10	YES	0.014	ANOVA	2015	6	0.979	0.262	A
					2016	6	0.830	0.123	AB
					2017	6	0.774	0.164	AB
					2018	6	0.824	0.103	AB
					2019	6	0.680	0.142	B
					2020	12	0.693	0.104	B
					2021	6	0.851	0.178	AB

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

^a Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among seven years.

^b *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

^c Similar letter indicates no significant differences.

Table E.5: Phytoplankton Monitoring Data (i.e., chlorophyll-a and phaeophytin-a concentrations) Collected at Camp Lake (JLO), Mary River Project CREMP, 2021

Analyte		Chlorophyll-a (µg/L)							
Station		JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	15-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	-	-	-
	Summer	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	-	-	-
	Fall	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	-	-	-
Winter	Surface	0.35	0.31	0.45	0.30	0.37	0.36	0.06	0.03
	Bottom	0.23	1.26	0.10	<0.10	0.13	0.43	0.56	0.28
	Average	0.29	0.79	0.28	0.30	0.25	0.38	0.23	0.10
Summer	Surface	1.35	1.60	1.40	1.49	1.42	1.45	0.10	0.04
	Bottom	1.43	1.47	1.35	1.54	1.36	1.43	0.08	0.04
	Average	1.39	1.54	1.38	1.52	1.39	1.44	0.08	0.03
Fall	Surface	1.59	1.83	1.70	1.69	1.64	1.69	0.09	0.04
	Bottom	1.69	1.67	1.72	1.87	1.78	1.75	0.08	0.04
	Average	1.64	1.75	1.71	1.78	1.71	1.72	0.05	0.02

Analyte		Phaeophytin-a (µg/L)							
Station		JL0-02	JL0-10	JL0-01	JL0-07	JL0-09	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	15-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	17-Apr-21	-	-	-
	Summer	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	-	-	-
	Fall	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	26-Aug-21	-	-	-
Winter	Surface	0.22	0.24	0.36	0.29	0.29	0.30	0.05	0.02
	Bottom	0.20	0.98	0.18	0.20	0.21	0.35	0.35	0.16
	Average	0.20	0.61	0.27	0.25	0.25	0.32	0.17	0.07
Summer	Surface	1.26	1.12	1.32	1.22	1.09	1.20	0.10	0.04
	Bottom	1.34	1.23	1.22	1.05	1.15	1.20	0.11	0.05
	Average	1.30	1.18	1.27	1.14	1.12	1.20	0.08	0.04
Fall	Surface	1.10	1.18	1.32	1.26	1.34	1.24	0.10	0.04
	Bottom	1.25	1.36	1.26	1.25	1.28	1.28	0.05	0.02
	Average	1.18	1.27	1.29	1.26	1.31	1.26	0.05	0.02

Table E.6: Statistical Comparisons of Chlorophyll-a Concentrations Among Winter, Spring, Summer and/or Fall Sampling Events at Mine-Exposed and Reference Creek and Lake Study Areas, Mary River Project CREMP, 2021

Study Area	Overall 3-group Comparison			Pair-wise, <i>post hoc</i> comparisons ^a			
	Significant Difference Among Seasons?	P-value	Statistical Test ^b	(I) Season	(J) Season	Significant Difference Between 3 Seasons?	P-value
Reference Creek Stations	YES	0.044	ANOVA	Spring	Summer	NO	0.112
				Spring	Fall	YES	0.046
				Summer	Fall	NO	0.840
Mary River GO-09 Reference Stations	NO	0.268	ANOVA	Spring	Summer	NO	0.410
				Spring	Fall	NO	0.274
				Summer	Fall	NO	0.938
Reference Lake 3	YES	0.001	tequal	Summer	Fall	YES	0.001
Camp Lake	YES	0.002	K-W	Winter	Summer	YES	0.002
				Winter	Fall	YES	0.002
				Summer	Fall	NO	0.077
Sheardown Lake NW	YES	0.001	ANOVA	Winter	Summer	YES	<0.001
				Winter	Fall	YES	<0.001
				Summer	Fall	YES	0.002
Sheardown Lake SE	YES	0.002	K-W	Winter	Summer	NO	0.071
				Winter	Fall	YES	<0.001
				Summer	Fall	NO	0.089
Mary Lake North Basin	YES	0.001	ANOVA	Winter	Summer	YES	<0.001
				Winter	Fall	YES	<0.001
				Summer	Fall	YES	0.021
Mary Lake South Basin	YES	0.001	K-W	Winter	Summer	YES	0.002
				Winter	Fall	YES	0.001
				Summer	Fall	NO	0.897

 P-value < 0.05.

^a *Post hoc* analysis of 1-way ANOVA among all areas protected for multiple comparisons.

^b Statistical tests include Analysis of Variance (ANOVA) and Kruskal Wallis H-test (KW H-test), as well as T-test (tequal) for Reference Lake 3 when only two seasons were sampled.

Table E.7: Summary Data and Statistical Results for Chlorophyll-a Concentration (mg/L) Comparisons between Individual Mine-Exposed Lakes and Reference Lake 3 for Summer Sampling, Mary River Project CREMP, 2021

Study Lake	Two-Group Comparison to Reference				Number of Stations (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
	Significant Difference between Areas?	P-value	Statistical Test ^a	Magnitude of Difference ^b						
Reference Lake 03	-	-	-	-	3	1.01	0.0701	0.0404	0.930	1.06
Camp Lake	YES	0.001	tequal	43	5	1.44	0.0772	0.0345	1.38	1.53
Sheardown Lake NW	YES	0.022	M-W	57	7	1.48	0.249	0.0940	1.07	1.67
Sheardown Lake SE	YES	0.001	tequal	88	5	1.90	0.0835	0.0374	1.75	1.96
Mary Lake North	YES	0.003	tequal	-32	3	0.688	0.0535	0.0309	0.630	0.735
Mary Lake South	YES	0.032	tequal	-19	7	0.815	0.118	0.0446	0.675	0.995

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

Note: "-" indicates no data available.

^a Statistical Test was Mann-Whitney (M-W) U-test between individual mine-exposed lakes and Reference Lake 3.

^b Magnitude calculated by comparing the difference between the reference area and mine-exposed area means (or median for M-W) divided by the reference area means (or median for M-W)

Table E.8: Summary Data and Statistical Results for Chlorophyll-a Concentration (mg/L) Comparisons between Individual Mine-Exposed Lakes and Reference Lake 3 for Fall Sampling, Mary River Project CREMP, 2021

Study Lake	Two-Group Comparison to Reference				Number of Stations (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
	Significant Difference between Areas?	P-value	Statistical Test ^a	Magnitude of Difference ^b						
Reference Lake 3	-	-	-	-	3	0.693	0.00289	0.00167	0.690	0.695
Camp Lake	YES	0.001	tequal	148	5	1.72	0.0526	0.0235	1.64	1.78
Sheardown Lake NW	YES	0.001	tunequal	183	7	1.96	0.159	0.0602	1.78	2.23
Sheardown Lake SE	YES	0.001	tequal	197	5	2.06	0.0735	0.0329	1.96	2.13
Mary Lake North	YES	0.016	tequal	20	3	0.832	0.0597	0.0344	0.790	0.900
Mary Lake South	NO	0.120	tequal	21	7	0.841	0.142	0.0536	0.725	1.08

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

Note: "-" indicates no data available.

^a Statistical Test was Mann-Whitney (M-W) U-test between individual mine-exposed lakes and Reference Lake 3.

^b Magnitude calculated by comparing the difference between the reference area and mine-exposed area means (or median for M-W) divided by the reference area means (or median for M-W)

Table E.9: Statistical Comparison of Chlorophyll-a Concentrations at Camp Lake Among Years of Mine Operation (2014 to 2021)

Season	Data Transformation	Statistical Test ^a	Overall 8-Year Comparison		Pair-wise, post-hoc comparisons ^b				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison ^c
Winter	log10	ANOVA	YES	0.001	2014	4	0.275	0.150	C
					2015	5	0.742	0.152	A
					2016	5	0.645	0.120	AB
					2017	5	0.316	0.108	BC
					2018	5	0.384	0.0414	ABC
					2019	5	0.474	0.123	ABC
					2020	10	0.468	0.225	ABC
					2021	5	0.360	0.240	BC
Summer	rank	K-W	YES	0.004	2014	2	1.05	1.20	BC
					2015	5	1.26	0.163	BC
					2016	5	1.50	0.319	AB
					2017	5	1.24	0.154	BC
					2018	5	2.00	0.0351	A
					2019	5	0.875	0.288	C
					2020	10	1.19	0.360	BC
					2021	5	1.44	0.0772	AB
Fall	rank	K-W	YES	0.001	2014	5	1.59	0.726	ABC
					2015	5	0.650	0.0696	D
					2016	5	1.06	0.214	CD
					2017	5	1.19	0.149	BC
					2018	5	2.15	0.0354	A
					2019	5	1.28	0.252	BC
					2020	10	1.06	0.191	CD
					2021	5	1.72	0.0526	AB
Annual	none	ANOVA	YES	0.020	2014	11	1.01	0.864	AB
					2015	15	0.884	0.305	B
					2016	15	1.07	0.421	AB
					2017	15	0.915	0.458	AB
					2018	15	1.51	0.828	A
					2019	15	0.875	0.402	B
					2020	30	0.905	0.411	B
					2021	15	1.17	0.622	AB

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

^a Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among eight years.

^b *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

^c Similar letter indicates no significant differences.

Table E.10: Phytoplankton Monitoring Data (i.e., chlorophyll-a and phaeophytin-a concentrations) Collected at Sheardown Lake Northwest (DLO-01), Mary River Project CREMP, 2021

Analyte		Chlorophyll-a (µg/L)								
Station		DD-HAB 9-STN1	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21	-	-	-
	Summer	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	23-Jul-21	-	-	-
	Fall	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	-	-	-
Winter	Surface	0.21	0.20	0.27	1.06	0.26	0.35	0.39	0.33	0.14
	Bottom	0.15	0.10	0.25	0.54	0.12	0.21	0.23	0.16	0.07
	Average	0.18	0.15	0.26	0.80	0.19	0.28	0.31	0.25	0.10
Summer	Surface	1.70	1.30	1.63	1.49	1.64	1.48	1.54	0.15	0.06
	Bottom	1.48	1.04	1.07	1.74	1.59	1.86	1.46	0.34	0.14
	Average	1.59	1.17	1.35	1.62	1.62	1.67	1.50	0.20	0.08
Fall	Surface	1.78	1.92	1.95	1.79	1.93	1.79	1.86	0.08	0.03
	Bottom	1.97	2.15	2.13	1.91	2.53	1.83	2.09	0.25	0.10
	Average	1.88	2.04	2.04	1.85	2.23	1.81	1.97	0.16	0.06

Analyte		Phaeophytin-a (µg/L)								
Station		DD-HAB 9-STN1	DL0-01-5	DL0-01-1	DL0-01-4	DL0-01-2	DL0-01-7	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	23-Apr-21	21-Apr-21	-	-	-
	Summer	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21	23-Jul-21	-	-	-
	Fall	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	-	-	-
Winter	Surface	0.44	0.35	0.41	0.84	0.42	0.45	0.49	0.18	0.07
	Bottom	0.32	0.30	0.40	0.46	0.36	0.42	0.38	0.06	0.02
	Average	0.38	0.33	0.41	0.65	0.39	0.44	0.43	0.11	0.05
Summer	Surface	1.32	1.22	1.32	1.28	1.28	1.27	1.28	0.04	0.02
	Bottom	1.28	1.14	1.09	1.18	1.07	1.16	1.15	0.07	0.03
	Average	1.30	1.18	1.21	1.23	1.18	1.22	1.22	0.05	0.02
Fall	Surface	1.40	1.45	1.49	1.39	1.47	1.48	1.45	0.04	0.02
	Bottom	1.45	1.48	1.47	1.42	1.89	1.41	1.52	0.18	0.07
	Average	1.43	1.47	1.48	1.41	1.68	1.45	1.48	0.10	0.04

Note: "-" date not applicable

Table E.11: Statistical Comparison of Chlorophyll-a Concentrations at Sheardown Lake NW Among Years of Mine Operation (2014 to 2021)

Season	Data Transformation	Statistical Test ^a	Overall 8-Year Comparison		Pair-wise, post-hoc comparisons ^b				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison ^c
Winter	rank	K-W	YES	0.001	2014	6	2.55	1.34	A
					2015	6	1.10	0.0469	A
					2016	6	0.874	0.316	AB
					2017	6	0.790	0.268	AB
					2018	6	1.03	0.495	A
					2019	6	0.463	0.235	BC
					2020	12	0.495	0.256	BC
					2021	6	0.310	0.245	C
Summer	rank	K-W	YES	0.001	2014	6	2.42	0.821	A
					2015	6	1.51	0.244	BCD
					2016	6	2.13	0.387	A
					2017	6	1.22	0.126	D
					2018	6	2.01	0.183	AB
					2019	6	1.81	0.246	ABC
					2020	12	2.45	2.78	CD
					2021	7	1.48	0.249	CD
Fall	rank	K-W	YES	0.001	2014	6	0.800	0.379	D
					2015	6	1.61	0.440	BC
					2016	6	1.53	0.183	BCD
					2017	6	1.56	0.222	BC
					2018	6	1.75	0.136	AB
					2019	6	1.19	0.309	CD
					2020	12	1.79	0.123	AB
					2021	7	1.96	0.159	A
Annual	rank	K-W	NO	0.110	2014	18	1.93	1.20	A
					2015	18	1.41	0.355	A
					2016	18	1.51	0.602	A
					2017	18	1.19	0.381	A
					2018	18	1.60	0.519	A
					2019	18	1.15	0.618	A
					2020	36	1.58	1.77	A
					2021	20	1.30	0.725	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

^a Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among eight years.

^b *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

^c Similar letter indicates no significant differences.

Table E.12: Phytoplankton Monitoring Data (i.e., chlorophyll-a and phaeophytin-a concentrations) Collected at Sheardown Lake SE (DLO-02), Mary River Project CREMP, 2021

Analyte		Chlorophyll-a (µg/L)							
Station		DL0-02-06	DL0-02-07	DL0-02-4	DL0-02-8	DL0-02-03	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	-	-	-
	Summer	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21	-	-	-
	Fall	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	-	-	-
Winter	Surface	0.33	0.97	2.03	1.62	1.17	1.22	0.65	0.29
	Bottom	0.12	1.09	1.45	0.44	0.33	0.69	0.56	0.25
	Average	0.23	1.03	1.74	1.03	0.75	0.96	0.55	0.25
Summer	Surface	1.88	1.92	1.84	1.93	1.81	1.88	0.05	0.02
	Bottom	1.99	1.99	2.03	1.97	1.70	1.94	0.13	0.06
	Average	1.94	1.96	1.94	1.95	1.76	1.91	0.08	0.04
Fall	Surface	2.03	1.98	2.06	2.02	2.12	2.04	0.05	0.02
	Bottom	2.00	1.93	2.12	2.19	2.15	2.08	0.11	0.05
	Average	2.02	1.96	2.09	2.11	2.14	2.06	0.07	0.03

Analyte		Phaeophytin-a (µg/L)							
Station		DL0-02-06	DL0-02-07	DL0-02-4	DL0-02-8	DL0-02-03	Average	Standard Deviation	Standard Error
Sample Collection Date	Winter	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	21-Apr-21	-	-	-
	Summer	23-Jul-21	23-Jul-21	24-Jul-21	24-Jul-21	23-Jul-21	-	-	-
	Fall	28-Aug-21	28-Aug-21	27-Aug-21	27-Aug-21	27-Aug-21	-	-	-
Winter	Surface	0.56	0.84	1.43	1.03	0.61	0.89	0.35	0.16
	Bottom	0.38	3.85	0.96	0.88	0.50	1.31	1.44	0.64
	Average	0.47	2.35	1.20	0.96	0.56	1.10	0.75	0.34
Summer	Surface	1.56	1.46	1.43	1.60	1.31	1.47	0.11	0.05
	Bottom	1.57	1.57	1.51	1.54	1.59	1.56	0.03	0.01
	Average	1.57	1.52	1.47	1.57	1.45	1.51	0.05	0.02
Fall	Surface	1.48	1.34	1.35	1.47	1.35	1.40	0.07	0.03
	Bottom	1.63	1.55	1.41	1.46	1.40	1.49	0.10	0.04
	Average	1.56	1.45	1.38	1.47	1.38	1.44	0.07	0.03

Note: "-" indicates date not applicable.

Table E.13: Statistical Comparison of Chlorophyll-a Concentrations at Sheardown Lake SE Among Years of Mine Operation (2014 to 2021)

Season	Data Transformation	Statistical Test ^a	Overall 8-Year Comparison		Pair-wise, post-hoc comparisons ^b				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison ^c
Winter	rank	K-W	YES	0.001	2014	5	2.67	1.01	A
					2015	5	1.58	0.525	ABC
					2016	5	1.90	0.648	AB
					2017	5	1.36	0.412	BCD
					2018	5	2.23	0.851	AB
					2019	5	1.88	0.386	AB
					2020	10	0.859	0.153	D
					2021	5	0.955	0.548	CD
Summer	rank	K-W	YES	0.001	2014	5	0.203	0.00437	D
					2015	5	0.913	0.0705	D
					2016	5	1.51	0.208	BCD
					2017	5	1.37	0.156	CD
					2018	5	2.12	0.0728	A
					2019	5	2.16	0.242	A
					2020	10	1.92	0.289	AB
					2021	5	1.90	0.0835	ABC
Fall	rank	K-W	YES	0.001	2014	5	1.54	1.63	CD
					2015	5	0.992	0.103	D
					2016	5	2.87	0.737	A
					2017	5	1.50	0.0757	BCD
					2018	5	2.03	0.115	ABC
					2019	5	2.00	0.446	ABC
					2020	10	1.35	0.0723	D
					2021	5	2.06	0.0735	AB
Annual	rank	K-W	YES	0.001	2014	15	1.47	1.46	CD
					2015	15	1.16	0.420	D
					2016	15	2.09	0.798	AB
					2017	15	1.41	0.248	CD
					2018	15	2.13	0.468	A
					2019	15	2.01	0.362	AB
					2020	30	1.38	0.478	CD
					2021	15	1.64	0.586	BC

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

^a Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among eight years.

^b *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

^c Similar letter indicates no significant differences.

Table E.14: Phytoplankton Monitoring Data (i.e., chlorophyll-a and phaeophytin-a concentrations) Collected at the Mary River, Mary River Project CREMP, 2021

Station		Upstream Reference			Upstream Mine-Exposed							Downstream Mine-Exposed		
		G0-09-A	G0-09	G0-09-B	G0-03	G0-01	F0-01	E0-10	E0-03	E0-21	E0-20	C0-10	C0-05	C0-01
Sample Collection Date	Spring	2-Jul-21	2-Jul-21	2-Jul-21	2-Jul-21	2-Jul-21	2-Jul-21	2-Jul-21	1-Jul-21	1-Jul-21	1-Jul-21	1-Jul-21	1-Jul-21	1-Jul-21
	Summer	1-Aug-21	1-Aug-21	1-Aug-21	1-Aug-21	1-Aug-21	1-Aug-21	27-Jul-21	27-Jul-21	27-Jul-21	27-Jul-21	26-Jul-21	26-Jul-21	26-Jul-21
	Fall	5-Sep-21	5-Sep-21	5-Sep-21	5-Sep-21	5-Sep-21	5-Sep-21	5-Sep-21	4-Sep-21	4-Sep-21	3-Sep-21	3-Sep-21	3-Sep-21	3-Sep-21
Chlorophyll-a (µg/L)	Spring	0.36	0.31	0.22	0.27	0.24	0.21	0.27	0.34	0.31	0.38	0.27	0.56	0.54
	Summer	0.35	0.36	0.34	0.44	0.38	1.06	0.53	0.58	0.52	0.73	0.34	0.48	0.96
	Fall	0.40	0.32	0.37	0.39	0.68	0.83	1.33	0.32	0.37	0.47	0.45	0.63	0.39
	Average	0.37	0.33	0.31	0.37	0.43	0.70	0.71	0.41	0.40	0.53	0.35	0.56	0.63
	Standard Deviation	0.03	0.03	0.08	0.09	0.22	0.44	0.55	0.14	0.11	0.18	0.09	0.08	0.30
	Standard Error	0.02	0.02	0.05	0.05	0.130	0.25	0.32	0.08	0.06	0.10	0.05	0.04	0.17
Phaeophytin-a (µg/L)	Spring	0.82	0.70	0.58	0.66	0.69	0.63	0.70	0.77	0.68	0.72	0.63	0.80	0.73
	Summer	0.79	0.78	0.82	0.83	0.71	1.04	0.82	0.83	0.83	0.88	0.67	0.75	1.00
	Fall	0.75	0.67	0.68	0.76	0.83	0.81	0.92	0.67	0.67	0.72	0.69	0.76	0.73
	Average	0.79	0.72	0.69	0.75	0.74	0.83	0.81	0.76	0.73	0.77	0.66	0.77	0.82
	Standard Deviation	0.04	0.06	0.12	0.09	0.08	0.21	0.11	0.08	0.09	0.09	0.03	0.03	0.16
	Standard Error	0.02	0.03	0.07	0.05	0.04	0.12	0.06	0.047	0.05	0.05	0.02	0.02	0.09

Table E.15: Phytoplankton Monitoring Data (i.e., chlorophyll-a and phaeophytin-a concentrations) Collected at Mary Lake (north and south basins; BLO), Mary River Project CREMP, 2021

Analyte		Chlorophyll-a (µg/L)												
Station		Mary Lake North			Mary Lake South							Average	Standard Deviation	Standard Error
		BL0-01A	BL0-01	BL0-01B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06			
Sample Collection Date	Winter	19-Apr-21	19-Apr-21	19-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21	-	-	-
	Summer	28-Jul-21	28-Jul-21	28-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	-	-	-
	Fall	29-Aug-21	29-Aug-21	29-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	-	-	-
Winter	Surface	0.12	0.12	0.11	0.31	0.33	0.66	0.26	0.25	0.28	0.55	0.30	0.18	0.06
	Bottom	<0.10	0.11	<0.10	<0.10	<0.10	0.20	0.12	<0.10	<0.10	0.13	0.12	0.03	0.01
	Average	0.11	0.12	0.11	0.21	0.22	0.43	0.19	0.18	0.19	0.34	0.21	0.10	0.03
Summer	Surface	0.63	0.73	0.74	0.68	0.55	0.51	0.84	0.72	0.58	0.80	0.68	0.11	0.03
	Bottom	0.63	0.74	0.66	0.82	0.80	0.94	1.06	0.93	0.99	1.19	0.88	0.18	0.06
	Average	0.63	0.74	0.70	0.75	0.68	0.73	0.95	0.83	0.79	1.00	0.78	0.12	0.04
Fall	Surface	0.82	0.98	0.71	0.60	0.73	0.79	0.72	1.09	0.68	1.12	0.82	0.18	0.06
	Bottom	0.76	0.82	0.90	0.85	0.77	0.70	0.99	0.89	0.80	1.04	0.85	0.11	0.03
	Average	0.79	0.90	0.81	0.73	0.75	0.75	0.86	0.99	0.74	1.08	0.84	0.12	0.04

Analyte		Phaeophytin-a (µg/L)												
Station		Mary Lake North			Mary Lake South							Average	Standard Deviation	Standard Error
		BL0-01-A	BL0-01	BL0-01-B	BL0-05-A	BL0-05	BL0-05-B	BL0-03	BL0-04	BL0-09	BL0-06			
Sample Collection Date	Winter	19-Apr-21	19-Apr-21	19-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	20-Apr-21	19-Apr-21	19-Apr-21	-	-	-
	Summer	28-Jul-21	28-Jul-21	28-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	30-Jul-21	-	-	-
	Fall	29-Aug-21	29-Aug-21	29-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	30-Aug-21	-	-	-
Winter	Surface	0.24	0.22	0.19	0.47	0.47	0.63	0.43	0.41	0.35	0.50	0.39	0.14	0.04
	Bottom	0.20	0.22	0.22	0.29	0.31	0.44	0.36	0.36	0.17	0.27	0.28	0.09	0.03
	Average	0.22	0.22	0.21	0.38	0.39	0.54	0.40	0.39	0.26	0.39	0.34	0.11	0.03
Summer	Surface	0.96	0.92	0.97	1.04	0.91	0.88	1.19	1.04	0.92	1.14	1.00	0.10	0.03
	Bottom	0.83	0.96	0.92	1.08	1.09	1.13	1.34	1.15	1.15	1.26	1.09	0.15	0.05
	Average	0.90	0.94	0.95	1.06	1.00	1.01	1.27	1.10	1.04	1.20	1.04	0.12	0.04
Fall	Surface	0.92	0.88	1.05	1.45	1.67	1.71	1.75	1.68	1.70	1.95	1.48	0.38	0.12
	Bottom	0.95	1.02	0.97	1.67	1.64	1.70	1.86	1.79	1.66	1.91	1.52	0.38	0.12
	Average	0.94	0.95	1.01	1.56	1.66	1.71	1.81	1.74	1.68	1.93	1.50	0.38	0.12

Note: "-" indicates date not applicable.

Table E.16: Statistical Comparison of Chlorophyll-a Concentrations at the Mary Lake North Basin Among Years of Mine Operation (2014 to 2021)

Season	Data Transformation	Statistical Test ^a	Overall 8-Year Comparison		Pair-wise, post-hoc comparisons ^b				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison ^c
Winter	rank	K-W	YES	0.047	2014	3	0.585	0.663	A
					2015	3	0.652	0.684	A
					2016	2	0.182	0.0247	AB
					2017	3	0.178	0.0553	AB
					2018	3	0.197	0.0425	AB
					2019	3	0.498	0.422	A
					2020	6	0.235	0.0602	A
					2021	3	0.110	0.00500	B
Summer	none	ANOVA	YES	0.001	2014	3	0.917	0.725	AB
					2015	3	0.827	0.246	B
					2016	3	1.16	0.0961	AB
					2017	3	0.266	0.0166	B
					2018	3	0.504	0.187	B
					2019	3	0.737	0.118	B
					2020	6	1.67	0.425	A
					2021	3	0.688	0.0535	B
Fall	none	ANOVA	YES	0.001	2014	3	0.517	0.252	C
					2015	3	0.623	0.0718	BC
					2016	3	0.997	0.0909	A
					2017	3	0.905	0.136	AB
					2018	3	0.860	0.0661	AB
					2019	3	0.850	0.0757	AB
					2020	6	1.01	0.0246	A
					2021	3	0.832	0.0597	AB
Annual	none	ANOVA	NO	0.109	2014	9	0.673	0.540	A
					2015	9	0.701	0.378	A
					2016	8	0.854	0.427	A
					2017	9	0.450	0.351	A
					2018	9	0.520	0.305	A
					2019	9	0.695	0.271	A
					2020	18	0.969	0.645	A
					2021	9	0.543	0.333	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

^a Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among eight years.

^b *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

^c Similar letter indicates no significant differences.

Table E.17: Statistical Comparison of Chlorophyll-a Concentrations at the Mary Lake South Basin Among Years of Mine Operation (2014 to 2021)

Season	Data Transformation	Statistical Test ^a	Overall 8-Year Comparison		Pair-wise, post-hoc comparisons ^b				
			Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Pairwise Comparison ^c
Winter	rank	K-W	YES	0.008	2014	7	0.879	1.46	ACD
					2015	7	0.646	0.340	AB
					2016	7	0.306	0.197	CD
					2017	7	0.351	0.209	ACD
					2018	7	0.532	0.337	ABC
					2019	7	0.482	0.168	ABC
					2020	14	0.592	0.232	B
					2021	7	0.249	0.0971	D
Summer	rank	K-W	YES	0.001	2014	7	0.864	0.594	AB
					2015	7	0.789	0.116	BC
					2016	7	1.08	0.172	A
					2017	7	0.802	0.0827	BC
					2018	7	0.848	0.218	AB
					2019	7	0.521	0.0254	C
					2020	14	1.01	0.129	A
					2021	7	0.815	0.118	B
Fall	rank	K-W	YES	0.001	2014	7	0.750	0.294	AB
					2015	7	0.895	0.120	AB
					2016	7	0.752	0.231	AC
					2017	7	0.750	0.0773	AC
					2018	7	0.904	0.0252	AB
					2019	7	0.934	0.0415	B
					2020	14	0.651	0.0663	C
					2021	7	0.841	0.142	AB
Annual	rank	K-W	NO	0.510	2014	21	0.831	0.878	A
					2015	21	0.777	0.232	A
					2016	21	0.711	0.376	A
					2017	21	0.634	0.244	A
					2018	21	0.762	0.277	A
					2019	21	0.645	0.230	A
					2020	42	0.750	0.241	A
					2021	21	0.635	0.302	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.05).

^a Statistical tests include Analysis of Variance (ANOVA) or Kruskal Wallis H-test (KW) for differences among eight years.

^b *Post hoc* analysis of 1-way ANOVA or Kruskal Wallis H-test (KW) among all years protected for multiple comparisons.

^c Similar letter indicates no significant differences.

APPENDIX F

**BENTHIC INVERTEBRATE COMMUNITY
DATA**

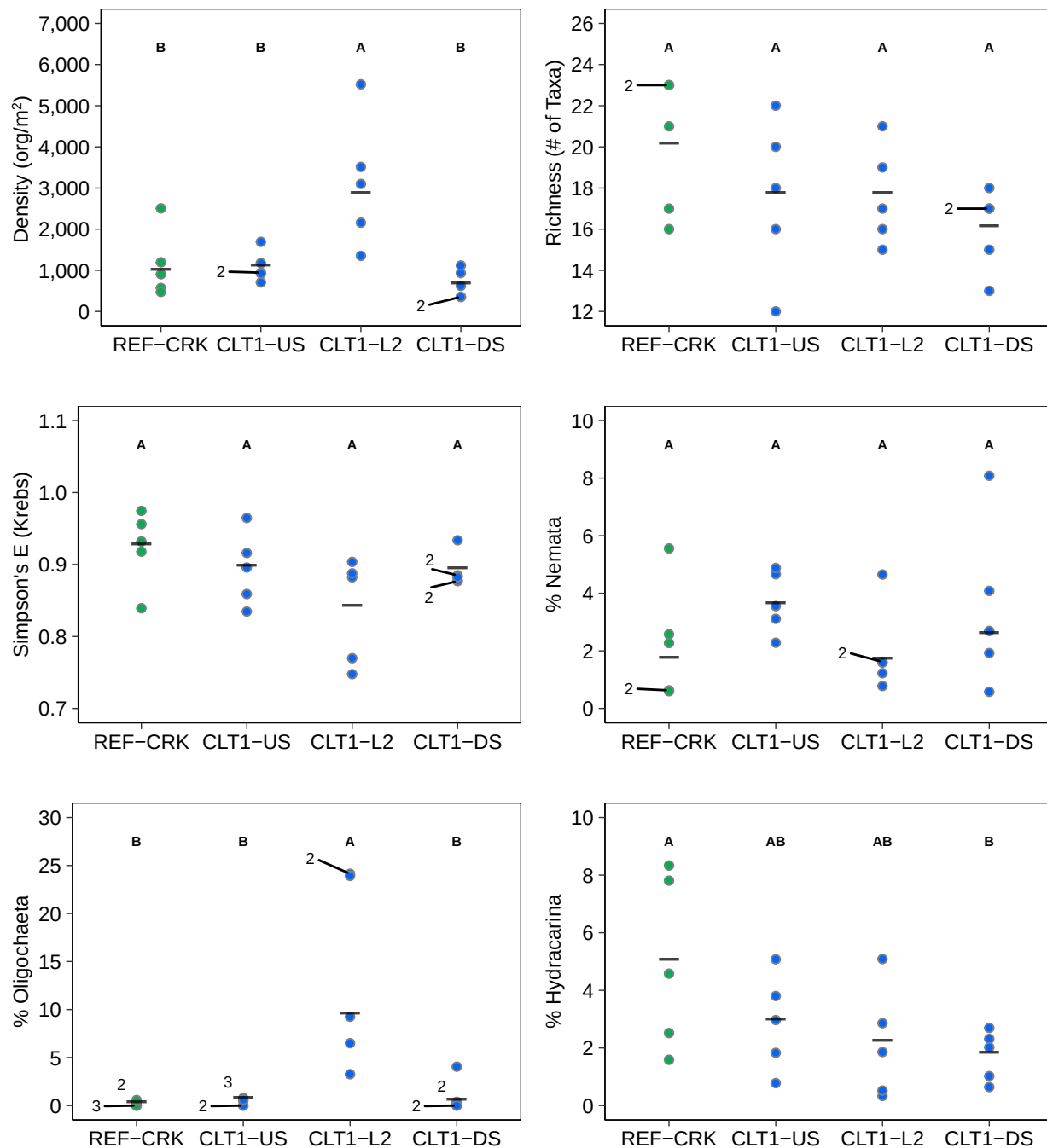


Figure F.1: Benthic Invertebrate Community Endpoint Comparisons for Camp Lake Tributary 1 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Notes: Green represents reference areas and blue represent mine-exposed areas. Areas that share a letter are not significant (P-value=0.1). Horizontal bars indicate measures of central tendency. Numbers indicate the number of overlapping points.

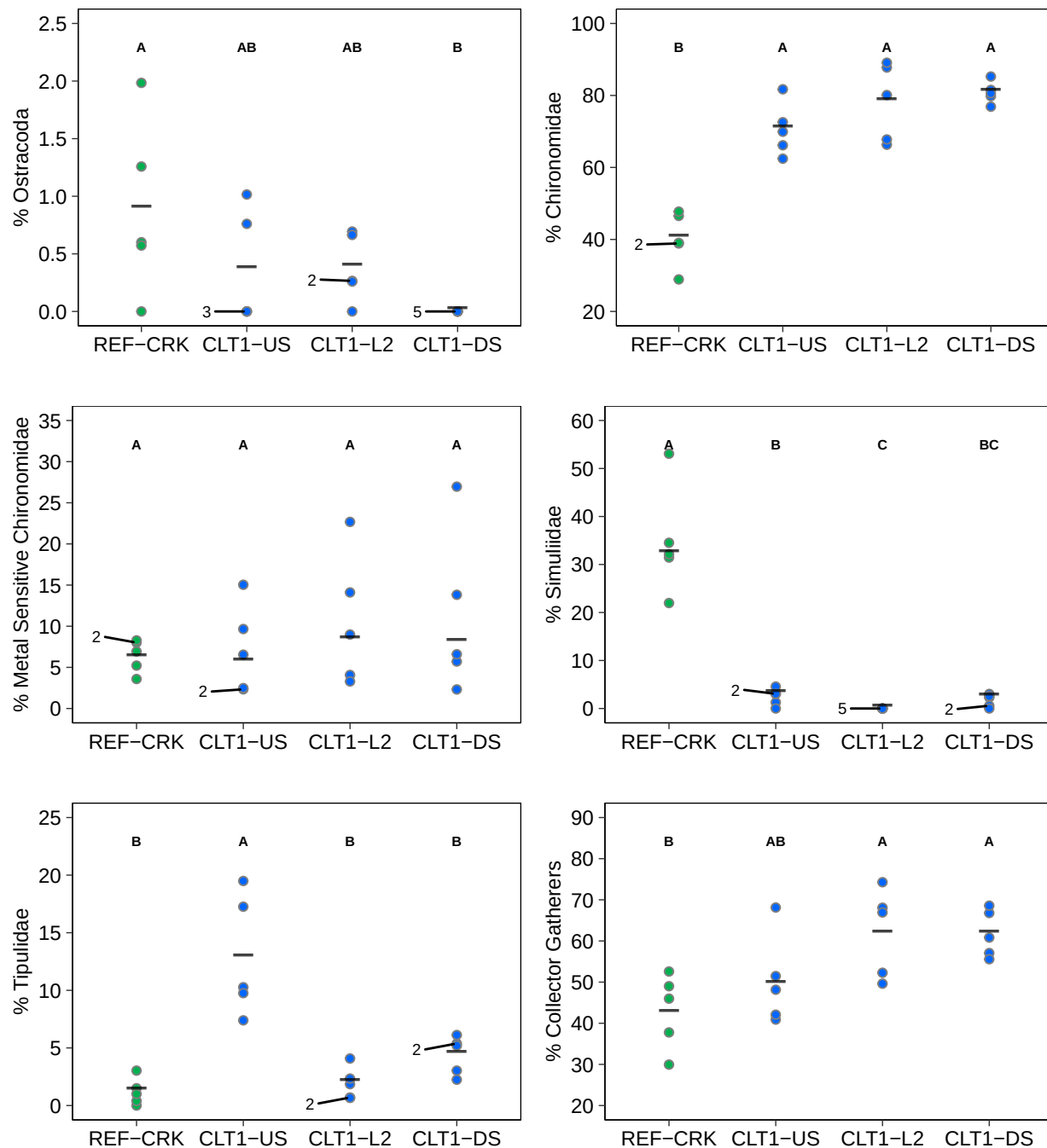


Figure F.1: Benthic Invertebrate Community Endpoint Comparisons for Camp Lake Tributary 1 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Notes: Green represents reference areas and blue represent mine-exposed areas. Areas that share a letter are not significant (P -value=0.1). Horizontal bars indicate measures of central tendency. Numbers indicate the number of overlapping points.

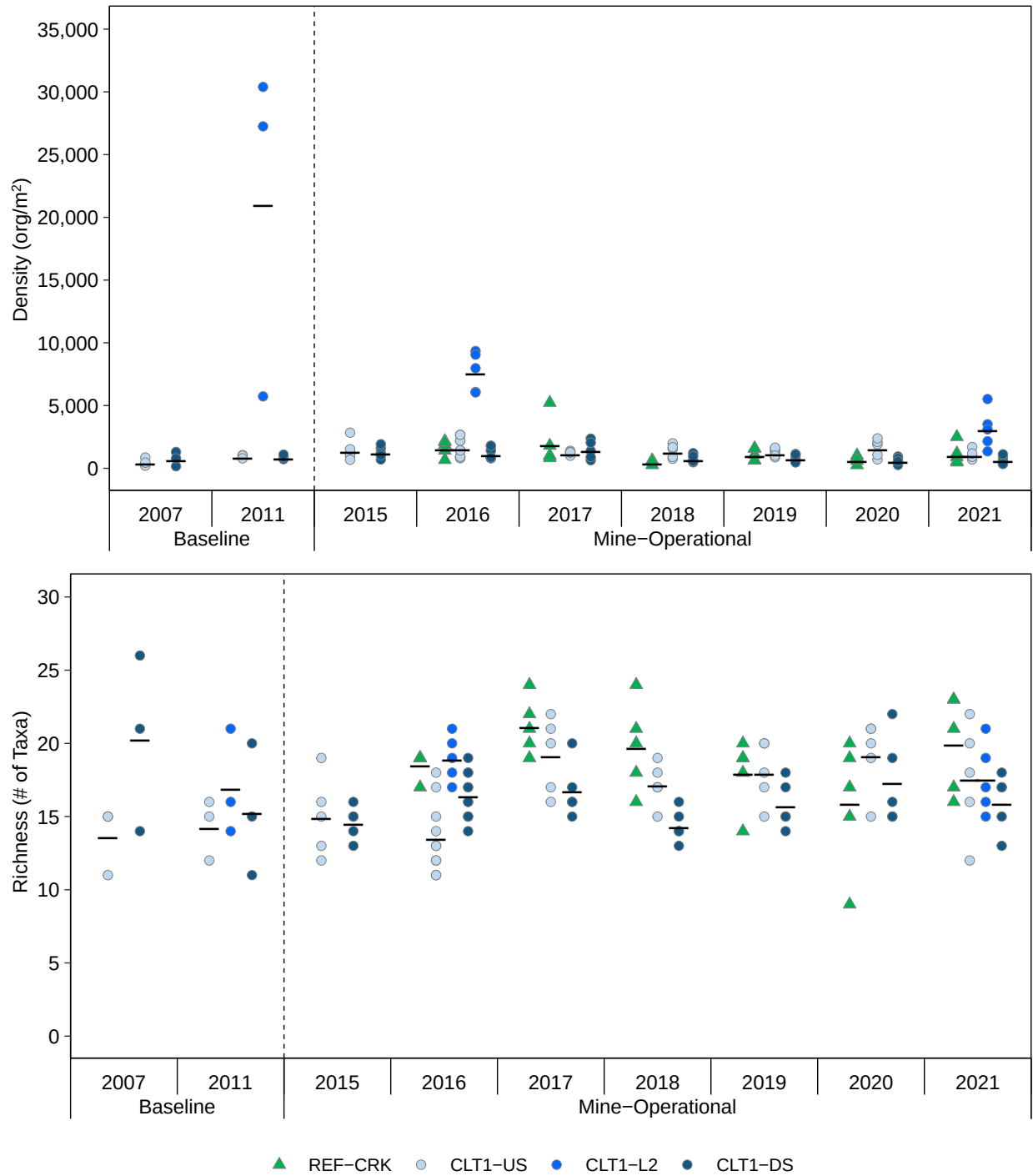


Figure F.2: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 1 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

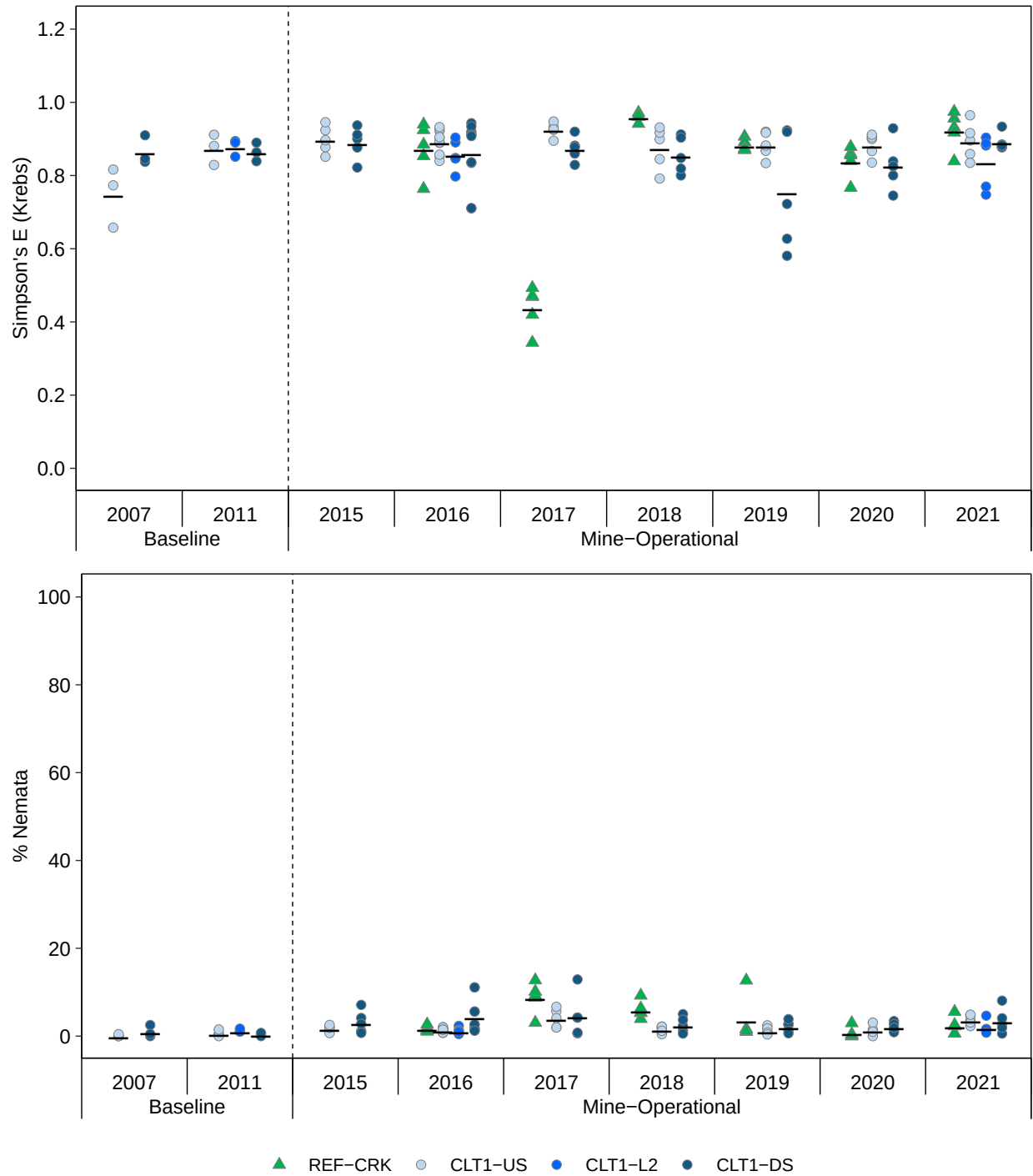


Figure F.2: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 1 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

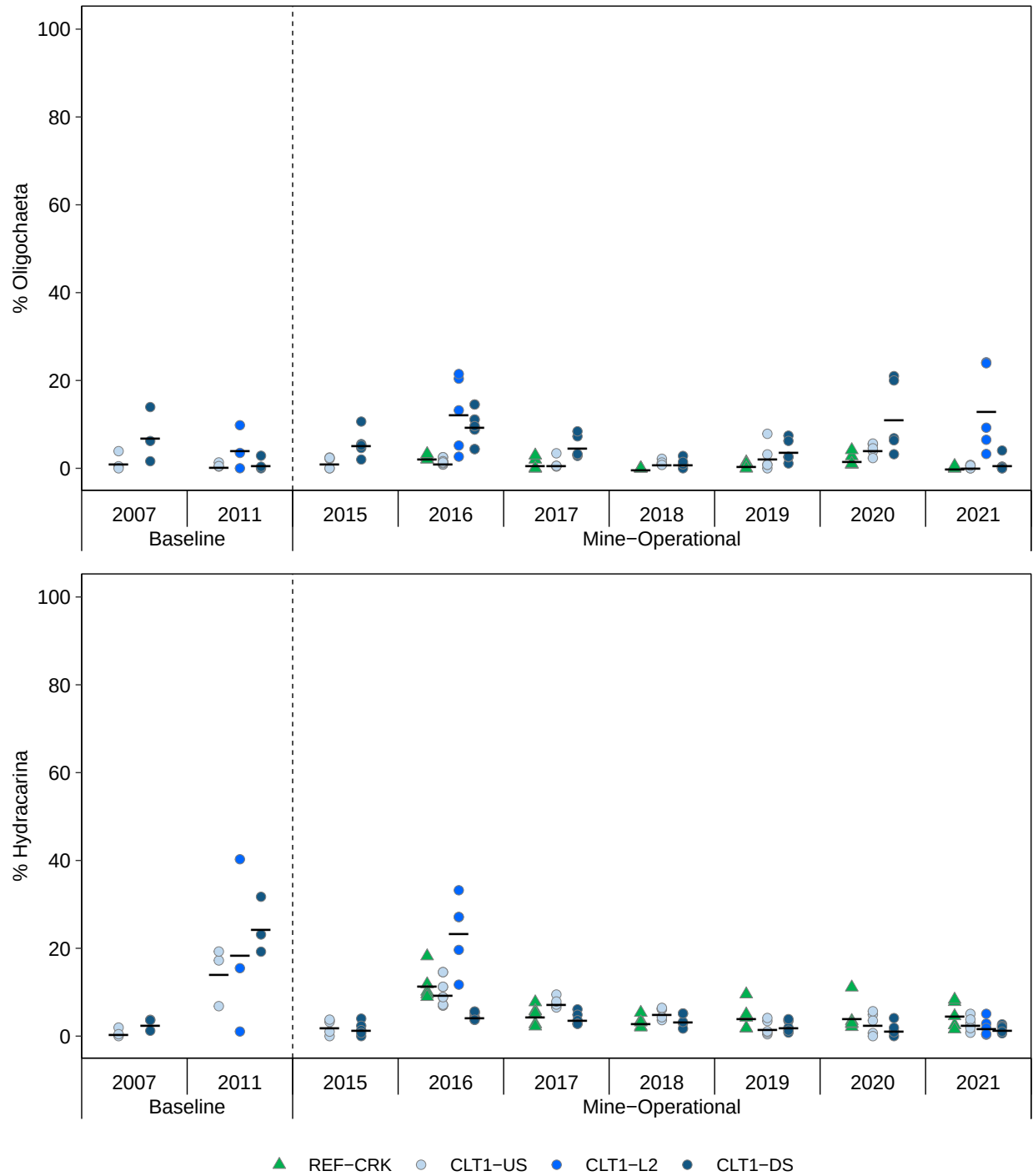


Figure F.2: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 1 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

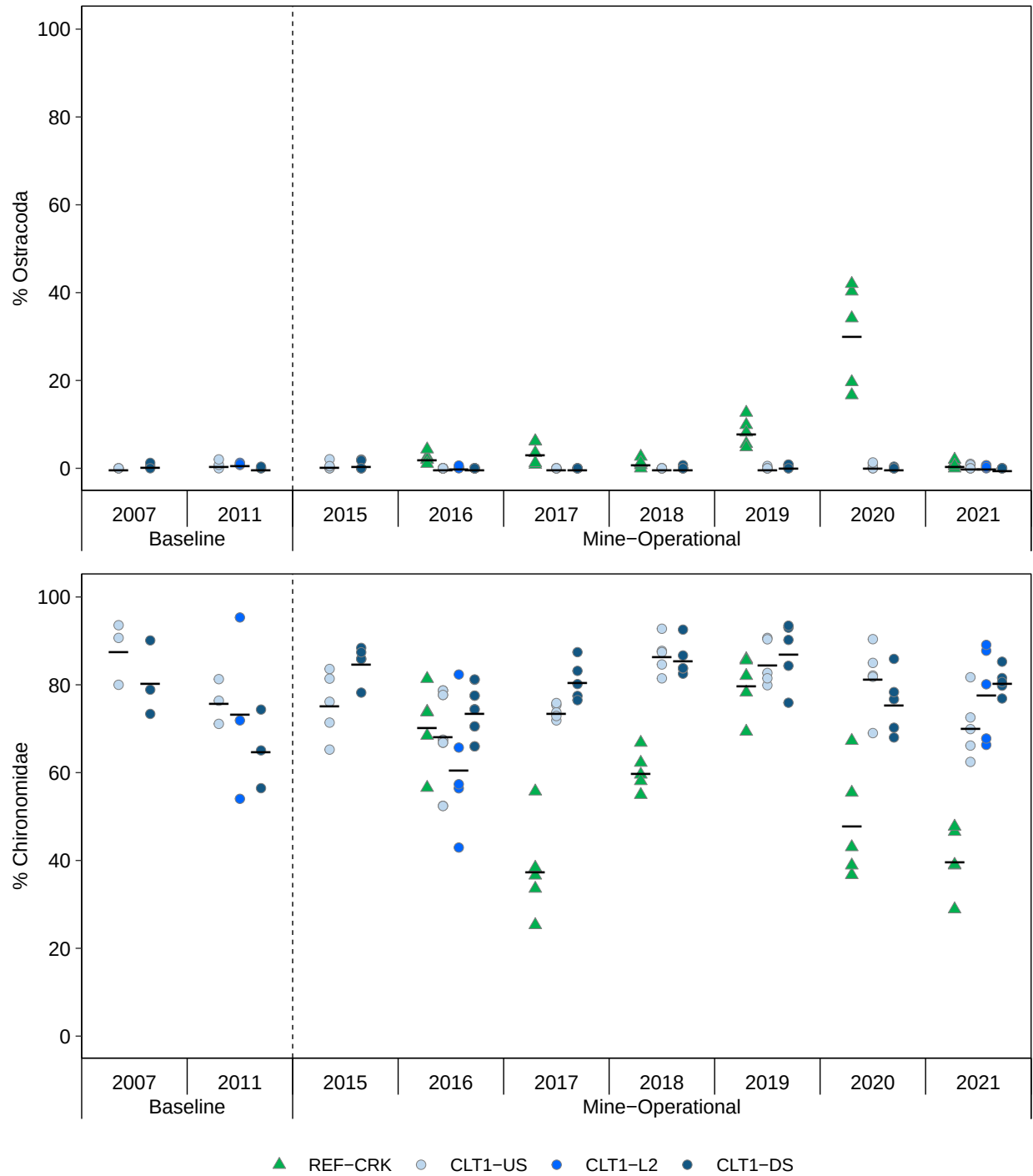


Figure F.2: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 1 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

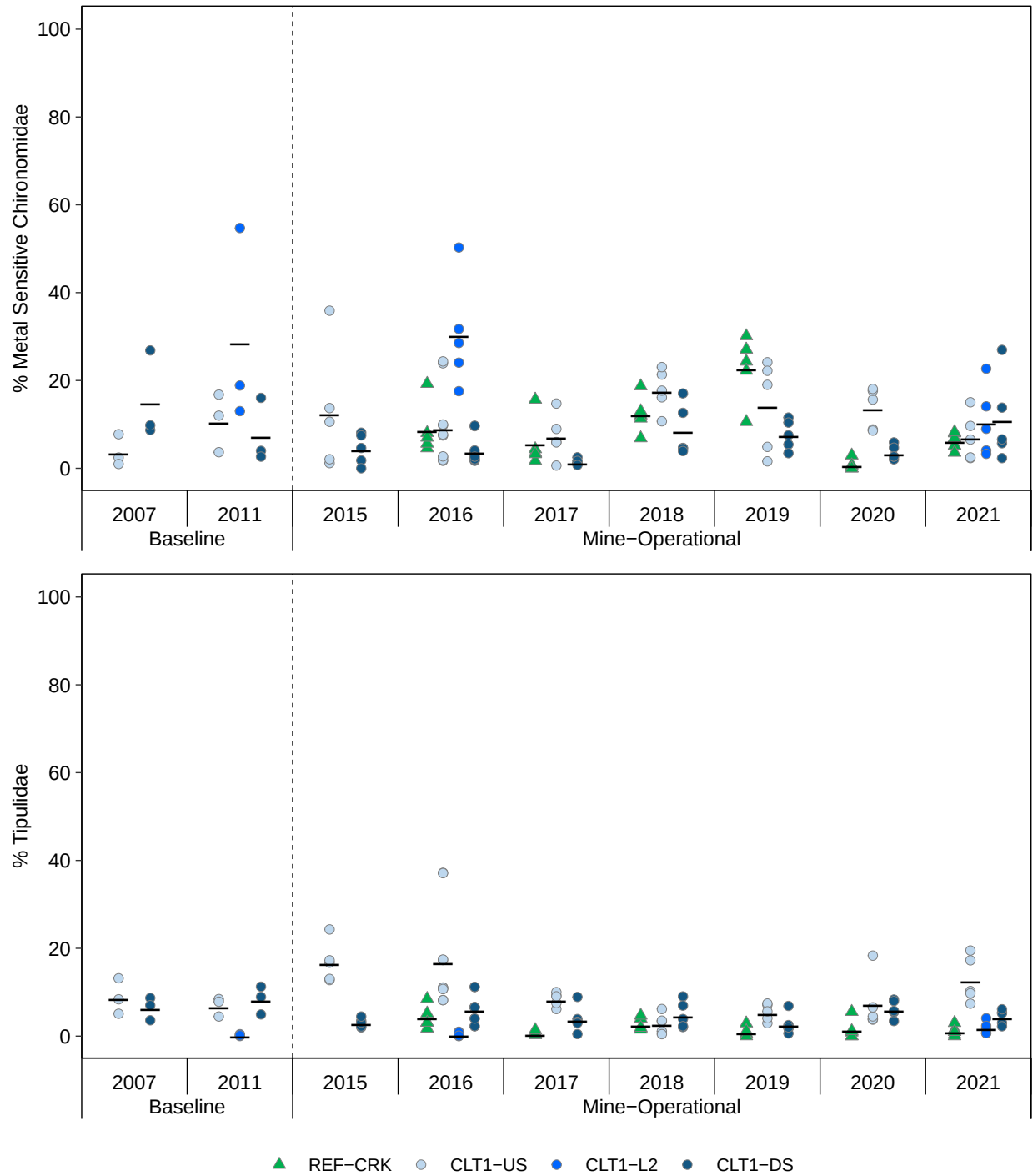


Figure F.2: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 1 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

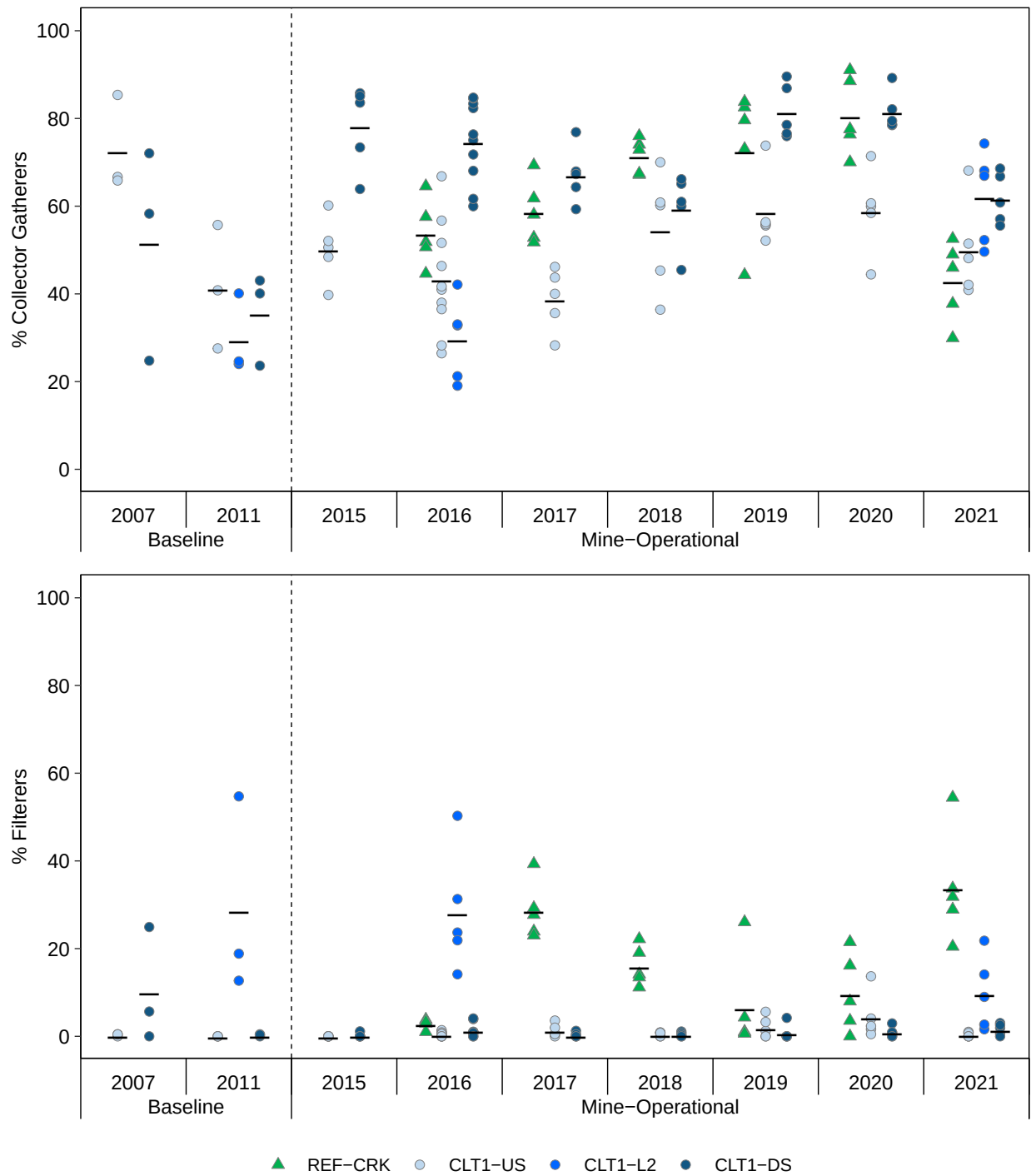


Figure F.2: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 1 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

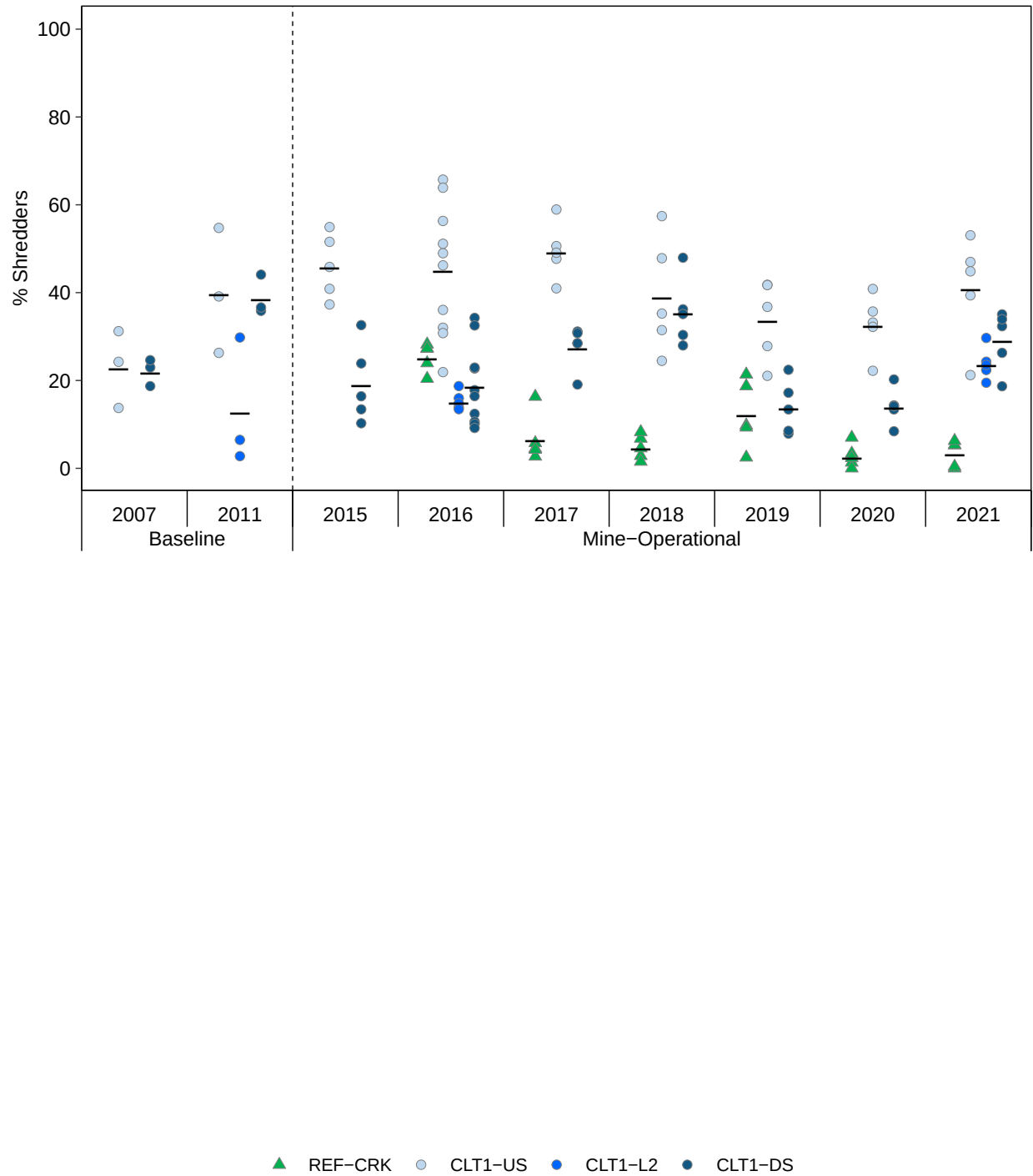


Figure F.2: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 1 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

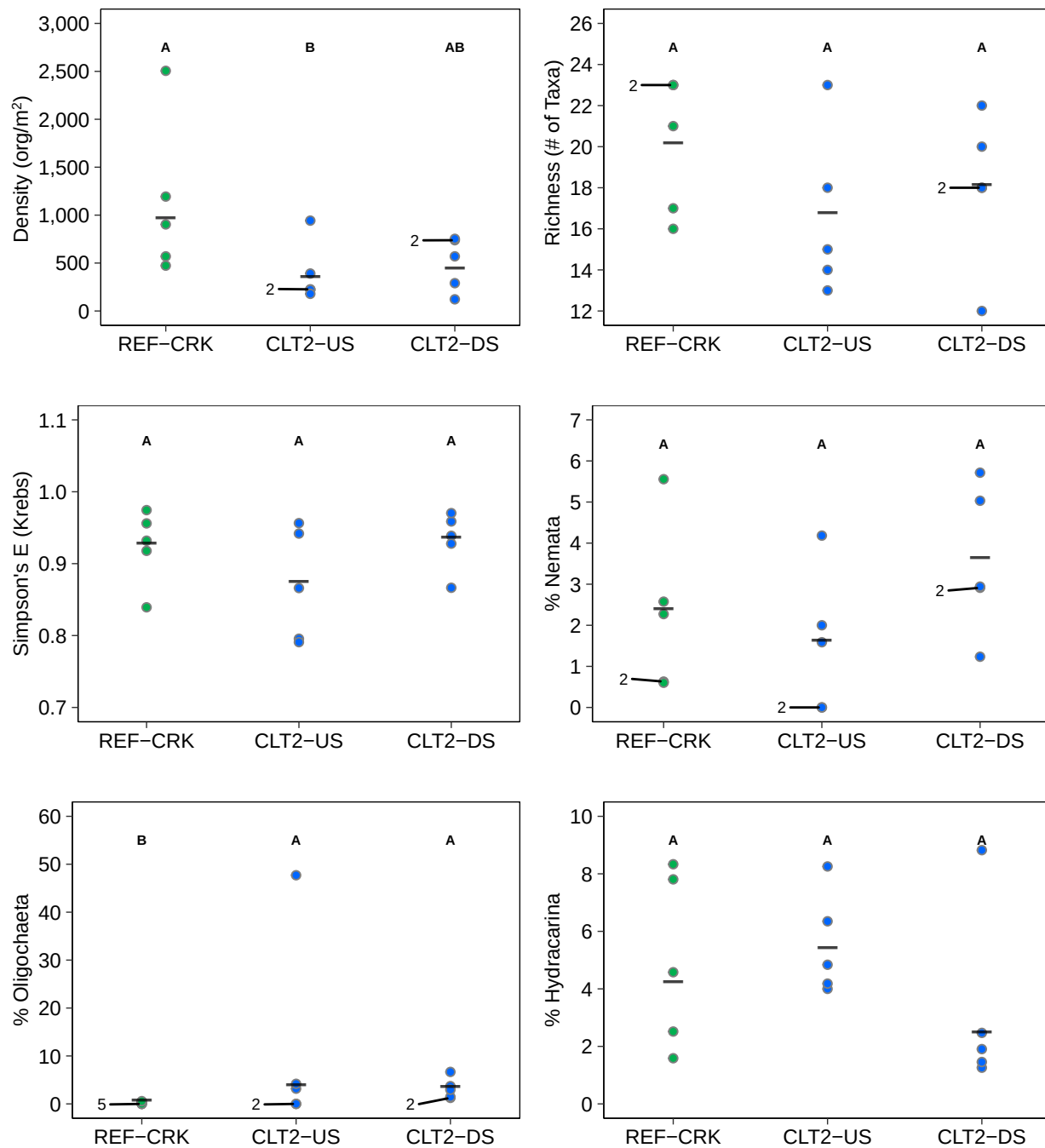


Figure F.3: Benthic Invertebrate Community Endpoint Comparisons for Camp Lake Tributary 2 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Notes: Green represents reference areas and blue represent mine-exposed areas. Areas that share a letter are not significant (P -value=0.1). Horizontal bars indicate measures of central tendency. Numbers indicate the number of overlapping points.

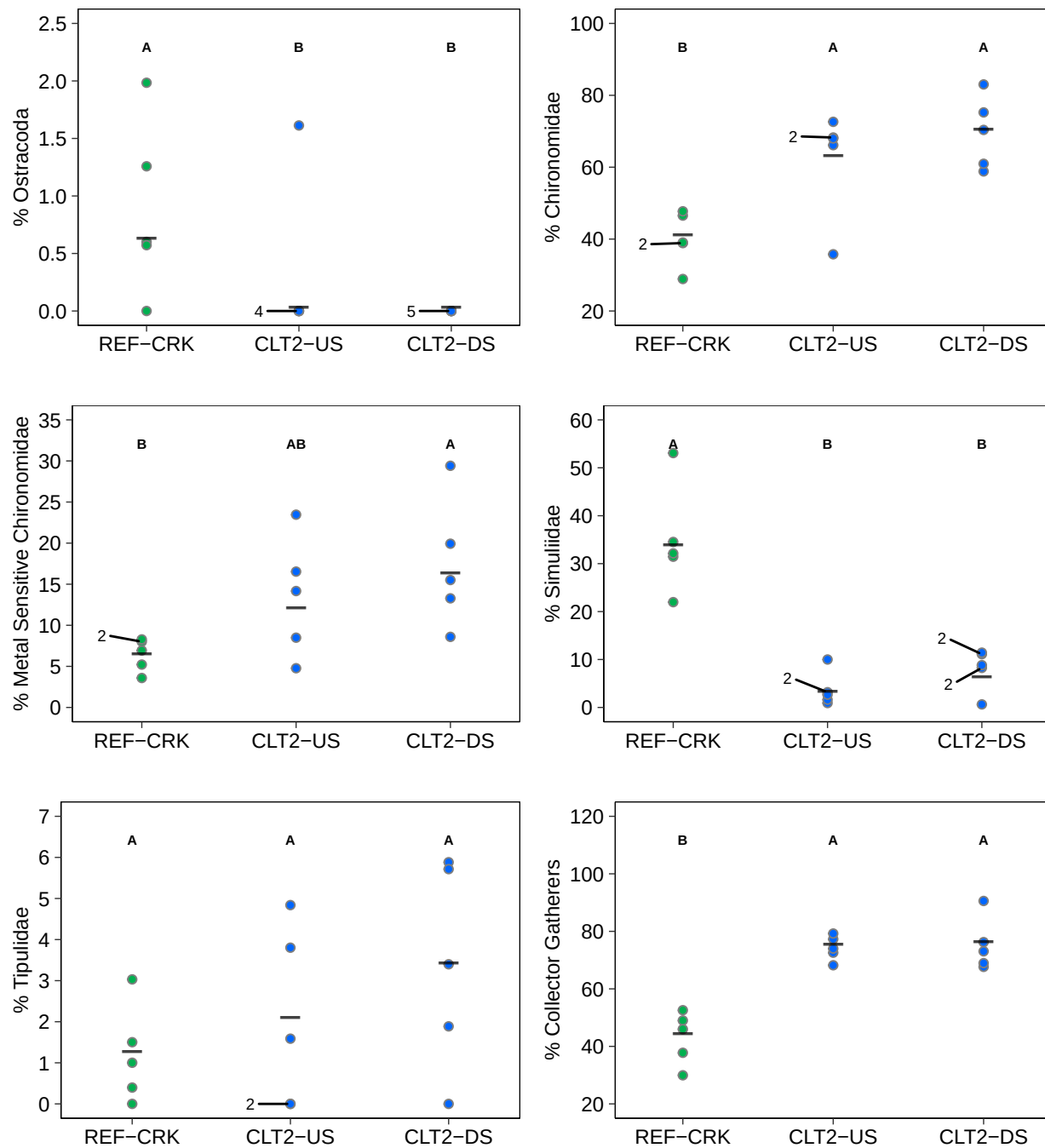


Figure F.3: Benthic Invertebrate Community Endpoint Comparisons for Camp Lake Tributary 2 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Notes: Green represents reference areas and blue represent mine-exposed areas. Areas that share a letter are not significant (P -value=0.1). Horizontal bars indicate measures of central tendency. Numbers indicate the number of overlapping points.

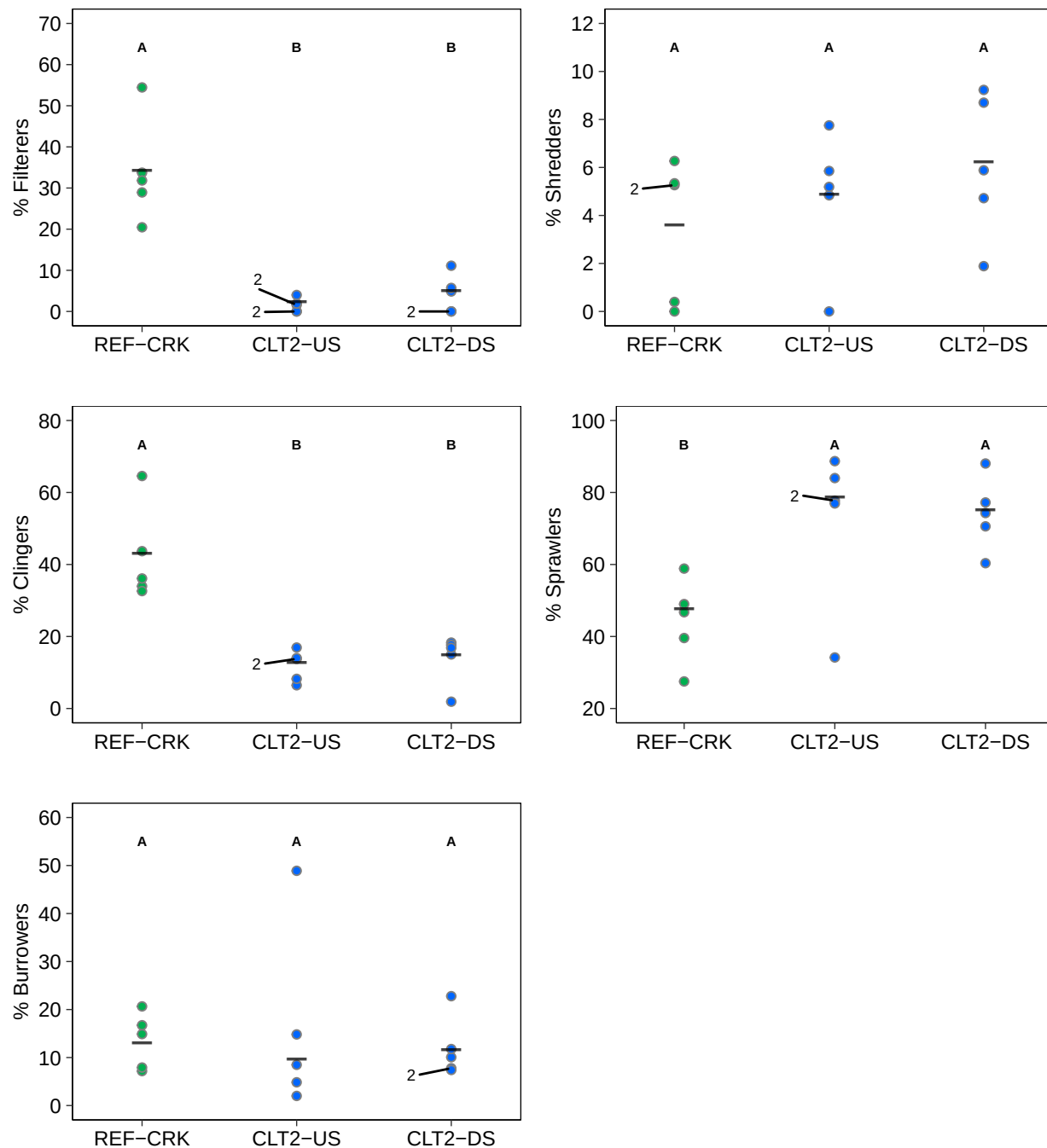


Figure F.3: Benthic Invertebrate Community Endpoint Comparisons for Camp Lake Tributary 2 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Notes: Green represents reference areas and blue represent mine-exposed areas. Areas that share a letter are not significant (P -value=0.1). Horizontal bars indicate measures of central tendency. Numbers indicate the number of overlapping points.

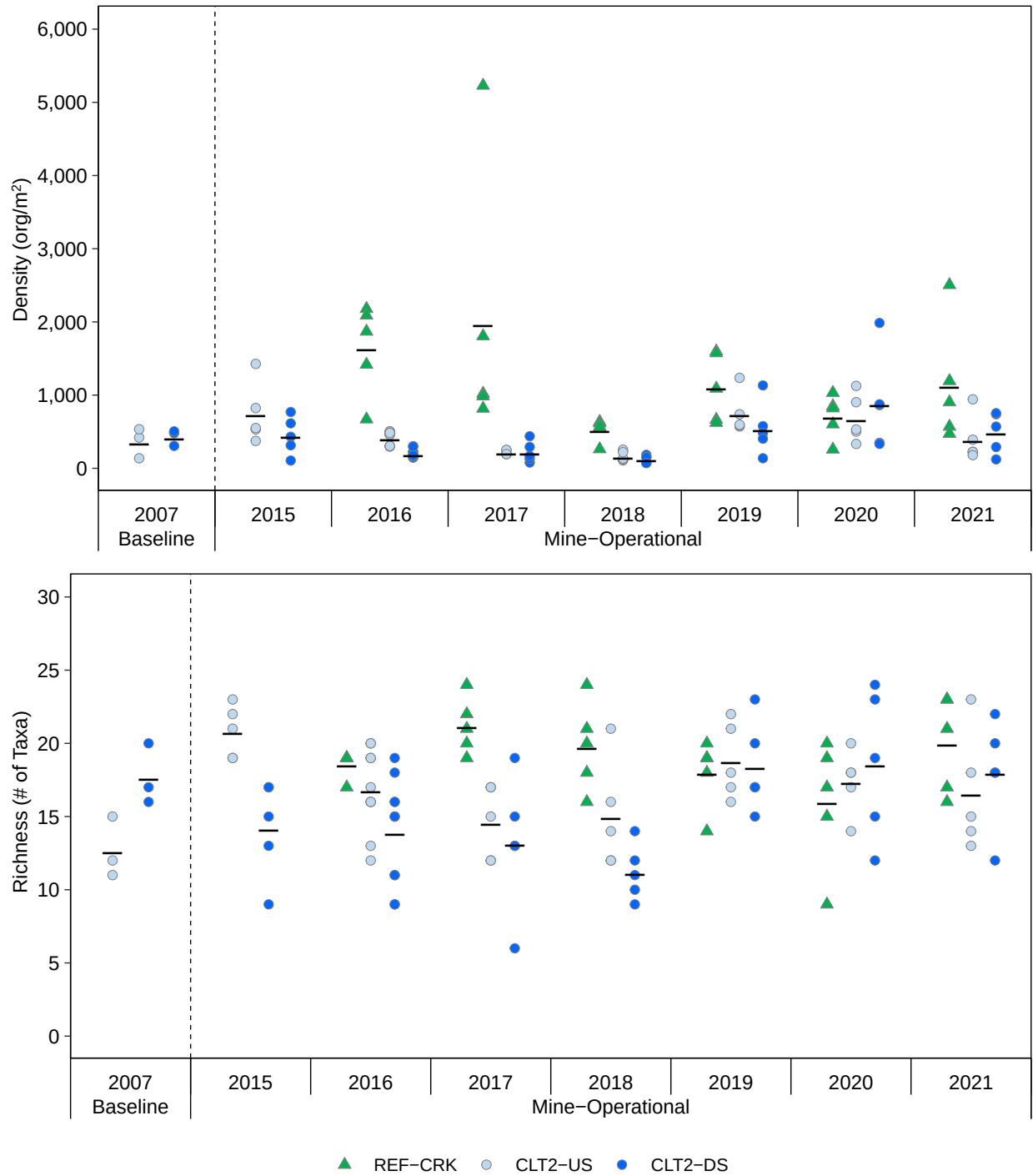


Figure F.4: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 2 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

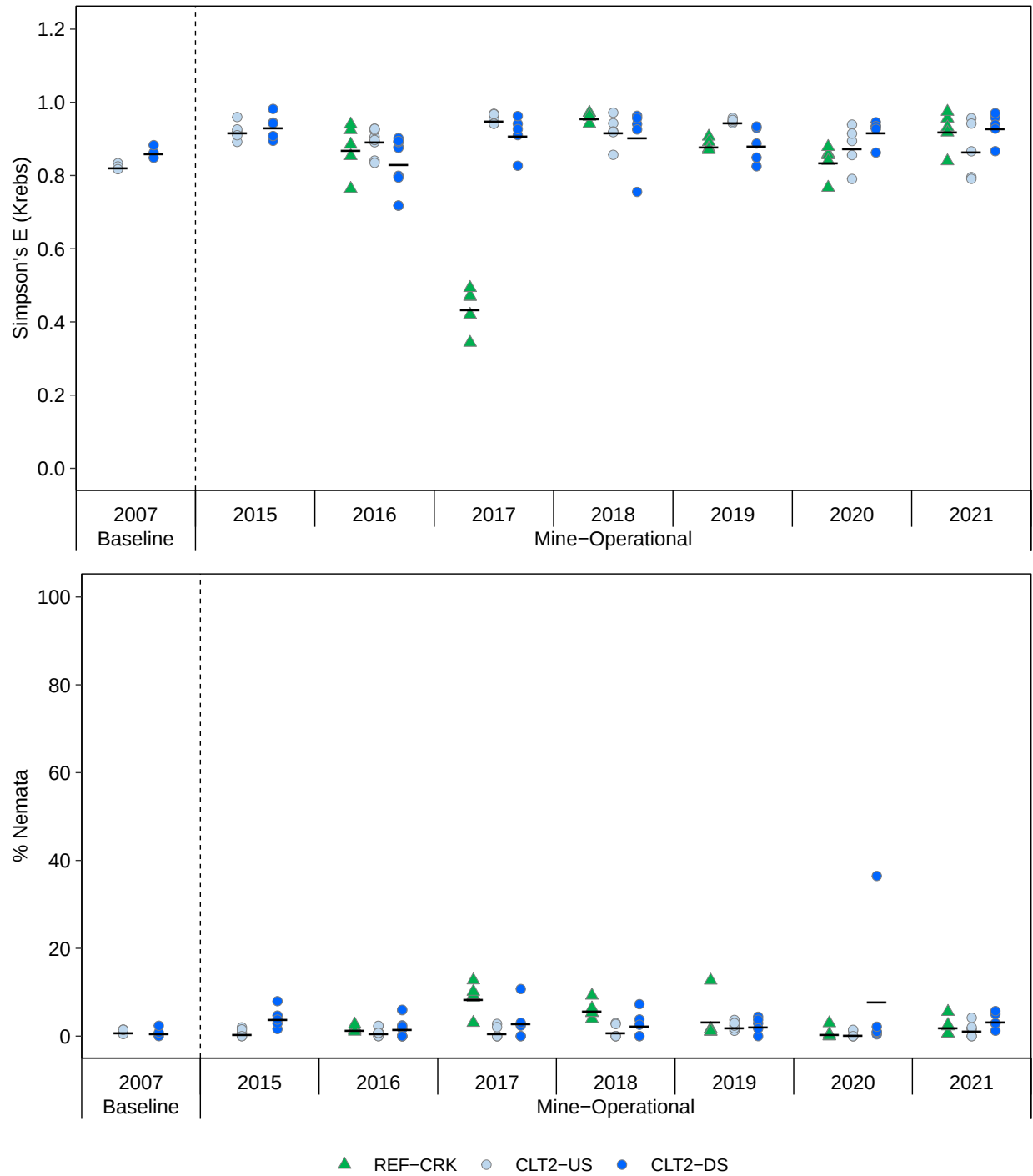


Figure F.4: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 2 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

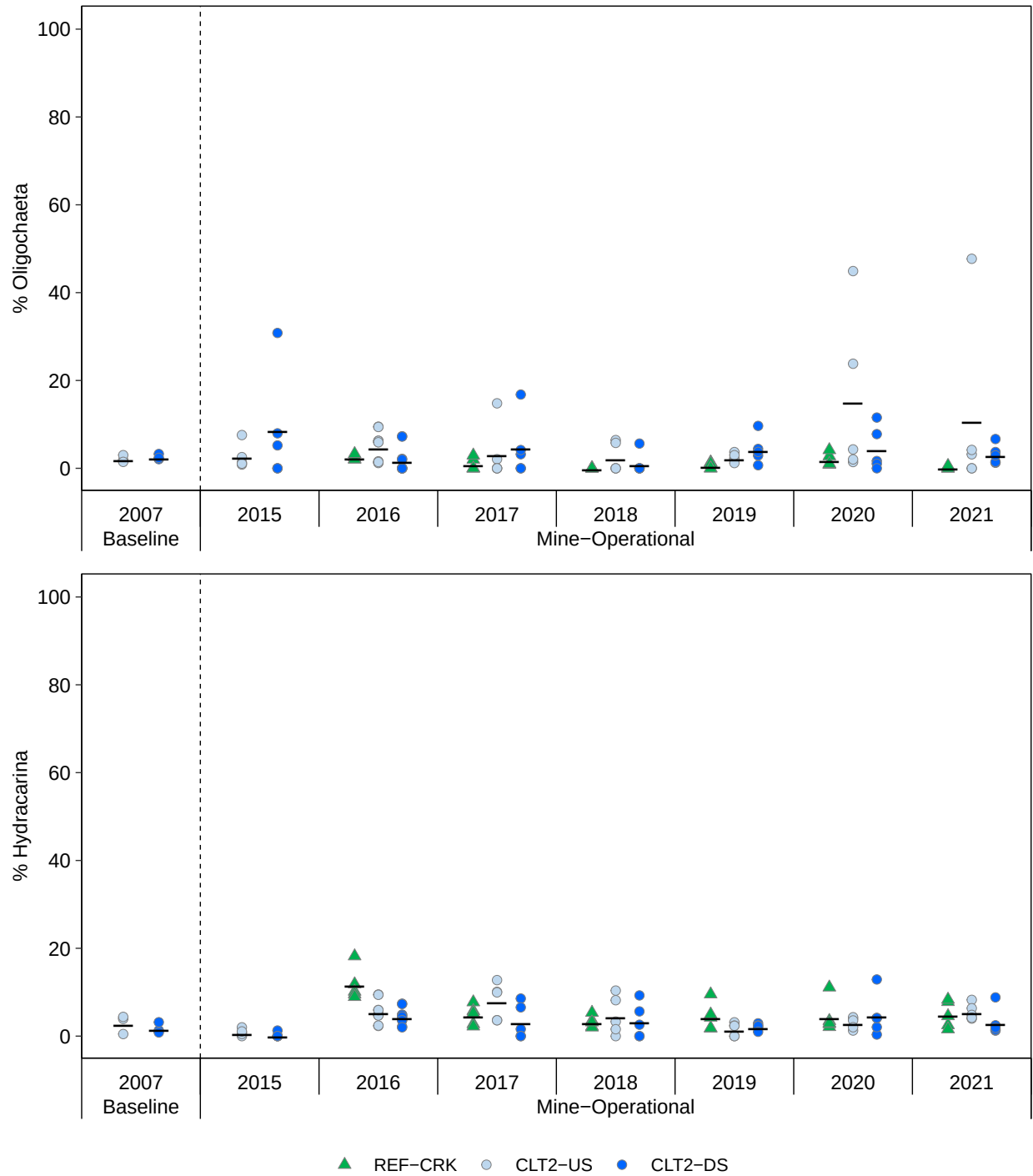


Figure F.4: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 2 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

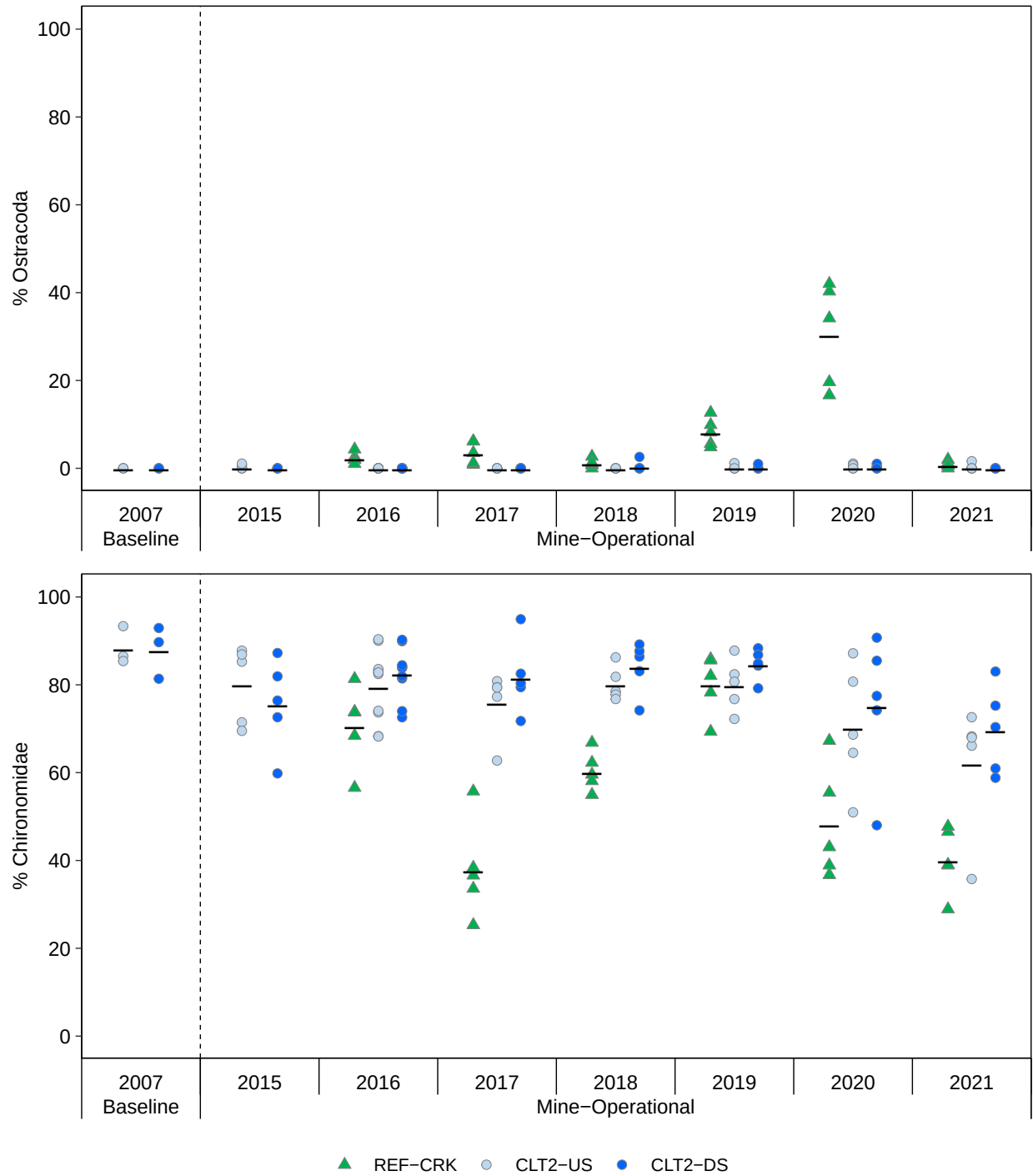


Figure F.4: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 2 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

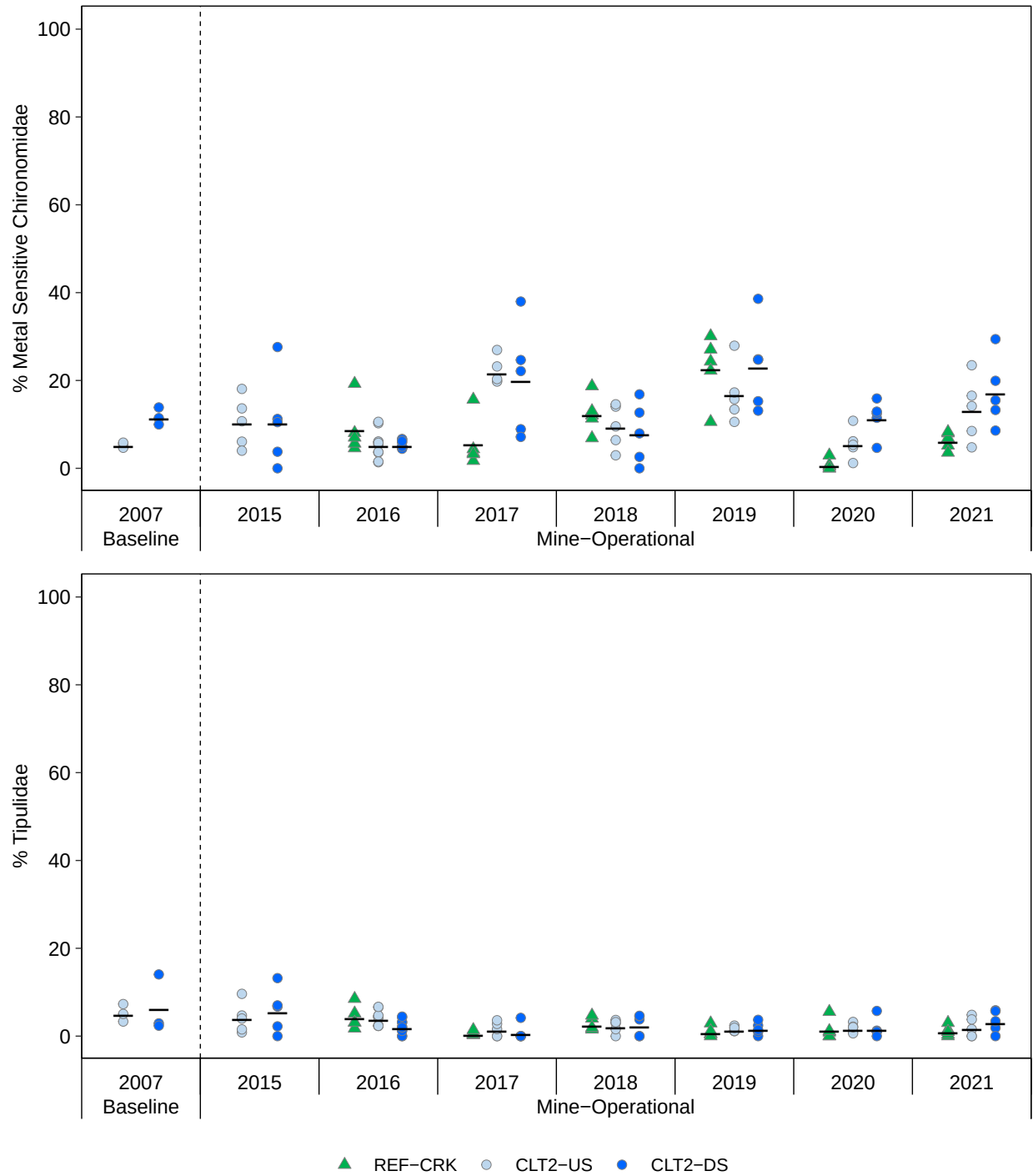


Figure F.4: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 2 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

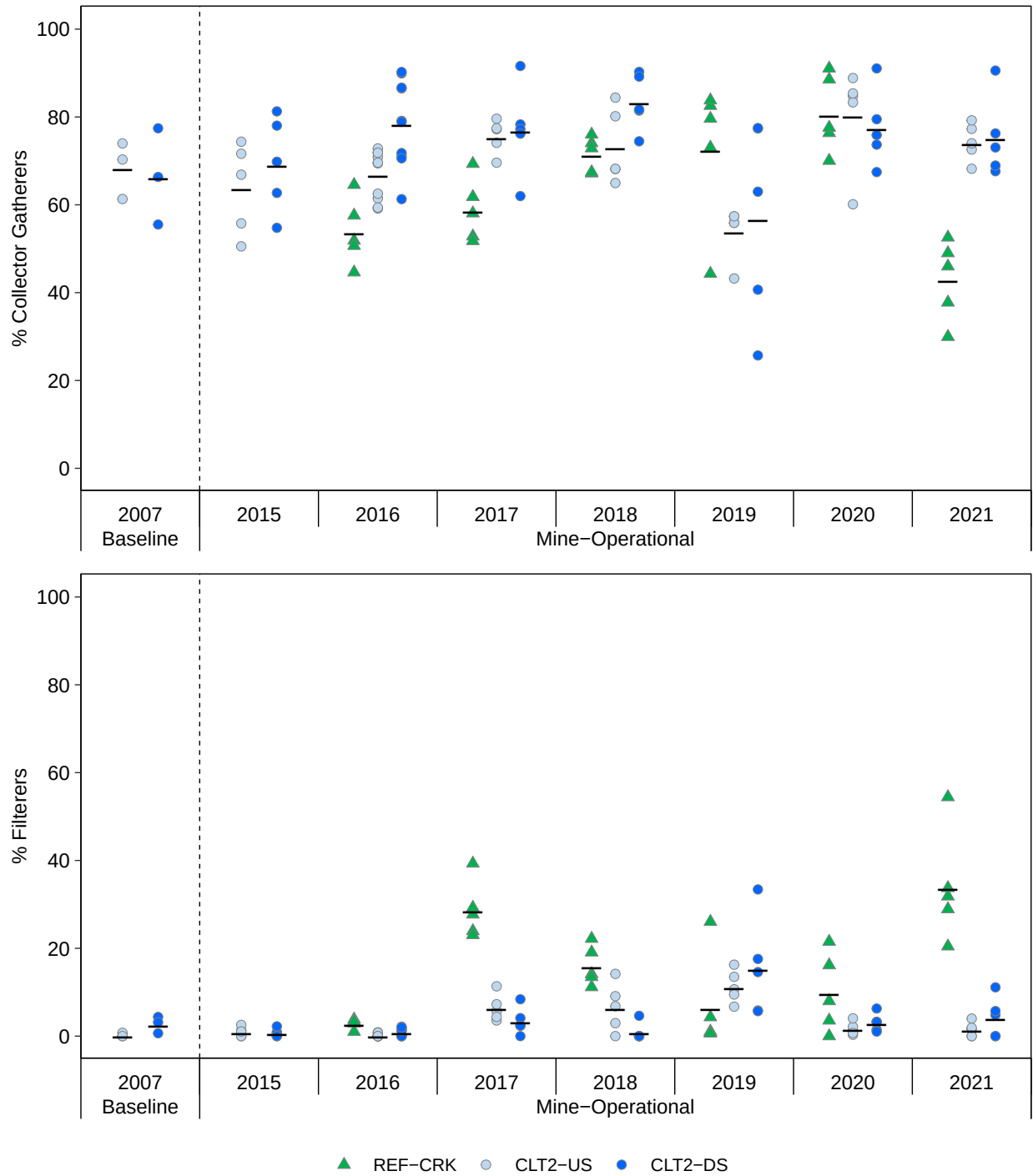


Figure F.4: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 2 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

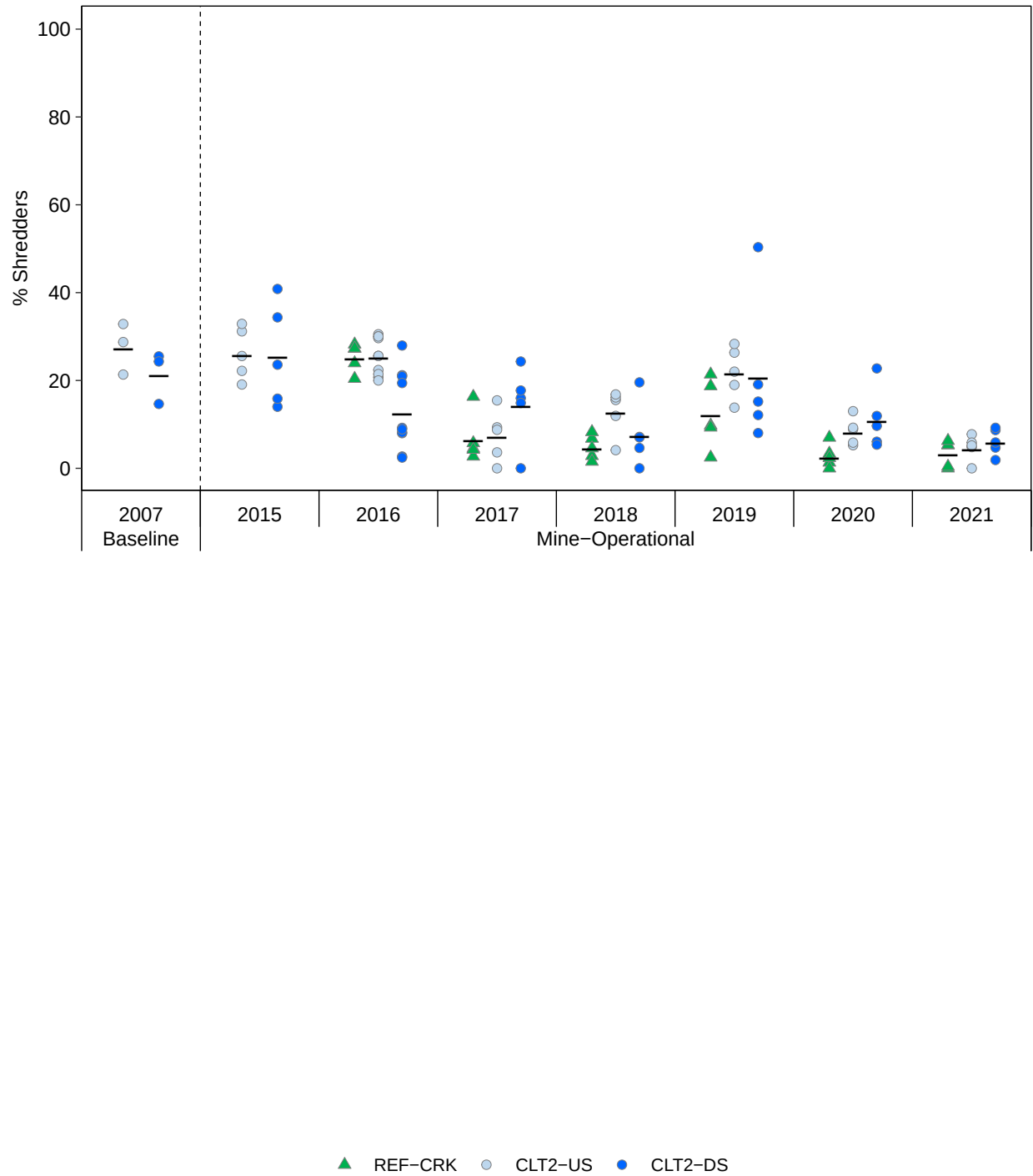


Figure F.4: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Tributary 2 Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

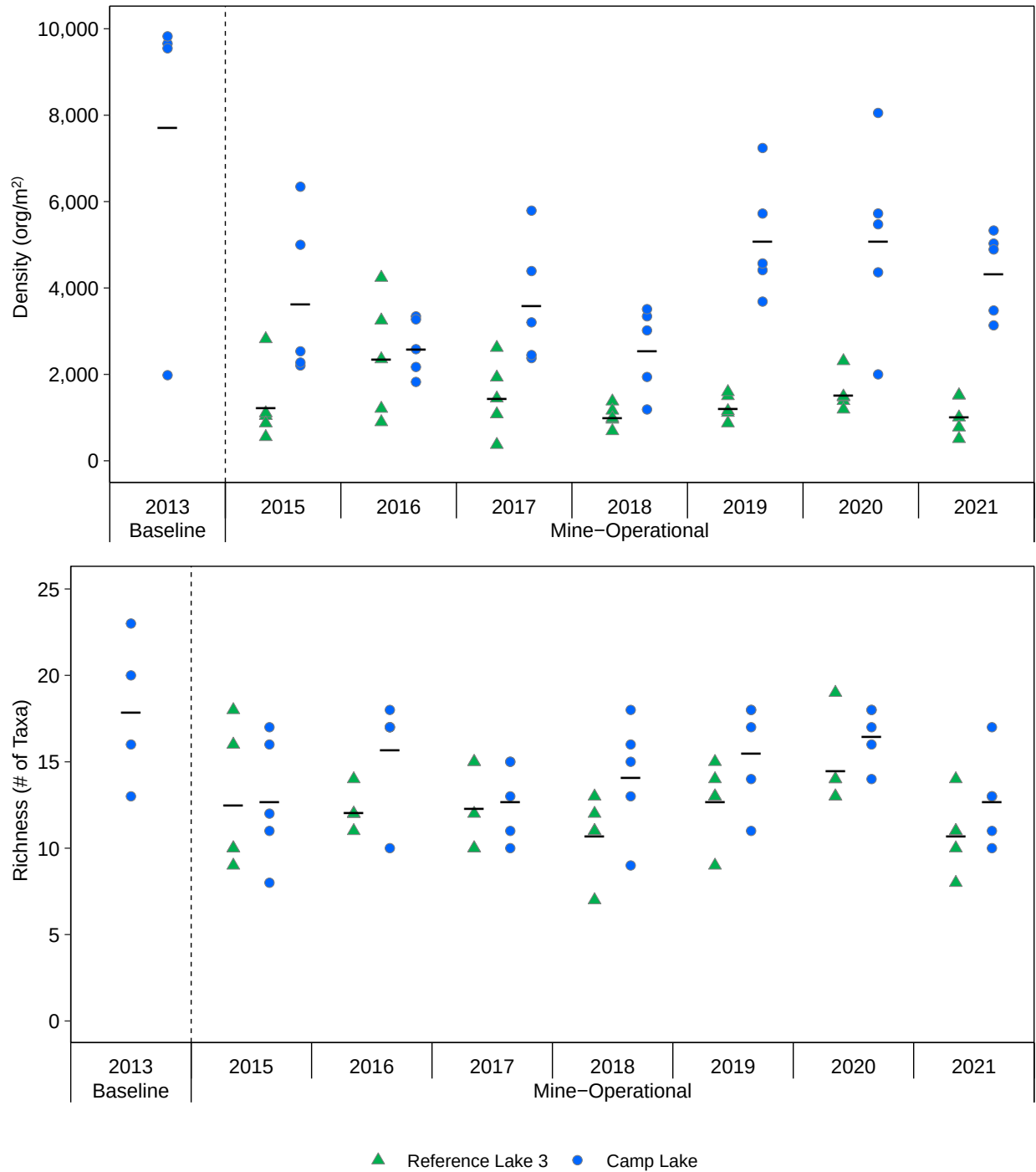


Figure F.5: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

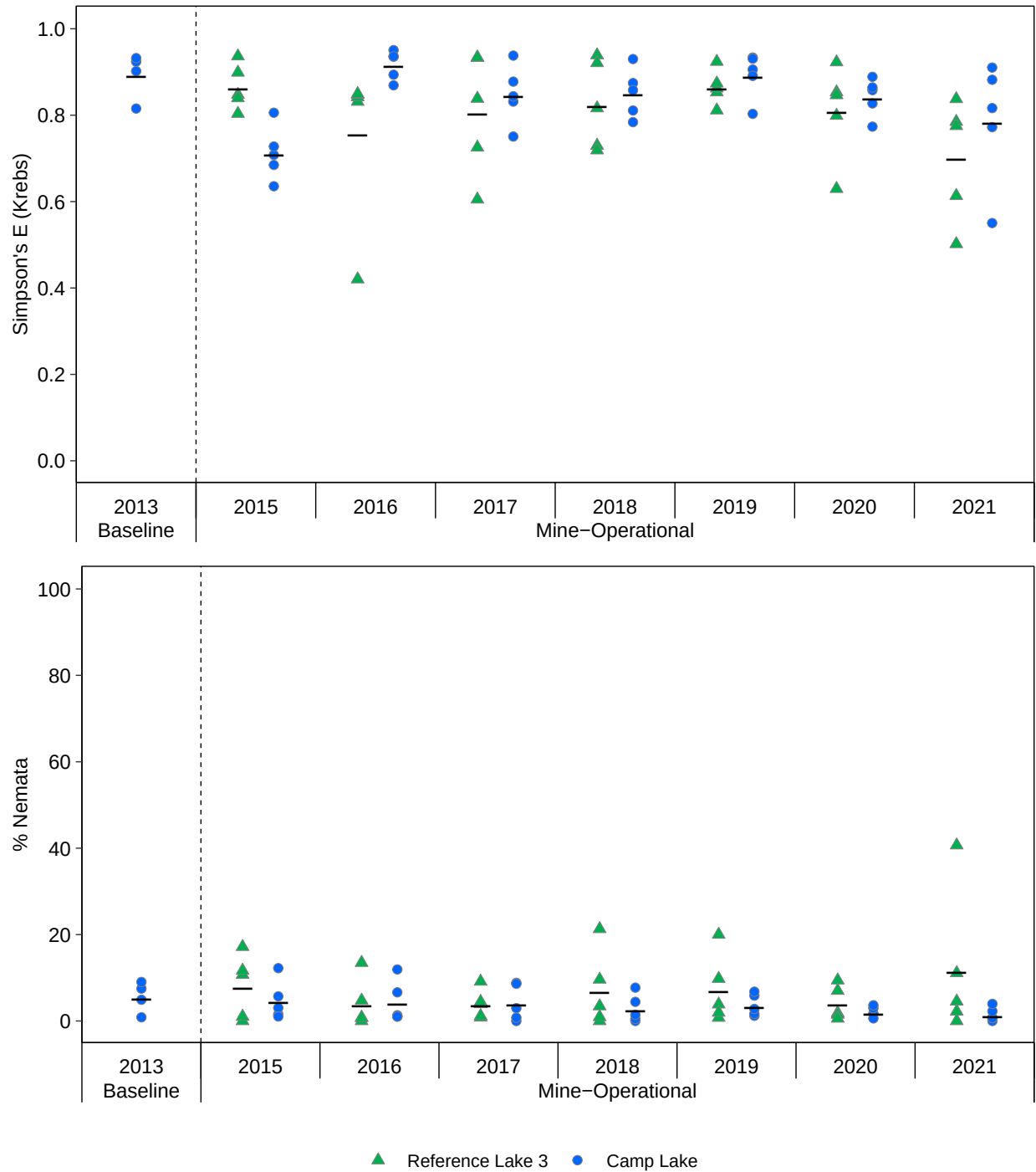


Figure F.5: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

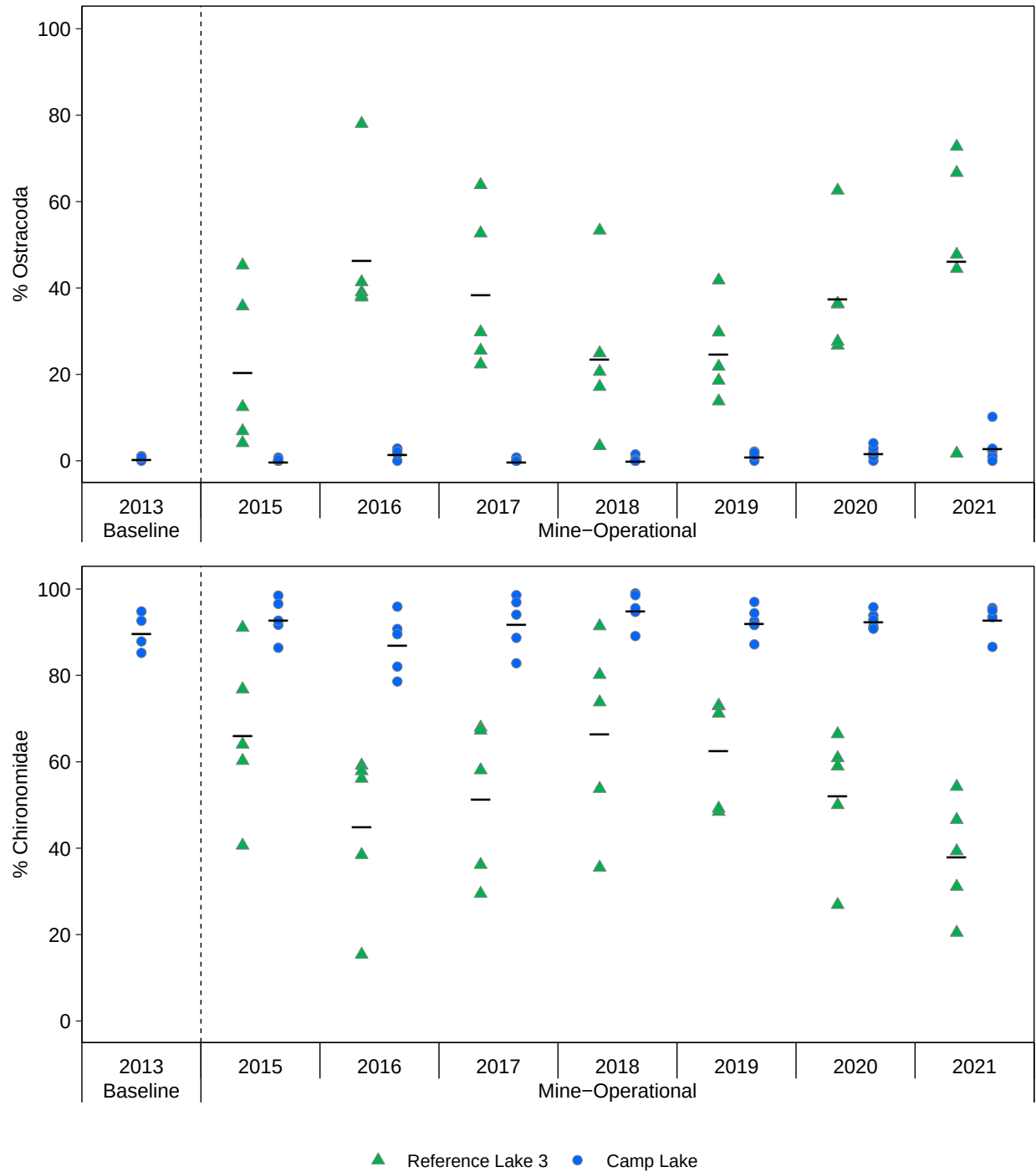


Figure F.5: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

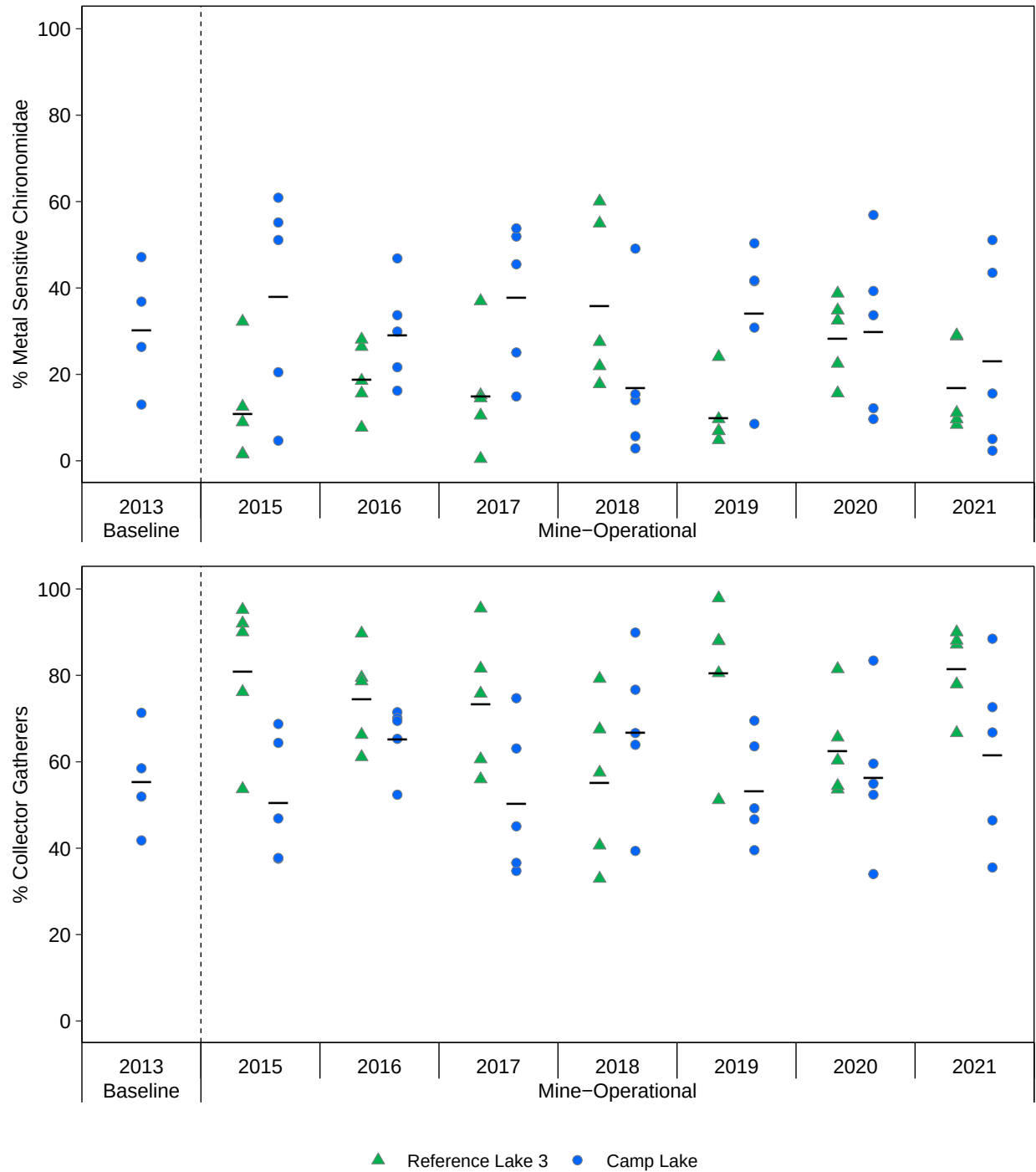


Figure F.5: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

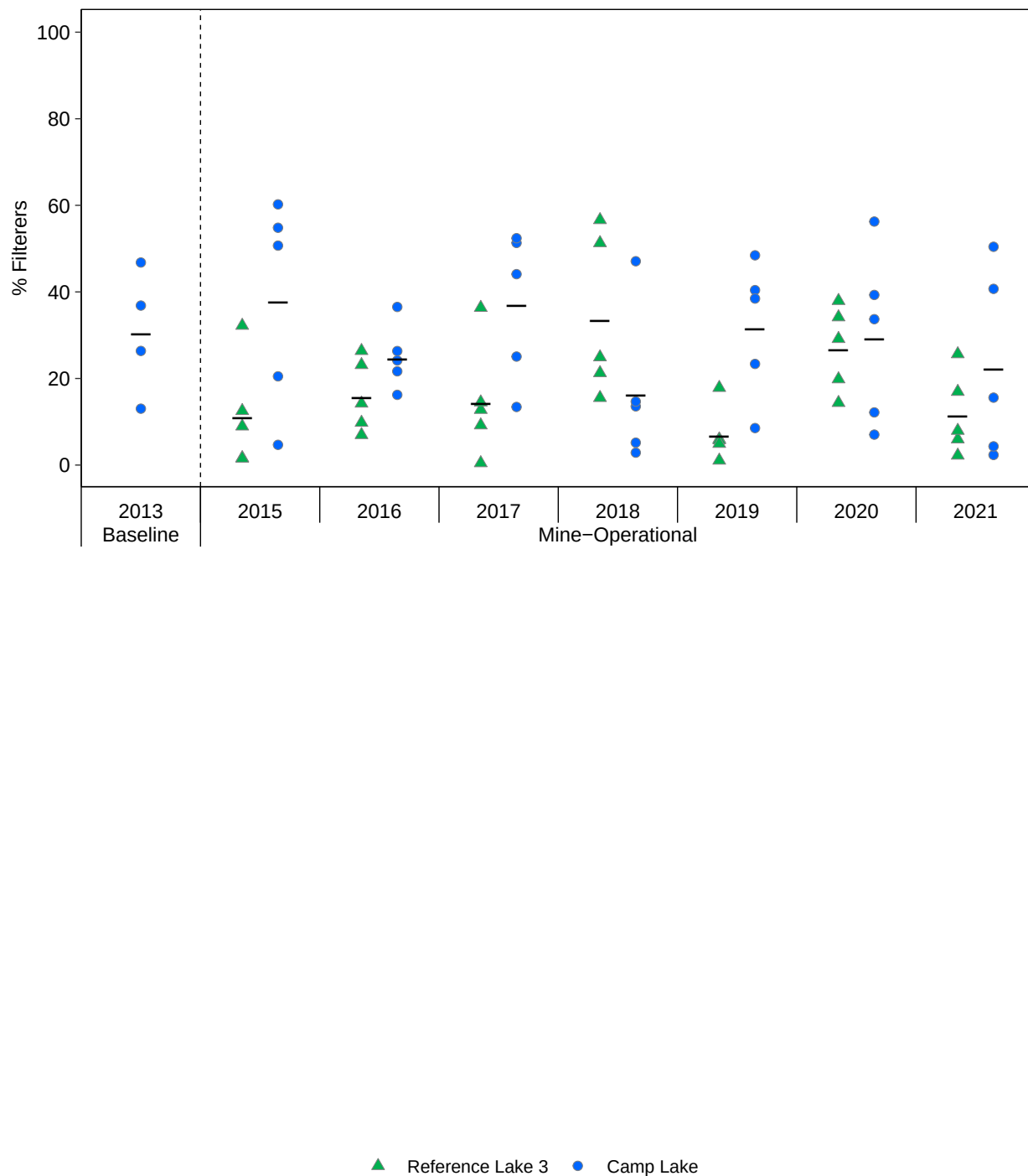


Figure F.5: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

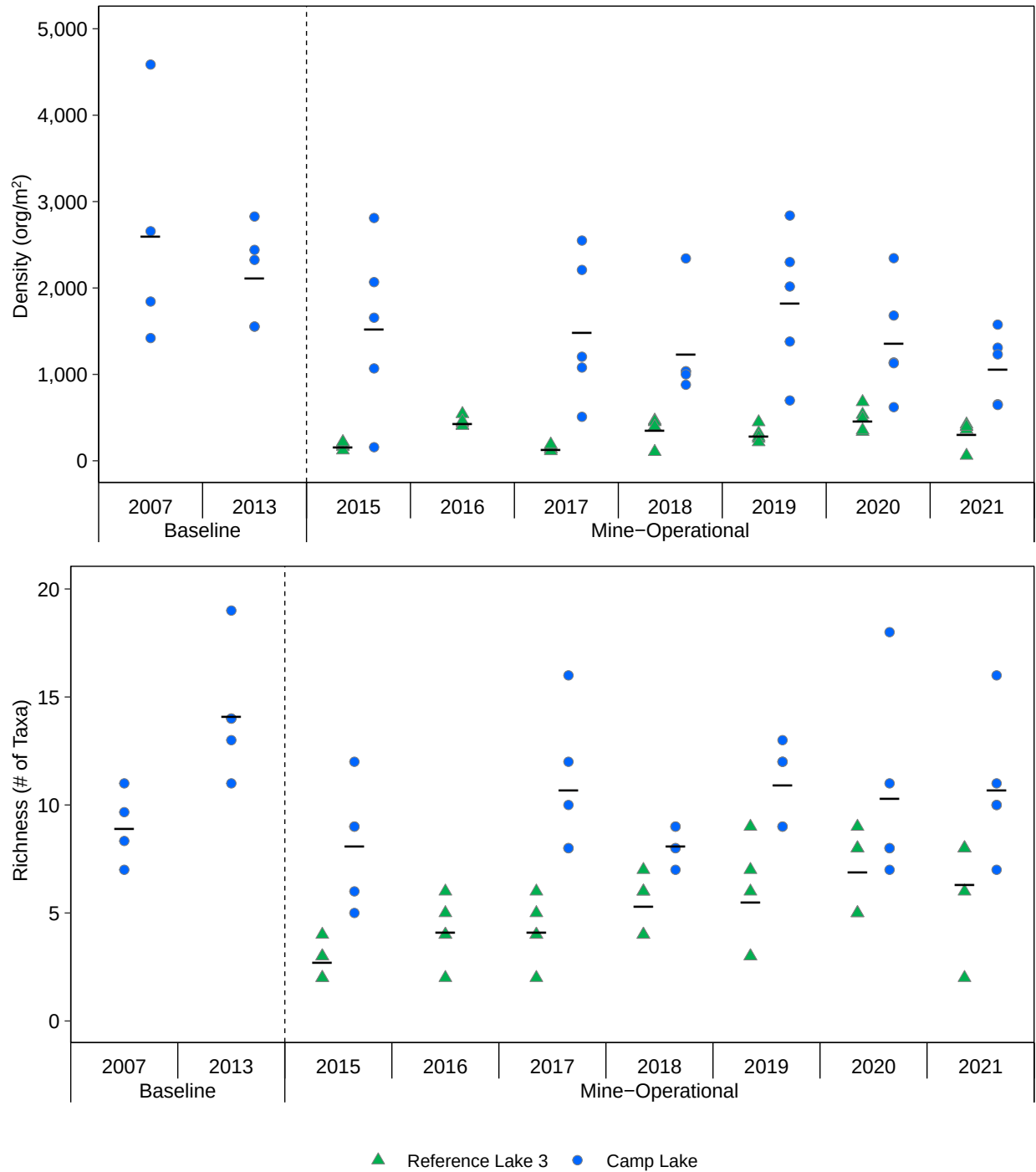


Figure F.6: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

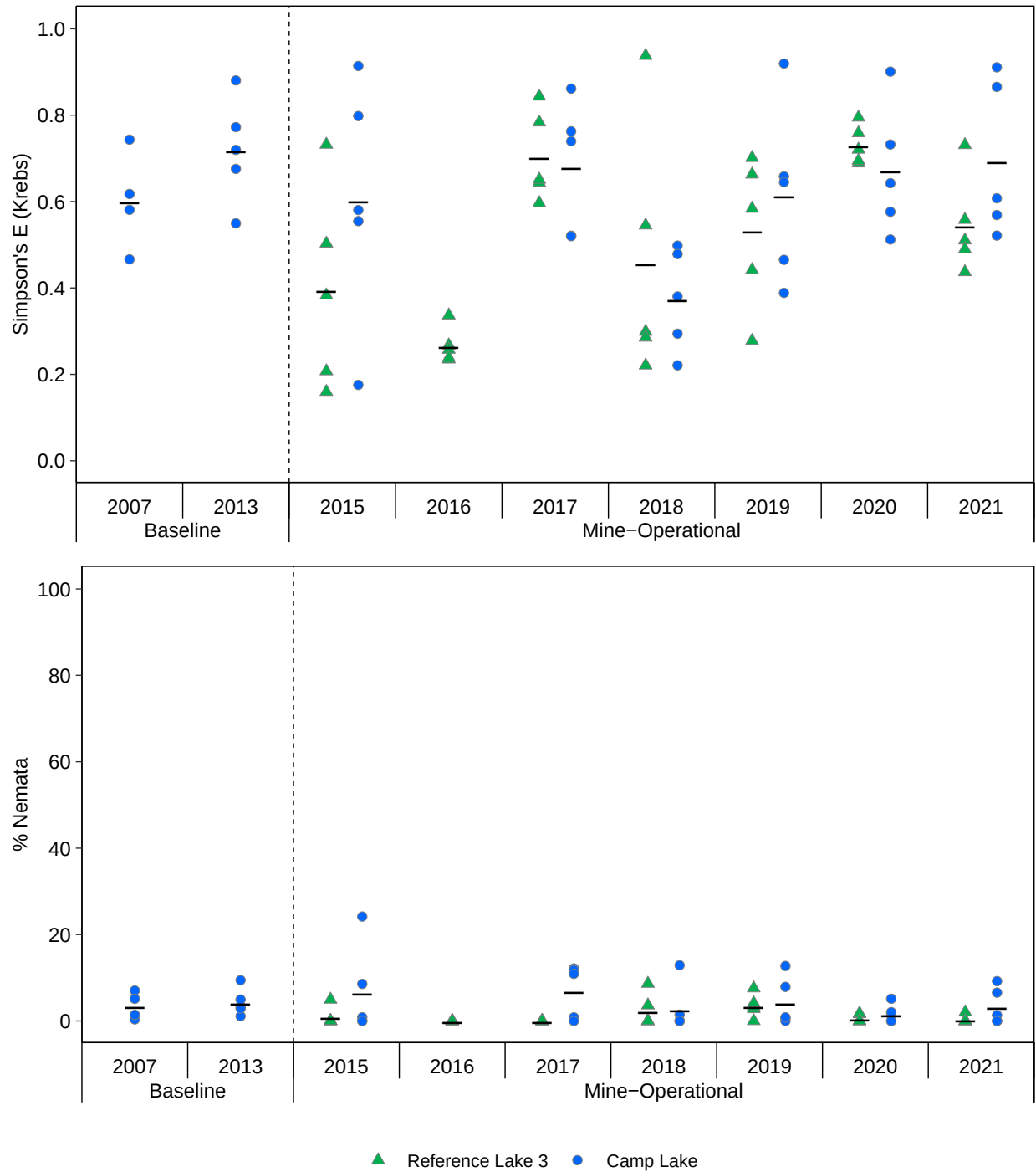


Figure F.6: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

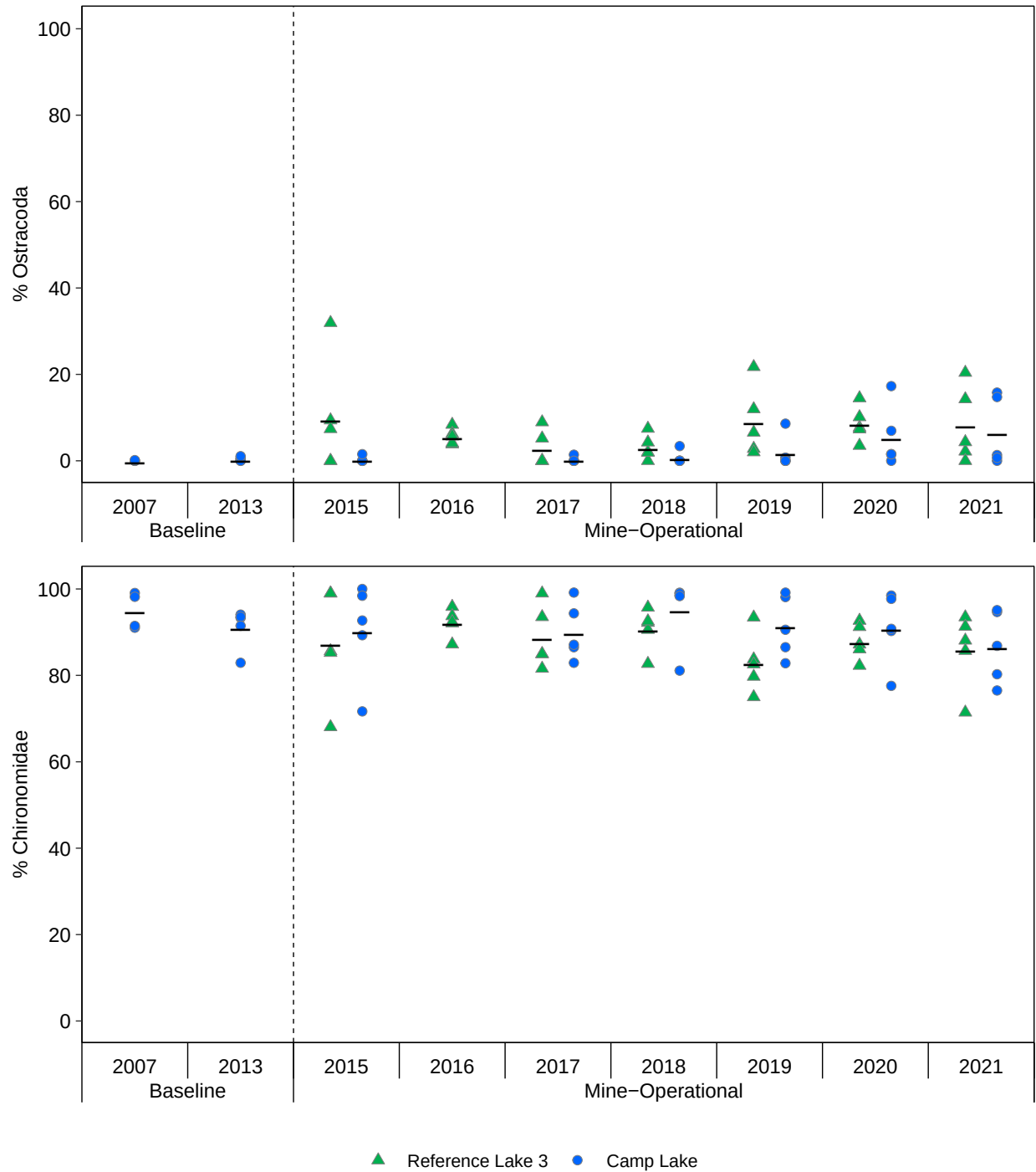


Figure F.6: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021)

Notes: Bars indicate means of replicates.

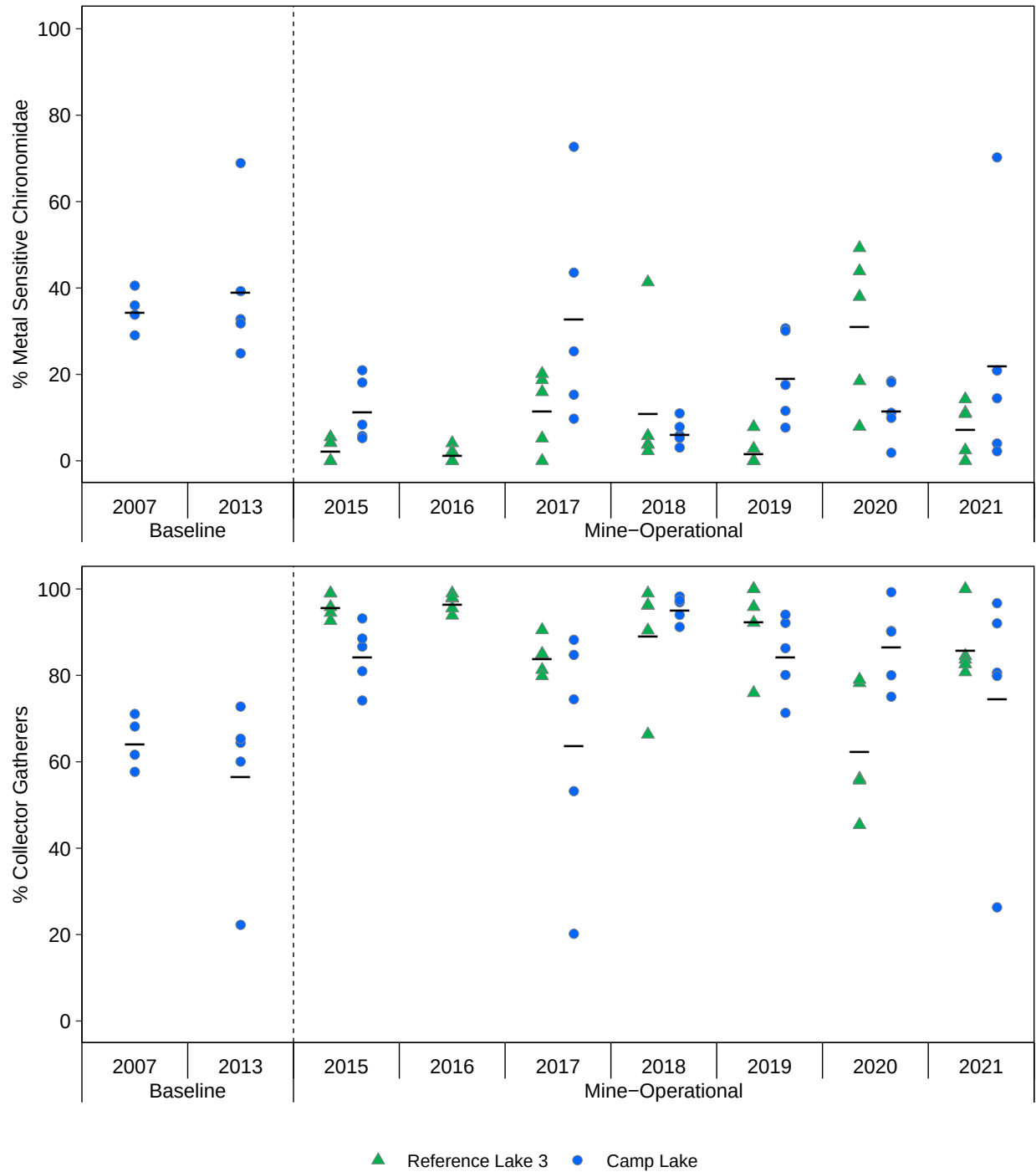


Figure F.6: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

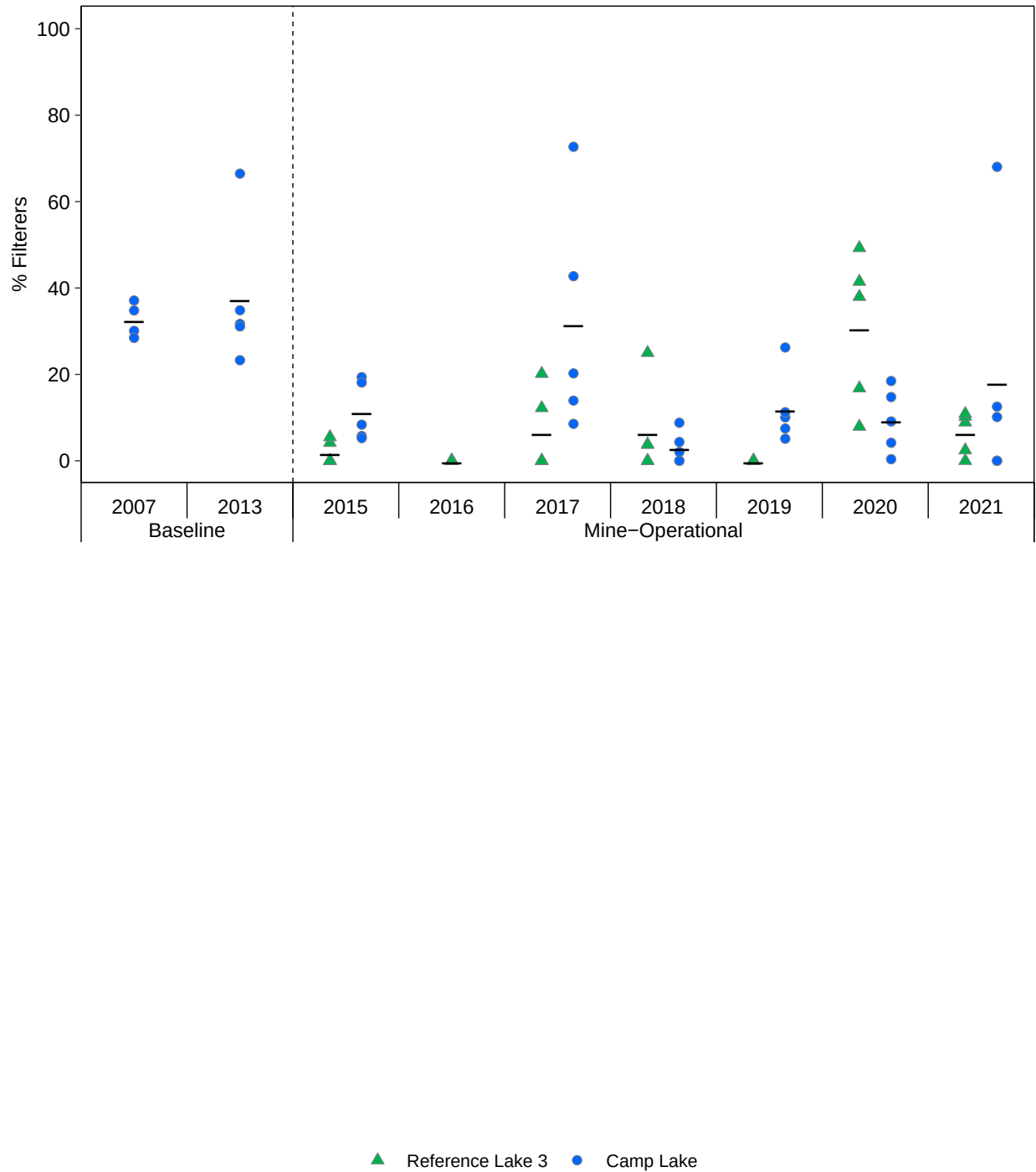


Figure F.6: Comparison of Key Benthic Invertebrate Community Metrics at Camp Lake Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

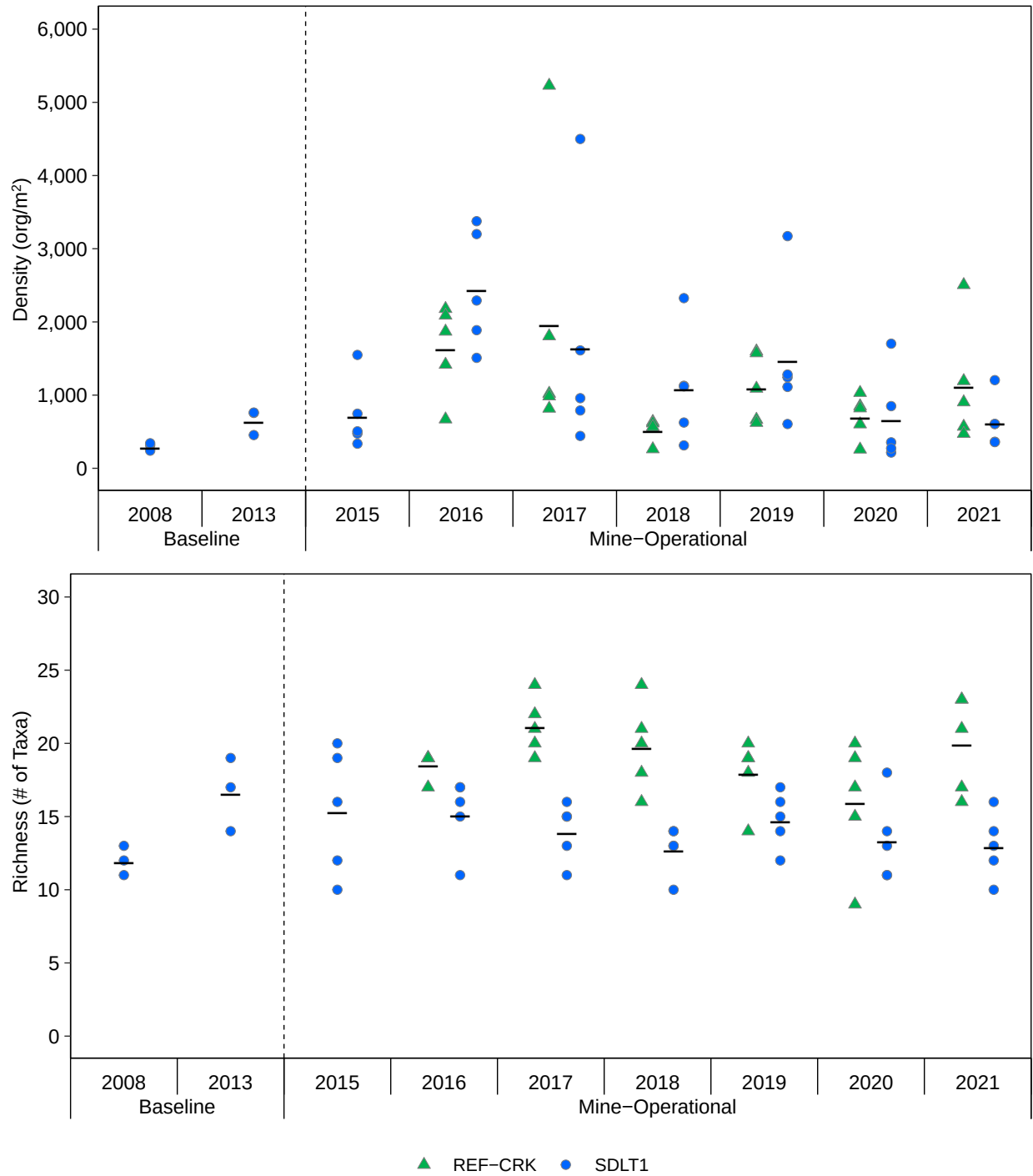


Figure F.7: Comparison of Key Benthic Invertebrate Community Metrics at SDLT1 Over Mine Baseline (2008) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

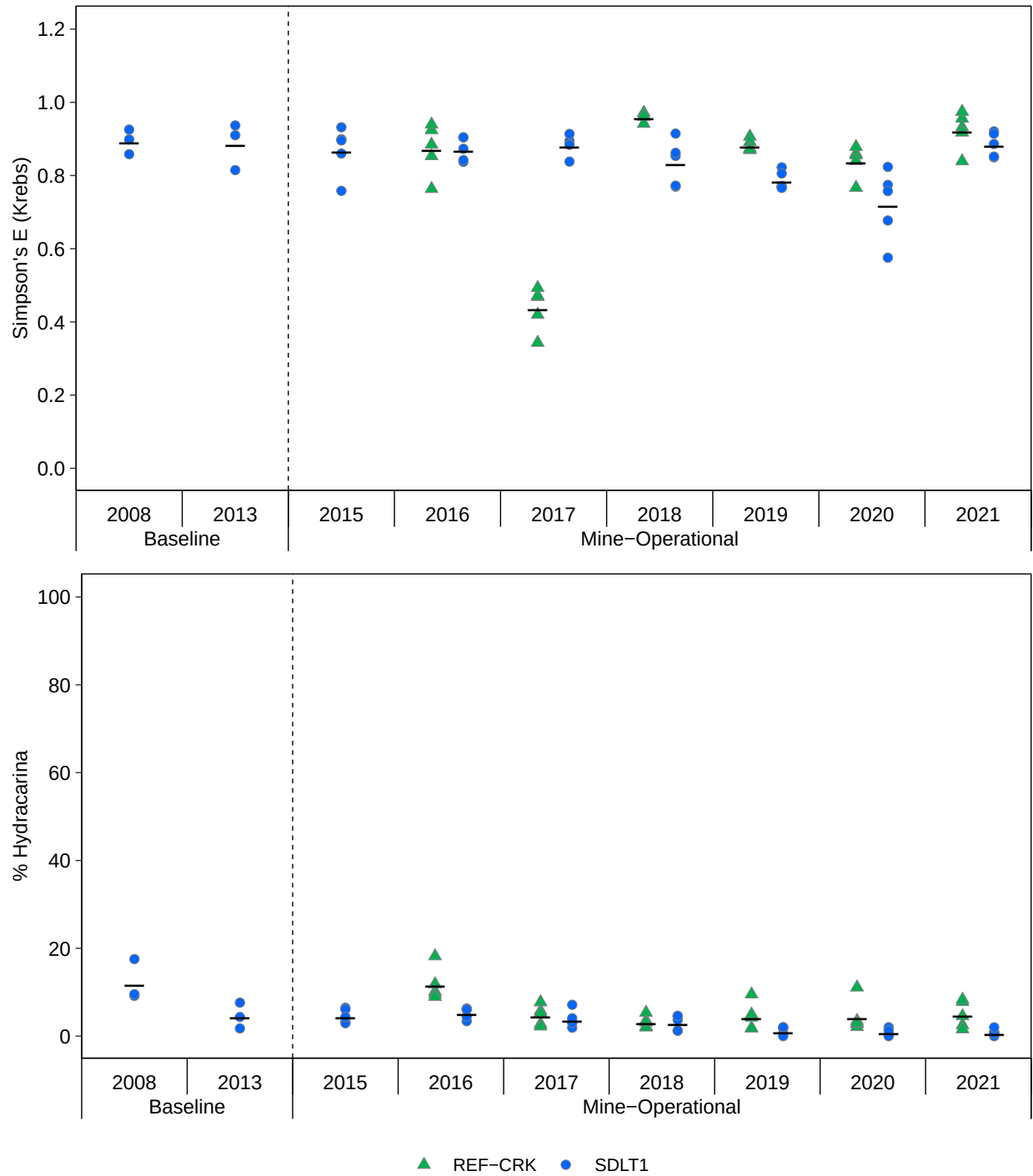


Figure F.7: Comparison of Key Benthic Invertebrate Community Metrics at SDLT1 Over Mine Baseline (2008) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

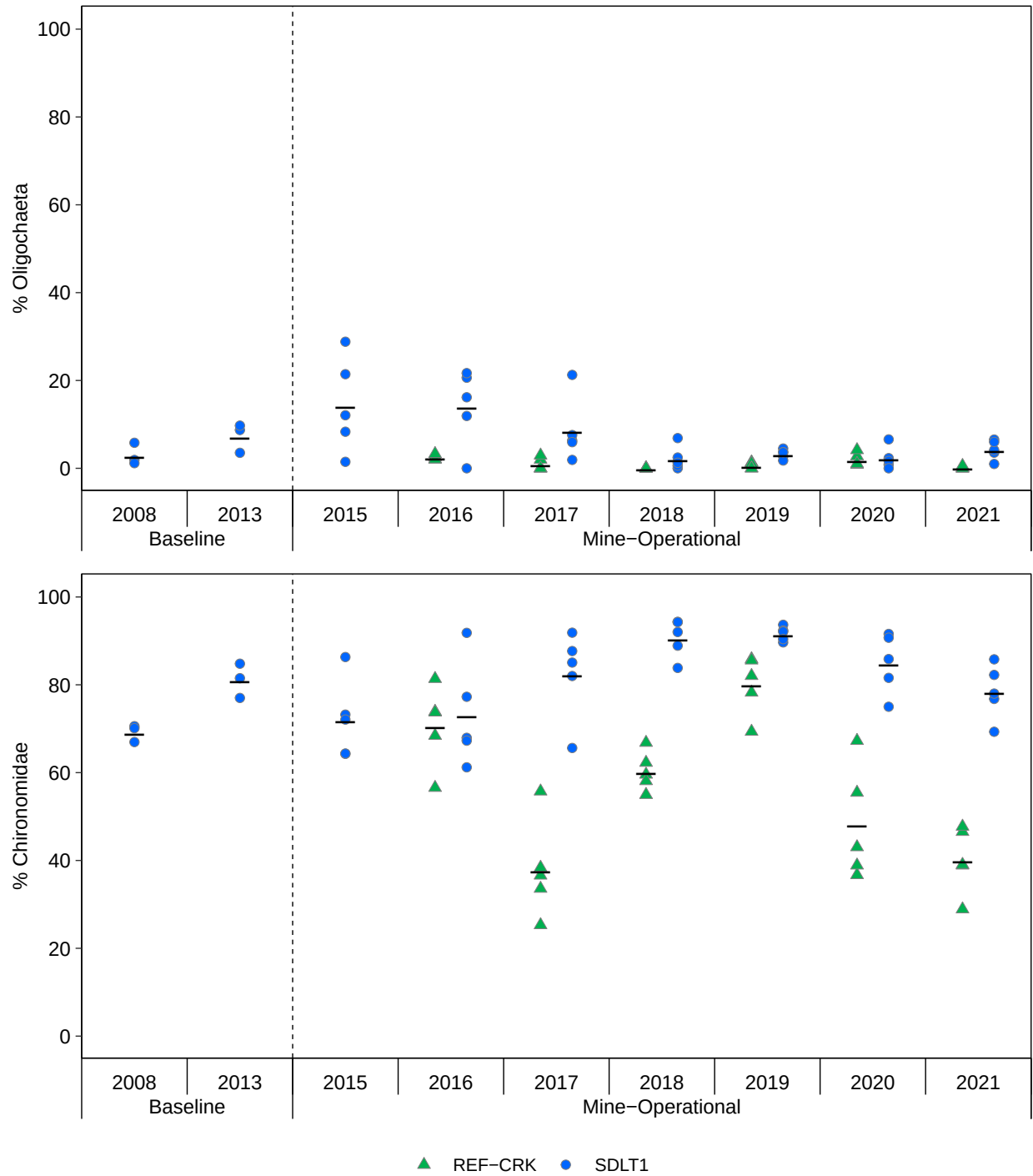


Figure F.7: Comparison of Key Benthic Invertebrate Community Metrics at SDLT1 Over Mine Baseline (2008) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

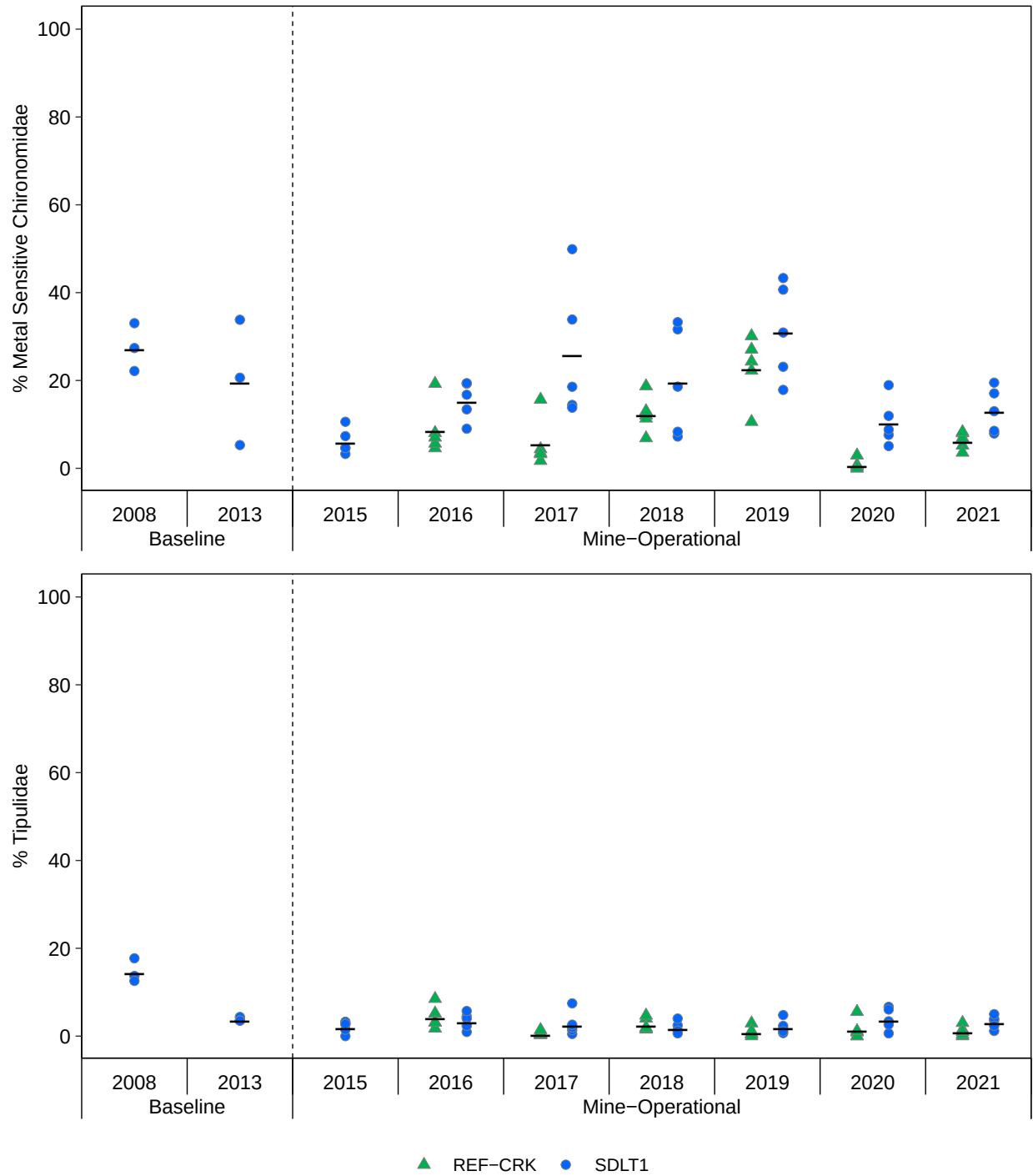


Figure F.7: Comparison of Key Benthic Invertebrate Community Metrics at SDLT1 Over Mine Baseline (2008) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

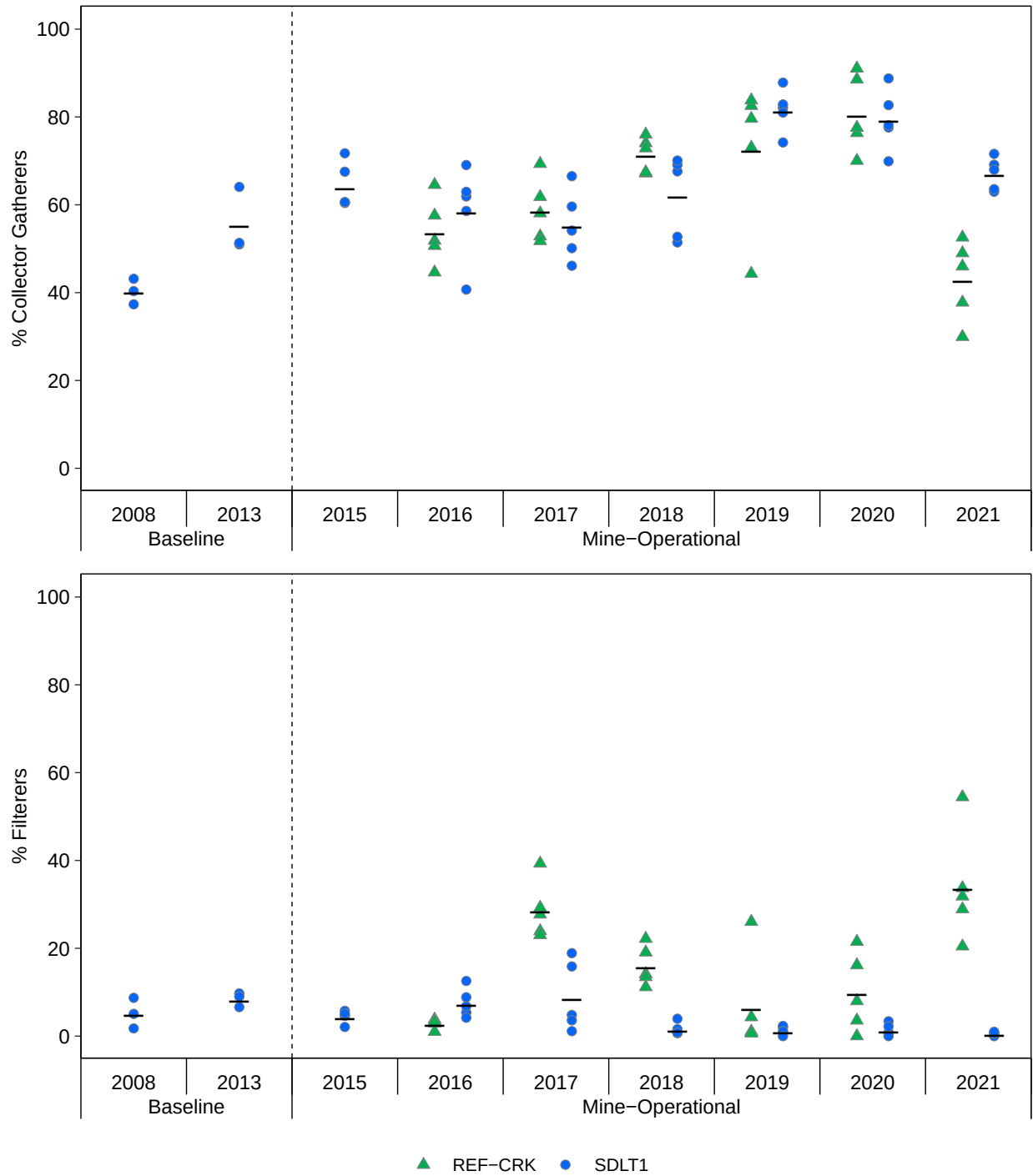


Figure F.7: Comparison of Key Benthic Invertebrate Community Metrics at SDLT1 Over Mine Baseline (2008) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

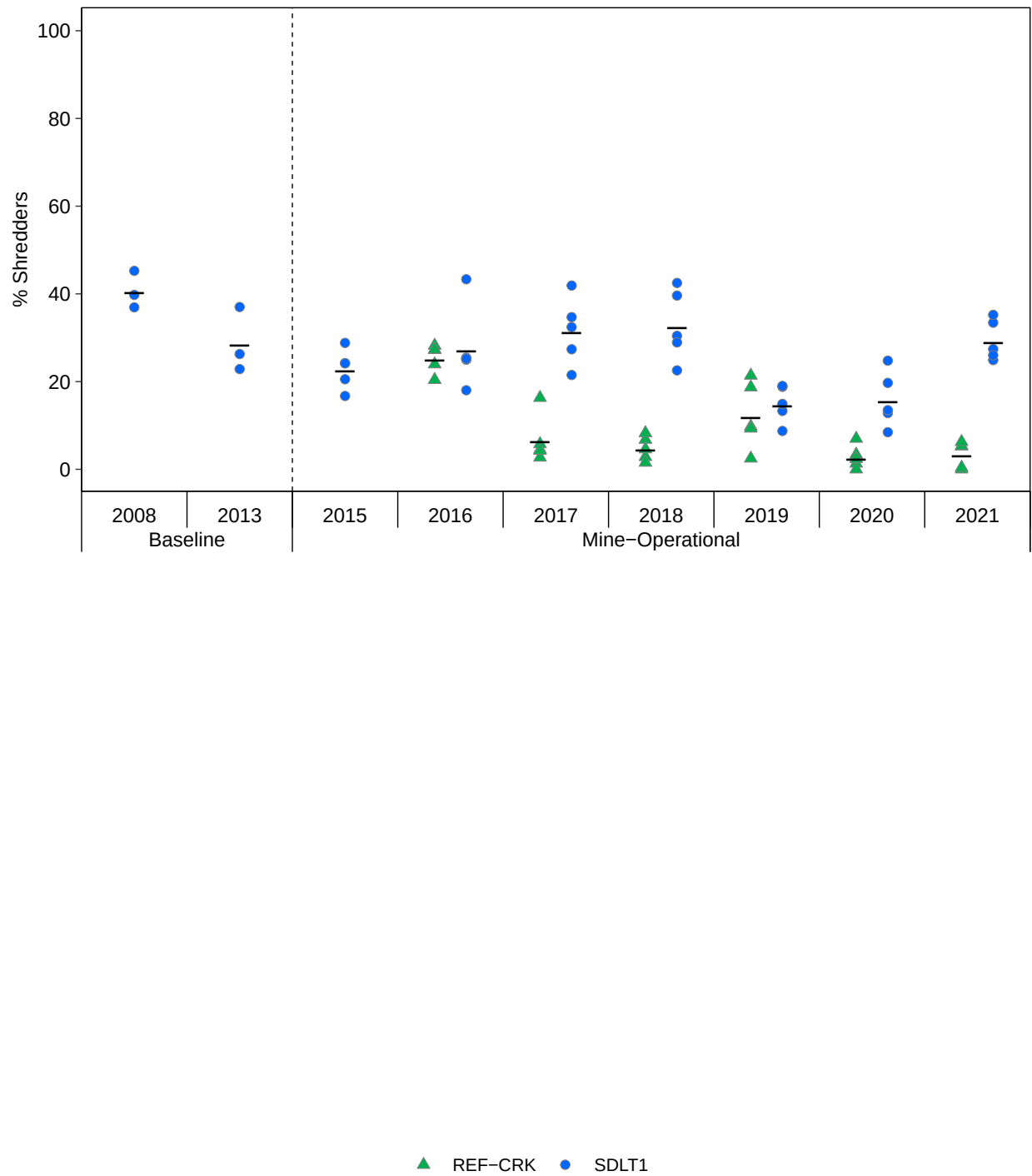


Figure F.7: Comparison of Key Benthic Invertebrate Community Metrics at SDLT1 Over Mine Baseline (2008) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

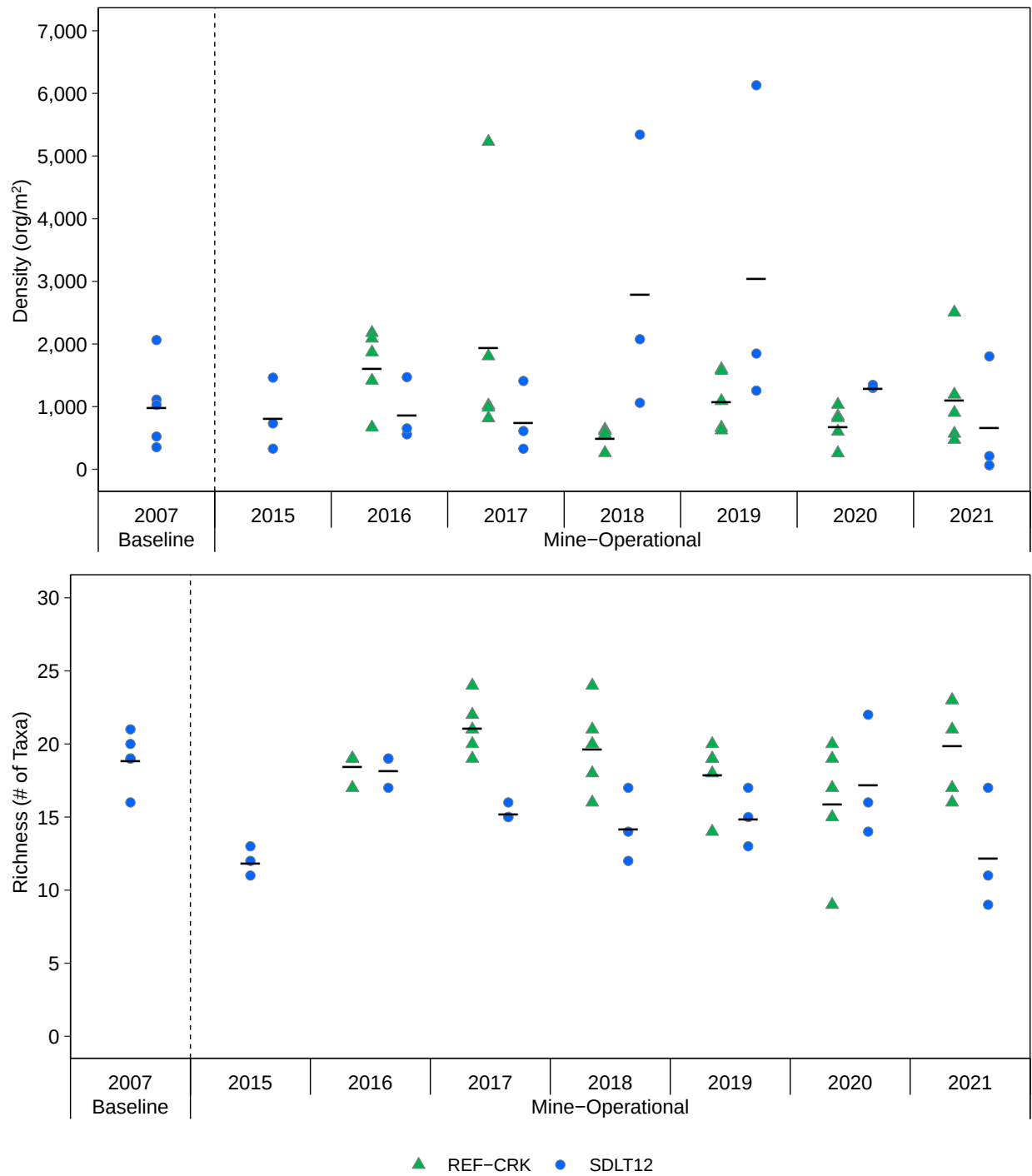


Figure F.8: Comparison of Key Benthic Invertebrate Community Metrics at SDLT12 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

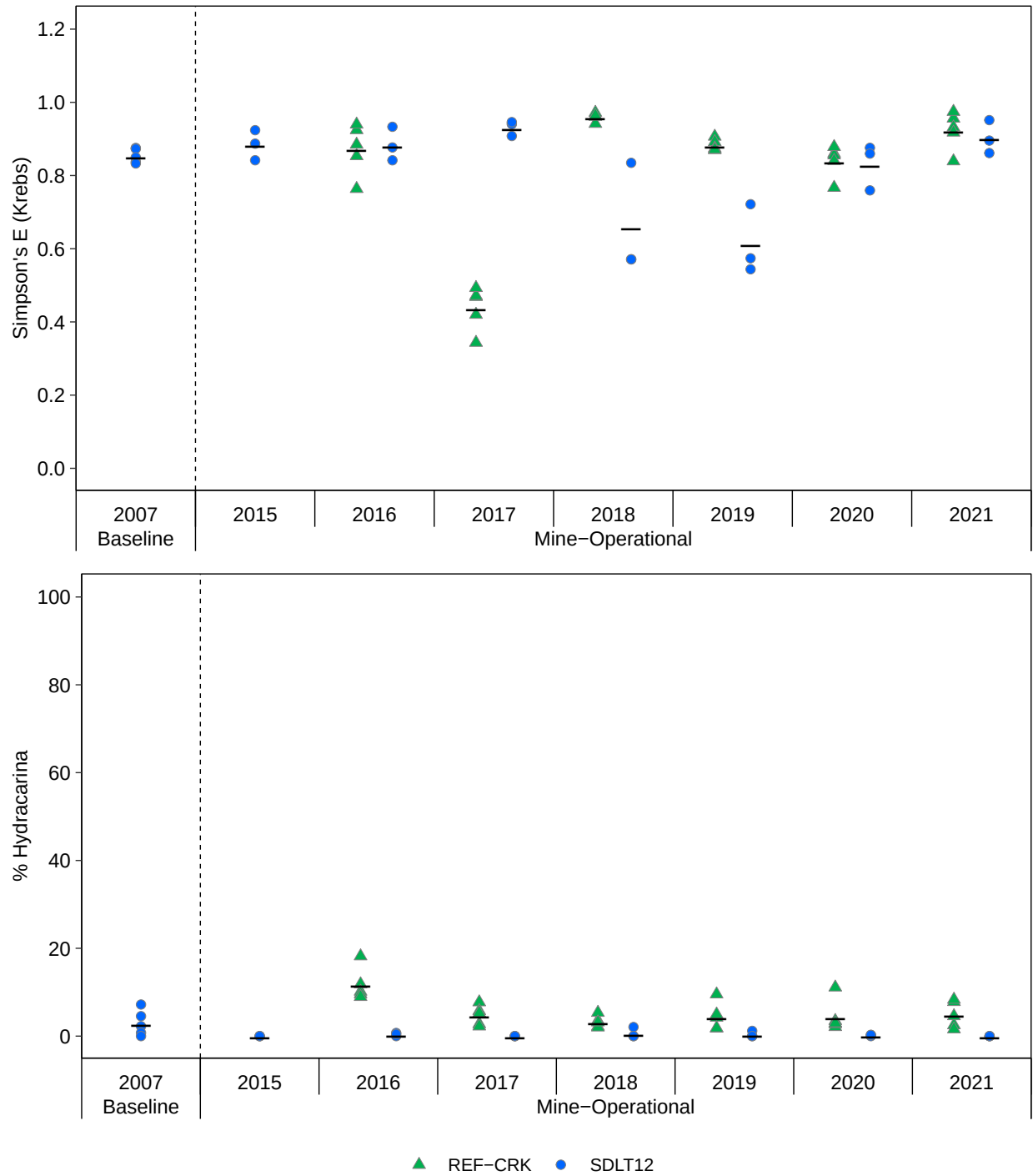


Figure F.8: Comparison of Key Benthic Invertebrate Community Metrics at SDLT12 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

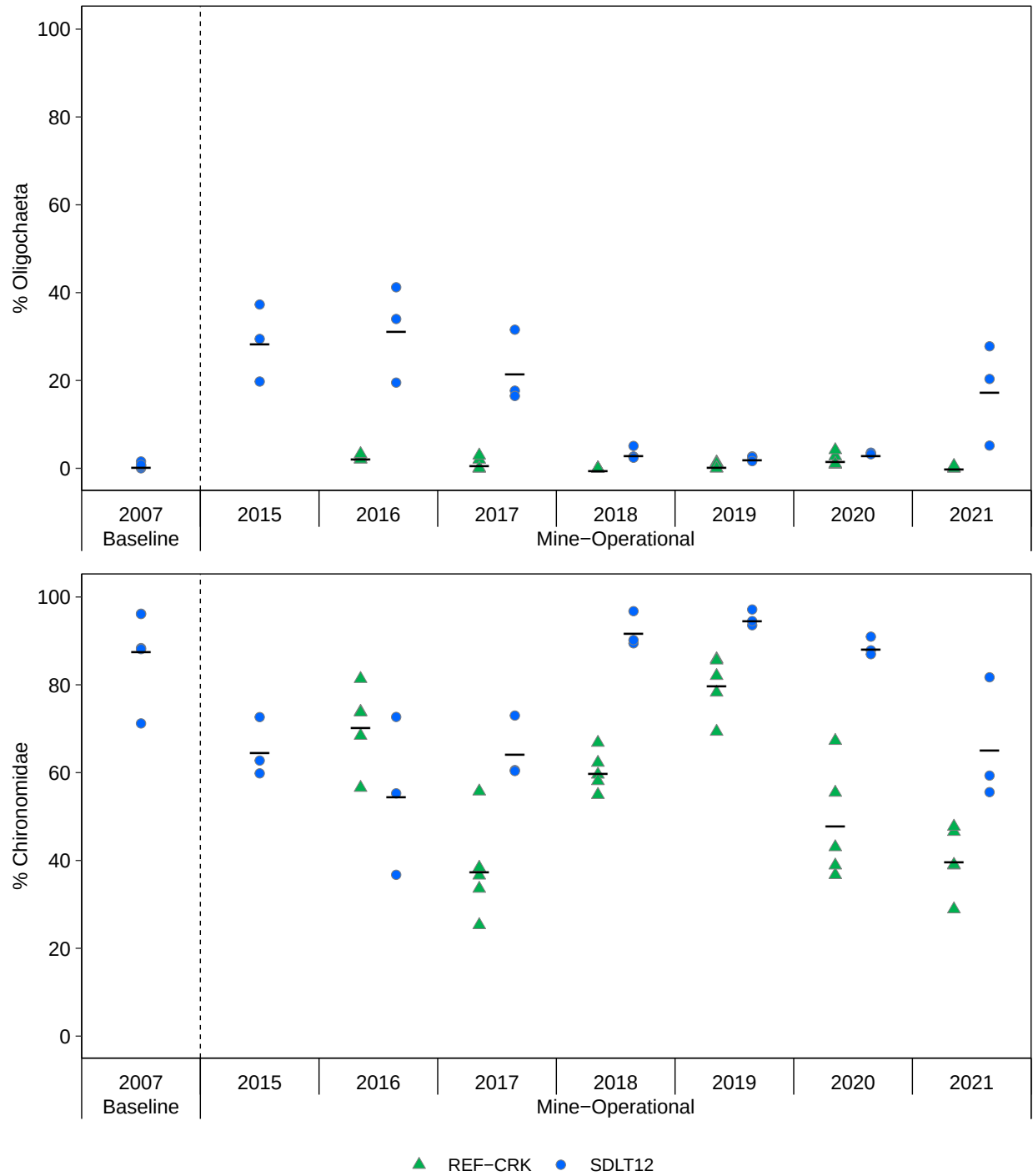


Figure F.8: Comparison of Key Benthic Invertebrate Community Metrics at SDLT12 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

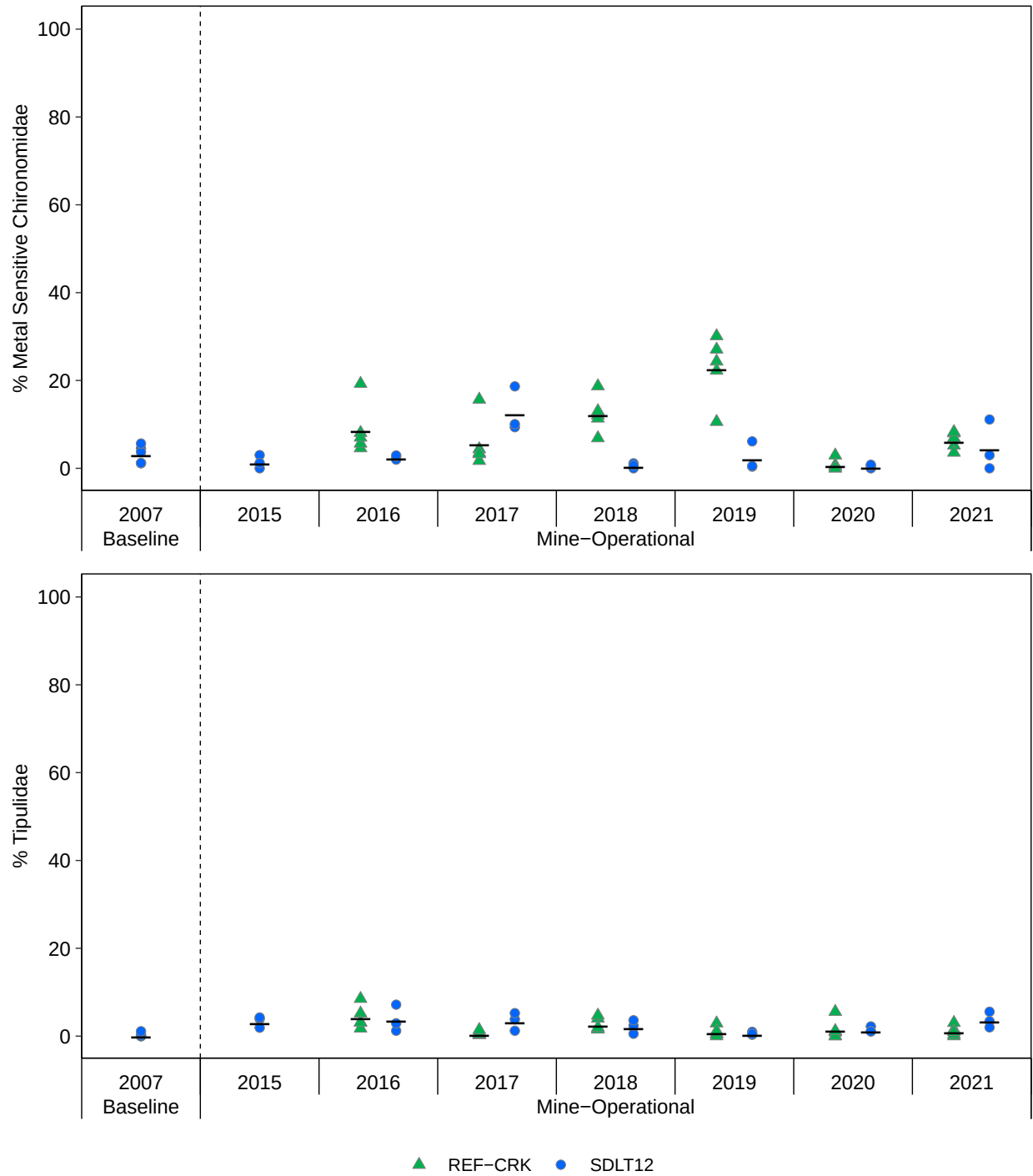


Figure F.8: Comparison of Key Benthic Invertebrate Community Metrics at SDLT12 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

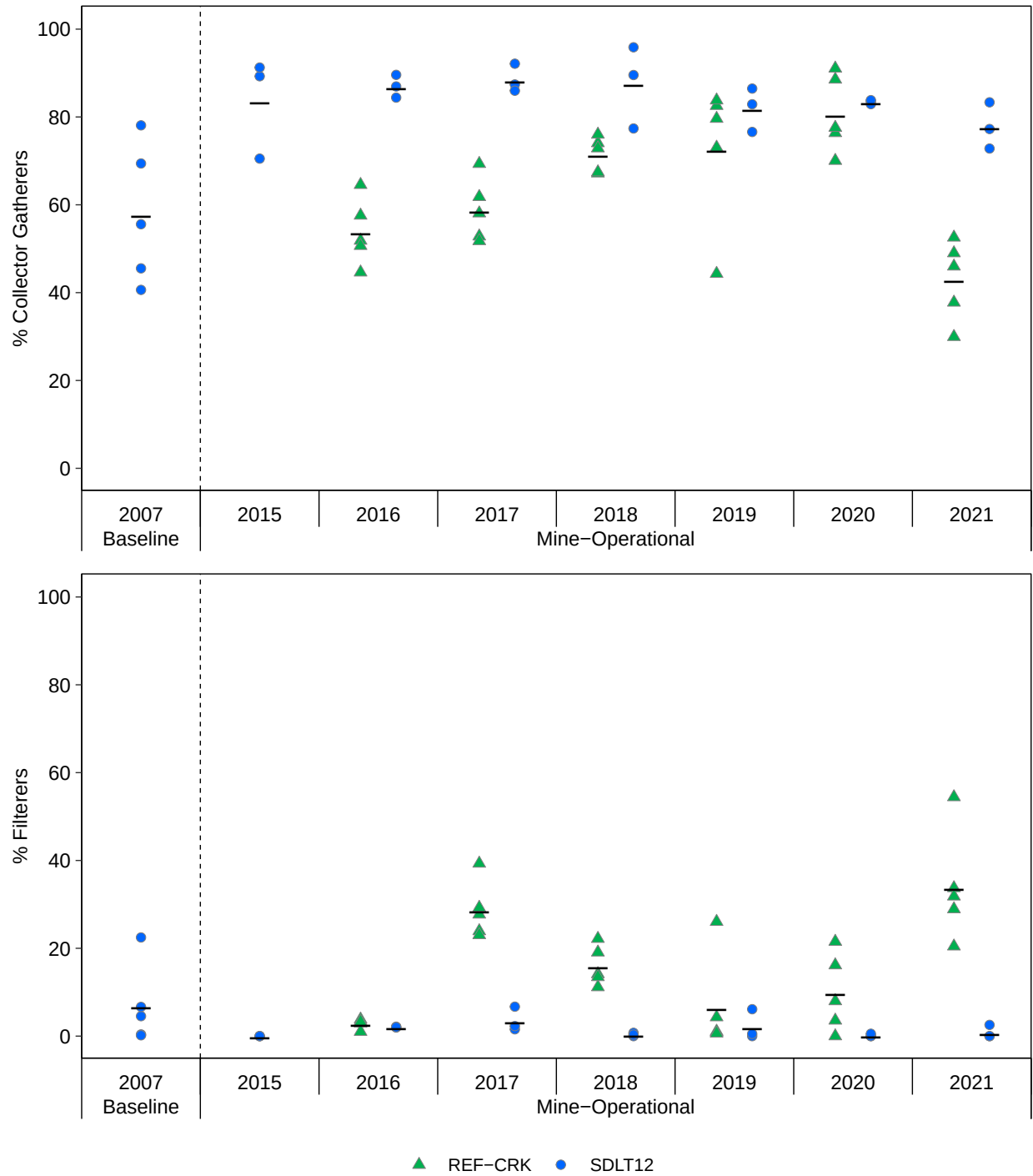


Figure F.8: Comparison of Key Benthic Invertebrate Community Metrics at SDLT12 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

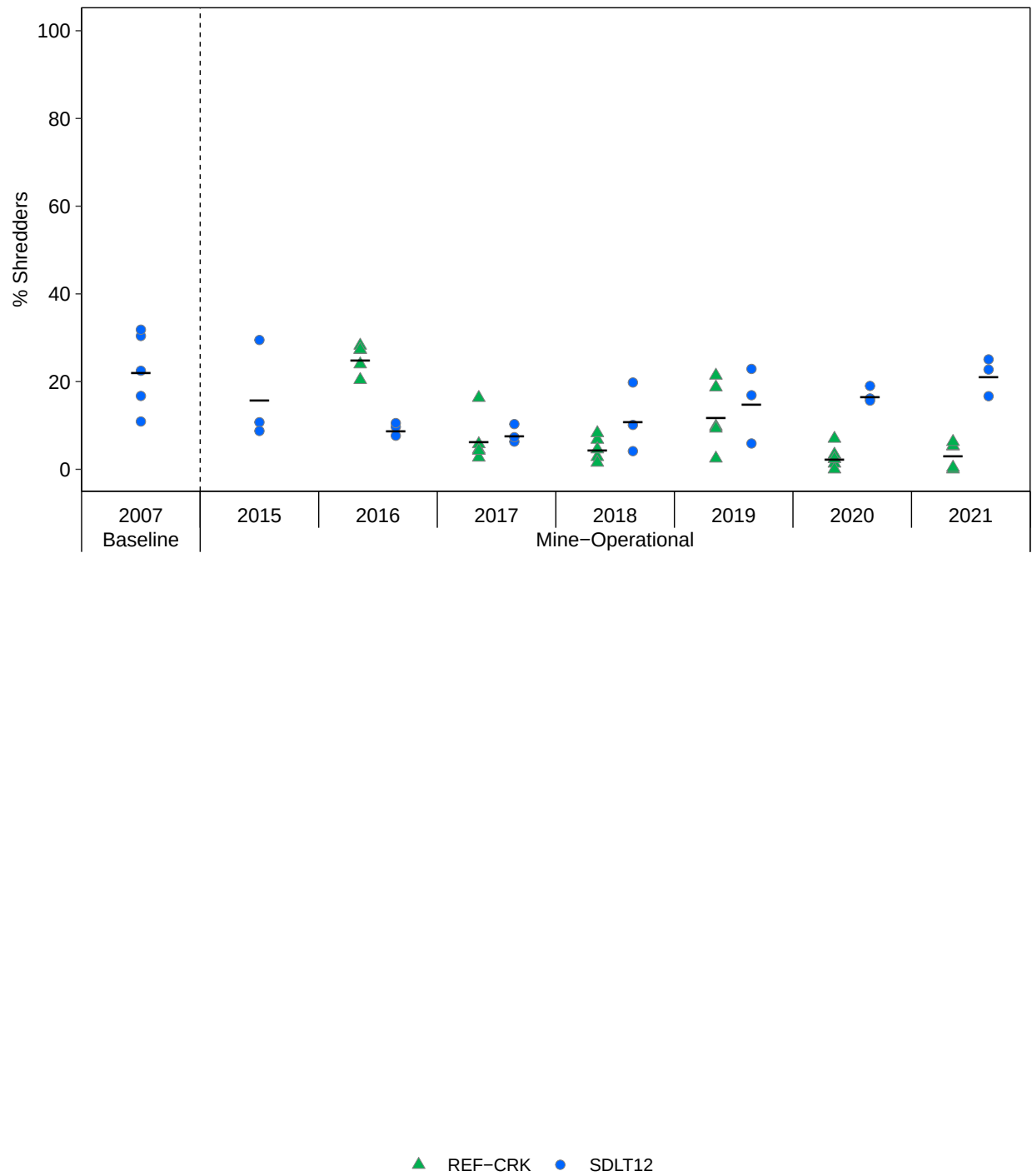


Figure F.8: Comparison of Key Benthic Invertebrate Community Metrics at SDLT12 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

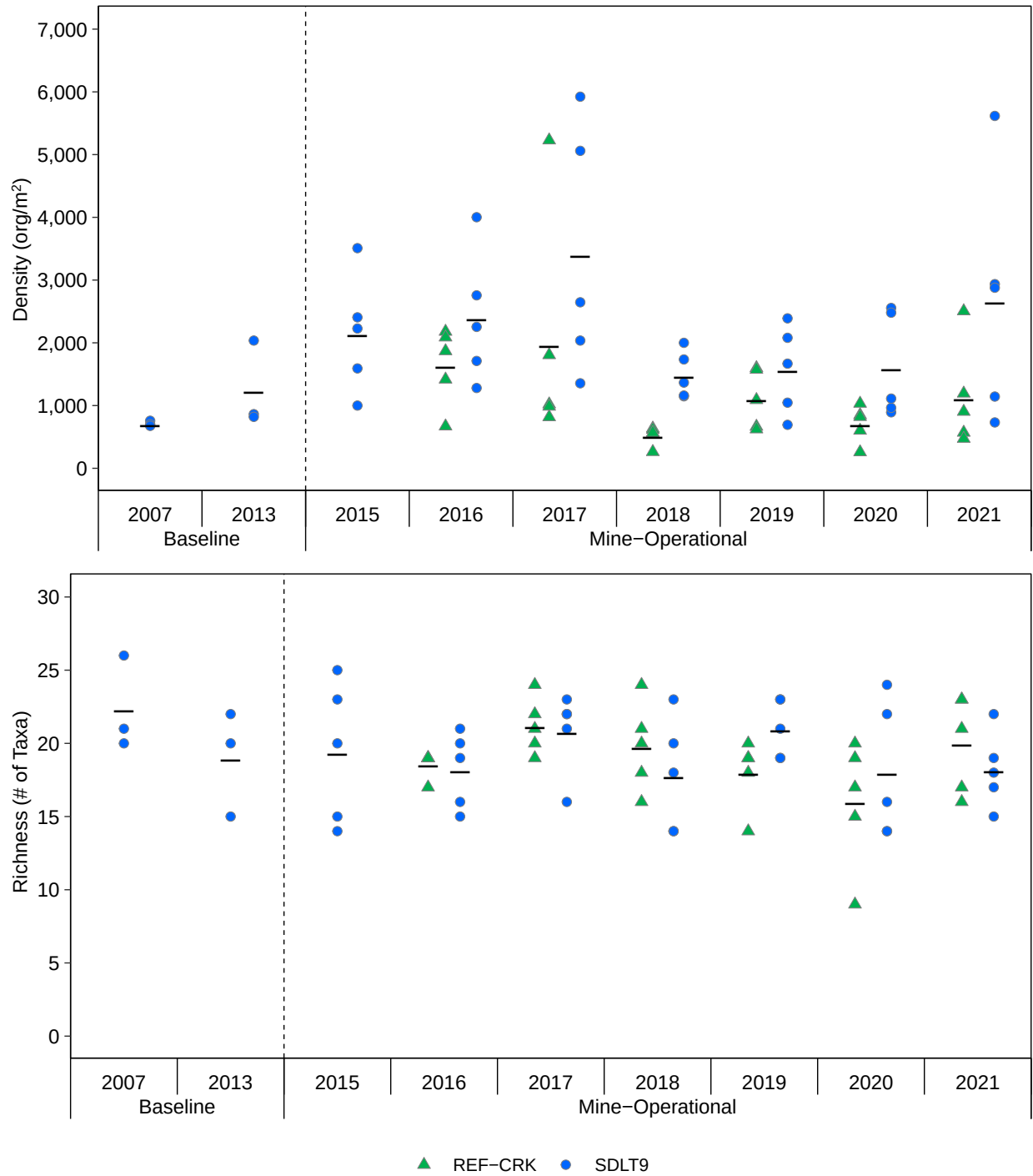


Figure F.9: Comparison of Key Benthic Invertebrate Community Metrics at SDLT9 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

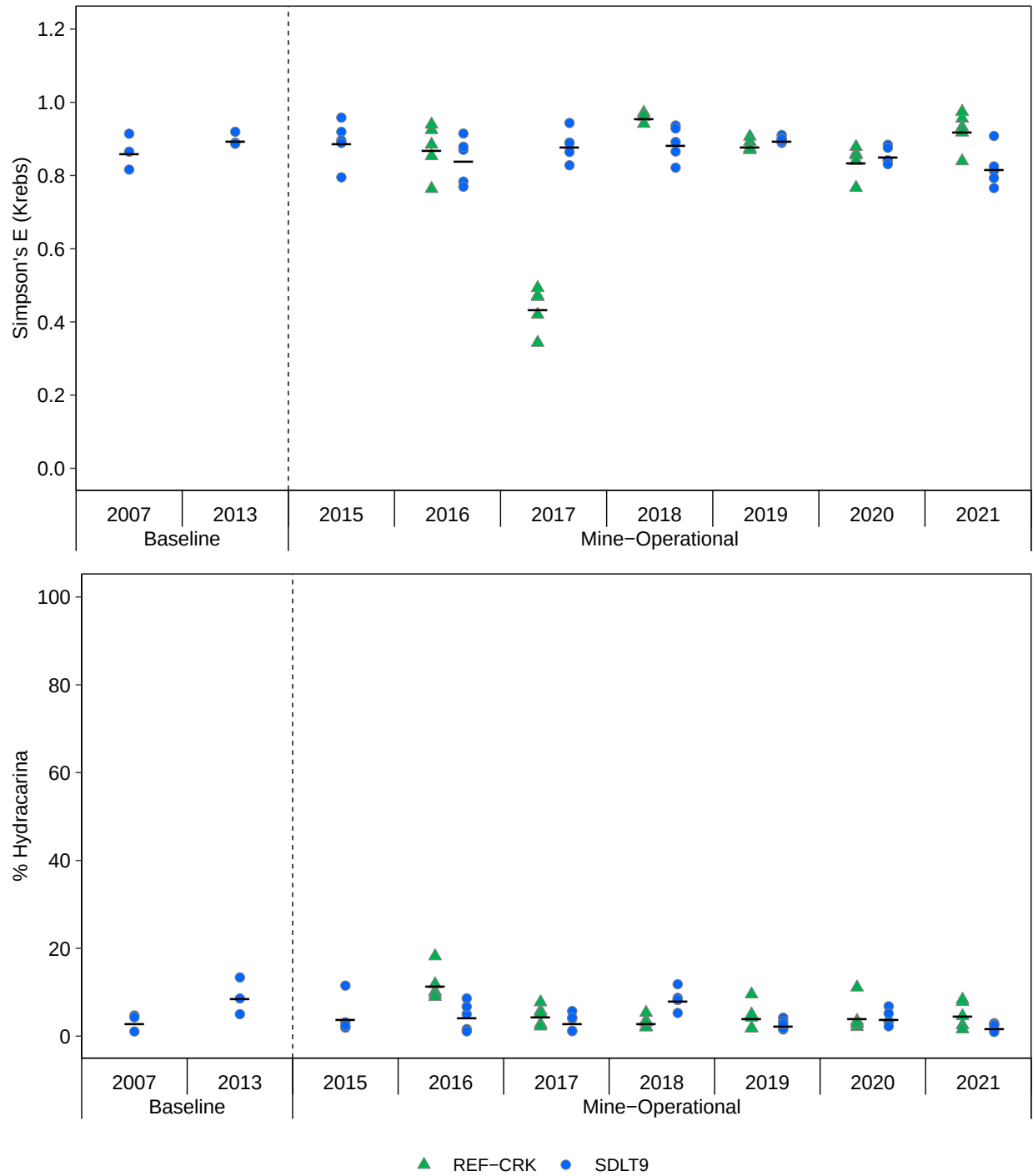


Figure F.9: Comparison of Key Benthic Invertebrate Community Metrics at SDLT9 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

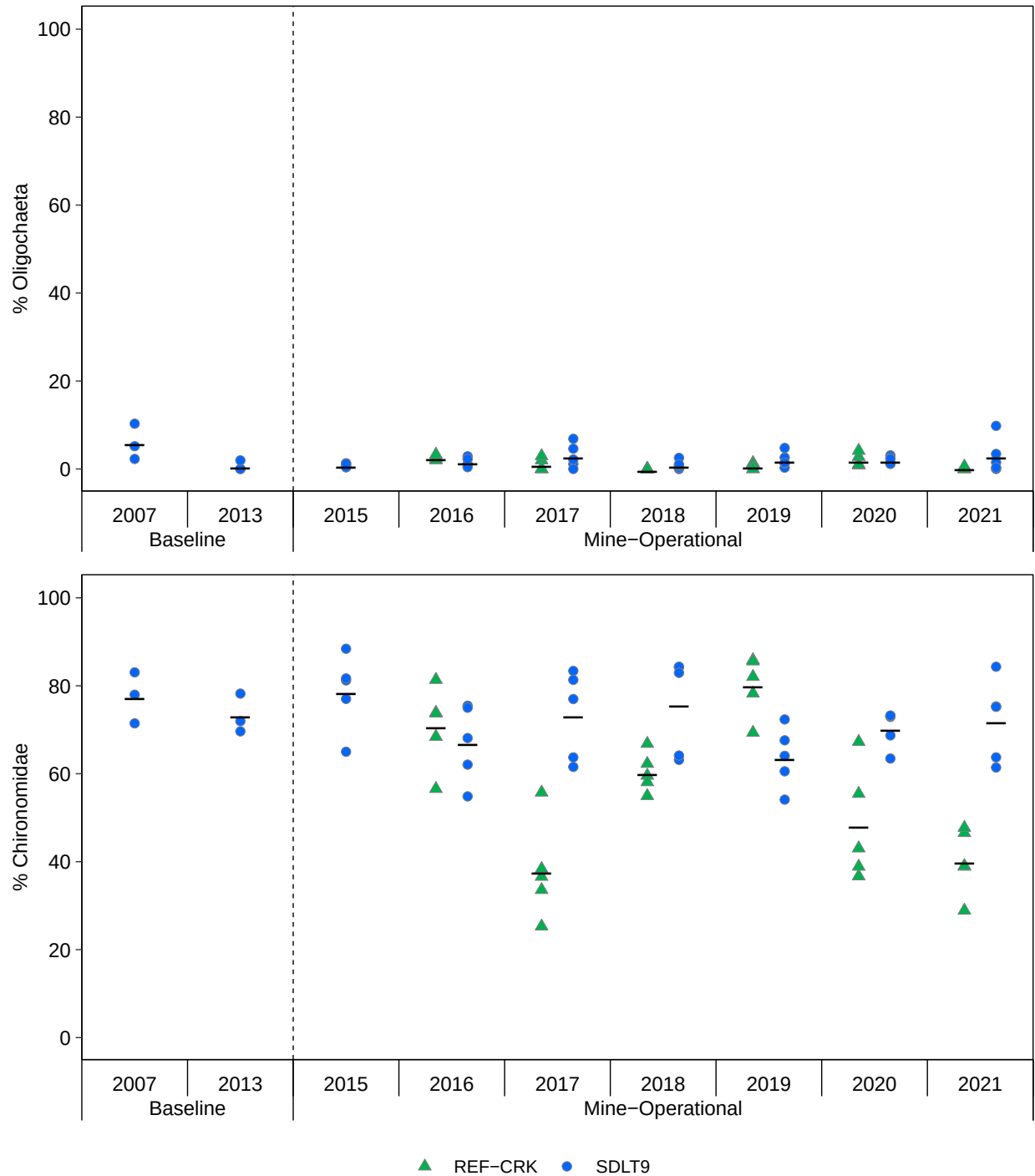


Figure F.9: Comparison of Key Benthic Invertebrate Community Metrics at SDLT9 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

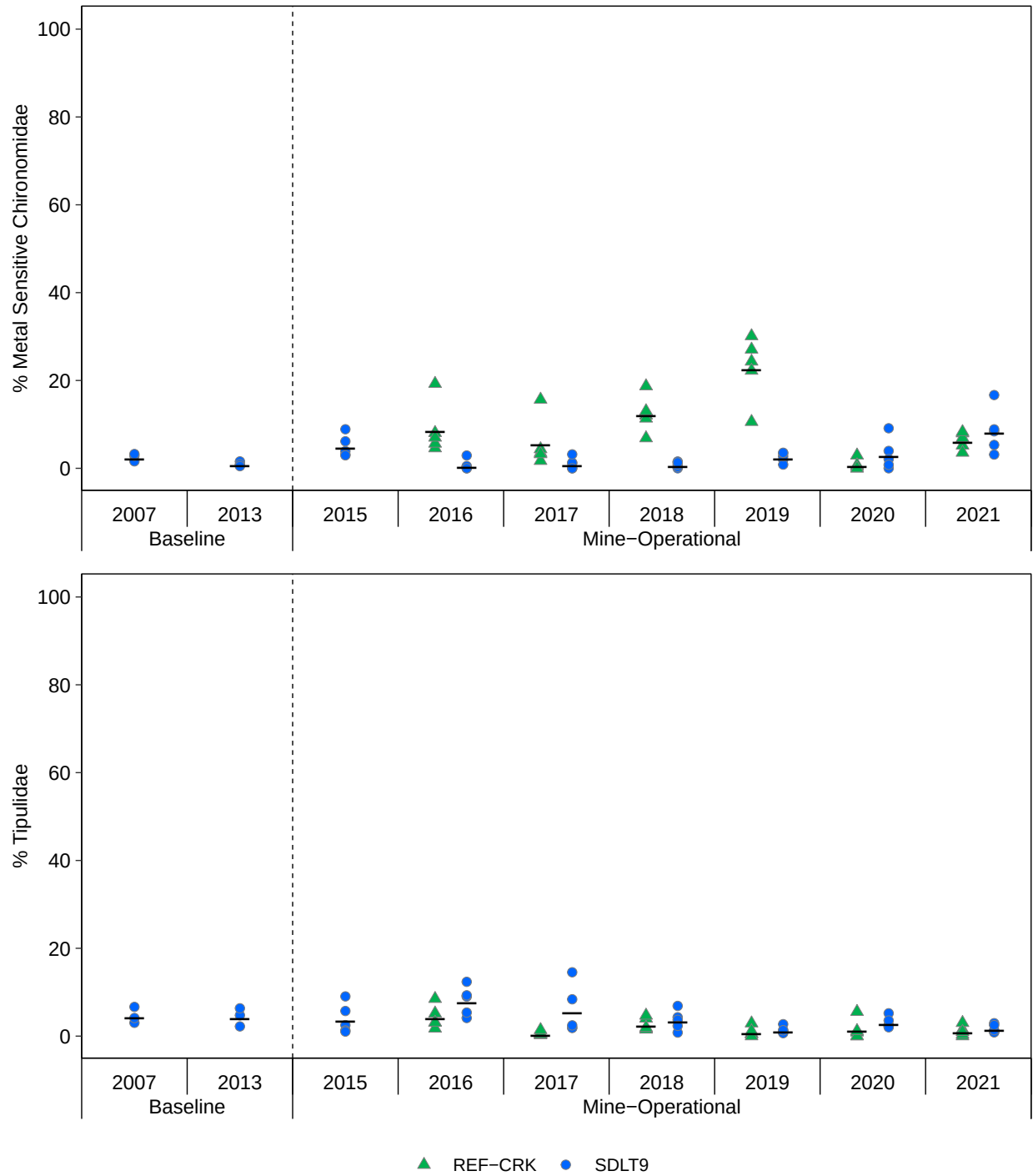


Figure F.9: Comparison of Key Benthic Invertebrate Community Metrics at SDLT9 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

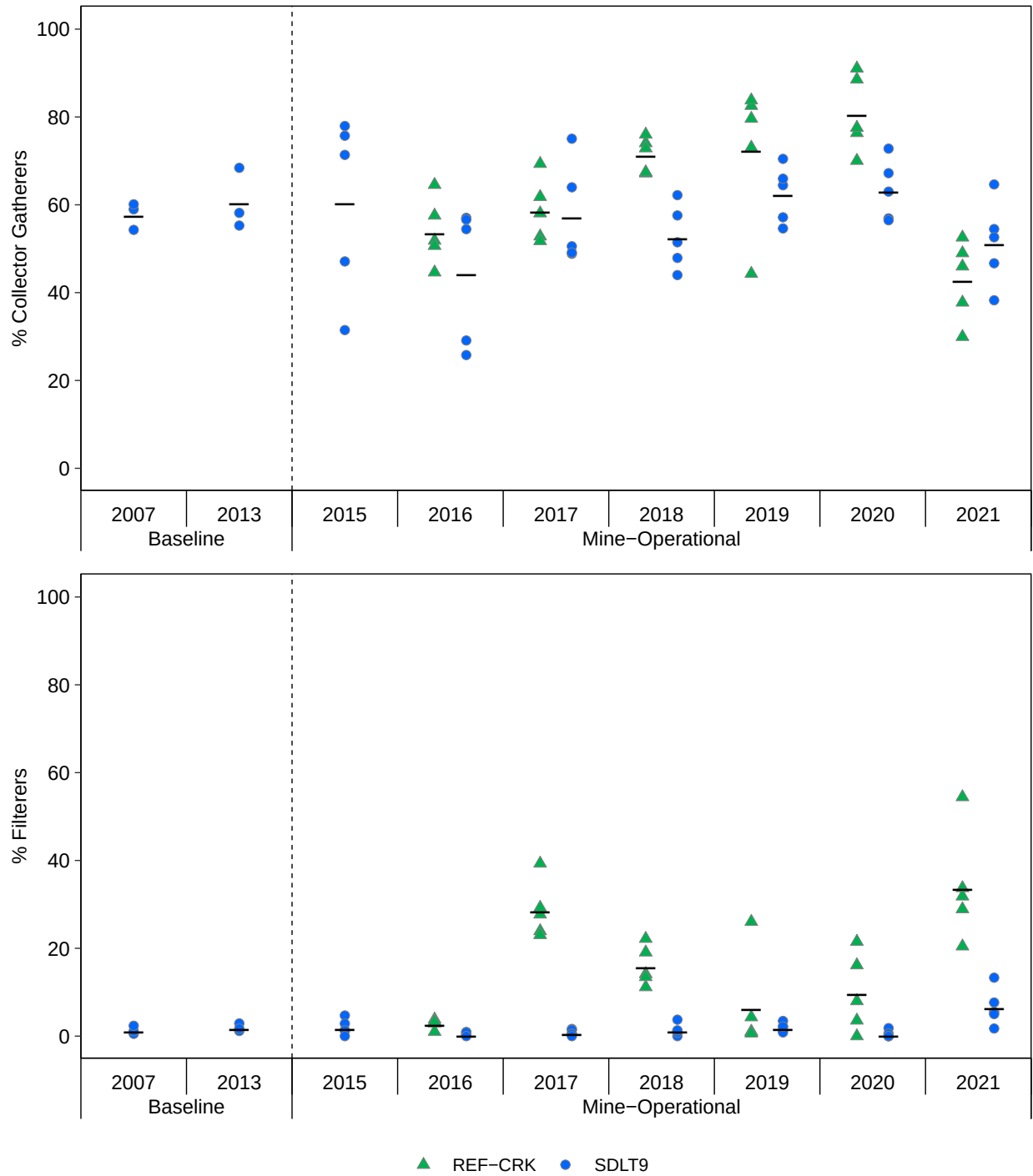


Figure F.9: Comparison of Key Benthic Invertebrate Community Metrics at SDLT9 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

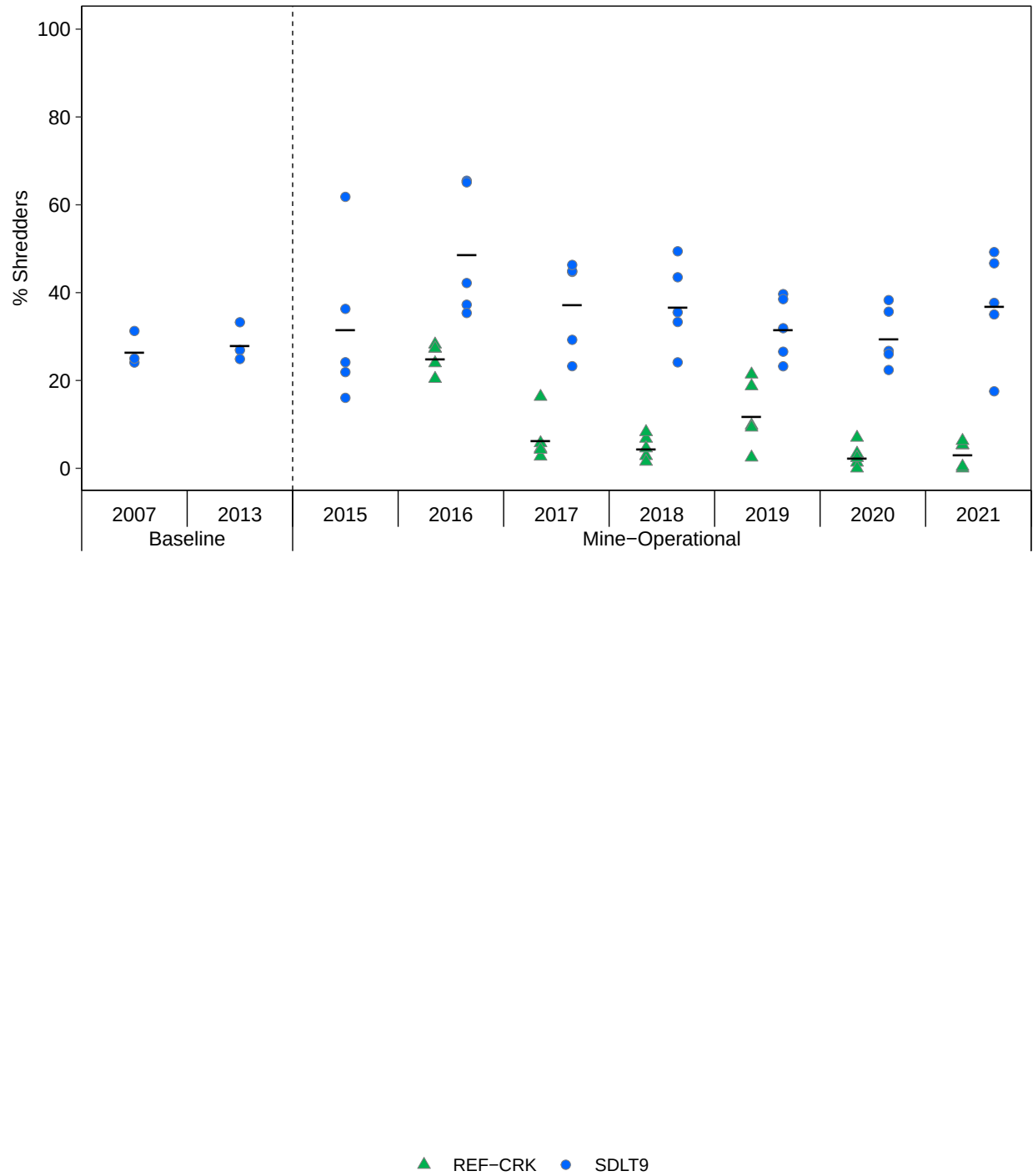


Figure F.9: Comparison of Key Benthic Invertebrate Community Metrics at SDLT9 Over Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

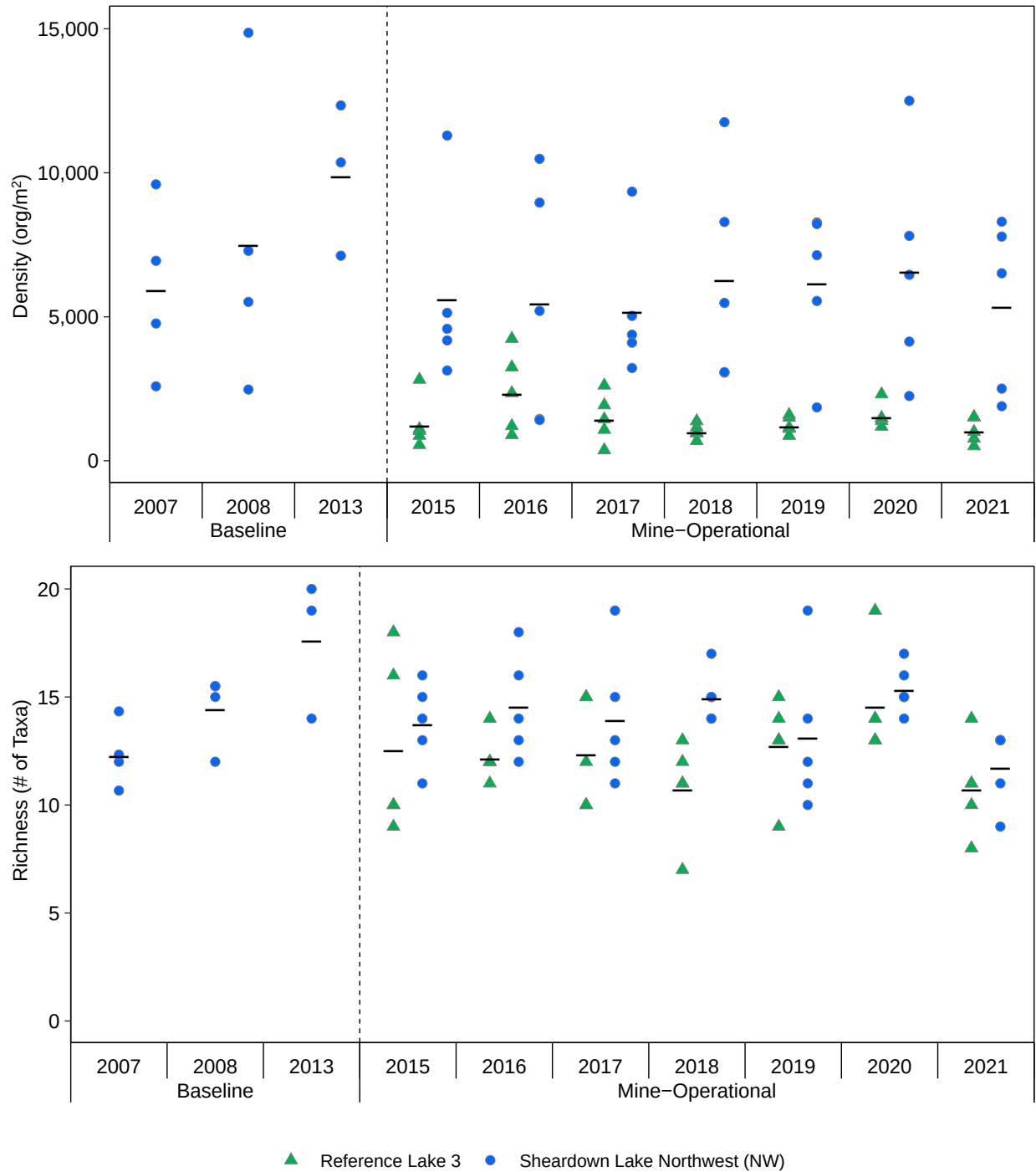


Figure F.10: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

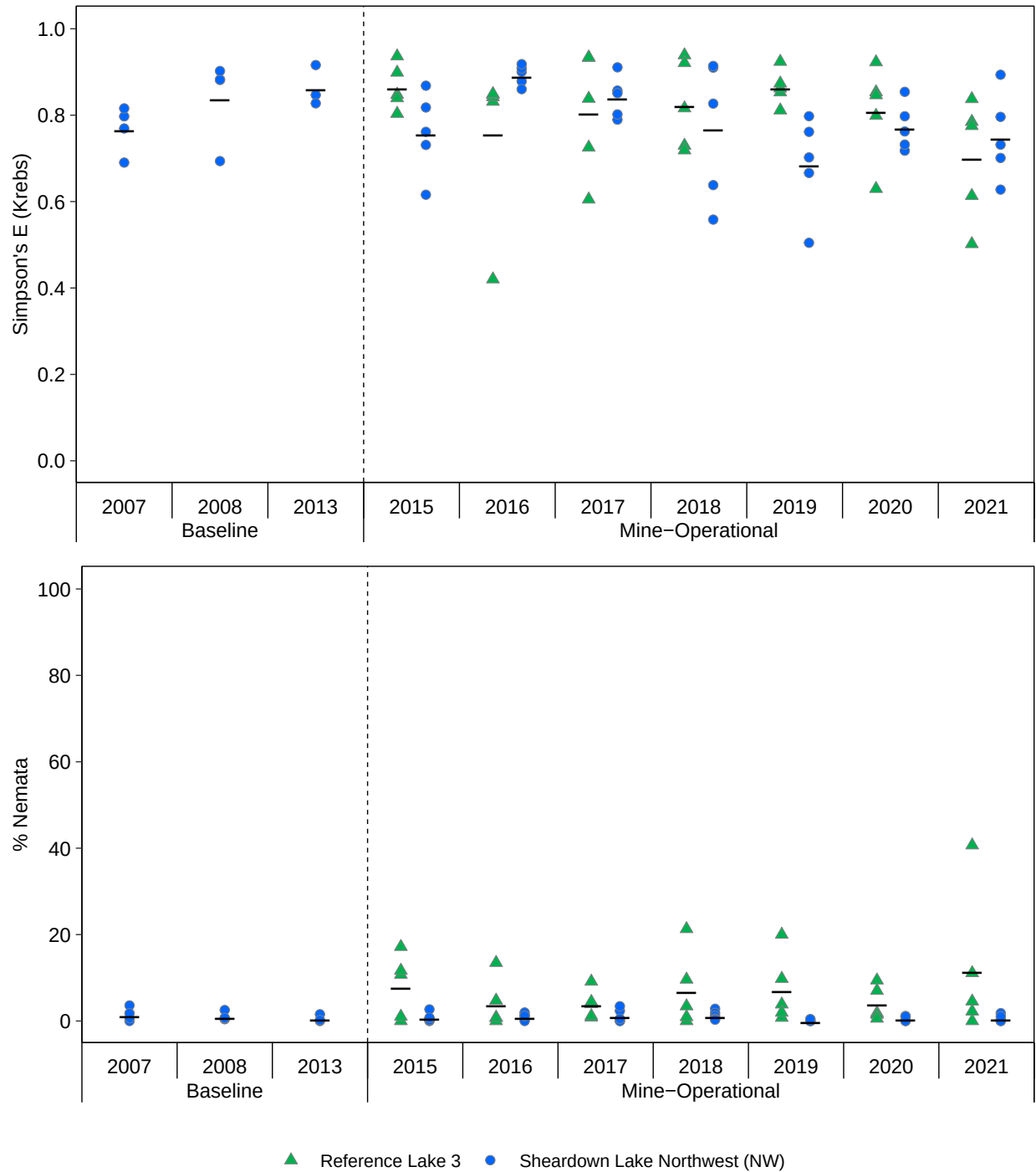


Figure F.10: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

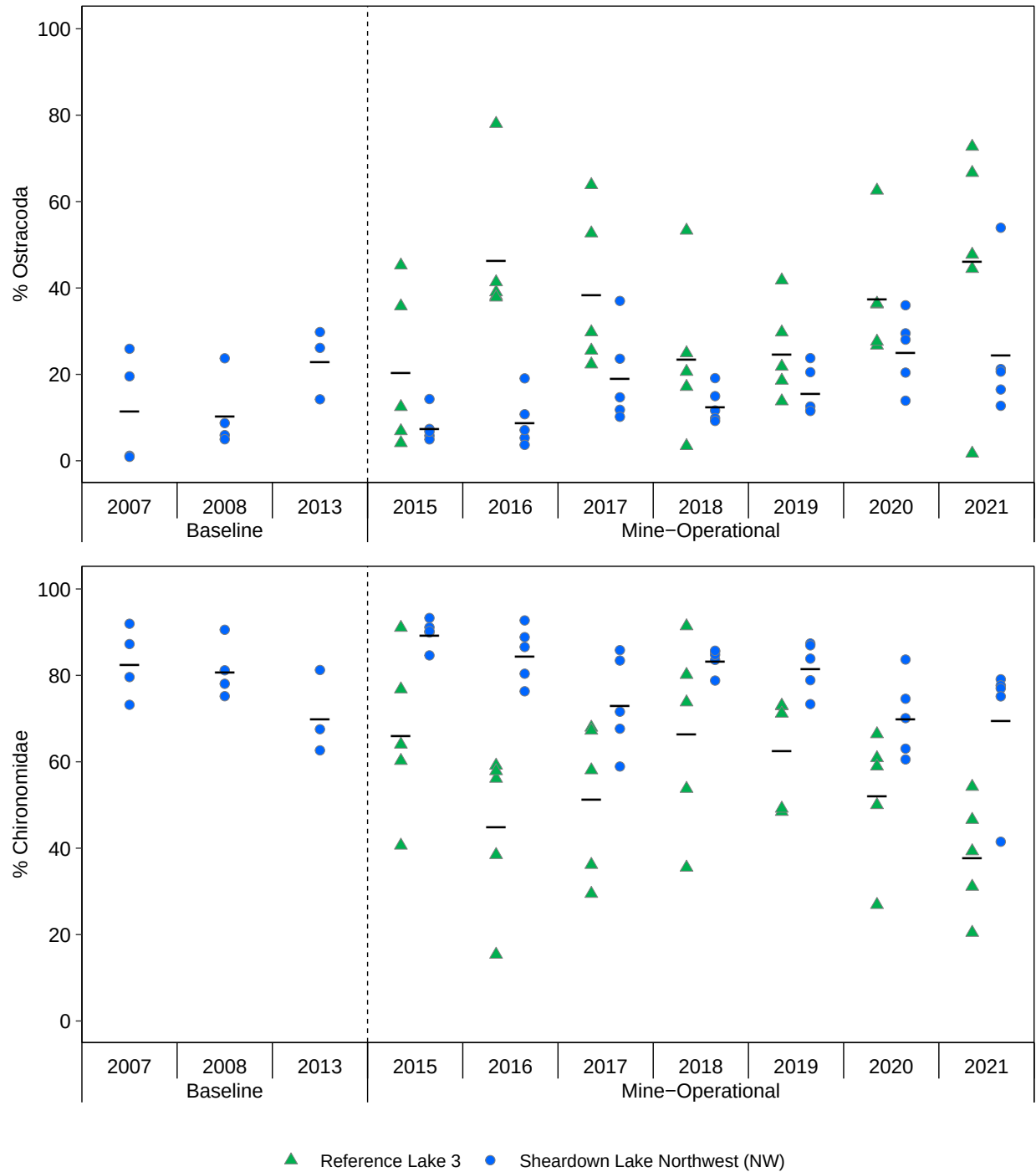


Figure F.10: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

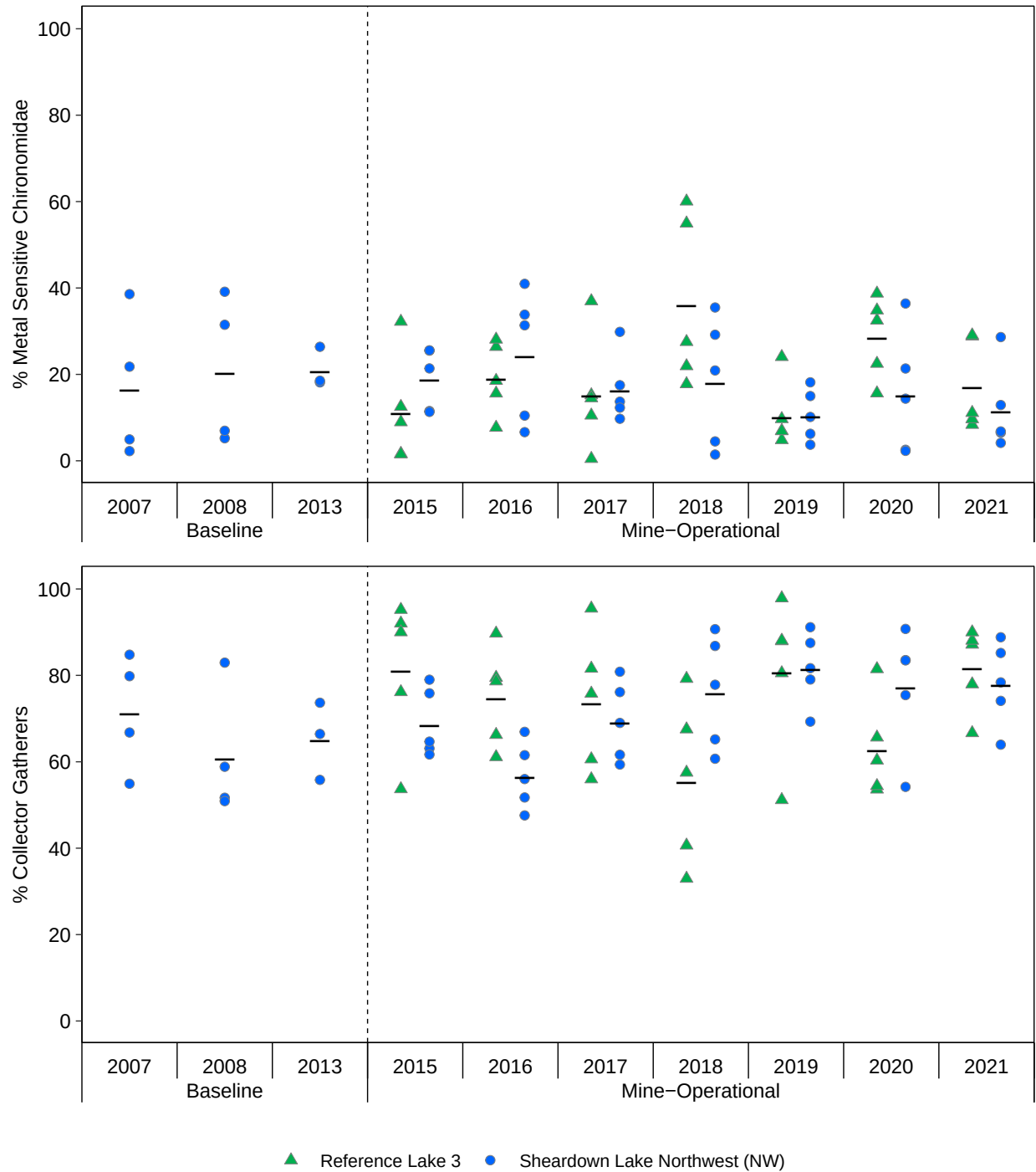
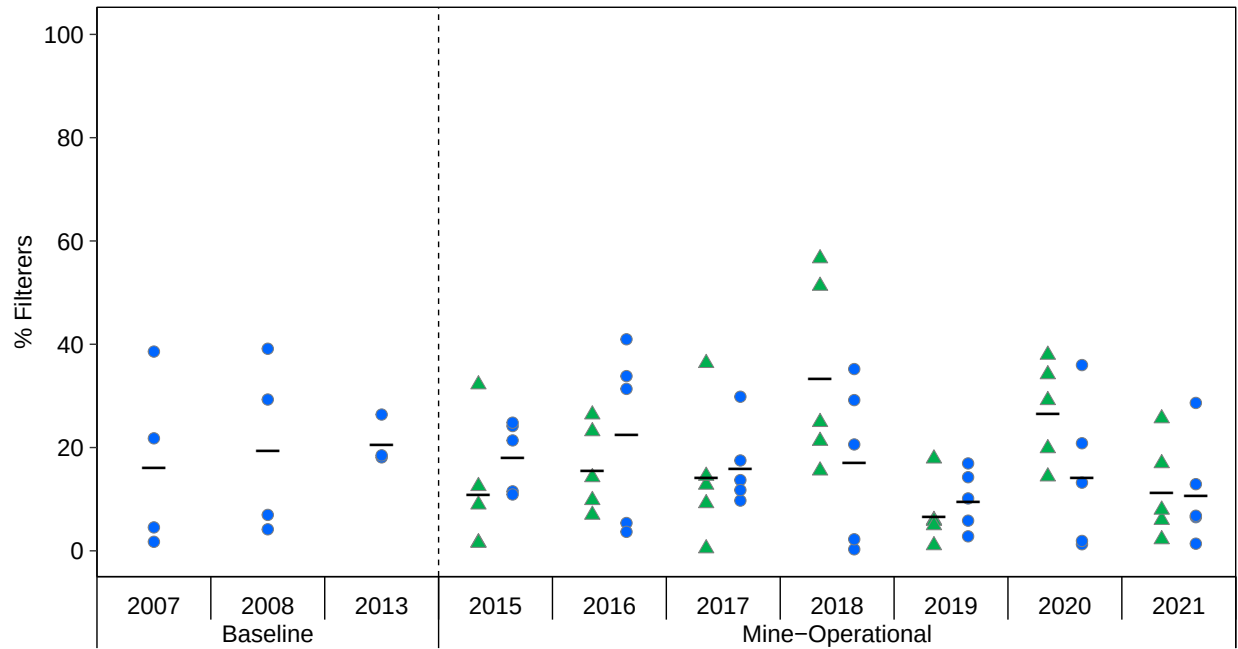


Figure F.10: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.



▲ Reference Lake 3 ● Sheardown Lake Northwest (NW)

Figure F.10: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

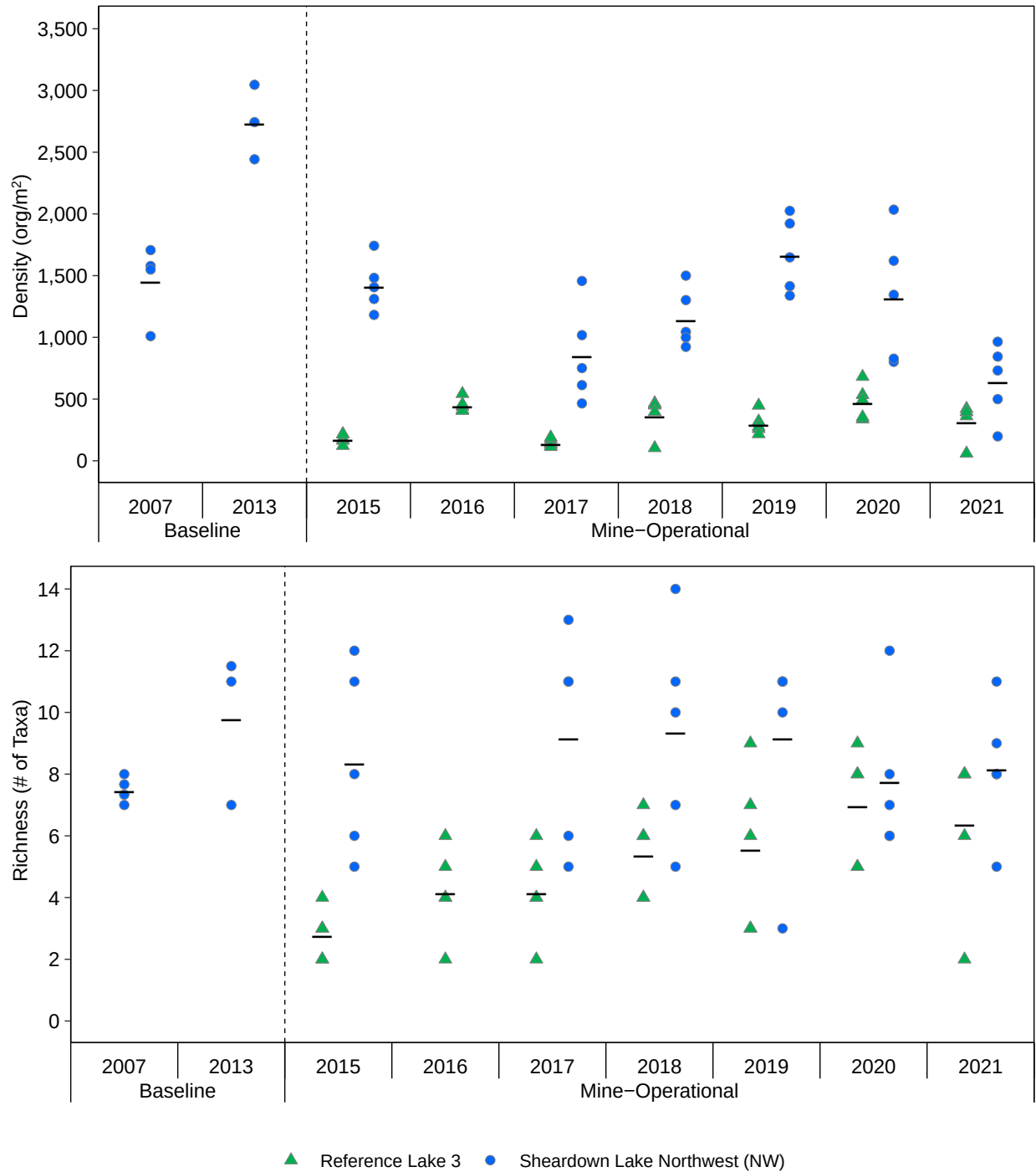


Figure F.11: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

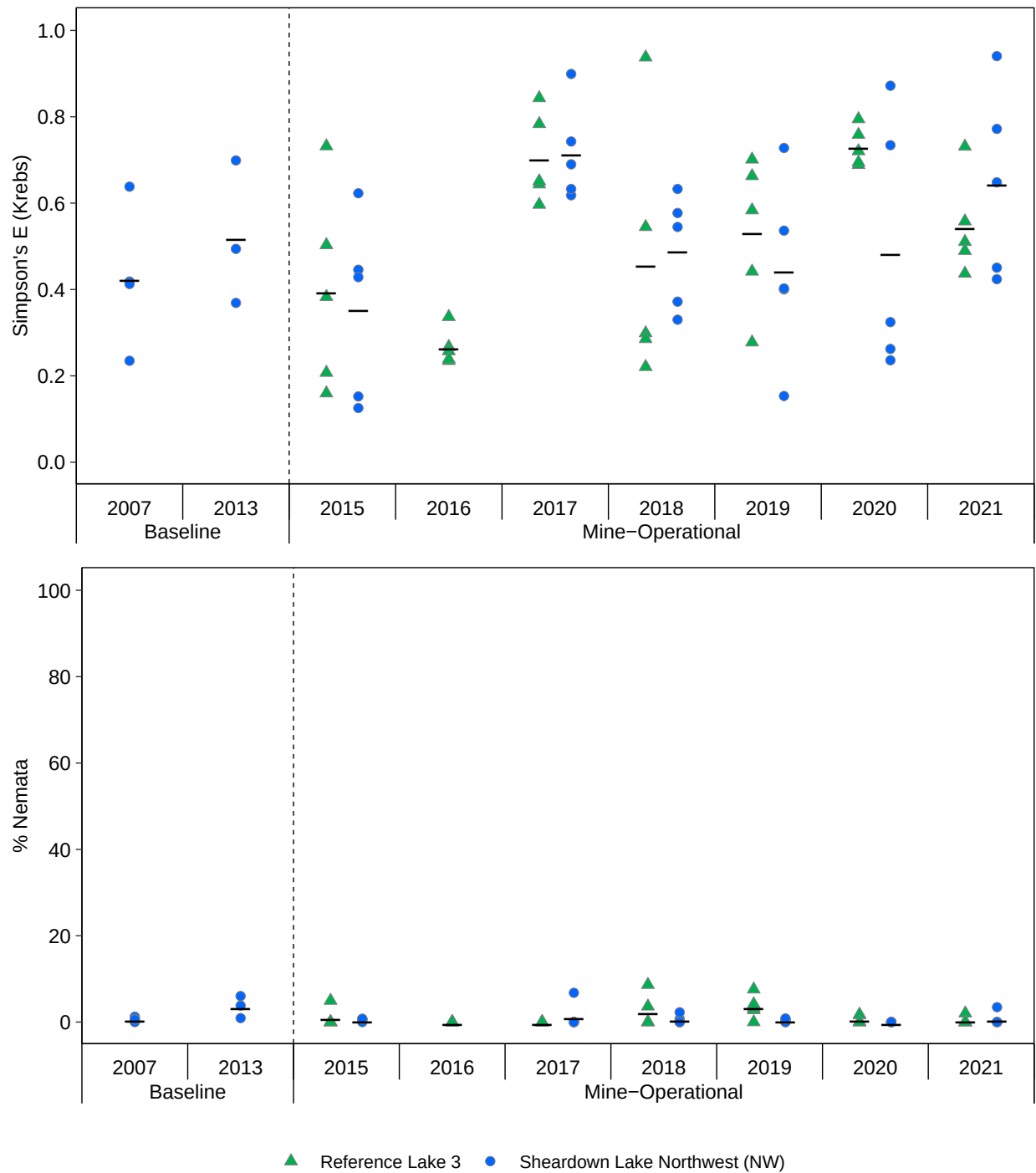


Figure F.11: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

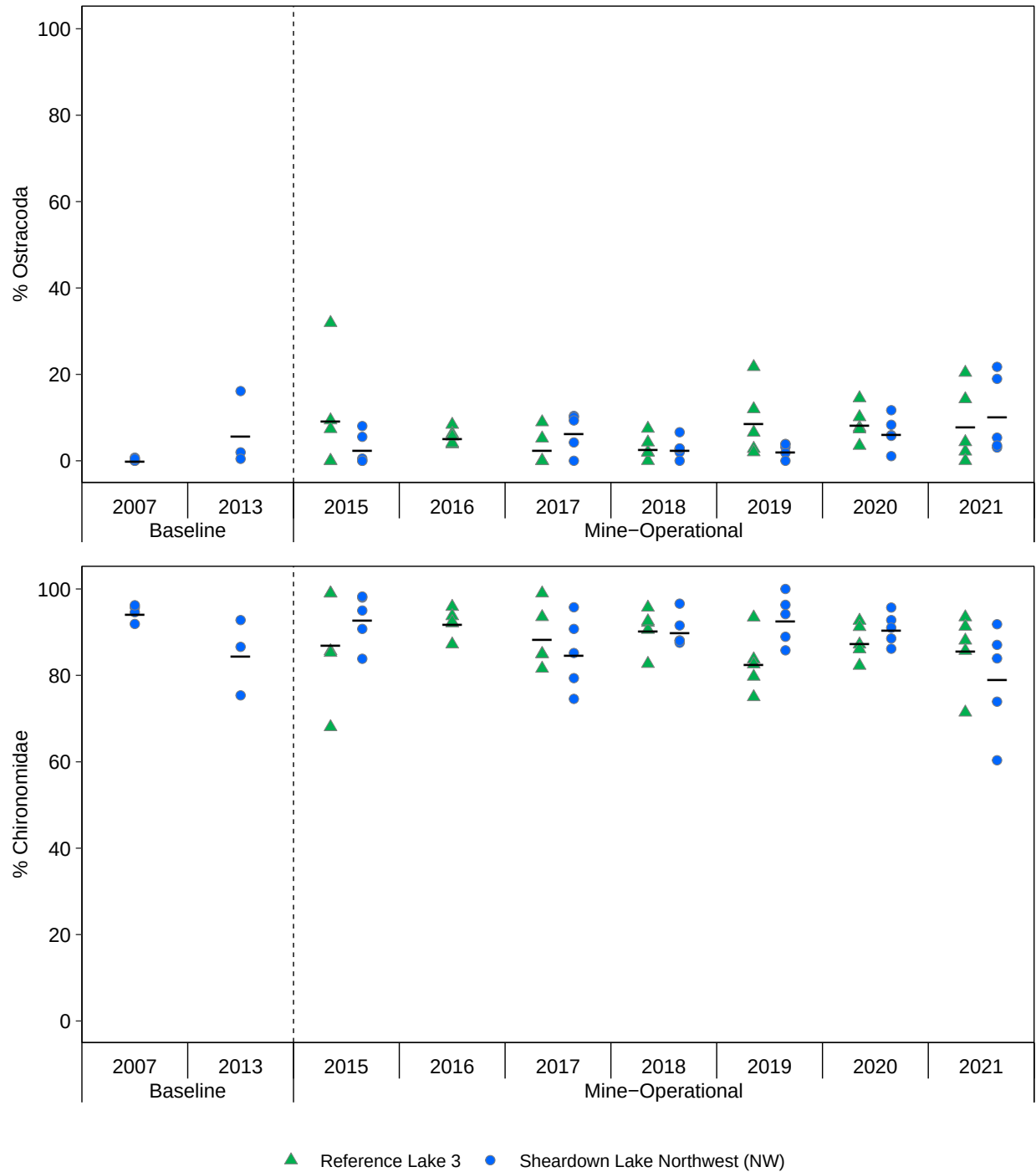


Figure F.11: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

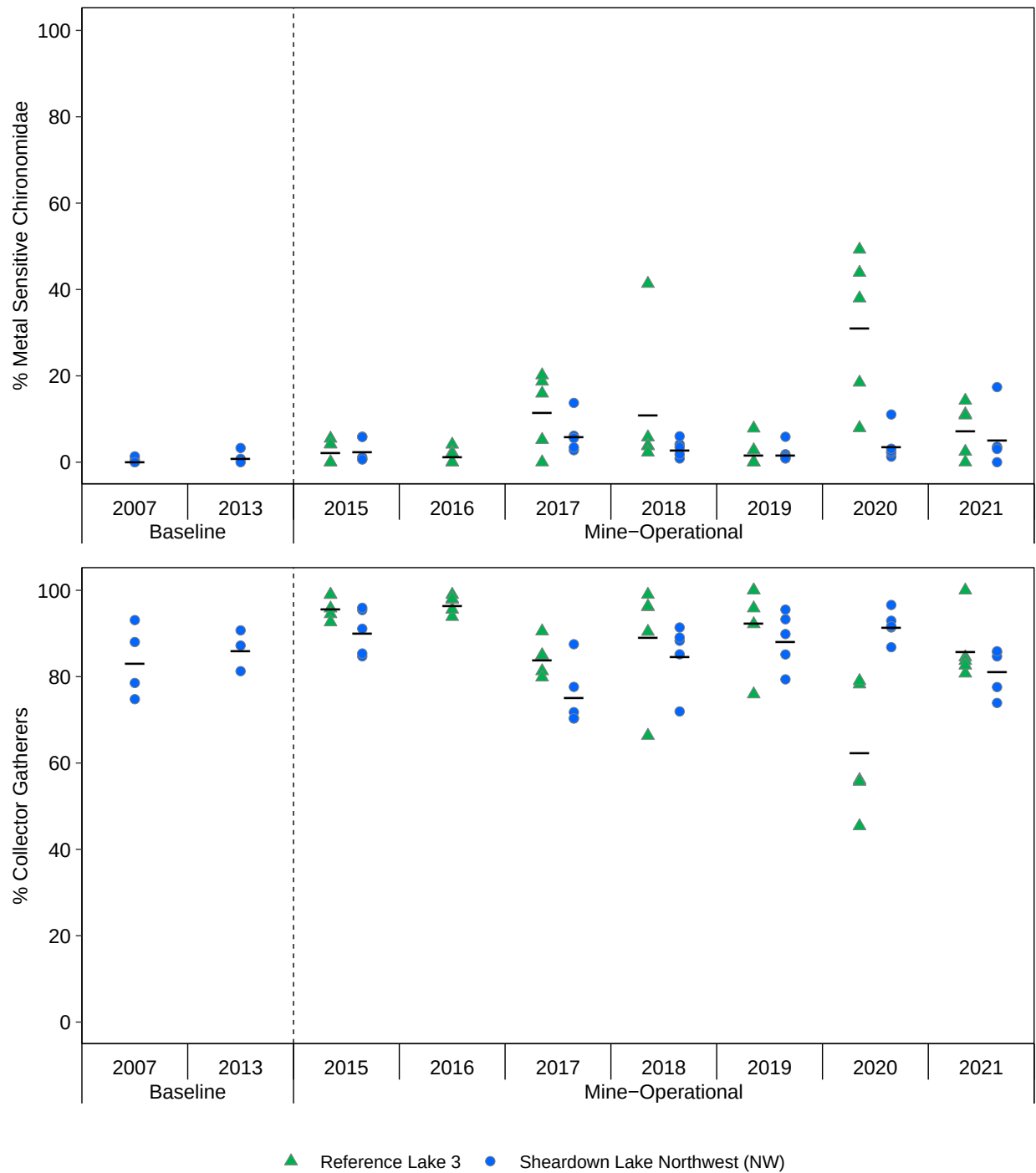


Figure F.11: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

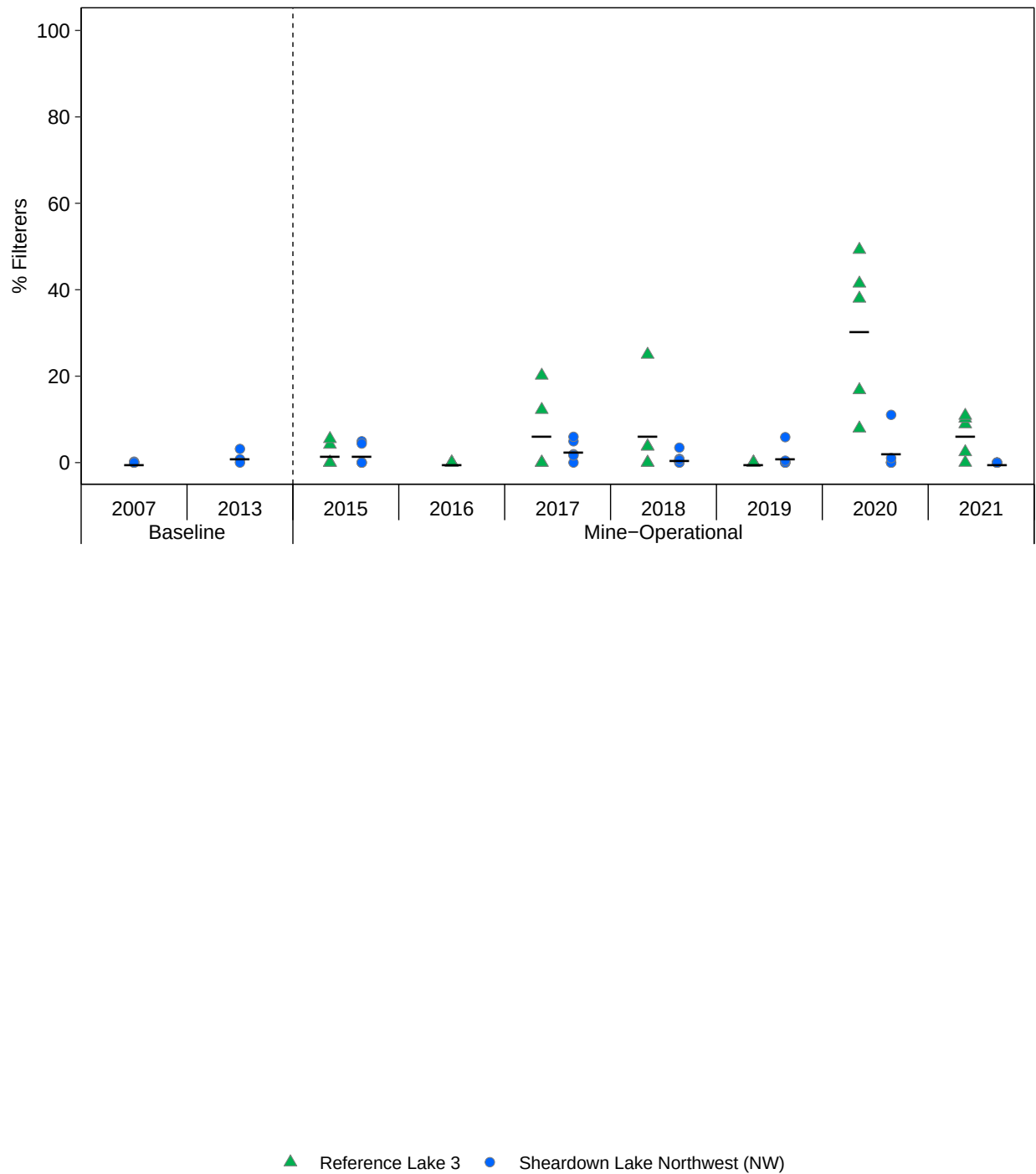


Figure F.11: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Northwest (NW) Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

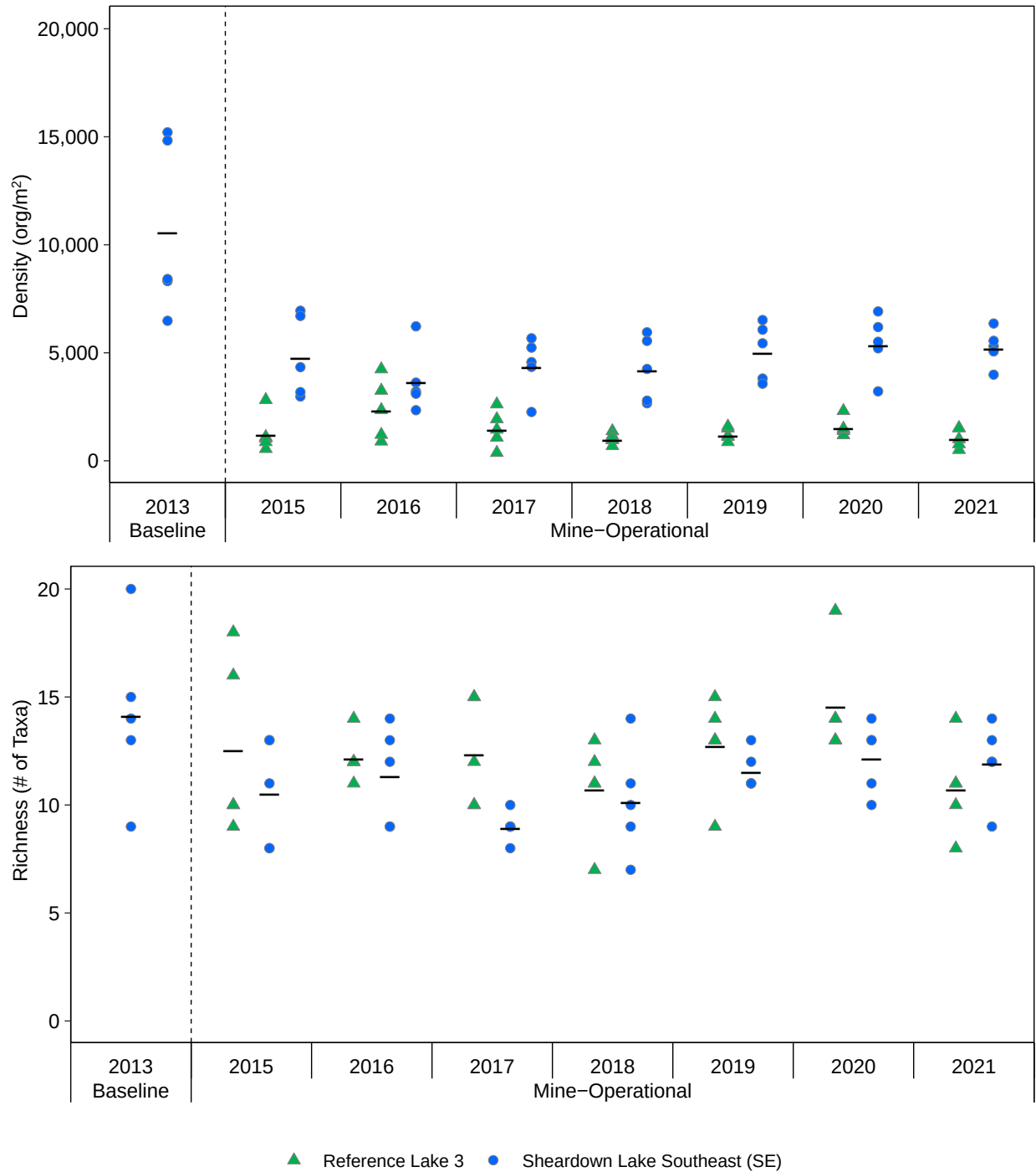


Figure F.12: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

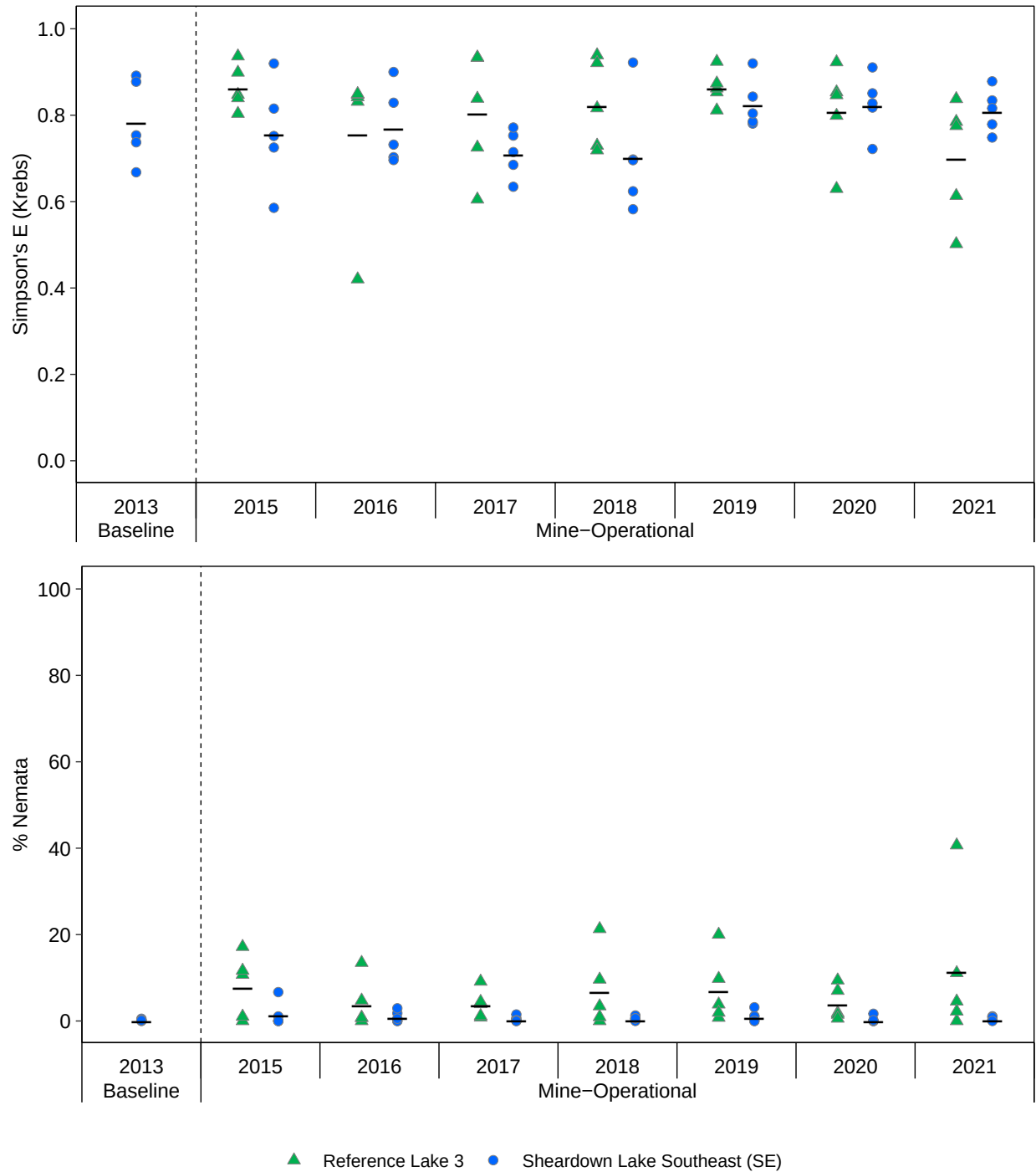


Figure F.12: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

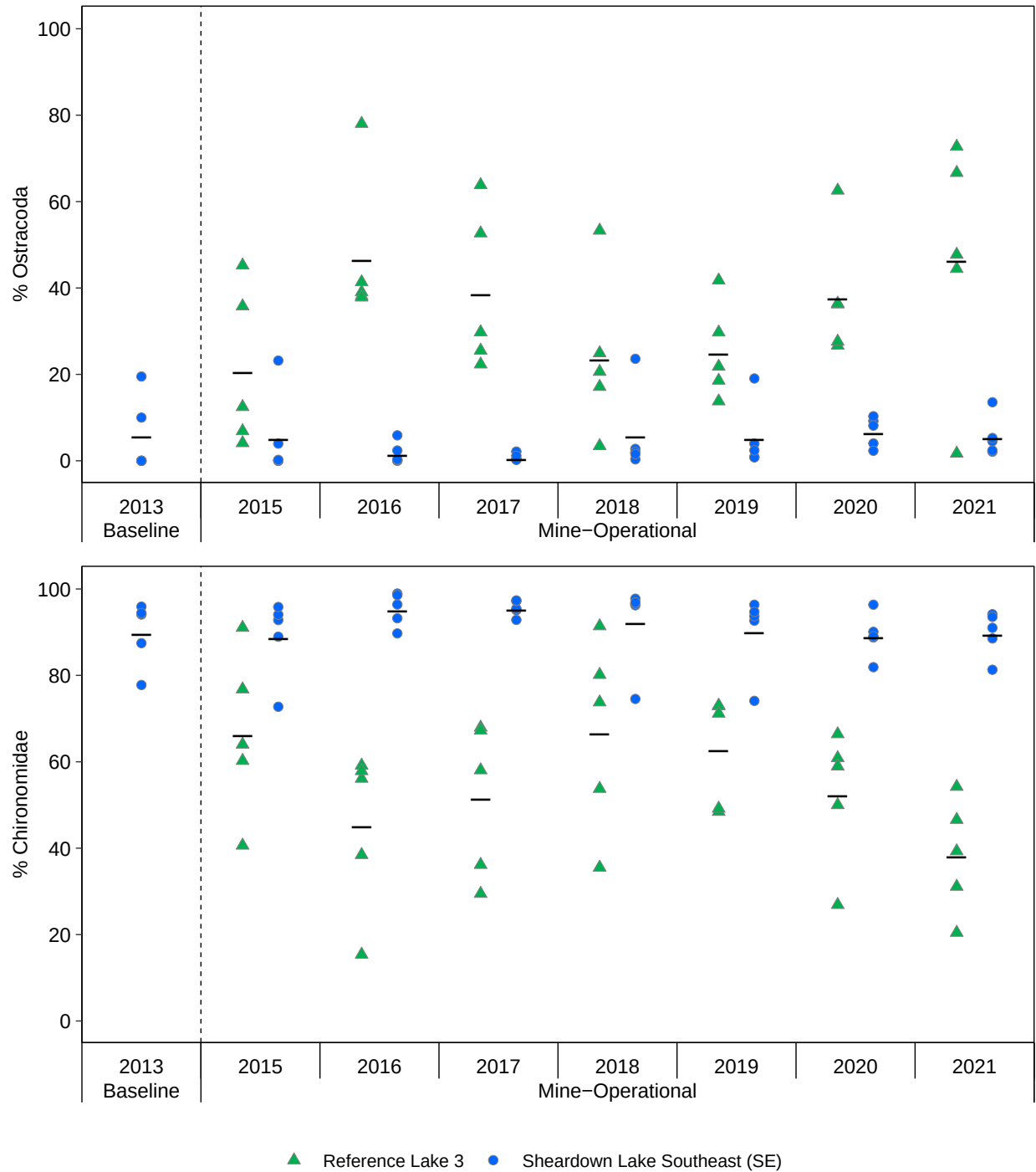


Figure F.12: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

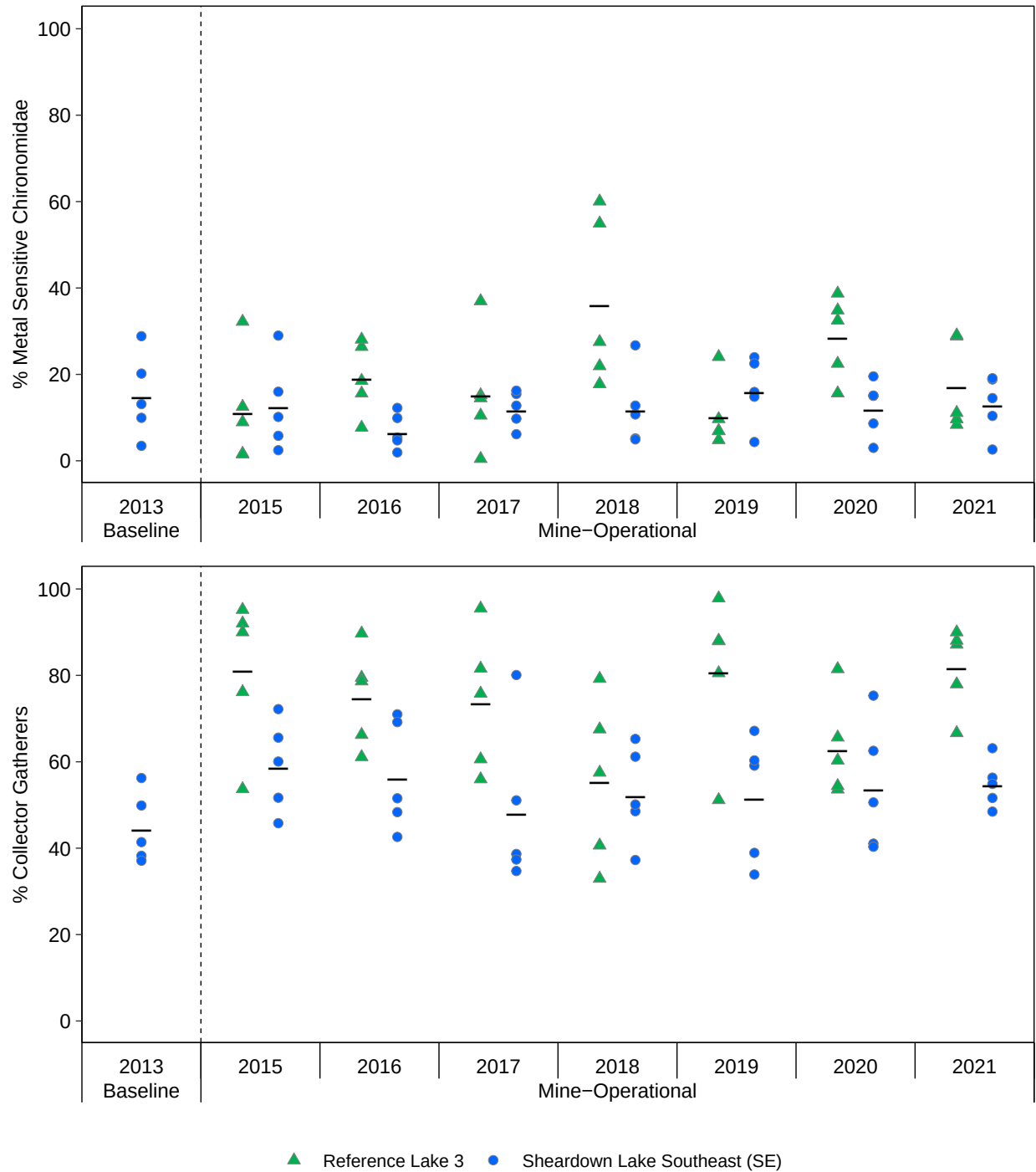
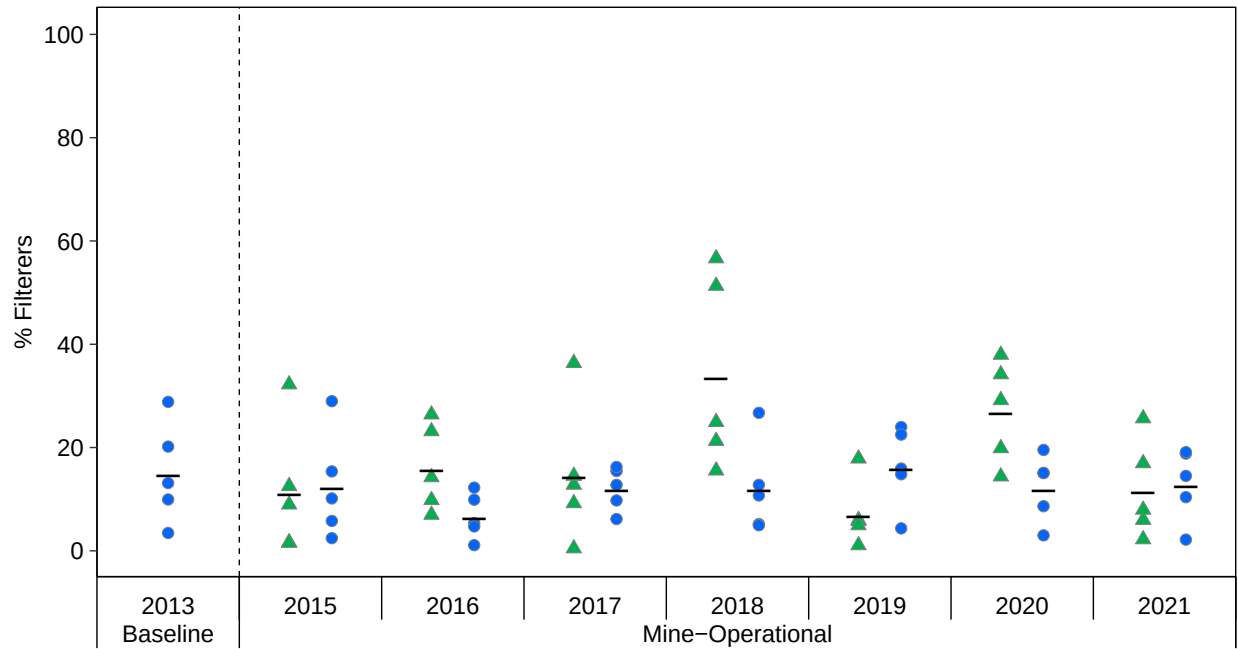


Figure F.12: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.



▲ Reference Lake 3 ● Sheardown Lake Southeast (SE)

Figure F.12: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Littoral Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

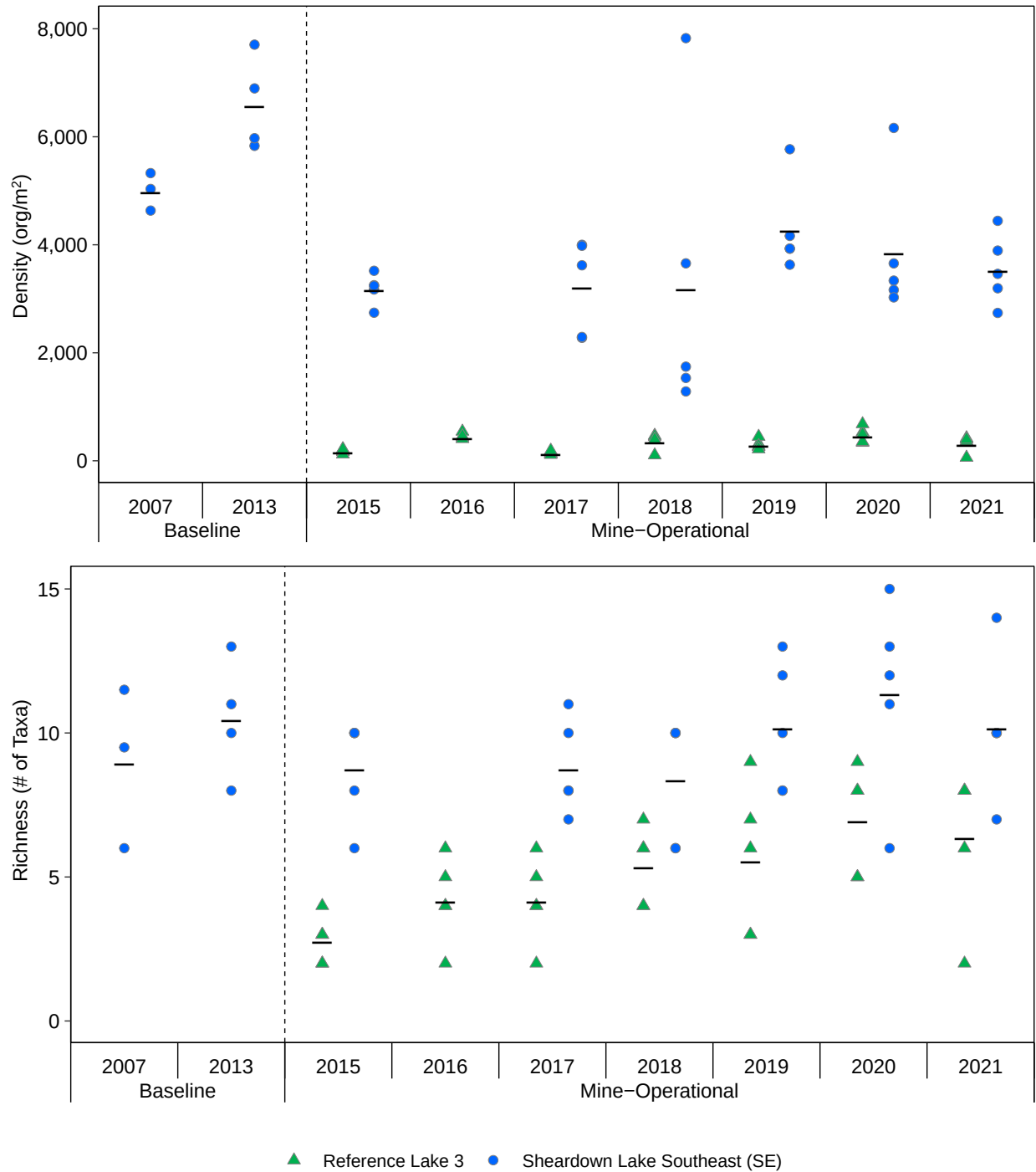


Figure F.13: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.



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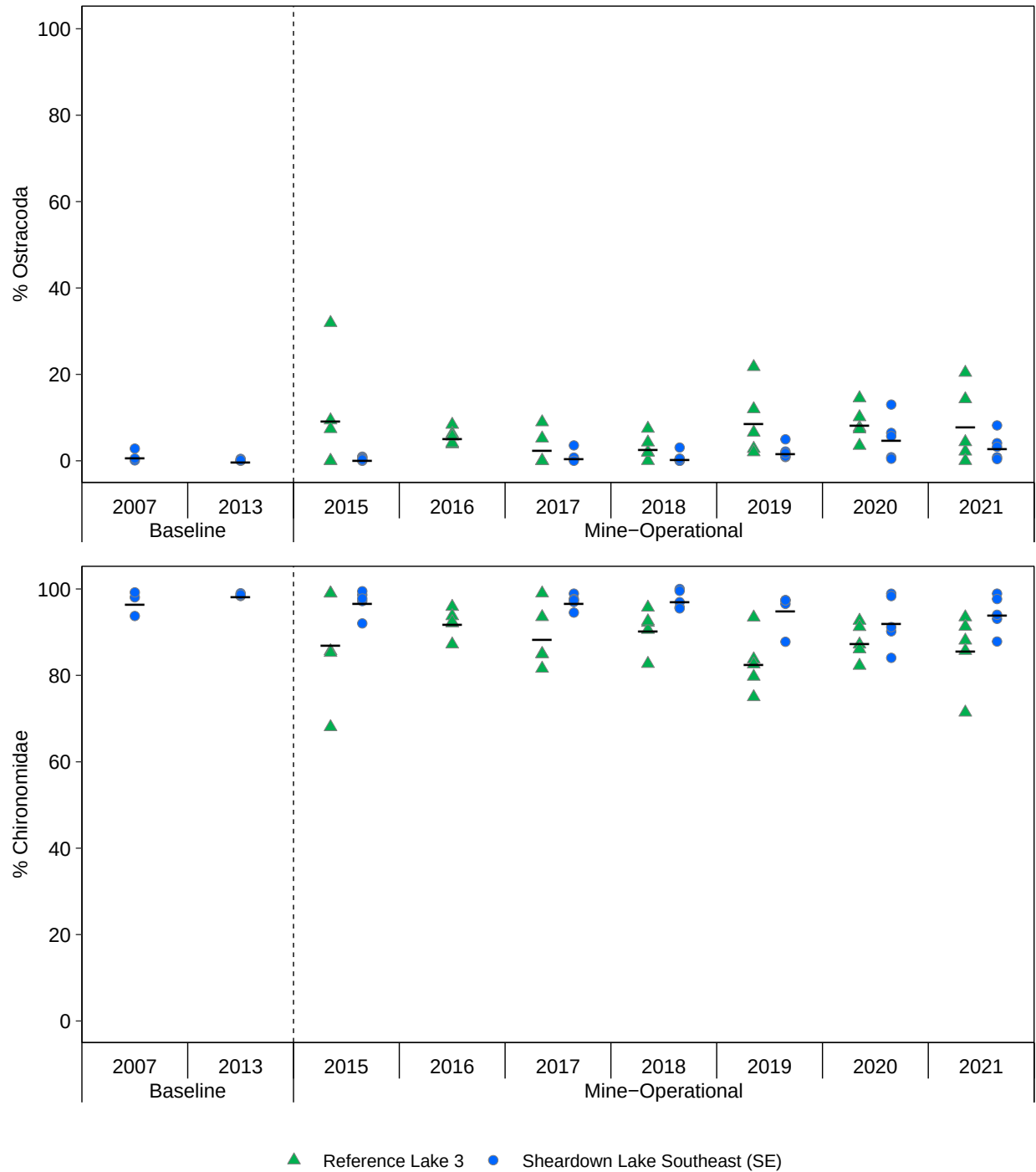


Figure F.13: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

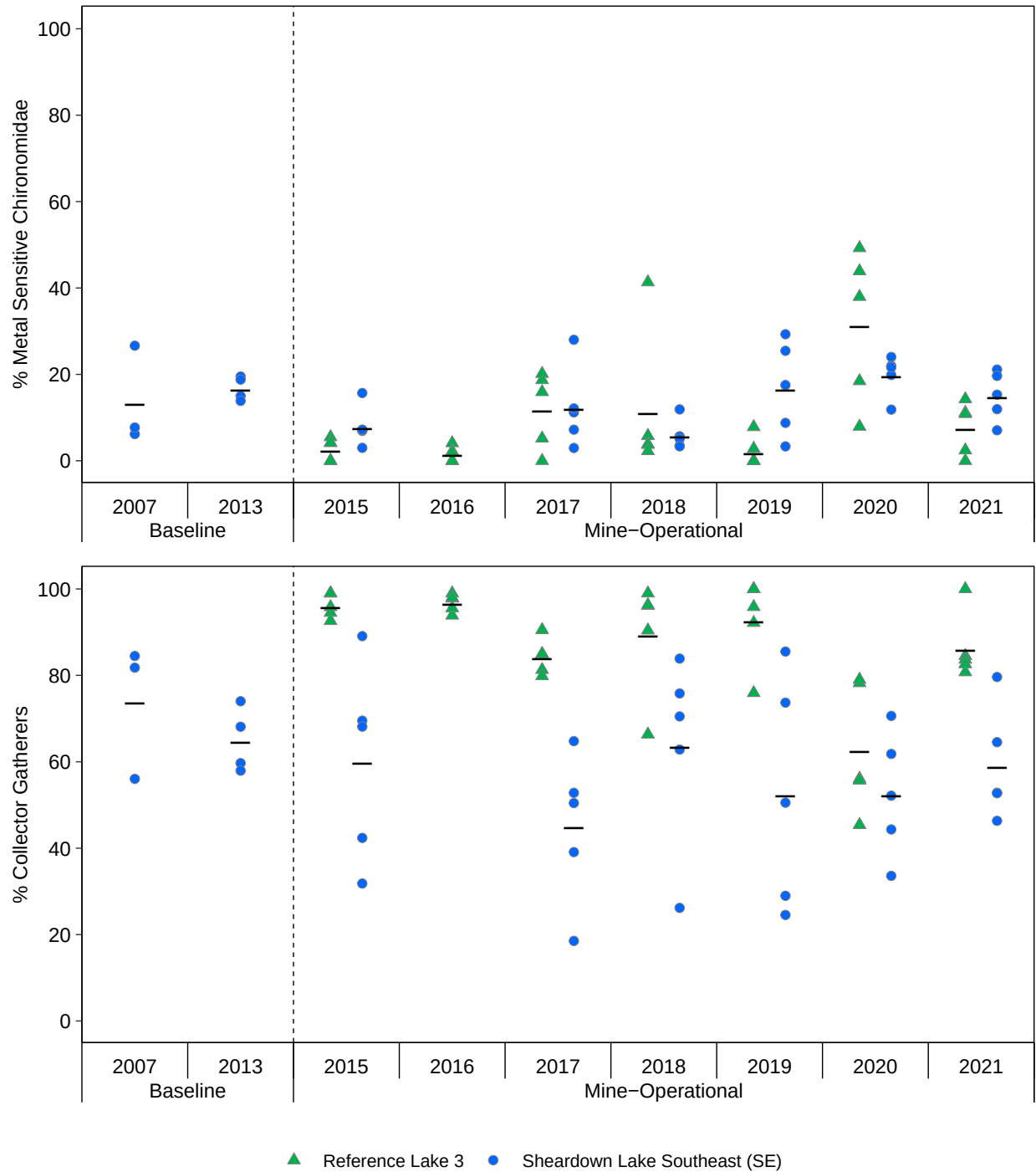


Figure F.13: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

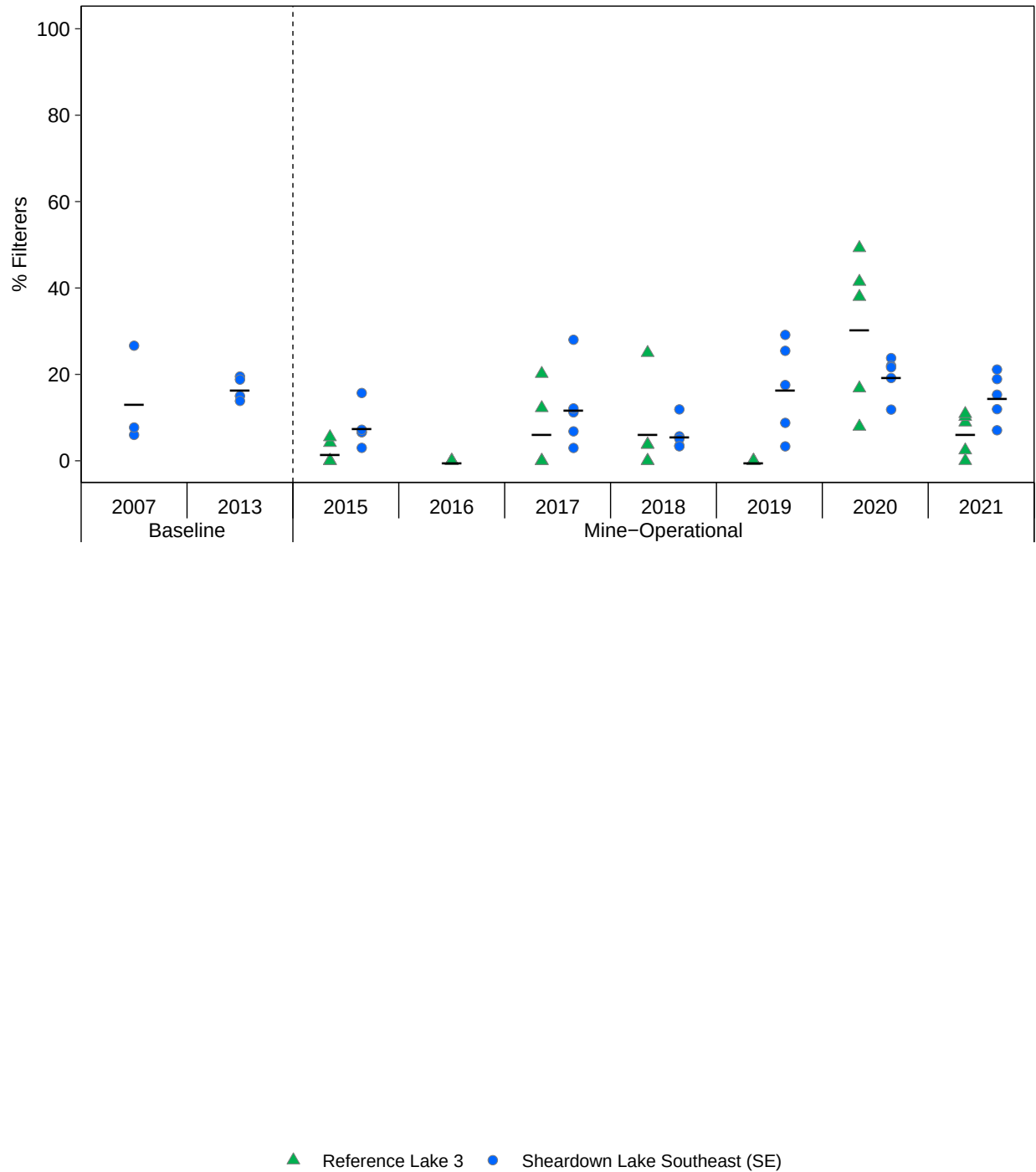


Figure F.13: Comparison of Key Benthic Invertebrate Community Metrics at Sheardown Lake Southeast (SE) Profundal Habitat Stations among Mine Baseline (2013) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

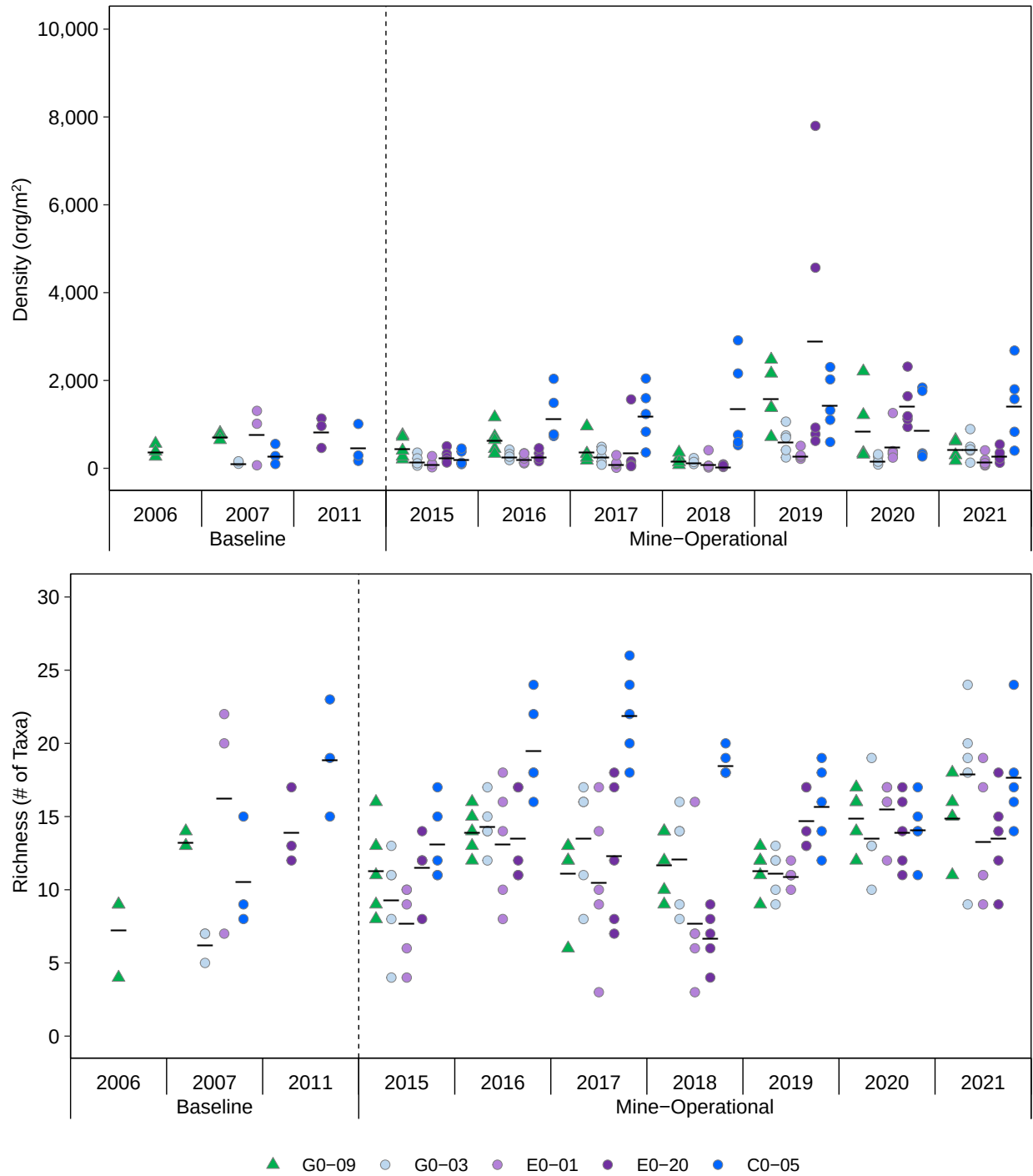


Figure F.14: Comparison of Key Benthic Invertebrate Community Metrics at Mary River Upstream (G0-09) and Downstream (G0-03, E0-01, E0-20, C0-05) Stations among Mine Baseline (2006 to 2011) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

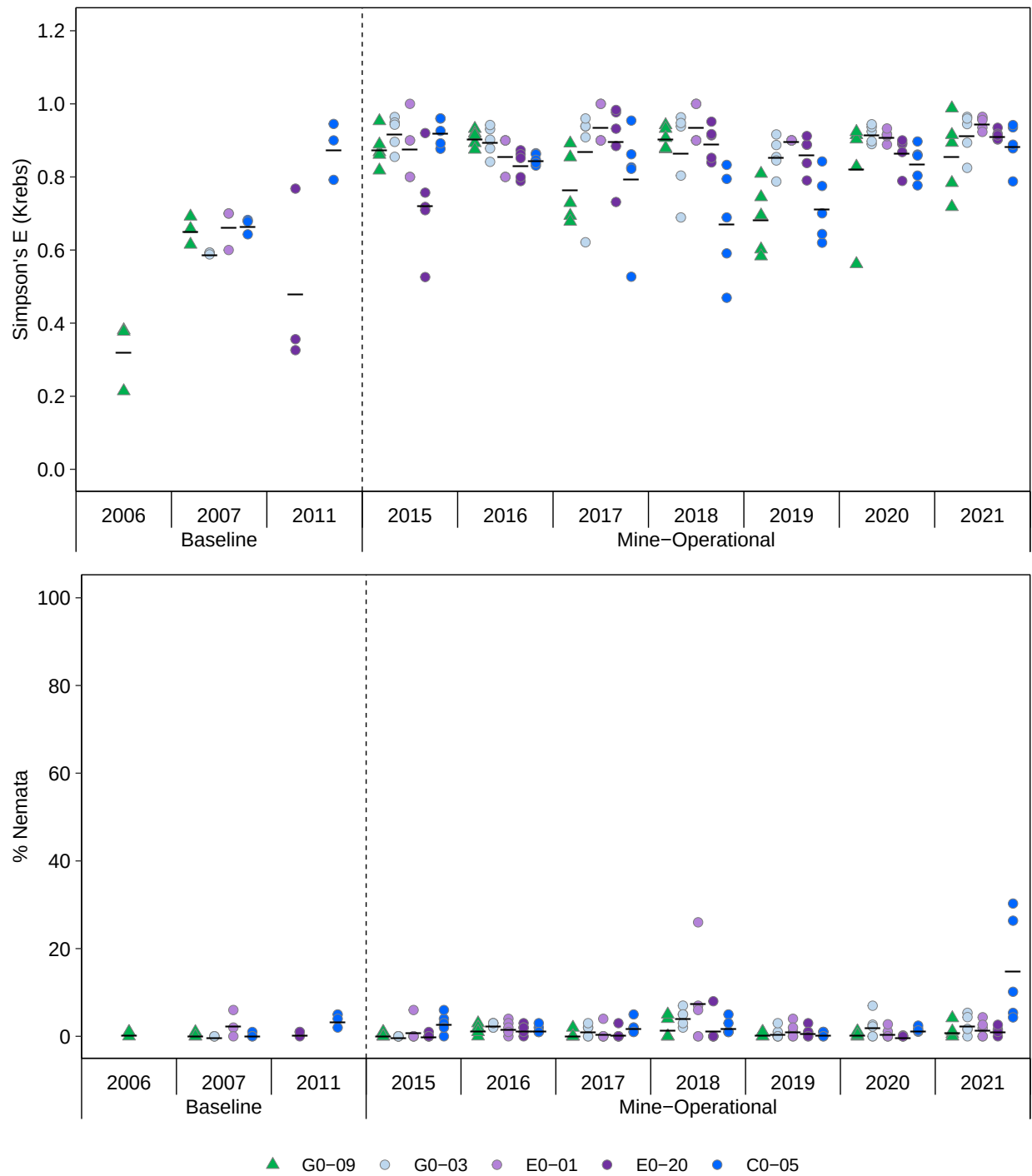


Figure F.14: Comparison of Key Benthic Invertebrate Community Metrics at Mary River Upstream (G0-09) and Downstream (G0-03, E0-01, E0-20, C0-05) Stations among Mine Baseline (2006 to 2011) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

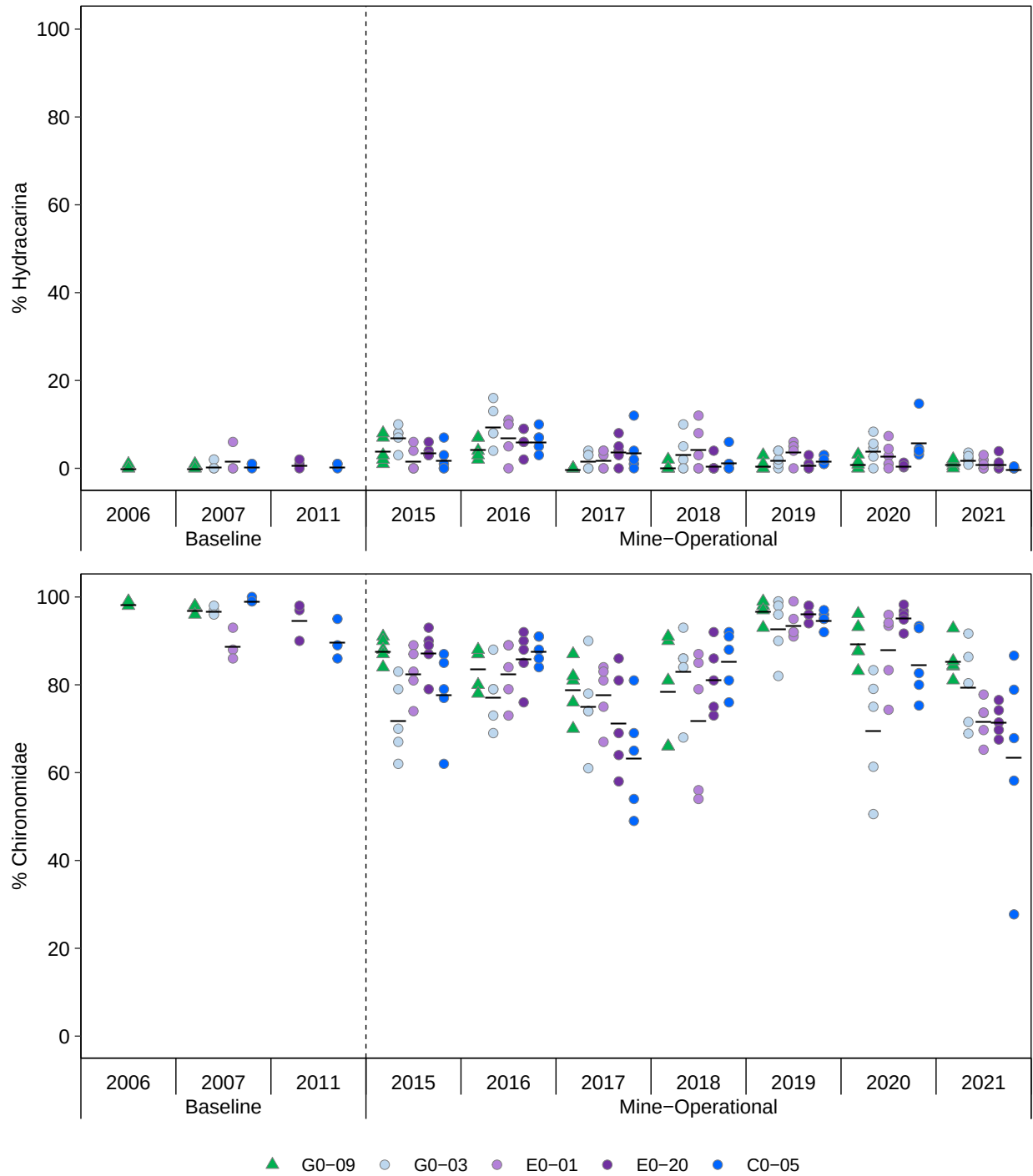


Figure F.14: Comparison of Key Benthic Invertebrate Community Metrics at Mary River Upstream (G0-09) and Downstream (G0-03, E0-01, E0-20, C0-05) Stations among Mine Baseline (2006 to 2011) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

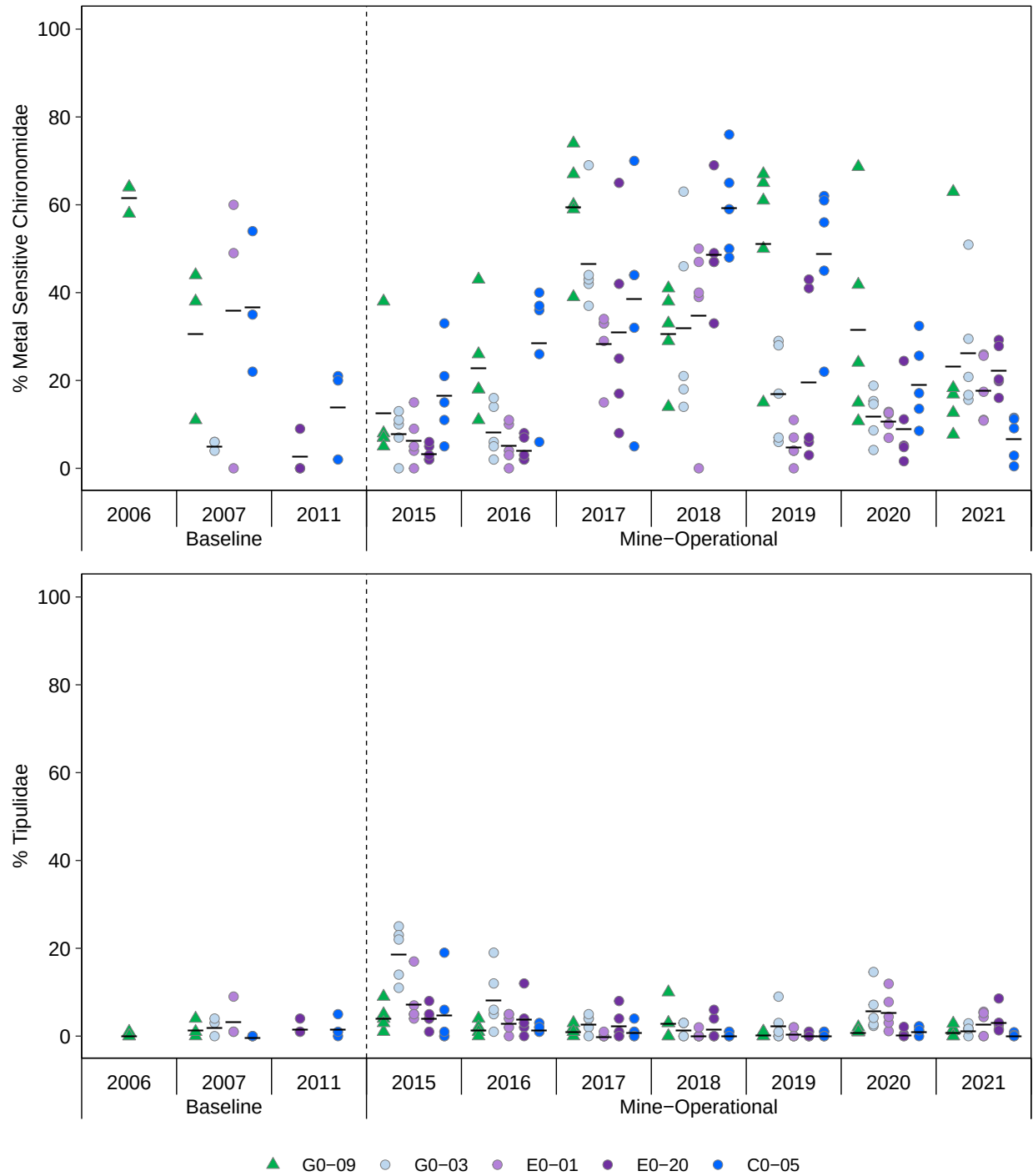


Figure F.14: Comparison of Key Benthic Invertebrate Community Metrics at Mary River Upstream (G0-09) and Downstream (G0-03, E0-01, E0-20, C0-05) Stations among Mine Baseline (2006 to 2011) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

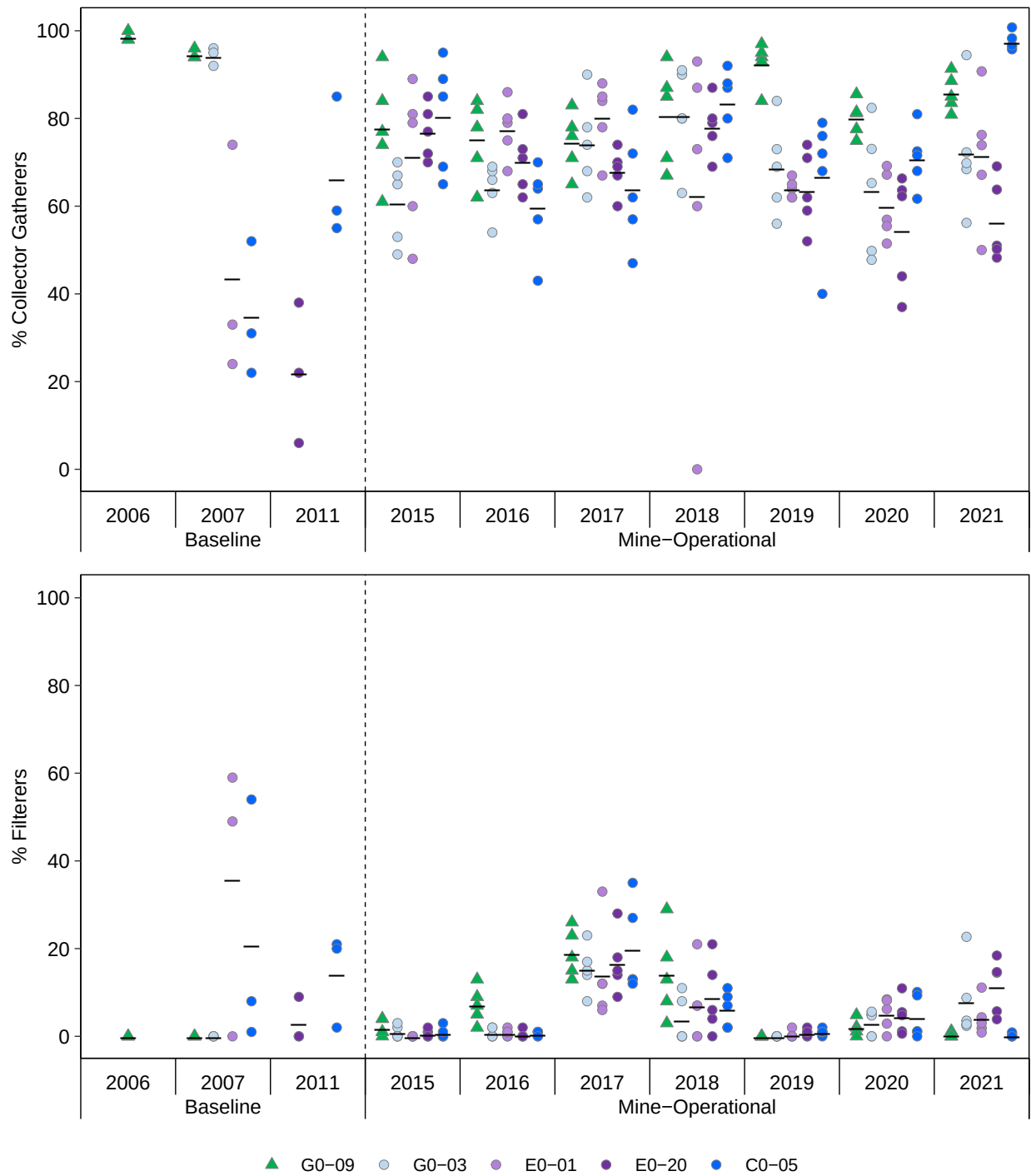


Figure F.14: Comparison of Key Benthic Invertebrate Community Metrics at Mary River Upstream (G0-09) and Downstream (G0-03, E0-01, E0-20, C0-05) Stations among Mine Baseline (2006 to 2011) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

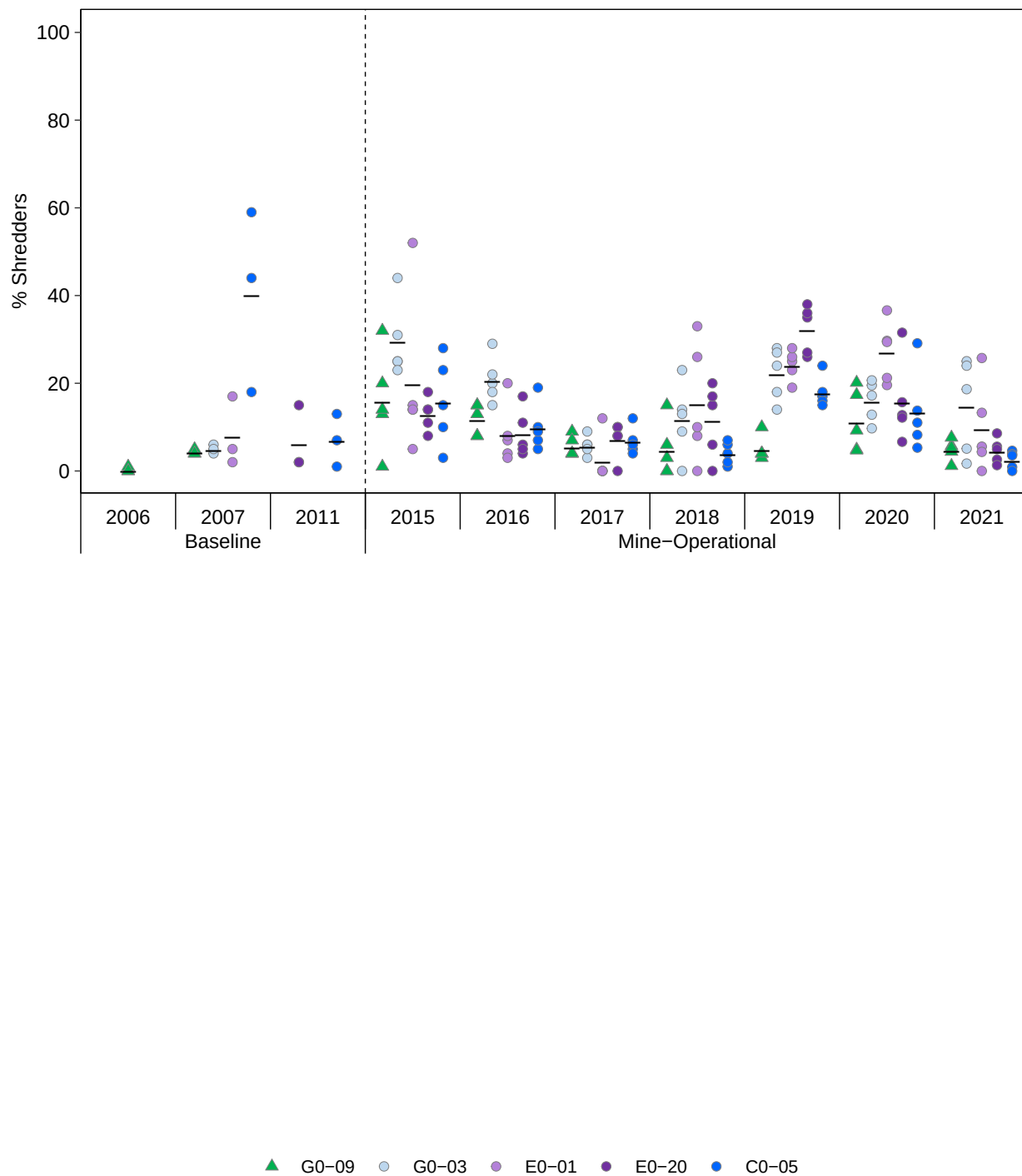


Figure F.14: Comparison of Key Benthic Invertebrate Community Metrics at Mary River Upstream (G0-09) and Downstream (G0-03, E0-01, E0-20, C0-05) Stations among Mine Baseline (2006 to 2011) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

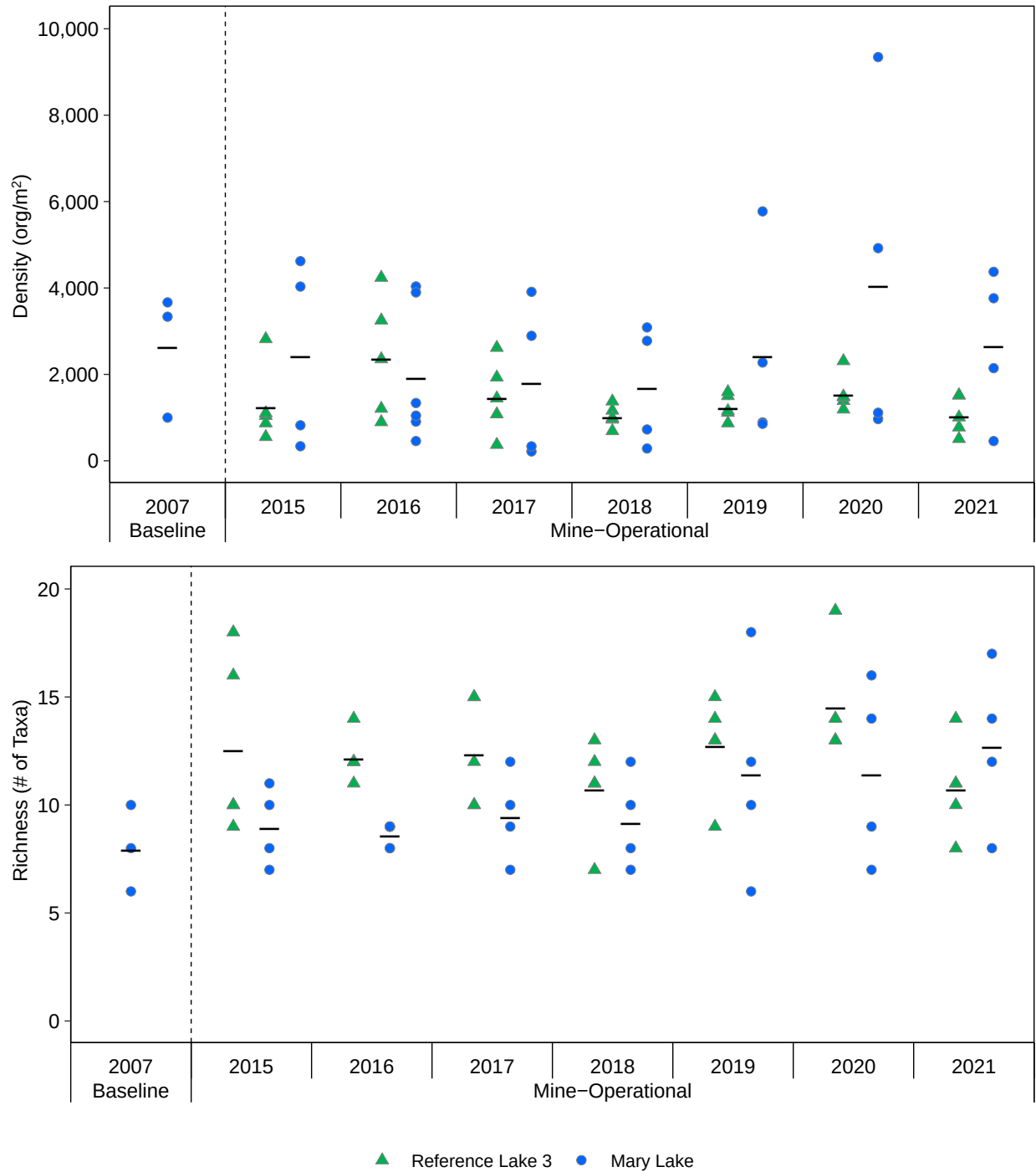


Figure F.15: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

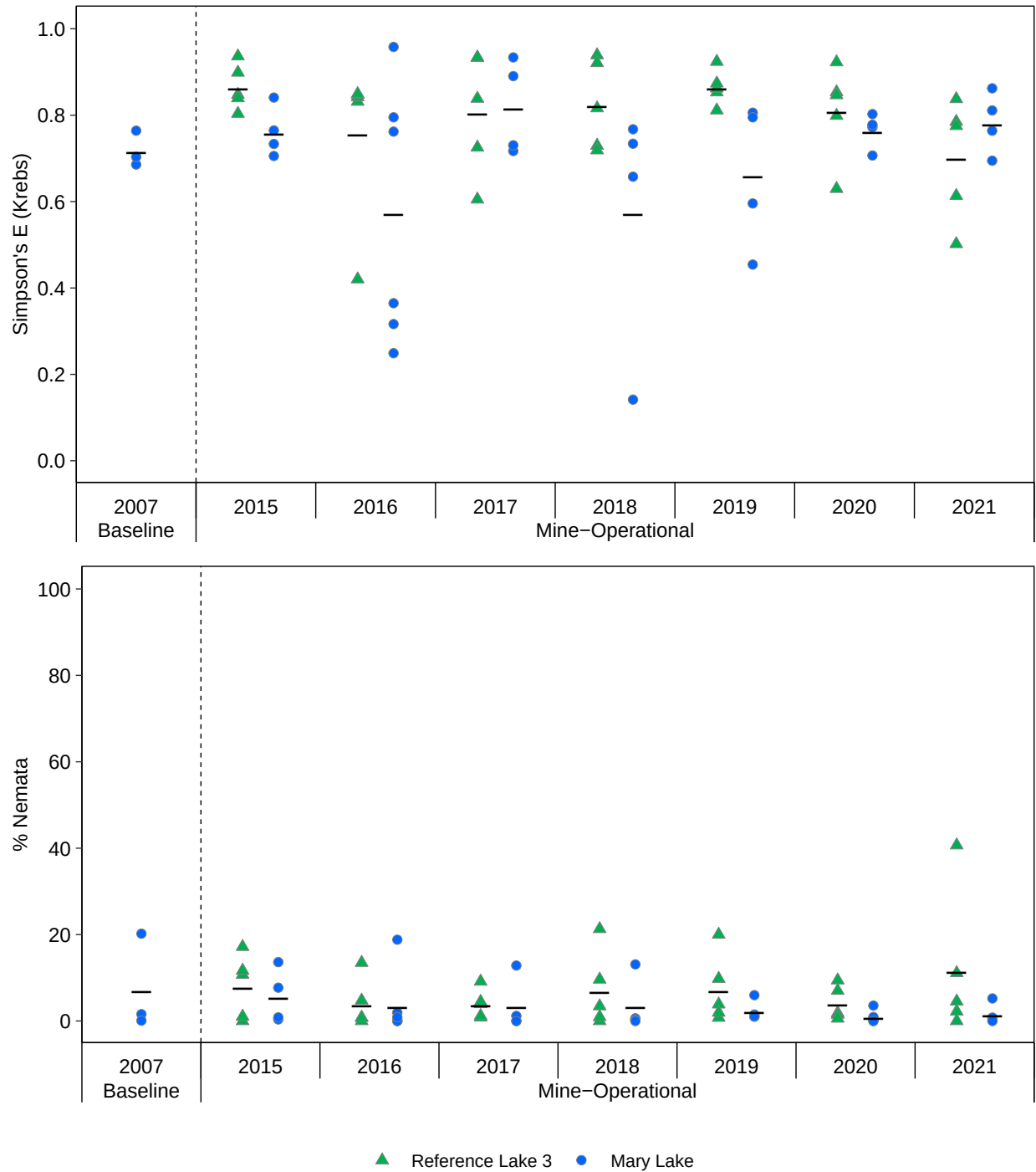


Figure F.15: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

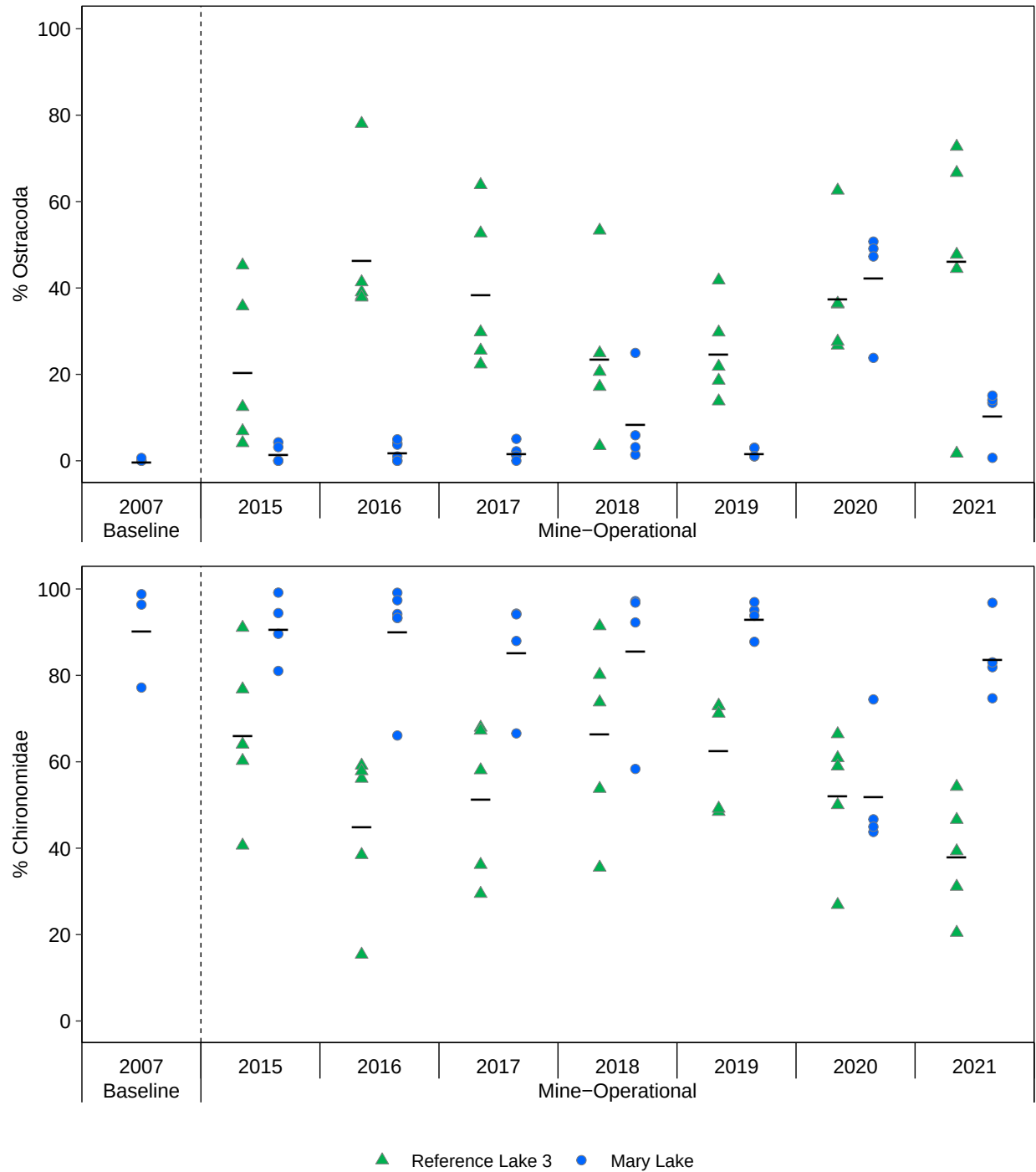


Figure F.15: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

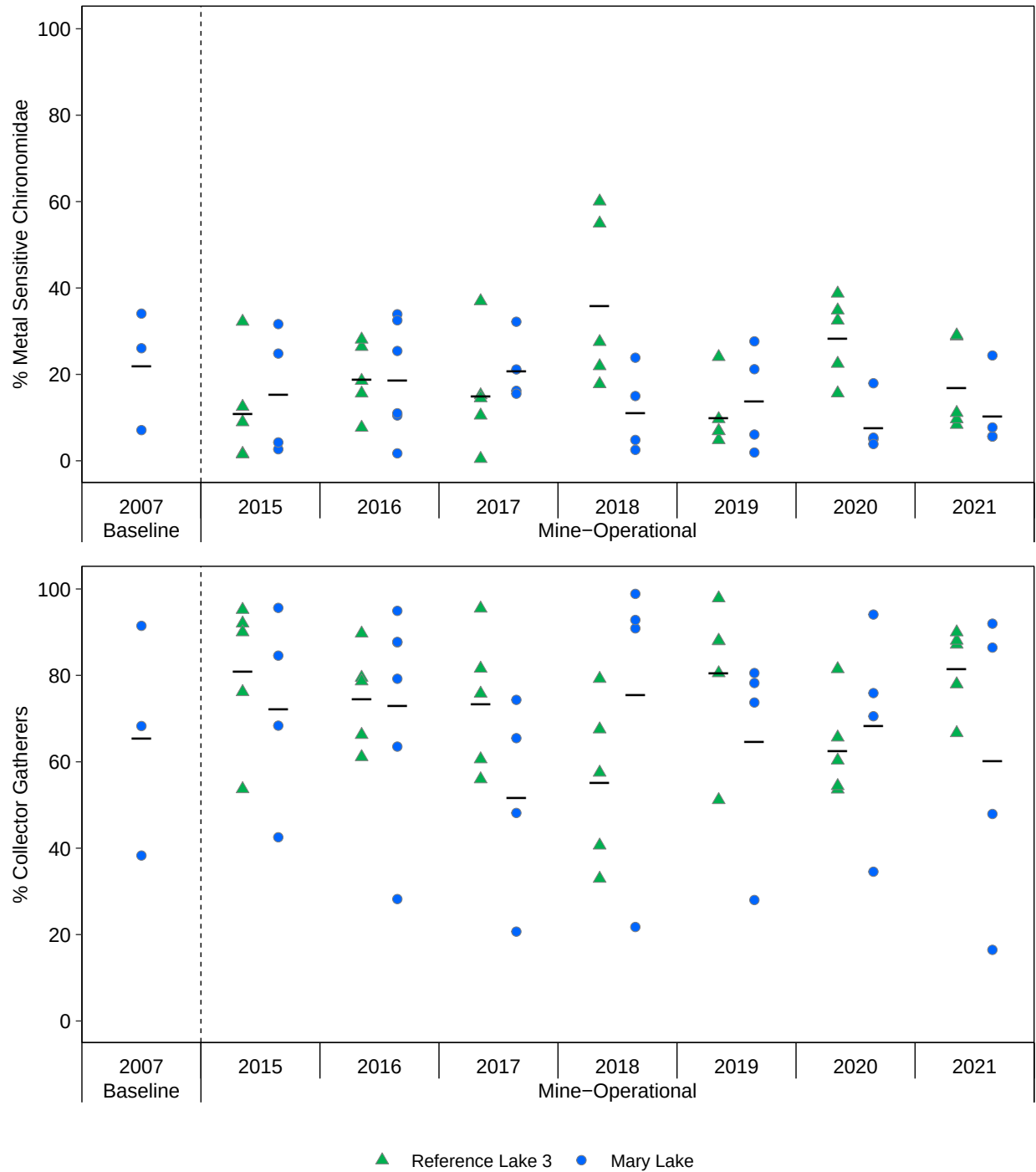


Figure F.15: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

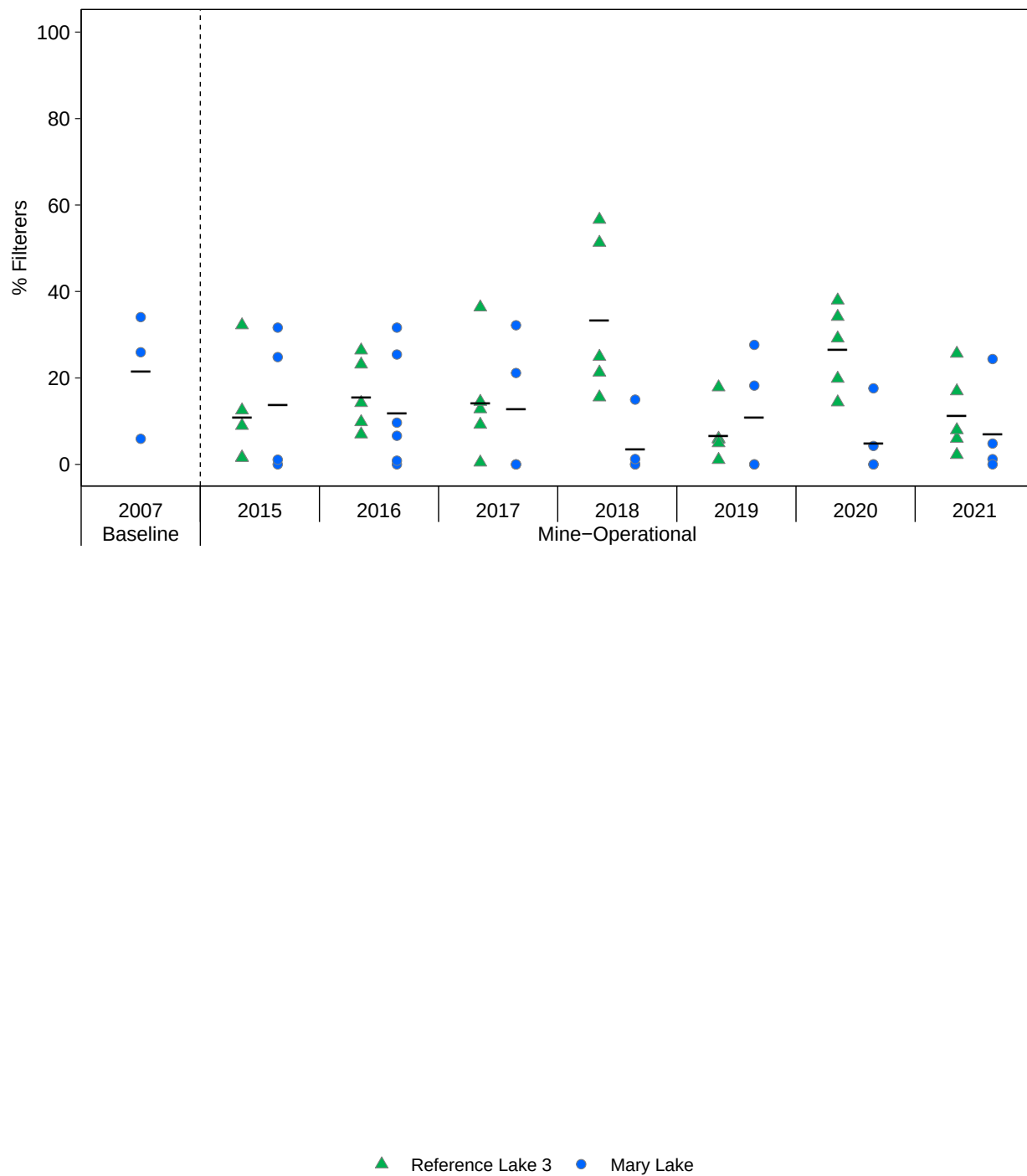


Figure F.15: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Littoral Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

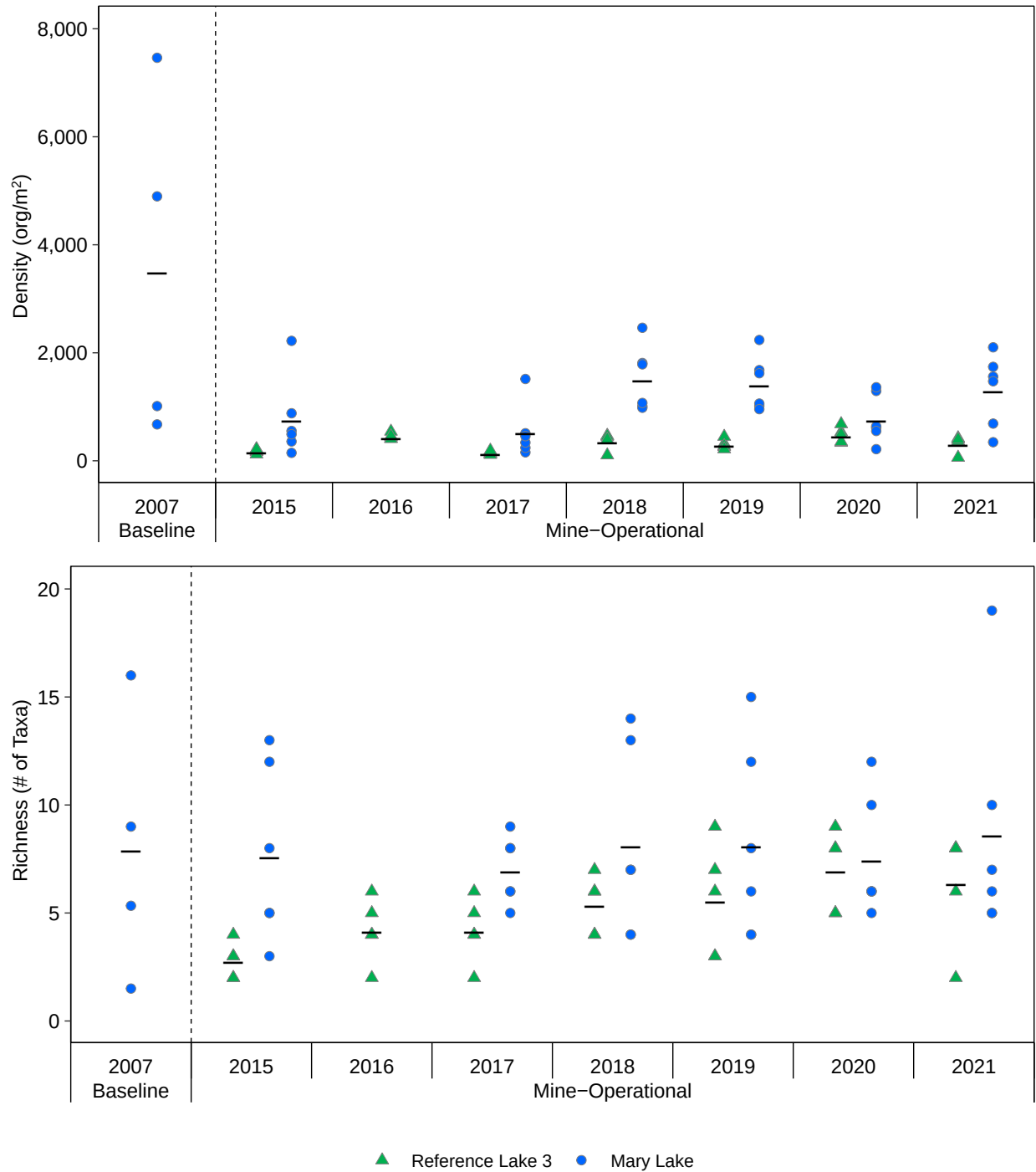


Figure F.16: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

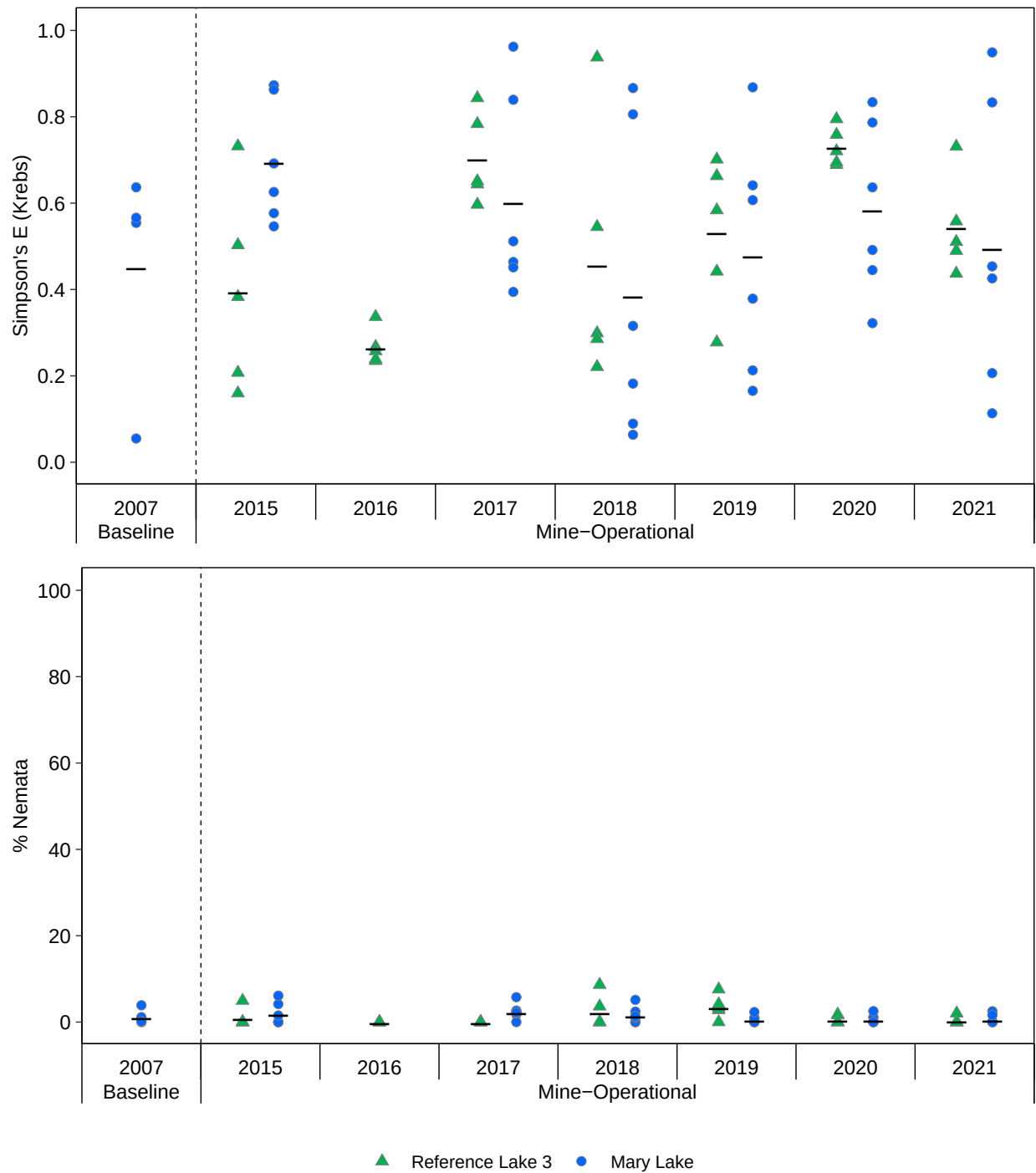


Figure F.16: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

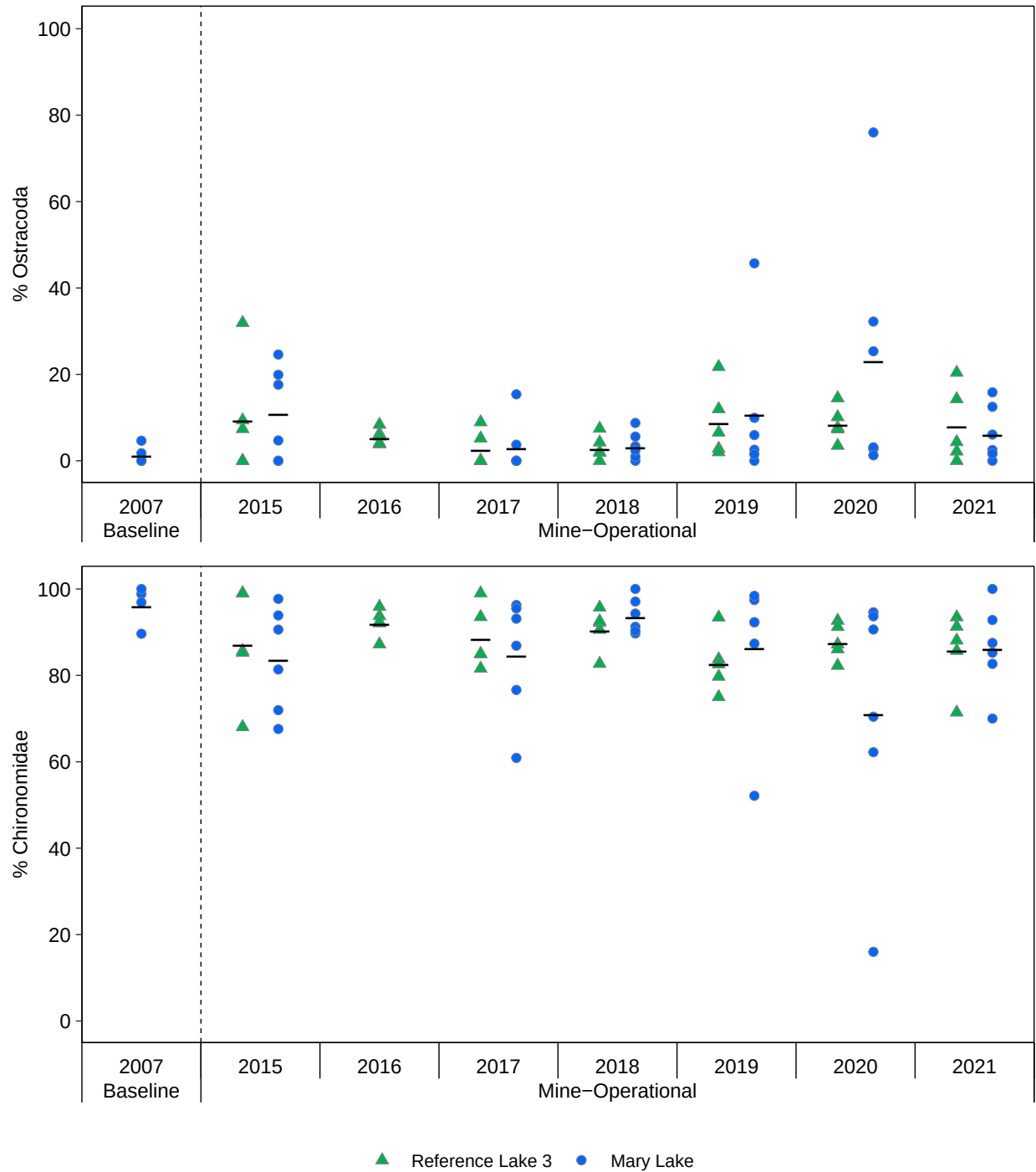


Figure F.16: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

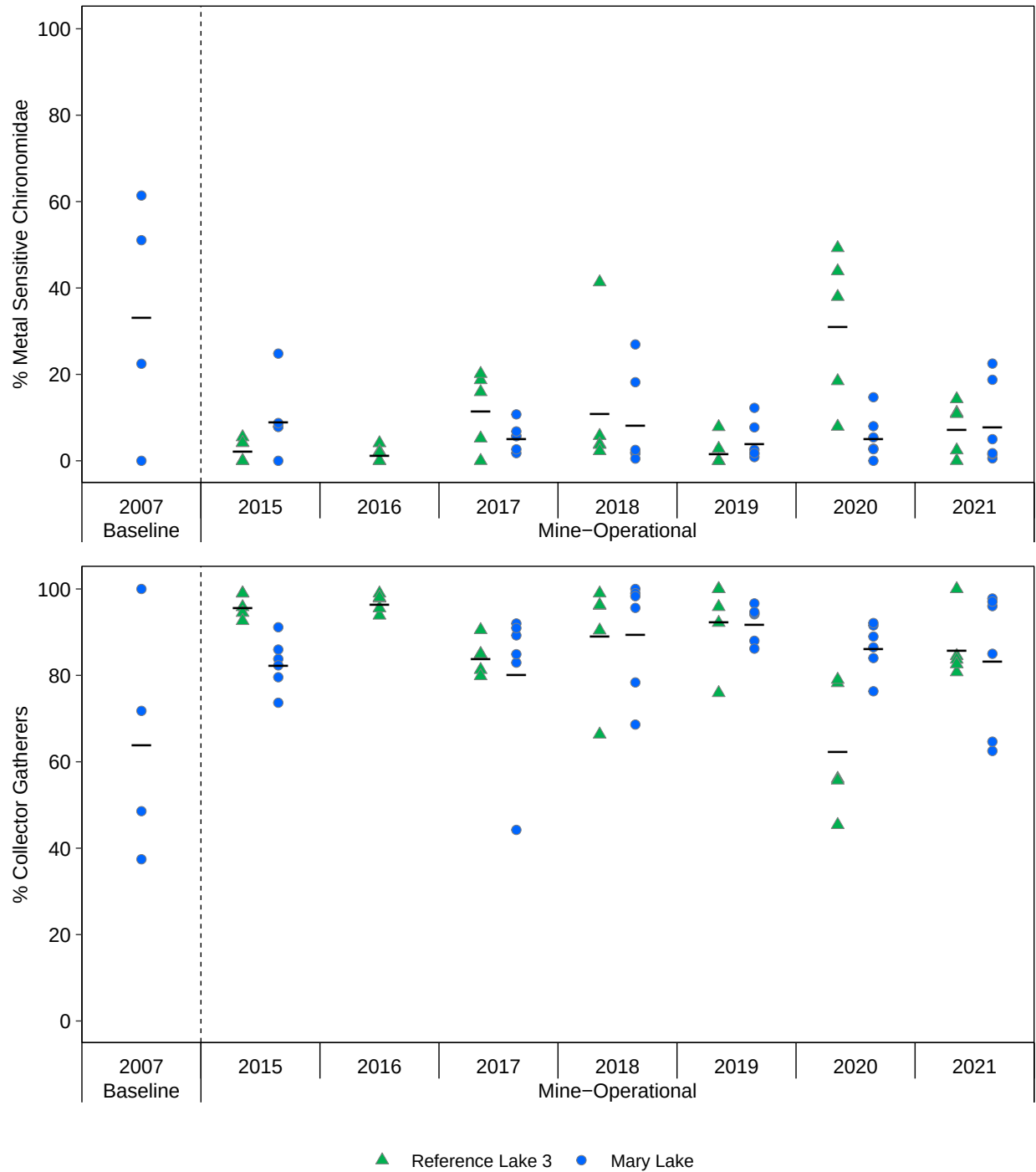


Figure F.16: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

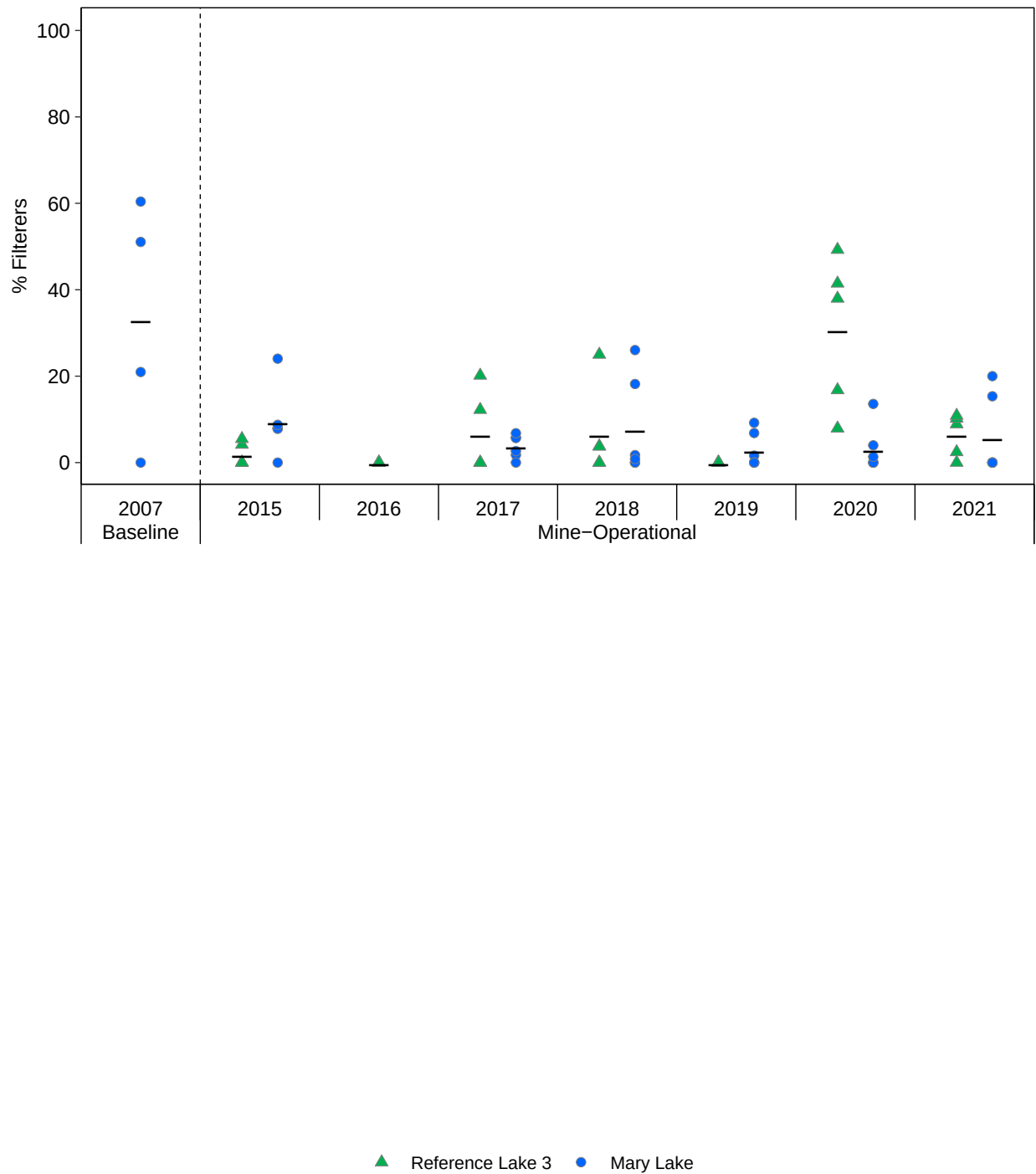


Figure F.16: Comparison of Key Benthic Invertebrate Community Metrics at Mary Lake Profundal Habitat Stations among Mine Baseline (2007) and Operational (2015 to 2021) Periods

Notes: Bars indicate means of replicates.

Table F.1: Replicate Grab Data for Benthic Invertebrate Community Samples Collected at the Unnamed Reference Creek and Camp Lake Tributary 1 (CLT1), Mary River Project CREMP, August 2021

Study Area	Station	Water Depth (cm)			Water Velocity (m/s)			Embeddedness			In-Stream Vegetation			Algae Presence		
		Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3
Unnamed Reference Creek	REF-CRK-B1	9	7	7	0.58	0.31	0.59	25%	25%	25%	sparse	none	none	sparse	sparse	sparse
	REF-CRK-B2	8	8	9	0.45	0.51	0.46	25%	25%	25%	none	sparse	none	sparse	sparse	sparse
	REF-CRK-B3	8	7	12	0.51	0.42	0.45	25%	25%	25%	none	none	sparse	sparse	sparse	sparse
	REF-CRK-B4	12	10	8	0.44	0.44	0.57	25%	25%	25%	none	sparse	sparse	sparse	sparse	sparse
	REF-CRK-B5	12	20	8	0.59	0.34	0.47	25%	25%	25%	none	sparse	sparse	sparse	sparse	sparse
Camp Lake Tributary 1 Upstream North Branch	CLT-1-US-B1	13	14	13	0.36	0.39	0.34	2500%	25%	25%	none	none	none	common	sparse	sparse
	CLT-1-US-B2	13	13	15	0.41	0.41	0.37	25%	25%	50%	none	none	none	sparse	sparse	sparse
	CLT-1-US-B3	15	14	15	0.46	0.41	0.41	25%	25%	25%	none	none	none	common	sparse	sparse
	CLT-1-US-B4	14	15	14	0.33	0.41	0.43	25%	25%	25%	none	none	none	common	sparse	common
	CLT-1-US-B5	11.5	19	14	0.34	0.41	0.38	25%	50%	25%	none	none	none	common	sparse	common
Camp Lake Tributary 1 Upper Main Stem	CLT-1-L2-B1	15	15	14	0.45	0.46	0.38	25%	25%	25%	none	none	none	sparse	sparse	sparse
	CLT-1-L2-B2	15	12	13	0.46	0.48	0.38	25%	25%	25%	none	none	none	sparse	common	sparse
	CLT-1-L2-B3	13	14	13	0.43	0.51	0.44	25%	25%	25%	none	none	none	sparse	sparse	sparse
	CLT-1-L2-B4	13	13	18	0.38	0.35	0.44	50%	25%	25%	none	none	none	sparse	sparse	sparse
	CLT-1-L2-B5	12	12	13	0.38	0.37	0.37	25%	50%	25%	none	none	none	sparse	sparse	common
Camp Lake Tributary 1 Lower Main Stem	CLT-1-DS-B1	12.5	11.5	10	0.40	0.32	0.32	25%	25%	25%	sparse	none	none	sparse	sparse	sparse
	CLT-1-DS-B2	9.5	10.5	8	0.33	0.56	0.58	50%	25%	50%	sparse	none	none	sparse	sparse	sparse
	CLT-1-DS-B3	9	12	8	0.57	0.45	0.33	50%	50%	50%	none	none	none	sparse	sparse	sparse
	CLT-1-DS-B4	12	9	8	0.51	0.46	0.42	25%	25%	25%	sparse	none	none	sparse	sparse	sparse
	CLT-1-DS-B5	10	11	10	0.50	0.46	0.32	50%	50%	50%	none	none	none	sparse	sparse	sparse

Table F.2: Replicate Station Habitat Feature Summary Statistics for the Camp Lake Tributary Benthic Stations, Mary River Project CREMP, August 2021

Metric	Study Area	Sample Size	Mean	Median	Standard Deviation	Standard Error	Minimum	Maximum
Water Depth (m)	Unnamed Reference Creek	5	9.67	9.00	2.22	0.994	7.67	13.3
	CLT1-US North Branch	5	14.2	14.3	0.645	0.289	13.3	14.8
	CLT1-L2 Upper Main Stem	5	13.7	13.3	1.00	0.447	12.3	14.7
	CLT1-DS Lower Main Stem	5	10.1	9.67	0.796	0.356	9.33	11.3
	CLT2-US Upstream	5	13.3	14.8	3.90	1.75	8.67	17.7
	CLT2-DS Downstream	5	10.3	9.67	1.50	0.672	8.83	12.3
Water Velocity (m/s)	Unnamed Reference Creek	5	0.475	0.473	0.0132	0.00593	0.460	0.493
	CLT1-US North Branch	5	0.391	0.390	0.0239	0.0107	0.363	0.427
	CLT1-L2 Upper Main Stem	5	0.419	0.430	0.0359	0.0161	0.373	0.460
	CLT1-DS Lower Main Stem	5	0.435	0.450	0.0546	0.0244	0.347	0.490
	CLT2-US Upstream	5	0.399	0.373	0.0561	0.0251	0.350	0.463
	CLT2-DS Downstream	5	0.439	0.480	0.0710	0.0318	0.350	0.497
Substrate Embeddedness (%)	Unnamed Reference Creek	5	0.250	0.250	0	0	0.250	0.250
	CLT1-US North Branch	5	1.93	0.333	3.67	1.64	0.250	8.50
	CLT1-L2 Upper Main Stem	5	0.283	0.250	0.0456	0.0204	0.250	0.333
	CLT1-DS Lower Main Stem	5	0.383	0.417	0.126	0.0565	0.250	0.500
	CLT2-US Upstream	5	0.400	0.417	0.109	0.0486	0.250	0.500
	CLT2-DS Downstream	5	0.267	0.250	0.0373	0.0167	0.250	0.333

Note: Five stations were sampled at each study area.

Table F.3: Benthic Station Habitat Feature Statistical Comparisons among Camp Lake Tributary 1 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Metric	Overall 3-group Comparison				Pair-wise, post-hoc comparisons			
	Statistical Test ^a	Transformation	Significant Difference between Areas?	p-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Water Depth (cm)	ANOVA	none	YES	0.001	Unnamed Reference Creek	CLT1 North Branch	YES	<0.001
					Unnamed Reference Creek	CLT1 Upper Main Stem	YES	0.001
					Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.963
					CLT1 North Branch	CLT1 Upper Main Stem	NO	0.931
					CLT1 North Branch	CLT1 Lower Main Stem	YES	<0.001
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	YES	0.003
Water Velocity (cm/s)	ANOVA	none	YES	0.012	Unnamed Reference Creek	CLT1 North Branch	YES	0.008
					Unnamed Reference Creek	CLT1 Upper Main Stem	NO	0.093
					Unnamed Reference Creek	CLT1 Lower Main Stem	NO	0.316
					CLT1 North Branch	CLT1 Upper Main Stem	NO	0.606
					CLT1 North Branch	CLT1 Lower Main Stem	NO	0.231
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	0.878
Substrate Embeddedness (%)	K-W	rank	NO	0.153	Unnamed Reference Creek	CLT1 North Branch	NO	ns
					Unnamed Reference Creek	CLT1 Upper Main Stem	NO	ns
					Unnamed Reference Creek	CLT1 Lower Main Stem	NO	ns
					CLT1 North Branch	CLT1 Upper Main Stem	NO	ns
					CLT1 North Branch	CLT1 Lower Main Stem	NO	ns
					CLT1 Upper Main Stem	CLT1 Lower Main Stem	NO	ns

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

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

Table F.4: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Unnamed Reference Creek Study Area, August 2021

Waterbody	Unnamed Reference Creek (REF-CRK)				
Station	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	1	14	2	3	18
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	-	1	-	-	4
F. Lumbriculidae					
Lumbriculus	-	-	-	-	-
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
F. Hygrobatidae					
Hygrobates	-	-	-	-	-
F. Lebertiidae					
Lebertia	-	-	-	-	-
F. Pionidae					
indeterminate	-	-	-	-	-
F. Sperchonidae					
Sperchon	4	4	26	11	32
SEED SHRIMPS					
Cl. Ostracoda	2	5	2	-	4
SPRINGTAILS					
Cl. Entognatha					
O. Collembola	-	-	-	-	-
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	17	27	52	14	56
CADDISFLIES					
O. Trichoptera					
F. Limnephilidae					
immature	-	-	-	-	-
TRUE FLIES					
O. Diptera					
BITING-MIDGE					
F. Ceratopogonidae					
Atrichopogon	-	-	1	-	-
Culicoides	-	-	1	4	-
Probezzia	-	-	-	-	-
MIDGES					
F. Chironomidae					
chironomid pupae	10	16	21	1	10
S.F. Chironominae					
Cladotanytarsus	-	-	-	-	-
Paratanytarsus	-	-	-	-	-
Rheotanytarsus	-	-	-	-	11
S.F. Diamesinae					
Diamesa	11	9	5	6	13
Pseudokiefferiella	-	2	5	3	31
S.F. Orthoclaadiinae					
Cardiocladius	9	18	40	16	25
Chaetocladius	-	-	2	-	-
Corynoneura	-	-	-	-	-
Cricotopus	-	-	9	1	13
Cricotopus/Orthocladus	-	2	2	2	22
Eukiefferiella	1	1	-	-	7
Hydrobaenus	-	1	-	-	2
Hydrosmittia	-	1	-	-	5
Krenosmittia	4	-	-	-	4
Limnophyes	15	24	9	10	2
Orthocladus (Euorthocladus)	3	2	3	-	-
Parakiefferiella	-	-	-	-	-
Parametriocnemus	-	1	2	-	2
Paraphaenocladus	-	-	1	-	-
Thienemanniella	4	7	5	9	38
Tokunagaia	3	-	1	-	-
Tvetenia	13	13	25	15	15
indeterminate	1	1	-	-	2
S.F. Tanypodinae					
Procladius	-	-	-	-	-
Thienemannimyia complex	-	-	-	-	-
F. Empididae					
Clinocera	11	15	7	4	5
pupae	-	-	-	-	-
F. Muscidae	-	-	-	-	-
F. Simuliidae					
Gymnopais	4	2	1	2	2
Metacnephia	15	26	32	10	89
Prosimulium	23	59	63	16	255
pupae	8	-	11	1	25
F. Tipulidae					
Tipula	-	1	5	4	7
SUMMARY METRICS					
Density (No. organisms per m ²)	570	903	1,194	473	2,505
Richness (total number of taxa) ^a	17	21	23	16	23
Simpson's Evenness (E)	0.956	0.932	0.918	0.974	0.839
Dominant Group Composition					
% Nemata	0.629	5.56	0.601	2.27	2.58
% Oligochaeta	0	0.397	0	0	0.572
% Acari	2.52	1.59	7.81	8.33	4.58
% Ostracods	1.26	1.98	0.601	0	0.572
% Chironomids	46.5	38.9	39.0	47.7	28.9
% Metal Sensitive Chironmids	8.00	5.22	3.58	6.93	8.28
% Simuliidae	31.4	34.5	32.1	22.0	53.1
% Tipulidae	0	0.397	1.50	3.03	1.00
Functional Feeding Group Composition					
% Collector - Gatherers	52.6	49.0	37.8	46.0	29.9
% Filterers	28.9	33.7	31.8	20.4	54.5
% Shredders	0	0.397	5.26	5.34	6.27
Habitat Preference Group Composition					
% Clingers	34.0	36.1	43.7	32.6	64.6
% Sprawlers	58.9	49.0	39.6	46.7	27.5
% Burrowers	7.17	14.9	16.7	20.6	7.91

^a Bold entries excluded from taxa count

Table F.5: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Camp Lake Tributary 1 Study Areas, August 2021

Waterbody	North Branch Upstream (CLT1-US)					Upper Main Stem (CLT1-L2)					Lower Main Stem (CLT1-DS)				
Station	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS															
P. Nemata	22	7	6	8	16	12	14	6	28	12	7	1	8	6	4
ANNELIDS															
P. Annelida															
WORMS															
Cl. Oligochaeta															
F. Enchytraeidae	-	1	-	2	2	2	78	87	142	100	1	7	-	1	-
F. Lumbriculidae															
Lumbriculus	-	-	-	-	-	30	2	4	2	-	-	-	-	-	-
ARTHROPODS															
P. Arthropoda															
MITES															
Cl. Arachnida															
O. Acarina															
F. Hygrobatidae															
Hygrobates	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
F. Lebertiidae															
Lebertia	-	1	-	-	-	16	6	2	2	4	-	-	-	-	-
F. Pionidae															
indeterminate	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-
F. Sperchonidae															
Sperchon	14	9	10	2	6	12	34	5	-	4	7	3	2	2	1
SEED SHRIMPS															
Cl. Ostracoda	-	2	2	-	-	-	6	1	4	4	-	-	-	-	-
SPRINGTAILS															
Cl. Entognatha															
O. Collembola	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
INSECTS															
Cl. Insecta															
MAYFLIES															
O. Ephemeroptera															
F. Baetidae															
Acentrella feropagus	4	11	24	-	10	-	18	12	6	4	8	8	2	16	5
CADDISFLIES															
O. Trichoptera															
F. Limnephilidae															
immature	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
TRUE FLIES															
O. Diptera															
BITING-MIDGE															
F. Ceratopogonidae															
Atrichopogon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Culicoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Probezzia	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
MIDGES															
F. Chironomidae															
chironomid pupae	30	26	42	12	16	20	44	28	46	44	12	28	10	32	9
S.F. Chironominae															
Cladotanytarsus	-	-	-	-	-	41	-	2	-	-	-	-	-	-	-
Paratanytarsus	-	-	-	-	-	94	13	7	48	325	-	-	-	-	-
Rheotanytarsus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S.F. Diamesinae															
Diamesa	6	5	12	-	-	-	-	-	-	4	-	1	1	-	-
Pseudokiefferiella	4	10	18	6	20	-	20	2	-	9	14	8	1	74	12

^a Bold entries excluded from taxa count

Table F.5: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Camp Lake Tributary 1 Study Areas, August 2021

Waterbody	North Branch Upstream (CLT1-US)					Upper Main Stem (CLT1-L2)					Lower Main Stem (CLT1-DS)				
Station	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
S.F. Orthoclaadiinae															
<i>Cardiocladius</i>	6	2	-	-	-	-	-	-	-	-	9	8	2	-	1
<i>Chaetocladius</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Corynoneura</i>	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
<i>Cricotopus</i>	68	27	18	30	36	245	172	59	100	271	36	9	10	44	17
<i>Cricotopus/Orthocladius</i>	114	27	6	81	82	-	19	-	16	45	36	23	23	33	8
<i>Eukiefferiella</i>	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-
<i>Hydrobaenus</i>	12	-	8	-	14	-	-	-	-	-	3	2	2	-	-
<i>Hydrosmittia</i>	28	8	8	63	22	94	26	2	40	153	66	28	19	48	24
<i>Krenosmittia</i>	8	1	8	2	4	-	-	1	4	-	14	3	5	7	4
<i>Limnophyes</i>	4	-	4	4	6	-	6	2	-	-	3	-	1	2	1
<i>Orthocladius (Euorthocladius)</i>	34	11	28	10	18	-	-	-	-	-	7	13	3	22	2
<i>Parakiefferiella</i>	-	-	-	-	-	212	6	-	32	280	-	-	1	-	-
<i>Parametrioctemus</i>	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
<i>Paraphaenocladius</i>	-	-	2	-	2	-	-	2	-	-	-	-	-	-	-
<i>Thienemanniella</i>	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tokunagaia</i>	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Tveteria</i>	10	2	6	2	18	126	383	142	120	163	12	10	1	2	1
indeterminate	-	2	4	-	-	-	-	-	-	54	-	-	-	2	-
S.F. Tanypodinae															
<i>Procladius</i>	-	-	-	-	-	12	-	2	-	20	-	-	-	-	-
<i>Thienemannimyia</i> complex	-	-	-	-	-	16	4	1	2	4	-	-	-	-	-
F. Empididae			6												
<i>Clinocera</i>	2	3	-	16	14	6	-	2	4	4	5	10	2	6	3
pupae	-	-	-	-	-	2	4	-	-	-	-	-	-	-	-
F. Muscidae	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
F. Simuliidae															
<i>Gymnopais</i>	6	4	10	-	10	-	-	-	-	-	1	-	-	-	-
<i>Metacnephia</i>	-	1	-	-	-	-	-	-	-	-	3	1	3	3	-
<i>Prosimulium</i>	-	1	2	-	-	-	-	-	-	-	1	-	-	5	-
pupae	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
F. Tipulidae															
<i>Tipula</i>	92	34	27	19	32	40	6	7	4	36	14	9	3	7	6
SUMMARY METRICS															
Density (No. organisms per m²)	1,692	706	943	921	1,176	3,513	3,100	1,351	2,158	5,520	932	620	355	1,118	351
Richness (total number of taxa)^a	18	20	22	12	16	15	19	21	16	17	18	17	17	15	13
Simpson's Evenness (E)	0.859	0.896	0.965	0.835	0.916	0.904	0.748	0.770	0.882	0.888	0.885	0.934	0.877	0.878	0.882
Dominant Group Composition															
% Nemata	4.66	3.55	2.28	3.11	4.88	1.22	1.62	1.59	4.65	0.779	2.69	0.578	8.08	1.92	4.08
% Oligochaeta	0	0.508	0	0.778	0.610	3.27	9.25	24.1	23.9	6.49	0.385	4.05	0	0.321	0
% Acari	2.97	5.08	3.80	0.778	1.83	2.86	5.09	1.86	0.332	0.519	2.69	2.31	2.02	0.641	1.02
% Ostracods	0	1.02	0.760	0	0	0	0.694	0.265	0.664	0.260	0	0	0	0	0
% Chironomids	69.9	62.4	66.2	81.7	72.6	87.8	80.1	66.3	67.8	89.1	81.5	76.9	79.8	85.3	80.6
% Metal Sensitive Chironmids	2.33	9.66	15.0	2.48	6.54	14.1	4.07	3.29	8.99	22.7	5.71	6.59	2.31	27.0	13.8
% Simuliidae	1.27	3.05	4.56	0	3.05	0	0	0	0	0	2.31	0.578	3.03	2.56	0
% Tipulidae	19.5	17.3	10.3	7.39	9.76	4.08	0.694	1.86	0.664	2.34	5.38	5.20	3.03	2.24	6.12
Functional Feeding Group Composition															
% Collector - Gatherers	40.9	42.1	68.1	48.1	51.5	49.6	68.1	74.3	66.9	52.3	57.1	66.8	55.6	68.6	60.8
% Filterers	0	1.02	0.760	0	0	14.1	1.60	2.69	8.99	21.8	1.92	0.578	3.03	2.56	0
% Shredders	53.0	47.0	21.2	44.8	39.4	29.7	24.3	19.5	22.4	23.5	32.4	18.7	35.1	26.3	33.9
Habitat Preference Group Composition															
% Clingers	37.8	37.9	19.3	38.2	34.5	28.4	28.7	19.5	22.1	21.7	32.0	16.4	37.1	27.2	28.8
% Sprawlers	36.2	39.5	68.1	50.5	50.2	63.0	59.8	52.7	48.4	68.7	55.9	68.0	49.5	68.3	59.8
% Burrowers	25.6	22.6	12.6	11.3	15.2	8.57	11.6	27.9	29.6	9.61	12.1	15.7	13.4	4.49	11.4

^a Bold entries excluded from taxa count

Table F.6: Benthic Invertebrate Community Summary Statistics for Camp Lake Tributary 1 Study Areas, Mary River Project CREMP, August 2021

Metric	Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Density (no. organisms / m ²)	Unnamed Reference Creek	1,129	820	367	473	903	2,505
	CLT1 Upstream North Branch	1,087	377	168	706	943	1,692
	CLT1 Upper Main Stem	3,128	1,579	706	1,351	3,100	5,520
	CLT1 Lower Main Stem	675	344	154	351	620	1,118
Richness (Number of Taxa)	Unnamed Reference Creek	20.0	3.32	1.48	16.0	21.0	23.0
	CLT1 Upstream North Branch	17.6	3.85	1.72	12.0	18.0	22.0
	CLT1 Upper Main Stem	16.0	2.00	0.894	13.0	17.0	18.0
	CLT1 Lower Main Stem	16.0	2.00	0.894	13.0	17.0	18.0
Simpson's Evenness	Unnamed Reference Creek	0.924	0.0521	0.0233	0.839	0.932	0.974
	CLT1 Upstream North Branch	0.894	0.0505	0.0226	0.835	0.896	0.965
	CLT1 Upper Main Stem	0.894	0.0505	0.0226	0.835	0.896	0.965
	CLT1 Lower Main Stem	0.891	0.0240	0.0107	0.877	0.882	0.934
Nemata (% of community)	Unnamed Reference Creek	2.33	2.02	0.904	0.601	2.27	5.56
	CLT1 Upstream North Branch	3.70	1.08	0.484	2.28	3.55	4.88
	CLT1 Upper Main Stem	3.70	1.08	0.484	2.28	3.55	4.88
	CLT1 Lower Main Stem	3.47	2.87	1.28	0.578	2.69	8.08
Oligochaeta (% of community)	Unnamed Reference Creek	0.194	0.273	0.122	0	0	0.572
	CLT1 Upstream North Branch	0.379	0.359	0.161	0	0.508	0.778
	CLT1 Upper Main Stem	0.379	0.359	0.161	0	0.508	0.778
	CLT1 Lower Main Stem	0.950	1.74	0.778	0	0.321	4.05
Hydracarina (% of community)	Unnamed Reference Creek	4.96	3.04	1.36	1.59	4.58	8.33
	CLT1 Upstream North Branch	2.89	1.67	0.748	0.778	2.97	5.08
	CLT1 Upper Main Stem	2.89	1.67	0.748	0.778	2.97	5.08
	CLT1 Lower Main Stem	1.74	0.872	0.390	0.641	2.02	2.69
Ostracoda (% of community)	Unnamed Reference Creek	0.883	0.760	0.340	0	0.601	1.98
	CLT1 Upstream North Branch	0.355	0.495	0.221	0	0	1.02
	CLT1 Upper Main Stem	0.355	0.495	0.221	0	0	1.02
	CLT1 Lower Main Stem	0	0	0	0	0	0
Chironomidae (% of community)	Unnamed Reference Creek	40.2	7.54	3.37	28.9	39.0	47.7
	CLT1 Upstream North Branch	70.6	7.32	3.27	62.4	69.9	81.7
	CLT1 Upper Main Stem	70.6	7.32	3.27	62.4	69.9	81.7
	CLT1 Lower Main Stem	80.8	3.03	1.36	76.9	80.6	85.3
Metal-Sensitive Chironomidae (% of community)	Unnamed Reference Creek	6.40	1.98	0.886	3.58	6.93	8.28
	CLT1 Upstream North Branch	7.21	5.34	2.39	2.33	6.54	15.0
	CLT1 Upper Main Stem	7.21	5.34	2.39	2.33	6.54	15.0
	CLT1 Lower Main Stem	11.1	9.82	4.39	2.31	6.59	27.0
Simuliidae (% of community)	Unnamed Reference Creek	34.6	11.4	5.08	22.0	32.1	53.1
	CLT1 Upstream North Branch	2.39	1.77	0.792	0	3.05	4.56
	CLT1 Upper Main Stem	2.39	1.77	0.792	0	3.05	4.56
	CLT1 Lower Main Stem	1.70	1.33	0.593	0	2.31	3.03
Tipulidae (% of community)	Unnamed Reference Creek	1.19	1.18	0.527	0	1.00	3.03
	CLT1 Upstream North Branch	12.8	5.23	2.34	7.39	10.3	19.5
	CLT1 Upper Main Stem	12.8	5.23	2.34	7.39	10.3	19.5
	CLT1 Lower Main Stem	4.40	1.67	0.745	2.24	5.20	6.12
Collector-Gatherer FFG (% of community)	Unnamed Reference Creek	43.0	9.14	4.09	29.9	46.0	52.6
	CLT1 Upstream North Branch	50.1	10.9	4.90	40.9	48.1	68.1
	CLT1 Upper Main Stem	50.1	10.9	4.90	40.9	48.1	68.1
	CLT1 Lower Main Stem	61.8	5.77	2.58	55.6	60.8	68.6
Filterer FFG (% of community)	Unnamed Reference Creek	33.9	12.6	5.62	20.4	31.8	54.5
	CLT1 Upstream North Branch	0.355	0.495	0.221	0	0	1.02
	CLT1 Upper Main Stem	0.355	0.495	0.221	0	0	1.02
	CLT1 Lower Main Stem	1.62	1.29	0.578	0	1.92	3.03
Shredder FFG (% of community)	Unnamed Reference Creek	3.45	3.00	1.34	0	5.26	6.27
	CLT1 Upstream North Branch	41.1	12.1	5.43	21.2	44.8	53.0
	CLT1 Upper Main Stem	41.1	12.1	5.43	21.2	44.8	53.0
	CLT1 Lower Main Stem	29.3	6.82	3.05	18.7	32.4	35.1
Clinger HPG (% of community)	Unnamed Reference Creek	42.2	13.2	5.92	32.6	36.1	64.6
	CLT1 Upstream North Branch	33.5	8.09	3.62	19.3	37.8	38.2
	CLT1 Upper Main Stem	33.5	8.09	3.62	19.3	37.8	38.2
	CLT1 Lower Main Stem	28.3	7.65	3.42	16.4	28.8	37.1
Sprawler HPG (% of community)	Unnamed Reference Creek	44.3	11.7	5.22	27.5	46.7	58.9
	CLT1 Upstream North Branch	48.9	12.5	5.58	36.2	50.2	68.1
	CLT1 Upper Main Stem	48.9	12.5	5.58	36.2	50.2	68.1
	CLT1 Lower Main Stem	60.3	8.03	3.59	49.5	59.8	68.3
Burrower HPG (% of community)	Unnamed Reference Creek	13.5	5.80	2.60	7.17	14.9	20.6
	CLT1 Upstream North Branch	17.4	6.31	2.82	11.3	15.2	25.6
	CLT1 Upper Main Stem	17.4	6.31	2.82	11.3	15.2	25.6
	CLT1 Lower Main Stem	11.4	4.21	1.88	4.49	12.1	15.7

Note: Sample size equals five for all study areas.

Table F.7: Statistical Comparison of Bray-Curtis Index for Camp Lake Tributary 1 and 2 Compared to Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Mine-Exposed Area	Comparison	Sample Size (n)		Betadisper P-Value	Mantel Test			dbRDA			
		Reference	Mine-Exposed		r	R ²	P-Value	F-Value	R ²	R ² _{adj}	P-Value
Camp Lake Tributary 1	CLT1-US vs REF-CRK	5	5	0.877	0.778	0.606	0.008	9.62	0.546	0.489	0.003
	CLT1-L2 vs REF-CRK	5	5	0.677	0.928	0.861	0.008	22.0	0.733	0.700	0.008
	CLT1-DS vs REF-CRK	5	5	0.330	0.884	0.781	0.008	13.1	0.621	0.573	0.001
Camp Lake Tributary 2	CLT2-US vs REF-CRK	5	5	0.153	0.670	0.449	0.008	5.81	0.421	0.348	0.008
	CLT2-DS vs REF-CRK	5	5	0.213	0.505	0.255	0.008	4.17	0.343	0.261	0.002



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

Table F.8: Statistical Comparison of Primary and Percent Compositional Benthic Metrics at Camp Lake Tributary 1 North Branch (CLT1-US) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2011	
Density (No. per m ²)	ANOVA	log10	YES	0.023	2007	3	505	330	-	-	B
					2011	3	949	139	1.3	-	AB
					2015	5	1,446	836	2.9	3.6	A
					2016	5	1,609	806	3.3	4.7	A
					2017	5	1,242	143	2.2	2.1	A
					2018	5	1,379	524	2.6	3.1	A
					2019	5	1,260	313	2.3	2.2	A
					2020	5	1,635	711	3.4	4.9	A
					2021	5	1,087	377	1.8	1.0	AB
Richness (No. of Taxa)	ANOVA	none	YES	0.003	2007	3	13.7	2.31	-	-	AB
					2011	3	14.3	2.08	0.3	-	AB
					2015	5	15	2.74	0.6	0.3	AB
					2016	5	13.2	2.39	-0.2	-0.5	B
					2017	5	19.2	2.59	2.4	2.4	A
					2018	5	17.2	1.48	1.5	1.4	AB
					2019	5	18	2.12	1.9	1.8	A
					2020	5	19.2	2.49	2.4	2.4	A
					2021	5	17.6	3.85	1.7	1.6	AB
Simpson's Evenness	ANOVA	none	YES	0.001	2007	3	0.749	0.0821	-	-	B
					2011	3	0.874	0.0417	1.5	-	A
					2015	5	0.899	0.0372	1.8	0.6	A
					2016	5	0.876	0.0268	1.5	0.0	A
					2017	5	0.925	0.0192	2.1	1.2	A
					2018	5	0.877	0.0578	1.6	0.1	A
					2019	5	0.884	0.0358	1.6	0.2	A
					2020	5	0.884	0.0319	1.6	0.2	A
					2021	5	0.894	0.0505	1.8	0.5	A
Nemata (% of community)	ANOVA	log10(x+1)	YES	<0.001	2007	3	0.148	0.256	-	-	B
					2011	3	0.696	0.766	2.1	-	B
					2015	5	1.68	0.734	6.0	1.3	B
					2016	5	1.32	0.505	4.6	0.8	B
					2017	5	4.08	2.13	15.4	4.4	A
					2018	5	1.56	0.732	5.5	1.1	B
					2019	5	1.27	0.825	4.4	0.7	B
					2020	5	1.3	1.13	4.5	0.8	B
					2021	5	3.7	1.08	13.9	3.9	A
Oligochaeta (% of community)	K-W	rank	YES	0.040	2007	3	1.46	2.13	-	-	BC
					2011	3	0.745	0.512	-0.3	-	BC
					2015	5	1.4	1.28	0.0	1.3	BC
					2016	5	1.5	0.627	0.0	1.5	C
					2017	5	1.08	1.31	-0.2	0.7	BC
					2018	5	1.21	0.568	-0.1	0.9	BC
					2019	5	2.53	3.2	0.5	3.5	C
					2020	5	4.38	1.34	1.4	7.1	A
					2021	5	0.379	0.359	-0.5	-0.7	B
Hydracarina (% of community)	ANOVA	log10(x+1)	YES	<0.001	2007	3	0.798	1.02	-	-	C
					2011	3	14.4	6.67	13.3	-	A
					2015	5	2.32	1.7	1.5	-1.8	C
					2016	5	9.77	3.19	8.8	-0.7	AB
					2017	5	7.65	1.13	6.7	-1.0	B
					2018	5	5.34	1.27	4.5	-1.4	BC
					2019	5	1.97	1.69	1.1	-1.9	C
					2020	5	2.96	2.52	2.1	-1.7	C
					2021	5	2.89	1.67	2.1	-1.7	C
Ostracoda (% of community)	K-W	rank	YES	0.060	2007	3	0	0	-	-	C
					2011	3	0.939	1.02	nm	-	A
					2015	5	0.603	0.85	nm	-0.3	AB
					2016	5	0	0	nm	-0.9	C
					2017	5	0	0	nm	-0.9	C
					2018	5	0	0	nm	-0.9	C
					2019	5	0.107	0.24	nm	-0.8	BC
					2020	5	0.547	0.607	nm	-0.4	AB
					2021	5	0.355	0.495	nm	-0.6	ABC

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.8: Statistical Comparison of Primary and Percent Compositional Benthic Metrics at Camp Lake Tributary 1 North Branch (CLT1-US) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2011	
Chironomidae (% of community)	ANOVA	none	YES	<0.001	2007	3	88.1	7.15	-	-	A
					2011	3	76.3	5.09	-1.7	-	ABC
					2015	5	75.6	7.47	-1.7	-0.1	ABC
					2016	5	68.6	10.6	-2.7	-1.5	C
					2017	5	74	1.66	-2.0	-0.5	ABC
					2018	5	86.8	4.18	-0.2	2.1	A
					2019	5	85	5.11	-0.4	1.7	A
					2020	5	81.7	7.87	-0.9	1.1	AB
					2021	5	70.6	7.32	-2.4	-1.1	BC
Metal Sensitive Chironomidae (% of community)	ANOVA	log10	NO	0.270	2007	3	3.73	3.57	-	-	A
					2011	3	10.8	6.64	2.0	-	A
					2015	5	12.7	14.1	2.5	0.3	A
					2016	5	9.33	9.05	1.6	-0.2	A
					2017	5	7.24	5.16	1.0	-0.5	A
					2018	5	17.8	4.82	3.9	1.1	A
					2019	5	14.4	10.4	3.0	0.5	A
					2020	5	13.8	4.7	2.8	0.5	A
					2021	5	7.21	5.34	1.0	-0.5	A
Tipulidae (% of community)	ANOVA	log10	YES	<0.001	2007	3	8.89	4.06	-	-	AB
					2011	3	6.92	2.14	-0.5	-	ABC
					2015	5	16.8	4.66	1.9	4.6	A
					2016	5	16.9	11.8	2.0	4.7	AB
					2017	5	8.41	1.54	-0.1	0.7	AB
					2018	5	2.93	2.27	-1.5	-1.9	C
					2019	5	5.45	1.93	-0.8	-0.7	BC
					2020	5	7.42	6.2	-0.4	0.2	AB
					2021	5	12.8	5.23	1.0	2.7	AB
Collector Gatherers FFG (% of community)	ANOVA	log10	YES	0.009	2007	3	72.6	11.0	-	-	A
					2011	3	41.4	14.1	-2.8	-	BC
					2015	5	50.2	7.33	-2.0	0.6	ABC
					2016	5	45.9	14.3	-2.4	0.3	BC
					2017	5	38.8	7.09	-3.1	-0.2	B
					2018	5	54.6	13.5	-1.6	0.9	ABC
					2019	5	58.8	8.57	-1.3	1.2	AC
					2020	5	59.0	9.62	-1.2	1.2	AC
					2021	5	50.1	10.9	-2.0	0.6	ABC
Filterers FFG (% of community)	K-W	rank	YES	0.024	2007	3	0.303	0.263	-	-	BC
					2011	3	0	0	-1.2	-	C
					2015	5	0	0	-1.2	nm	C
					2016	5	0.435	0.420	0.5	nm	BC
					2017	5	1.33	1.46	3.9	nm	AB
					2018	5	0.501	0.459	0.8	nm	BC
					2019	5	2.02	2.40	6.5	nm	AB
					2020	5	4.44	5.33	15.7	nm	A
					2021	5	0.355	0.495	0.2	nm	BC
Shredders FFG (% of community)	ANOVA	none	YES	0.051	2007	3	23.1	8.79	-	-	B
					2011	3	40.0	14.2	1.9	-	AB
					2015	5	46.1	7.29	2.6	0.4	AB
					2016	5	42.8	16.6	2.2	0.2	AB
					2017	5	49.5	6.44	3.0	0.7	A
					2018	5	39.3	13.2	1.8	0.0	AB
					2019	5	33.8	9.13	1.2	-0.4	AB
					2020	5	32.8	6.82	1.1	-0.5	AB
					2021	5	41.1	12.1	2.0	0.1	AB

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.9: Statistical Comparison of Primary and Percent Compositional Benthic Metrics at Camp Lake Tributary 1 Upper Main Stem (CLT1-L2) Among Years of Mine Operation (2016 and 2021) and Baseline (2011) for the Mary River Project CREMP

Metric	Overall 3-Year Comparison ^a				Pair-wise, post-hoc comparisons					
	Statistical Test	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b	Pairwise Comparison
									vs. Baseline Year 2011	
Density (No. per m ²)	ANOVA	log10	YES	0.004	2011	3	21,125	13,424	-	A
					2016	5	7,701	1,580	-1.0	A
					2021	5	3,128	1,579	-1.3	B
Richness (No. of Taxa)	ANOVA	log10	NO	0.451	2011	3	17	3.61	-	A
					2016	5	19	1.58	0.6	A
					2021	5	17.6	2.41	0.2	A
Simpson's Evenness	ANOVA	log10	NO	0.590	2011	3	0.879	0.0236	-	A
					2016	5	0.857	0.0419	-0.9	A
					2021	5	0.838	0.0733	-1.7	A
Nemata (% of community)	ANOVA	log10	NO	0.591	2011	3	1.3	0.4	-	A
					2016	5	1.3	0.7	0.1	A
					2021	5	2.0	1.5	1.9	A
Oligochaeta (% of community)	ANOVA	log10	NO	0.142	2011	3	4.4	5.0	-	A
					2016	5	12.6	8.6	1.6	A
					2021	5	13.4	9.9	1.8	A
Hydracarina (% of community)	ANOVA	log10	YES	0.010	2011	3	18.9	19.8	-	AB
					2016	5	23.8	8.3	0.2	A
					2021	5	2.1	2.0	-0.8	B
Chironomidae (% of community)	ANOVA	log10	NO	0.193	2011	3	73.8	20.7	-	A
					2016	5	61.0	14.5	-0.6	A
					2021	5	78.2	10.8	0.2	A
Metal Sensitive Taxa (% of community)	ANOVA	log10	YES	0.033	2011	3	28.9	22.6	-	AB
					2016	5	30.4	12.3	0.1	A
					2021	5	10.6	8.0	-0.8	B
Tipulidae (% of community)	ANOVA	log10(x+1)	YES	0.044	2011	3	0.2	0.2	-	B
					2016	5	0.5	0.4	1.2	B
					2021	5	1.9	1.4	8.3	A
Collector Gatherers FFG (% of community)	ANOVA	log10	YES	0.002	2011	3	29.6	9.1	-	B
					2016	5	29.6	9.5	0.0	B
					2021	5	62.2	10.7	3.6	A
Filterers FFG (% of community)	ANOVA	log10	YES	0.053	2011	3	28.8	22.7	-	AB
					2016	5	28.3	13.7	0.0	A
					2021	5	9.8	8.4	-0.8	B
Shredders FFG (% of community)	ANOVA	none	NO	0.108	2011	3	13.0	14.6	-	A
					2016	5	15.4	2.1	0.2	A
					2021	5	23.9	3.7	0.7	A



Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).



Indicates magnitude of difference outside of a ± 2 SD effect size of respective baseline year mean indicating an ecologically meaningful difference between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.10: Statistical Comparison of Benthic Metrics at Camp Lake Tributary 1 Lower Mainstem (CLT1-DS) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison ^a				Pair-wise, post-hoc comparisons						
	Statistical Test	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2011	
Density (No. per m ²)	ANOVA	none	YES	0.052	2007	3	754	573	-	-	AB
					2011	3	898	183	0.3	-	AB
					2015	5	1,301	479	1.0	2.2	AB
					2016	5	1,143	444	0.7	1.3	AB
					2017	5	1,465	735	1.2	3.1	A
					2018	5	771	309	0.0	-0.7	AB
					2019	5	843	293	0.2	-0.3	AB
					2020	5	626	261	-0.2	-1.5	B
					2021	5	675	344	-0.1	-1.2	AB
Richness (No. of Taxa)	ANOVA	log10	NO	0.182	2007	3	20.3	6.03	-	-	A
					2011	3	15.3	4.51	-0.8	-	A
					2015	5	14.6	1.14	-0.9	-0.2	A
					2016	5	16.0	1.58	-0.7	0.2	A
					2017	5	16.8	1.92	-0.6	0.3	A
					2018	5	14.4	1.14	-1.0	-0.2	A
					2019	5	15.8	1.64	-0.7	0.1	A
					2020	5	17.4	3.05	-0.5	0.5	A
					2021	5	16.0	2.00	-0.7	0.2	A
Simpson's Evenness	ANOVA	none	NO	0.196	2007	3	0.864	0.0397	-	-	A
					2011	3	0.864	0.0254	0.0	-	A
					2015	5	0.889	0.0436	0.6	1.0	A
					2016	5	0.86	0.0911	-0.1	-0.2	A
					2017	5	0.874	0.0331	0.3	0.4	A
					2018	5	0.857	0.05	-0.2	-0.3	A
					2019	5	0.755	0.161	-2.7	-4.3	A
					2020	5	0.828	0.0671	-0.9	-1.4	A
					2021	5	0.891	0.0240	0.7	1.1	A
Nemata (% of community)	K-W	rank	NO	0.214	2007	3	1.01	1.34	-	-	A
					2011	3	0.427	0.381	-0.4	-	A
					2015	5	3.18	2.58	1.6	7.2	A
					2016	5	4.46	4.07	2.6	10.6	A
					2017	5	4.55	4.99	2.6	10.8	A
					2018	5	2.57	1.81	1.2	5.6	A
					2019	5	2.22	1.29	0.9	4.7	A
					2020	5	2.05	1.04	0.8	4.3	A
					2021	5	3.47	2.87	1.8	8.0	A
Oligochaeta (% of community)	ANOVA	log10(x+1)	YES	0.001	2007	3	7.26	6.23	-	-	ABC
					2011	3	1.08	1.56	-1.0	-	AC
					2015	5	5.6	3.14	-0.3	2.9	ABC
					2016	5	9.68	3.69	0.4	5.5	AB
					2017	5	4.97	2.66	-0.4	2.5	ABC
					2018	5	1.2	1.04	-1.0	0.1	C
					2019	5	3.99	2.7	-0.5	1.9	ABC
					2020	5	11.5	8.35	0.7	6.7	B
					2021	5	0.95	1.74	-1.0	-0.1	C
Hydracarina (% of community)	K-W	rank	YES	0.003	2007	3	2.87	1.42	-	-	BCDE
					2011	3	24.7	6.39	15.4	-	A
					2015	5	1.68	1.55	-0.8	-3.6	CE
					2016	5	4.6	0.806	1.2	-3.1	AB
					2017	5	4.03	1.43	0.8	-3.2	ABD
					2018	5	3.64	1.50	0.5	-3.3	BDE
					2019	5	2.27	1.35	-0.4	-3.5	CDE
					2020	5	1.61	1.55	-0.9	-3.6	C
					2021	5	1.74	0.872	-0.8	-3.6	C
Ostracoda (% of community)	K-W	rank	NO	0.150	2007	3	0.619	0.621	-	-	A
					2011	3	0.122	0.211	-0.8	-	A
					2015	5	0.758	1.04	0.2	3.0	A
					2016	5	0	0	-1.0	-0.6	A
					2017	5	0	0	-1.0	-0.6	A
					2018	5	0.143	0.319	-0.8	0.1	A
					2019	5	0.402	0.417	-0.3	1.3	A
					2020	5	0.0763	0.171	-0.9	-0.2	A
					2021	5	0	0	-1.0	-0.6	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm = MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.10: Statistical Comparison of Benthic Metrics at Camp Lake Tributary 1 Lower Mainstem (CLT1-DS) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison ^a				Pair-wise, post-hoc comparisons						
	Statistical Test	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2011	
Chironomidae (% of community)	ANOVA	log10	YES	<0.001	2007	3	80.8	8.53	-	-	AB
					2011	3	65.3	8.95	-1.8	-	C
					2015	5	85.2	4.02	0.5	2.2	AB
					2016	5	73.9	5.94	-0.8	1.0	BC
					2017	5	80.9	4.46	0.0	1.7	AB
					2018	5	85.9	4.05	0.6	2.3	A
					2019	5	87.4	7.37	0.8	2.5	A
					2020	5	75.8	7.09	-0.6	1.2	ABC
					2021	5	80.8	3.03	0.0	1.7	AB
Metal Sensitive Chironomidae (% of community)	K-W	rank	YES	0.014	2007	3	15.1	10.2	-	-	A
					2011	3	7.56	7.37	-0.7	-	AB
					2015	5	4.41	3.52	-1.0	-0.4	BC
					2016	5	4.08	3.26	-1.1	-0.5	BC
					2017	5	1.49	0.665	-1.3	-0.8	C
					2018	5	8.56	5.95	-0.6	0.1	AB
					2019	5	7.67	3.37	-0.7	0.0	AB
					2020	5	3.59	1.63	-1.1	-0.5	BC
					2021	5	11.1	9.82	-0.4	0.5	AB
Tipulidae (% of community)	ANOVA	log10	YES	0.076	2007	3	6.45	2.6	-	-	AB
					2011	3	8.38	3.2	0.7	-	A
					2015	5	3.06	1	-1.3	-1.7	AB
					2016	5	6.13	3.38	-0.1	-0.7	AB
					2017	5	3.9	3.09	-1.0	-1.4	AB
					2018	5	4.85	3.06	-0.6	-1.1	AB
					2019	5	2.75	2.41	-1.4	-1.8	B
					2020	5	6.2	2.01	-0.1	-0.7	AB
					2021	5	4.4	1.67	-0.8	-1.2	AB
Collector Gatherers FFG (% of community)	ANOVA	none	YES	<0.001	2007	3	51.7	24.3	-	-	CD
					2011	3	35.6	10.5	-0.7	-	D
					2015	5	78.4	9.5	1.1	4.1	AB
					2016	5	75.8	9.66	1.0	3.8	AB
					2017	5	67.2	6.41	0.6	3.0	BC
					2018	5	59.5	8.3	0.3	2.3	CD
					2019	5	81.5	6.28	1.2	4.4	A
					2020	5	81.6	4.52	1.2	4.4	A
					2021	5	61.8	5.77	0.4	2.5	CD
Filterers FFG (% of community)	K-W	rank	NO	0.353	2007	3	10.2	13.1	-	-	A
					2011	3	0.275	0.242	-0.8	-	A
					2015	5	0.227	0.508	-0.8	-0.2	A
					2016	5	1.37	1.57	-0.7	4.5	A
					2017	5	0.34	0.546	-0.8	0.3	A
					2018	5	0.428	0.475	-0.7	0.6	A
					2019	5	0.841	1.88	-0.7	2.3	A
					2020	5	0.935	1.21	-0.7	2.7	A
					2021	5	1.62	1.29	-0.7	5.6	A
Shredders FFG (% of community)	ANOVA	log10	YES	<0.001	2007	3	22.1	3.05	-	-	ABC
					2011	3	38.9	4.55	5.5	-	A
					2015	5	19.3	8.98	-0.9	-4.3	BC
					2016	5	18.2	9.71	-1.3	-4.5	BC
					2017	5	27.6	4.92	1.8	-2.5	AB
					2018	5	35.5	7.73	4.4	-0.7	A
					2019	5	13.9	6.1	-2.7	-5.5	C
					2020	5	14.1	4.19	-2.6	-5.5	C
					2021	5	29.3	6.82	2.4	-2.1	AB

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm = MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.11: Replicate Grab Data for Benthic Invertebrate Community Samples Collected at the Unnamed Reference Creek and Camp Lake Tributary 2 (CLT2), Mary River Project CREMP, August 2021

Study Area	Station	Water Depth (cm)			Water Velocity (m/s)			Embeddedness			In-Stream Vegetation			Algae Presence		
		Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3
Unnamed Reference Creek	REF-CRK-B1	9	7	7	0.58	0.31	0.59	25%	25%	25%	sparse	none	none	sparse	sparse	sparse
	REF-CRK-B2	8	8	9	0.45	0.51	0.46	25%	25%	25%	none	sparse	none	sparse	sparse	sparse
	REF-CRK-B3	8	7	12	0.51	0.42	0.45	25%	25%	25%	none	none	sparse	sparse	sparse	sparse
	REF-CRK-B4	12	10	8	0.44	0.44	0.57	25%	25%	25%	none	sparse	sparse	sparse	sparse	sparse
	REF-CRK-B5	12	20	8	0.59	0.34	0.47	25%	25%	25%	none	sparse	sparse	sparse	sparse	sparse
Camp Lake Tributary 2 Upstream	CLT-2-US-B1	9.5	15	22	0.45	0.38	0.29	25%	50%	50%	none	none	none	sparse	sparse	sparse
	CLT-2-US-B2	20	19	14	0.31	0.44	0.62	50%	50%	50%	none	none	none	sparse	sparse	sparse
	CLT-2-US-B3	10	8	8	0.31	0.32	0.42	25%	50%	25%	none	none	none	sparse	sparse	sparse
	CLT-2-US-B4	20	14	11	0.59	0.34	0.46	50%	75%	25%	none	none	none	sparse	sparse	sparse
	CLT-2-US-B5	10	11	8	0.37	0.30	0.39	25%	25%	25%	sparse	none	none	sparse	sparse	sparse
Camp Lake Tributary 2 Downstream	CLT-2-DS-B1	8	10	11	0.49	0.53	0.42	25%	25%	25%	none	none	none	sparse	sparse	sparse
	CLT-2-DS-B2	7	6.5	14	0.58	0.48	0.42	25%	25%	25%	none	none	sparse	sparse	sparse	sparse
	CLT-2-DS-B3	7	12	7.5	0.32	0.37	0.43	25%	25%	25%	none	none	none	sparse	sparse	sparse
	CLT-2-DS-B4	17	13	7	0.35	0.34	0.36	50%	25%	25%	none	none	none	sparse	sparse	sparse
	CLT-2-DS-B5	14	14	6	0.52	0.61	0.36	25%	25%	25%	none	none	none	sparse	sparse	sparse

Table F.12: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Camp Lake Tributary 2 Study Areas, August 2021

Waterbody	Upstream (CLT2-US)					Downstream (CLT2-DS)				
Station	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
ROUNDWORMS										
P. Nemata	-	1	-	1	11	8	6	1	1	12
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Enchytraeidae	52	2	-	-	11	2	3	3	1	14
F. Lumbriculidae										
Lumbriculus	-	-	-	-	-	-	-	-	-	-
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
F. Hygrobatidae										
Hygrobates	-	-	-	-	-	-	-	-	-	-
F. Lebertiidae										
Lebertia	-	-	-	-	-	-	-	-	-	-
F. Pionidae										
indeterminate	-	-	-	-	-	-	-	-	-	-
F. Sperchonidae										
Sperchon	9	4	3	2	11	2	3	2	3	4
SEED SHRIMPS										
Cl. Ostracoda	-	-	1	-	-	-	-	-	-	-
SPRINGTAILS										
Cl. Entognatha										
O. Collembola	-	-	-	-	-	-	-	-	-	-
INSECTS										
Cl. Insecta										
MAYFLIES										
O. Ephemeroptera										
F. Baetidae										
Acentrella feropagus	3	1	3	2	4	2	4	2	1	8
CADDISFLIES										
O. Trichoptera										
F. Limnephilidae										
immature	-	-	-	-	-	-	-	-	-	-
TRUE FLIES										
O. Diptera										
BITING-MIDGE										
F. Ceratopogonidae										
Atrichopogon	-	-	-	-	-	-	-	-	-	-
Culicoides	-	-	-	-	1	3	-	2	-	-
Probezzia	-	-	-	-	-	-	-	-	-	-
MIDGES										
F. Chironomidae										
chironomid pupae	9	11	13	10	37	16	24	4	6	24
S.F. Chironominae										
Cladotanytarsus	-	-	-	-	-	-	-	-	-	-
Paratanytarsus	-	-	-	-	-	-	-	-	-	-
Rheotanytarsus	-	-	-	-	-	-	-	-	-	-
S.F. Diamesinae										
Diamesa	1	8	4	3	4	10	22	9	7	24
Pseudokiefferiella	3	3	3	2	14	2	5	1	-	10

^a Bold entries excluded from taxa count

Table F.12: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Camp Lake Tributary 2 Study Areas, August 2021

Waterbody	Upstream (CLT2-US)					Downstream (CLT2-DS)				
Station	B1	B2	B3	B4	B5	B1	B2	B3	B4	B5
S.F. Orthocladiinae										
Cardiocladius	1	1	-	-	4	-	-	-	-	8
Chaetocladius	-	-	-	-	2	-	-	-	-	-
Corynoneura	-	-	-	-	-	-	2	-	-	-
Cricotopus	3	1	-	-	1	-	4	2	-	4
Cricotopus/Orthocladius	7	4	4	5	68	42	17	7	2	10
Eukiefferiella	-	3	-	1	-	5	15	1	-	-
Hydrobaenus	-	-	1	-	2	-	1	-	-	2
Hydrosmittia	2	1	-	-	3	1	2	1	-	4
Krenosmittia	2	5	3	1	3	18	19	4	-	2
Limnophyes	1	2	3	2	2	17	4	2	1	-
Orthocladius (Euorthocladius)	3	3	7	9	34	9	9	7	2	16
Parakiefferiella	-	-	-	-	-	-	-	-	-	-
Parametriocnemus	-	-	-	-	-	1	-	-	-	-
Paraphaenocladius	-	-	-	1	-	-	-	2	-	4
Thienemanniella	1	-	-	-	4	1	4	1	1	2
Tokunagaia	-	-	-	-	-	-	1	-	-	-
Tvetenia	5	1	3	-	12	10	25	15	1	16
indeterminate	1	-	-	-	1	-	1	1	-	2
S.F. Tanypodinae										
Procladius	-	-	-	-	-	-	-	-	-	-
Thienemannimyia complex	-	-	-	-	-	-	-	-	-	-
F. Empididae										
Clinocera	5	8	10	6	16	6	11	5	2	8
pupae	-	1	-	-	-	-	-	-	1	-
F. Muscidae	-	-	-	-	1	-	-	-	-	-
F. Simuliidae										
Gymnopaïs	1	1	1	3	2	1	7	-	3	12
Metacnephia	-	-	-	1	2	-	4	-	-	6
Prosimulium	-	1	-	1	3	-	6	1	-	6
pupae	-	-	-	-	-	-	-	8	-	-
F. Tipulidae										
Tipula	-	1	3	-	10	3	7	-	2	12
SUMMARY METRICS										
Density (No. organisms per m²)	391	226	222	179	943	570	738	290	122	753
Richness (total number of taxa) ^a	15	18	13	14	23	18	22	18	12	20
Simpson's Evenness (E)	0.796	0.956	0.942	0.866	0.791	0.866	0.959	0.939	0.928	0.970
Dominant Group Composition										
% Nemata	0	1.59	0	2.00	4.18	5.03	2.91	1.23	2.94	5.71
% Oligochaeta	47.7	3.17	0	0	4.18	1.26	1.46	3.70	2.94	6.67
% Acari	8.26	6.35	4.84	4.00	4.18	1.26	1.46	2.47	8.82	1.90
% Ostracods	0	0	1.61	0	0	0	0	0	0	0
% Chironomids	35.8	68.2	66.1	68.0	72.6	83.0	75.2	70.4	58.8	61.0
% Metal Sensitive Chironmids	4.77	23.5	16.5	14.2	8.49	8.59	15.5	13.3	29.4	19.9
% Simuliidae	0.917	3.17	1.61	10.0	2.66	0.629	8.25	11.1	8.82	11.4
% Tipulidae	0	1.59	4.84	0	3.80	1.89	3.40	0	5.88	5.71
Functional Feeding Group Composition										
% Collector - Gatherers	77.3	68.2	72.6	74.0	79.2	90.6	76.2	73.1	67.7	68.9
% Filterers	0	1.59	0	4.00	1.90	0	4.85	11.1	0	5.71
% Shredders	7.75	5.85	4.84	0	5.19	1.89	8.70	4.72	5.88	9.23
Habitat Preference Group Composition										
% Clingers	16.9	13.8	6.45	14.0	8.23	1.89	15.0	18.3	17.6	16.9
% Sprawlers	34.2	77.7	88.7	84.0	77.0	88.0	77.2	74.3	70.6	60.4
% Burrowers	48.9	8.48	4.84	2.00	14.8	10.1	7.77	7.41	11.8	22.8

^a Bold entries excluded from taxa count

Table F.13: Benthic Station Habitat Feature Statistical Comparisons among Camp Lake Tributary 2 and Unnamed Reference Creek Study Areas, Mary River Project CREMP, August 2021

Metric	Overall 3-group Comparison				Pair-wise, post-hoc comparisons			
	Statistical Test ^a	Transformation	Significant Difference between Areas?	p-value	(I) Area	(J) Area	Significant Difference Between Areas?	P-value
Water Depth (cm)	ANOVA	none	NO	0.125	Unnamed Reference Creek	CLT2 Upstream	NO	ns
					Unnamed Reference Creek	CLT2 Downstream	NO	ns
					CLT2 Upstream	CLT2 Downstream	NO	ns
Water Velocity (cm/s)	ANOVA	none	NO	0.116	Unnamed Reference Creek	CLT2 Upstream	NO	ns
					Unnamed Reference Creek	CLT2 Downstream	NO	ns
					CLT2 Upstream	CLT2 Downstream	NO	ns
Substrate Embeddedness (%)	K-W	rank	YES	0.019	Unnamed Reference Creek	CLT2 Upstream	YES	0.008
					Unnamed Reference Creek	CLT2 Downstream	NO	0.613
					CLT2 Upstream	CLT2 Downstream	YES	0.031

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

^aStatistical 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). "ns" indicates not significant.

Table F.14: Benthic Invertebrate Community Summary Statistics for Camp Lake Tributary 2 Study Areas, Mary River Project CREMP, August 2021

Metric	Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Density (no. organisms / m ²)	Unnamed Reference Creek	1,129	820	367	473	903	2,505
	CLT2 Upstream	392	318	142	179	226	943
	CLT2 Downstream	495	279	125	122	570	753
Richness (Number of Taxa)	Unnamed Reference Creek	20.0	3.32	1.48	16.0	21.0	23.0
	CLT2 Upstream	16.6	4.04	1.81	13.0	15.0	23.0
	CLT2 Downstream	18.0	3.74	1.67	12.0	18.0	22.0
Simpson's Evenness	Unnamed Reference Creek	0.924	0.0521	0.0233	0.839	0.932	0.974
	CLT2 Upstream	0.870	0.0782	0.0350	0.791	0.866	0.956
	CLT2 Downstream	0.932	0.0404	0.0181	0.866	0.939	0.970
Nemata (% of community)	Unnamed Reference Creek	2.33	2.02	0.904	0.601	2.27	5.56
	CLT2 Upstream	1.55	1.73	0.773	0	1.59	4.18
	CLT2 Downstream	3.57	1.80	0.807	1.23	2.94	5.71
Oligochaeta (% of community)	Unnamed Reference Creek	0.194	0.273	0.122	0	0	0.572
	CLT2 Upstream	11.0	20.6	9.21	0	3.17	47.7
	CLT2 Downstream	3.21	2.19	0.979	1.26	2.94	6.67
Hydracarina (% of community)	Unnamed Reference Creek	4.96	3.04	1.36	1.59	4.58	8.33
	CLT2 Upstream	5.53	1.78	0.798	4.00	4.84	8.26
	CLT2 Downstream	3.18	3.19	1.43	1.26	1.90	8.82
Ostracoda (% of community)	Unnamed Reference Creek	0.883	0.760	0.340	0	0.601	1.98
	CLT2 Upstream	0.323	0.721	0.323	0	0	1.61
	CLT2 Downstream	0	0	0	0	0	0
Chironomidae (% of community)	Unnamed Reference Creek	40.2	7.54	3.37	28.9	39.0	47.7
	CLT2 Upstream	62.2	14.9	6.68	35.8	68.0	72.6
	CLT2 Downstream	69.7	10.0	4.49	58.8	70.4	83.0
Metal-Sensitive Chironomidae (% of community)	Unnamed Reference Creek	6.40	1.98	0.886	3.58	6.93	8.28
	CLT2 Upstream	13.5	7.25	3.24	4.77	14.2	23.5
	CLT2 Downstream	17.3	7.89	3.53	8.59	15.5	29.4
Simuliidae (% of community)	Unnamed Reference Creek	34.6	11.4	5.08	22.0	32.1	53.1
	CLT2 Upstream	3.67	3.64	1.63	0.917	2.66	10.0
	CLT2 Downstream	8.05	4.37	1.96	0.629	8.82	11.4
Tipulidae (% of community)	Unnamed Reference Creek	1.19	1.18	0.527	0	1.00	3.03
	CLT2 Upstream	2.05	2.21	0.987	0	1.59	4.84
	CLT2 Downstream	3.38	2.52	1.13	0	3.40	5.88
Collector-Gatherer FFG (% of community)	Unnamed Reference Creek	43.0	9.14	4.09	29.9	46.0	52.6
	CLT2 Upstream	74.3	4.29	1.92	68.2	74.0	79.2
	CLT2 Downstream	75.3	9.19	4.11	67.7	73.1	90.6
Filterer FFG (% of community)	Unnamed Reference Creek	33.9	12.6	5.62	20.4	31.8	54.5
	CLT2 Upstream	1.50	1.65	0.739	0	1.59	4.00
	CLT2 Downstream	4.34	4.63	2.07	0	4.85	11.1
Shredder FFG (% of community)	Unnamed Reference Creek	3.45	3.00	1.34	0	5.26	6.27
	CLT2 Upstream	4.73	2.87	1.28	0	5.19	7.75
	CLT2 Downstream	6.08	3.01	1.35	1.89	5.88	9.23
Clinger HPG (% of community)	Unnamed Reference Creek	42.2	13.2	5.92	32.6	36.1	64.6
	CLT2 Upstream	11.9	4.37	1.95	6.45	13.8	16.9
	CLT2 Downstream	13.9	6.85	3.06	1.89	16.9	18.3
Sprawler HPG (% of community)	Unnamed Reference Creek	44.3	11.7	5.22	27.5	46.7	58.9
	CLT2 Upstream	72.3	21.9	9.77	34.2	77.7	88.7
	CLT2 Downstream	74.1	10.1	4.50	60.4	74.3	88.0
Burrower HPG (% of community)	Unnamed Reference Creek	13.5	5.80	2.60	7.17	14.9	20.6
	CLT2 Upstream	15.8	19.1	8.55	2.00	8.48	48.9
	CLT2 Downstream	12.0	6.31	2.82	7.41	10.1	22.8

Note: Sample size equals five for all study areas.

Table F.15: Statistical Comparison of Benthic Metrics at Camp Lake Tributary 2 Upstream (CLT2-US) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference vs Baseline Year 2007 ^b	Pairwise Comparison
Density (No. per m ²)	ANOVA	log10	YES	<0.001	2007	3	364	205	-	ABC
					2015	5	741	416	1.8	A
					2016	5	409	100	0.2	AB
					2017	5	216	30.2	-0.7	BC
					2018	5	168	65	-1.0	C
					2019	5	745	282	1.9	A
					2020	5	679	325	1.5	A
					2021	5	392	318	0.1	ABC
Richness (No. of Taxa)	ANOVA	log10	YES	0.008	2007	3	12.7	2.08	-	B
					2015	5	20.8	1.79	3.9	A
					2016	5	16.4	2.88	1.8	ABC
					2017	5	14.6	2.51	0.9	BC
					2018	5	15	3.74	1.1	BC
					2019	5	18.8	2.59	2.9	AC
					2020	5	17.4	2.19	2.3	ABC
					2021	5	16.6	4.04	1.9	ABC
Simpson's Evenness	K-W	rank	YES	0.007	2007	3	0.825	0.00817	-	C
					2015	5	0.922	0.025	11.9	AB
					2016	5	0.895	0.0374	8.6	BC
					2017	5	0.955	0.0133	15.9	A
					2018	5	0.922	0.0425	11.9	AB
					2019	5	0.949	0.00536	15.2	A
					2020	5	0.879	0.058	6.6	BC
					2021	5	0.87	0.0782	5.5	BC
Nemata (% of community)	ANOVA	none	NO	0.354	2007	3	1.14	0.58	-	A
					2015	5	0.878	0.900	-0.5	A
					2016	5	0.918	0.865	-0.4	A
					2017	5	0.97	1.35	-0.3	A
					2018	5	1.14	1.57	0.0	A
					2019	5	2.41	0.971	2.2	A
					2020	5	0.54	0.742	-1.0	A
					2021	5	1.55	1.73	0.7	A
Oligochaeta (% of community)	K-W	rank	NO	0.586	2007	3	2.12	0.791	-	A
					2015	5	2.67	2.82	0.7	A
					2016	5	4.84	3.5	3.4	A
					2017	5	3.37	6.45	1.6	A
					2018	5	2.44	3.35	0.4	A
					2019	5	2.43	0.959	0.4	A
					2020	5	15.3	19	16.7	A
					2021	5	11	20.6	11.2	A
Hydracarina (% of community)	ANOVA	log10(x+1)	YES	0.004	2007	3	2.93	2.14	-	ABC
					2015	5	0.882	0.745	-1.0	C
					2016	5	5.49	2.55	1.2	AB
					2017	5	8.01	4.16	2.4	A
					2018	5	4.69	4.42	0.8	ABC
					2019	5	1.58	1.47	-0.6	BC
					2020	5	3.03	1.31	0.0	BC
					2021	5	5.53	1.78	1.2	ABC
Ostracoda (% of community)	K-W	rank	NO	0.420	2007	3	0	0	-	A
					2015	5	0.359	0.507	nm	A
					2016	5	0	0	nm	A
					2017	5	0	0	nm	A
					2018	5	0	0	nm	A
					2019	5	0.235	0.525	nm	A
					2020	5	0.358	0.506	nm	A
					2021	5	0.323	0.721	nm	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.15: Statistical Comparison of Benthic Metrics at Camp Lake Tributary 2 Upstream (CLT2-US) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference vs Baseline Year 2007 ^b	Pairwise Comparison
Chironomidae (% of community)	ANOVA	none	YES	0.018	2007	3	88.4	4.3	-	A
					2015	5	80.2	8.93	-1.9	A
					2016	5	79.8	8.68	-2.0	AB
					2017	5	75.9	7.48	-2.9	AB
					2018	5	80.2	3.86	-1.9	A
					2019	5	80	5.87	-2.0	AB
					2020	5	70.4	14.2	-4.2	AB
					2021	5	62.2	14.9	-6.1	B
Metal Sensitive Chironomidae (% of community)	ANOVA	none	YES	<0.001	2007	3	5.33	0.591	-	C
					2015	5	10.5	5.68	8.7	BC
					2016	5	5.55	3.36	0.4	C
					2017	5	22.0	3.09	28.2	A
					2018	5	9.51	4.96	7.1	BC
					2019	5	17.0	6.61	19.7	AB
					2020	5	5.66	3.45	0.6	C
					2021	5	13.5	7.25	13.8	ABC
Tipulidae (% of community)	ANOVA	log10(x+1)	YES	0.027	2007	3	5.23	1.99	-	A
					2015	5	4.14	3.46	-0.5	A
					2016	5	4.08	1.80	-0.6	A
					2017	5	1.60	1.63	-1.8	A
					2018	5	2.28	1.49	-1.5	A
					2019	5	1.56	0.559	-1.8	A
					2020	5	1.84	0.989	-1.7	A
					2021	5	2.05	2.21	-1.6	A
Collector Gatherers FFG (% of community)	K-W	rank	YES	0.003	2007	3	68.5	6.51	-	ABCD
					2015	5	63.8	10.3	-0.7	CD
					2016	5	67.2	5.96	-0.2	BCD
					2017	5	75.6	3.88	1.1	AB
					2018	5	73.2	8.55	0.7	ABD
					2019	5	54.0	6.04	-2.2	C
					2020	5	80.5	11.6	1.8	A
					2021	5	74.3	4.29	0.9	AB
Filterers FFG (% of community)	K-W	rank	YES	<0.001	2007	3	0.25	0.432	-	D
					2015	5	0.987	1.06	nm	D
					2016	5	0.156	0.349	nm	D
					2017	5	6.45	3.07	nm	AB
					2018	5	6.61	5.49	nm	ABC
					2019	5	11.3	3.68	nm	A
					2020	5	1.69	1.49	nm	BCD
					2021	5	1.50	1.65	nm	CD
Shredders FFG (% of community)	ANOVA	log10(x+1)	YES	<0.001	2007	3	27.6	5.83	-	A
					2015	5	26.2	5.85	-0.2	A
					2016	5	25.4	4.59	-0.4	A
					2017	5	7.44	5.91	-3.5	C
					2018	5	12.9	5.26	-2.5	BC
					2019	5	21.9	5.81	-1.0	AB
					2020	5	8.45	3.10	-3.3	C
					2021	5	4.73	2.87	-3.9	C

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.16: Statistical Comparison of Benthic Metrics at Camp Lake Tributary 2 Downstream (CLT2-DS) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison ^a				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference vs Basline line 2007 ^b	Pairwise Comparison
Density (No. per m ²)	ANOVA	log10	YES	0.003	2007	3	431	109	-	ABC
					2015	5	447	258	0.1	AB
					2016	5	201	60.7	-2.1	BC
					2017	5	222	144	-1.9	BC
					2018	5	127	51.2	-2.8	C
					2019	5	546	366	1.1	AB
					2020	5	881	672	4.1	A
					2021	5	495	279	0.6	AB
Richness (No. of Taxa)	ANOVA	none	YES	0.020	2007	3	17.7	2.08	-	AB
					2015	5	14.2	3.35	-1.7	AB
					2016	5	13.8	3.7	-1.9	AB
					2017	5	13.2	4.71	-2.2	AB
					2018	5	11.2	1.92	-3.1	B
					2019	5	18.4	3.13	0.3	A
					2020	5	18.6	5.13	0.4	A
					2021	5	18	3.74	0.1	AB
Simpson's Evenness	K-W	rank	YES	0.066	2007	3	0.865	0.0174	-	CD
					2015	5	0.934	0.0343	4.0	A
					2016	5	0.835	0.0769	-1.7	D
					2017	5	0.913	0.0522	2.8	ABC
					2018	5	0.908	0.0868	2.5	AB
					2019	5	0.885	0.0482	1.1	BCD
					2020	5	0.921	0.0333	3.2	AB
					2021	5	0.932	0.0404	3.9	AB
Nemata (% of community)	K-W	rank	NO	0.527	2007	3	1.07	1.21	-	A
					2015	5	4.19	2.39	2.6	A
					2016	5	1.97	2.46	0.7	A
					2017	5	3.24	4.41	1.8	A
					2018	5	2.74	3.03	1.4	A
					2019	5	2.56	1.75	1.2	A
					2020	5	8.18	15.8	5.9	A
					2021	5	3.57	1.8	2.1	A
Oligochaeta (% of community)	K-W	rank	NO	0.522	2007	3	2.57	0.619	-	A
					2015	5	8.8	12.8	10.1	A
					2016	5	1.85	3.13	-1.2	A
					2017	5	4.83	6.94	3.7	A
					2018	5	1.13	2.52	-2.3	A
					2019	5	4.28	3.31	2.8	A
					2020	5	4.41	5.02	3.0	A
					2021	5	3.21	2.19	1.0	A
Hydracarina (% of community)	K-W	rank	NO	0.108	2007	3	1.77	1.23	-	A
					2015	5	0.255	0.57	-1.2	A
					2016	5	4.44	1.94	2.2	A
					2017	5	3.34	3.97	1.3	A
					2018	5	3.5	3.97	1.4	A
					2019	5	2.11	0.719	0.3	A
					2020	5	4.72	4.84	2.4	A
					2021	5	3.18	3.19	1.1	A
Ostracoda (% of community)	K-W	rank	NO	0.348	2007	3	0	0	-	A
					2015	5	0	0	nm	A
					2016	5	0	0	nm	A
					2017	5	0	0	nm	A
					2018	5	0.519	1.16	nm	A
					2019	5	0.198	0.443	nm	A
					2020	5	0.289	0.452	nm	A
					2021	5	0	0	nm	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.16: Statistical Comparison of Benthic Metrics at Camp Lake Tributary 2 Downstream (CLT2-DS) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison ^a				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference vs Basline line 2007 ^b	Pairwise Comparison
Chironomidae (% of community)	ANOVA	none	YES	0.095	2007	3	88.0	5.96	-	A
					2015	5	75.6	10.4	-2.1	A
					2016	5	82.9	5.86	-0.9	A
					2017	5	81.8	8.39	-1.0	A
					2018	5	84.1	5.99	-0.7	A
					2019	5	84.7	3.46	-0.6	A
					2020	5	75.2	16.5	-2.1	A
					2021	5	69.7	10.0	-3.1	A
Metal Sensitive Chironomidae (% of community)	ANOVA	log10(x+1)	YES	0.019	2007	3	11.8	1.96	-	AB
					2015	5	10.6	10.6	-0.6	AB
					2016	5	5.41	0.915	-3.3	B
					2017	5	20.2	12.6	4.3	AB
					2018	5	8.01	6.95	-1.9	B
					2019	5	23.3	10.1	5.9	A
					2020	5	11.5	4.16	-0.2	AB
					2021	5	17.3	7.89	2.8	AB
Tipulidae (% of community)	ANOVA	log10(x+1)	NO	0.139	2007	3	6.45	6.59	-	A
					2015	5	5.83	5.09	-0.1	A
					2016	5	2.18	1.73	-0.6	A
					2017	5	0.833	1.86	-0.9	A
					2018	5	2.6	2.39	-0.6	A
					2019	5	1.71	1.42	-0.7	A
					2020	5	1.82	2.24	-0.7	A
					2021	5	3.38	2.52	-0.5	A
Collector Gatherers FFG (% of community)	ANOVA	none	YES	0.044	2007	3	66.4	11.0	-	AB
					2015	5	69.3	10.9	0.3	AB
					2016	5	79.6	8.75	1.2	A
					2017	5	77.1	10.5	1.0	AB
					2018	5	83.4	6.47	1.5	A
					2019	5	56.8	23.0	-0.9	B
					2020	5	77.5	8.74	1.0	AB
					2021	5	75.3	9.19	0.8	AB
Filterers FFG (% of community)	K-W	rank	YES	0.011	2007	3	2.73	1.89	-	BC
					2015	5	0.762	0.916	-1.0	BC
					2016	5	0.97	0.929	-0.9	BC
					2017	5	3.46	3.12	0.4	BC
					2018	5	0.927	2.07	-1.0	C
					2019	5	15.4	11.3	6.7	A
					2020	5	3.05	2.08	0.2	B
					2021	5	4.34	4.63	0.9	BC
Shredders FFG (% of community)	ANOVA	log10(x+1)	YES	0.027	2007	3	21.5	5.95	-	AB
					2015	5	25.7	11.6	0.7	A
					2016	5	12.0	7.92	-1.6	AB
					2017	5	14.6	8.93	-1.2	AB
					2018	5	7.68	7.25	-2.3	B
					2019	5	21.0	16.9	-0.1	AB
					2020	5	11.2	7.01	-1.7	AB
					2021	5	6.08	3.01	-2.6	B

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.17: Statistical Comparison of Physical Sediment Quality Between Littoral and Profundal Stations of Reference Lake 3, Mary River Project CREMP, August 2021

Habitat Variable	Statistical Test Results				Summary Statistics						
	Statistical Analysis ^a	Transformation	Significant Difference Between Areas?	P-value	Station Type	Sample Size (n)	Mean	Standard Deviation	Standard Error	Minimum	Maximum
Sand-Sized Particles (% by weight)	tequal	none	NO	0.647	Littoral	5	40.0	6.49	2.90	32.5	48.8
					Profundal	5	42.0	6.80	3.04	35.7	49.8
Silt-Sized Particles (% by weight)	tequal	none	NO	0.545	Littoral	5	49.6	6.98	3.12	39.2	58.2
					Profundal	5	47.2	5.32	2.38	39.2	53.1
Clay-Sized Particles (% by weight)	M-W	rank	NO	0.421	Littoral	5	10.4	2.42	1.08	6.80	12.9
					Profundal	5	10.9	3.54	1.58	4.70	13.2
Moisture (% by weight)	M-W	rank	NO	0.421	Littoral	5	54.8	7.60	3.40	49.1	63.8
					Profundal	5	56.9	7.06	3.16	52.1	69.4
Total Organic Carbon (%)	tequal	none	NO	0.396	Littoral	5	4.37	1.96	0.875	1.92	7.32
					Profundal	5	3.54	0.672	0.300	2.48	4.32

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

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

Table F.18: 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 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	Data 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	0.729	Reference	5	10.3	2.18	0.974	7.70	12.6
						Camp	5	9.76	2.40	1.07	7.30	12.6
	Sand-Sized Material (%)	tequal	none	NO	0.092	Reference	5	40.0	6.49	2.90	32.5	48.8
						Camp	5	56.3	18.0	8.03	38.8	79.7
	Silt-Sized Material (%)	tequal	none	NO	0.244	Reference	5	49.6	6.98	3.12	39.2	58.2
						Camp	5	39.7	16.2	7.25	18.9	56.9
	Clay-Sized Material (%)	tequal	none	YES	0.002	Reference	5	10.4	2.42	1.08	6.80	12.9
						Camp	5	3.92	2.10	0.940	1.30	6.60
	Moisture (%)	tequal	none	NO	0.648	Reference	5	54.8	7.60	3.40	49.1	63.8
						Camp	5	58.4	15.1	6.75	37.5	78.5
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.018	Reference	5	4.37	1.96	0.875	1.92	7.32
						Camp	5	1.64	0.655	0.293	1.07	2.68
Profundal (Deep) Stations	Station Depth (m)	tequal	none	NO	0.671	Reference	5	20.5	1.51	0.673	18.2	22.4
						Camp	5	22.1	8.17	3.65	15.4	32.7
	Sand-Sized Material (%)	tequal	none	NO	0.583	Reference	5	42.0	6.80	3.04	35.7	49.8
						Camp	9	40.6	23.3	7.76	22.7	81.1
	Silt-Sized Material (%)	tequal	none	NO	0.616	Reference	5	47.2	5.32	2.38	39.2	53.1
						Camp	9	50.2	20.0	6.66	16.2	69.6
	Clay-Sized Material (%)	tequal	none	NO	0.545	Reference	5	10.9	3.54	1.58	4.70	13.2
						Camp	9	9.21	4.61	1.54	2.40	15.0
	Moisture (%)	tequal	none	NO	0.986	Reference	5	56.9	7.06	3.16	52.1	69.4
						Camp	9	62.1	16.8	5.60	33.4	75.2
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.007	Reference	5	3.54	0.672	0.300	2.48	4.32
						Camp	9	1.49	0.869	0.290	0.280	2.84

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

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

Table F.19: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Reference Lake 3 Study Areas, August 2021

Lake	Reference Lake 3 (REF-03)									
Station Type	Littoral Stations					Profundal Stations				
Station	1	2	3	4	5	6	7	8	9	10
ROUNDWORMS										
P. Nemata	24	-	13	8	2	-	-	1	-	-
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae	-	-	1	-	-	-	-	-	-	-
F. Lumbriculidae										
Lumbriculus	-	-	-	-	-	-	-	-	-	-
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
F. Acalyptonotidae										
Acalyptonotus	1	4	1	1	-	4	-	2	2	1
F. Hygrobatidae										
Hygrobates	1	4	2	1	-	1	-	-	-	1
F. Lebertiidae										
Lebertia	-	2	2	2	-	-	-	1	-	-
SEED SHRIMPS										
Cl. Ostracoda	1	84	52	128	60	-	1	10	2	1
INSECTS										
Cl. Insecta										
CADDISFLIES										
O. Trichoptera										
F. Apataniidae										
Apatania	-	-	-	-	-	-	-	-	-	-
F. Limnephilidae										
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	-	4	-	-	-	1	-	-	-	1
S.F. Chironominae										
Chironomus	-	-	-	-	-	-	-	-	-	-
Corynocera ambigua	-	-	-	-	-	-	-	-	-	-
Lipiniella	-	-	-	-	-	-	-	-	-	-
Micropsectra	10	10	30	14	-	1	-	5	5	4
Paratanytarsus	-	-	-	-	-	-	-	-	-	-
Sergentia	-	-	-	-	-	1	-	-	-	-
Stictochironomus	-	28	1	2	6	-	-	-	-	-
Tanytarsus	-	-	-	-	-	-	-	-	-	-
Chironomini indeterminate	-	-	-	-	2	-	-	-	-	-
Tanytarsini indeterminate	-	-	-	-	-	-	-	-	-	-
S.F. Diamesinae										
Protanypus	5	-	4	3	3	-	-	2	-	1
Pseudodiamesa	2	4	-	-	5	-	-	-	-	-
Pseudokiefferiella	-	-	-	-	-	-	-	-	-	-
S.F. Orthocladiinae										
Abiskomyia	2	26	4	13	5	1	-	1	3	1
Heterotrissocladius	12	4	1	-	-	30	6	27	33	35
Hydrobaenus	-	-	-	-	-	-	-	-	-	-
Hydrosmittia	-	-	-	-	-	-	-	-	-	-
Mesocricotopus	-	-	-	-	-	-	-	-	-	-
Paracladius	-	-	1	1	-	-	-	-	-	-
Parakiefferiella	-	-	-	-	-	1	-	-	-	-
Psectrocladius	-	4	1	-	-	-	-	-	-	-
Zalutschia	-	2	4	3	7	-	-	-	1	1
S.F. Tanypodinae										
Procladius	1	-	-	-	-	2	-	-	-	-
Thienemannimyia complex	-	-	-	-	-	-	-	-	-	-
SUMMARY METRICS										
Density (No. organisms per m ²)	508	1,516	1,008	1,516	775	362	60.3	422	396	396
Richness (total number of taxa) ^a	10.0	11.0	14.0	11.0	8.00	8.00	2.00	8.00	6.00	8.00
Simpson's Evenness (E)	0.838	0.785	0.775	0.502	0.613	0.510	0.490	0.731	0.558	0.437
Shannon-Wiener Diversity	2.46	2.38	2.43	1.58	1.81	1.52	0.592	2.00	1.46	1.32
Dominant Taxonomic Group Composition										
% Nemata	40.7	0	11.1	4.55	2.22	0	0	2.04	0	0
% Hydracarina	3.39	5.68	4.27	2.27	0	11.9	0	6.12	4.35	4.35
% Ostracods	1.69	47.7	44.4	72.7	66.7	0	14.3	20.4	4.35	2.17
% Chironomids	54.2	46.6	39.3	20.4	31.1	88.1	85.7	71.4	91.3	93.5
% Metal Sensitive Chironmids	28.8	8.36	29.1	9.66	11.1	2.45	0	14.3	10.9	11.1
Functional Feeding Group Composition										
% Collector - Gatherers	78.0	87.2	66.7	88.1	90.0	80.8	100	83.7	82.6	84.5
% Filterers	16.9	5.97	25.6	7.95	2.22	2.45	0	10.2	10.9	8.90
% Shredders	0	1.19	3.42	1.70	7.78	0	0	0	2.17	2.23
Habitat Preference Group Composition										
% Clingers	20.3	11.7	29.9	10.2	2.22	16.8	0	16.3	15.2	13.2
% Sprawlers	30.5	71.6	53.9	82.4	85.6	83.2	100	77.5	84.8	84.5
% Burrowers	49.1	16.7	16.2	7.39	12.2	0	0	6.12	0	2.23

^a Bold entries excluded from taxa count

Table F.20: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Camp Lake Study Areas, August 2021

Lake	Camp Lake (JL0)									
Station Type	Littoral Stations					Profundal Stations				
Station	2	21	20	19	18	16	1	7	11	12
ROUNDWORMS										
P. Nemata	4	16	14	4	-	14	-	-	1	12
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae										
Lumbriculus	4	-	-	-	-	4	-	-	-	-
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
F. Acalyptonotidae										
Acalyptonotus	-	4	-	16	8	-	3	5	-	1
F. Hygrobatidae										
Hygrobates	-	-	-	4	-	2	-	-	-	1
F. Lebertiidae										
Lebertia	-	-	-	-	-	-	-	1	2	2
SEED SHRIMPS										
Cl. Ostracoda	16	-	63	6	8	-	12	1	1	27
INSECTS										
Cl. Insecta										
CADDISFLIES										
O. Trichoptera										
F. Apataniidae										
Apatania	4	-	6	8	-	-	-	-	-	-
F. Limnephilidae										
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	12	30	26	82	20	12	1	6	3	2
S.F. Chironominae										
Chironomus	-	-	-	-	8	4	-	-	-	-
Corynocera ambigua	-	-	-	10	-	-	-	-	-	-
Lipiniella	-	-	-	-	-	-	-	-	-	-
Micropsectra	-	30	20	22	-	10	-	93	9	-
Paratanytarsus	24	26	162	80	8	-	-	-	-	-
Sergentia	-	-	-	-	8	8	-	-	21	-
Stictochironomus	272	174	72	144	240	54	4	10	8	-
Tanytarsus	-	2	115	100	-	4	-	-	-	-
Chironomini indeterminate	-	-	-	-	-	-	-	-	-	-
Tanytarsini indeterminate	-	-	-	-	-	-	-	-	-	-
S.F. Diamesinae										
Protanypus	4	-	4	4	-	4	2	3	5	4
Pseudodiamesa	-	-	-	-	-	2	1	-	1	-
Pseudokiefferiella	-	-	-	-	-	-	-	-	-	-
S.F. Orthocladiinae										
Abiskomyia	24	34	52	54	32	6	-	2	6	4
Heterotrissocladius	76	26	8	8	8	14	50	18	15	128
Hydrobaenus	-	-	-	-	-	-	-	-	-	-
Hydrosmittia	-	-	-	-	-	-	-	-	-	-
Mesocricotopus	-	-	-	-	-	2	-	2	-	-
Paracladius	-	-	-	-	-	-	-	-	-	-
Parakiefferiella	-	-	-	-	-	-	-	-	-	-
Psectrocladius	4	-	-	2	-	-	-	-	-	-
Zalutschia	4	2	4	4	-	2	-	2	-	1
S.F. Tanypodinae										
Procladius	52	34	60	28	20	6	3	-	3	1
Thienemannimyia complex	68	26	13	8	4	4	-	-	-	-
SUMMARY METRICS										
Density (No. organisms per m ²)	4,891	3,479	5,330	5,029	3,134	1,309	654	1,231	646	1,576
Richness (total number of taxa) ^a	13.0	11.0	13.0	17.0	10.0	16.0	7.00	10.0	11.0	10.0
Simpson's Evenness (E)	0.772	0.816	0.910	0.882	0.550	0.865	0.608	0.569	0.911	0.521
Shannon-Wiener Diversity	2.43	2.57	2.98	3.03	1.74	3.16	1.63	1.70	2.87	1.50
Dominant Taxonomic Group Composition										
% Nemata	0.704	3.96	2.26	0.685	0	9.21	0	0	1.33	6.56
% Hydracarina	0	0.990	0	3.42	2.20	1.32	3.95	4.20	2.67	2.19
% Ostracods	2.82	0	10.2	1.03	2.20	0	15.8	0.699	1.33	14.8
% Chironomids	95.1	95.0	86.6	93.5	95.6	86.8	80.3	95.1	94.7	76.5
% Metal Sensitive Chironmids	5.04	15.6	51.1	43.5	2.33	14.5	4.01	70.2	20.9	2.22
Functional Feeding Group Composition										
% Collector - Gatherers	72.7	66.8	35.5	46.4	88.5	79.9	92.0	26.3	80.6	96.7
% Filterers	4.32	15.6	50.4	40.7	2.33	10.1	0	68.0	12.5	0
% Shredders	0.720	0.537	0.679	0.806	0	1.45	0	1.46	0	0.554
Habitat Preference Group Composition										
% Clingers	0.704	9.58	23.9	29.4	4.53	17.2	3.95	72.2	44.4	2.19
% Sprawlers	48.2	39.7	60.9	40.1	23.2	26.1	88.0	18.3	36.1	89.0
% Burrowers	51.1	50.7	15.2	30.5	72.3	56.7	8.03	9.51	19.4	8.77

^a Bold entries excluded from taxa count

Table F.21: Statistical Comparison of Bray-Curtis Index between the Mine-Exposed Lakes and Reference Lake 3, Mary River Project CREMP, August 2021

Waterbody	Comparison	Sample Size (n)		Betadisper P-Value	Mantel Test			dbRDA			
		Reference	Mine-Exposed		r	R ²	P-Value	F-Value	R ²	R ² _{adj}	P-Value
Reference Lake 3	Littoral vs Profundal	5	5	0.805	0.436	0.190	0.008	5.48	0.407	0.332	0.007
Camp Lake (JL0)	Littoral Habitat, vs Reference Lake 3	5	5	0.480	0.744	0.553	0.008	7.70	0.490	0.427	0.005
	Profundal Habitat, vs Reference Lake 3	5	5	0.769	0.274	0.0751	0.008	2.92	0.267	0.176	0.002
Sheardown Lake NW (DL0-1)	Littoral Habitat, vs Reference Lake 3	5	5	0.937	0.465	0.216	0.023	5.32	0.400	0.324	0.024
	Profundal Habitat, vs Reference Lake 3	5	5	0.871	0.509	0.259	0.008	4.80	0.375	0.297	0.006
Sheardown Lake SE (DL0-2)	Littoral Habitat, vs Reference Lake 3	5	5	0.088	0.676	0.456	0.008	8.08	0.503	0.440	0.007
	Profundal Habitat, vs Reference Lake 3	5	5	0.586	0.726	0.527	0.008	9.77	0.550	0.494	0.007
Mary Lake (BL0)	Littoral Habitat, vs Reference Lake 3	5	4	0.566	0.282	0.0797	0.048	1.84	0.208	0.0950	0.076
	Profundal Habitat, vs Reference Lake 3	5	6	0.934	0.277	0.0766	0.015	2.49	0.216	0.129	0.019

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

Table F.22: Statistical Comparison of Benthic Invertebrate Community Metrics at Camp Lake Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2013) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons ^a					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference vs Baseline line 2013	Pairwise Comparison
Density (Individuals/m2)	ANOVA	log10	YES	0.027	2013	4	7,752	3,849	-	A
					2015	5	3,671	1,891	-1.1	AB
					2016	5	2,639	668	-1.3	B
					2017	5	3,642	1,449	-1.1	AB
					2018	5	2,600	998	-1.3	B
					2019	5	5,126	1,390	-0.7	AB
					2020	5	5,122	2,202	-0.7	AB
					2021	5	4,373	994	-0.9	AB
Richness (Number of Taxa)	ANOVA	none	NO	0.108	2013	4	18	4.4	-	A
					2015	5	12.8	3.7	-1.2	A
					2016	5	15.8	3.27	-0.5	A
					2017	5	12.8	2.28	-1.2	A
					2018	5	14.2	3.42	-0.9	A
					2019	5	15.6	3.05	-0.5	A
					2020	5	16.6	1.67	-0.3	A
					2021	5	12.8	2.68	-1.2	A
Simpson's Evenness (E)	K-W	rank	YES	0.010	2013	4	0.893	0.0535	-	AB
					2015	5	0.712	0.0625	-3.4	C
					2016	5	0.917	0.0341	0.4	A
					2017	5	0.848	0.0685	-0.8	B
					2018	5	0.851	0.0569	-0.8	B
					2019	5	0.893	0.0532	0.0	AB
					2020	5	0.842	0.0443	-1.0	B
					2021	5	0.786	0.143	-2.0	BC
Nemata (%)	ANOVA	log10(x+1)	NO	0.633	2013	4	5.58	3.57	-	A
					2015	5	4.71	4.58	-0.2	A
					2016	5	4.39	4.85	-0.3	A
					2017	5	4.24	4.24	-0.4	A
					2018	5	2.81	3.24	-0.8	A
					2019	5	3.67	2.52	-0.5	A
					2020	5	2.1	1.2	-1.0	A
					2021	5	1.52	1.6	-1.1	A
Ostracoda (%)	K-W	rank	YES	0.029	2013	4	0.66	0.466	-	ABC
					2015	5	0.203	0.326	-1.0	C
					2016	5	1.84	1.14	2.5	A
					2017	5	0.155	0.346	-1.1	C
					2018	5	0.356	0.642	-0.7	BC
					2019	5	1.27	0.83	1.3	AB
					2020	5	2.02	1.61	2.9	A
					2021	5	3.24	4.02	5.5	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = $(MCT_{year1} - MCT_{Baseline}) / SD_{Baseline}$. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

Table F.22: Statistical Comparison of Benthic Invertebrate Community Metrics at Camp Lake Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2013) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons ^a					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Effect Size vs. Baseline Year 2013	Pairwise Comparison
Chironomidae (%)	ANOVA	none	NO	0.303	2013	4	90.1	4.38	-	A
					2015	5	93.2	4.68	0.7	A
					2016	5	87.4	6.98	-0.6	A
					2017	5	92.2	6.46	0.5	A
					2018	5	95.4	3.97	1.2	A
					2019	5	92.5	3.64	0.5	A
					2020	5	92.9	2	0.6	A
					2021	5	93.2	3.76	0.7	A
Metal Sensitive Chironomidae (%)	ANOVA	none	NO	0.640	2013	4	30.8	14.6	-	A
					2015	5	38.5	24.5	0.5	A
					2016	5	29.7	11.8	-0.1	A
					2017	5	38.2	17.3	0.5	A
					2018	5	17.4	18.5	-0.9	A
					2019	5	34.6	16.1	0.3	A
					2020	5	30.3	19.7	0.0	A
					2021	5	23.5	22.4	-0.5	A
Collector Gatherers (%)	ANOVA	none	NO	0.589	2013	4	55.9	12.4	-	A
					2015	5	51.1	14.7	-0.4	A
					2016	5	65.8	7.82	0.8	A
					2017	5	50.8	17.4	-0.4	A
					2018	5	67.3	18.6	0.9	A
					2019	5	53.7	12.4	-0.2	A
					2020	5	56.9	17.7	0.1	A
					2021	5	62	21.1	0.5	A
Filterers (%)	ANOVA	none	NO	0.588	2013	4	30.8	14.5	-	A
					2015	5	38.2	24.3	0.5	A
					2016	5	25	7.48	-0.4	A
					2017	5	37.3	17.3	0.4	A
					2018	5	16.7	17.8	-1.0	A
					2019	5	31.9	15.9	0.1	A
					2020	5	29.7	20.2	-0.1	A
					2021	5	22.7	21.8	-0.6	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

Table F.23: Statistical Comparison of Benthic Metrics at Camp Lake Profundal (Deep) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2013) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2013	
Density (No. per m ²)	ANOVA	none	NO	0.139	2007	4	2,626	1,403	-	-	A
					2013	5	2,140	567	-0.3	-	A
					2015	5	1,552	1,005	-0.8	-1.0	A
					2017	5	1,510	844	-0.8	-1.1	A
					2018	5	1,258	609	-1.0	-1.6	A
					2019	5	1,847	830	-0.6	-0.5	A
					2020	5	1,383	656	-0.9	-1.3	A
					2021	5	1,083	416	-1.1	-1.9	A
Richness (No. of Taxa)	ANOVA	log10	YES	0.046	2007	4	9	1.72	-	-	AB
					2013	5	14.2	2.95	3.0	-	A
					2015	5	8.2	2.77	-0.5	-2.0	B
					2017	5	10.8	3.35	1.0	-1.2	AB
					2018	5	8.2	0.837	-0.5	-2.0	B
					2019	5	11	1.87	1.2	-1.1	AB
					2020	5	10.4	4.51	0.8	-1.3	AB
					2021	5	10.8	3.27	1.0	-1.2	AB
Simpson's Evenness	ANOVA	none	NO	0.101	2007	4	0.602	0.114	-	-	A
					2013	5	0.72	0.122	1.0	-	A
					2015	5	0.604	0.283	0.0	-1.0	A
					2017	5	0.681	0.154	0.7	-0.3	A
					2018	5	0.374	0.118	-2.0	-2.8	A
					2019	5	0.615	0.206	0.1	-0.9	A
					2020	5	0.673	0.151	0.6	-0.4	A
					2021	5	0.695	0.18	0.8	-0.2	A
Nemata (%)	K-W	rank	NO	0.837	2007	4	3.49	3.13	-	-	A
					2013	5	4.35	3.16	0.3	-	A
					2015	5	6.72	10.4	1.0	0.8	A
					2017	5	7.14	6.16	1.2	0.9	A
					2018	5	2.87	5.64	-0.2	-0.5	A
					2019	5	4.43	5.65	0.3	0.0	A
					2020	5	1.72	2.11	-0.6	-0.8	A
					2021	5	3.42	4.22	0.0	-0.3	A
Ostracoda (%)	K-W	rank	NO	0.109	2007	4	0.0375	0.0749	-	-	A
					2013	5	0.406	0.446	4.9	-	A
					2015	5	0.306	0.684	3.6	-0.2	A
					2017	5	0.282	0.631	3.3	-0.3	A
					2018	5	0.68	1.52	8.6	0.6	A
					2019	5	1.87	3.78	24.5	3.3	A
					2020	5	5.46	7.12	72.4	11.3	A
					2021	5	6.52	8.02	86.5	13.7	A
Chironomidae (%)	K-W	rank	NO	0.676	2007	4	94.9	4.29	-	-	A
					2013	5	91.1	4.66	-0.9	-	A
					2015	5	90.4	11.3	-1.0	-0.2	A
					2017	5	90	6.59	-1.1	-0.2	A
					2018	5	95.2	7.9	0.1	0.9	A
					2019	5	91.4	7.13	-0.8	0.1	A
					2020	5	91	8.39	-0.9	0.0	A
					2021	5	86.7	8.36	-1.9	-0.9	A
Metal Sensitive Chironomidae (%)	ANOVA	log10	YES	0.006	2007	4	34.8	4.77	-	-	A
					2013	5	39.5	17.2	1.0	-	A
					2015	5	11.7	7.33	-4.8	-1.6	AB
					2017	5	33.3	25.5	-0.3	-0.4	A
					2018	5	6.61	2.97	-5.9	-1.9	B
					2019	5	19.5	10.5	-3.2	-1.2	AB
					2020	5	11.9	6.85	-4.8	-1.6	AB
					2021	5	22.4	27.8	-2.6	-1.0	AB
Collector Gatherers (%)	K-W	rank	YES	0.002	2007	4	64.6	6.09	-	-	D
					2013	5	57	19.9	-1.2	-	D
					2015	5	84.7	7.33	3.3	1.4	ABC
					2017	5	64.2	28.1	-0.1	0.4	CD
					2018	5	95.6	2.91	5.1	1.9	A
					2019	5	84.8	9.3	3.3	1.4	ABC
					2020	5	87	9.51	3.7	1.5	AB
					2021	5	75.1	28.2	1.7	0.9	BC
Filterers (%)	K-W	rank	YES	0.004	2007	4	32.6	4.03	-	-	A
					2013	5	37.5	16.8	1.2	-	A
					2015	5	11.4	6.85	-5.3	-1.6	BC
					2017	5	31.6	26.4	-0.2	-0.4	AB
					2018	5	3.04	3.69	-7.3	-2.1	C
					2019	5	12	8.29	-5.1	-1.5	BC
					2020	5	9.37	7.41	-5.8	-1.7	C
					2021	5	18.1	28.5	-3.6	-1.2	BC

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of a ± 2 SD effect size of respective baseline year mean indicating an ecologically meaningful difference between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD=0.

Table F.24: Replicate Grab Habitat Data for Benthic Invertebrate Community Samples Collected at the Sheardown Lake Tributaries, Mary River Project CREMP, August 2021

Study Area	Station	Water Depth (cm)			Water Velocity (m/s)			Embeddedness			In-Stream Vegetation			Algae Presence		
		Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3
Unnamed Reference Creek	REF-CRK-B1	9	7	7	0.58	0.31	0.59	25%	25%	25%	sparse	none	none	sparse	sparse	sparse
	REF-CRK-B2	8	8	9	0.45	0.51	0.46	25%	25%	25%	none	sparse	none	sparse	sparse	sparse
	REF-CRK-B3	8	7	12	0.51	0.42	0.45	25%	25%	25%	none	none	sparse	sparse	sparse	sparse
	REF-CRK-B4	12	10	8	0.44	0.44	0.57	25%	25%	25%	none	sparse	sparse	sparse	sparse	sparse
	REF-CRK-B5	12	20	8	0.59	0.34	0.47	25%	25%	25%	none	sparse	sparse	sparse	sparse	sparse
Sheardown Lake Tributary 1	SDLT1 - B1	7	8	6	0.42	0.33	0.26	50%	25%	50%	sparse	sparse	sparse	common	sparse	sparse
	SDLT1 - B2	7	10	5.5	0.45	0.61	0.31	25%	0%	50%	sparse	common	sparse	sparse	sparse	sparse
	SDLT1 - B3	5	5	6	0.34	0.39	0.35	25%	50%	25%	sparse	sparse	sparse	sparse	sparse	sparse
	SDLT1 - B4	8	14	6	0.42	0.58	0.48	25%	25%	25%	sparse	common	sparse	none	sparse	none
	SDLT1 - B5	7.5	7	7	0.30	0.37	0.51	25%	25%	0%	sparse	sparse	none	sparse	sparse	sparse
Sheardown Lake Tributary 9	SDLT9 - B1	8	7	10	0.30	0.30	0.33	25%	25%	25%	none	none	none	sparse	sparse	sparse
	SDLT9 - B2	11	6	8	0.33	0.41	0.39	25%	25%	25%	none	none	none	sparse	sparse	sparse
	SDLT9 - B3	6	10	8	0.56	0.51	0.53	25%	25%	25%	none	none	none	common	common	common
	SDLT9 - B4	11	9	6	0.46	0.57	0.51	25%	25%	25%	none	none	none	common	sparse	common
	SDLT9 - B5	5	6	6	0.38	0.39	0.54	25%	25%	25%	none	none	none	common	sparse	sparse
Sheardown Lake Tributary 12	SDLT12 - B1	14	6	5	0.22	0.41	0.35	50%	0%	50%	common	sparse	common	sparse	sparse	sparse
	SDLT12 - B2	8	8	13	0.29	0.30	0.25	25%	50%	25%	sparse	none	none	sparse	sparse	sparse
	SDLT12 - B3	11	10	7	0.45	0.41	0.28	50%	25%	50%	sparse	sparse	common	sparse	sparse	common

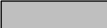
Table F.25: Replicate Station Habitat Feature Summary Statistics for the Sheardown Lake Tributary Benthic Stations, Mary River Project CREMP, August 2021

Metric	Study Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Water Depth (cm)	Unnamed Reference Creek	9.67	2.22	0.994	7.67	9.00	13.3
	Sheardown Tributary 1 (SDLT1)	7.27	1.43	0.638	5.33	7.17	9.33
	Sheardown Tributary 12 (SDLT12)	9.11	0.694	0.401	8.33	9.33	9.67
	Sheardown Tributary 9 (SDLT9)	7.80	1.22	0.544	5.67	8.33	8.67
Water Velocity (m/s)	Unnamed Reference Creek	0.475	0.0132	0.00593	0.460	0.473	0.493
	Sheardown Tributary 1 (SDLT1)	0.408	0.0657	0.0294	0.337	0.393	0.493
	Sheardown Tributary 12 (SDLT12)	0.329	0.0500	0.0289	0.280	0.327	0.380
	Sheardown Tributary 9 (SDLT9)	0.434	0.0933	0.0417	0.310	0.437	0.533
Substrate Embeddedness (%)	Unnamed Reference Creek	0.250	0	0	0.250	0.250	0.250
	Sheardown Tributary 1 (SDLT1)	0.283	0.0950	0.0425	0.167	0.250	0.417
	Sheardown Tributary 12 (SDLT12)	0.361	0.0481	0.0278	0.333	0.333	0.417
	Sheardown Tributary 9 (SDLT9)	0.250	0	0	0.250	0.250	0.250

Note: Five stations were sampled at Unnamed Reference Creek, SDLT1, and SDLT9, and three stations were sampled at SDLT12.

Table F.26: Benthic Station Habitat Feature Statistical Comparisons Between Individual Sheardown Lake Tributaries and Unnamed Reference Creek, Mary River Project CREMP, August 2021

Metric	Pair-wise comparisons ^a					
	Area 1	Area 2	Statistical Test ^a	Data Transformation	Significant Difference between Areas?	P-value
Water Depth (cm)	Unnamed Reference Creek	SDLT1	tequal	none	YES	0.077
	Unnamed Reference Creek	SDLT12	tequal	none	NO	0.697
	Unnamed Reference Creek	SDLT9	tequal	none	NO	0.138
Water Velocity (m/s)	Unnamed Reference Creek	SDLT1	tunequal	none	YES	0.083
	Unnamed Reference Creek	SDLT12	tequal	none	YES	0.001
	Unnamed Reference Creek	SDLT9	tunequal	none	NO	0.38
Substrate Embeddedness (%)	Unnamed Reference Creek	SDLT1	tequal	none	NO	0.455
	Unnamed Reference Creek	SDLT12	M-W	rank	YES	0.016
	Unnamed Reference Creek	SDLT9	-	-	-	-

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

Note: "-" not tested because the observed embeddedness in SDLT9 remained unchanged across five stations

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

Table F.27: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Sheardown Lake Tributary 1 (SDLT1), August 2021

Waterbody	Sheardown Lake Tributary 1 (SDLT1-R1)				
Station	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	20	6	13	8	3
FLATWORMS					
P. Platyhelminthes					
Cl. Turbellaria					
indeterminate	-	-	-	-	-
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	22	1	6	7	6
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Trombidiformes					
F. Sperchonidae					
Sperchon	2	1	-	1	2
HARPACTICIDS					
O. Harpacticoida	-	-	-	-	-
SEED SHRIMPS					
Cl. Ostracoda	-	-	-	-	-
SPRINGTAILS					
Cl. Entognatha					
O. Collembola	-	-	-	-	-
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	14	19	3	4	2
CADDISFLIES					
O. Trichoptera					
F. Limnephilidae					
immature	-	-	-	-	-
TRUE FLIES					
O. Diptera					
MIDGES					
F. Chironomidae					
chironomid pupae	6	5	4	4	-
S.F. Chironominae					
Paratanytarsus	-	-	-	1	-
Rheotanytarsus	2	-	1	-	-
Tanytarsini indeterminate	-	-	-	-	-
S.F. Diamesinae					
Diamesa	-	-	-	-	1
Pseudokiefferiella	24	16	13	31	12
S.F. Orthoclaadiinae					
Chaetocladius	-	-	-	-	-
Cricotopus	74	17	53	21	21
Cricotopus/Orthocladius	24	5	3	16	-
Diplocladius	-	-	-	-	-
Doncricotopus	-	-	-	-	-
Eukiefferiella	-	-	-	-	-
Hydrobaenus	6	-	1	1	-
Hydrosmittia	108	7	27	44	16
Krenosmittia	-	-	-	-	4
Limnophyes	-	-	-	-	1
Metriocnemus	-	-	-	-	-
Orthocladius (Euorthocladius)	-	-	1	-	-
Parakiefferiella	4	1	-	1	-
Paraphaenocladius	-	-	-	-	1
Rheocricotopus	-	-	-	-	-
Thienemanniella	-	-	-	-	-
Tvetenia	10	18	41	17	22
indeterminate	-	1	-	1	-
S.F. Tanypodinae					
Thienemannimyia complex	-	-	1	2	-
F. Dixidae					
Dixella	-	-	-	-	-
F. Empididae					
Clinocera	8	-	-	6	2
F. Simuliidae					
Gymnopais holopticoides	-	-	-	-	1
Metacnephia	-	-	-	-	-
Prosimulium	-	-	-	-	-
indeterminate	-	-	-	-	1
immature	-	-	-	-	-
pupae	-	-	-	-	-
F. Tipulidae					
Ormosia	-	-	-	-	-
Tipula	12	4	2	4	5
SUMMARY METRICS					
Density (No. organisms per m ²)	1,204	362	606	606	358
Richness (total number of taxa) ^a	13	10	12	14	16
Simpson's Evenness (E)	0.850	0.921	0.852	0.886	0.914
Dominant Group Composition					
% Nemata	5.95	5.94	7.69	4.73	3.00
% Acari	0.595	0.990	0	0.592	2.00
% Ostracods	0	0	0	0	0
% Oligochaeta	6.55	0.990	3.55	4.14	6.00
% Chironomids	76.8	69.3	85.8	82.2	78.0
% Metal Sensitive Chironmids	7.92	17.1	8.52	19.5	13.0
% Simuliidae	0	0	0	0	2.00
% Tipulidae	3.57	3.96	1.18	2.37	5.00
Functional Feeding Group Composition					
% Collector - Gatherers	63.0	71.6	63.6	69.1	68.0
% Filterers	0.609	0	0.609	0.609	1.00
% Shredders	33.4	27.4	35.2	24.9	26.0
Habitat Preference Group Composition					
% Clingers	33.5	24.4	34.6	26.7	27.0
% Sprawlers	50.5	64.7	52.9	62.1	59.0
% Burrowers	16.1	10.9	12.4	11.2	14.0

^a Bold entries excluded from taxa count

Table F.28: Benthic Invertebrate Community Summary Statistics for the Sheardown Lake Tributaries, Mary River Project CREMP, August 2021

Metric	Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Density (no. organisms/m ²)	Unnamed Reference Creek	1,129	820	367	473	903	2,505
	Sheardown Tributary 1 (SDLT1)	627	345	154	358	606	1,204
	Sheardown Tributary 12 (SDLT12)	693	964	557	64.5	211	1,803
	Sheardown Tributary 9 (SDLT9)	2,661	1,929	863	731	2,878	5,616
Richness (Number of Taxa)	Unnamed Reference Creek	20.0	3.32	1.48	16.0	21.0	23.0
	Sheardown Tributary 1 (SDLT1)	13.0	2.24	1.00	10.0	13.0	16.0
	Sheardown Tributary 12 (SDLT12)	12.3	4.16	2.40	9.00	11.0	17.0
	Sheardown Tributary 9 (SDLT9)	18.2	2.59	1.16	15.0	18.0	22.0
Simpson's Evenness	Unnamed Reference Creek	0.924	0.0521	0.0233	0.839	0.932	0.974
	Sheardown Tributary 1 (SDLT1)	0.885	0.0334	0.0150	0.850	0.886	0.921
	Sheardown Tributary 12 (SDLT12)	0.903	0.0455	0.0263	0.861	0.895	0.951
	Sheardown Tributary 9 (SDLT9)	0.821	0.0536	0.0240	0.766	0.813	0.908
Nemata (% of community)	Unnamed Reference Creek	2.33	2.02	0.904	0.601	2.27	5.56
	Sheardown Tributary 1 (SDLT1)	5.46	1.73	0.776	3.00	5.94	7.69
	Sheardown Tributary 12 (SDLT12)	12.2	2.64	1.53	10.3	11.1	15.2
	Sheardown Tributary 9 (SDLT9)	3.47	1.90	0.848	0.627	3.32	5.39
Oligochaeta (% of community)	Unnamed Reference Creek	0.194	0.273	0.122	0	0	0.572
	Sheardown Tributary 1 (SDLT1)	4.25	2.21	0.987	0.990	4.14	6.55
	Sheardown Tributary 12 (SDLT12)	17.8	11.5	6.65	5.17	20.3	27.8
	Sheardown Tributary 9 (SDLT9)	3.01	4.03	1.80	0	1.49	9.80
Hydracarina (% of community)	Unnamed Reference Creek	4.96	3.04	1.36	1.59	4.58	8.33
	Sheardown Tributary 1 (SDLT1)	0.835	0.741	0.331	0	0.595	2.00
	Sheardown Tributary 12 (SDLT12)	0	0	0	0	0	0
	Sheardown Tributary 9 (SDLT9)	2.15	0.859	0.384	0.940	2.49	2.94
Ostracoda (% of community)	Unnamed Reference Creek	0.883	0.760	0.340	0	0.601	1.98
	Sheardown Tributary 1 (SDLT1)	0	0	0	0	0	0
	Sheardown Tributary 12 (SDLT12)	0.830	0.848	0.490	0	0.795	1.69
	Sheardown Tributary 9 (SDLT9)	4.80	3.44	1.54	2.19	3.32	10.3
Chironomidae (% of community)	Unnamed Reference Creek	40.2	7.54	3.37	28.9	39.0	47.7
	Sheardown Tributary 1 (SDLT1)	78.4	6.22	2.78	69.3	78.0	85.8
	Sheardown Tributary 12 (SDLT12)	65.5	14.1	8.16	55.6	59.3	81.7
	Sheardown Tributary 9 (SDLT9)	72.0	9.40	4.21	61.4	75.2	84.3
Metal-Sensitive Chironomidae (% of community)	Unnamed Reference Creek	6.40	1.98	0.886	3.58	6.93	8.28
	Sheardown Tributary 1 (SDLT1)	13.2	5.11	2.28	7.92	13.0	19.5
	Sheardown Tributary 12 (SDLT12)	4.70	5.75	3.32	0	2.99	11.1
	Sheardown Tributary 9 (SDLT9)	8.48	5.15	2.30	3.12	8.42	16.7
% Simuliidae (% of community)	Unnamed Reference Creek	34.6	11.4	5.08	22.0	32.1	53.1
	Sheardown Tributary 1 (SDLT1)	0.400	0.894	0.400	0	0	2.00
	Sheardown Tributary 12 (SDLT12)	0	0	0	0	0	0
	Sheardown Tributary 9 (SDLT9)	7.16	5.49	2.45	0.490	6.27	15.6
% Tipulidae (% of community)	Unnamed Reference Creek	1.19	1.18	0.527	0	1.00	3.03
	Sheardown Tributary 1 (SDLT1)	3.22	1.48	0.660	1.18	3.57	5.00
	Sheardown Tributary 12 (SDLT12)	3.64	1.80	1.04	1.99	3.39	5.56
	Sheardown Tributary 9 (SDLT9)	1.73	0.944	0.422	0.855	1.37	2.94

Table F.28: Benthic Invertebrate Community Summary Statistics for the Sheardown Lake Tributaries, Mary River Project CREMP, August 2021

Metric	Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
% Collector Gatherers FFG (% of community)	Unnamed Reference Creek	43.0	9.14	4.09	29.9	46.0	52.6
	Sheardown Tributary 1 (SDLT1)	67.0	3.69	1.65	63.0	68.0	71.6
	Sheardown Tributary 12 (SDLT12)	77.8	5.28	3.05	72.8	77.3	83.3
	Sheardown Tributary 9 (SDLT9)	51.3	9.76	4.36	38.3	52.6	64.6
% Filterers FFG (% of community)	Unnamed Reference Creek	33.9	12.6	5.62	20.4	31.8	54.5
	Sheardown Tributary 1 (SDLT1)	0.565	0.359	0.160	0	0.609	1.00
	Sheardown Tributary 12 (SDLT12)	0.853	1.48	0.853	0	0	2.56
	Sheardown Tributary 9 (SDLT9)	6.65	4.28	1.92	1.74	5.51	13.3
% Shredders FFG (% of community)	Unnamed Reference Creek	3.45	3.00	1.34	0	5.26	6.27
	Sheardown Tributary 1 (SDLT1)	29.4	4.63	2.07	24.9	27.4	35.2
	Sheardown Tributary 12 (SDLT12)	21.5	4.33	2.50	16.7	22.7	25.1
	Sheardown Tributary 9 (SDLT9)	37.2	12.5	5.60	17.5	37.7	49.2
% Clingers HPG (% of community)	Unnamed Reference Creek	45.9	11.4	5.10	35.6	42.1	65.3
	Sheardown Tributary 1 (SDLT1)	29.2	4.51	2.02	24.4	27.0	34.6
	Sheardown Tributary 12 (SDLT12)	18.5	6.55	3.78	11.1	21.1	23.5
	Sheardown Tributary 9 (SDLT9)	46.8	9.57	4.28	34.5	44.9	60.8
% Sprawlers HPG (% of community)	Unnamed Reference Creek	40.6	9.28	4.15	26.8	43.0	52.0
	Sheardown Tributary 1 (SDLT1)	57.8	6.00	2.68	50.5	59.0	64.7
	Sheardown Tributary 12 (SDLT12)	47.8	9.97	5.76	40.0	44.4	59.0
	Sheardown Tributary 9 (SDLT9)	44.5	11.5	5.15	29.7	50.0	56.2
% Burrowers HPG (% of community)	Unnamed Reference Creek	13.5	5.80	2.60	7.17	14.9	20.6
	Sheardown Tributary 1 (SDLT1)	12.9	2.14	0.956	10.9	12.4	16.1
	Sheardown Tributary 12 (SDLT12)	33.8	14.0	8.09	17.9	39.0	44.4
	Sheardown Tributary 9 (SDLT9)	8.20	5.99	2.68	3.45	5.85	18.1

Note: Sample size equals five for Unnamed Reference Creek, SDLT1, and SDLT9, and three for SDLT12.

Table F.29: Statistical Comparison of Bray-Curtis Index for the Sheardown Lake Tributaries Compared to Unnamed Reference Creek, Mary River Project CREMP, August 2021

Comparison	Betadisper P-Value	Mantel Test			dbRDA			
		r	R ²	P-Value	F-Value	R ²	R ² _{adj}	P-Value
SDLT1 vs Reference Creek	0.852	0.890	0.791	0.008	19.9	0.713	0.677	0.007
SDLT12 vs Reference Creek	0.237	0.908	0.824	0.018	12.9	0.682	0.629	0.019
SDLT9 vs Reference Creek	0.439	0.558	0.312	0.008	5.39	0.403	0.328	0.003

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

Note: Sample size was five for all study areas except SDLT9, at which the sample size was three.

Table F.30: Statistical Comparison of Benthic Metrics at Sheardown Lake Tributary 1 (SDLT1) Among Years of Mine Operation (2015 to 2021) and Baseline (2008, 2013) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2008	vs. Baseline Year 2013	
Density (No. per m ²)	ANOVA	log10	YES	0.002	2008	3	300	52.4	-	-	C
					2013	3	657	176	6.8	-	ABC
					2015	5	722	485	8.1	0.4	BC
					2016	5	2,453	814	41.1	10.2	A
					2017	5	1,660	1,643	26.0	5.7	AB
					2018	5	1,102	766	15.3	2.5	ABC
					2019	5	1,483	982	22.6	4.7	AB
					2020	5	679	625	7.2	0.1	BC
					2021	5	627	345	6.2	-0.2	BC
Richness (No. of Taxa)	ANOVA	none	NO	0.289	2008	3	12	1	-	-	A
					2013	3	16.7	2.52	4.7	-	A
					2015	5	15.4	4.34	3.4	-0.5	A
					2016	5	15.2	2.49	3.2	-0.6	A
					2017	5	14	2	2.0	-1.1	A
					2018	5	12.8	1.64	0.8	-1.5	A
					2019	5	14.8	1.92	2.8	-0.8	A
					2020	5	13.4	2.88	1.4	-1.3	A
					2021	5	13	2.24	1.0	-1.5	A
Simpson's Evenness	ANOVA	none	YES	<0.001	2008	3	0.894	0.0338	-	-	A
					2013	3	0.887	0.0641	-0.2	-	A
					2015	5	0.869	0.067	-0.7	-0.3	A
					2016	5	0.872	0.0323	-0.7	-0.2	A
					2017	5	0.883	0.0278	-0.3	-0.1	A
					2018	5	0.834	0.0625	-1.8	-0.8	A
					2019	5	0.787	0.0258	-3.2	-1.6	AB
					2020	5	0.722	0.0972	-5.1	-2.6	B
					2021	5	0.885	0.0334	-0.3	0.0	A
Oligochaeta (% of community)	K-W	rank	YES	0.050	2008	3	2.96	2.49	-	-	CD
					2013	3	7.32	3.33	1.8	-	ABC
					2015	5	14.4	10.8	4.6	2.1	A
					2016	5	14.1	8.77	4.5	2.0	AB
					2017	5	8.61	7.39	2.3	0.4	ABC
					2018	5	2.24	2.75	-0.3	-1.5	D
					2019	5	3.26	1.04	0.12	-1.2	BCD
					2020	5	2.28	2.56	-0.27	-1.5	D
					2021	5	4.25	2.21	0.52	-0.9	ABCD
Hydracarina (% of community)	ANOVA	log10(x+1)	YES	<0.001	2008	3	12.1	4.73	-	-	A
					2013	3	4.58	2.94	-1.6	-	BCD
					2015	5	4.63	1.6	-1.6	0.0	BC
					2016	5	5.29	1.28	-1.4	0.2	B
					2017	5	3.86	1.99	-1.7	-0.2	BCD
					2018	5	3.06	1.69	-1.9	-0.5	BCD
					2019	5	1.29	0.909	-2.3	-1.1	CD
					2020	5	1.09	0.852	-2.3	-1.2	D
					2021	5	0.835	0.741	-2.4	-1.3	D
Chironomidae (% of community)	ANOVA	none	YES	<0.001	2008	3	69.2	1.97	-	-	B
					2013	3	81.1	3.91	6.0	-	AB
					2015	5	72	9.01	1.4	-2.3	B
					2016	5	73.1	11.9	2.0	-2.0	B
					2017	5	82.4	10.1	6.7	0.3	AB
					2018	5	90.7	4.42	10.9	2.5	A
					2019	5	91.6	1.6	11.4	2.7	A
					2020	5	85	6.86	8.0	1.0	AB
					2021	5	78.4	6.22	4.7	-0.7	AB

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable; nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.30: Statistical Comparison of Benthic Metrics at Sheardown Lake Tributary 1 (SDLT1) Among Years of Mine Operation (2015 to 2021) and Baseline (2008, 2013) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2008	vs. Baseline Year 2013	
Metal Sensitive Chironomidae (% of community)	ANOVA	log10	YES	<0.001	2008	3	27.5	5.45	-	-	AB
					2013	3	19.9	14.3	-1.4	-	ABC
					2015	5	6.09	2.91	-3.9	-1.0	C
					2016	5	15.6	4.39	-2.2	-0.3	ABC
					2017	5	26.1	15.6	-0.3	0.4	AB
					2018	5	19.8	12.4	-1.4	0.0	AB
					2019	5	31.2	11	0.7	0.8	A
					2020	5	10.5	5.34	-3.1	-0.7	BC
					2021	5	13.2	5.11	-2.6	-0.5	ABC
Tipulidae (% of community)	ANOVA	log10(x+1)	YES	<0.001	2008	3	14.7	2.71	-	-	A
					2013	3	3.81	0.5	-4.0	-	B
					2015	5	2.06	1.33	-4.7	-3.7	B
					2016	5	3.51	1.87	-4.1	-0.6	B
					2017	5	2.79	2.73	-4.4	-2.1	B
					2018	5	1.92	1.34	-4.7	-4.0	B
					2019	5	2.11	1.62	-4.6	-3.6	B
					2020	5	3.87	2.49	-4.0	0.1	B
					2021	5	3.22	1.48	-4.2	-1.2	B
Collector Gatherers FFG (% of community)	ANOVA	none	YES	<0.001	2008	3	40.3	2.91	-	-	D
					2013	3	55.5	7.46	5.2	-	CD
					2015	5	64.2	5.2	8.2	1.2	C
					2016	5	58.6	10.7	6.3	0.4	C
					2017	5	55.3	8.01	5.2	0.0	CD
					2018	5	62.2	9.28	7.5	0.9	C
					2019	5	81.6	4.89	14.2	3.5	A
					2020	5	79.4	6.96	13.4	3.2	AB
					2021	5	67	3.69	9.2	1.5	BC
Filterers FFG (% of community)	K-W	rank	YES	<0.001	2008	3	5.18	3.48	-	-	AB
					2013	3	8.45	1.64	0.9	-	A
					2015	5	4.46	1.4	-0.2	-2.4	A
					2016	5	7.56	3.29	0.7	-0.5	A
					2017	5	8.86	7.96	1.1	0.3	A
					2018	5	1.56	1.39	-1.0	-4.2	BC
					2019	5	1.26	0.922	-1.1	-4.4	BC
					2020	5	1.38	1.38	-1.1	-4.3	C
					2021	5	0.565	0.359	-1.3	-4.8	C
Shredders FFG (% of community)	ANOVA	log10	YES	<0.001	2008	3	40.6	4.23	-	-	A
					2013	3	28.7	7.38	-2.8	-	A
					2015	5	22.9	4.53	-4.2	-0.8	AB
					2016	5	27.4	9.44	-3.1	-0.2	A
					2017	5	31.6	7.68	-2.1	0.4	A
					2018	5	32.8	8.15	-1.8	0.6	A
					2019	5	15	4.26	-6.1	-1.9	B
					2020	5	15.8	6.4	-5.9	-1.7	B
					2021	5	29.4	4.63	-2.6	0.1	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable; nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.31: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Sheardown Lake Tributary 12 (SDLT12), August 2021

Waterbody	Sheardown Lake Tributary 12 (SDLT12-DS)		
Station	B1	B2	B3
ROUNDWORMS			
P. Nemata	2	9	52
FLATWORMS			
P. Platyhelminthes			
Cl. Turbellaria			
indeterminate	-	-	-
ANNELIDS			
P. Annelida			
WORMS			
Cl. Oligochaeta			
F. Enchytraeidae	5	12	26
ARTHROPODS			
P. Arthropoda			
MITES			
Cl. Arachnida			
O. Trombidiformes			
F. Sperchonidae			
Sperchon	-	-	-
HARPACTICIDS			
O. Harpacticoida	-	-	-
SEED SHRIMPS			
Cl. Ostracoda	-	1	4
SPRINGTAILS			
Cl. Entognatha			
O. Collembola	-	-	-
INSECTS			
Cl. Insecta			
MAYFLIES			
O. Ephemeroptera			
F. Baetidae			
Acentrella feropagus	-	-	-
CADDISFLIES			
O. Trichoptera			
F. Limnephilidae			
immature	-	-	-
TRUE FLIES			
O. Diptera			
MIDGES			
F. Chironomidae			
chironomid pupae	-	4	28
S.F. Chironominae			
Paratanytarsus	-	-	12
Rheotanytarsus	-	-	-
Tanytarsini indeterminate	-	-	-
S.F. Diamesinae			
Diamesa	1	-	2
Pseudokiefferiella	1	-	-
S.F. Orthocladiinae			
Chaetocladius	-	-	16
Cricotopus	2	2	-
Cricotopus/Orthocladius	-	9	110
Diploccladius	2	14	50
Doncricotopus	-	-	-
Eukiefferiella	-	-	-
Hydrobaenus	3	1	152
Hydrosmittia	1	1	3
Krenosmittia	-	-	2
Limnophyes	-	1	14
Metriocnemus	-	-	2
Orthocladius (Euorthocladius)	-	-	-
Parakiefferiella	-	-	-
Paraphaenocladius	-	-	4
Rheocricotopus	-	-	-
Thienemanniella	-	-	-
Tvetenia	-	-	-
indeterminate	-	3	16
S.F. Tanypodinae			
Thienemannimyia complex	-	-	-
F. Dixidae			
Dixella	-	-	-
F. Empididae			
Clinocera	-	-	-
F. Simuliidae			
Gymnopsis holopticoides	-	-	-
Metacnephia	-	-	-
Prosimulium	-	-	-
indeterminate	-	-	-
immature	-	-	-
pupae	-	-	-
F. Tipulidae			
Ormosia	-	1	2
Tipula	1	1	8
SUMMARY METRICS			
Density (No. organisms per m ²)	65	211	1,803
Richness (total number of taxa) ^a	9	11	17
Simpson's Evenness (E)	0.951	0.895	0.861
Dominant Group Composition			
% Nemata	11.1	15.2	10.3
% Acari	0	0	0
% Ostracods	0	1.69	0.795
% Oligochaeta	27.8	20.3	5.17
% Chironomids	55.6	59.3	81.7
% Metal Sensitive Chironmids	11.1	0	2.99
% Simuliidae	0	0	0
% Tipulidae	5.56	3.39	1.99
Functional Feeding Group Composition			
% Collector - Gatherers	83.3	77.3	72.8
% Filterers	0	0	2.56
% Shredders	16.7	22.7	25.1
Habitat Preference Group Composition			
% Clingers	11.1	21.1	23.5
% Sprawlers	44.4	40.0	59.0
% Burrowers	44.4	39.0	17.9

^a Bold entries excluded from taxa count

Table F.32: Statistical Comparison of Benthic Invertebrate Community Metrics at Sheardown Lake Tributary 12 Upstream (SDLT12) Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Density (No. per m ²)	ANOVA	log10	NO	0.108	2007	5	1,016	669	-	A
					2015	3	841	575	-0.3	A
					2016	3	894	502	-0.2	A
					2017	3	783	561	-0.3	A
					2018	3	2,826	2,237	2.7	A
					2019	3	3,078	2,660	3.1	A
					2020	3	1,318	26.4	0.5	A
					2021	3	693	964	-0.5	A
Richness (No. of Taxa)	ANOVA	log10	YES	0.009	2007	5	19.0	1.9	-	A
					2015	3	12.0	1.0	-3.7	B
					2016	3	18.3	1.2	-0.4	A
					2017	3	15.3	0.6	-2.0	AB
					2018	3	14.3	2.5	-2.5	AB
					2019	3	15.0	2.0	-2.1	AB
					2020	3	17.3	4.2	-0.9	AB
					2021	3	12.3	4.2	-3.6	B
Simpson's Evenness	ANOVA	none	YES	<0.001	2007	5	0.854	0.020	-	A
					2015	3	0.884	0.041	1.5	A
					2016	3	0.884	0.046	1.5	A
					2017	3	0.931	0.021	3.9	A
					2018	3	0.659	0.152	-9.8	B
					2019	3	0.613	0.095	-12.2	B
					2020	3	0.832	0.063	-1.1	A
					2021	3	0.903	0.046	2.5	A
Oligochaeta (% of community)	K-W	rank	YES	0.002	2007	5	0.7	0.6	-	D
					2015	3	28.8	8.8	48.7	AB
					2016	3	31.6	11.1	53.6	A
					2017	3	21.9	8.4	36.8	ABC
					2018	3	3.4	1.5	4.7	CD
					2019	3	2.3	0.6	2.8	D
					2020	3	3.4	0.2	4.6	BCD
					2021	3	17.8	11.5	29.7	ABC
Hydracarina (% of community)	K-W	rank	NO	0.116	2007	5	3.0	2.9	-	A
					2015	3	0.0	0.0	-1.0	A
					2016	3	0.4	0.4	-0.9	A
					2017	3	0.0	0.0	-1.0	A
					2018	3	0.7	1.2	-0.8	A
					2019	3	0.4	0.7	-0.9	A
					2020	3	0.2	0.2	-0.9	A
					2021	3	0.0	0.0	-1.0	A
Chironomidae (% of community)	ANOVA	none	YES	<0.001	2007	5	88.0	10.2	-	A
					2015	3	65.1	6.7	-2.2	BC
					2016	3	54.9	18.0	-3.2	C
					2017	3	64.6	7.2	-2.3	BC
					2018	3	92.1	4.0	0.4	A
					2019	3	95.1	1.9	0.7	A
					2020	3	88.6	2.1	0.1	AB
					2021	3	65.5	14.1	-2.2	BC

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.32: Statistical Comparison of Benthic Invertebrate Community Metrics at Sheardown Lake Tributary 12 Upstream (SDLT12) Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Metal Sensitive Chironomidae (% of community)	ANOVA	log10(x+1)	YES	0.002	2007	5	3.3	2.0	-	B
					2015	3	1.4	1.5	-0.9	B
					2016	3	2.6	0.5	-0.3	B
					2017	3	12.7	5.2	4.7	A
					2018	3	0.6	0.6	-1.3	B
					2019	3	2.3	3.3	-0.5	B
					2020	3	0.5	0.4	-1.4	B
					2021	3	4.7	5.8	0.7	B
Tipulidae (% of community)	ANOVA	log10(x+1)	YES	0.029	2007	5	0.3	0.5	-	A
					2015	3	3.4	1.3	6.3	AB
					2016	3	3.8	3.1	7.2	B
					2017	3	3.4	2.0	6.5	AB
					2018	3	2.2	1.5	3.9	AB
					2019	3	0.6	0.3	0.6	AB
					2020	3	1.5	0.7	2.4	AB
					2021	3	3.6	1.8	6.9	AB
Collector Gatherers FFG (% of community)	ANOVA	none	YES	0.003	2007	5	57.8	15.8	-	B
					2015	3	83.7	11.4	1.6	A
					2016	3	87.0	2.6	1.8	A
					2017	3	88.5	3.2	1.9	A
					2018	3	87.6	9.4	1.9	A
					2019	3	82.0	5.0	1.5	A
					2020	3	83.4	0.5	1.6	A
					2021	3	77.8	5.3	1.3	AB
Filterers FFG (% of community)	K-W	rank	YES	0.081	2007	5	6.9	9.2	-	A
					2015	3	0.0	0.0	-0.7	C
					2016	3	2.1	0.1	-0.5	AB
					2017	3	3.5	2.8	-0.4	A
					2018	3	0.4	0.4	-0.7	ABC
					2019	3	2.2	3.4	-0.5	ABC
					2020	3	0.2	0.3	-0.7	BC
					2021	3	0.9	1.5	-0.7	ABC
Shredders FFG (% of community)	ANOVA	none	NO	0.118	2007	5	22.5	8.9	-	A
					2015	3	16.3	11.4	-0.7	A
					2016	3	9.3	1.5	-1.5	A
					2017	3	8.0	2.1	-1.6	A
					2018	3	11.3	7.9	-1.3	A
					2019	3	15.2	8.6	-0.8	A
					2020	3	16.9	1.8	-0.6	A
					2021	3	21.5	4.3	-0.1	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.33: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Sheardown Lake Tributary 9 (SDLT9), August 2021

Waterbody	Sheardown Lake Tributary 9 (SDLT9-DS)			
Station	B1	B2	B3	B4
ROUNDWORMS				
P. Nemata	11	52	41	24
FLATWORMS				
P. Platyhelminthes				
Cl. Turbellaria				
indeterminate	1	-	-	-
ANNELIDS				
P. Annelida				
WORMS				
Cl. Oligochaeta				
F. Enchytraeidae	20	-	28	12
ARTHROPODS				
P. Arthropoda				
MITES				
Cl. Arachnida				
O. Trombidiformes				
F. Sperchonidae				
Sperchon	6	44	13	20
HARPACTICIDS				
O. Harpacticoida	-	4	-	-
SEED SHRIMPS				
Cl. Ostracoda	21	52	18	48
SPRINGTAILS				
Cl. Entognatha				
O. Collembola	5	-	-	-
INSECTS				
Cl. Insecta				
MAYFLIES				
O. Ephemeroptera				
F. Baetidae				
Acentrella feropagus	-	60	76	24
CADDISFLIES				
O. Trichoptera				
F. Limnephilidae				
immature	-	8	-	-
TRUE FLIES				
O. Diptera				
MIDGES				
F. Chironomidae				
chironomid pupae	28	48	28	32
S.F. Chironominae				
Paratanytarsus	1	-	-	-
Rheotanytarsus	-	-	-	-
Tanytarsini indeterminate	1	-	-	4
S.F. Diamesinae				
Diamesa	2	80	126	24
Pseudokiefferiella	1	-	3	36
S.F. Orthoclaadiinae				
Chaetocladius	-	-	-	-
Cricotopus	40	343	45	84
Cricotopus/Orthocladius	30	375	84	172
Diplocladius	6	-	-	4
Doncricotopus	1	-	-	-
Eukiefferiella	-	-	3	-
Hydrobaenus	-	-	-	12
Hydrosmittia	3	-	7	-
Krenosmittia	1	16	10	-
Limnophyes	4	-	3	-
Metriocnemus	-	-	-	-
Orthocladius (Euorthocladius)	-	-	-	-
Parakiefferiella	-	-	-	-
Paraphaenocladius	1	-	-	-
Rheocricotopus	1	-	-	-
Thienemanniella	-	-	3	-
Tvetenia	9	183	191	180
indeterminate	1	135	-	56
S.F. Tanypodinae				
Thienemannimyia complex	-	-	-	-
F. Dixidae				
Dixella	-	-	-	4
F. Empididae				
Clinocera	3	28	5	12
F. Simuliidae				
Gymnopais holopticoides	-	4	19	8
Metacnephia	-	16	77	24
Prosimulium	-	8	3	-
indeterminate	-	-	-	-
immature	-	4	-	4
pupae	1	92	29	8
F. Tipulidae				
Ormosia	-	-	-	-
Tipula	6	15	7	11
SUMMARY METRICS				
Density (No. organisms per m ²)	731	5,616	2,935	2,878
Richness (total number of taxa) ^a	22	15	19	18
Simpson's Evenness (E)	0.813	0.766	0.908	0.825
Dominant Group Composition				
% Nemata	5.39	3.32	5.01	2.99
% Acari	2.94	2.81	1.59	2.49
% Ostracods	10.3	3.32	2.20	5.98
% Oligochaeta	9.80	0	3.42	1.49
% Chironomids	63.7	75.3	61.4	75.2
% Metal Sensitive Chironmids	3.12	5.32	16.7	8.42
% Simuliidae	0.490	7.91	15.6	5.48
% Tipulidae	2.94	0.957	0.855	1.37
Functional Feeding Group Composition				
% Collector - Gatherers	46.7	38.3	64.6	54.5
% Filterers	1.74	7.66	13.3	5.51
% Shredders	46.7	49.2	17.5	35.0
Habitat Preference Group Composition				
% Clingers	49.8	60.8	34.5	44.1
% Sprawlers	29.7	34.9	56.2	50.0
% Burrowers	18.1	4.28	9.28	5.85

^a Bold entries excluded from taxa count

Table F.34: Statistical Comparison of Benthic Metrics at Sheardown Lake Tributary 9 (SDLT9) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2013) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2013	
Density (No. per m ²)	ANOVA	log10	YES	0.034	2007	3	712	41.9	-	-	A
					2013	3	1,240	690	12.6	-	AB
					2015	5	2,147	942	34.2	1.3	AB
					2016	5	2,401	1,054	40.3	1.7	AB
					2017	5	3,404	1,983	64.2	3.1	B
					2018	5	1,482	375	18.4	0.4	AB
					2019	5	1,575	705	20.6	0.5	AB
					2020	5	1,601	841	21.2	0.5	AB
					2021	5	2,661	1,929	46.5	2.1	AB
Richness (No. of Taxa)	ANOVA	none	NO	0.545	2007	3	22.3	3.21	-	-	A
					2013	3	19	3.61	-1.0	-	A
					2015	5	19.4	4.83	-0.9	0.1	A
					2016	5	18.2	2.59	-1.3	-0.2	A
					2017	5	20.8	2.77	-0.5	0.5	A
					2018	5	17.8	3.9	-1.4	-0.3	A
					2019	5	21	2	-0.4	0.6	A
					2020	5	18	4.69	-1.3	-0.3	A
					2021	5	18.2	2.59	-1.3	-0.2	A
Simpson's Evenness	ANOVA	none	NO	0.133	2007	3	0.865	0.049	-	-	A
					2013	3	0.899	0.018	0.7	-	A
					2015	5	0.892	0.0604	0.6	-0.4	A
					2016	5	0.843	0.0635	-0.4	-3.1	A
					2017	5	0.883	0.0422	0.4	-0.9	A
					2018	5	0.889	0.0473	0.5	-0.6	A
					2019	5	0.899	0.00797	0.7	0.0	A
					2020	5	0.855	0.0235	-0.2	-2.4	A
					2021	5	0.821	0.0536	-0.9	-4.3	A
Oligochaeta (% of community)	K-W	rank	NO	0.148	2007	3	5.9	4.1	-	-	A
					2013	3	0.7	1.1	-1.3	-	A
					2015	5	0.8	0.4	-1.3	0.2	A
					2016	5	1.5	1.0	-1.1	0.8	A
					2017	5	3.0	2.8	-0.7	2.0	A
					2018	5	0.9	1.0	-1.2	0.3	A
					2019	5	2.1	1.7	-0.9	1.3	A
					2020	5	2.1	0.9	-1.0	1.2	A
					2021	5	3.0	4.0	-0.7	2.1	A
Hydracarina (% of community)	ANOVA	log10	YES	0.019	2007	3	3.4	2.0	-	-	AB
					2013	3	9.0	4.2	2.8	-	A
					2015	5	4.2	4.1	0.4	-1.1	AB
					2016	5	4.6	3.2	0.6	-1.0	AB
					2017	5	3.3	2.0	-0.1	-1.4	AB
					2018	5	8.5	2.3	2.6	-0.1	A
					2019	5	2.7	1.1	-0.3	-1.5	AB
					2020	5	4.2	1.8	0.4	-1.2	AB
					2021	5	2.2	0.9	-0.6	-1.6	B
Chironomidae (% of community)	K-W	rank	NO	0.214	2007	3	77.5	5.8	-	-	A
					2013	3	73.3	4.4	-0.7	-	A
					2015	5	78.7	8.7	0.2	1.2	A
					2016	5	67.1	8.8	-1.8	-1.4	A
					2017	5	73.4	10.1	-0.7	0.0	A
					2018	5	75.8	11.1	-0.3	0.6	A
					2019	5	63.7	6.9	-2.4	-2.2	A
					2020	5	70.3	4.3	-1.2	-0.7	A
					2021	5	72.0	9.4	-0.9	-0.3	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.34: Statistical Comparison of Benthic Metrics at Sheardown Lake Tributary 9 (SDLT9) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2013) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2013	
Metal Sensitive Chironomidae (% of community)	K-W	rank	YES	0.004	2007	3	2.6	0.9	-	-	ABC
					2013	3	1.0	0.5	-1.8	-	CD
					2015	5	5.0	2.5	2.8	7.4	AB
					2016	5	0.8	1.2	-2.1	-0.4	D
					2017	5	1.1	1.3	-1.7	0.2	CD
					2018	5	0.8	0.6	-2.0	-0.3	CD
					2019	5	2.5	1.1	-0.1	2.8	ABC
					2020	5	3.2	3.6	0.7	4.0	BCD
					2021	5	8.5	5.2	6.8	13.7	A
Tipulidae (% of community)	ANOVA	log10	YES	0.009	2007	3	4.6	1.9	-	-	AB
					2013	3	4.4	2.1	-0.1	-	AB
					2015	5	3.9	3.4	-0.4	-0.2	AB
					2016	5	8.0	3.3	1.8	1.7	A
					2017	5	5.8	5.6	0.7	0.7	AB
					2018	5	3.6	2.3	-0.5	-0.4	AB
					2019	5	1.4	0.8	-1.7	-1.5	B
					2020	5	3.1	1.3	-0.8	-0.6	AB
					2021	5	1.7	0.9	-1.5	-1.3	B
Collector Gatherers FFG (% of community)	ANOVA	none	NO	0.242	2007	3	57.8	3.1	-	-	A
					2013	3	60.6	6.9	0.9	-	A
					2015	5	60.7	20.5	0.9	0.0	A
					2016	5	44.6	15.7	-4.3	-2.3	A
					2017	5	57.5	11.6	-0.1	-0.4	A
					2018	5	52.6	7.3	-1.7	-1.2	A
					2019	5	62.5	6.5	1.5	0.3	A
					2020	5	63.3	6.9	1.8	0.4	A
					2021	5	51.3	9.8	-2.1	-1.3	A
Filterers FFG (% of community)	K-W	rank	YES	0.011	2007	3	1.3	0.9	-	-	BC
					2013	3	1.9	0.9	0.6	-	AB
					2015	5	2.0	1.8	0.7	0.1	B
					2016	5	0.5	0.4	-0.9	-1.6	C
					2017	5	0.8	0.7	-0.6	-1.3	BC
					2018	5	1.4	1.4	0.1	-0.6	BC
					2019	5	2.0	1.0	0.7	0.1	AB
					2020	5	0.5	0.8	-0.9	-1.6	C
					2021	5	6.7	4.3	5.7	5.4	A
Shredders FFG (% of community)	ANOVA	none	NO	0.171	2007	3	26.8	3.9	-	-	A
					2013	3	28.4	4.4	0.4	-	A
					2015	5	32.0	18.2	1.3	0.8	A
					2016	5	49.1	15.0	5.7	4.7	A
					2017	5	37.7	10.7	2.8	2.1	A
					2018	5	37.2	9.7	2.7	2.0	A
					2019	5	32.0	7.2	1.3	0.8	A
					2020	5	29.8	6.8	0.8	0.3	A
					2021	5	37.2	12.5	2.7	2.0	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.35: Statistical Comparison of Sediment Physical Properties Between Sheardown Lake NW (DL0-1) and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	Data 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	0.344	Reference	5	40.0	6.49	2.90	32.5	48.8
						Sheardown NW	7	46.0	21.6	8.15	19.0	88.9
	Silt-Sized Material (%)	M-W	rank	NO	0.421	Reference	5	49.6	6.98	3.12	39.2	58.2
						Sheardown NW	7	45.5	18.1	6.83	10.4	69.8
	Clay-Sized Material (%)	M-W	rank	NO	0.548	Reference	5	10.4	2.42	1.08	6.80	12.9
						Sheardown NW	7	8.53	4.39	1.66	1.00	14.9
	Moisture (%)	M-W	rank	NO	0.151	Reference	5	54.8	7.60	3.40	49.1	63.8
						Sheardown NW	7	70.4	19.7	7.44	27.0	84.5
	Total Organic Carbon (TOC) Content (%)	tequal	none	NO	0.302	Reference	5	4.37	1.96	0.875	1.92	7.32
						Sheardown NW	7	2.90	1.69	0.637	0.220	5.41
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	none	NO	0.183	Reference	5	42.0	6.80	3.04	35.7	49.8
						Sheardown NW	7	25.1	20.0	7.56	9.30	61.9
	Silt-Sized Material (%)	tequal	none	NO	0.149	Reference	5	47.2	5.32	2.38	39.2	53.1
						Sheardown NW	7	60.9	15.1	5.69	34.6	75.3
	Clay-Sized Material (%)	tequal	none	NO	0.428	Reference	5	10.9	3.54	1.58	4.70	13.2
						Sheardown NW	7	14.0	5.40	2.04	3.50	20.1
	Moisture (%)	tequal	none	NO	0.576	Reference	5	56.9	7.06	3.16	52.1	69.4
						Sheardown NW	7	58.9	12.3	4.64	42.5	72.5
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.001	Reference	5	3.54	0.672	0.300	2.48	4.32
						Sheardown NW	7	1.31	0.528	0.200	0.650	2.08

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

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

Table F.36: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Sheardown Lake NW Study Areas, August 2021

Lake	Sheardown Lake NW (DL0-01)									
Station Type	Littoral Stations					Profundal Stations				
Station	9	4	3	11	10	5	14	15	2	12
ROUNDWORMS										
P. Nemata	8	-	-	1	4	-	-	-	-	2
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae										
Lumbriculus	8	-	-	-	-	1	-	-	-	-
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
F. Acalyptonotidae										
Acalyptonotus	-	4	-	9	10	3	-	-	-	1
F. Hygrobatidae										
Hygrobates	12	20	16	5	4	2	10	1	4	7
F. Lebertiidae										
Lebertia	-	-	-	2	-	2	2	-	1	2
SEED SHRIMPS										
Cl. Ostracoda	156	520	192	48	28	3	6	5	3	11
INSECTS										
Cl. Insecta										
CADDISFLIES										
O. Trichoptera										
F. Apataniidae										
Apatania	4	20	-	-	-	-	-	-	-	-
F. Limnephilidae										
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	4	40	40	1	4	-	-	-	-	-
S.F. Chironominae										
Chironomus	51	-	-	-	-	67	70	-	1	-
Corynocera ambigua	-	-	-	-	-	-	-	-	-	-
Lipiniella	-	-	-	-	-	-	-	-	-	-
Micropsectra	17	24	160	4	14	-	-	-	-	-
Paratanytarsus	34	52	84	-	-	-	-	-	-	-
Sergentia	8	16	4	-	-	-	4	-	-	-
Stictochironomus	412	124	272	180	104	-	2	-	-	-
Tanytarsus	-	36	-	-	-	-	-	-	-	-
Chironomini indeterminate	-	-	-	-	-	-	-	-	-	-
Tanytarsini indeterminate	-	-	-	-	-	-	-	-	-	-
S.F. Diamesinae										
Protanypus	-	-	-	7	-	-	2	4	2	2
Pseudodiamesa	-	-	-	1	-	-	2	-	1	-
Pseudokiefferiella	-	-	-	-	-	-	-	-	-	-
S.F. Orthoclaadiinae										
Abiskomyia	-	12	-	8	10	2	8	-	1	-
Heterotrissocladius	25	60	88	-	14	-	2	8	75	30
Hydrobaenus	-	-	-	-	-	-	-	-	-	-
Hydrosmittia	-	-	-	-	-	-	-	-	-	-
Mesocricotopus	-	-	-	-	-	-	-	-	-	-
Paracladius	-	-	-	2	-	-	-	-	-	-
Parakiefferiella	-	-	-	-	-	-	-	-	-	-
Psectrocladius	-	-	-	-	-	-	-	-	-	-
Zalutschia	-	-	-	4	2	-	-	-	-	-
S.F. Tanypodinae										
Procladius	9	12	4	19	24	5	4	5	10	3
Thienemannimyia complex	8	24	44	-	2	-	-	-	-	-
SUMMARY METRICS										
Density (No. organisms per m ²)	6,510	8,301	7,784	2,506	1,894	732	964	198	844	499
Richness (total number of taxa) ^a	13.0	13.0	9.00	13.0	11.0	8.00	11.0	5.00	9.00	8.00
Simpson's Evenness (E)	0.701	0.732	0.894	0.628	0.796	0.424	0.648	0.940	0.451	0.772
Shannon-Wiener Diversity	2.19	2.41	2.52	1.97	2.50	1.31	2.10	2.12	1.36	2.14
Dominant Taxonomic Group Composition										
% Nemata	1.06	0	0	0.344	1.82	0	0	0	0	3.45
% Hydracarina	1.59	2.49	1.77	5.50	6.36	8.24	10.7	4.35	5.10	17.2
% Ostracods	20.6	53.9	21.2	16.5	12.7	3.53	5.36	21.7	3.06	19.0
% Chironomids	75.1	41.5	77.0	77.7	79.1	87.1	83.9	73.9	91.8	60.3
% Metal Sensitive Chironomids	6.79	12.9	28.6	4.14	6.51	0	3.57	17.4	3.06	3.45
Functional Feeding Group Composition										
% Collector - Gatherers	88.8	78.4	64.0	85.2	74.1	85.9	85.7	73.9	84.7	77.6
% Filterers	6.79	12.9	28.6	1.38	6.51	0	0	0	0	0
% Shredders	0	0	0	1.38	0.930	0	0	0	0	0
Habitat Preference Group Composition										
% Clingers	5.45	13.3	21.0	6.88	12.9	8.24	14.3	4.35	5.10	17.2
% Sprawlers	30.8	72.4	47.1	28.2	36.9	11.8	19.6	78.3	91.8	75.9
% Burrowers	63.8	14.3	31.9	64.9	50.2	80.0	66.1	17.4	3.06	6.90

^a Bold entries excluded from taxa count

Table F.37: Statistical Comparison of Benthic Metrics at Sheardown Lake NW Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2008, 2013) for the Mary River Project CREMP

Metric	Overall 10-Year Comparison				Pair-wise, post-hoc comparisons							
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference vs Baseline 2007 ^b			Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2008	vs. Baseline Year 2013	
Density (No. per m ²)	ANOVA	none	NO	0.818	2007	4	5,974	3,000	-	-	-	A
					2008	4	7,536	5,273	0.5	-	-	A
					2013	3	9,940	2,634	1.3	0.5	-	A
					2015	5	5,665	3,230	-0.1	-0.4	-1.6	A
					2016	5	5,503	4,184	-0.2	-0.4	-1.7	A
					2017	5	5,216	2,398	-0.3	-0.4	-1.8	A
					2018	5	6,334	3,717	0.1	-0.2	-1.4	A
					2019	5	6,207	2,673	0.1	-0.3	-1.4	A
					2020	5	6,631	3,914	0.2	-0.2	-1.3	A
Richness (No. of Taxa)	ANOVA	log10	YES	0.057	2007	4	12.3	1.52	-	-	-	AB
					2008	4	14.5	1.68	1.4	-	-	AB
					2013	3	17.7	3.21	3.6	1.9	-	A
					2015	5	13.8	1.92	1.0	-0.4	-1.2	AB
					2016	5	14.6	2.41	1.5	0.1	-1.0	AB
					2017	5	14	3.16	1.1	-0.3	-1.2	AB
					2018	5	15	1.22	1.8	0.3	-0.8	AB
					2019	5	13.2	3.56	0.6	-0.8	-1.4	AB
					2020	5	15.4	1.14	2.0	0.5	-0.7	AB
Simpson's Evenness	ANOVA	none	YES	0.046	2007	4	0.768	0.0553	-	-	-	AB
					2008	4	0.84	0.098	1.3	-	-	AB
					2013	3	0.863	0.0466	1.7	0.2	-	AB
					2015	5	0.759	0.0957	-0.2	-0.8	-2.2	AB
					2016	5	0.893	0.0235	2.3	0.5	0.6	A
					2017	5	0.842	0.0485	1.3	0.0	-0.5	AB
					2018	5	0.769	0.163	0.0	-0.7	-2.0	AB
					2019	5	0.686	0.114	-1.5	-1.6	-3.8	B
					2020	5	0.773	0.0548	0.1	-0.7	-1.9	AB
Nemata (%)	K-W	rank	NO	0.466	2007	4	1.52	1.58	-	-	-	A
					2008	4	1.09	0.976	-0.3	-	-	A
					2013	3	0.592	0.846	-0.6	-0.5	-	A
					2015	5	0.851	1.07	-0.4	-0.2	0.3	A
					2016	5	1.14	0.713	-0.2	0.1	0.6	A
					2017	5	1.26	1.55	-0.2	0.2	0.8	A
					2018	5	1.34	1.03	-0.1	0.3	0.9	A
					2019	5	0.165	0.226	-0.9	-0.9	-0.5	A
					2020	5	0.61	0.569	-0.6	-0.5	0.0	A
Ostracoda (%)	ANOVA	log10	YES	0.013	2007	4	11.9	12.8	-	-	-	B
					2008	4	10.8	8.73	-0.1	-	-	AB
					2013	3	23.4	8.14	0.9	1.4	-	AB
					2015	5	7.84	3.72	-0.3	-0.3	-1.9	AB
					2016	5	9.19	6.13	-0.2	-0.2	-1.7	AB
					2017	5	19.5	11.1	0.6	1.0	-0.5	AB
					2018	5	13	4.1	0.1	0.3	-1.3	AB
					2019	5	16	5.73	0.3	0.6	-0.9	AB
					2020	5	25.6	8.56	1.1	1.7	0.3	A
					2021	5	25	16.5	1.0	1.6	0.2	A

Indicates a significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.37: Statistical Comparison of Benthic Metrics at Sheardown Lake NW Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2008, 2013) for the Mary River Project CREMP

Metric	Overall 10-Year Comparison				Pair-wise, post-hoc comparisons							
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference vs Baseline 2007 ^b			Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2008	vs. Baseline Year 2013	
Chironomidae (%)	K-W	rank	YES	0.010	2007	4	83	8.28	-	-	-	ABCD
					2008	4	81.2	6.67	-0.2	-	-	BCDE
					2013	3	70.5	9.64	-1.5	-1.6	-	DE
					2015	5	89.8	3.2	0.8	1.3	2.0	A
					2016	5	85	6.59	0.2	0.6	1.5	AB
					2017	5	73.5	11.2	-1.1	-1.2	0.3	CDE
					2018	5	83.7	2.85	0.1	0.4	1.4	ABC
					2019	5	82.1	5.95	-0.1	0.1	1.2	ABCD
					2020	5	70.4	9.29	-1.5	-1.6	0.0	E
					2021	5	70.1	16	-1.6	-1.7	0.0	DE
Metal Sensitive Chironomidae (%)	ANOVA	log10	NO	0.795	2007	4	16.9	16.9	-	-	-	A
					2008	4	20.7	17.2	0.2	-	-	A
					2013	3	21	4.65	0.2	0.0	-	A
					2015	5	19.1	7.18	0.1	-0.1	-0.4	A
					2016	5	24.6	15.2	0.5	0.2	0.8	A
					2017	5	16.6	7.91	0.0	-0.2	-0.9	A
					2018	5	18.3	15	0.1	-0.1	-0.6	A
					2019	5	10.6	5.98	-0.4	-0.6	-2.2	A
					2020	5	15.4	14.3	-0.1	-0.3	-1.2	A
					2021	5	11.8	9.95	-0.3	-0.5	-2.0	A
Collector Gatherers (%)	ANOVA	none	YES	0.025	2007	4	71.6	13.4	-	-	-	AB
					2008	4	61.1	15	-0.8	-	-	AB
					2013	3	65.3	8.98	-0.5	0.3	-	AB
					2015	5	68.9	7.97	-0.2	0.5	0.4	AB
					2016	5	56.8	7.68	-1.1	-0.3	-0.9	A
					2017	5	69.4	9.19	-0.2	0.6	0.5	AB
					2018	5	76.2	13.1	0.3	1.0	1.2	AB
					2019	5	81.7	8.43	0.8	1.4	1.8	B
					2020	5	77.5	14.1	0.4	1.1	1.4	AB
					2021	5	78.1	9.76	0.5	1.1	1.4	AB
Filterers (%)	ANOVA	none	NO	0.872	2007	4	16.7	17.1	-	-	-	A
					2008	4	19.9	17.1	0.2	-	-	A
					2013	3	21	4.68	0.3	0.1	-	A
					2015	5	18.6	6.83	0.1	-0.1	-0.5	A
					2016	5	23	17.3	0.4	0.2	0.4	A
					2017	5	16.5	7.99	0.0	-0.2	-1.0	A
					2018	5	17.5	15.7	0.0	-0.1	-0.7	A
					2019	5	9.99	5.81	-0.4	-0.6	-2.4	A
					2020	5	14.6	14.5	-0.1	-0.3	-1.4	A
					2021	5	11.2	10.5	-0.3	-0.5	-2.1	A

Indicates a significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}; MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.38: Statistical Comparison of Benthic Metrics at Sheardown Lake NW Profundal (Deep) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2013) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2013	
Density (No. per m ²)	ANOVA	none	YES	<0.001	2007	4	1,461	308	-	-	BC
					2013	3	2,744	302	4.2	-	A
					2015	5	1,425	210	-0.1	-4.4	BC
					2017	5	861	391	-1.9	-6.2	CD
					2018	5	1,154	240	-1.0	-5.3	BCD
					2019	5	1,670	302	0.7	-3.6	B
					2020	5	1,326	527	-0.4	-4.7	BC
					2021	5	648	304	-2.6	-6.9	D
Richness (No. of Taxa)	ANOVA	none	NO	0.924	2007	4	7.5	0.4	-	-	A
					2013	3	9.8	2.5	5.4	-	A
					2015	5	8.4	3.1	2.1	-0.6	A
					2017	5	9.2	3.5	4.0	-0.3	A
					2018	5	9.4	3.5	4.4	-0.2	A
					2019	5	9.2	3.5	4.0	-0.3	A
					2020	5	7.8	2.5	0.7	-0.8	A
					2021	5	8.2	2.2	1.6	-0.7	A
Simpson's Evenness	ANOVA	log10	NO	0.155	2007	4	0.426	0.165	-	-	A
					2013	3	0.521	0.167	0.6	-	A
					2015	5	0.355	0.212	-0.4	-1.0	A
					2017	5	0.717	0.113	1.8	1.2	A
					2018	5	0.491	0.133	0.4	-0.2	A
					2019	5	0.444	0.21	0.1	-0.5	A
					2020	5	0.486	0.295	0.4	-0.2	A
					2021	5	0.647	0.218	1.3	0.8	A
Nemata (%)	K-W	rank	YES	0.071	2007	4	0.6	0.5	-	-	AB
					2013	3	3.6	2.6	5.8	-	A
					2015	5	0.5	0.3	-0.2	-1.2	AB
					2017	5	1.4	3.0	1.4	-0.9	BC
					2018	5	0.6	1.0	-0.1	-1.2	BC
					2019	5	0.4	0.4	-0.4	-1.2	BC
					2020	5	0.0	0.0	-1.2	-1.4	C
					2021	5	0.7	1.5	0.1	-1.1	BC
Ostracoda (%)	ANOVA	log10(x+1)	YES	0.081	2007	4	0.3	0.4	-	-	A
					2013	3	6.2	8.7	16.4	-	AB
					2015	5	2.8	3.7	7.0	-0.4	AB
					2017	5	6.8	4.6	18.1	0.1	AB
					2018	5	2.9	2.4	7.1	-0.4	AB
					2019	5	2.6	1.7	6.3	-0.4	AB
					2020	5	6.6	3.9	17.4	0.0	AB
					2021	5	10.5	9.1	28.4	0.5	B
Chironomidae (%)	ANOVA	none	YES	0.036	2007	4	94.6	1.9	-	-	A
					2013	3	84.9	8.8	-5.0	-	AB
					2015	5	93.2	6.0	-0.7	0.9	A
					2017	5	85.1	8.5	-4.9	0.0	AB
					2018	5	90.4	3.8	-2.2	0.6	AB
					2019	5	93.0	5.7	-0.8	0.9	A
					2020	5	90.8	3.7	-2.0	0.7	AB
					2021	5	79.4	12.5	-7.8	-0.6	B
Metal Sensitive Chironomidae (%)	K-W	rank	YES	0.077	2007	4	0.5	0.6	-	-	C
					2013	3	1.4	1.7	1.4	-	BC
					2015	5	2.8	2.8	3.7	0.9	ABC
					2017	5	6.3	4.4	9.2	2.9	A
					2018	5	3.3	2.0	4.4	1.1	AB
					2019	5	2.2	2.1	2.7	0.5	BC
					2020	5	4.0	4.0	5.6	1.6	AB
					2021	5	5.5	6.8	7.9	2.4	AB
Collector Gatherers (%)	ANOVA	none	YES	0.008	2007	4	83.6	8.4	-	-	AB
					2013	3	86.4	4.8	0.3	-	AB
					2015	5	90.5	5.3	0.8	0.9	A
					2017	5	75.5	7.4	-1.0	-2.3	B
					2018	5	85.2	7.7	0.2	-0.3	AB
					2019	5	88.6	6.5	0.6	0.5	A
					2020	5	91.9	3.5	1.0	1.2	A
					2021	5	81.6	5.5	-0.2	-1.0	AB
Filterers (%)	K-W	rank	NO	0.278	2007	4	0.1	0.1	-	-	A
					2013	3	1.3	1.7	11.6	-	A
					2015	5	1.9	2.6	16.7	0.3	A
					2017	5	2.9	2.5	26.1	1.0	A
					2018	5	1.0	1.4	8.5	-0.2	A
					2019	5	1.3	2.6	11.2	0.0	A
					2020	5	2.4	4.9	21.7	0.7	A
					2021	5	0.0	0.0	-0.5	-0.8	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of a ± 2 SD effect size of respective baseline year mean indicating an ecologically meaningful difference between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.39: Statistical Comparison of Sediment Physical Properties Between Sheardown Lake SE (DL0-2) and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	Data 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	0.001	Reference	5	40.0	6.49	2.90	32.5	48.8
						Sheardown SE	5	11.4	5.88	2.63	7.30	21.3
	Silt-Sized Material (%)	tequal	none	YES	0.001	Reference	5	49.6	6.98	3.12	39.2	58.2
						Sheardown SE	5	74.6	5.54	2.48	67.8	78.9
	Clay-Sized Material (%)	tequal	none	NO	0.124	Reference	5	10.4	2.42	1.08	6.80	12.9
						Sheardown SE	5	14.0	3.94	1.76	9.30	20.1
	Moisture (%)	M-W	rank	NO	0.69	Reference	5	54.8	7.60	3.40	49.1	63.8
						Sheardown SE	5	54.7	6.60	2.95	47.6	62.6
	Total Organic Carbon (TOC) Content (%)	tequal	log10	YES	0.001	Reference	5	4.37	1.96	0.875	1.92	7.32
						Sheardown SE	5	1.06	0.218	0.0976	0.850	1.40
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	none	YES	0.001	Reference	5	42.0	6.80	3.04	35.7	49.8
						Sheardown SE	5	12.4	4.04	1.81	8.00	16.5
	Silt-Sized Material (%)	tequal	none	YES	0.001	Reference	5	47.2	5.32	2.38	39.2	53.1
						Sheardown SE	5	72.5	3.75	1.67	69.2	76.7
	Clay-Sized Material (%)	M-W	rank	YES	0.011	Reference	5	10.9	3.54	1.58	4.70	13.2
						Sheardown SE	5	15.1	0.477	0.214	14.3	15.4
	Moisture (%)	M-W	rank	NO	0.295	Reference	5	56.9	7.06	3.16	52.1	69.4
						Sheardown SE	5	51.6	2.97	1.33	49.2	55.2
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.001	Reference	5	3.54	0.672	0.300	2.48	4.32
						Sheardown SE	5	0.880	0.146	0.0651	0.740	1.11

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

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

Table F.40: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Sheardown Lake SE Study Areas, August 2021

Lake	Sheardown Lake SE (DL0-02)									
Station Type	Littoral Stations					Profundal Stations				
Station	11	10	4	9	1	12	8	13	2	3
ROUNDWORMS										
P. Nemata	2	8	4	-	1	-	3	-	-	-
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae										
Lumbriculus	-	-	-	-	-	-	-	-	-	-
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
F. Acalyptonotidae										
Acalyptonotus	4	-	11	10	2	10	2	4	-	6
F. Hygrobatidae										
Hygrobates	8	10	10	9	13	5	1	-	1	2
F. Lebertiidae										
Lebertia	8	4	7	5	7	3	5	5	-	2
SEED SHRIMPS										
Cl. Ostracoda	14	100	21	34	13	37	13	13	3	2
INSECTS										
Cl. Insecta										
CADDISFLIES										
O. Trichoptera										
F. Apataniidae										
Apatania	2	16	-	-	-	-	-	-	-	-
F. Limnephilidae										
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	2	-	2	-	-	1	-	-	3	-
S.F. Chironominae										
Chironomus	-	4	7	-	-	-	2	2	266	71
Corynocera ambigua	-	-	-	-	-	-	-	-	-	-
Lipiniella	-	-	-	-	-	-	-	-	-	-
Micropsectra	53	72	5	51	90	57	74	36	-	68
Paratanytarsus	-	53	-	-	7	8	2	2	-	-
Sergentia	-	-	-	-	-	-	-	-	-	-
Stictochironomus	256	247	197	257	232	122	177	103	22	237
Tanytarsus	32	16	5	16	19	4	-	-	26	41
Chironomini indeterminate	-	-	-	-	-	-	-	-	-	-
Tanytarsini indeterminate	-	-	-	-	-	-	-	-	-	-
S.F. Diamesinae										
Protanypus	-	-	2	-	-	-	3	-	-	-
Pseudodiamesa	-	-	-	-	-	-	-	-	-	-
Pseudokiefferiella	-	-	-	-	-	-	-	-	-	-
S.F. Orthoclaadiinae										
Abiskomyia	8	11	50	63	97	50	12	50	-	23
Heterotrissocladius	4	11	10	-	4	-	2	-	2	-
Hydrobaenus	-	-	-	-	-	-	-	-	-	-
Hydrosmittia	-	-	-	-	-	-	-	-	-	-
Mesocricotopus	-	-	-	-	-	-	-	-	-	-
Paracladius	-	-	-	-	-	-	-	-	-	-
Parakiefferiella	-	-	-	-	-	-	-	-	-	-
Psectrocladius	-	-	-	-	-	-	-	-	-	-
Zalutschia	-	-	-	-	-	-	-	2	-	-
S.F. Tanypodinae										
Procladius	195	133	132	200	131	155	99	101	48	64
Thienemannimyia complex	-	53	-	-	-	-	7	-	-	-
SUMMARY METRICS										
Density (No. organisms per m²)	5,063	6,355	3,987	5,554	5,304	3,892	3,462	2,738	3,195	4,443
Richness (total number of taxa) ^a	12.0	14.0	13.0	9.00	12.0	10.0	14.0	10.0	7.00	10.0
Simpson's Evenness (E)	0.748	0.878	0.779	0.816	0.834	0.858	0.764	0.838	0.527	0.810
Shannon-Wiener Diversity	2.13	2.90	2.38	2.26	2.46	2.47	2.24	2.33	1.35	2.33
Dominant Taxonomic Group Composition										
% Nemata	0.340	1.08	0.864	0	0.162	0	0.746	0	0	0
% Hydracarina	3.40	1.90	6.05	3.72	3.57	3.98	1.99	2.83	0.270	1.94
% Ostracods	2.38	13.6	4.54	5.27	2.11	8.19	3.23	4.09	0.809	0.388
% Chironomids	93.5	81.3	88.5	91.0	94.2	87.8	94.0	93.1	98.9	97.7
% Metal Sensitive Chironmids	14.5	19.1	2.60	10.4	18.8	15.3	19.6	11.9	7.07	21.1
Functional Feeding Group Composition										
% Collector - Gatherers	48.5	51.6	63.1	54.9	56.3	46.3	52.7	52.8	79.6	64.5
% Filterers	14.5	19.1	2.17	10.4	18.8	15.3	18.9	11.9	7.07	21.1
% Shredders	0	0	0	0	0	0	0	0.629	0	0
Habitat Preference Group Composition										
% Clingers	18.2	16.0	8.22	14.1	21.3	17.5	20.4	14.2	7.34	23.1
% Sprawlers	37.7	48.9	46.2	46.0	40.9	55.4	33.6	52.8	14.4	17.2
% Burrowers	44.0	35.1	45.6	39.8	37.8	27.1	46.0	33.0	78.3	59.7

^a Bold entries excluded from taxa count

Table F.41: Statistical Comparison of Benthic Invertebrate Community Metrics at Sheardown Lake SE Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2013) for the Mary River Project CREMP

Metric	Overall 7-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2013	Pairwise Comparison
Density (No. per m ²)	ANOVA	none	YES	<0.001	2013	5	10,649	4,062	-	A
					2015	5	4,829	1,898	-1.4	B
					2016	5	3,700	1,485	-1.7	B
					2017	5	4,417	1,317	-1.5	B
					2018	5	4,240	1,520	-1.6	B
					2019	5	5,080	1,329	-1.4	B
					2020	5	5,407	1,391	-1.3	B
					2021	5	5,253	858	-1.3	B
Richness (No. of Taxa)	ANOVA	none	YES	0.051	2013	5	14.2	3.96	-	A
					2015	5	10.6	2.51	-0.9	AB
					2016	5	11.4	2.3	-0.7	AB
					2017	5	9	0.707	-1.3	B
					2018	5	10.2	2.59	-1.0	AB
					2019	5	11.6	0.894	-0.7	AB
					2020	5	12.2	1.64	-0.5	AB
					2021	5	12	1.87	-0.6	AB
Simpson's Evenness	ANOVA	log10	NO	0.181	2013	5	0.785	0.096	-	A
					2015	5	0.759	0.123	-0.3	A
					2016	5	0.772	0.0891	-0.1	A
					2017	5	0.712	0.0547	-0.8	A
					2018	5	0.704	0.131	-0.8	A
					2019	5	0.826	0.0577	0.4	A
					2020	5	0.826	0.0683	0.4	A
					2021	5	0.811	0.0502	0.3	A
Nemata (% of community)	K-W	rank	NO	0.927	2013	5	0.22	0.19	-	A
					2015	5	1.55	2.91	7.1	A
					2016	5	1.06	1.29	4.5	A
					2017	5	0.47	0.64	1.4	A
					2018	5	0.56	0.48	1.8	A
					2019	5	1.07	1.30	4.5	A
					2020	5	0.37	0.73	0.8	A
					2021	5	0.49	0.46	1.4	A
Ostracoda (% of community)	K-W	rank	NO	0.218	2013	5	5.90	8.75	-	A
					2015	5	5.47	10.10	0.0	A
					2016	5	1.74	2.52	-0.5	A
					2017	5	0.84	0.82	-0.6	A
					2018	5	6.05	9.85	0.0	A
					2019	5	5.42	7.73	-0.1	A
					2020	5	6.80	3.46	0.1	A
					2021	5	5.57	4.66	0.0	A
Chironomidae (% of community)	K-W	rank	NO	0.12	2013	5	89.90	7.54	-	A
					2015	5	88.90	9.37	-0.1	A
					2016	5	95.40	3.90	0.7	A
					2017	5	95.60	1.84	0.8	A
					2018	5	92.40	9.99	0.3	A
					2019	5	90.30	9.16	0.1	A
					2020	5	89.20	5.14	-0.1	A
					2021	5	89.70	5.20	0.0	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.41: Statistical Comparison of Benthic Invertebrate Community Metrics at Sheardown Lake SE Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2013) for the Mary River Project CREMP

Metric	Overall 7-Year Comparison				Pair-wise, post-hoc comparisons ^b					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Effect Size vs. Baseline Year 2013	Pairwise Comparison
Metal Sensitive Taxa (% of community)	ANOVA	none	NO	0.701	2013	5	15.1	9.8	-	A
					2015	5	12.7	10.4	-0.2	A
					2016	5	6.8	4.2	-0.8	A
					2017	5	12.1	4.2	-0.3	A
					2018	5	12.1	8.9	-0.3	A
					2019	5	16.3	7.8	0.1	A
					2020	5	12.3	6.5	-0.3	A
					2021	5	13.1	6.9	-0.2	A
Collector-Gatherer FFG (% of community)	ANOVA	log10	NO	0.603	2013	5	44.6	8.2	-	A
					2015	5	59.0	10.6	1.8	A
					2016	5	56.5	12.8	1.4	A
					2017	5	48.4	18.8	0.5	A
					2018	5	52.5	11.1	1.0	A
					2019	5	51.9	14.6	0.9	A
					2020	5	54.0	14.9	1.1	A
					2021	5	54.9	5.5	1.3	A
Filterer FFG (% of community)	ANOVA	none	NO	0.687	2013	5	15.1	9.8	-	A
					2015	5	12.6	10.4	-0.3	A
					2016	5	6.7	4.4	-0.9	A
					2017	5	12.1	4.2	-0.3	A
					2018	5	12.1	8.9	-0.3	A
					2019	5	16.3	7.8	0.1	A
					2020	5	12.3	6.5	-0.3	A
					2021	5	13.0	7.0	-0.2	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.42: Statistical Comparison of Benthic Metrics at Sheardown Lake SE Profundal (Deep) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2013) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons ^b						
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2013	
Density (No. per m ²)	K-W	rank	YES	0.02	2007	3	4,998	348	-	-	AB
					2013	4	6,602	874	4.6	-	A
					2015	5	3,185	281	-5.2	-3.9	D
					2017	5	3,234	880	-5.1	-3.9	CD
					2018	5	3,209	2,747	-5.1	-3.9	D
					2019	5	4,284	851	-2.1	-2.7	ABC
					2020	5	3,869	1,304	-3.2	-3.1	BCD
					2021	5	3,546	653	-4.2	-3.5	BCD
Richness (No. of Taxa)	ANOVA	none	NO	0.479	2007	3	9	2.78	-	-	A
					2013	4	10.5	2.08	0.5	-	A
					2015	5	8.8	1.79	-0.1	-0.8	A
					2017	5	8.8	1.64	-0.1	-0.8	A
					2018	5	8.4	2.19	-0.2	-1.0	A
					2019	5	10.2	2.28	0.4	-0.1	A
					2020	5	11.4	3.36	0.9	0.4	A
Simpson's Evenness	K-W	rank	YES	0.047	2007	3	0.607	0.0927	-	-	BC
					2013	4	0.703	0.0395	1.0	-	AB
					2015	5	0.588	0.13	-0.2	-2.9	BC
					2017	5	0.651	0.0862	0.5	-1.3	ABC
					2018	5	0.568	0.0501	-0.4	-3.4	C
					2019	5	0.706	0.149	1.1	0.1	AB
					2020	5	0.772	0.0994	1.8	1.7	A
					2021	5	0.759	0.135	1.6	1.4	A
Nemata (% of community)	K-W	rank	NO	0.557	2007	3	0.0301	0.0521	-	-	A
					2013	4	0.113	0.0944	1.6	-	A
					2015	5	0.626	1.15	11.4	5.4	A
					2017	5	0	0	-0.6	-1.2	A
					2018	5	0.886	1.71	16.4	8.2	A
					2019	5	0.281	0.348	4.8	1.8	A
					2020	5	0.183	0.181	2.9	0.7	A
					2021	5	0.149	0.334	2.3	0.4	A
Ostracoda (% of community)	K-W	rank	YES	0.025	2007	3	1.15	1.47	-	-	ABC
					2013	4	0.169	0.192	-0.7	-	C
					2015	5	0.506	0.388	-0.4	1.8	BC
					2017	5	1.03	1.44	-0.1	4.5	BC
					2018	5	0.803	1.29	-0.2	3.3	C
					2019	5	2.16	1.66	0.7	10.4	A
					2020	5	5.29	5.11	2.8	26.7	A
					2021	5	3.34	3.13	1.5	16.5	AB
Chironomidae (% of community)	ANOVA	none	NO	0.233	2007	3	97	2.89	-	-	A
					2013	4	98.6	0.29	0.6	-	A
					2015	5	97	2.92	0.0	-5.5	A
					2017	5	97.1	1.61	0.0	-5.2	A
					2018	5	97.6	2.11	0.2	-3.4	A
					2019	5	95.3	4.22	-0.6	-11.4	A
					2020	5	92.5	6.2	-1.6	-21.0	A
					2021	5	94.3	4.36	-0.9	-14.8	A
Metal Sensitive Taxa (% of community)	ANOVA	none	YES	0.071	2007	3	13.5	11.4	-	-	AB
					2013	4	16.8	2.78	0.3	-	AB
					2015	5	7.99	4.66	-0.5	-3.2	AB
					2017	5	12.3	9.5	-0.1	-1.6	AB
					2018	5	5.9	3.5	-0.7	-3.9	B
					2019	5	16.9	10.9	0.3	0.0	AB
					2020	5	19.9	4.72	0.6	1.1	A
					2021	5	15	5.73	0.1	-0.6	AB
Collector-Gatherer FFG (% of community)	ANOVA	none	NO	0.51	2007	3	74.1	15.7	-	-	A
					2013	4	64.9	7.51	-0.6	-	A
					2015	5	60.2	22.9	-0.9	-0.6	A
					2017	5	45.1	17.4	-1.8	-2.6	A
					2018	5	63.8	22.4	-0.7	-0.1	A
					2019	5	52.6	26.8	-1.4	-1.6	A
					2020	5	52.5	14.5	-1.4	-1.7	A
					2021	5	59.2	13.2	-0.9	-0.8	A
Filterer FFG (% of community)	ANOVA	log10	YES	0.036	2007	3	13.4	11.5	-	-	AB
					2013	4	16.8	2.78	0.3	-	AB
					2015	5	7.82	4.7	-0.5	-3.2	AB
					2017	5	12.2	9.56	-0.1	-1.7	AB
					2018	5	5.9	3.5	-0.7	-3.9	B
					2019	5	16.9	10.9	0.3	0.0	AB
					2020	5	19.7	4.68	0.5	1.0	A
					2021	5	14.9	5.59	0.1	-0.7	AB

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of a ± 2 SD effect size of respective baseline year mean indicating an ecologically meaningful difference between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.43: Replicate Grab Data for Benthic Invertebrate Community Samples Collected at the Mary River, Mary River Project CREMP, August 2021

Study Area	Station	Water Depth (cm)			Water Velocity (m/s)			Embeddedness			In-Stream Vegetation			Algae Presence		
		Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3	Replicate Grab 1	Replicate Grab 2	Replicate Grab 3
Mary River Upstream Reference (GO-09) (Reference)	G0-09 B1	18	10	21	0.33	0.60	0.37	25%	25%	25%	none	none	none	sparse	sparse	sparse
	G0-09 B2	13	10	8	0.41	0.30	0.46	25%	25%	25%	none	none	none	sparse	sparse	sparse
	G0-09 B3	8	7	9.5	0.40	0.47	0.39	25%	25%	25%	none	none	none	sparse	sparse	sparse
	G0-09 B4	20	10	16	0.31	0.57	0.31	50%	25%	25%	none	none	none	sparse	sparse	sparse
	G0-09 B5	12	8	10	0.42	0.40	0.33	25%	25%	25%	none	none	none	sparse	sparse	sparse
Mary River Upstream (GO-03)	G0-03 B1	11	18	22	0.30	0.31	0.49	50%	50%	50%	none	none	none	sparse	sparse	sparse
	G0-03 B2	8	12	8	0.36	0.30	0.33	25%	25%	25%	none	none	none	sparse	sparse	sparse
	G0-03 B3	8	10	11	0.55	0.47	0.38	25%	25%	50%	none	none	none	sparse	sparse	sparse
	G0-03 B4	8	10	10	0.34	0.32	0.47	50%	50%	25%	none	none	none	sparse	sparse	sparse
	G0-03 B5	19	10	8	0.41	0.37	0.47	25%	50%	50%	none	none	none	sparse	sparse	sparse
Mary River Upper Mine-Exposed (EO-01)	E0-01 B1	11	9	18	0.39	0.60	0.43	25%	50%	25%	none	none	none	sparse	sparse	sparse
	E0-01 B2	10	13	20	0.41	0.33	0.44	50%	50%	50%	none	none	none	sparse	sparse	sparse
	E0-01 B3	13	12	8	0.31	0.36	0.34	25%	20%	25%	none	none	none	sparse	sparse	sparse
	E0-01 B4	6	14	12	0.42	0.42	0.36	50%	50%	25%	none	none	none	sparse	sparse	sparse
	E0-01 B5	14	8	6	0.37	0.55	0.46	50%	25%	25%	none	none	none	sparse	sparse	sparse
Mary River Middle Mine-Exposed (EO-20)	E0-20 B1	11	10	11	0.39	0.46	0.53	25%	25%	50%	none	none	none	sparse	sparse	sparse
	E0-20 B2	22	18	17	0.41	0.37	0.44	0%	25%	25%	none	none	none	sparse	sparse	sparse
	E0-20 B3	8	12	15	0.42	0.31	0.33	25%	25%	25%	none	none	none	sparse	sparse	sparse
	E0-20 B4	13	16	12	0.46	0.52	0.34	25%	50%	25%	none	none	none	sparse	sparse	sparse
	E0-20 B5	13	8	20	0.60	0.43	0.34	25%	50%	25%	none	none	none	sparse	sparse	sparse
Mary River Lower Mine-Exposed (CO-05)	C0-05 B1	8	8	6	0.31	0.31	0.32	50%	50%	50%	sparse	none	common	common	sparse	sparse
	C0-05 B2	10	8	8	0.53	0.47	0.46	50%	50%	50%	sparse	sparse	none	sparse	sparse	common
	C0-05 B3	15	18	16	0.31	0.46	0.32	25%	50%	50%	sparse	sparse	none	sparse	sparse	sparse
	C0-05 B4	10	11	13	0.44	0.41	0.43	25%	25%	25%	none	none	none	sparse	sparse	sparse
	C0-05 B5	18	15	20	0.45	0.38	0.51	50%	25%	25%	none	none	none	sparse	sparse	sparse

Table F.44: Replicate Station Habitat Feature Summary Statistics for Mary River Benthic Stations, Mary River Project CREMP, August 2021

Metric	Study Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Water Depth (cm)	G0-09 Reference Area	12.0	3.58	1.60	8.17	10.3	16.3
	G0-03 Upstream Area	11.5	3.30	1.48	9.33	9.67	17.0
	E0-01 Upper Mine-Exposed Area	11.6	1.94	0.865	9.33	11.0	14.3
	E0-20 Middle Mine-Exposed Area	13.7	3.22	1.44	10.7	13.7	19.0
	C0-05 Lower Mine-Exposed Area	12.3	4.58	2.05	7.33	11.3	17.7
Water Velocity (m/s)	G0-09 Reference Area	0.405	0.0212	0.00946	0.383	0.397	0.433
	G0-03 Upstream Area	0.391	0.0522	0.0233	0.330	0.377	0.467
	E0-01 Upper Mine-Exposed Area	0.413	0.0553	0.0247	0.337	0.400	0.473
	E0-20 Middle Mine-Exposed Area	0.423	0.0445	0.0199	0.353	0.440	0.460
	C0-05 Lower Mine-Exposed Area	0.407	0.0689	0.0308	0.313	0.427	0.487
Substrate Embeddedness (%)	G0-09 Reference Area	0.267	0.0373	0.0167	0.250	0.250	0.333
	G0-03 Upstream Area	0.383	0.0950	0.0425	0.250	0.417	0.500
	E0-01 Upper Mine-Exposed Area	0.363	0.100	0.0448	0.233	0.333	0.500
	E0-20 Middle Mine-Exposed Area	0.283	0.0745	0.0333	0.167	0.333	0.333
	C0-05 Lower Mine-Exposed Area	0.400	0.109	0.0486	0.250	0.417	0.500

Note: Five stations were sampled at each study area.

Table F.45: Benthic Station Habitat Feature Statistical Comparisons Among Mary River Reference and Mine-Exposed Study Areas, Mary River Project CREMP, August 2021

Metric	Overall 5-Area Comparison				Pair-wise, post hoc comparisons			
	Statistical Test ^a	Transformation	Significant Difference between Areas?	p-value	Study Area	Mean	Standard Deviation	Pairwise Comparison
Water Depth (cm)	ANOVA	log10	NO	0.840	G0-09	12.0	3.58	A
					G0-03	11.5	3.30	A
					E0-01	11.6	1.94	A
					E0-20	13.7	3.22	A
					C0-05	12.3	4.58	A
Water Velocity (m/s)	ANOVA	none	NO	0.898	G0-09	0.405	0.0212	A
					G0-03	0.391	0.0522	A
					E0-01	0.413	0.0553	A
					E0-20	0.423	0.0445	A
					C0-05	0.407	0.0689	A
Substrate Embeddedness (%)	ANOVA	none	NO	0.083	G0-09	0.267	0.0373	A
					G0-03	0.383	0.0950	A
					E0-01	0.363	0.100	A
					E0-20	0.283	0.0745	A
					C0-05	0.400	0.109	A

 Indicates a significant difference for respective comparison (p-values ≤ 0.05).

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

Table F.46: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for the Mary River Upstream Reference (G0-09) Study Area, August 2021

Waterbody	Mary River Upstream Reference (G0-09)				
Station	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	-	1	-	2	2
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	1	1	-	1	-
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
immature	-	-	-	-	-
F. Sperchonidae					
Sperchon	3	1	-	2	1
SEED SHRIMPS					
Cl. Ostracoda	-	-	-	-	-
SPRINGTAILS					
Cl. Entognatha					
O. Collembola	2	-	-	-	-
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	-	-	-	-	-
STONEFLIES					
O. Plecoptera					
F. Capniidae					
immature	-	-	-	1	-
TRUE FLIES					
O. Diptera					
BITING-MIDGE					
F. Ceratopogonidae					
indeterminate	-	-	-	1	-
MIDGES					
F. Chironomidae					
chironomid pupae	79	38	34	25	13
S.F. Chironominae					
Lipiniella	-	-	-	-	-
Paratanytarsus	-	-	-	-	-
Stictochironomus	-	-	-	-	-
Tanytarsini indeterminate	-	-	-	1	-
S.F. Diamesinae					
Diamesa	5	11	3	5	2
Pseudokiefferiella	8	74	3	6	4
S.F. Orthocladiinae					
Cardiocladius	-	1	-	-	-
Chaetocladius	-	1	3	3	2
Corynoneura	-	-	-	1	-
Cricotopus	-	2	2	2	1
Cricotopus/Orthocladius	17	6	5	18	3
Diplocladius	7	-	-	-	-
Eukiefferiella	-	-	1	21	1
Hydrobaenus	-	-	-	4	2
Hydrosmittia	-	-	-	-	1
Krenosmittia	-	-	-	-	-
Limnophyes	1	-	6	-	2
Metriocnemus	2	2	2	-	1
Orthocladius (Euorthocladius)	9	5	12	50	1
Parakiefferiella	-	-	-	-	-
Paraphaenocladius	-	-	-	-	3
Thienemanniella	4	-	-	-	-
Tokunagaia	9	5	3	5	2
Tvetenia	-	1	-	-	-
indeterminate	3	6	4	-	3
S.F. Podonominae					
Trichotanypus	-	-	-	-	-
S.F. Tanypodinae					
Thienemannimyia complex	-	-	-	-	-
F. Empididae					
Clinocera	-	-	-	4	-
pupae	-	-	-	-	-
F. Simuliidae					
Gymnopaïs	17	20	6	17	4
Metacnephia	-	-	-	-	-
Prosimulium	2	2	-	-	-
F. Tipulidae					
Tipula	2	3	-	5	-
pupae	-	-	-	-	-
SUMMARY METRICS					
Density (No. organisms per m²)	613	645	301	624	172
Richness (total number of taxa) ^a	15	15	11	18	16
Simpson's Evenness (E)	0.894	0.718	0.915	0.784	0.988
Dominant Group Composition					
% Nemata	0	0.556	0	1.15	4.17
% Oligochaeta	0.585	0.556	0	0.575	0
% Acari	1.75	0.556	0	1.15	2.08
% Ostracods	0	0	0	0	0
% Chironomids	84.2	84.4	92.9	81.0	85.4
% Metal Sensitive Chironmids	16.8	63.0	12.7	7.68	18.3
% Simuliidae	11.1	12.2	7.14	9.77	8.33
% Tipulidae	1.17	1.67	0	2.87	0
Functional Feeding Group Composition					
% Collector - Gatherers	88.6	83.5	91.3	80.9	85.0
% Filterers	1.17	1.11	0	0	0
% Shredders	1.17	4.42	5.73	5.33	7.63
Habitat Preference Group Composition					
% Clingers	12.9	15.5	12.9	15.1	18.0
% Sprawlers	84.2	81.0	87.1	79.0	77.8
% Burrowers	4.35	5.00	4.22	5.87	7.22

^a Bold entries excluded from taxa count

Table F.47: Statistical Comparison of Benthic Metrics at the Mary River Reference Area (G0-09) Among Years of Mine Operation (2015 to 2021) and Baseline (2006, 2007) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transformation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2006	vs. Baseline Year 2007	
Density (No. per m ²)	ANOVA	log10	YES	<0.001	2006	3	404	149	-	-	BC
					2007	3	739	83.8	2.2	-	AB
					2015	5	472	255	0.5	-3.2	BC
					2016	5	662	320	1.7	-0.9	AB
					2017	5	410	313	0.0	-3.9	BC
					2018	5	194	112	-1.4	-6.5	C
					2019	5	1,623	700	8.2	10.5	A
					2020	5	886	831	3.2	1.8	AB
					2021	5	471	219	0.4	-3.2	BC
Richness (No. of Taxa)	ANOVA	none	YES	0.002	2006	3	7.33	2.89	-	-	B
					2007	3	13.3	0.577	2.1	-	A
					2015	5	11.4	3.21	1.4	-3.3	AB
					2016	5	14.0	1.58	2.3	1.2	A
					2017	5	11.2	2.95	1.3	-3.6	AB
					2018	5	11.8	2.28	1.5	-2.6	AB
					2019	5	11.4	1.52	1.4	-3.3	AB
					2020	5	15.0	2.00	2.7	2.9	A
					2021	5	15.0	2.55	2.7	2.9	A
Simpson's Evenness	ANOVA	none	YES	<0.001	2006	3	0.324	0.0953	-	-	C
					2007	3	0.655	0.0386	3.5	-	B
					2015	5	0.878	0.0493	5.8	5.8	A
					2016	5	0.907	0.0227	6.1	6.5	A
					2017	5	0.769	0.0973	4.7	3.0	AB
					2018	5	0.907	0.0300	6.1	6.5	A
					2019	5	0.687	0.0953	3.8	0.8	B
					2020	5	0.826	0.153	5.3	4.4	AB
					2021	5	0.860	0.108	5.6	5.3	A
Nemata (% of community)	K-W	rank	YES	0.698	2006	3	0.667	0.577	-	-	A
					2007	3	0.333	0.577	nm	-	A
					2015	5	0.400	0.548	nm	nm	A
					2016	5	1.60	1.14	nm	nm	A
					2017	5	0.400	0.894	nm	nm	A
					2018	5	1.80	2.49	nm	nm	A
					2019	5	0.600	0.548	nm	nm	A
					2020	5	0.505	0.562	nm	nm	A
					2021	5	1.17	1.74	nm	nm	A
Hydracarina (% of community)	ANOVA	log10(x+1)	YES	<0.001	2006	3	0.333	0.577	-	-	B
					2007	3	0.333	0.577	0.0	-	B
					2015	5	4.20	3.11	6.7	6.7	A
					2016	5	4.60	2.30	7.4	7.4	A
					2017	5	0	0	-0.6	-0.6	B
					2018	5	0.400	0.894	0.1	0.1	B
					2019	5	0.800	1.30	0.8	0.8	B
					2020	5	1.10	1.31	1.3	1.3	B
					2021	5	1.11	0.852	1.3	1.3	B
Chironomidae (% of community)	ANOVA	none	YES	<0.001	2006	3	98.7	0.577	-	-	A
					2007	3	97.3	1.15	-2.4	-	AB
					2015	5	88.0	2.74	-18.5	-8.1	ABC
					2016	5	84.0	4.64	-25.5	-11.6	C
					2017	5	79.2	6.46	-33.8	-15.7	C
					2018	5	78.8	12.3	-34.5	-16.1	C
					2019	5	97.0	2.35	-2.9	-0.3	A
					2020	5	89.6	5.11	-15.8	-6.7	ABC
					2021	5	85.6	4.38	-22.7	-10.2	BC

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.47: Statistical Comparison of Benthic Metrics at the Mary River Reference Area (G0-09) Among Years of Mine Operation (2015 to 2021) and Baseline (2006, 2007) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison				Pair-wise, post-hoc comparisons						
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2006	vs. Baseline Year 2007	
Metal Sensitive Taxa (% of community)	ANOVA	none	YES	<0.001	2006	3	62.0	3.46	-	-	A
					2007	3	31.0	17.6	-9.0	-	ABC
					2015	5	13.0	14.0	-14.2	-1.0	C
					2016	5	23.2	12.3	-11.2	-0.4	BC
					2017	5	59.8	13.1	-0.6	1.6	A
					2018	5	31.0	10.6	-9.0	0.0	ABC
					2019	5	51.6	21.5	-3.0	1.2	AB
					2020	5	32.0	23.7	-8.7	0.1	ABC
					2021	5	23.7	22.3	-11.1	-0.4	BC
Tipulidae (% of community)	K-W	rank	NO	0.193	2006	3	0.333	0.577	-	-	A
					2007	3	1.67	2.08	nm	-	A
					2015	5	4.40	2.97	nm	1.3	A
					2016	5	1.80	1.48	nm	0.1	A
					2017	5	1.40	1.14	nm	-0.1	A
					2018	5	3.20	4.09	nm	0.7	A
					2019	5	0.600	0.548	nm	-0.5	A
					2020	5	1.22	0.469	nm	-0.2	A
					2021	5	1.14	1.21	nm	-0.3	A
Collector-Gatherer FFG (% of community)	ANOVA	none	YES	<0.001	2006	3	98.7	1.15	-	-	A
					2007	3	94.7	1.15	-3.5	-	ABC
					2015	5	78.0	12.2	-18.0	-14.5	CD
					2016	5	75.4	8.99	-20.3	-16.8	D
					2017	5	74.6	6.88	-21.0	-17.5	D
					2018	5	80.8	11.4	-15.6	-12.1	BCD
					2019	5	92.6	5.03	-5.3	-1.8	AB
					2020	5	80.2	4.06	-16.1	-12.6	BCD
					2021	5	85.9	4.13	-11.1	-7.7	ABCD
Filterer FFG (% of community)	K-W	rank	YES	<0.001	2006	3	0	0	-	-	CD
					2007	3	0	0	nm	-	CD
					2015	5	2.00	1.87	nm	nm	BCD
					2016	5	7.20	4.15	nm	nm	AB
					2017	5	19.0	5.43	nm	nm	A
					2018	5	14.2	9.98	nm	nm	A
					2019	5	0	0	nm	nm	D
					2020	5	2.03	1.80	nm	nm	BC
					2021	5	0.456	0.625	nm	nm	CD
Shredder FFG (% of community)	K-W	rank	YES	0.013	2006	3	0.333	0.577	-	-	E
					2007	3	4.33	0.577	nm	-	CDE
					2015	5	16.0	11.3	nm	nm	AB
					2016	5	11.8	3.56	nm	nm	A
					2017	5	5.60	2.30	nm	nm	BCD
					2018	5	4.80	6.22	nm	nm	DE
					2019	5	5.00	2.83	nm	nm	DE
					2020	5	11.3	7.14	nm	nm	ABC
					2021	5	4.85	2.37	nm	nm	BCD

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.48: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for the Mary River Upstream of the Mine (G0-03) Study Area, August 2021

Waterbody	Mary River Upstream of the Mine (G0-03)				
Station	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	6	6	4	-	2
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	-	-	5	1	-
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
immature	-	-	-	-	-
F. Sperchonidae					
Sperchon	4	3	4	1	1
SEED SHRIMPS					
Cl. Ostracoda	-	-	-	-	-
SPRINGTAILS					
Cl. Entognatha					
O. Collembola	-	2	-	-	-
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	4	5	3	-	2
STONEFLIES					
O. Plecoptera					
F. Capniidae					
immature	-	-	-	-	-
TRUE FLIES					
O. Diptera					
BITING-MIDGE					
F. Ceratopogonidae					
indeterminate	-	1	-	-	-
MIDGES					
F. Chironomidae					
chironomid pupae	23	43	51	15	49
S.F. Chironominae					
Lipiniella	-	-	-	-	-
Paratanytarsus	-	-	-	-	-
Stictochironomus	-	-	-	-	-
Tanytarsini indeterminate	-	-	2	-	-
S.F. Diamesinae					
Diamesa	7	8	9	1	3
Pseudokiefferiella	6	8	47	9	5
S.F. Orthocladiinae					
Cardiocladius	-	8	-	-	2
Chaetocladius	-	-	2	-	-
Corynoneura	1	-	1	-	-
Cricotopus	15	7	27	1	-
Cricotopus/Orthocladius	7	8	19	-	2
Diplocladius	-	-	3	-	-
Eukiefferiella	-	-	-	-	1
Hydrobaenus	6	3	1	-	1
Hydrosmittia	3	-	2	-	-
Krenosmittia	-	-	-	-	1
Limnophyes	2	-	-	-	2
Metriocnemus	2	1	2	1	2
Orthocladius (Euorthocladius)	9	4	6	3	5
Parakiefferiella	-	-	-	-	-
Paraphaenocladius	-	1	7	-	-
Thienemanniella	-	1	1	-	-
Tokunagaia	2	-	7	-	2
Tvetenia	7	5	28	3	5
indeterminate	-	1	-	-	1
S.F. Pedominae					
Trichotanypus	-	-	-	-	1
S.F. Tanypodinae					
Thienemannimyia complex	-	-	-	-	-
F. Empididae					
Clinocera	2	1	4	-	-
pupae	-	-	-	-	-
F. Simuliidae					
Gymnopais	-	5	4	-	3
Metacnephia	3	8	4	1	9
Prosimulium	1	4	2	-	18
F. Tipulidae					
Tipula	2	4	4	-	2
pupae	-	-	-	-	-
SUMMARY METRICS					
Density (No. organisms per m ²)	401	491	892	129	427
Richness (total number of taxa) ^a	18	20	24	9	19
Simpson's Evenness (E)	0.945	0.964	0.894	0.825	0.960
Dominant Group Composition					
% Nemata	5.36	4.38	1.61	0	1.68
% Oligochaeta	0	0	2.01	2.78	0
% Acari	3.57	2.19	1.61	2.78	0.840
% Ostracods	0	0	0	0	0
% Chironomids	80.4	71.5	86.3	91.7	68.9
% Metal Sensitive Chironmids	15.6	20.8	29.5	50.9	16.7
% Simuliidae	3.57	12.4	4.02	2.78	25.2
% Tipulidae	1.79	2.92	1.61	0	1.68
Functional Feeding Group Composition					
% Collector - Gatherers	68.5	56.2	69.8	94.4	72.3
% Filterers	3.57	8.76	2.41	2.78	22.7
% Shredders	25.0	18.6	24.0	5.09	1.68
Habitat Preference Group Composition					
% Clingers	32.2	31.1	29.6	10.6	26.1
% Sprawlers	60.7	49.0	64.1	86.6	66.4
% Burrowers	9.54	19.7	7.33	7.87	11.7

^a Bold entries excluded from taxa count

Table F.49: Benthic Invertebrate Community Summary Statistics for Mary River, Mary River Project CREMP, August 2021

Metric	Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Density (no. organisms / m ²)	G0-09 Reference Area	471	219	98.0	172	613	645
	G0-03 Upstream Area	468	275	123	129	427	892
	E0-01 Upper Mine-Exposed Area	173	140	62.8	64.5	118	409
	E0-20 Middle Mine-Exposed Area	304	158	70.6	125	276	545
	C0-05 Lower Mine-Exposed Area	1,458	885	396	401	1,577	2,681
Richness (Number of Taxa)	G0-09 Reference Area	15.0	2.55	1.14	11.0	15.0	18.0
	G0-03 Upstream Area	18.0	5.52	2.47	9.00	19.0	24.0
	E0-01 Upper Mine-Exposed Area	13.4	4.34	1.94	9.00	11.0	19.0
	E0-20 Middle Mine-Exposed Area	13.6	3.36	1.50	9.00	14.0	18.0
	C0-05 Lower Mine-Exposed Area	17.8	3.77	1.69	14.0	17.0	24.0
Simpson's Evenness	G0-09 Reference Area	0.860	0.108	0.0482	0.718	0.894	0.988
	G0-03 Upstream Area	0.917	0.0589	0.0263	0.825	0.945	0.964
	E0-01 Upper Mine-Exposed Area	0.948	0.0177	0.00789	0.923	0.956	0.964
	E0-20 Middle Mine-Exposed Area	0.915	0.0131	0.00584	0.902	0.914	0.935
	C0-05 Lower Mine-Exposed Area	0.886	0.0619	0.0277	0.788	0.888	0.942
Nemata (% of community)	G0-09 Reference Area	1.17	1.74	0.778	0	0.556	4.17
	G0-03 Upstream Area	2.60	2.20	0.984	0	1.68	5.36
	E0-01 Upper Mine-Exposed Area	1.77	1.85	0.827	0	1.89	4.35
	E0-20 Middle Mine-Exposed Area	1.31	0.954	0.427	0	1.30	2.63
	C0-05 Lower Mine-Exposed Area	15.3	12.2	5.44	4.31	10.2	30.3
Hydracarina (% of community)	G0-09 Reference Area	1.11	0.852	0.381	0	1.15	2.08
	G0-03 Upstream Area	2.20	1.05	0.470	0.840	2.19	3.57
	E0-01 Upper Mine-Exposed Area	1.16	1.30	0.583	0	0.877	3.03
	E0-20 Middle Mine-Exposed Area	1.25	1.60	0.714	0	1.02	3.90
	C0-05 Lower Mine-Exposed Area	0.0862	0.193	0.0862	0	0	0.431
Chironomidae (% of community)	G0-09 Reference Area	85.6	4.38	1.96	81.0	84.4	92.9
	G0-03 Upstream Area	79.8	9.63	4.31	68.9	80.4	91.7
	E0-01 Upper Mine-Exposed Area	72.0	4.74	2.12	65.2	73.6	77.8
	E0-20 Middle Mine-Exposed Area	71.9	3.56	1.59	67.5	71.4	76.5
	C0-05 Lower Mine-Exposed Area	63.9	22.9	10.2	27.7	67.9	86.6
Metal-Sensitive Chironomidae (% of community)	G0-09 Reference Area	23.7	22.3	9.99	7.68	16.8	63.0
	G0-03 Upstream Area	26.7	14.6	6.53	15.6	20.8	50.9
	E0-01 Upper Mine-Exposed Area	18.2	7.42	3.32	10.9	17.4	25.9
	E0-20 Middle Mine-Exposed Area	22.6	5.65	2.53	16.0	20.3	29.2
	C0-05 Lower Mine-Exposed Area	7.04	5.06	2.26	0.462	9.11	11.5
Tipulidae (% of community)	G0-09 Reference Area	1.14	1.21	0.542	0	1.17	2.87
	G0-03 Upstream Area	1.60	1.04	0.466	0	1.68	2.92
	E0-01 Upper Mine-Exposed Area	3.03	2.80	1.25	0	4.35	5.56
	E0-20 Middle Mine-Exposed Area	3.43	2.96	1.32	1.32	2.60	8.57
	C0-05 Lower Mine-Exposed Area	0.323	0.372	0.166	0	0.267	0.893

Note: Sample size equals five for all study areas.

Table F.49: Benthic Invertebrate Community Summary Statistics for Mary River, Mary River Project CREMP, August 2021

Metric	Area	Mean	Standard Deviation	Standard Error	Minimum	Median	Maximum
Collector-Gatherer FFG (% of community)	G0-09 Reference Area	85.9	4.13	1.85	80.9	85.0	91.3
	G0-03 Upstream Area	72.2	13.9	6.21	56.2	69.8	94.4
	E0-01 Upper Mine-Exposed Area	71.6	14.8	6.63	50.0	73.9	90.7
	E0-20 Middle Mine-Exposed Area	56.5	9.34	4.18	48.2	51.0	69.1
	C0-05 Lower Mine-Exposed Area	97.6	2.02	0.905	95.8	96.7	101
Filterer FFG (% of community)	G0-09 Reference Area	0.456	0.625	0.279	0	0	1.17
	G0-03 Upstream Area	8.04	8.58	3.84	2.41	3.57	22.7
	E0-01 Upper Mine-Exposed Area	4.25	4.05	1.81	0.877	3.03	11.1
	E0-20 Middle Mine-Exposed Area	11.4	6.29	2.81	3.90	14.5	18.4
	C0-05 Lower Mine-Exposed Area	0.258	0.394	0.176	0	0	0.893
Shredder FFG (% of community)	G0-09 Reference Area	4.85	2.37	1.06	1.17	5.33	7.63
	G0-03 Upstream Area	14.9	10.8	4.85	1.68	18.6	25.0
	E0-01 Upper Mine-Exposed Area	9.79	10.1	4.53	0	5.56	25.8
	E0-20 Middle Mine-Exposed Area	4.60	2.81	1.26	1.32	4.97	8.57
	C0-05 Lower Mine-Exposed Area	2.58	2.01	0.901	0	3.54	4.61
Clinger HPG (% of community)	G0-09 Reference Area	14.9	2.15	0.964	12.9	15.1	18.0
	G0-03 Upstream Area	25.9	8.84	3.95	10.6	29.6	32.2
	E0-01 Upper Mine-Exposed Area	20.3	10.4	4.63	9.09	17.4	37.1
	E0-20 Middle Mine-Exposed Area	19.3	5.03	2.25	11.4	20.3	24.9
	C0-05 Lower Mine-Exposed Area	3.47	1.38	0.617	1.79	4.08	5.06
Sprawler HPG (% of community)	G0-09 Reference Area	81.8	3.83	1.71	77.8	81.0	87.1
	G0-03 Upstream Area	65.4	13.6	6.08	49.0	64.1	86.6
	E0-01 Upper Mine-Exposed Area	63.9	15.0	6.70	38.8	69.6	77.8
	E0-20 Middle Mine-Exposed Area	55.4	8.62	3.85	48.2	50.6	67.8
	C0-05 Lower Mine-Exposed Area	61.9	24.1	10.8	23.6	69.6	85.6
Burrower HPG (% of community)	G0-09 Reference Area	5.33	1.24	0.555	4.22	5.00	7.22
	G0-03 Upstream Area	11.2	5.05	2.26	7.33	9.54	19.7
	E0-01 Upper Mine-Exposed Area	19.5	5.42	2.42	13.0	18.5	27.8
	E0-20 Middle Mine-Exposed Area	25.3	10.4	4.66	14.0	25.7	40.3
	C0-05 Lower Mine-Exposed Area	35.6	22.3	9.98	13.9	30.2	71.4

Note: Sample size equals five for all study areas.

Table F.50: Benthic Invertebrate Community Metric Statistical Comparison Results among Mary River Reference (GO-09), Upstream (G0-03) and Mine-Exposed (E0-01, E0-20, C0-05) Study Areas, Mary River Project CREMP, August 2021

Metric	Overall 5-Area Comparison				Pair-wise, post-hoc comparisons				
	Statistical Test ^a	Data Transformation	Significant Difference Among Areas?	P-value	Area	Mean	Standard Deviation (SD)	Magnitude of Difference (GO-09 Reference SD)	Pairwise Comparison
Collector-Gatherer FFG (% of community)	ANOVA	log10	YES	<0.001	GO-09 Ref	85.9	4.1	nc	AB
					G0-03	72.2	13.9	-3.3	BC
					E0-01	71.6	14.8	-3.5	BC
					E0-20	56.5	9.3	-7.1	C
					C0-05	97.6	2.0	2.8	A
Filterer FFG (% of community)	K-W	rank	YES	0.001	GO-09 Ref	0.5	0.6	nc	B
					G0-03	8.0	8.6	12.1	A
					E0-01	4.3	4.1	6.1	A
					E0-20	11.4	6.3	17.5	A
					C0-05	0.3	0.4	-0.3	B
Shredder FFG (% of community)	ANOVA	log10(x+1)	YES	0.069	GO-09 Ref	4.9	2.4	nc	AB
					G0-03	14.9	10.8	4.2	A
					E0-01	9.8	10.1	2.1	AB
					E0-20	4.6	2.8	-0.1	AB
					C0-05	2.6	2.0	-1.0	B
Clinger HPG (% of community)	ANOVA	log10	YES	<0.001	GO-09 Ref	14.9	2.2	nc	A
					G0-03	25.9	8.8	5.1	A
					E0-01	20.3	10.4	2.5	A
					E0-20	19.3	5.0	2.0	A
					C0-05	3.5	1.4	-5.3	B
Sprawler HPG (% of community)	ANOVA	none	NO	0.103	GO-09 Ref	81.8	3.8	nc	A
					G0-03	65.4	13.6	-4.3	A
					E0-01	63.9	15.0	-4.7	A
					E0-20	55.4	8.6	-6.9	A
					C0-05	61.9	24.1	-5.2	A
Burrower HPG (% of community)	ANOVA	log10	YES	<0.001	GO-09 Ref	5.3	1.2	nc	C
					G0-03	11.2	5.1	4.7	B
					E0-01	19.5	5.4	11.4	AB
					E0-20	25.3	10.4	16.1	A
					C0-05	35.6	22.3	24.4	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.10).

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

Notes: nc= no comparison; nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Exp} - MCT_{Ref})/SD_{Ref}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, means for untransformed data.

Table F.51: Statistical Comparison of Bray-Curtis Index for the Mary River Mine-exposed Areas Compared to the Upstream Reference Area, Mary River Project CREMP, August 2021

Comparison	Betadisper P-Value	Mantel Test			dbRDA			
		r	R ²	P-Value	F-Value	R ²	R ² _{adj}	P-Value
G0-03 vs G0-09	0.963	0.259	0.0671	0.047	1.95	0.196	0.0955	0.064
E0-01 vs G0-09	0.074	0.325	0.106	0.008	2.55	0.242	0.147	0.008
E0-20 vs G0-09	0.504	0.624	0.39	0.008	6.97	0.466	0.399	0.007
C0-05 vs G0-09	0.54	0.819	0.671	0.008	7.94	0.498	0.435	0.007

 Highlighted values indicate significant difference between study areas based on statistical test p-value less than 0.10.
Note: Sample size was five for all study areas.

Table F.52: Statistical Comparison of Benthic Invertebrate Community Metrics at Mary River Upstream of the Mine (G0-03) Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Density (No. per m2)	ANOVA	log10	YES	0.003	2007	3	136	29	-	BC
					2015	5	169	122	1.1	C
					2016	5	287	92	5.2	ABC
					2017	5	282	172	5.0	ABC
					2018	5	165	54	1.0	BC
					2019	5	634	315	17.0	A
					2020	5	196	95	2.0	BC
					2021	5	468	275	11.3	AB
Richness (No. of Taxa)	ANOVA	none	YES	0.002	2007	3	6.3	1.2	-	C
					2015	5	9.4	3.5	2.7	BC
					2016	5	14.4	1.8	7.0	AB
					2017	5	13.6	3.9	6.3	ABC
					2018	5	12.2	3.5	5.1	ABC
					2019	5	11.2	1.6	4.2	BC
					2020	5	13.6	3.3	6.3	ABC
					2021	5	18.0	5.5	10.1	A
Simpson's Evenness	K-W	rank	YES	0.070	2007	3	0.591	0.003	-	C
					2015	5	0.921	0.045	114.2	A
					2016	5	0.899	0.041	106.6	AB
					2017	5	0.873	0.142	97.6	AB
					2018	5	0.868	0.119	95.8	AB
					2019	5	0.858	0.049	92.4	BC
					2020	5	0.918	0.024	113.1	AB
					2021	5	0.917	0.059	112.8	A
Nemata (% of community)	K-W	rank	YES	0.008	2007	3	0.0	1.2	-	CE
					2015	5	0.0	0.0	0.0	E
					2016	5	2.6	0.5	2.2	AB
					2017	5	1.4	1.3	1.2	BCDE
					2018	5	4.4	2.0	3.7	A
					2019	5	0.8	1.3	0.7	CDE
					2020	5	2.4	2.9	2.0	ABCD
					2021	5	2.6	2.2	2.2	ABD
Hydracarina (% of community)	ANOVA	log10(x+1)	YES	<0.001	2007	3	0.7	1.2	-	C
					2015	5	7.2	2.6	5.7	AB
					2016	5	9.8	4.7	7.9	A
					2017	5	2.0	1.9	1.2	BC
					2018	5	3.4	4.2	2.4	BC
					2019	5	2.2	1.8	1.3	BC
					2020	5	4.3	3.1	3.1	ABC
					2021	5	2.2	1.1	1.3	BC
Chironomidae (% of community)	ANOVA	none	YES	0.002	2007	3	97.0	1.0	-	A
					2015	5	72.2	8.6	-24.8	B
					2016	5	77.6	7.2	-19.4	AB
					2017	5	75.4	10.4	-21.6	B
					2018	5	83.4	9.3	-13.6	AB
					2019	5	93.0	7.1	-4.0	A
					2020	5	69.9	13.6	-27.1	B
					2021	5	79.8	9.6	-17.2	AB

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.52: Statistical Comparison of Benthic Invertebrate Community Metrics at Mary River Upstream of the Mine (G0-03) Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Metal Sensitive Chironomidae (% of community)	ANOVA	log10(x+1)	YES	<0.001	2007	3	5.3	1.2	-	C
					2015	5	8.2	5.1	2.5	C
					2016	5	8.6	6.1	2.8	C
					2017	5	47.0	12.6	36.2	A
					2018	5	32.4	21.2	23.5	AB
					2019	5	17.4	11.0	10.5	BC
					2020	5	12.3	5.8	6.1	BC
					2021	5	26.7	14.6	18.6	ABC
Tipulidae (% of community)	ANOVA	log10(x+1)	YES	<0.001	2007	3	2.3	2.1	-	B
					2015	5	19.0	6.1	8.0	A
					2016	5	8.6	7.0	3.0	B
					2017	5	3.0	2.0	0.3	B
					2018	5	1.8	1.6	-0.3	B
					2019	5	2.6	3.8	0.1	B
					2020	5	6.2	5.1	1.9	B
					2021	5	1.6	1.0	-0.4	B
Collector Gatherers FFG (% of community)	ANOVA	none	YES	0.004	2007	3	94.3	2.1	-	A
					2015	5	60.8	9.2	-16.1	B
					2016	5	64.0	6.0	-14.6	B
					2017	5	74.4	10.6	-9.6	AB
					2018	5	80.8	11.3	-6.5	AB
					2019	5	68.8	10.7	-12.3	B
					2020	5	63.7	14.9	-14.7	B
					2021	5	72.2	13.9	-10.6	AB
Filterers FFG (% of community)	K-W	rank	YES	0.002	2007	3	0.0	2.2	-	B
					2015	5	1.0	1.4	0.5	B
					2016	5	0.8	1.1	0.4	B
					2017	5	15.4	5.4	7.0	A
					2018	5	3.8	5.3	1.7	BC
					2019	5	0.0	0.0	0.0	B
					2020	5	3.1	2.8	1.4	BC
					2021	5	8.0	8.6	3.7	AC
Shredders FFG (% of community)	ANOVA	none	YES	<0.001	2007	3	5.0	1.0	-	C
					2015	5	29.6	8.6	24.6	A
					2016	5	20.8	5.3	15.8	AB
					2017	5	5.8	2.2	0.8	C
					2018	5	11.8	8.4	6.8	BC
					2019	5	22.2	6.0	17.2	AB
					2020	5	16.0	4.6	11.0	BC
					2021	5	14.9	10.8	9.9	BC

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.53: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for the Mary River Upper Mine-Exposed (E0-01) Study Area, August 2021

Waterbody	Mary River Upper Mine-Exposed (E0-01)				
Station	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	1	-	1	-	3
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	3	-	-	2	-
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
immature	-	-	-	-	-
F. Sperchonidae					
Sperchon	1	-	-	1	1
SEED SHRIMPS					
Cl. Ostracoda	-	-	-	-	-
SPRINGTAILS					
Cl. Entognatha					
O. Collembola	-	-	-	-	-
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	3	-	1	4	6
STONEFLIES					
O. Plecoptera					
F. Capniidae					
immature	-	-	-	-	-
TRUE FLIES					
O. Diptera					
BITING-MIDGE					
F. Ceratopogonidae					
indeterminate	1	-	1	1	-
MIDGES					
F. Chironomidae					
chironomid pupae	19	8	9	11	38
S.F. Chironominae					
Lipiniella	-	-	-	-	-
Paratanytarsus	-	-	-	-	-
Stictochironomus	-	-	-	-	-
Tanytarsini indeterminate	-	-	-	-	-
S.F. Diamesinae					
Diamesa	3	1	1	-	11
Pseudokiefferiella	-	1	-	3	5
S.F. Orthocladiinae					
Cardiocladius	4	-	-	2	5
Chaetocladius	1	-	-	-	
Corynoneura	1	-	-	-	-
Cricotopus	1	-	-	-	2
Cricotopus/Orthocladius	6	1	-	-	9
Diplocladius	-	-	-	-	-
Eukiefferiella	-	-	-	-	1
Hydrobaenus	-	-	-	-	1
Hydrosmittia	-	-	-	-	
Krenosmittia	-	-	-	-	-
Limnophyes	1	-	1	-	1
Metriocnemus	1	1	-	-	1
Orthocladius (Euorthocladius)	-	1	1	2	4
Parakiefferiella	1	-	-	-	-
Paraphaenocladius	-	-	-	-	1
Thienemanniella	-	-	-	-	-
Tokunagaia	-	1	-	2	3
Tvetenia	1	-	3	2	2
indeterminate	-	-	-	1	-
S.F. Podonominae					
Trichotanypus	-	-	-	-	-
S.F. Tanypodinae					
Thienemannimyia complex	-	-	-	-	-
F. Empididae					
Clinocera	1	1	1	1	9
pupae	-	-	-	-	-
F. Simuliidae					
Gymnopais	3	-	2	-	4
Metacnephia	-	1	-	-	-
Prosimulium	1	1	1	1	1
F. Tipulidae					
Tipula	-	1	1	-	6
pupae	-	-	-	-	-
SUMMARY METRICS					
Density (No. organisms per m ²)	190	65	82	118	409
Richness (total number of taxa) ^a	17	9	11	11	19
Simpson's Evenness (E)	0.935	0.960	0.923	0.964	0.956
Dominant Group Composition					
% Nemata	1.89	0	4.35	0	2.63
% Oligochaeta	5.66	0	0	6.06	0
% Acari	1.89	0	0	3.03	0.877
% Ostracods	0	0	0	0	0
% Chironomids	73.6	77.8	65.2	69.7	73.7
% Metal Sensitive Chironmids	11.0	25.9	10.9	17.4	25.6
% Simuliidae	7.55	11.1	13.0	3.03	4.39
% Tipulidae	0	5.56	4.35	0	5.26
Functional Feeding Group Composition					
% Collector - Gatherers	50.0	90.7	73.9	76.3	67.2
% Filterers	1.89	11.1	4.35	3.03	0.877
% Shredders	25.8	5.56	4.35	0	13.3
Habitat Preference Group Composition					
% Clingers	37.1	16.7	17.4	9.09	21.2
% Sprawlers	38.8	77.8	69.6	70.2	62.9
% Burrowers	27.8	18.5	13.0	20.7	17.5

^a Bold entries excluded from taxa count

Table F.54: Statistical Comparison of Benthic Invertebrate Community Metrics at the Mary River Upper Mine-Exposed Area (E0-01) Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transformation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Density (No. per m ²)	ANOVA	log10	YES	0.012	2007	3	797	648	-	AB
					2015	5	116	97	-1.1	AB
					2016	5	230	109	-0.9	AB
					2017	5	126	106	-1.0	AB
					2018	5	119	164	-1.0	A
					2019	5	312	115	-0.7	AB
					2020	5	513	420	-0.4	B
					2021	5	173	140	-1.0	AB
Richness (No. of Taxa)	ANOVA	none	YES	0.030	2007	3	16.3	8.1	-	A
					2015	5	7.8	2.7	-1.0	A
					2016	5	13.2	4.2	-0.4	A
					2017	5	10.6	5.3	-0.7	A
					2018	5	7.8	4.9	-1.0	A
					2019	5	11.0	0.7	-0.7	A
					2020	5	15.6	2.1	-0.1	A
					2021	5	13.4	4.3	-0.4	A
Simpson's Evenness	ANOVA	log10	YES	<0.001	2007	3	0.667	0.058	-	B
					2015	5	0.880	0.084	3.7	A
					2016	5	0.860	0.055	3.3	A
					2017	5	0.940	0.055	4.7	A
					2018	5	0.940	0.055	4.7	A
					2019	5	0.900	0.000	4.0	A
					2020	5	0.913	0.016	4.3	A
					2021	5	0.948	0.018	4.9	A
Nemata (% of community)	K-W	rank	YES	0.560	2007	3	2.7	3.1	-	A
					2015	5	1.2	2.7	-0.5	A
					2016	5	2.0	1.6	-0.2	A
					2017	5	0.8	1.8	-0.6	A
					2018	5	7.8	10.7	1.7	A
					2019	5	1.4	1.7	-0.4	A
					2020	5	0.8	1.2	-0.6	A
					2021	5	1.8	1.9	-0.3	A
Hydracarina (% of community)	ANOVA	log10(x+1)	NO	0.165	2007	3	2.0	3.5	-	A
					2015	5	2.0	2.8	0.0	A
					2016	5	7.2	4.7	1.5	A
					2017	5	2.2	2.1	0.1	A
					2018	5	4.6	5.3	0.8	A
					2019	5	4.0	2.4	0.6	A
					2020	5	3.1	2.9	0.3	A
					2021	5	1.2	1.3	-0.2	A
Chironomidae (% of community)	ANOVA	none	YES	0.002	2007	3	89.0	3.6	-	ABC
					2015	5	82.8	5.9	-1.7	ABC
					2016	5	82.8	6.9	-1.7	ABC
					2017	5	78.0	7.1	-3.0	BC
					2018	5	72.2	16.0	-4.7	C
					2019	5	93.8	3.3	1.3	A
					2020	5	88.2	9.2	-0.2	AB
					2021	5	72.0	4.7	-4.7	C

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.54: Statistical Comparison of Benthic Invertebrate Community Metrics at the Mary River Upper Mine-Exposed Area (E0-01) Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transformation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Metal Sensitive Chironomidae (% of community)	K-W	rank	YES	0.013	2007	3	36.3	31.9	-	A
					2015	5	6.6	5.7	-0.9	BC
					2016	5	5.6	4.7	-1.0	C
					2017	5	28.8	8.0	-0.2	A
					2018	5	35.2	20.2	0.0	A
					2019	5	5.2	4.1	-1.0	C
					2020	5	11.0	2.5	-0.8	ABC
					2021	5	18.2	7.4	-0.6	AB
Tipulidae (% of community)	K-W	rank	YES	0.006	2007	3	3.7	4.6	-	ABC
					2015	5	7.6	5.4	0.9	A
					2016	5	3.2	2.2	-0.1	AB
					2017	5	0.2	0.4	-0.8	D
					2018	5	0.4	0.9	-0.7	CD
					2019	5	0.8	1.1	-0.6	BCD
					2020	5	5.7	4.3	0.4	A
					2021	5	3.0	2.8	-0.1	ABC
Collector Gatherers FFG (% of community)	K-W	rank	NO	0.110	2007	3	43.7	26.6	-	A
					2015	5	71.4	16.9	1.0	A
					2016	5	77.6	6.7	1.3	A
					2017	5	80.4	8.3	1.4	A
					2018	5	62.6	37.3	0.7	A
					2019	5	64.0	2.1	0.8	A
					2020	5	60.0	7.7	0.6	A
					2021	5	71.6	14.8	1.0	A
Filterers FFG (% of community)	K-W	rank	YES	0.007	2007	3	36.0	31.6	-	A
					2015	5	0.0	0.0	-1.1	D
					2016	5	0.8	0.8	-1.1	BCD
					2017	5	14.0	11.0	-0.7	A
					2018	5	7.0	8.6	-0.9	ABC
					2019	5	0.4	0.9	-1.1	CD
					2020	5	5.2	3.6	-1.0	AB
					2021	5	4.3	4.1	-1.0	AB
Shredders FFG (% of community)	K-W	rank	YES	0.006	2007	3	8.0	7.9	-	BC
					2015	5	20.0	18.3	1.5	AB
					2016	5	8.4	6.8	0.1	BC
					2017	5	2.4	5.4	-0.7	C
					2018	5	15.4	13.6	0.9	AB
					2019	5	24.2	3.4	2.0	A
					2020	5	27.3	7.0	2.4	A
					2021	5	9.8	10.1	0.2	BC

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.55: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for the Mary River Middle Mine-Exposed (E0-20) Study Area, August 2021

Waterbody	Mary River Middle Mine-Exposed (E0-20)				
Station	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	-	1	1	1	4
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	-	-	-	-	-
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
immature	-	1	-	-	-
F. Sperchonidae					
Sperchon	-	2	-	1	2
SEED SHRIMPS					
Cl. Ostracoda	-	-	-	-	-
SPRINGTAILS					
Cl. Entognatha					
O. Collembola	-	-	-	-	-
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	3	8	1	1	7
STONEFLIES					
O. Plecoptera					
F. Capniidae					
immature	-	-	-	-	-
TRUE FLIES					
O. Diptera					
BITING-MIDGE					
F. Ceratopogonidae					
indeterminate	-	-	-	-	-
MIDGES					
F. Chironomidae					
chironomid pupae	7	32	13	20	32
S.F. Chironominae					
Lipiniella	-	-	-	-	-
Paratanytarsus	-	-	-	1	-
Stictochironomus	-	-	-	-	-
Tanytarsini indeterminate	-	-	-	-	-
S.F. Diamesinae					
Diamesa	3	4	13	16	13
Pseudokiefferiella	2	2	-	3	4
S.F. Orthocladiinae					
Cardiocladius	8	3	10	18	14
Chaetocladius	-	-	-	-	1
Corynoneura	-	-	-	-	-
Cricotopus	-	-	1	1	-
Cricotopus/Orthocladius	-	3	3	3	10
Diplocladius	-	-	-	-	-
Eukiefferiella	-	-	-	-	-
Hydrobaenus	-	-	-	-	-
Hydrosmittia	-	-	-	-	-
Krenosmittia	4	-	-	2	-
Limnophyes	-	-	-	1	-
Metriocnemus	-	-	-	-	-
Orthocladius (Euorthocladius)	-	6	3	7	21
Parakiefferiella	-	-	-	-	-
Paraphaenocladius	-	-	-	-	-
Thienemanniella	-	-	2	2	1
Tokunagaia	-	1	-	-	3
Tvetenia	1	1	1	1	7
indeterminate	-	-	-	-	-
S.F. Podonominae					
Trichotanypus	-	-	-	-	-
S.F. Tanypodinae					
Thienemannimyia complex	-	-	-	-	-
F. Empididae					
Clinocera	2	3	-	2	-
pupae	-	-	-	-	-
F. Simuliidae					
Gymnopaïs	-	5	4	2	3
Metacnephia	-	1	7	9	19
Prosimulium	2	2	2	4	9
F. Tipulidae					
Tipula	3	2	1	3	2
pupae	-	-	-	-	-
SUMMARY METRICS					
Density (No. organisms per m²)	125	276	222	351	545
Richness (total number of taxa) ^a	9	14	12	18	15
Simpson's Evenness (E)	0.935	0.918	0.902	0.904	0.914
Dominant Group Composition					
% Nemata	0	1.30	1.61	1.02	2.63
% Oligochaeta	0	0	0	0	0
% Acari	0	3.90	0	1.02	1.32
% Ostracods	0	0	0	0	0
% Chironomids	71.4	67.5	74.2	76.5	69.7
% Metal Sensitive Chironmids	19.8	20.3	29.2	27.8	16.0
% Simuliidae	5.71	10.4	21.0	15.3	20.4
% Tipulidae	8.57	2.60	1.61	3.06	1.32
Functional Feeding Group Composition					
% Collector - Gatherers	48.2	69.1	51.0	50.2	63.8
% Filterers	5.71	3.90	14.5	14.7	18.4
% Shredders	8.57	2.60	5.55	4.97	1.32
Habitat Preference Group Composition					
% Clingers	11.4	18.2	24.9	20.3	21.7
% Sprawlers	48.2	67.8	49.4	50.6	61.1
% Burrowers	40.3	14.0	25.7	29.1	17.1

^a Bold entries excluded from taxa count

Table F.56: Statistical Comparison of Benthic Invertebrate Community Metrics at the Mary River Middle Mine-Exposed Area (E0-20) Among Years of Mine Operation (2015 to 2021) and Baseline (2011) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b	Pairwise Comparison
									vs. Baseline Year 2011	
Density (No. per m ²)	K-W	rank	YES	<0.001	2011	3	854	348	-	AB
					2015	5	278	146	-1.7	BC
					2016	5	283	118	-1.6	BC
					2017	5	382	665	-1.4	CD
					2018	5	61	23	-2.3	D
					2019	5	2,939	3,175	6.0	A
					2020	5	1,441	553	1.7	A
					2021	5	304	158	-1.6	BC
Richness (No. of Taxa)	ANOVA	none	YES	0.008	2011	3	14.0	2.7	-	A
					2015	5	11.6	2.2	-0.9	AB
					2016	5	13.6	3.1	-0.2	A
					2017	5	12.4	5.0	-0.6	AB
					2018	5	6.8	1.9	-2.7	B
					2019	5	14.8	2.1	0.3	A
					2020	5	14.0	2.6	0.0	A
					2021	5	13.6	3.4	-0.2	A
Simpson's Evenness	K-W	rank	YES	0.010	2011	3	0.483	0.247	-	D
					2015	5	0.726	0.140	1.0	CD
					2016	5	0.835	0.038	1.4	BCD
					2017	5	0.902	0.103	1.7	A
					2018	5	0.895	0.047	1.7	AB
					2019	5	0.863	0.049	1.5	ABC
					2020	5	0.868	0.046	1.6	ABC
					2021	5	0.915	0.013	1.7	A
Nemata (% of community)	K-W	rank	NO	0.151	2011	3	0.7	0.6	-	A
					2015	5	0.2	0.4	-0.8	A
					2016	5	1.6	1.1	1.6	A
					2017	5	0.6	1.3	-0.1	A
					2018	5	1.6	3.6	1.6	A
					2019	5	1.0	1.2	0.6	A
					2020	5	0.0	0.1	-1.1	A
					2021	5	1.3	1.0	1.1	A
Hydracarina (% of community)	K-W	rank	YES	0.007	2011	3	1.0	1.0	-	BC
					2015	5	3.8	1.3	2.8	A
					2016	5	6.4	2.9	5.4	A
					2017	5	4.0	2.9	3.0	AB
					2018	5	0.8	1.8	-0.2	C
					2019	5	1.0	1.2	0.0	C
					2020	5	0.8	0.4	-0.2	BC
					2021	5	1.3	1.6	0.3	BC
Chironomidae (% of community)	ANOVA	none	YES	<0.001	2011	3	95.0	4.4	-	A
					2015	5	87.6	5.3	-1.7	AB
					2016	5	86.2	6.3	-2.0	AB
					2017	5	71.6	11.7	-5.4	C
					2018	5	81.4	7.8	-3.1	BC
					2019	5	96.4	1.7	0.3	A
					2020	5	95.5	2.5	0.1	A
					2021	5	71.9	3.6	-5.3	C

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.56: Statistical Comparison of Benthic Invertebrate Community Metrics at the Mary River Middle Mine-Exposed Area (E0-20) Among Years of Mine Operation (2015 to 2021) and Baseline (2011) for the Mary River Project CREMP

Metric	Overall 8-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b	Pairwise Comparison
									vs. Baseline Year 2011	
Metal Sensitive Chironomidae (% of community)	ANOVA	log10(x+1)	YES	<0.001	2011	3	3.0	5.2	-	C
					2015	5	3.6	1.8	0.1	C
					2016	5	4.4	2.9	0.3	C
					2017	5	31.4	22.6	5.5	AB
					2018	5	49.0	12.9	8.8	A
					2019	5	20.0	20.1	3.3	BC
					2020	5	9.4	9.1	1.2	BC
					2021	5	22.6	5.7	3.8	BC
Tipulidae (% of community)	K-W	rank	YES	0.085	2011	3	2.0	1.7	-	ABC
					2015	5	4.4	2.5	1.4	A
					2016	5	4.2	4.6	1.3	AB
					2017	5	2.6	3.4	0.3	ABC
					2018	5	2.0	2.8	0.0	BC
					2019	5	0.4	0.5	-0.9	C
					2020	5	0.6	0.9	-0.8	C
					2021	5	3.4	3.0	0.8	AB
Collector Gatherers FFG (% of community)	ANOVA	none	YES	<0.001	2011	3	22.0	16.0	-	C
					2015	5	77.0	6.2	3.4	A
					2016	5	70.4	7.4	3.0	AB
					2017	5	68.0	5.2	2.9	AB
					2018	5	78.2	6.5	3.5	A
					2019	5	63.6	9.0	2.6	AB
					2020	5	54.6	13.2	2.0	B
					2021	5	56.5	9.3	2.2	B
Filterers FFG (% of community)	ANOVA	log10(x+1)	YES	<0.001	2011	3	3.0	5.2	-	BC
					2015	5	0.6	0.9	-0.5	C
					2016	5	0.4	0.9	-0.5	C
					2017	5	16.8	7.1	2.7	A
					2018	5	9.0	8.4	1.2	ABC
					2019	5	0.8	0.8	-0.4	C
					2020	5	4.6	4.2	0.3	BC
					2021	5	11.4	6.3	1.6	AB
Shredders FFG (% of community)	ANOVA	log10(x+1)	YES	<0.001	2011	3	6.3	7.5	-	B
					2015	5	13.0	3.7	0.9	B
					2016	5	8.6	5.4	0.3	B
					2017	5	7.2	4.2	0.1	B
					2018	5	11.6	8.3	0.7	B
					2019	5	32.4	5.5	3.5	A
					2020	5	15.8	9.4	1.3	B
					2021	5	4.6	2.8	-0.2	B

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm=MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.57: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for the Mary River Lower Mine-Exposed (C0-05) Study Area, August 2021

Waterbody	Mary River Lower Mine-Exposed (C0-05)				
Station	B1	B2	B3	B4	B5
ROUNDWORMS					
P. Nemata	116	152	6	76	10
ANNELIDS					
P. Annelida					
WORMS					
Cl. Oligochaeta					
F. Enchytraeidae	188	48	23	72	8
ARTHROPODS					
P. Arthropoda					
MITES					
Cl. Arachnida					
O. Acarina					
immature	-	-	-	-	-
F. Sperchonidae					
Sperchon	-	-	-	-	1
SEED SHRIMPS					
Cl. Ostracoda	-	2	2	-	7
SPRINGTAILS					
Cl. Entognatha					
O. Collembola	10	-	2	-	1
INSECTS					
Cl. Insecta					
MAYFLIES					
O. Ephemeroptera					
F. Baetidae					
Acentrella feropagus	-	2	-	-	1
STONEFLIES					
O. Plecoptera					
F. Capniidae					
immature	-	-	-	-	-
TRUE FLIES					
O. Diptera					
BITING-MIDGE					
F. Ceratopogonidae					
indeterminate	2	-	-	2	-
MIDGES					
F. Chironomidae					
chironomid pupae	2	10	17	36	47
S.F. Chironominae					
Lipiniella	-	-	-	-	1
Paratanytarsus	-	-	-	-	-
Stictochironomus	-	-	-	-	3
Tanytarsini indeterminate	-	-	-	-	1
S.F. Diamesinae					
Diamesa	-	2	1	4	1
Pseudokiefferiella	2	12	9	60	19
S.F. Orthocladiinae					
Cardiocladius	-	-	-	-	3
Chaetocladius	-	-	-	-	-
Corynoneura	-	-	1	-	-
Cricotopus	2	10	-	8	-
Cricotopus/Orthocladius	16	14	-	15	7
Diplocladius	-	4	-	-	1
Eukiefferiella	-	-	1	-	-
Hydrobaenus	4	2	-	-	15
Hydrosmittia	42	90	12	212	15
Krenosmittia	-	-	-	-	-
Limnophyes	10	12	6	30	18
Metriocnemus	6	4	3	11	4
Orthocladius (Euorthocladius)	-	6	3	-	7
Parakiefferiella	2	-	-	4	1
Paraphaenocladius	12	74	9	136	34
Thienemanniella	-	-	-	-	-
Tokunagaia	-	-	-	8	3
Tvetenia	22	50	13	64	19
indeterminate	2	2	-	-	1
S.F. Podonominae					
Trichotanypus	-	-	1	-	1
S.F. Tanypodinae					
Thienemannimyia complex	-	-	-	2	-
F. Empididae					
Clinocera	-	4	-	2	2
pupae	-	-	-	4	-
F. Simuliidae					
Gymnopaïs	-	-	1	-	1
Metacnephia	-	2	-	-	-
Prosimulium	-	-	1	-	-
F. Tipulidae					
Tipula	-	-	1	2	-
pupae	2	-	-	-	-
SUMMARY METRICS					
Density (No. organisms per m²)	1,577	1,799	401	2,681	832
Richness (total number of taxa) ^a	14	17	18	16	24
Simpson's Evenness (E)	0.788	0.878	0.936	0.888	0.942
Dominant Group Composition					
% Nemata	26.4	30.3	5.36	10.2	4.31
% Oligochaeta	42.7	9.56	20.5	9.63	3.45
% Acari	0	0	0	0	0.431
% Ostracods	0	0.398	1.79	0	3.02
% Chironomids	27.7	58.2	67.9	78.9	86.6
% Metal Sensitive Chironmids	0.462	2.89	11.5	9.11	11.2
% Simuliidae	0	0.398	1.79	0	0.431
% Tipulidae	0.455	0	0.893	0.267	0
Functional Feeding Group Composition					
% Collector - Gatherers	96.3	95.8	101	96.7	98.3
% Filterers	0	0.398	0.893	0	0
% Shredders	4.61	3.87	0.893	3.54	0
Habitat Preference Group Composition					
% Clingers	4.16	5.06	1.79	4.08	2.29
% Sprawlers	23.6	55.1	69.6	75.6	85.6
% Burrowers	71.4	40.7	30.2	21.9	13.9

^a Bold entries excluded from taxa count

Table F.58: Statistical Comparison of Benthic Metrics at the Mary River Lower Mine-Exposed Area (C0-05) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison ^a				Pair-wise, post-hoc comparisons						
	Statistical Test	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2011	
Density (No. per m2)	ANOVA	none	YES	0.066	2007	3	311	230	-	-	A
					2011	3	491	455	0.8	-	A
					2015	5	234	168	-0.3	-0.6	A
					2016	5	1,161	584	3.7	1.5	A
					2017	5	1,214	654	3.9	1.6	A
					2018	5	1,391	1,083	4.7	2.0	A
					2019	5	1,470	693	5.0	2.2	A
					2020	5	906	818	2.6	0.9	A
					2021	5	1,458	885	5.0	2.1	A
Richness (No. of Taxa)	ANOVA	log10	YES	<0.001	2007	3	10.7	3.8	-	-	D
					2011	3	19.0	4.0	2.2	-	ABC
					2015	5	13.2	2.7	0.7	-1.5	BD
					2016	5	19.6	3.3	2.3	0.2	AC
					2017	5	22.0	3.2	3.0	0.8	A
					2018	5	18.6	0.9	2.1	-0.1	AC
					2019	5	15.8	2.9	1.3	-0.8	ABC
					2020	5	14.2	2.2	0.9	-1.2	BCD
					2021	5	17.8	3.8	1.9	-0.3	ABC
Simpson's E (Krebs)	K-W	rank	YES	0.002	2007	3	0.668	0.022	-	-	D
					2011	3	0.879	0.079	9.8	-	AB
					2015	5	0.923	0.038	11.8	0.6	A
					2016	5	0.849	0.015	8.4	-0.4	AB
					2017	5	0.798	0.161	6.0	-1.0	BCD
					2018	5	0.675	0.149	0.3	-2.6	CD
					2019	5	0.716	0.092	2.2	-2.1	CD
					2020	5	0.839	0.048	7.9	-0.5	BC
					2021	5	0.886	0.062	10.1	0.1	AB
Nemata (% of community)	K-W	rank	YES	0.002	2007	3	0.3	0.6	-	-	C
					2011	3	3.7	1.5	5.8	-	AB
					2015	5	3.0	2.2	4.6	-0.4	B
					2016	5	1.6	0.9	2.2	-1.4	BC
					2017	5	2.2	1.6	3.2	-1.0	B
					2018	5	2.2	1.8	3.2	-1.0	BC
					2019	5	0.6	0.5	0.5	-2.0	C
					2020	5	1.5	0.6	2.1	-1.4	B
					2021	5	15.3	12.2	25.9	7.6	A
Hydracarina (% of community)	K-W	rank	YES	0.004	2007	3	0.7	0.6	-	-	CD
					2011	3	0.7	0.6	0.0	-	CD
					2015	5	2.2	3.0	2.7	2.7	CD
					2016	5	6.4	2.6	9.9	9.9	A
					2017	5	3.8	4.8	5.4	5.4	ABC
					2018	5	1.6	2.5	1.6	1.6	CD
					2019	5	2.0	1.0	2.3	2.3	BC
					2020	5	6.0	4.9	9.3	9.3	AB
					2021	5	0.1	0.2	-1.0	-1.0	D
Chironomidae (% of community)	K-W	rank	YES	<0.001	2007	3	99.3	0.6	-	-	A
					2011	3	90.0	4.6	-16.1	-	ABC
					2015	5	78.0	9.9	-36.9	-2.6	CDE
					2016	5	88.0	3.1	-19.6	-0.4	BC
					2017	5	63.6	12.6	-61.9	-5.8	E
					2018	5	85.6	6.9	-23.7	-1.0	C
					2019	5	95.0	1.9	-7.5	1.1	AB
					2020	5	84.8	8.0	-25.1	-1.1	CD
					2021	5	63.9	22.9	-61.4	-5.7	DE

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm = MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.58: Statistical Comparison of Benthic Metrics at the Mary River Lower Mine-Exposed Area (C0-05) Among Years of Mine Operation (2015 to 2021) and Baseline (2007, 2011) for the Mary River Project CREMP

Metric	Overall 9-Year Comparison ^a				Pair-wise, post-hoc comparisons						
	Statistical Test	Data Transform-ation	Significant Difference Among Areas?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b		Pairwise Comparison
									vs. Baseline Year 2007	vs. Baseline Year 2011	
Metal Sensitive Chironomidae (% of community)	ANOVA	none	YES	<0.001	2007	3	37.0	16.1	-	-	ABCD
					2011	3	14.3	10.7	-1.4	-	CD
					2015	5	17.0	10.7	-1.2	0.3	CD
					2016	5	29.0	13.9	-0.5	1.4	BCD
					2017	5	39.0	23.5	0.1	2.3	ABC
					2018	5	59.6	11.5	1.4	4.2	A
					2019	5	49.2	16.6	0.8	3.3	AB
					2020	5	19.4	9.6	-1.1	0.5	CD
					2021	5	7.0	5.1	-1.9	-0.7	D
Tipulidae (% of community)	K-W	rank	YES	0.088	2007	3	0.0	0.0	-	-	B
					2011	3	2.0	2.7	nm	-	AC
					2015	5	5.2	8.1	nm	1.2	AC
					2016	5	1.8	0.8	nm	-0.1	A
					2017	5	1.2	1.6	nm	-0.3	ABC
					2018	5	0.4	0.5	nm	-0.6	BC
					2019	5	0.4	0.5	nm	-0.6	BC
					2020	5	1.4	0.9	nm	-0.2	A
					2021	5	0.3	0.4	nm	-0.6	BC
Collector Gatherers FFG (% of community)	ANOVA	none	YES	<0.001	2007	3	35.0	15.4	-	-	D
					2011	3	66.3	16.3	2.0	-	BC
					2015	5	80.6	13.0	3.0	0.9	ABC
					2016	5	59.8	10.5	1.6	-0.4	CD
					2017	5	64.0	13.5	1.9	-0.1	BC
					2018	5	83.6	8.3	3.2	1.1	AB
					2019	5	67.0	15.6	2.1	0.0	BC
					2020	5	71.0	7.0	2.3	0.3	BC
					2021	5	97.6	2.0	4.1	1.9	A
Filterers FFG (% of community)	K-W	rank	YES	<0.001	2007	3	21.0	28.8	-	-	ABC
					2011	3	14.3	10.7	-0.2	-	AB
					2015	5	0.8	1.3	-0.7	-1.3	DE
					2016	5	0.6	0.5	-0.7	-1.3	DE
					2017	5	20.0	10.4	0.0	0.5	A
					2018	5	6.2	4.1	-0.5	-0.8	ABC
					2019	5	1.0	0.7	-0.7	-1.2	CDE
					2020	5	4.3	5.0	-0.6	-0.9	BCD
					2021	5	0.3	0.4	-0.7	-1.3	E
Shredders FFG (% of community)	K-W	rank	YES	0.001	2007	3	40.3	20.7	-	-	A
					2011	3	7.0	6.0	-1.6	-	CDE
					2015	5	15.8	10.0	-1.2	1.5	ABC
					2016	5	10.0	5.4	-1.5	0.5	BCD
					2017	5	6.8	3.1	-1.6	0.0	CDE
					2018	5	4.0	2.6	-1.8	-0.5	DE
					2019	5	18.0	3.5	-1.1	1.8	AB
					2020	5	13.5	9.3	-1.3	1.1	ABC
					2021	5	2.6	2.0	-1.8	-0.7	E

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint values between study years.

Notes: "-" indicates not applicable. nm = MOD could not be calculated due to SD = 0.

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

^b Magnitude of Difference = (MCT_{Year} - MCT_{Base Year})/SD_{Base Year}. MCT = Measure of Central Tendency; MCT reported as geometric mean for log10-transformed data, median for rank-transformed data, back-transformed means for untransformed data.

Table F.59: Statistical Comparison of Sediment Physical Properties Between Mary Lake (BL0) and Reference Lake 3 Stations Collected at Littoral and Profundal Depths, Mary River Project CREMP, August 2021

Lake Zone	Sediment Variable	Statistical Test Results				Summary Statistics						
		Statistical Test ^a	Data 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	0.119	Reference Lake	5	40.0	6.49	2.90	32.5	48.8
						Mary Lake	4	27.1	34.5	17.2	5.10	77.9
	Silt-Sized Material (%)	tequal	none	NO	0.572	Reference Lake	5	49.6	6.98	3.12	39.2	58.2
						Mary Lake	4	56.4	24.5	12.2	19.9	72.5
	Clay-Sized Material (%)	tunequal	none	NO	0.423	Reference Lake	5	10.4	2.42	1.08	6.80	12.9
						Mary Lake	4	16.6	13.3	6.64	2.20	29.7
	Moisture (%)	tequal	none	NO	0.137	Reference Lake	5	54.8	7.60	3.40	49.1	63.8
						Mary Lake	4	43.5	12.6	6.29	25.0	51.8
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.011	Reference Lake	5	4.37	1.96	0.875	1.92	7.32
						Mary Lake	4	0.943	0.348	0.174	0.540	1.31
Profundal (Deep) Stations	Sand-Sized Material (%)	tequal	log10	NO	0.128	Reference Lake	5	42.0	6.80	3.04	35.7	49.8
						Mary Lake	11	22.7	24.8	7.47	4.70	91.7
	Silt-Sized Material (%)	tequal	none	NO	0.929	Reference Lake	5	47.2	5.32	2.38	39.2	53.1
						Mary Lake	11	52.9	19.2	5.78	6.10	74.1
	Clay-Sized Material (%)	tunequal	none	NO	0.166	Reference Lake	5	10.9	3.54	1.58	4.70	13.2
						Mary Lake	11	24.4	13.3	4.02	2.20	45.6
	Moisture (%)	tequal	none	NO	0.081	Reference Lake	5	56.9	7.06	3.16	52.1	69.4
						Mary Lake	11	47.2	11.4	3.44	24.1	63.8
	Total Organic Carbon (TOC) Content (%)	tequal	none	YES	0.001	Reference Lake	5	3.54	0.672	0.300	2.48	4.32
						Mary Lake	11	0.825	0.202	0.0609	0.340	1.06

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

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

Table F.60: Benthic Invertebrate Community Data, Expressed in Number of Organisms per Square Metre, for Mary Lake Study Areas, August 2021

Lake	Mary Lake (BL0)									
Station Type	Littoral Stations				Profundal Stations					
Station	1	11	7	6	3	15	14	13	4	5
ROUNDWORMS										
P. Nemata	1	4	-	13	2	-	-	-	-	4
ANNELIDS										
P. Annelida										
WORMS										
Cl. Oligochaeta										
F. Naididae										
S.F. Tubificinae										
immatures with hair chaetae	-	-	-	-	-	-	-	-	-	-
F. Lumbriculidae										
Lumbriculus	-	-	-	-	-	-	-	-	-	-
ARTHROPODS										
P. Arthropoda										
MITES										
Cl. Arachnida										
O. Acarina										
F. Acalyptonotidae										
Acalyptonotus	5	4	1	9	2	3	3	2	-	4
F. Hygrobatidae										
Hygrobates	5	16	-	1	2	-	-	-	-	20
F. Lebertiidae										
Lebertia	-	-	-	-	8	-	1	-	-	4
SEED SHRIMPS										
Cl. Ostracoda	3	68	8	35	10	32	1	11	-	4
INSECTS										
Cl. Insecta										
CADDISFLIES										
O. Trichoptera										
F. Apataniidae										
Apatania	-	-	-	5	-	-	-	-	-	-
F. Limnephilidae										
TRUE FLIES										
O. Diptera										
MIDGES										
F. Chironomidae										
chironomid pupae	6	8	1	-	-	1	-	-	-	8
S.F. Chironominae										
Chironomus	2	8	-	-	-	-	-	-	-	36
Corynocera ambigua	-	-	-	-	-	-	-	-	-	-
Lipiniella	-	4	-	-	-	-	-	-	-	-
Micropsectra	82	4	-	3	16	-	-	-	-	28
Paratanytarsus	1	8	-	-	-	-	-	-	-	4
Sergentia	-	80	-	-	-	-	-	-	-	16
Stictochironomus	16	176	5	-	2	-	-	-	-	44
Tanytarsus	22	8	-	-	-	-	-	-	-	-
Chironomini indeterminate	-	-	-	-	-	-	-	-	-	-
Tanytarsini indeterminate	-	4	-	-	-	-	-	-	-	4
S.F. Diamesinae										
Protanypus	-	4	4	8	-	1	1	1	2	4
Pseudodiamesa	-	-	-	3	2	2	1	-	1	-
Pseudokiefferiella	-	-	-	-	-	-	-	-	-	4
S.F. Orthoclaadiinae										
Abiskomyia	46	16	7	43	-	-	-	-	-	12
Heterotrissocladius	3	60	1	123	34	158	31	165	163	20
Hydrobaenus	-	-	-	-	-	-	-	-	-	4
Hydrosmittia	-	-	-	-	-	-	-	-	-	4
Mesocricotopus	-	-	-	-	-	-	-	-	-	-
Paracladius	-	16	-	4	-	-	-	-	-	-
Parakiefferiella	-	-	-	-	-	-	-	-	-	-
Psectrocladius	-	-	-	-	-	-	-	-	-	-
Zalutschia	7	-	1	-	-	-	-	-	1	12
S.F. Tanypodinae										
Procladius	237	16	25	2	2	5	2	2	4	8
Thienemannimyia complex	1	4	-	-	-	-	-	-	-	-
SUMMARY METRICS										
Density (No. organisms per m²)	3,763	4,374	456	2,144	689	1,739	344	1,559	1,473	2,101
Richness (total number of taxa) ^a	14.0	17.0	8.00	12.0	10.0	6.00	7.00	5.00	5.00	19.0
Simpson's Evenness (E)	0.695	0.862	0.811	0.764	0.833	0.426	0.454	0.206	0.113	0.949
Shannon-Wiener Diversity	2.11	3.00	2.25	2.34	2.49	1.02	1.31	0.552	0.354	3.69
Dominant Taxonomic Group Composition										
% Nemata	0.229	0.787	0	5.22	2.50	0	0	0	0	1.64
% Hydracarina	2.29	3.94	1.89	4.02	15.0	1.49	10.00	1.10	0	11.5
% Ostracods	0.686	13.4	15.1	14.1	12.5	15.8	2.50	6.08	0	1.64
% Chironomids	96.8	81.9	83.0	74.7	70.0	82.7	87.5	92.8	100	85.2
% Metal Sensitive Chironmids	24.4	5.62	7.72	5.62	22.5	1.49	5.00	0.552	1.75	18.8
Functional Feeding Group Composition										
% Collector - Gatherers	16.5	86.4	47.9	92.0	62.5	96.0	85.0	97.8	97.1	64.7
% Filterers	24.4	4.82	0	1.20	20.0	0	0	0	0	15.3
% Shredders	1.62	0	1.93	0	0	0	0	0	0.585	5.11
Habitat Preference Group Composition										
% Clingers	26.4	24.0	1.89	7.23	35.0	1.49	10.0	1.10	0	31.9
% Sprawlers	69.2	37.5	80.7	84.3	60.0	98.0	87.5	98.3	98.8	30.6
% Burrowers	4.41	38.5	17.4	8.43	5.00	0.498	2.50	0.552	1.17	37.4

^a Bold entries excluded from taxa count

Table F.61: Statistical Comparison of Benthic Invertebrate Community Metrics at Mary Lake Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 7-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Density (No. per m ²)	ANOVA	none	NO	0.837	2007	3	2,667	1,454	-	A
					2015	4	2,453	2,186	-0.1	A
					2016	6	1,946	1,591	-0.5	A
					2017	4	1,839	1,853	-0.6	A
					2018	4	1,718	1,418	-0.7	A
					2019	4	2,448	2,313	-0.2	A
					2020	4	4,086	3,955	1.0	A
					2021	4	2,685	1,758	0.0	A
Richness (No. of Taxa)	ANOVA	log10	NO	0.416	2007	3	8.0	2.0	-	A
					2015	4	9.0	1.8	0.5	A
					2016	6	8.7	0.5	0.3	A
					2017	4	9.5	2.1	0.8	A
					2018	4	9.3	2.2	0.6	A
					2019	4	11.5	5.0	1.8	A
					2020	4	11.5	4.2	1.8	A
					2021	4	12.8	3.8	2.4	A
Simpson's Evenness	ANOVA	none	NO	0.362	2007	3	0.718	0.041	-	A
					2015	4	0.761	0.058	1.0	A
					2016	6	0.574	0.299	-3.5	A
					2017	4	0.818	0.110	2.4	A
					2018	4	0.575	0.293	-3.5	A
					2019	4	0.663	0.169	-1.3	A
					2020	4	0.765	0.041	1.1	A
					2021	4	0.783	0.071	1.6	A
Nemata (% of community)	K-W	rank	NO	0.723	2007	3	7.29	11.2	-	A
					2015	4	5.64	6.29	-0.1	A
					2016	6	3.64	7.47	-0.3	A
					2017	4	3.5	6.25	-0.3	A
					2018	4	3.5	6.41	-0.3	A
					2019	4	2.38	2.4	-0.4	A
					2020	4	1.12	1.69	-0.6	A
					2021	4	1.56	2.46	-0.5	A
Ostracoda (% of community)	K-W	rank	YES	0.012	2007	3	0.218	0.378	-	C
					2015	4	1.86	2.2	4.3	BC
					2016	6	2.29	2.22	5.5	BC
					2017	4	2.11	2.17	5.0	BC
					2018	4	8.86	10.9	22.9	AB
					2019	4	2.02	1.14	4.8	BC
					2020	4	42.7	12.7	112.4	A
					2021	4	10.8	6.78	28.0	AB
Chironomidae (% of community)	ANOVA	none	YES	0.002	2007	3	90.8	11.8	-	A
					2015	4	91	7.74	0.0	A
					2016	6	90.6	12.2	0.0	A
					2017	4	85.7	13.1	-0.4	A
					2018	4	86.2	18.7	-0.4	A
					2019	4	93.4	3.97	0.2	A
					2020	4	52.5	14.7	-3.2	B
					2021	4	84.1	9.23	-0.6	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.61: Statistical Comparison of Benthic Invertebrate Community Metrics at Mary Lake Littoral (Shallow) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 7-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference ^b vs. Baseline Year 2007	Pairwise Comparison
Metal Sensitive Taxa (% of community)	ANOVA	log10	NO	0.696	2007	3	22.4	13.8	-	A
					2015	4	15.8	14.6	-0.5	A
					2016	6	19.2	13.3	-0.2	A
					2017	4	21.3	7.7	-0.1	A
					2018	4	11.6	9.83	-0.8	A
					2019	4	14.2	12.2	-0.6	A
					2020	4	8.05	6.63	-1.0	A
					2021	4	10.8	9.08	-0.8	A
Collector-Gatherer FFG (% of community)	K-W	rank	NO	0.751	2007	3	66	26.7	-	A
					2015	4	72.8	23.1	0.3	A
					2016	6	73.5	24.7	0.3	A
					2017	4	52.2	23.6	-0.5	A
					2018	4	76.1	36.4	0.4	A
					2019	4	65.1	24.9	0.0	A
					2020	4	68.8	24.9	0.1	A
					2021	4	60.7	35.4	-0.2	A
Filterer FFG (% of community)	K-W	rank	NO	0.599	2007	3	22	14.5	-	A
					2015	4	14.4	16.2	-0.5	A
					2016	6	12.4	13.2	-0.7	A
					2017	4	13.3	16	-0.6	A
					2018	4	4.06	7.31	-1.2	A
					2019	4	11.5	13.8	-0.7	A
					2020	4	5.46	8.33	-1.1	A
					2021	4	7.6	11.4	-1.0	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD for rank-transformed data and as back-transformed mean and SD for all other cases.

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

^b Contrast MODs could not be calculated because the MAD (Median Absolute Deviation) =0.

Table F.62: Statistical Comparison of Benthic Invertebrate Community Metrics at Mary Lake Profundal (Deep) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 7-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference	Pairwise Comparison
									vs. Baseline Year 2007	
Density (No. per m ²)	ANOVA	log10	YES	0.006	2007	4	3,512	3,257	-	A
					2015	6	775	748	-0.8	BC
					2017	6	536	497	-0.9	B
					2018	6	1,520	599	-0.6	AC
					2019	6	1,428	506	-0.6	AC
					2020	6	779	452	-0.8	ABC
					2021	6	1,318	666	-0.7	ABC
Richness (No. of Taxa)	ANOVA	log10	NO	0.994	2007	4	7.96	6.17	-	A
					2015	6	7.67	4.08	0.0	A
					2017	6	7	1.55	-0.2	A
					2018	6	8.17	4.36	0.0	A
					2019	6	8.17	4.49	0.0	A
					2020	6	7.5	2.81	-0.1	A
					2021	6	8.67	5.39	0.1	A
Simpson's Evenness	ANOVA	log10	NO	0.245	2007	4	0.453	0.268	-	A
					2015	6	0.696	0.142	0.9	A
					2017	6	0.604	0.236	0.6	A
					2018	6	0.387	0.359	-0.2	A
					2019	6	0.479	0.273	0.1	A
					2020	6	0.586	0.201	0.5	A
					2021	6	0.497	0.334	0.2	A
Nemata (% of community)	K-W	rank	NO	0.423	2007	4	1.3	1.8	-	A
					2015	6	1.97	2.6	0.4	A
					2017	6	2.4	1.89	0.6	A
					2018	6	1.65	1.94	0.2	A
					2019	6	0.693	0.917	-0.3	A
					2020	6	0.607	1.04	-0.4	A
					2021	6	0.69	1.1	-0.3	A
Ostracoda (% of community)	K-W	rank	NO	0.27	2007	4	1.6	2.19	-	A
					2015	6	11.1	10.9	4.3	A
					2017	6	3.18	6.16	0.7	A
					2018	6	3.52	3.22	0.9	A
					2019	6	10.9	17.4	4.2	A
					2020	6	23.4	28.9	10.0	A
					2021	6	6.43	6.41	2.2	A
Chironomidae (% of community)	K-W	rank	NO	0.308	2007	4	96.3	4.66	-	A
					2015	6	83.8	12.2	-2.7	A
					2017	6	84.9	13.8	-2.4	A
					2018	6	93.8	4.13	-0.5	A
					2019	6	86.7	17.4	-2.1	A
					2020	6	71.3	30.2	-5.4	A
					2021	6	86.4	10.1	-2.1	A

 Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

 Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

Table F.62: Statistical Comparison of Benthic Invertebrate Community Metrics at Mary Lake Profundal (Deep) Stations Among Years of Mine Operation (2015 to 2021) and Baseline (2007) for the Mary River Project CREMP

Metric	Overall 6-Year Comparison				Pair-wise, post-hoc comparisons					
	Statistical Test ^a	Data Transformation	Significant Difference Among Years?	P-value	Year	Sample Size (n)	Mean	Standard Deviation	Magnitude of Difference	Pairwise Comparison
									vs. Baseline Year 2007	
Metal Sensitive Taxa (% of community)	K-W	rank	NO	0.671	2007	4	33.7	27.9	-	A
					2015	6	9.54	8.16	-0.9	A
					2017	6	5.57	3.2	-1.0	A
					2018	6	8.63	11.2	-0.9	A
					2019	6	4.46	4.55	-1.0	A
					2020	6	5.6	5.22	-1.0	A
					2021	6	8.34	9.71	-0.9	A
Collector-Gatherer FFG (% of community)	K-W	rank	NO	0.259	2007	4	64.5	27.7	-	A
					2015	6	82.7	5.91	0.7	A
					2017	6	80.7	18.2	0.6	A
					2018	6	90	13.2	0.9	A
					2019	6	92.3	4.19	1.0	A
					2020	6	86.6	5.88	0.8	A
					2021	6	83.8	16.4	0.7	A
Filterer FFG (% of community)	K-W	rank	NO	0.29	2007	4	33.1	27.8	-	A
					2015	6	9.41	7.87	-0.9	A
					2017	6	3.78	2.69	-1.1	A
					2018	6	7.8	11.4	-0.9	A
					2019	6	2.94	4.05	-1.1	A
					2020	6	3.15	5.34	-1.1	A
					2021	6	5.89	9.24	-1.0	A

Indicates a statistically significant difference for respective comparison (p-value ≤ 0.1).

Indicates magnitude of difference outside of the Critical Effect Size of ± 2 SD of respective baseline year mean, suggesting an ecologically meaningful difference in endpoint value between study years.

Notes: "-" indicates not applicable. MOD = Magnitude of Difference = (MCT_{year1} - MCT_{Baseline})/SD_{Baseline}. MCT = Measure of Central Tendency; SD = Standard Deviation. MCT and SD reported as median and MAD (Median Absolute Deviation) for rank-transformed data and as back-transformed mean and SD for all other cases.

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

APPENDIX G

FISH POPULATION SURVEY DATA

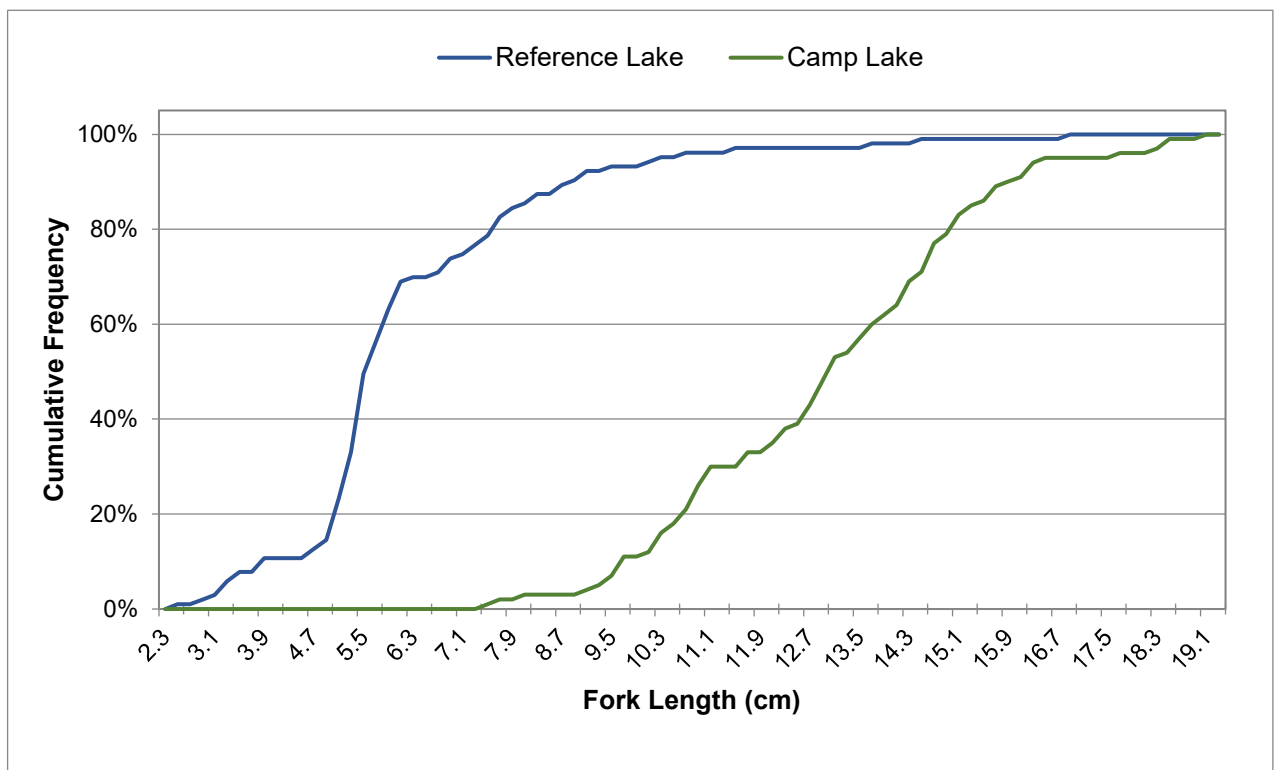


Figure G.1: Cumulative Length-frequency Distributions for Juvenile Arctic Charr Captured by Electrofishing at Nearshore Areas of Camp Lake and Reference Lake 3, Mary River Project CREMP, August 2021

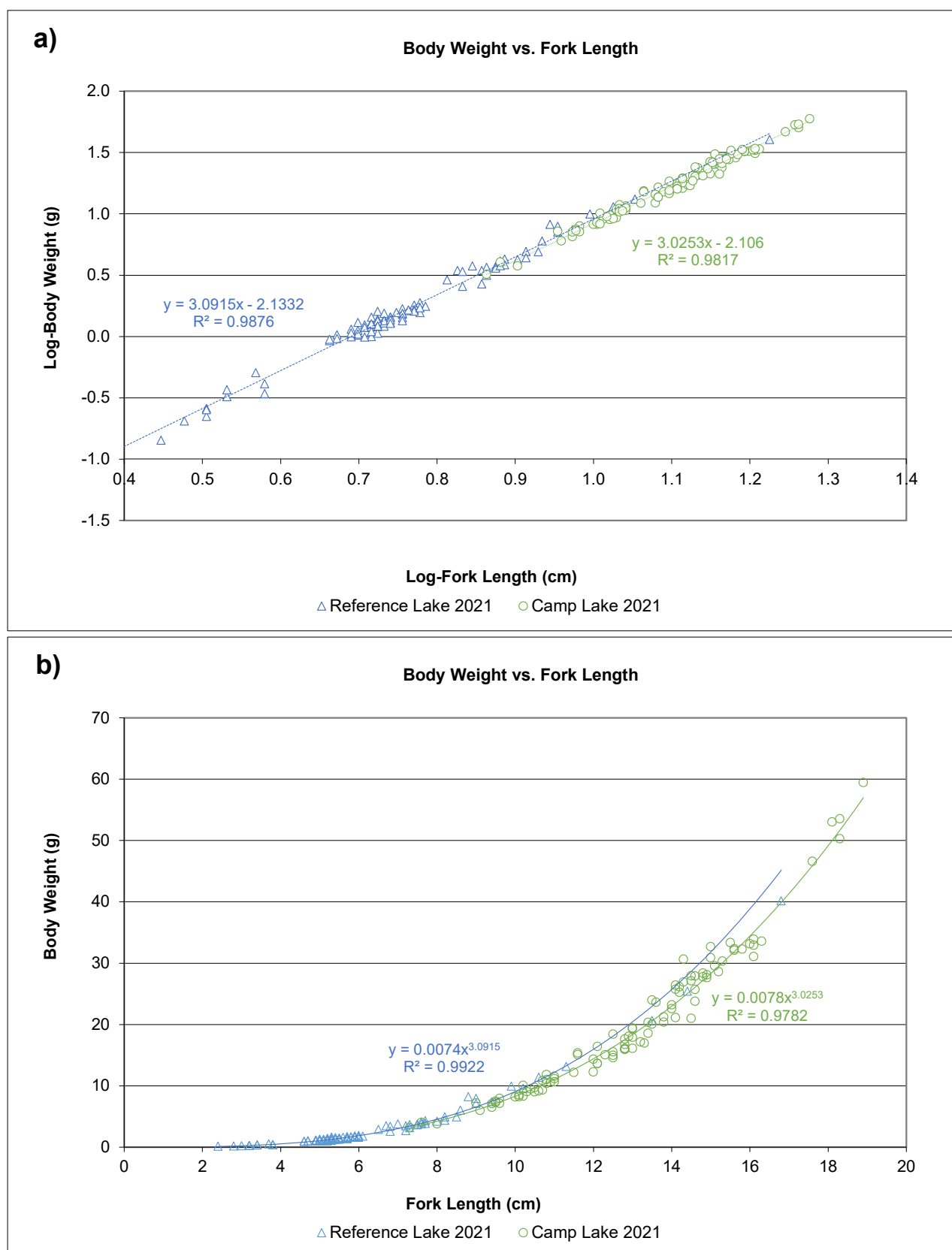


Figure G.2: Comparison of Condition (Weight-at-fork-length Relationship) for Arctic Charr Collected at the Nearshore Area of Camp Lake and Reference Lake 3 in August 2021 using Log-transformed (a) and Untransformed (b) Data

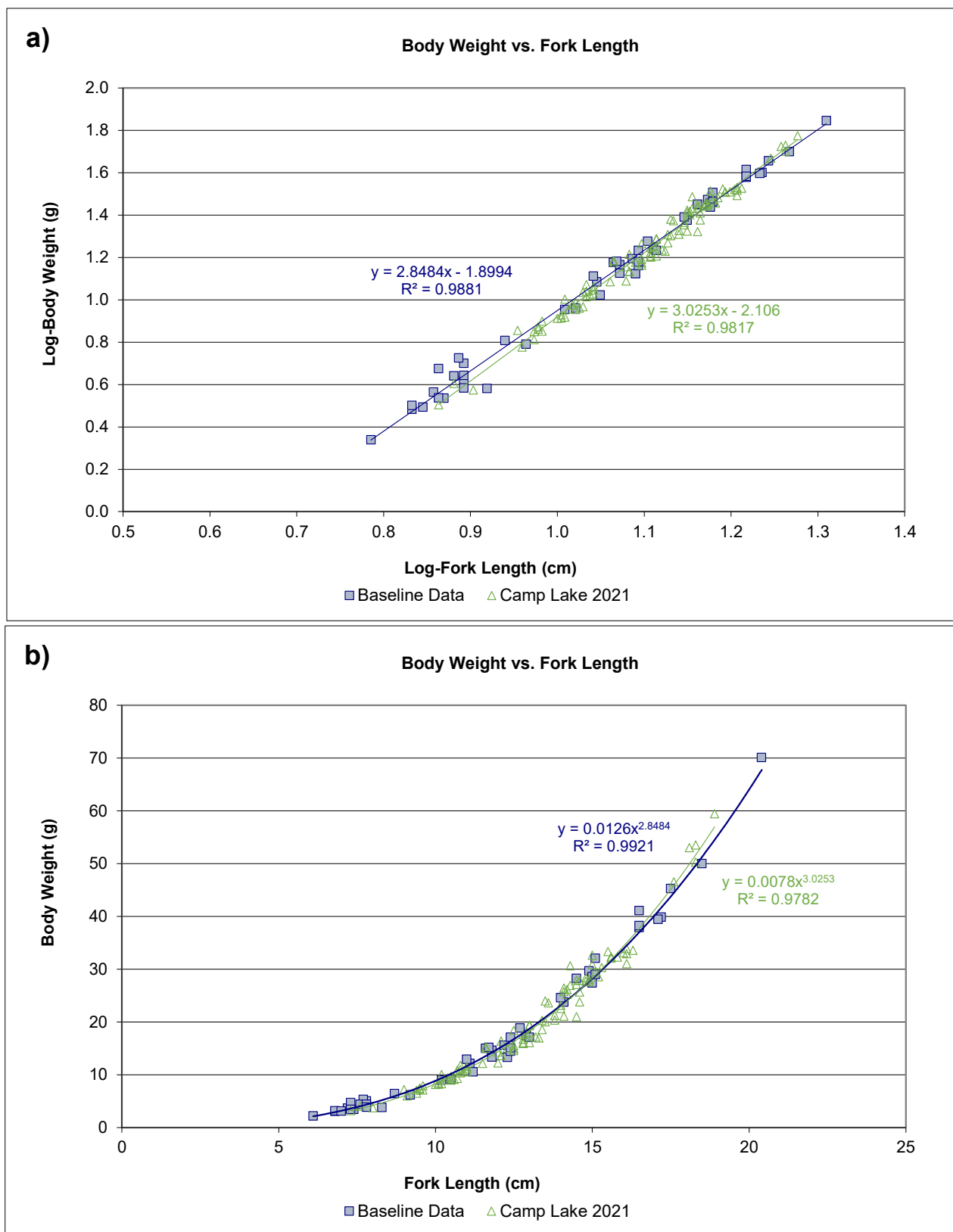


Figure G.3: Comparison of Condition (Weight-at-fork length Relationship) for Arctic Charr Collected in Fall (August-September) at Camp Lake Nearshore Areas in 2021 and during the Mine Baseline Period (2013) using Log-transformed (a) and Untransformed (b) Data

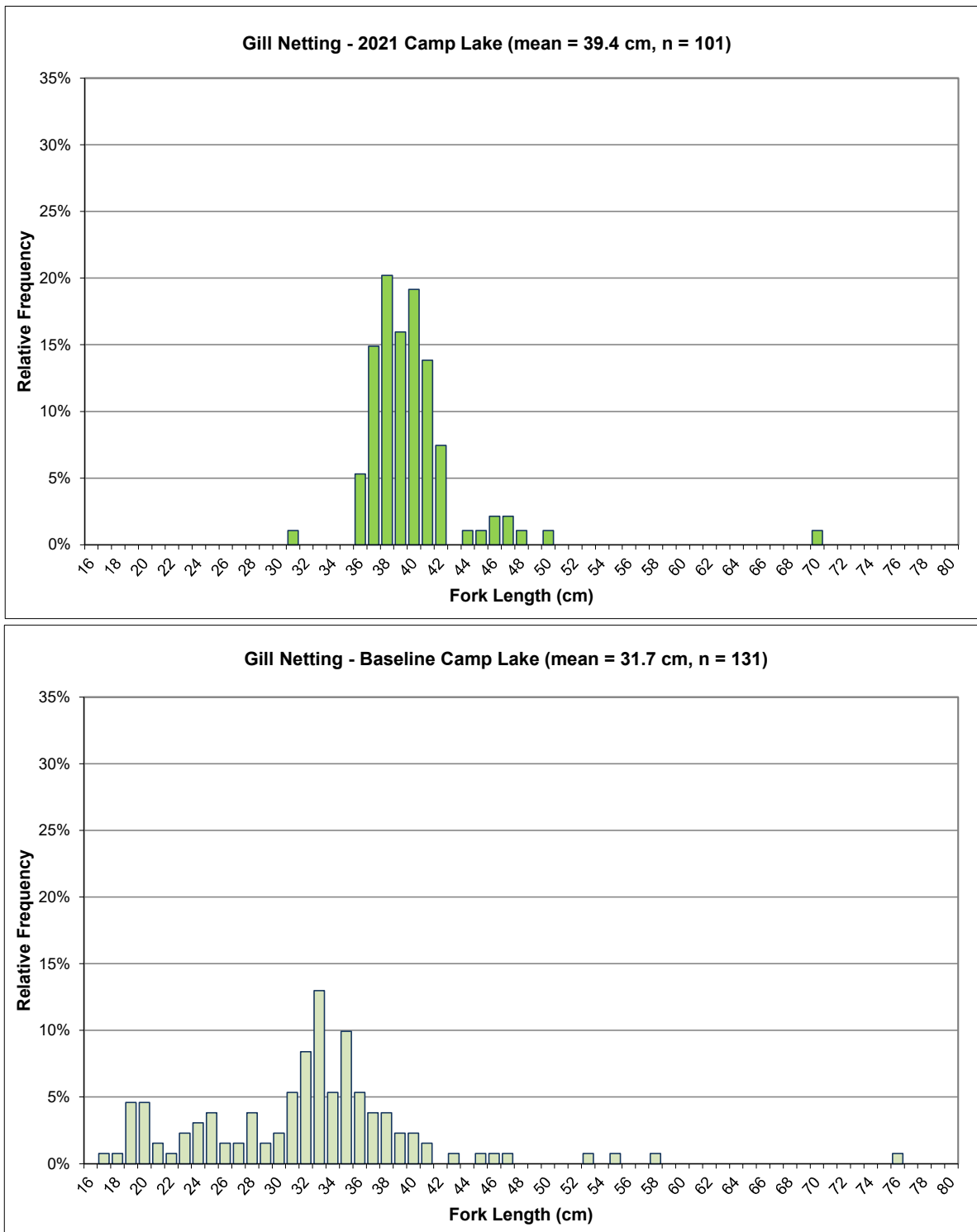


Figure G.4: Length-Frequency Distributions for Arctic Charr Captured by Gill Netting at Camp Lake (JL0) in 2021 and Baseline Studies Conducted in Fall, Mary River Project CREMP

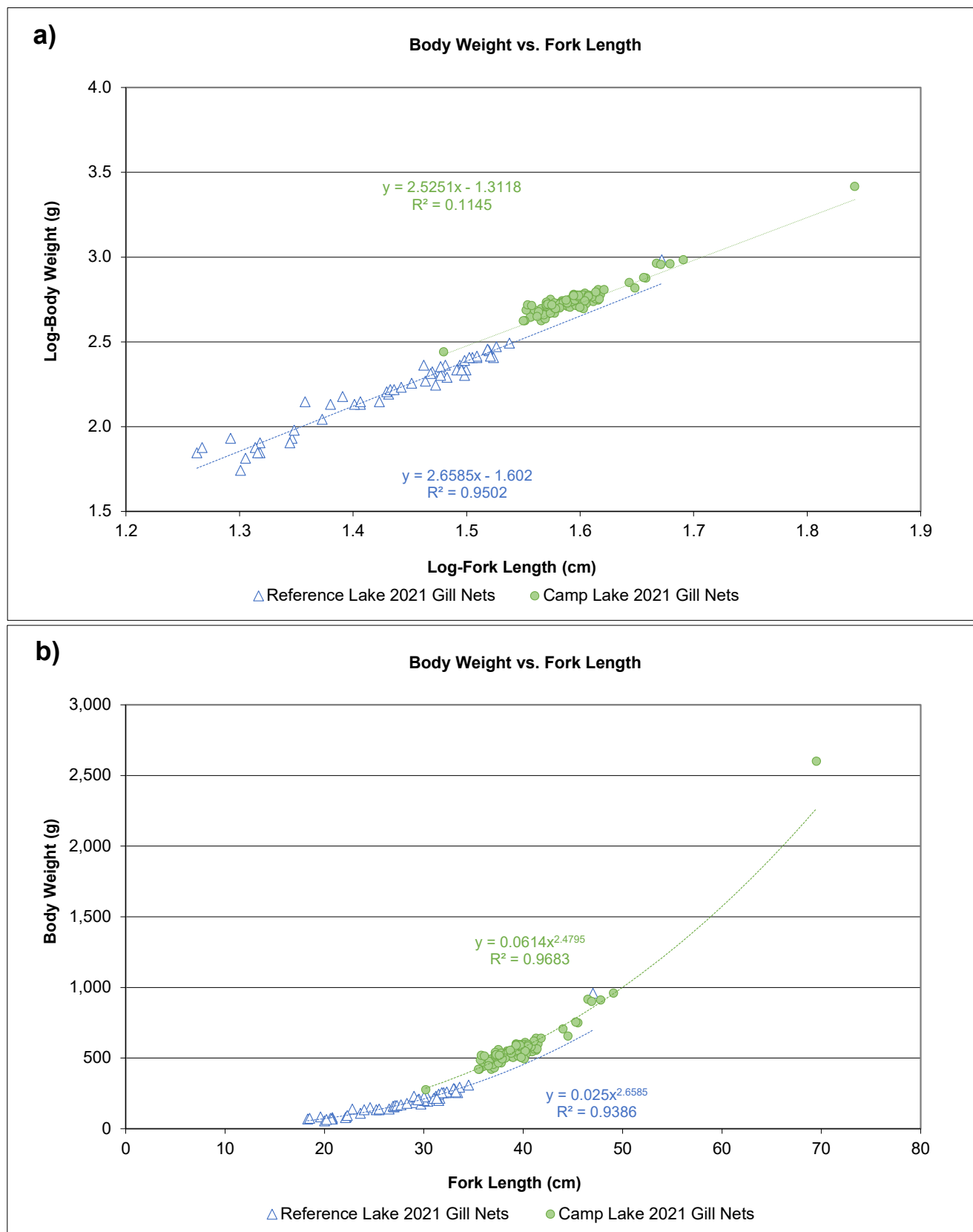


Figure G.5: Comparison of Condition (Weight-at-fork-length Relationship) for Arctic Charr Collected at Littoral/Profundal Areas of Camp Lake and Reference Lake 3 in August 2021 using Log-transformed (a) and Untransformed (b) Data

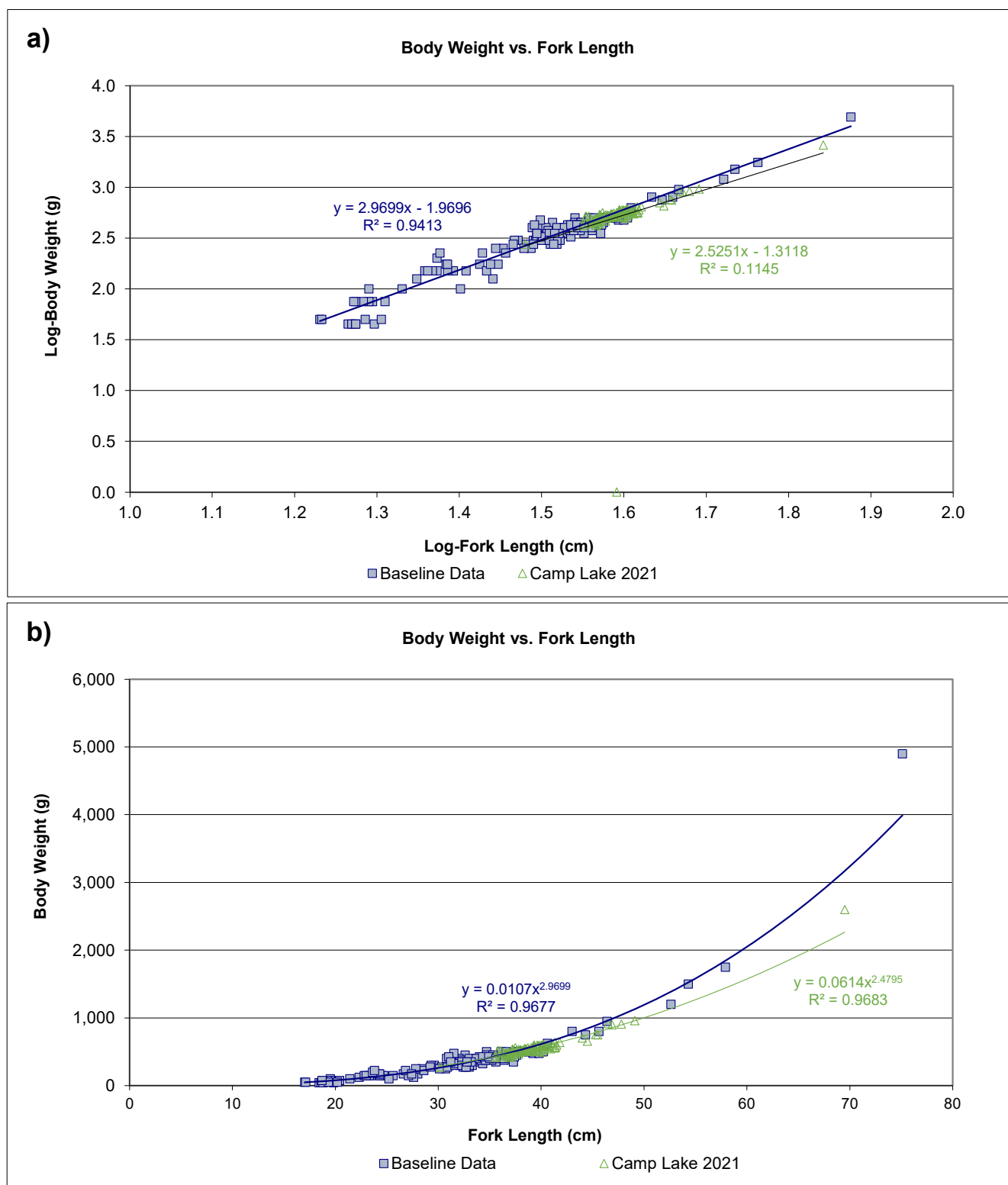


Figure G.6: Comparison of Condition (Weight-at-fork Length Relationship) for Arctic Charr Collected in Fall (August to September) at Camp Lake Littoral/Profundal Areas in 2021 and during the Mine Baseline Period (2006, 2007, 2008, 2013) using Log-transformed (a) and Untransformed (b) Data

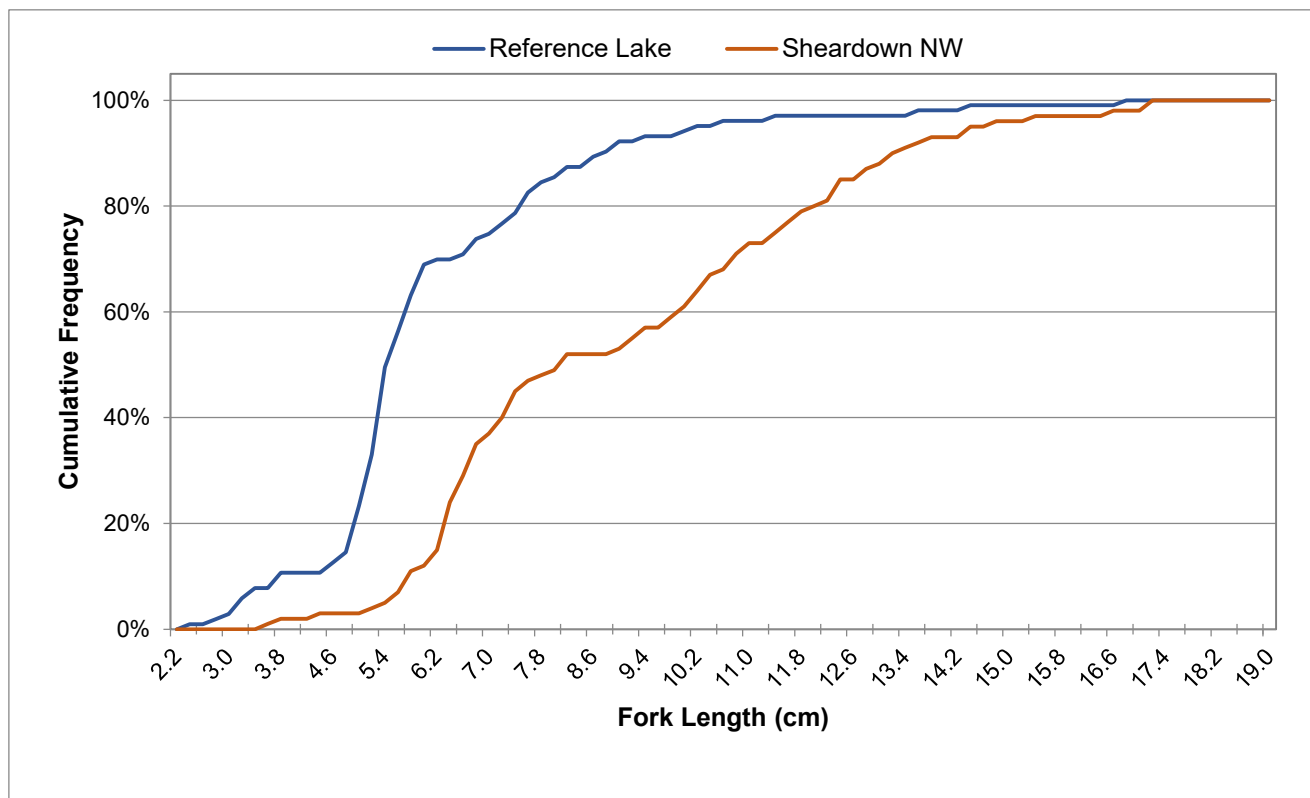


Figure G.7: Cumulative Length-frequency Distributions for Juvenile Arctic Charr Captured by Electrofishing at Nearshore Areas of Sheardown Lake NW and Reference Lake 3, Mary River Project CREMP, August 2021

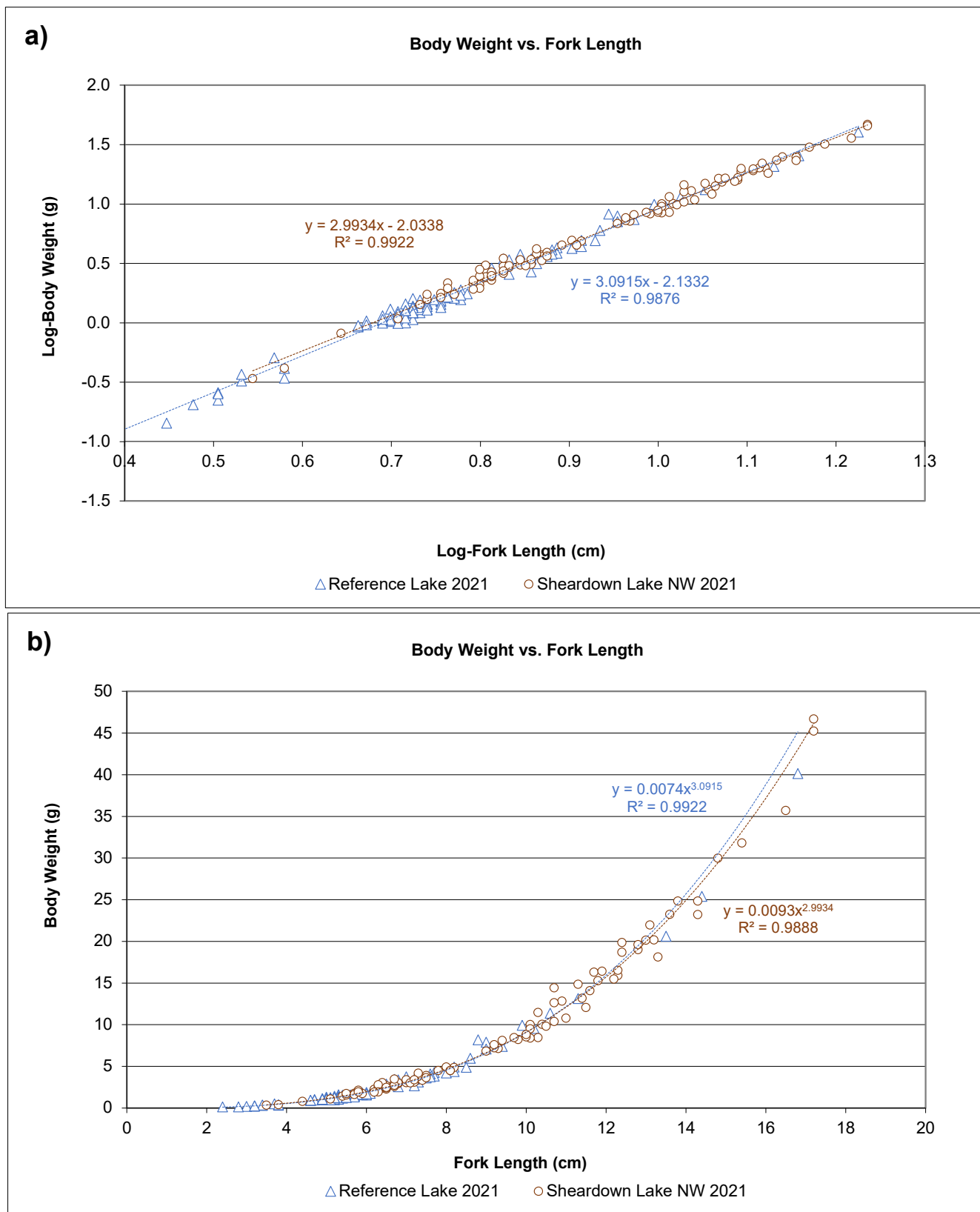


Figure G.8: Comparison of Condition (Weight-at-fork-length Relationship) for Arctic Charr Collected at the Nearshore Area of Sheardown Lake NW and Reference Lake 3 in August 2021 using Log-transformed (a) and Untransformed (b) Data

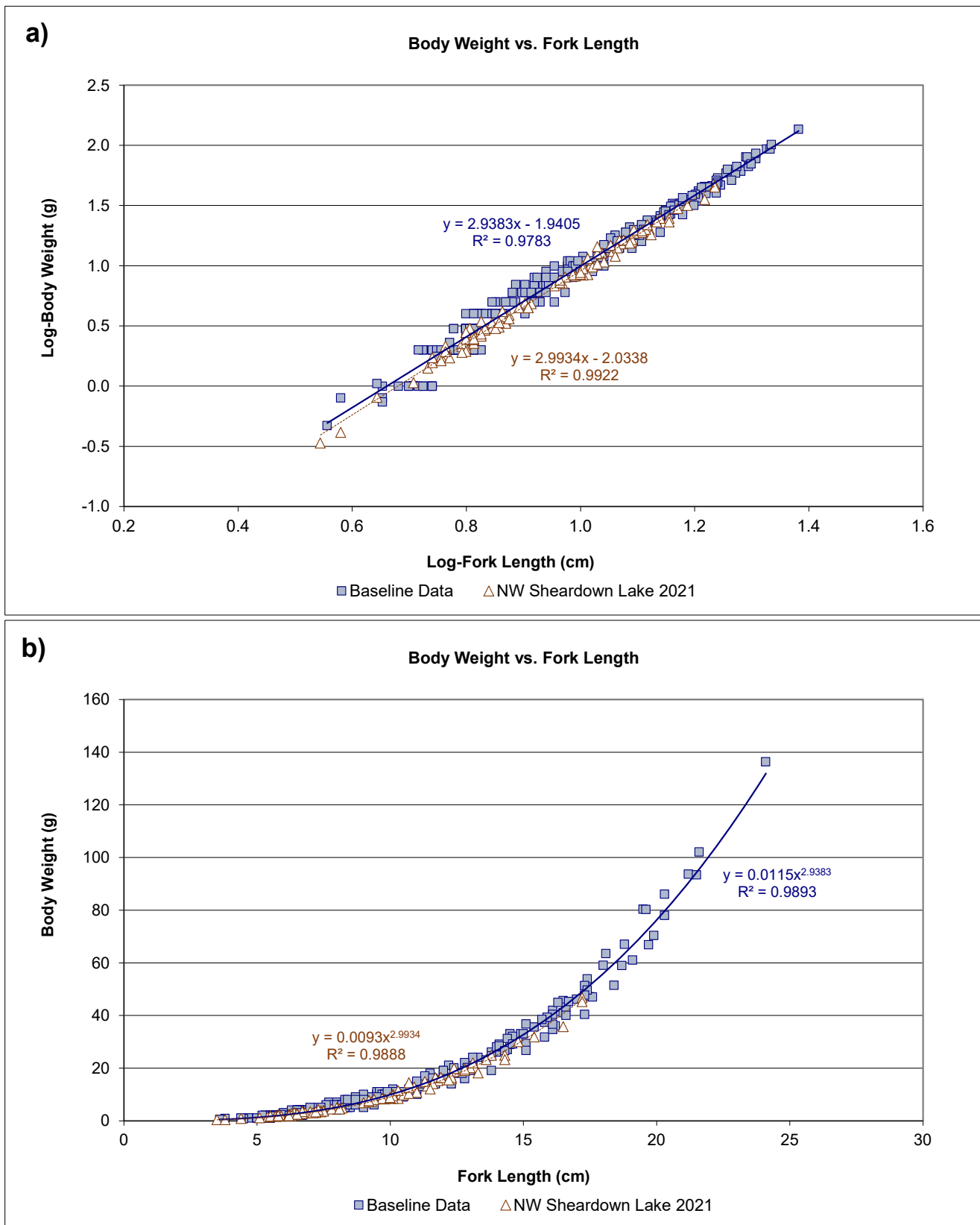


Figure G.9: Comparison of Condition (Weight-at-fork length Relationship) for Arctic Charr Collected in Fall (August to September) at Sheardown Lake NW Nearshore Areas in 2021 and During the Mine Baseline Period (2007, 2008, 2013) using Log-transformed (a) and Untransformed (b) Data, Mary River Project CREMP

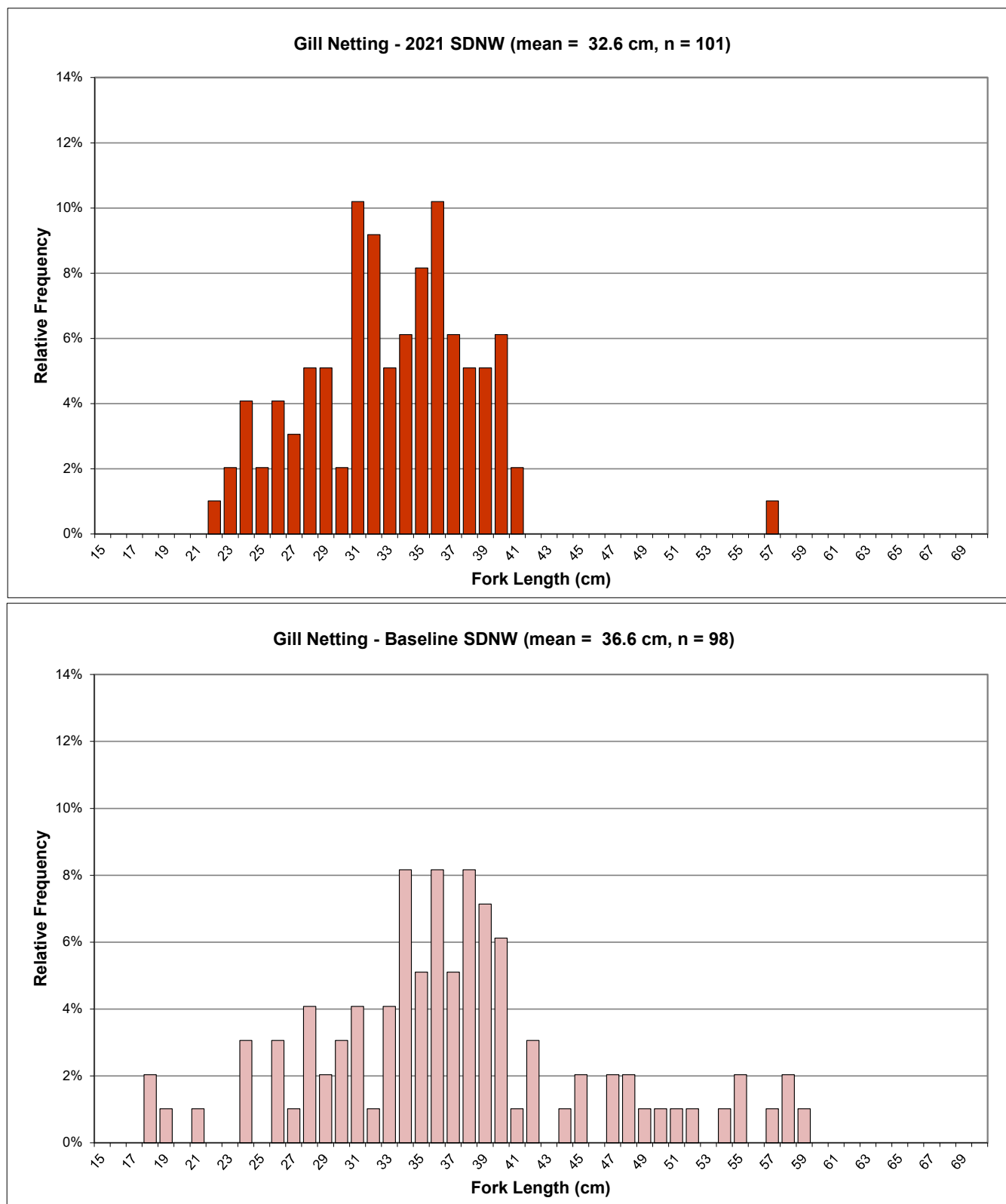


Figure G.10: Length-Frequency Distributions for Arctic Charr Captured by Gill Netting at Sheardown Lake NW (DL0-01) in 2021 and Baseline Studies Conducted in Fall, Mary River Project CREMP

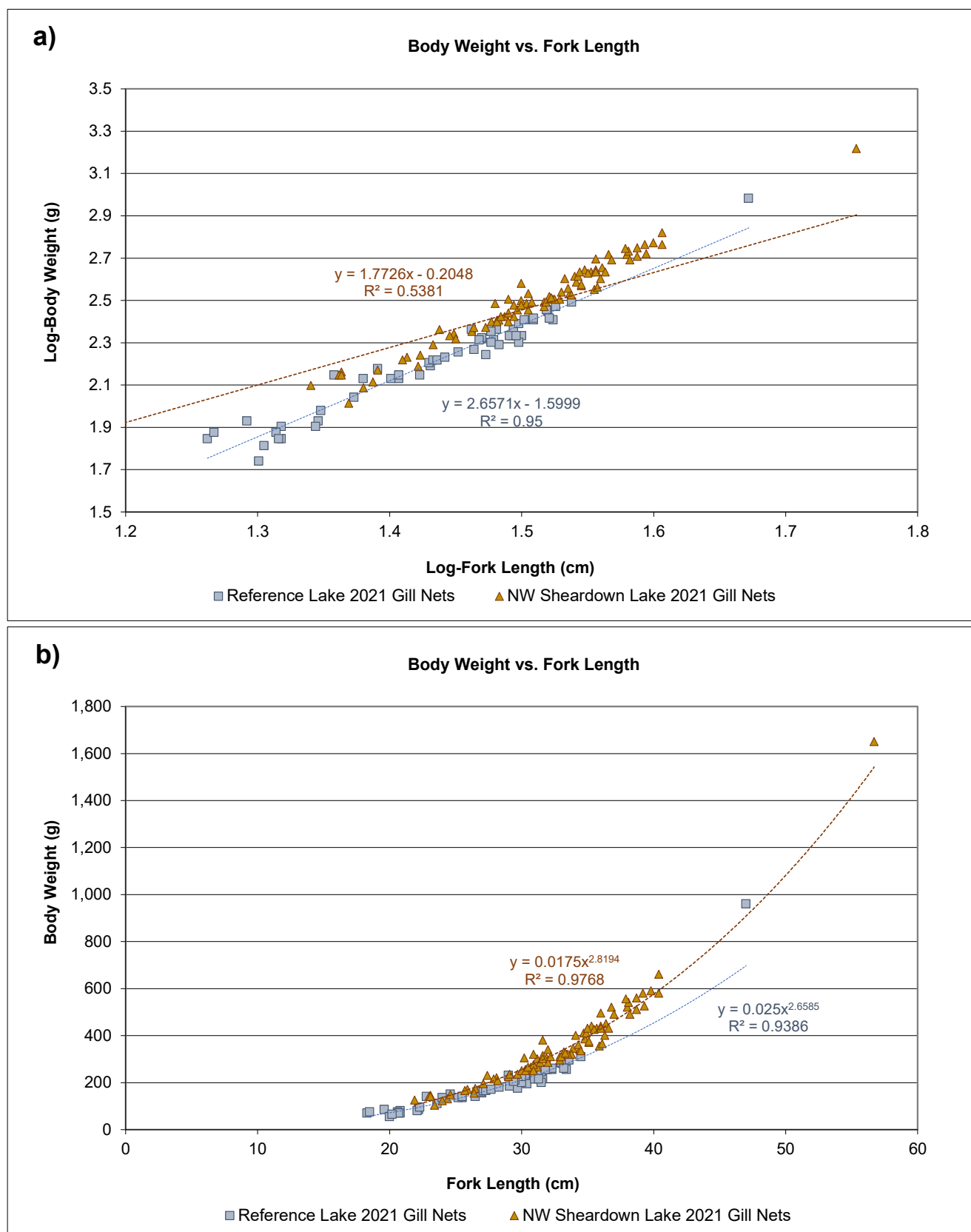


Figure G.11: Comparison of Condition (Weight-at-fork-length Relationship) for Arctic Charr Collected at Littoral/Profundal Areas of Sheardown Lake NW and Reference Lake 3 in August 2021 using Log-transformed (a) and Untransformed (b) Data

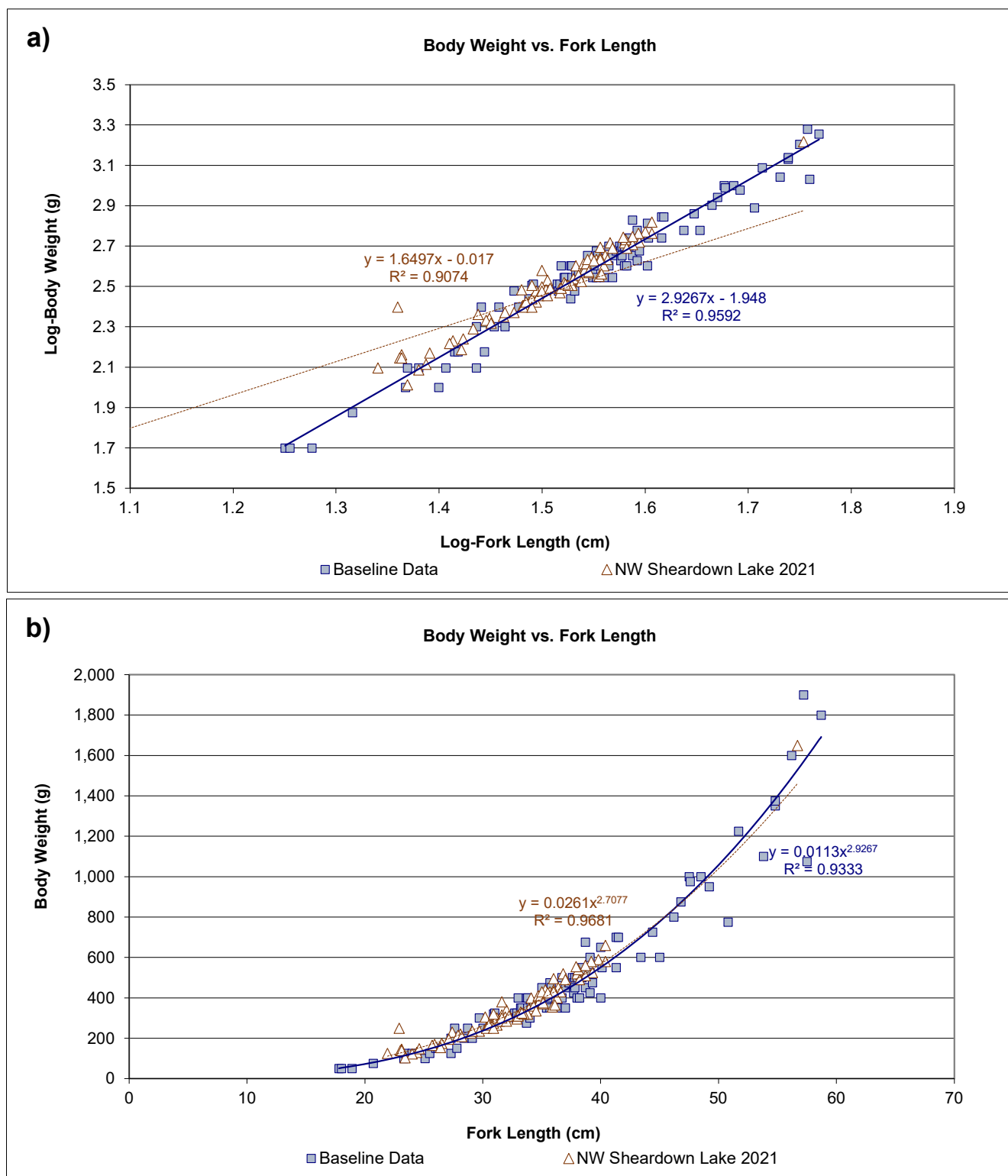


Figure G.12: Comparison of Condition (Weight-at-fork Length Relationship) for Arctic Charr Collected in Fall (August to September) at Sheardown Lake NW Nearshore Areas in 2021 and during the Mine Baseline Period (2006, 2007, 2008, 2013) using Log-transformed (a) and Untransformed (b) Data, Mary River Project CREMP

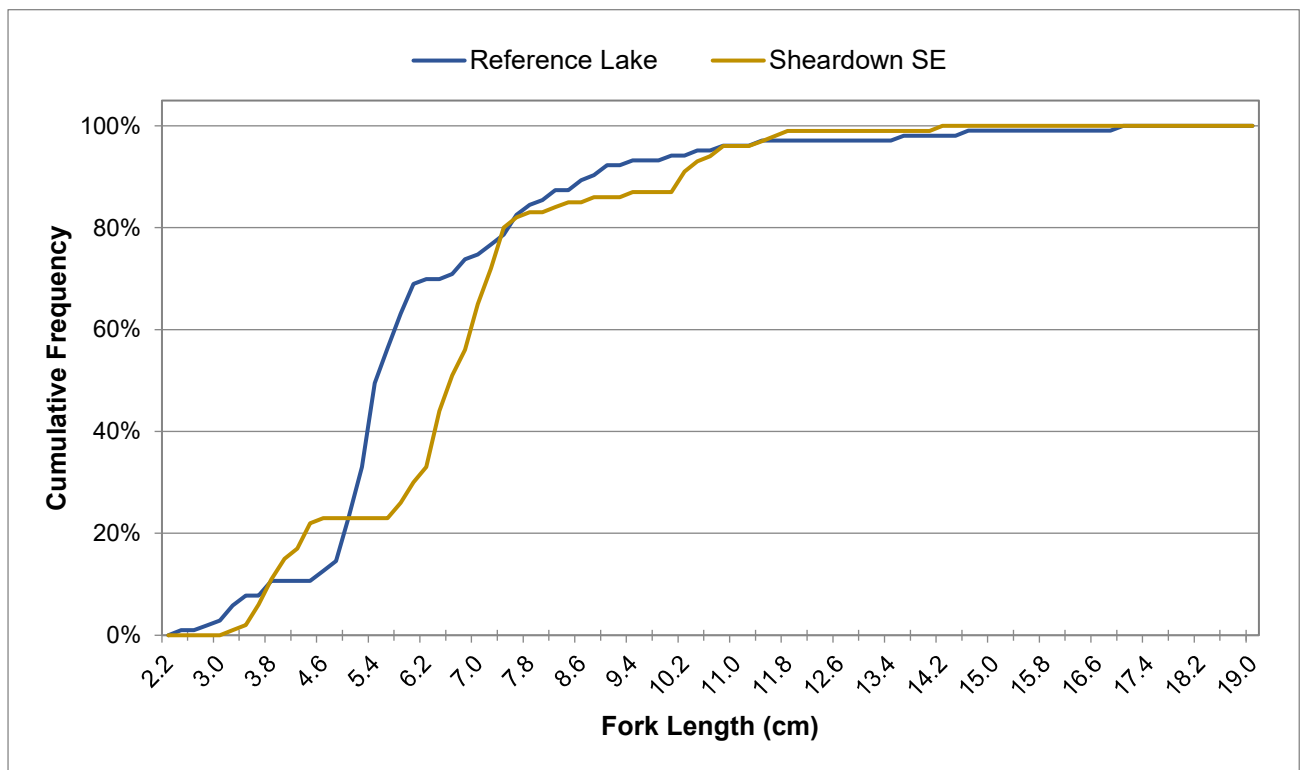


Figure G.13: Cumulative Length-frequency Distributions for Juvenile Arctic Charr Captured by Electrofishing at Nearshore Areas of Sheardown Lake SE and Reference Lake 3, Mary River Project CREMP, August 2021

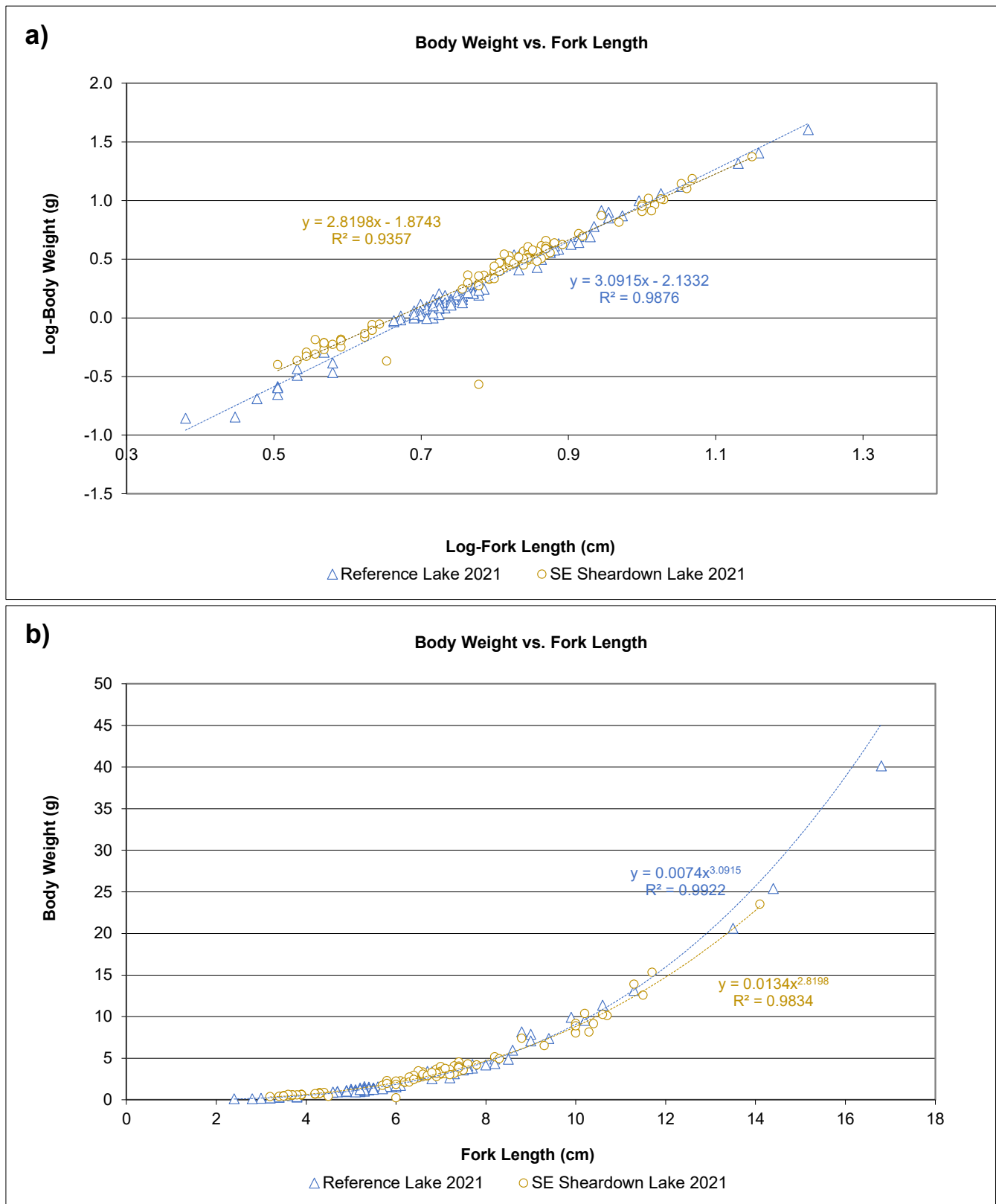


Figure G.14: Comparison of Condition (Weight-at-fork Length Relationship) for Arctic Charr Collected at the Nearshore Area of Sheardown Lake SE and Reference Lake 3 in August 2021 using Log-transformed (a) and Untransformed (b) Data

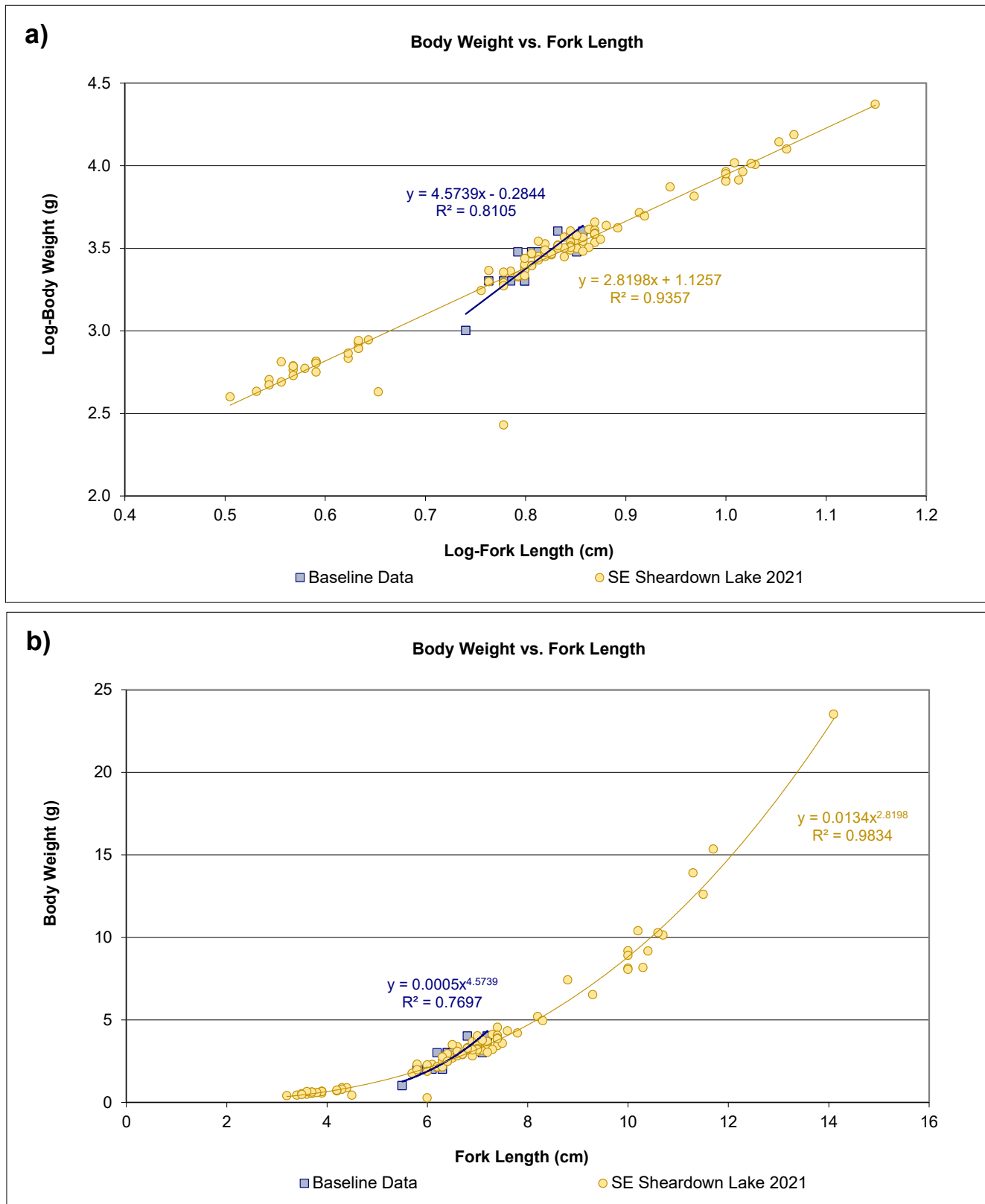


Figure G.15: Comparison of Condition (Weight-at-fork Length Relationship) for Arctic Charr Collected in Fall (August to September) at Sheardown Lake SE Nearshore Areas in 2021 and During the Mine Baseline Period (2007) using Log-transformed (a) and Untransformed (b) Data, Mary River Project CREMP

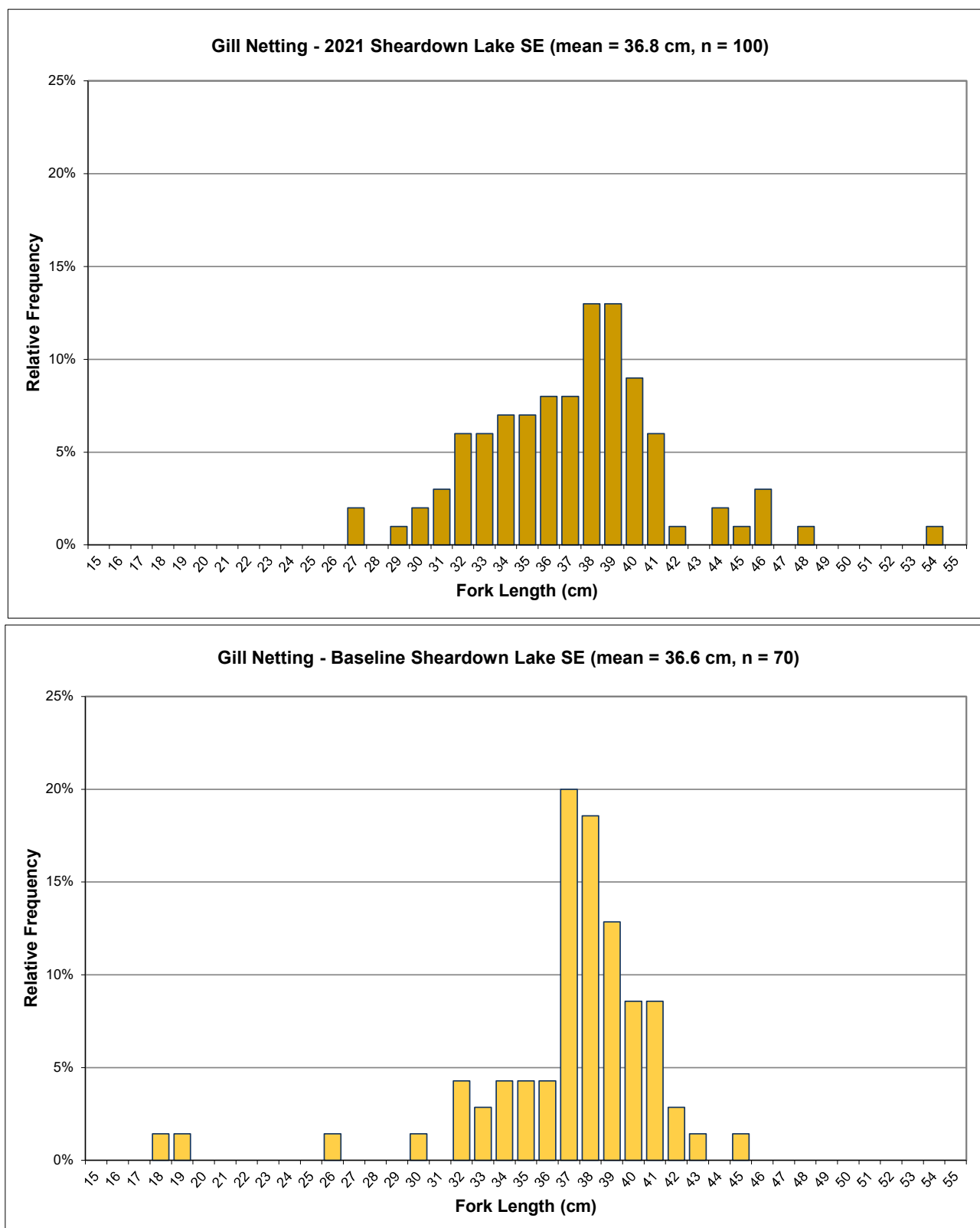


Figure G.16: Length-Frequency Distributions for Arctic Charr Captured by Gill Netting at Sheardown Lake SE (DL0-02) in 2021 and Baseline Studies Conducted in Fall, Mary River Project CREMP

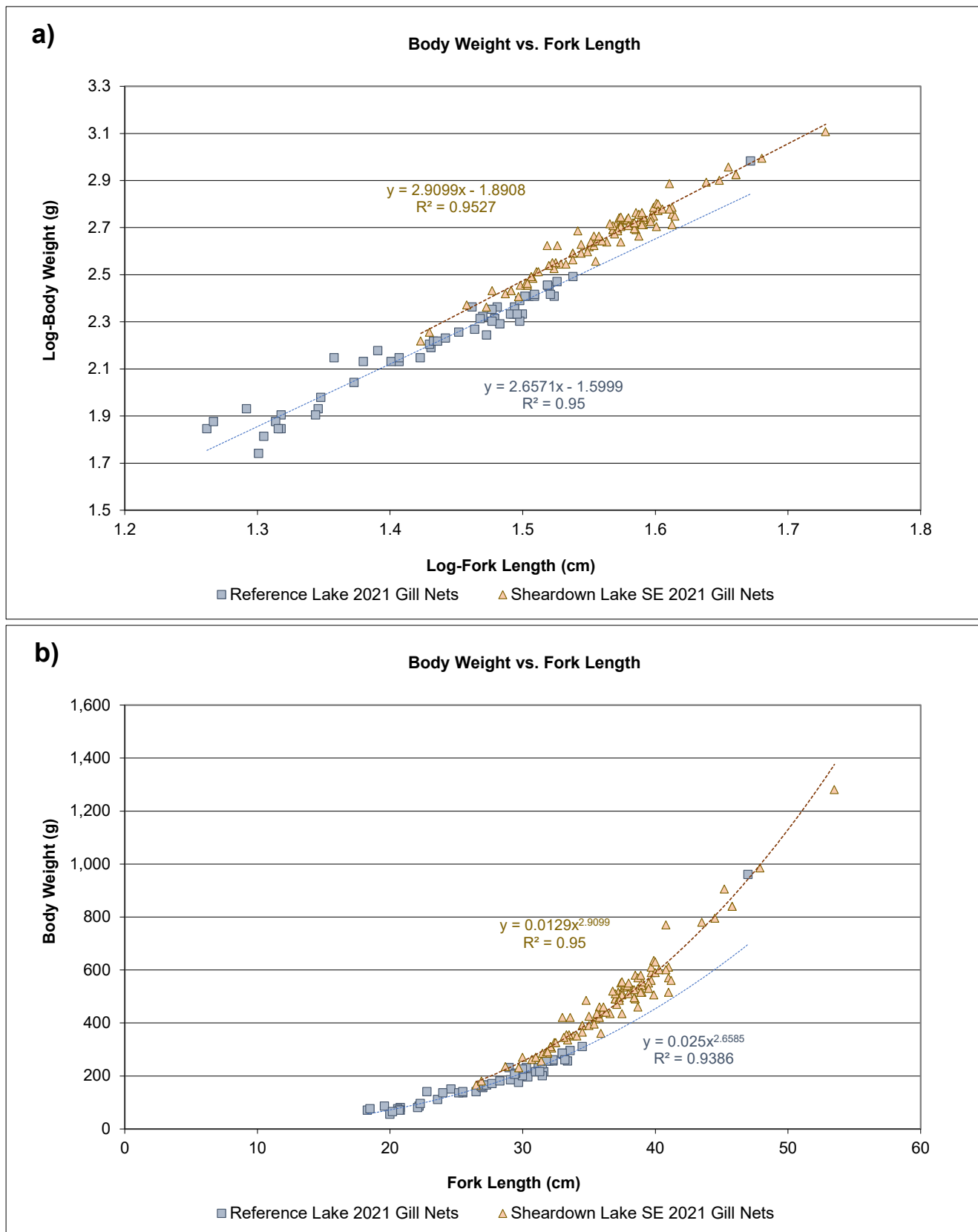


Figure G.17: Comparison of Condition (Weight-at-fork-length Relationship) for Arctic Charr Collected at Littoral/Profundal Areas of Sheardown Lake SE and Reference Lake 3 in August 2021 using Log-transformed (a) and Untransformed (b) Data

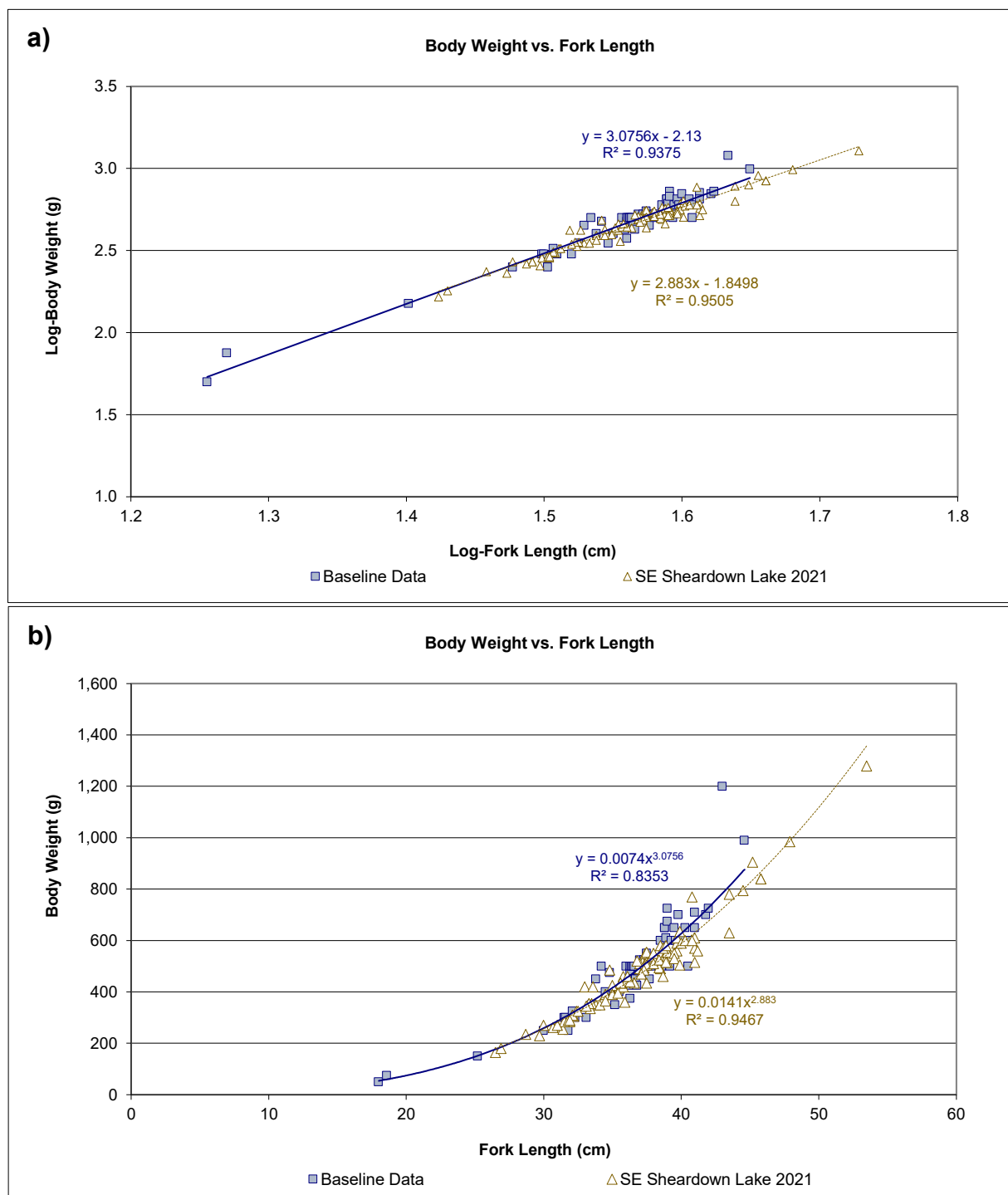


Figure G.18: Comparison of Condition (Weight-at-fork Length Relationship) for Arctic Charr collected in Fall (August to September) at Sheardown Lake SE Nearshore Areas in 2021 and During the Mine Baseline Period (2007, 2008) using Log-transformed (a) and Untransformed (b) Data, Mary River Project CREMP

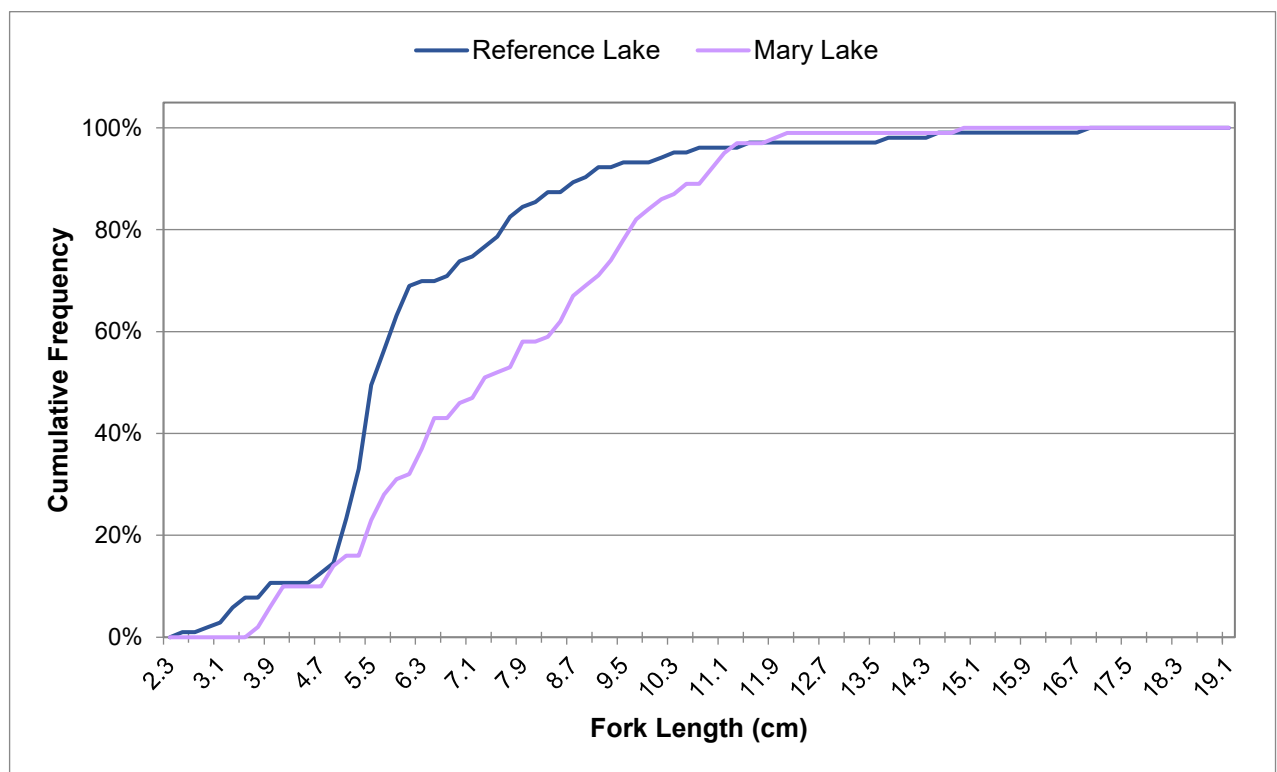


Figure G.19: Cumulative Length-frequency Distributions for Juvenile Arctic Charr Captured by Electrofishing at Nearshore Areas of Mary Lake and Reference Lake 3, Mary River Project CREMP, August 2021

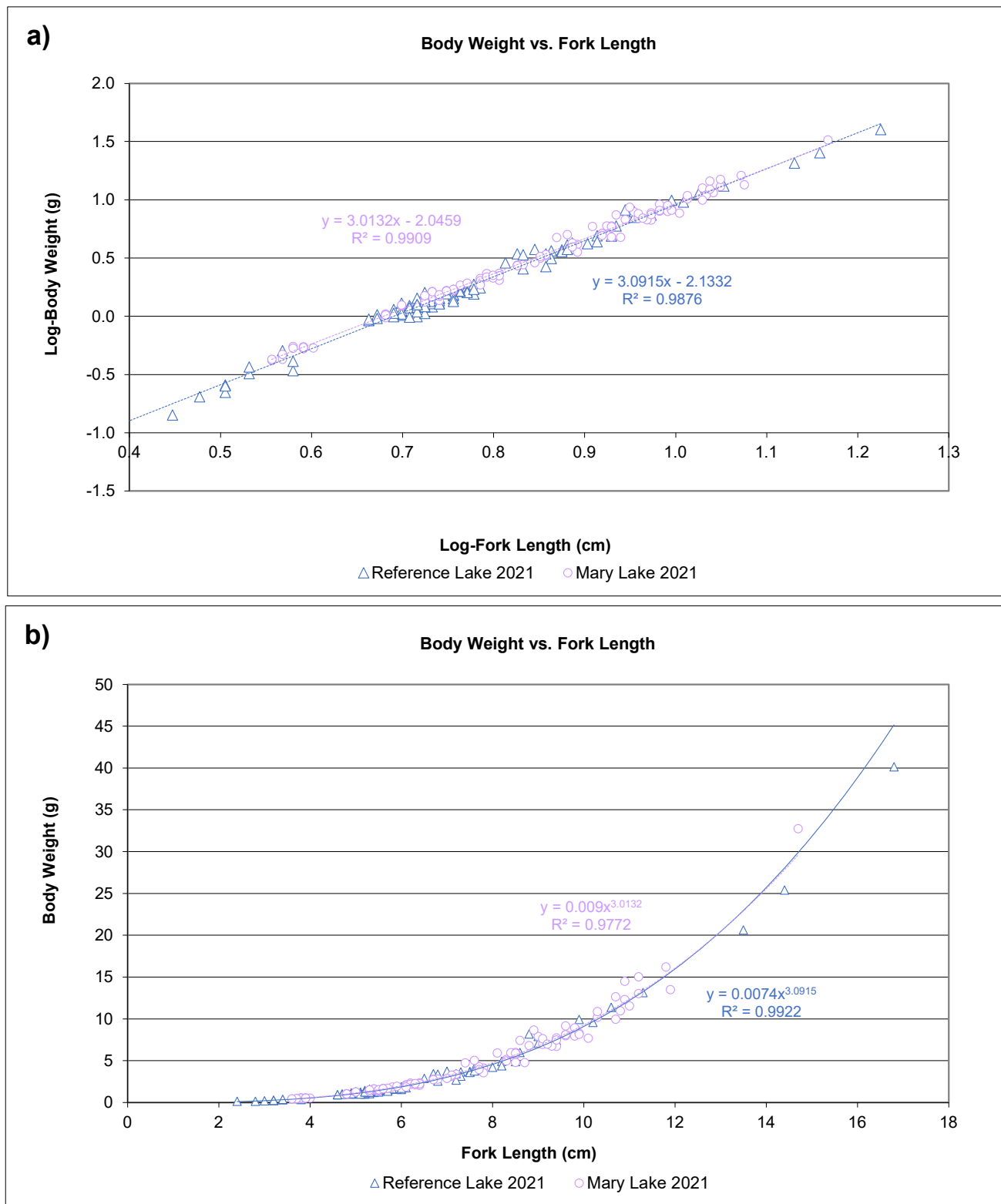


Figure G.20: Comparison of Condition (Weight-at-fork-Length Relationship) for Arctic Charr Collected at the Nearshore Area of Mary Lake and Reference Lake 3 in August 2021 using Log-Transformed (a) and Untransformed (b) Data, Mary River Project 2021 CREMP

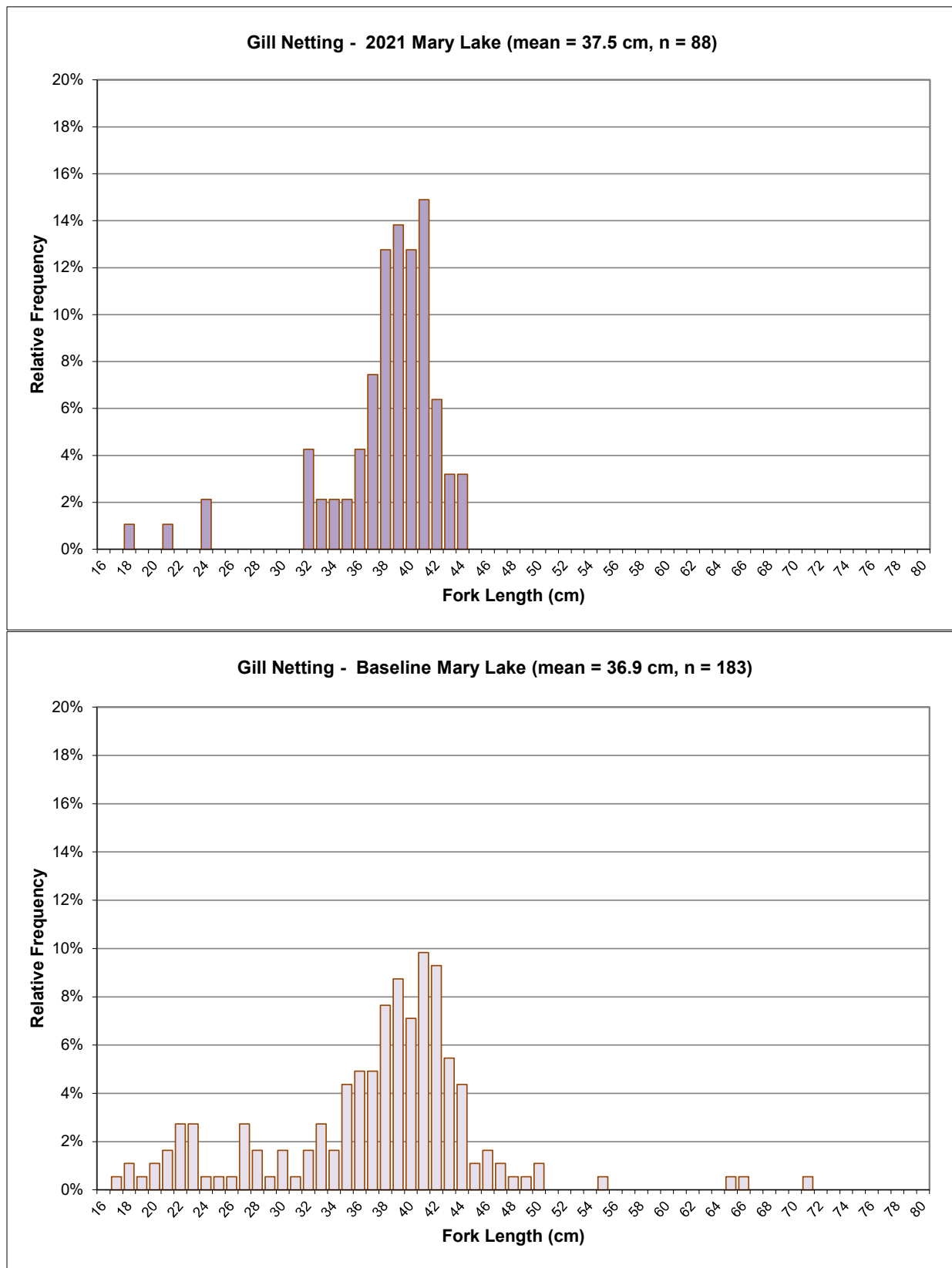


Figure G.21: Length-Frequency Distributions for Arctic Charr Captured by Gill Netting at Mary Lake (BL0) in 2021 and Baseline Studies Conducted in Fall, Mary River Project CREMP

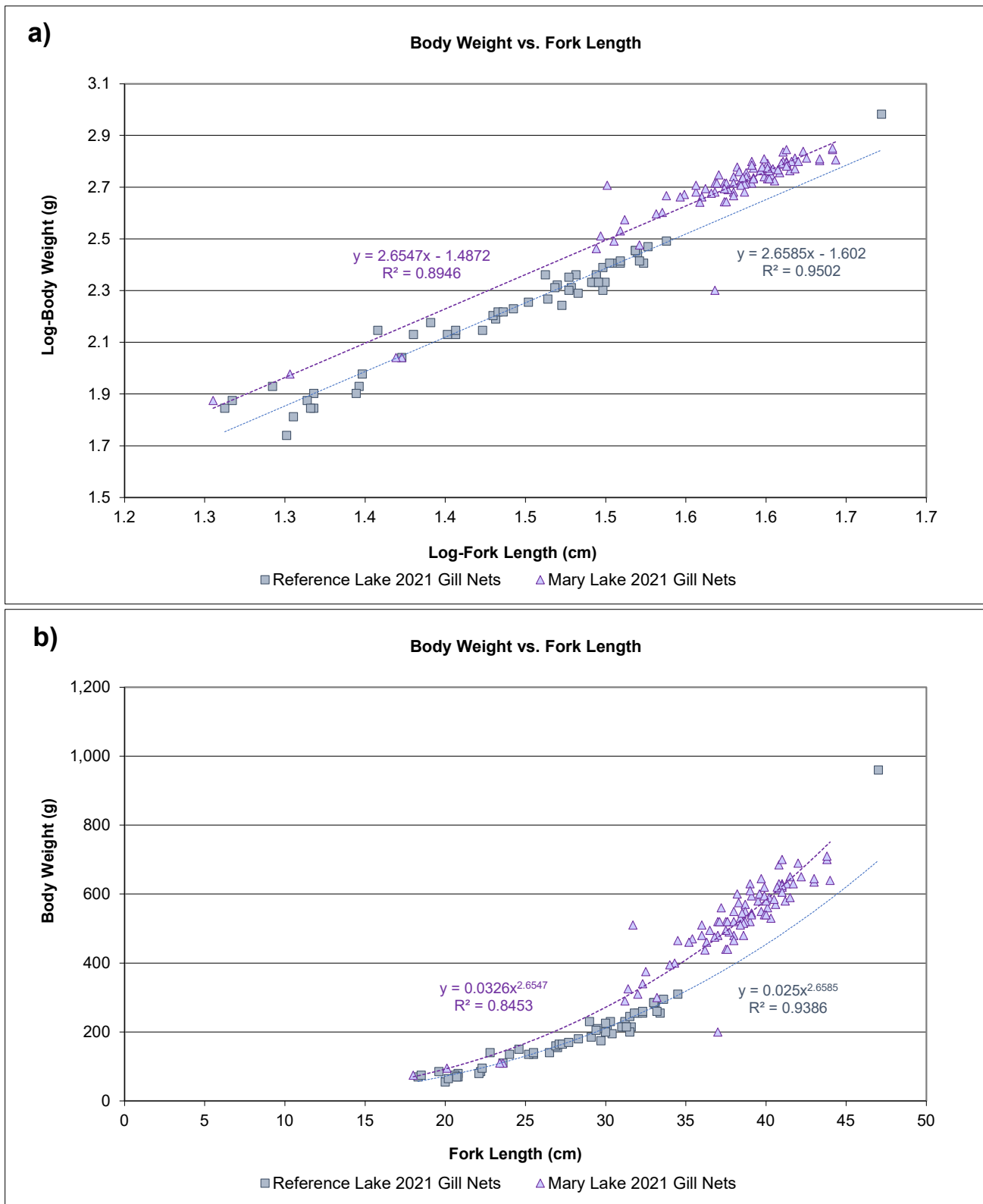


Figure G.22: Comparison of Condition (Weight-at-fork-length Relationship) for Arctic Charr Collected at Littoral/Profundal Areas of Mary Lake and Reference Lake 3 in August 2021 using Log-transformed (a) and Untransformed (b) Data

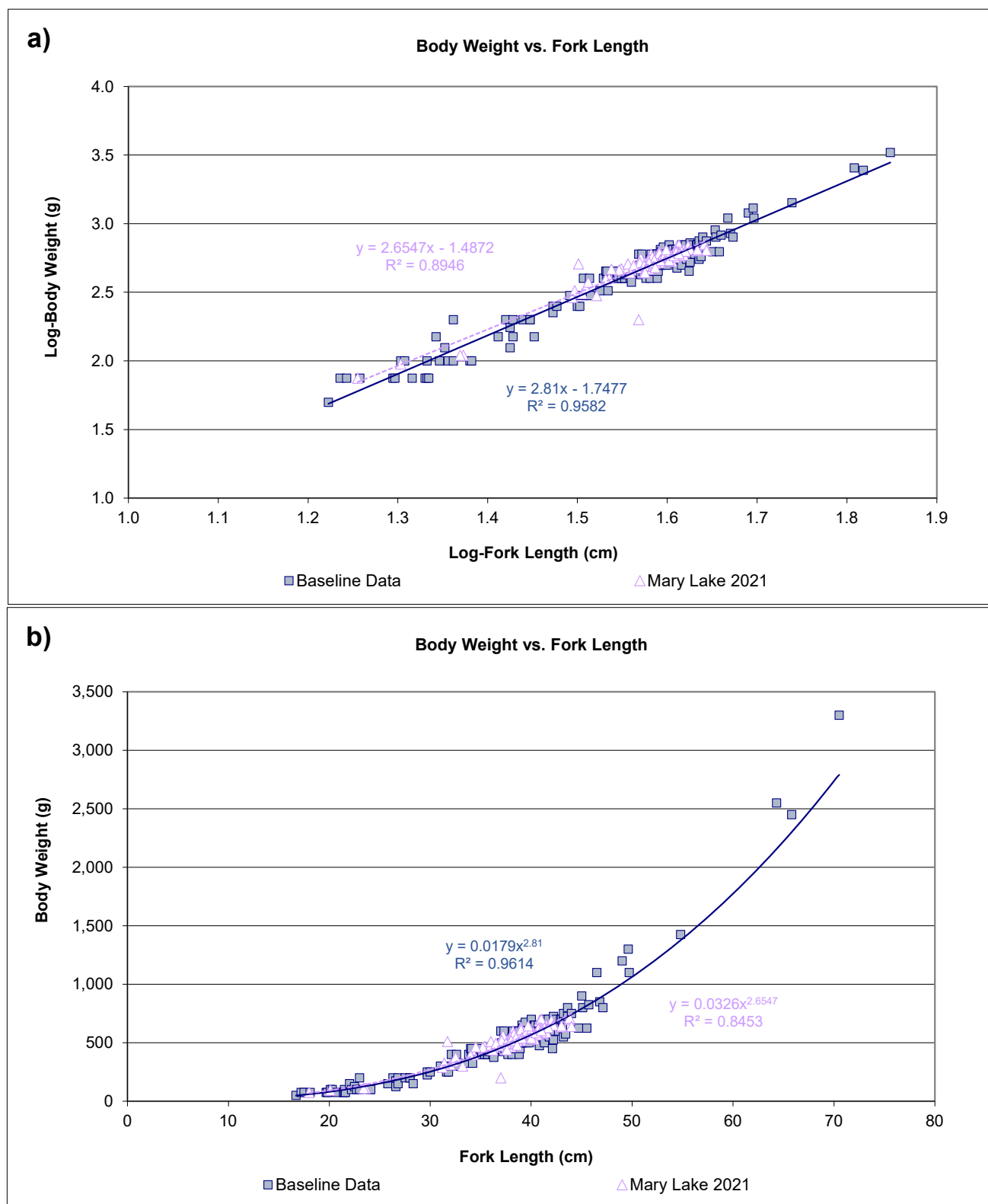


Figure G.23: Comparison of Condition (Weight-at-fork Length Relationship) for Arctic Charr Collected in Fall (August to September) at Mary Lake Nearshore Areas in 2021 and During the Mine Baseline Period (2006, 2007) using Log-transformed (a) and Untransformed (b) Data

Table G.1: Electrofishing Catch Records, Mary River Project CREMP, August 2021

Waterbody	Sample Station Identifier	Location (NAD83, UTM Zone 17W)				Fishing Date	Electrofisher Settings			No. of Passes	Effort (seconds)	Fish Species						Total (all species)	
												Arctic Charr			Nine-spine Stickleback				
		Start		Finish			Output Voltage (volts)	Cycle Freq. (Hz)	Duty Cycle (%)			No. Captured	No. Mortalities / Retained	CPUE	No. Captured	No. Mortalities / Retained	CPUE	Total Catch	CPUE
		Easting	Northing	Easting	Northing														
Reference Lake 3	REF	575165	7853095	574762	7853056	18-Aug-21	500	30	12	1	6,438	115	10	1.07	4	0	0.04	119	1.11
Camp Lake	JLO	557795	7914715	557781	7914716	14-Aug-21	500	30	12	1	639	117	10	10.99	0	0	0.00	117	10.99
Sheardown Lake NW	SDNW	560355	7913428	560142	7913498	14-Aug-21	500	30	12	1	2,945	116	10	2.36	3	0	0.06	119	2.42
Sheardown Lake SE	SDSE	560758	7912320	560880	7912212	11-Aug-21	500	30	12	1	5,923	108	12	1.09	77	7	0.78	185	1.87
Mary Lake	BLO	555406	7905141	555685	7904651	12-Aug-21	500	30	12	1	3,779	102	10	1.62	31	0	0.49	133	2.11

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per electrofishing minute.

Table G.2: Gill Netting Catch Records for Reference Lake 3, Mary River Project CREMP, August 2021

Gill Net Set ID	Location (NAD83, UTM Zone 17N)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Fishing Hours	Effort (m*hrs/100 m)	Arctic Charr Catch Per Mesh Size			Total Catch	CPUE
	Easting	Northing								1½"	2"	3"		
REF-21-GN-01A	574448	7853189	91.4	16-Aug-21	16-Aug-21	12:20	13:40	1.33	1.22	0	0	0	0	0
REF-21-GN-01B	574448	7853189	91.4	16-Aug-21	16-Aug-21	13:50	15:26	1.60	1.46	3	0	0	3	2.05
REF-21-GN-01C	574448	7853189	91.4	16-Aug-21	16-Aug-21	15:40	16:55	1.25	1.14	1	0	0	1	0.87
REF-21-GN-01D	574448	7853189	91.4	17-Aug-21	17-Aug-21	9:10	10:50	1.67	1.52	1	2	0	3	1.97
REF-21-GN-01E	574448	7853189	91.4	17-Aug-21	17-Aug-21	11:05	13:00	1.92	1.75	1	2	0	3	1.71
REF-21-GN-01F	574448	7853189	91.4	17-Aug-21	17-Aug-21	13:10	15:00	1.83	1.68	0	2	0	2	1.19
REF-21-GN-02A	574478	7852999	91.4	16-Aug-21	16-Aug-21	12:25	13:55	1.50	1.37	2	1	0	3	2.19
REF-21-GN-02B	574478	7852999	91.4	16-Aug-21	16-Aug-21	14:15	15:50	1.58	1.45	0	0	0	0	0
REF-21-GN-02C	574478	7852999	91.4	16-Aug-21	16-Aug-21	16:00	17:07	1.12	1.02	0	3	1	4	3.92
REF-21-GN-02D	574478	7852999	91.4	17-Aug-21	17-Aug-21	9:15	11:10	1.92	1.75	1	1	0	2	1.14
REF-21-GN-02E	574478	7852999	91.4	17-Aug-21	17-Aug-21	11:20	13:15	1.92	1.75	0	6	0	6	3.42
REF-21-GN-02F	574478	7852999	91.4	17-Aug-21	17-Aug-21	13:50	15:30	1.67	1.52	4	3	0	7	4.59
REF-21-GN-03A	574016	7852760	91.4	16-Aug-21	16-Aug-21	12:35	14:10	1.58	1.45	0	0	0	0	0
REF-21-GN-03B	574016	7852760	91.4	16-Aug-21	16-Aug-21	14:30	15:50	1.33	1.219	2	0	0	2	1.64
REF-21-GN-03C	574016	7852760	91.4	16-Aug-21	16-Aug-21	16:10	17:30	1.33	1.219	2	0	0	2	1.64
REF-21-GN-04A	574171	7852734	91.4	16-Aug-21	16-Aug-21	12:50	14:40	1.83	1.676	1	4	1	6	3.58
REF-21-GN-04B	574171	7852734	91.4	16-Aug-21	16-Aug-21	15:00	16:20	1.33	1.22	2	2	0	4	3.28
REF-21-GN-05A	574571	7853028	91.4	17-Aug-21	17-Aug-21	9:40	11:30	1.83	1.68	0	0	0	0	0

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Table G.2: Gill Netting Catch Records for Reference Lake 3, Mary River Project CREMP, August 2021

Gill Net Set ID	Location (NAD83, UTM Zone 17N)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Fishing Hours	Effort (m*hrs/100 m)	Arctic Charr Catch Per Mesh Size			Total Catch	CPUE
	Easting	Northing								1½"	2"	3"		
REF-21-GN-06A	574476	7853100	91.4	17-Aug-21	17-Aug-21	9:50	11:40	1.83	1.68	0	0	0	0	0
REF-21-GN-07A	575243	7853016	91.4	17-Aug-21	17-Aug-21	11:55	14:00	2.08	1.90	2	1	0	3	1.57
REF-21-GN-07B	575243	7853016	91.4	17-Aug-21	17-Aug-21	14:20	16:00	1.67	1.52	0	2	0	2	1.31
REF-21-GN-08A	574822	7853087	91.4	17-Aug-21	17-Aug-21	12:35	14:25	1.83	1.68	1	1	0	2	1.19
REF-21-GN-08B	574822	7853087	91.4	17-Aug-21	17-Aug-21	14:40	16:15	1.58	1.45	-	-	-	0	0
Total									34.3	23	30	2	55	1.62

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Table G.3: Summary of Arctic Charr Gill Net Catches by Mesh Size, Mary River Project CREMP, August 2021

Waterbody	Effort (m*hrs/100 m)	Arctic Charr Catch Per Mesh Size			Total Catch	CPUE	Mortalities
		1½"	2"	3"			
Reference Lake 3	34.3	23	30	2	55	1.62	0
Camp Lake	12.2	13	45	59	117	9.68	5
Sheardown Lake NW	37.1	23	78	30	131	7.82	11
Sheardown Lake SE	15.8	30	69	49	148	10.35	29
Mary Lake	25.9	19	31	38	88	3.37	0
Total	125.2	108	253	178	539	6.57	45

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Table G.4: Arctic Charr Measurements from Fish Captured at Reference Lake 3 by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
REF3-21-ACJ-01	9.9	10.7	9.921	-	1.022
REF3-21-ACJ-02	5.4	5.8	1.319	-	0.838
REF3-21-ACJ-03	5.1	5.5	1.240	-	0.935
REF3-21-ACJ-04	8.6	9.2	5.984	-	0.941
REF3-21-ACJ-05	5.9	6.3	1.792	-	0.873
REF3-21-ACJ-06	9.0	9.8	7.905	-	1.084
REF3-21-ACJ-07	7.3	7.9	3.645	-	0.937
REF3-21-ACJ-08	7.7	8.4	4.271	-	0.936
REF3-21-ACJ-09	3.7	3.9	0.506	-	0.999
REF3-21-ACJ-10	5.1	5.4	1.182	-	0.891
REF3-21-ACJ-11	10.2	11.1	9.563	-	0.901
REF3-21-ACJ-12	14.4	15.8	25.411	-	0.851
REF3-21-ACJ-13	7.7	8.3	3.835	-	0.840
REF3-21-ACJ-14	7.6	8.1	4.097	-	0.933
REF3-21-ACJ-15	8.2	8.8	4.912	-	0.891
REF3-21-ACJ-16	5.3	5.7	1.312	-	0.881
REF3-21-ACJ-17	16.8	18.3	40.148	-	0.847
REF3-21-ACJ-18	9.4	10.2	7.387	-	0.889
REF3-21-ACJ-19	7.3	7.7	3.140	-	0.807
REF3-21-ACJ-20	6.7	7.3	3.436	-	1.142
REF3-21-ACJ-21	6.0	6.4	1.881	-	0.871
REF3-21-ACJ-22	5.2	5.6	1.292	-	0.919
REF3-21-ACJ-23	5.7	6.0	1.514	-	0.818
REF3-21-ACJ-24	5.4	5.7	1.382	-	0.878
REF3-21-ACJ-25	7.5	8.0	3.720	-	0.882
REF3-21-ACJ-26	13.5	14.7	20.638	4++	0.839
REF3-21-ACJ-27	7.2	7.7	3.444	2+	0.923
REF3-21-ACJ-28	9.0	9.7	7.083	3	0.972
REF3-21-ACJ-29	6.8	7.3	2.554	2+	0.812
REF3-21-ACJ-30	5.3	5.6	1.304	1+	0.876
REF3-21-ACJ-31	8.2	8.7	4.374	2	0.793
REF3-21-ACJ-32	10.6	11.5	11.382	3++	0.956
REF3-21-ACJ-33	8.5	9.1	4.897	3	0.797
REF3-21-ACJ-34	6.8	7.4	3.374	2+	1.073
REF3-21-ACJ-35	6.1	6.5	1.753	1+	0.772
REF3-21-ACJ-36	11.3	12.2	13.150	-	0.911
REF3-21-ACJ-37	8.8	9.7	8.190	-	1.202
REF3-21-ACJ-38	7.5	8.0	3.601	-	0.854
REF3-21-ACJ-39	7.2	7.6	2.674	-	0.716
REF3-21-ACJ-40	6.0	6.4	1.559	-	0.722
REF3-21-ACJ-41	5.2	5.5	1.433	-	1.019
REF3-21-ACJ-42	5.8	6.2	1.621	-	0.831
REF3-21-ACJ-43	7.6	8.0	3.762	-	0.857
REF3-21-ACJ-44	5.9	6.2	1.649	-	0.803
REF3-21-ACJ-45	7.0	7.6	3.750	-	1.093
REF3-21-ACJ-46	5.3	5.5	1.200	-	0.806
REF3-21-ACJ-47	5.3	5.6	1.251	-	0.840
REF3-21-ACJ-48	5.3	5.6	1.599	-	1.074
REF3-21-ACJ-49	5.5	5.8	1.434	-	0.862
REF3-21-ACJ-50	3.8	4.0	0.341	-	0.621
REF3-21-ACJ-51	4.6	4.8	0.921	-	0.946
REF3-21-ACJ-52	8.0	8.5	4.207	-	0.822
REF3-21-ACJ-53	6.5	6.8	2.878	-	1.048
REF3-21-ACJ-54	5.2	5.6	1.199	-	0.853
REF3-21-ACJ-55	5.9	6.1	1.601	-	0.780
REF3-21-ACJ-56	5.0	5.4	1.297	-	1.038
REF3-21-ACJ-57	5.5	5.7	1.294	-	0.778
REF3-21-ACJ-58	5.4	5.7	1.543	-	0.980
REF3-21-ACJ-59	3.2	3.3	0.222	-	0.677
REF3-21-ACJ-60	4.7	5.0	1.031	-	0.993
REF3-21-ACJ-61	5.2	5.4	0.994	-	0.707
REF3-21-ACJ-62	5.7	6.0	1.680	-	0.907
REF3-21-ACJ-63	5.7	6.1	1.540	-	0.832
REF3-21-ACJ-64	5.6	5.9	1.561	-	0.889

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.4: Arctic Charr Measurements from Fish Captured at Reference Lake 3 by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
REF3-21-ACJ-65		5.7	6.0	1.421	-	0.767
REF3-21-ACJ-66		5.4	5.6	1.209	-	0.768
REF3-21-ACJ-67		5.8	6.1	1.640	-	0.841
REF3-21-ACJ-68		5.0	5.3	1.022	-	0.818
REF3-21-ACJ-69		5.3	5.6	1.255	-	0.843
REF3-21-ACJ-70		5.5	5.7	1.424	-	0.856
REF3-21-ACJ-71		5.4	5.6	1.287	-	0.817
REF3-21-ACJ-72		5.0	5.3	1.120	-	0.896
REF3-21-ACJ-73		6.0	6.2	1.706	-	0.790
REF3-21-ACJ-74		4.7	5.0	0.959	-	0.924
REF3-21-ACJ-75		5.4	5.7	1.341	-	0.852
REF3-21-ACJ-76		5.3	5.5	1.210	-	0.813
REF3-21-ACJ-77		5.5	5.8	1.431	-	0.860
REF3-21-ACJ-78		4.9	5.2	1.144	-	0.972
REF3-21-ACJ-79		5.3	5.5	1.059	-	0.711
REF3-21-ACJ-80		5.0	5.3	1.046	-	0.837
REF3-21-ACJ-81		3.4	3.5	0.322	-	0.819
REF3-21-ACJ-82		4.9	5.2	1.037	-	0.881
REF3-21-ACJ-83		4.9	5.2	1.051	-	0.893
REF3-21-ACJ-84		5.3	5.6	1.375	-	0.924
REF3-21-ACJ-85		3.8	3.9	0.411	-	0.749
REF3-21-ACJ-86		5.3	5.7	1.335	-	0.897
REF3-21-ACJ-87		5.2	5.4	1.094	-	0.778
REF3-21-ACJ-88		5.1	5.4	0.985	-	0.743
REF3-21-ACJ-89		3.0	3.2	0.204	-	0.756
REF3-21-ACJ-90		3.4	3.5	0.367	-	0.934
REF3-21-ACJ-91		5.3	5.6	1.213	-	0.815
REF3-21-ACJ-92		2.4	2.5	0.139	-	1.005
REF3-21-ACJ-93		5.2	5.5	1.260	-	0.896
REF3-21-ACJ-94		5.5	5.8	1.364	-	0.820
REF3-21-ACJ-95		5.7	5.9	1.341	-	0.724
REF3-21-ACJ-96		5.2	5.5	1.263	-	0.898
REF3-21-ACJ-97		3.2	3.3	0.258	-	0.787
REF3-21-ACJ-98		4.6	4.9	0.945	-	0.971
REF3-21-ACJ-99		5.5	5.7	1.277	-	0.768
REF3-21-ACJ-100		4.9	5.2	0.992	-	0.843
REF3-21-ACJ-101		3.2	3.3	0.252	-	0.769
REF3-21-ACJ-102		4.9	5.2	1.064	-	0.904
REF3-21-ACJ-103		2.8	2.9	0.142	-	0.647
Overall Catch Summary	Sample Size (N)	103	103	103	10	103
	Mean	6.2	6.6	3.114	2.3	0.871
	Median	5.5	5.7	1.382	2.0	0.857
	Standard Deviation	2.3	2.5	5.264	0.9	0.103
	Standard Error	0.22	0.25	0.519	0.30	0.010
	Minimum	2.4	2.5	0.139	1	0.621
	Maximum	16.8	18.3	40.148	4	1.202
Young-of-the-Year Catch Summary	Proportion of YOY	11%				
	Sample Size (N)	11	11	11	0	11
	Mean	3.3	3.4	0.3	-	0.8
	Median	3.2	3.3	0.3	-	0.8
	Standard Deviation	0.4	0.4	0.1	-	0.1
	Standard Error	0.1	0.1	0.0	-	0.0
	Minimum	2.4	2.5	0.1	-	0.6
	Maximum	3.8	4.0	0.5	-	1.0

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.5: Arctic Charr Measurements from Fish Captured at Camp Lake by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
JL0-21-ACJ-01	13.0	14.0	16.062	-	0.731
JL0-21-ACJ-02	14.2	15.4	25.208	-	0.880
JL0-21-ACJ-03	12.1	13.2	16.376	-	0.924
JL0-21-ACJ-04	9.6	10.4	7.918	-	0.895
JL0-21-ACJ-05	11.0	12.0	11.543	-	0.867
JL0-21-ACJ-06	14.5	15.6	27.108	-	0.889
JL0-21-ACJ-07	11.5	12.4	12.155	-	0.799
JL0-21-ACJ-08	15.8	17.1	32.271	-	0.818
JL0-21-ACJ-09	7.3	7.7	3.193	-	0.821
JL0-21-ACJ-10	13.4	14.5	20.318	-	0.844
JL0-21-ACJ-11	8.0	8.4	3.750	-	0.732
JL0-21-ACJ-12	12.8	14.1	17.611	-	0.840
JL0-21-ACJ-13	10.1	10.9	8.195	-	0.795
JL0-21-ACJ-14	10.3	11.1	9.034	-	0.827
JL0-21-ACJ-15	10.7	11.8	9.277	-	0.757
JL0-21-ACJ-16	10.0	10.8	8.165	-	0.817
JL0-21-ACJ-17	14.9	16.2	28.056	-	0.848
JL0-21-ACJ-18	12.0	12.9	12.238	-	0.708
JL0-21-ACJ-19	10.8	11.8	11.791	-	0.936
JL0-21-ACJ-20	14.0	15.2	22.538	-	0.821
JL0-21-ACJ-21	10.7	11.6	10.840	-	0.885
JL0-21-ACJ-22	12.9	13.8	18.026	-	0.840
JL0-21-ACJ-23	14.1	15.3	25.735	-	0.918
JL0-21-ACJ-24	13.8	15.1	21.213	-	0.807
JL0-21-ACJ-25	14.1	15.2	26.399	-	0.942
JL0-21-ACJ-26	14.6	15.8	27.883	-	0.896
JL0-21-ACJ-27	12.5	13.5	14.921	-	0.764
JL0-21-ACJ-28	9.5	10.4	7.441	-	0.868
JL0-21-ACJ-29	15.1	17.0	29.532	-	0.858
JL0-21-ACJ-30	17.6	19.2	46.555	-	0.854
JL0-21-ACJ-31	18.3	19.6	50.271	5++	0.820
JL0-21-ACJ-32	12.0	13.1	14.298	3+	0.827
JL0-21-ACJ-33	14.1	15.4	21.081	3++	0.752
JL0-21-ACJ-34	16.1	17.4	31.035	4++	0.744
JL0-21-ACJ-35	13.2	14.1	17.147	4+	0.746
JL0-21-ACJ-36	9.1	9.8	5.979	2+	0.793
JL0-21-ACJ-37	11.6	12.7	15.311	3++	0.981
JL0-21-ACJ-38	16.1	17.5	32.894	3++	0.788
JL0-21-ACJ-39	12.5	13.6	18.373	-	0.941
JL0-21-ACJ-40	13.6	14.9	23.605	-	0.938
JL0-21-ACJ-41	13.0	14.1	17.860	-	0.813
JL0-21-ACJ-42	12.8	13.9	16.089	-	0.767
JL0-21-ACJ-43	13.0	14.4	19.419	-	0.884
JL0-21-ACJ-44	11.0	12.0	10.620	-	0.798
JL0-21-ACJ-45	10.5	11.4	9.692	-	0.837
JL0-21-ACJ-46	14.3	16.2	26.890	-	0.920
JL0-21-ACJ-47	14.6	15.8	23.769	-	0.764
JL0-21-ACJ-48	11.6	12.6	15.047	-	0.964
JL0-21-ACJ-49	12.8	13.9	16.698	-	0.796
JL0-21-ACJ-50	12.8	13.8	15.930	-	0.760
JL0-21-ACJ-51	12.1	13.2	13.621	-	0.769
JL0-21-ACJ-52	9.4	9.9	6.488	1++	0.781
JL0-21-ACJ-53	7.6	8.0	4.021	1++	0.916
JL0-21-ACJ-54	12.3	13.4	15.018	-	0.807
JL0-21-ACJ-55	10.5	11.3	8.970	-	0.775
JL0-21-ACJ-56	9.6	10.3	7.113	-	0.804
JL0-21-ACJ-57	15.2	16.5	28.577	-	0.814
JL0-21-ACJ-58	14.9	16.0	27.603	-	0.834
JL0-21-ACJ-59	13.3	14.5	16.955	-	0.721
JL0-21-ACJ-60	14.8	15.9	28.362	-	0.875
JL0-21-ACJ-61	14.6	15.8	25.668	-	0.825
JL0-21-ACJ-62	10.1	11.0	8.476	-	0.823
JL0-21-ACJ-63	12.5	13.7	14.553	-	0.745
JL0-21-ACJ-64	9.0	9.6	7.165	-	0.983

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.5: Arctic Charr Measurements from Fish Captured at Camp Lake by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
JL0-21-ACJ-65		11.0	11.9	11.119	-	0.835
JL0-21-ACJ-66		14.5	15.8	20.970	-	0.688
JL0-21-ACJ-67		12.8	13.7	15.900	-	0.76
JL0-21-ACJ-68		15.6	17.0	32.071	-	0.845
JL0-21-ACJ-69		14.0	15.0	23.168	-	0.844
JL0-21-ACJ-70		10.8	11.7	10.976	-	0.871
JL0-21-ACJ-71		9.4	10.1	7.066	-	0.851
JL0-21-ACJ-72		16.3	17.6	33.551	-	0.775
JL0-21-ACJ-73		10.2	10.9	8.268	-	0.779
JL0-21-ACJ-74		15.0	16.4	30.842	-	0.914
JL0-21-ACJ-75		10.8	11.7	10.335	-	0.820
JL0-21-ACJ-76		14.2	15.4	26.121	-	0.912
JL0-21-ACJ-77		15.3	16.1	30.287	-	0.846
JL0-21-ACJ-78		10.6	11.5	9.120	-	0.766
JL0-21-ACJ-79		9.5	10.3	7.259	-	0.847
JL0-21-ACJ-80		16.0	17.5	33.113	-	0.808
JL0-21-ACJ-81		13.5	14.6	23.969	-	0.974
JL0-21-ACJ-82		14.3	15.7	30.620	-	1.047
JL0-21-ACJ-83		16.1	17.8	33.876	-	0.812
JL0-21-ACJ-84		10.4	11.2	9.444	-	0.840
JL0-21-ACJ-85		13.0	14.1	19.281	-	0.878
JL0-21-ACJ-86		15.6	17.2	32.315	-	0.851
JL0-21-ACJ-87		14.5	15.9	27.918	-	0.916
JL0-21-ACJ-88		13.5	14.7	20.044	-	0.815
JL0-21-ACJ-89		13.8	15.0	20.362	-	0.775
JL0-21-ACJ-90		10.2	11.1	10.049	-	0.947
JL0-21-ACJ-91		18.1	19.6	52.997	-	0.894
JL0-21-ACJ-92		14.8	16.2	27.744	-	0.856
JL0-21-ACJ-93		12.5	13.6	15.486	-	0.793
JL0-21-ACJ-94		18.3	19.8	53.508	-	0.873
JL0-21-ACJ-95		13.4	14.6	18.555	-	0.771
JL0-21-ACJ-96		15.5	16.8	33.319	-	0.895
JL0-21-ACJ-97		15.0	16.2	32.661	-	0.968
JL0-21-ACJ-98		12.1	13.1	13.594	-	0.767
JL0-21-ACJ-99		18.9	20.4	59.419	-	0.880
JL0-21-ACJ-100		10.9	11.8	10.524	-	0.813
Overall Catch Summary	Sample Size (N)	100	100	100	10	100
	Average	12.9	14.0	20.018	2.9	0.838
	Median	13.0	14.1	17.736	3.0	0.831
	Standard Deviation	2.5	2.7	11.401	1.3	0.069
	Standard Error	0.25	0.27	1.140	0.41	0.007
	Minimum	7.3	7.7	3.193	1.0	0.688
	Maximum	18.9	20.4	59.419	5.0	1.047
Young-of-the-Year Catch Summary	Proportion of YOY	0%				
	Sample Size (N)	0	0	0	0	0
	Average	-	-	-	-	-
	Median	-	-	-	-	-
	Standard Deviation	-	-	-	-	-
	Standard Error	-	-	-	-	-
	Minimum	-	-	-	-	-
	Maximum	-	-	-	-	-

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.6: Results of Nearshore Arctic Charr Non-Young-of-the-Year (YOY) Health Endpoint Statistical Comparisons between Camp Lake (JLO) and Reference Lake 3 (REF), Mary River Project CREMP, August 2021

Group	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	MOD (%) ^c
			Response	Covariate	REF	JL0		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
								Interaction P-value	Covariate P-value		Statistic	REF	JL0		
All Fish	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	103	100	K-S	-	-	-	-	-	-	<0.001	-
Non-YOY	Survival	Length Frequency Distribution	Fork Length (cm)	-	92	100	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	92	100	M-W	-	-	-	Median	5.55	13.0	<0.001	134
		Body Weight	Body Weight (g)	-	92	100	M-W	-	-	-	Median	1.47	17.7	<0.001	1,103
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	92	100	ANCOVA	0.614	<0.001	9.03	Adjusted Mean	6.54	6.06	0.002

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

Notes: YOY = young-of-year. MOD = magnitude of difference.

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

Table G.7: Results of Nearshore Arctic Charr Non-Young-of-the-Year (Non-YOY) Health Endpoint Statistical Comparisons between Samples Collected in 2021 and the Baseline Period at Individual Mine-Exposed Lakes, Mary River Project 2021 CREMP

Lake	Group	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
				Response	Covariate	Baseline	2021		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
									Interaction P-value	Covariate P-value		Statistic	Baseline	2021		
Camp (JLO)	Non-YOY	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	51	100	K-S	-	-	-	-	-	-	0.009	-
		Body Size	Fork Length	Fork Length (cm)	-	51	100	tunequal	-	-	-	Mean	11.8	12.9	0.051	9.6
			Body Weight	log[Body Weight (g)]	-	51	100	tequal	-	-	-	Geometric Mean	12.3	17.0	0.011	38
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	51	100	ANCOVA	0.004 ^d	<0.001	12.2	Adjusted Mean	15.6	15.0	0.028	-3.5
Sheardown NW (DLO-01)	Non-YOY	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	244	97	K-S	-	-	-	-	-	-	0.044	-
		Body Size	Fork Length	Fork Length (cm)	-	244	97	M-W	-	-	-	Median	8.30	8.20	0.612	-1.2
			Body Weight	Body Weight (g)	-	244	97	M-W	-	-	-	Median	6.00	4.92	0.199	-18
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	244	97	ANCOVA	0.761	<0.001	9.09	Adjusted Mean	7.42	6.86	<0.001	-7.5
Sheardown SE (DLO-02)	Non-YOY	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	16	77	K-S	-	-	-	-	-	-	0.012	-
		Body Size	Fork Length	log[Fork Length (cm)]	-	16	77	M-W	-	-	-	Median	6.30	7.00	<0.001	11
			Body Weight	Body Weight(g)	-	16	77	M-W	-	-	-	Median	2.50	3.30	0.004	32
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	16	77	ANCOVA	0.031 ^e	<0.001	7.17	Adjusted Mean	3.46	3.45	0.955	-0.41
			Condition	log[Body Weight (g)]	log[Fork Length (cm)]	14 ^f	76 ^g	ANCOVA	<0.001 ^h	<0.001	7.23	Adjusted Mean	3.70	3.64	0.603	-1.7

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

^c The magnitude of difference calculated as: [(2018 mean - baseline mean) / baseline area mean] x 100. When there is a significant interaction in the ANCOVA, the magnitude of difference is calculated at the minimum and maximum values of overlap in covariate values as : [(2018 predicted mean - baseline predicted mean) / baseline predicted mean] x 100.

^d ANCOVA proceeded under the assumption that the slopes are practically parallel (R2 of interaction model = 0.9858 and R2 of parallel slope model = 0.985; a difference < 0.02) following Environment Canada (2012).

^e ANCOVA proceeded under the assumption that the slopes are practically parallel (R2 of interaction model = 0.8453 and R2 of parallel slope model = 0.837; a difference < 0.02) following Environment Canada (2012).

^f Two outliers (SLSE-07-1, Stdnt resid: -4.087; SLSE-07-2, Stdnt resid:-4.087) removed from analysis.

^g One outlier (DLO2-21-ACJ-58 Stdnt resid: -17.766) removed from analysis.

^h ANCOVA proceeded under the assumption that the slopes are practically parallel (R2 of interaction model = 0.9585 and R2 of parallel slope model = 0.9465; a difference < 0.02) following Environment Canada (2012).

Table G.8: Arctic Charr Estimated Sample Sizes to Detect Various Effect Sizes as a Percentage Change in Respective Fish Health Endpoints at Camp Lake Using 2021 Data Relative to Reference Lake 3 Data (2021) or Camp Lake Baseline Data (2006 to 2013) with $\alpha=\beta=0.1$, Mary River Project 2021 CREMP

Comparison	Group	Indicator	Endpoint	Variables		Test ^a	S ^b	COV (%) ^c	Minimum Sample Size to Detect an Effect Size (% Increase/Decrease Relative to Reference) with α=β=0.1										
				Response	Covariate				log(Response)	5%	10%	20%	25%	30%	33%	40%	50%	100%	
										-5%	-9%	-17%	-20%	-23%	-25%	-29%	-33%	-50%	
										Response	±5%	±10%	±20%	±25%	±30%	±33%	±40%	±50%	±100%
Nearshore Arctic Charr (Electrofishing) versus Ref. Lake 3, 2021 Data	Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.101	35.6	Response	454	121	34	24	18	14	11	9	4	
			Body Weight	Body Weight (g)	-	M-W	0.311	262	Response	4,266	1,120	307	205	150	124	92	64	22	
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0407	-	log(Response)	66	19	7	5	5	4	4	4	3	
Nearshore Arctic Charr (Electrofishing) 2021 versus Baseline	Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	tunequal	-	24.8	Response	421	106	27	18	13	11	8	6	3	
			Body Weight	log[Body Weight (g)]	-	tequal	0.315	-	log(Response)	3,795	995	273	183	132	110	81	56	20	
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0396	-	log(Response)	62	18	7	5	5	4	4	4	3	
Littoral/Profundal Arctic Charr (Gill Netting) versus Ref. Lake 3, 2021 Data	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0589	16.3	Response	156	42	13	10	7	6	5	4	3	
			Body Weight	Body Weight (g)	-	M-W	0.159	103	Response	1,116	294	82	55	41	34	25	18	7	
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0385	-	log(Response)	59	17	6	5	4	4	4	4	3	
			Condition ^d	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0363	-	log(Response)	53	15	6	5	4	4	4	3	3	
Littoral/Profundal Arctic Charr (Gill Netting) 2021 versus Baseline	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0877	21.5	Response	341	91	25	17	12	10	7	6	4	
			Body Weight	Body Weight (g)	-	M-W	0.266	101	Response	3,117	819	225	151	109	92	68	47	18	
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0663	-	log(Response)	170	46	14	10	8	7	6	5	4	

^a Sample size estimates for the M-W test were estimated based for a two-sample t-test using sample sizes multiplied by 0.864. The 0.864 is the lower bound of the asymptotic relative efficiency of the Mann-Whitney test and the two-sample t-test (Hodges and Lehmann 1956). Estimates were generated for the response variable on the untransformed and log₁₀-transformed scales and the lowest sample size is reported.

^b Pooled standard deviation of the regression residuals

^c Coefficient of variation (pooled standard deviation/reference mean)×100%

^d Outliers removed from analysis.

Table G.9: Arctic Charr Measurements from Fish Captured at Reference Lake 3 by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
REF3-21-AC-01	REF-21-GN-02A	2	31.2	33.9	225	-	0.741
REF3-21-AC-02	REF-21-GN-02A	1.5	31.2	33.8	230	-	0.757
REF3-21-AC-03	REF-21-GN-02A	1.5	19.6	21.4	85	-	1.129
REF3-21-AC-04	REF-21-GN-04A	3	32.0	34.7	255	-	0.778
REF3-21-AC-05	REF-21-GN-04A	2	26.5	29.1	140	-	0.752
REF3-21-AC-06	REF-21-GN-04A	2	29.1	32.3	185	-	0.751
REF3-21-AC-07	REF-21-GN-04A	2	29.0	31.6	230	-	0.943
REF3-21-AC-08	REF-21-GN-04A	2	30.1	32.8	205	-	0.752
REF3-21-AC-09	REF-21-GN-04A	1.5	22.8	24.5	140	-	1.181
REF3-21-AC-10	REF-21-GN-01B	1.5	18.3	19.9	70	-	1.142
REF3-21-AC-11	REF-21-GN-01B	1.5	31.1	33.5	215	-	0.715
REF3-21-AC-12	REF-21-GN-01B	1.5	18.5	20.2	75	-	1.185
REF3-21-AC-13	REF-21-GN-01B	1.5	27.0	29.5	155	-	0.787
REF3-21-AC-14	REF-21-GN-03B	1.5	23.6	25.8	110	-	0.837
REF3-21-AC-15	REF-21-GN-03B	1.5	25.5	27.9	135	-	0.814
REF3-21-AC-16	REF-21-GN-04B	2	32.3	35.1	255	-	0.757
REF3-21-AC-17	REF-21-GN-04B	2	31.6	34.2	215	-	0.681
REF3-21-AC-18	REF-21-GN-04B	1.5	33.1	36.0	280	-	0.772
REF3-21-AC-19	REF-21-GN-04B	1.5	29.7	32.1	175	-	0.668
REF3-21-AC-20	REF-21-GN-01C	1.5	24.6	25.9	150	-	1.008
REF3-21-AC-21	REF-21-GN-02C	3	47.0	50.2	960	-	0.925
REF3-21-AC-22	REF-21-GN-02C	2	33.4	35.8	255	-	0.684
REF3-21-AC-23	REF-21-GN-02C	2	30.4	32.5	195	-	0.694
REF3-21-AC-24	REF-21-GN-02C	2	20.0	21.6	55	-	0.688
REF3-21-AC-25	REF-21-GN-03C	1.5	30.3	32.9	230	-	0.827
REF3-21-AC-26	REF-21-GN-03C	1.5	22.2	24.0	85	-	0.777
REF3-21-AC-27	REF-21-GN-01D	2	26.9	29.6	160	-	0.822
REF3-21-AC-28	REF-21-GN-01D	2	30.0	32.7	200	-	0.741
REF3-21-AC-29	REF-21-GN-01D	1.5	25.2	27.8	135	-	0.844
REF3-21-AC-30	REF-21-GN-02D	2	33.6	36.5	295	-	0.778
REF3-21-AC-31	REF-21-GN-02D	1.5	27.1	28.8	165	-	0.829
REF3-21-AC-32	REF-21-GN-05A	1.5	24.0	25.4	135	-	0.977
REF3-21-AC-33	REF-21-GN-01E	2	34.5	37.0	310	-	0.755
REF3-21-AC-34	REF-21-GN-01E	2	31.5	34.2	245	-	0.784
REF3-21-AC-35	REF-21-GN-01E	2	32.3	35.0	260	-	0.772
REF3-21-AC-36	REF-21-GN-02E	2	33.0	35.9	285	-	0.793
REF3-21-AC-37	REF-21-GN-02E	2	30.0	32.6	225	-	0.833
REF3-21-AC-38	REF-21-GN-02E	2	31.0	33.4	215	-	0.722
REF3-21-AC-39	REF-21-GN-02E	2	31.5	33.7	200	-	0.640
REF3-21-AC-40	REF-21-GN-02E	2	31.8	34.1	255	-	0.793
REF3-21-AC-41	REF-21-GN-02E	2	25.5	27.9	140	-	0.844
REF3-21-AC-42	REF-21-GN-07A	2	29.5	32.2	210	-	0.818
REF3-21-AC-43	REF-21-GN-07A	1.5	20.8	22.6	80	-	0.889
REF3-21-AC-44	REF-21-GN-07A	1.5	20.6	22.5	75	-	0.858
REF3-21-AC-45	REF-21-GN-08A	1.5	22.1	24.4	80	-	0.741
REF3-21-AC-46	REF-21-GN-01F	2	33.0	35.9	285	-	0.793
REF3-21-AC-47	REF-21-GN-01F	2	27.3	29.4	165	-	0.811

Note: "-" indicates measurement not taken or no comment.

Table G.9: Arctic Charr Measurements from Fish Captured at Reference Lake 3 by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
REF3-21-AC-48	REF-21-GN-02F	2	27.7	30.2	170	-	0.800
REF3-21-AC-49	REF-21-GN-02F	2	29.4	31.7	205	-	0.807
REF3-21-AC-50	REF-21-GN-02F	2	31.3	34.3	215	-	0.701
REF3-21-AC-51	REF-21-GN-02F	1.5	20.8	22.6	70	-	0.778
REF3-21-AC-52	REF-21-GN-02F	1.5	28.3	30.6	180	-	0.794
REF3-21-AC-53	REF-21-GN-02F	1.5	22.3	24.4	95	-	0.857
REF3-21-AC-54	REF-21-GN-02F	1.5	20.7	22.5	70	-	0.789
REF3-21-AC-55	REF-21-GN-07B	2	33.2	36.1	260	-	0.710
REF3-21-AC-56	REF-21-GN-08B	1.5	20.2	21.9	65	-	0.789
Overall Catch Summary	Sample Size (N)		56	56	56	-	56
	Average		28.0	30.3	192	-	0.814
	Median		29.3	31.9	190	-	0.789
	Standard Deviation		5.3	5.7	126	-	0.120
	Standard Error		0.7	0.8	17	-	0.016
	Minimum		18.3	19.9	55	-	0.640
	Maximum		47.0	50.2	960	-	1.185

Note: "-" indicates measurement not taken or no comment.

Table G.10: Gill Netting Catch Records for Camp Lake, Mary River Project CREMP, August 2021

Gill Net Set ID	Location (NAD83, UTM Zone 17N)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Hours	Effort (m*hrs/100 m)	Arctic Charr Catch Per Mesh Size			Total Catch	CPUE
	Easting	Northing								1½"	2"	3"		
JL0-21-GN-01A	557521	7914762	91.4	7-Aug-21	7-Aug-21	8:30	9:30	1.00	0.914	2	3	4	9	9.8
JL0-21-GN-01B	557521	7914762	91.4	7-Aug-21	7-Aug-21	9:50	11:20	1.50	1.37	1	6	2	9	6.6
JL0-21-GN-01C	557521	7914762	91.4	7-Aug-21	7-Aug-21	11:55	13:40	1.75	1.60	3	3	4	10	6.2
JL0-21-GN-02A	557631	7914751	91.4	7-Aug-21	7-Aug-21	8:40	9:55	1.25	1.14	1	5	7	13	11.4
JL0-21-GN-02B	557631	7914751	91.4	7-Aug-21	7-Aug-21	10:20	11:58	1.63	1.49	2	3	12	17	11.4
JL0-21-GN-02C	557631	7914751	91.4	7-Aug-21	7-Aug-21	12:35	14:00	1.42	1.30	0	6	9	15	11.6
JL0-21-GN-03A	557705	7914650	91.4	7-Aug-21	7-Aug-21	8:50	10:30	1.67	1.52	1	5	13	19	12.5
JL0-21-GN-03B	557705	7914650	91.4	7-Aug-21	7-Aug-21	11:00	12:40	1.67	1.52	3	8	3	14	9.2
JL0-21-GN-03C	557705	7914650	91.4	7-Aug-21	7-Aug-21	13:05	14:30	1.42	1.30	0	6	5	11	8.49
Total									12.16	13	45	59	117	9.7

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Table G.11: Arctic Charr Measurements from Fish Captured at Camp Lake by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
JL0-21-AC-01	JL0-21-GN-01	3	36.5	39.7	470	-	0.967
JL0-21-AC-02	JL0-21-GN-01	3	41.3	44.9	555	-	0.788
JL0-21-AC-03	JL0-21-GN-01	3	39.0	42.1	560	-	0.944
JL0-21-AC-04	JL0-21-GN-01	3	38.5	42.0	540	-	0.946
JL0-21-AC-05	JL0-21-GN-01	2	40.9	44.5	545	-	0.797
JL0-21-AC-06	JL0-21-GN-01	2	39.1	42.4	520	-	0.870
JL0-21-AC-07	JL0-21-GN-01	2	39.3	42.2	570	-	0.939
JL0-21-AC-08	JL0-21-GN-01	1.5	37.8	40.7	465	-	0.861
JL0-21-AC-09	JL0-21-GN-01	1.5	39.8	42.9	505	-	0.801
JL0-21-AC-10	JL0-21-GN-02	1.5	37.0	39.7	435	-	0.859
JL0-21-AC-11	JL0-21-GN-02	2	36.8	40.0	480	-	0.963
JL0-21-AC-12	JL0-21-GN-02	2	37.1	40.4	490	-	0.960
JL0-21-AC-13	JL0-21-GN-02	2	36.6	39.5	470	-	0.959
JL0-21-AC-14	JL0-21-GN-02	2	36.8	40.0	495	-	0.993
JL0-21-AC-15	JL0-21-GN-02	2	37.5	40.7	560	-	1.062
JL0-21-AC-16	JL0-21-GN-02	3	41.1	44.6	565	-	0.814
JL0-21-AC-17	JL0-21-GN-02	3	37.2	40.3	540	-	1.049
JL0-21-AC-18	JL0-21-GN-02	3	36.0	39.2	440	-	0.943
JL0-21-AC-19	JL0-21-GN-02	3	36.8	39.6	420	-	0.843
JL0-21-AC-20	JL0-21-GN-02	3	40.3	44.1	530	-	0.810
JL0-21-AC-21	JL0-21-GN-02	3	37.0	40.2	460	-	0.908
JL0-21-AC-22	JL0-21-GN-02	3	39.3	42.6	600	-	0.988
JL0-21-AC-23	JL0-21-GN-03	3	38.0	41.4	530	-	0.966
JL0-21-AC-24	JL0-21-GN-03	3	37.3	40.2	505	-	0.973
JL0-21-AC-25	JL0-21-GN-03	3	41.5	45.7	600	-	0.839
JL0-21-AC-26	JL0-21-GN-03	3	44.0	47.5	705	-	0.828
JL0-21-AC-27	JL0-21-GN-03	3	47.8	51.6	910	-	0.833
JL0-21-AC-28	JL0-21-GN-03	3	38.1	41.1	520	-	0.940
JL0-21-AC-29	JL0-21-GN-03	3	40.6	44.2	590	-	0.882
JL0-21-AC-30	JL0-21-GN-03	3	36.3	39.0	485	-	1.014
JL0-21-AC-31	JL0-21-GN-03	3	40.0	43.4	595	-	0.930
JL0-21-AC-32	JL0-21-GN-03	3	36.7	39.1	460	-	0.931
JL0-21-AC-33	JL0-21-GN-03	3	39.0	42.5	520	-	0.877
JL0-21-AC-34	JL0-21-GN-03	3	37.3	40.1	460	-	0.886
JL0-21-AC-35	JL0-21-GN-03	3	41.4	44.9	565	-	0.796
JL0-21-AC-36	JL0-21-GN-03	2	37.3	40.3	510	-	0.983
JL0-21-AC-37	JL0-21-GN-03	2	38.4	42.2	550	-	0.971
JL0-21-AC-38	JL0-21-GN-03	2	37.8	41.2	535	-	0.991
JL0-21-AC-39	JL0-21-GN-03	2	40.1	43.7	585	-	0.907
JL0-21-AC-40	JL0-21-GN-03	2	38.4	41.9	540	-	0.954
JL0-21-AC-41	JL0-21-GN-03	1.5	39.6	42.8	595	-	0.958
JL0-21-AC-42	JL0-21-GN-01	3	40.2	44.2	610	-	0.939
JL0-21-AC-43	JL0-21-GN-01	3	38.9	42.2	510	-	0.866
JL0-21-AC-44	JL0-21-GN-01	2	39.3	42.7	555	-	0.914
JL0-21-AC-45	JL0-21-GN-01	2	36.9	39.9	455	-	0.906
JL0-21-AC-46	JL0-21-GN-01	2	37.3	42.0	490	-	0.944
JL0-21-AC-47	JL0-21-GN-01	2	37.1	40.1	430	-	0.842
JL0-21-AC-48	JL0-21-GN-01	2	69.5	74.2	2,600	-	0.774
JL0-21-AC-49	JL0-21-GN-01	2	38.8	42.2	510	-	0.873
JL0-21-AC-50	JL0-21-GN-01	1.5	39.0	42.4	-	-	-
JL0-21-AC-51	JL0-21-GN-02	3	46.5	51.4	915	-	0.910
JL0-21-AC-52	JL0-21-GN-02	3	39.8	43.6	525	-	0.833
JL0-21-AC-53	JL0-21-GN-02	3	37.8	41.0	495	-	0.916
JL0-21-AC-54	JL0-21-GN-02	3	45.5	48.9	750	-	0.796
JL0-21-AC-55	JL0-21-GN-02	3	40.1	43.3	495	-	0.768
JL0-21-AC-56	JL0-21-GN-02	3	44.5	48.1	655	Gill/Operculum Parasite	0.743
JL0-21-AC-57	JL0-21-GN-02	3	41.3	44.7	640	-	0.909
JL0-21-AC-58	JL0-21-GN-02	3	40.8	44.3	580	-	0.854
JL0-21-AC-59	JL0-21-GN-02	3	37.0	40.8	455	-	0.898
JL0-21-AC-60	JL0-21-GN-02	3	40.4	44.2	570	-	0.864
JL0-21-AC-61	JL0-21-GN-02	3	39.8	42.9	595	-	0.944
JL0-21-AC-62	JL0-21-GN-02	3	37.5	40.8	465	-	0.882
JL0-21-AC-63	JL0-21-GN-02	2	35.7	38.0	485	-	1.066
JL0-21-AC-64	JL0-21-GN-02	2	40.0	43.2	580	-	0.906
JL0-21-AC-65	JL0-21-GN-02	2	46.9	50.8	900	-	0.872
JL0-21-AC-66	JL0-21-GN-02	1.5	35.6	38.0	420	-	0.931
JL0-21-AC-67	JL0-21-GN-02	1.5	39.3	43.1	595	-	0.980
JL0-21-AC-68	JL0-21-GN-03	3	37.8	40.5	500	-	0.926
JL0-21-AC-69	JL0-21-GN-03	3	38.2	42.7	525	-	0.942

Note: "-" indicates measurement not taken or no comment.

Table G.11: Arctic Charr Measurements from Fish Captured at Camp Lake by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
JL0-21-AC-70	JL0-21-GN-03	3	39.0	42.2	505	-	0.851
JL0-21-AC-71	JL0-21-GN-03	2	36.6	39.7	475	-	0.969
JL0-21-AC-72	JL0-21-GN-03	2	39.5	43.1	515	-	0.836
JL0-21-AC-73	JL0-21-GN-03	2	41.8	45.1	640	-	0.876
JL0-21-AC-74	JL0-21-GN-03	2	35.5	38.4	420	-	0.939
JL0-21-AC-75	JL0-21-GN-03	2	38.5	42.2	540	-	0.946
JL0-21-AC-76	JL0-21-GN-03	2	39.2	43.1	545	-	0.905
JL0-21-AC-77	JL0-21-GN-03	2	40.2	43.5	585	-	0.900
JL0-21-AC-78	JL0-21-GN-03	2	39.4	42.7	555	-	0.907
JL0-21-AC-79	JL0-21-GN-03	1.5	37.2	40.8	510	-	0.991
JL0-21-AC-80	JL0-21-GN-03	1.5	38.2	42.2	500	-	0.897
JL0-21-AC-81	JL0-21-GN-03	1.5	49.1	53.6	960	Gill plate eroded	0.811
JL0-21-AC-82	JL0-21-GN-01	3	37.2	40.2	520	-	1.010
JL0-21-AC-83	JL0-21-GN-01	3	40.1	43.1	595	-	0.923
JL0-21-AC-84	JL0-21-GN-01	3	38.8	42.4	535	-	0.916
JL0-21-AC-85	JL0-21-GN-01	3	41.1	44.9	620	-	0.893
JL0-21-AC-86	JL0-21-GN-01	2	30.2	33.1	275	-	0.998
JL0-21-AC-87	JL0-21-GN-01	2	40.5	44.0	595	-	0.896
JL0-21-AC-88	JL0-21-GN-01	2	37.9	41.4	495	-	0.909
JL0-21-AC-89	JL0-21-GN-01	1.5	45.3	48.4	755	-	0.812
JL0-21-AC-90	JL0-21-GN-01	1.5	39.7	43.2	580	-	0.927
JL0-21-AC-91	JL0-21-GN-01	1.5	40.5	44.0	585	-	0.881
JL0-21-AC-92	JL0-21-GN-02	2	40.2	43.4	550	-	0.847
JL0-21-AC-93	JL0-21-GN-02	2	36.5	40.0	445	-	0.915
JL0-21-AC-94	JL0-21-GN-02	2	39.7	43.2	590	-	0.943
JL0-21-AC-95	JL0-21-GN-02	2	35.8	39.0	520	-	1.133
JL0-21-AC-96	JL0-21-GN-02	2	39.3	42.5	590	-	0.972
JL0-21-AC-97	JL0-21-GN-02	2	37.3	40.5	525	-	1.012
JL0-21-AC-98	JL0-21-GN-02	3	36.1	39.1	515	-	1.095
JL0-21-AC-99	JL0-21-GN-02	3	38.7	42.0	555	-	0.958
JL0-21-AC-100	JL0-21-GN-02	3	37.6	40.2	520	-	0.978
JL0-21-AC-101	JL0-21-GN-02	3	39.8	43.2	505	-	0.801
Overall Catch Summary	Sample Size (N)		101	101	100	-	100
	Average		39.4	42.8	569	-	0.912
	Median		39.0	42.2	533	-	0.912
	Standard Deviation		4.1	4.4	229	-	0.073
	Standard Error		0.41	0.43	23	-	0.007
	Minimum		30.2	33.1	275	-	0.743
	Maximum		69.5	74.2	2,600	-	1.133

Note: "-" indicates measurement not taken or no comment.

Table G.12: Results of Littoral/Profundal Arctic Charr Health Endpoint Statistical Comparisons between 2021 Camp Lake (JL0) and 2021 Reference Lake 3 (REF) Data, and for Camp Lake between 2021 and the Mine Baseline Period (2005 to 2013), Mary River Project 2021 CREMP

Comparison	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
			Response	Covariate	REF 2021 or JL0 Base	JL0 2021		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
								Interaction P-value	Covariate P-value		Statistic	REF 2021 or JL0 Base	JL0 2021		
Camp Lake versus Reference Lake 3, 2021	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	56	101	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	56	101	M-W	-	-	-	Median	29.2	39.0	<0.001	33
		Body Weight	Body Weight (g)	-	56	100	M-W	-	-	-	Median	190	532	<0.001	180
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	56	100	ANCOVA	0.125	<0.001	34.5	Adjusted Mean	303	393	<0.001	30
		Condition	log[Body Weight (g)]	log[Fork Length (cm)]	55 ^d	100	ANCOVA	0.484	<0.001	34.4	Adjusted Mean	294	395	<0.001	34
Camp Lake 2021 versus Baseline	Survival	Length Frequency Distribution	Fork Length (cm)	-	131	101	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	131	101	M-W	-	-	-	Median	32.3	39.0	<0.001	21
		Body Weight	Body Weight (g)	-	131	100	M-W	-	-	-	Median	350	532	<0.001	52
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	131	100	ANCOVA	0.006 ^e	<0.001	34.1	Adjusted Mean	381	364	0.060	-4.4

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint)

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

^d One outlier (REF3-21-AC-21, Stdnt resid: 4.164) was removed from the analysis.

^e ANCOVA proceeded under the assumption that the slopes are practically parallel (R2 of interaction model = 0.9540 and R2 of parallel slope model = 0.9525; a difference < 0.02) following Environment Canada (2012).

Table G.13: Arctic Charr Measurements from Fish Captured at Sheardown Lake NW by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
DL01-21-ACJ-01	6.3	6.7	2.255	-	0.902
DL01-21-ACJ-02	7.2	7.6	3.098	-	0.830
DL01-21-ACJ-03	11.8	12.7	15.283	-	0.930
DL01-21-ACJ-04	6.7	7.2	2.976	-	0.989
DL01-21-ACJ-05	6.3	6.6	2.217	-	0.887
DL01-21-ACJ-06	5.7	6.1	1.760	-	0.950
DL01-21-ACJ-07	6.5	6.8	2.455	-	0.894
DL01-21-ACJ-08	4.4	4.6	0.812	-	0.953
DL01-21-ACJ-09	7.4	7.8	3.709	-	0.915
DL01-21-ACJ-10	10.9	11.9	12.837	-	0.991
DL01-21-ACJ-11	5.4	5.7	1.416	-	0.899
DL01-21-ACJ-12	9.8	10.6	8.236	-	0.875
DL01-21-ACJ-13	11.4	12.2	13.164	-	0.889
DL01-21-ACJ-14	7.5	8.0	3.898	-	0.924
DL01-21-ACJ-15	13.8	15.0	24.825	-	0.945
DL01-21-ACJ-16	6.4	6.8	2.392	-	0.912
DL01-21-ACJ-17	13.2	14.3	20.164	-	0.877
DL01-21-ACJ-18	10.3	11.0	8.458	-	0.774
DL01-21-ACJ-19	7.4	7.9	3.589	-	0.886
DL01-21-ACJ-20	9.7	10.5	8.451	-	0.926
DL01-21-ACJ-21	11.0	11.8	10.796	-	0.811
DL01-21-ACJ-22	3.5	3.7	0.337	-	0.786
DL01-21-ACJ-23	10.4	11.1	10.032	-	0.892
DL01-21-ACJ-24	12.8	13.9	19.007	-	0.906
DL01-21-ACJ-25	7.0	7.4	3.048	-	0.889
DL01-21-ACJ-26	6.4	6.7	2.429	-	0.927
DL01-21-ACJ-27	8.2	8.7	4.852	1	0.880
DL01-21-ACJ-28	6.3	6.6	2.077	-	0.831
DL01-21-ACJ-29	5.9	6.2	1.723	-	0.839
DL01-21-ACJ-30	6.5	6.8	2.278	-	0.829
DL01-21-ACJ-31	14.8	16.2	29.974	-	0.925
DL01-21-ACJ-32	5.5	5.8	1.570	1	0.944
DL01-21-ACJ-33	11.7	12.5	16.306	-	1.018
DL01-21-ACJ-34	8.0	8.5	4.924	-	0.962
DL01-21-ACJ-35	9.3	10.1	7.153	2	0.889
DL01-21-ACJ-36	11.9	12.9	16.411	4+	0.974
DL01-21-ACJ-37	17.2	18.5	46.687	-	0.918
DL01-21-ACJ-38	6.2	6.5	2.131	-	0.894
DL01-21-ACJ-39	10.5	11.4	9.806	-	0.847
DL01-21-ACJ-40	6.8	7.2	2.919	-	0.928
DL01-21-ACJ-41	8.1	8.7	4.502	-	0.847
DL01-21-ACJ-42	6.2	6.6	2.261	-	0.949
DL01-21-ACJ-43	7.8	8.3	4.498	1+	0.948
DL01-21-ACJ-44	11.6	12.7	14.094	-	0.903
DL01-21-ACJ-45	7.4	7.9	3.338	-	0.824
DL01-21-ACJ-46	12.4	13.3	18.693	-	0.980
DL01-21-ACJ-47	7.3	7.8	3.788	-	0.974
DL01-21-ACJ-48	10.7	11.6	10.372	-	0.847
DL01-21-ACJ-49	7.0	7.4	3.373	-	0.983
DL01-21-ACJ-50	10.1	10.7	8.402	-	0.815
DL01-21-ACJ-51	7.5	7.9	3.642	-	0.863
DL01-21-ACJ-52	13.3	14.4	18.115	3++	0.770
DL01-21-ACJ-53	10.0	10.8	8.525	-	0.853
DL01-21-ACJ-54	10.1	10.9	10.010	-	0.972
DL01-21-ACJ-55	12.4	13.5	19.845	-	1.041
DL01-21-ACJ-56	10.1	10.9	9.499	-	0.922
DL01-21-ACJ-57	11.5	12.4	12.059	-	0.793
DL01-21-ACJ-58	10.7	11.6	12.642	-	1.032
DL01-21-ACJ-59	12.3	13.1	15.904	-	0.855
DL01-21-ACJ-60	13.6	14.6	23.243	-	0.924
DL01-21-ACJ-61	9.4	10.4	8.100	2	0.975
DL01-21-ACJ-62	6.8	7.2	3.009	1++	0.957
DL01-21-ACJ-63	5.7	6.0	1.627	1+	0.879
DL01-21-ACJ-64	5.5	5.9	1.729	1+	1.039

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.13: Arctic Charr Measurements from Fish Captured at Sheardown Lake NW by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
DL01-21-ACJ-65		15.4	16.6	31.794	-	0.871
DL01-21-ACJ-66		7.3	7.7	4.173	-	1.073
DL01-21-ACJ-67		9.0	9.7	6.833	-	0.937
DL01-21-ACJ-68		5.8	6.3	2.149	-	1.101
DL01-21-ACJ-69		6.5	6.9	2.665	-	0.970
DL01-21-ACJ-70		6.3	6.7	2.464	-	0.985
DL01-21-ACJ-71		5.1	5.4	1.073	-	0.809
DL01-21-ACJ-72		6.7	7.0	2.604	-	0.866
DL01-21-ACJ-73		6.4	6.9	3.033	-	1.157
DL01-21-ACJ-74		6.3	6.7	2.803	-	1.121
DL01-21-ACJ-75		10.7	11.5	14.437	-	1.178
DL01-21-ACJ-76		13.0	14.1	20.135	-	0.916
DL01-21-ACJ-77		3.8	4.0	0.414	-	0.754
DL01-21-ACJ-78		16.5	17.8	35.694	-	0.795
DL01-21-ACJ-79		12.8	13.8	19.602	-	0.935
DL01-21-ACJ-80		6.3	6.7	1.946	-	0.778
DL01-21-ACJ-81		11.3	12.1	14.862	-	1.030
DL01-21-ACJ-82		14.3	15.5	24.842	-	0.850
DL01-21-ACJ-83		8.1	8.7	4.494	-	0.846
DL01-21-ACJ-84		6.7	7.1	2.719	-	0.904
DL01-21-ACJ-85		10.0	10.8	8.819	-	0.882
DL01-21-ACJ-86		6.5	6.9	2.432	-	0.886
DL01-21-ACJ-87		9.2	9.9	7.241	-	0.930
DL01-21-ACJ-88		6.7	7.1	3.469	-	1.153
DL01-21-ACJ-89		12.3	13.3	16.529	-	0.888
DL01-21-ACJ-90		13.1	14.1	21.960	-	0.977
DL01-21-ACJ-91		10.3	11.1	11.472	-	1.050
DL01-21-ACJ-92		12.2	13.3	15.489	-	0.853
DL01-21-ACJ-93		5.8	6.1	1.941	-	0.995
DL01-21-ACJ-94		7.1	7.5	3.017	-	0.843
DL01-21-ACJ-95		7.2	7.6	3.391	-	0.909
DL01-21-ACJ-96		14.3	15.5	23.215	-	0.794
DL01-21-ACJ-97		9.2	9.9	7.608	-	0.977
DL01-21-ACJ-98		6.5	6.9	2.480	-	0.903
DL01-21-ACJ-99		6.2	6.6	1.909	-	0.801
DL01-21-ACJ-100		17.2	18.6	45.241	-	0.889
Overall Catch Summary	Sample Size (N)	100	100	100	4	100
	Average	9.1	10	9.327	1.5	0.916
	Median	8.1	8.7	4.677	1.5	0.905
	Standard Deviation	3.1	3.4	9.440	0.6	0.086
	Standard Error	0.31	0.34	0.944	0.3	0.009
	Minimum	3.5	3.7	0.337	1.0	0.754
	Maximum	17.2	18.6	46.687	2.0	1.178
Young-of-the-Year Catch Summary	proportion of YOY	3%				
	Sample Size (N)	3	3	3	-	3
	Average	3.9	4.1	0.5	-	0.8
	Median	3.8	4.0	0.4	-	0.8
	Standard Deviation	0.5	0.5	0.3	-	0.1
	Standard Error	0.3	0.3	0.1	-	0.1
	Minimum	3.5	3.7	0.3	-	0.8
	Maximum	4.4	4.6	0.8	-	1.0

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.14: Results of Nearshore Arctic Charr Non-Young-of-the-Year (YOY) Health Endpoint Statistical Comparisons between Sheardown Lake NW (DL01) and Reference Lake 3 (REF), Mary River Project CREMP, August 2021

Group	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
			Response	Covariate	REF	DL01		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
											Interaction P-value	Covariate P-value			
All Fish	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	103	100	K-S	-	-	-	-	-	-	<0.001	-
YOY	Body Size	Fork Length	Fork Length (cm)	-	11	3	tequal	-	-	-	Mean	3.26	3.90	0.044	20
		Body Weight	Body Weight (g)	-	11	3	tequal	-	-	-	Mean	0.288	0.521	0.031	81
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	11	3	ANCOVA	0.302	<0.001	3.37	Adjusted Mean	0.299	0.319	0.615	6.7
Non-YOY	Survival	Length Frequency Distribution	Fork Length (cm)	-	92	97	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	92	97	M-W	-	-	-	Median	5.55	8.20	<0.001	48
		Body Weight	Body Weight (g)	-	92	97	M-W	-	-	-	Median	1.47	4.92	<0.001	234
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	92	97	ANCOVA	0.068	<0.001	7.44	Adjusted Mean	3.60	3.77	0.007	4.6

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

Table G.15: Arctic Charr Estimated Sample Sizes to Detect Various Effect Sizes as a Percentage Change in Respective Fish Health Endpoints at Sheardown Lake NW (DL01) Using 2021 Data Relative to Reference Lake 3 Data (2021) or Sheardown Lake NW Baseline Data (2006 to 2013) with $\alpha=\beta=0.1$, Mary River Project 2021 CREMP

Comparison	Group	Indicator	Endpoint	Variables		Test ^a	S ^b	COV (%) ^c	Minimum Sample Size to Detect an Effect Size (% Increase/Decrease Relative to Reference) with α=β=0.1									
				Response	Covariate				log(Response)	5%	10%	20%	25%	30%	33%	40%	50%	100%
										-5%	-9%	-17%	-20%	-23%	-25%	-29%	-33%	-50%
										Response	±5%	±10%	±20%	±25%	±30%	±33%	±40%	±50%
Nearshore Arctic Charr (Electrofishing) versus Ref. Lake 3, 2021 Data	Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.128	40.7	Response	726	191	54	36	27	22	17	12	5
			Body Weight	Body Weight (g)	-	M-W	0.387	225	Response	6,602	1,732	475	318	230	191	141	98	34
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0427	-	log(Response)	72	20	7	6	5	5	4	4	3
Nearshore Arctic Charr (Electrofishing) 2021 versus Baseline	Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.169	40.7	Response	1,266	330	84	55	39	32	22	16	5
			Body Weight	Body Weight (g)	-	M-W	0.504	116	Response	10,597	2,651	664	425	296	240	167	108	28
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0670	-	log(Response)	174	47	15	10	8	7	6	5	4
Littoral/Profundal Arctic Charr (Gill Netting) versus Ref. Lake 3, 2021 Data	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0751	18.9	Response	250	68	19	13	10	9	6	5	3
			Body Weight	Body Weight (g)	-	M-W	0.213	87.4	Response	1,997	525	145	98	71	60	43	31	12
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0439	-	log(Response)	76	21	8	6	5	5	4	4	3
Littoral/Profundal Arctic Charr (Gill Netting) 2021 versus Baseline	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0896	19.6	Response	307	78	21	14	11	9	6	5	3
			Body Weight	Body Weight (g)	-	M-W	0.266	57.5	Response	2,619	657	166	107	75	61	43	28	9
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0528	-	log(Response)	109	30	10	7	6	5	5	4	3

^a Sample size estimates for the M-W test were estimated based for a two-sample t-test using sample sizes multiplied by 0.864. The 0.864 is the lower bound of the asymptotic relative efficiency of the Mann-Whitney test and the two-sample t-test (Hodges and Lehmann 1956). Estimates were generated for the response variable on the untransformed and log₁₀-transformed scales and the lowest sample size is reported.

^b Pooled standard deviation of the regression residuals

^c Coefficient of variation (pooled standard deviation/reference mean)×100%

Table G.16: Gill Netting Catch Records for Sheardown Lake NW, Mary River Project CREMP, August 2021

Gill Net Set ID	Location (NAD83, UTM Zone 17N)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Fishing Hours	Effort (m*hrs/100 m)	Arctic Charr Catch Per Mesh Size			Total Catch	CPUE
	Easting	Northing								1½"	2"	3"		
DL01-21-GN-01A	560779	7913102	91.4	8-Aug-21	8-Aug-21	9:45	11:00	1.25	1.14	1	0	0	1	0.87
DL01-21-GN-01B	560779	7913102	91.4	8-Aug-21	8-Aug-21	11:05	11:55	0.83	0.76	1	2	0	3	3.94
DL01-21-GN-02A	560632	7913224	91.4	8-Aug-21	8-Aug-21	9:50	11:25	1.58	1.45	0	7	1	8	5.53
DL01-21-GN-02B	560632	7913224	91.4	8-Aug-21	8-Aug-21	11:30	12:30	1.00	0.914	2	2	3	7	7.66
DL01-21-GN-03A	560479	7913156	91.4	8-Aug-21	8-Aug-21	10:10	11:40	1.50	1.37	0	4	2	6	4.37
DL01-21-GN-04A	559900	7913244	91.4	10-Aug-21	10-Aug-21	9:40	10:40	1.00	0.91	0	5	2	7	7.66
DL01-21-GN-04B	559900	7913244	91.4	10-Aug-21	10-Aug-21	11:05	12:30	1.42	1.30	1	1	0	2	1.54
DL01-21-GN-04C	559900	7913244	91.4	10-Aug-21	10-Aug-21	12:40	14:25	1.75	1.60	1	3	1	5	3.125
DL01-21-GN-04D	559900	7913244	91.4	10-Aug-21	10-Aug-21	14:50	16:25	1.58	1.45	0	2	1	3	2.07
DL01-21-GN-05A	559734	7913452	91.4	10-Aug-21	10-Aug-21	9:45	11:15	1.50	1.37	0	0	0	0	0
DL01-21-GN-05B	559734	7913452	91.4	10-Aug-21	10-Aug-21	11:20	12:45	1.42	1.30	0	1	0	1	0.77
DL01-21-GN-05C	559734	7913452	91.4	10-Aug-21	10-Aug-21	12:50	14:55	2.08	1.91	1	4	1	6	3.15
DL01-21-GN-05D	559734	7913452	91.4	10-Aug-21	10-Aug-21	15:20	16:35	1.25	1.14	0	3	1	4	3.5
DL01-21-GN-06A	559752	7913551	91.4	10-Aug-21	10-Aug-21	9:55	11:30	1.58	1.45	1	2	1	4	2.8
DL01-21-GN-06B	559752	7913551	91.4	10-Aug-21	10-Aug-21	11:45	13:00	1.25	1.14	1	2	0	3	2.6
DL01-21-GN-06C	559752	7913551	91.4	10-Aug-21	10-Aug-21	13:20	15:30	2.17	1.98	0	1	0	1	0.5
DL01-21-GN-07A	559811	7913629	91.4	10-Aug-21	10-Aug-21	10:05	11:45	1.67	1.52	1	3	0	4	2.6
DL01-21-GN-08A	560110	7913024	91.4	10-Aug-21	10-Aug-21	12:15	14:05	1.83	1.68	2	1	1	4	2.4
DL01-21-GN-08B	560110	7913024	91.4	10-Aug-21	10-Aug-21	14:20	15:59	1.65	1.51	0	3	1	4	2.7
DL01-21-GN-09A	560316	7913024	91.4	10-Aug-21	10-Aug-21	15:50	15:51	0.02	0.02	2	0	0	2	131.2
DL01-21-GN-09B	560316	7913024	91.4	10-Aug-21	10-Aug-21	15:53	16:40	0.78	0.72	0	2	0	2	2.8
DL01-21-GN-10A	560435	7912604	91.4	10-Aug-21	10-Aug-21	12:10	13:15	1.08	0.99	1	1	1	3	3.0
DL01-21-GN-10B	560435	7912604	91.4	10-Aug-21	10-Aug-21	13:20	14:30	1.17	1.07	0	0	1	1	0.9
DL01-21-GN-10C	560435	7912604	91.4	10-Aug-21	10-Aug-21	14:40	16:15	1.58	1.45	2	4	5	11	7.6
DL01-21-GN-11A	560555	7912683	91.4	10-Aug-21	10-Aug-21	12:20	13:25	1.08	0.99	0	2	4	6	6.06
DL01-21-GN-11B	560555	7912683	91.4	10-Aug-21	10-Aug-21	13:45	14:55	1.17	1.067	1	1	1	3	2.81
DL01-21-GN-11C	560555	7912683	91.4	10-Aug-21	10-Aug-21	15:10	16:25	1.25	1.14	2	6	1	9	7.87
DL01-21-GN-12A	560553	7912792	91.4	10-Aug-21	10-Aug-21	12:25	13:05	0.67	0.61	1	1	1	3	4.92
DL01-21-GN-12B	560553	7912792	91.4	10-Aug-21	10-Aug-21	13:10	14:10	1.00	0.91	0	3	1	4	4.37
DL01-21-GN-12C	560553	7912792	91.4	10-Aug-21	10-Aug-21	14:25	15:45	1.33	1.22	1	4	0	5	4.10
DL01-21-GN-13A	560461	7912807	91.4	10-Aug-21	10-Aug-21	14:10	15:15	1.08	0.99	1	8	0	9	9.09
Total									37.1	23	78	30	131	7.82

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m·hours of net.

Table G.17: Arctic Charr Measurements from Fish Captured at Sheardown Lake NW by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
DL01-21-AC-01	DL01-21-GN-01A	1.5	23.1	24.8	145	-	1.176
DL01-21-AC-02	DL01-21-GN-02A	2	23.0	24.7	140	-	1.151
DL01-21-AC-03	DL01-21-GN-02A	2	30.3	32.7	255	-	0.917
DL01-21-AC-04	DL01-21-GN-02A	2	31.2	34.1	265	-	0.873
DL01-21-AC-05	DL01-21-GN-02A	2	33.4	35.8	320	-	0.859
DL01-21-AC-06	DL01-21-GN-02A	2	29.0	32.1	225	-	0.923
DL01-21-AC-07	DL01-21-GN-02A	2	25.9	29.5	170	-	0.978
DL01-21-AC-08	DL01-21-GN-02A	2	34.8	38.0	385	-	0.914
DL01-21-AC-09	DL01-21-GN-02A	3	39.3	42.6	525	-	0.865
DL01-21-AC-10	DL01-21-GN-03A	2	24.4	26.4	130	-	0.895
DL01-21-AC-11	DL01-21-GN-03A	2	25.7	28.0	165	-	0.972
DL01-21-AC-12	DL01-21-GN-03A	2	30.4	33.5	255	-	0.908
DL01-21-AC-13	DL01-21-GN-03A	2	23.1	25.8	140	-	1.136
DL01-21-AC-14	DL01-21-GN-03A	3	38.7	41.9	510	-	0.880
DL01-21-AC-15	DL01-21-GN-03A	3	30.2	33.0	305	-	1.107
DL01-21-AC-16	DL01-21-GN-01B	1.5	32.0	35.4	340	-	1.038
DL01-21-AC-17	DL01-21-GN-01B	2	40.4	43.6	580	-	0.880
DL01-21-AC-18	DL01-21-GN-01B	2	29.7	32.8	235	-	0.897
DL01-21-AC-19	DL01-21-GN-02B	1.5	35.9	39.1	355	-	0.767
DL01-21-AC-20	DL01-21-GN-02B	1.5	31.6	34.0	380	-	1.204
DL01-21-AC-21	DL01-21-GN-02B	2	30.7	33.0	265	-	0.916
DL01-21-AC-22	DL01-21-GN-02B	2	27.4	29.8	230	-	1.118
DL01-21-AC-23	DL01-21-GN-02B	3	35.1	37.9	370	-	0.856
DL01-21-AC-24	DL01-21-GN-02B	3	38.0	40.5	520	-	0.948
DL01-21-AC-26	DL01-21-GN-04A	3	39.8	43.2	590	-	0.936
DL01-21-AC-27	DL01-21-GN-04A	3	39.2	42.4	580	-	0.963
DL01-21-AC-28	DL01-21-GN-04A	2	35.7	39.1	-	-	-
DL01-21-AC-29	DL01-21-GN-04A	2	31.6	34.4	315	-	0.998
DL01-21-AC-30	DL01-21-GN-04A	2	30.9	33.4	275	-	0.932
DL01-21-AC-31	DL01-21-GN-04A	2	31.2	34.1	300	-	0.988
DL01-21-AC-32	DL01-21-GN-04A	2	35.7	38.6	430	-	0.945
DL01-21-AC-33	DL01-21-GN-06A	3	36.3	39.1	400	-	0.836
DL01-21-AC-34	DL01-21-GN-06A	2	31.4	34.0	285	-	0.921
DL01-21-AC-35	DL01-21-GN-06A	2	34.4	37.2	340	-	0.835
DL01-21-AC-36	DL01-21-GN-06A	1.5	30.0	-	250	-	0.926
DL01-21-AC-37	DL01-21-GN-07A	2	34.1	37.1	400	-	1.009
DL01-21-AC-38	DL01-21-GN-07A	2	30.9	33.5	320	-	1.085
DL01-21-AC-39	DL01-21-GN-07A	2	40.4	43.5	660	-	1.001
DL01-21-AC-40	DL01-21-GN-07A	1.5	21.9	23.9	125	-	1.190
DL01-21-AC-41	DL01-21-GN-04B	1.5	28.1	30.7	220	-	0.992
DL01-21-AC-42	DL01-21-GN-04B	2	30.3	33.0	250	-	0.899
DL01-21-AC-43	DL01-21-GN-05B	2	36.8	40.0	520	-	1.043

Note: "-" indicates measurement not taken or no comment.

Table G.17: Arctic Charr Measurements from Fish Captured at Sheardown Lake NW by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
DL01-21-AC-44	DL01-21-GN-06B	1.5	56.7	60.8	1,650	-	0.905
DL01-21-AC-45	DL01-21-GN-06B	2	32.9	35.6	295	-	0.828
DL01-21-AC-46	DL01-21-GN-06B	2	29.1	31.3	235	-	0.954
DL01-21-AC-47	DL01-21-GN-08A	3	38.7	42.2	560	-	0.966
DL01-21-AC-48	DL01-21-GN-08A	2	31.9	35.2	305	-	0.940
DL01-21-AC-49	DL01-21-GN-08A	1.5	36.0	38.7	495	-	1.061
DL01-21-AC-50	DL01-21-GN-08A	1.5	36.4	39.3	450	-	0.933
DL01-21-AC-51	DL01-21-GN-04C	1.5	32.0	34.7	285	-	0.870
DL01-21-AC-52	DL01-21-GN-04C	2	27.1	29.5	195	-	0.980
DL01-21-AC-53	DL01-21-GN-04C	2	36.6	39.8	430	-	0.877
DL01-21-AC-54	DL01-21-GN-04C	2	33.9	36.9	345	-	0.886
DL01-21-AC-55	DL01-21-GN-04C	3	35.3	38.0	440	-	1.000
DL01-21-AC-56	DL01-21-GN-05C	1.5	34.7	37.9	410	-	0.981
DL01-21-AC-57	DL01-21-GN-05C	2	31.6	34.1	300	-	0.951
DL01-21-AC-58	DL01-21-GN-05C	2	32.2	34.6	310	-	0.929
DL01-21-AC-59	DL01-21-GN-05C	2	38.1	40.9	540	-	0.976
DL01-21-AC-60	DL01-21-GN-05C	2	34.9	38.1	410	-	0.965
DL01-21-AC-61	DL01-21-GN-05C	3	36.0	39.2	440	-	0.943
DL01-21-AC-62	DL01-21-GN-06C	2	35.1	38.1	375	-	0.867
DL01-21-AC-63	DL01-21-GN-09A	1.5	33.8	36.4	320	-	0.829
DL01-21-AC-64	DL01-21-GN-09A	1.5	36.0	39.2	430	-	0.922
DL01-21-AC-65	DL01-21-GN-08B	3	37.0	40.5	490	-	0.967
DL01-21-AC-66	DL01-21-GN-08B	2	32.9	36.2	310	-	0.871
DL01-21-AC-67	DL01-21-GN-08B	2	27.9	30.3	215	-	0.990
DL01-21-AC-68	DL01-21-GN-08B	2	34.3	37.4	360	-	0.892
DL01-21-AC-69	DL01-21-GN-09B	2	33.2	36.1	330	-	0.902
DL01-21-AC-70	DL01-21-GN-09B	2	30.5	33.3	265	-	0.934
DL01-21-AC-71	DL01-21-GN-12C	2	33.0	35.6	310	-	0.863
DL01-21-AC-72	DL01-21-GN-12C	2	30.9	33.3	250	-	0.847
DL01-21-AC-73	DL01-21-GN-12C	2	36.1	39.2	365	-	0.776
DL01-21-AC-74	DL01-21-GN-13A	2	33.5	36.1	320	-	0.851
DL01-21-AC-75	DL01-21-GN-13A	2	26.5	28.4	174	-	0.935
DL01-21-AC-76	DL01-21-GN-13A	2	26.4	28.3	154	-	0.837
DL01-21-AC-77	DL01-21-GN-13A	2	24.6	26.0	148	-	0.994
DL01-21-AC-78	DL01-21-GN-13A	2	28.2	30.7	208	-	0.928
DL01-21-AC-79	DL01-21-GN-13A	2	34.5	36.0	335	-	0.816
DL01-21-AC-80	DL01-21-GN-13A	2	24.0	26.0	122	-	0.883
DL01-21-AC-81	DL01-21-GN-13A	2	35.0	37.9	430	-	1.003
DL01-21-AC-82	DL01-21-GN-13A	1.5	35.5	38.1	425	-	0.950
DL01-21-AC-83	DL01-21-GN-11B	1.5	33.3	36.2	325	-	0.880
DL01-21-AC-84	DL01-21-GN-11B	2	23.4	24.9	103	-	0.804
DL01-21-AC-85	DL01-21-GN-11B	3	37.9	41.0	555	-	1.019
DL01-21-AC-86	DL01-21-GN-10B	3	38.2	41.0	490	-	0.879

Note: "-" indicates measurement not taken or no comment.

Table G.17: Arctic Charr Measurements from Fish Captured at Sheardown Lake NW by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
DL01-21-AC-87	DL01-21-GN-12B	3	39.4	42.2	535	-	0.875
DL01-21-AC-88	DL01-21-GN-12B	2	28.8	31.1	210	-	0.879
DL01-21-AC-89	DL01-21-GN-12B	2	37.6	40.5	490	-	0.922
DL01-21-AC-90	DL01-21-GN-12B	2	37.2	39.9	415	-	0.806
DL01-21-AC-91	DL01-21-GN-11A	3	39.2	42.0	515	-	0.855
DL01-21-AC-92	DL01-21-GN-11A	3	39.2	42.4	555	-	0.921
DL01-21-AC-93	DL01-21-GN-11A	3	37.1	39.8	495	-	0.969
DL01-21-AC-94	DL01-21-GN-11A	3	38.9	41.5	510	-	0.866
DL01-21-AC-95	DL01-21-GN-11A	2	28.8	30.9	202	-	0.846
DL01-21-AC-96	DL01-21-GN-11A	2	31.0	33.5	254	-	0.853
DL01-21-AC-97	DL01-21-GN-10A	2	26.2	28.3	160	-	0.890
DL01-21-AC-98	DL01-21-GN-10A	1.5	27.8	30.1	172	-	0.801
DL01-21-AC-99	DL01-21-GN-12A	2	27.7	29.9	199	-	0.936
DL01-21-AC-100	DL01-21-GN-12A	1.5	25.9	28.1	170	-	0.978
DL01-21-AC-101	DL01-21-GN-12C	1.5	33.0	35.7	315	-	0.877
DL01-21-AC-102	DL01-21-GN-12C	2	25.3	27.4	142	-	0.877
Overall Catch Summary	Sample Size (N)		101	100	100	-	100
	Mean		32.7	35.4	347	-	0.932
	Median		33.0	35.8	320	-	0.922
	Standard Deviation		5.26	5.6	187	-	0.088
	Standard Error		0.524	0.56	19	-	0.009
	Minimum		21.9	23.9	103	-	0.767
	Maximum		56.7	60.8	1,650	-	1.204

Note: "-" indicates measurement not taken or no comment.

Table G.18: Results of Littoral/Profundal Arctic Charr Health Endpoint Statistical Comparisons between 2021 Sheardown Lake NW (DL01) and 2021 Reference Lake 3 (REF) Data, and for Sheardown Lake NW between 2021 and the Mine Baseline Period (2006 to 2013), Mary River Project 2021 CREMP

Comparison	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
			Response	Covariate	REF 2021 or DL01 Base	DL01 2021		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
											Interaction P-value	Covariate P-value	Statistic		
Sheardown Lake NW versus Reference Lake 3, 2021	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	56	101	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	56	101	M-W	-	-	-	Median	29.2	33.0	<0.001	13
		Body Weight	Body Weight (g)	-	56	100	M-W	-	-	-	Median	190	320	<0.001	68
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	56	100	ANCOVA	0.045 ^d	<0.001	30.4	Adjusted Mean	222	265	<0.001	20
Sheardown Lake NW 2021 versus Baseline	Survival	Length Frequency Distribution	Fork Length (cm)	-	98	101	K-S	-	-	-	-	-	-	0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	98	101	M-W	-	-	-	Median	35.8	33.0	<0.001	-7.7
		Body Weight	Body Weight (g)	-	98	100	M-W	-	-	-	Median	400	320	0.001	-20
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	98	100	ANCOVA	0.385	<0.001	33.8	Adjusted Mean	338	358	0.001	6.0

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

^d ANCOVA proceeded under the assumption that the slopes are practically parallel (R2 of interaction model = 0.9701 and R2 of parallel slope model = 0.9693; a difference < 0.02) following Environment Canada (2012).

Table G.19: Arctic Charr Measurements from Fish Captured at Sheardown Lake SE by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
DL02-21-ACJ-01	6.8	7.4	3.298	-	1.049
DL02-21-ACJ-02	7.4	7.8	3.811	-	0.940
DL02-21-ACJ-03	9.3	10.0	6.512	-	0.810
DL02-21-ACJ-04	6.5	6.9	2.813	-	1.024
DL02-21-ACJ-05	7.4	7.8	4.544	-	1.121
DL02-21-ACJ-06	4.3	4.5	0.848	-	1.067
DL02-21-ACJ-07	3.7	4.1	0.579	-	1.143
DL02-21-ACJ-08	6.0	6.3	1.945	-	0.900
DL02-21-ACJ-09	14.1	15.3	23.518	-	0.839
DL02-21-ACJ-10	6.6	7.2	3.350	1+	1.165
DL02-21-ACJ-11	6.7	7.2	2.877	-	0.957
DL02-21-ACJ-12	6.4	6.8	2.490	-	0.950
DL02-21-ACJ-13	6.1	6.5	2.291	-	1.009
DL02-21-ACJ-14	7.0	7.5	3.081	-	0.898
DL02-21-ACJ-15	7.1	7.6	3.557	-	0.994
DL02-21-ACJ-16	7.1	7.5	3.479	-	0.972
DL02-21-ACJ-17	10.0	10.8	9.182	-	0.918
DL02-21-ACJ-18	11.7	12.7	15.342	-	0.958
DL02-21-ACJ-19	8.2	8.7	5.191	-	0.941
DL02-21-ACJ-20	6.9	7.4	3.679	1+	1.120
DL02-21-ACJ-21	7.0	7.5	3.844	-	1.121
DL02-21-ACJ-22	7.4	7.8	3.422	-	0.844
DL02-21-ACJ-23	6.9	7.3	2.807	-	0.854
DL02-21-ACJ-24	10.7	11.8	10.126	-	0.827
DL02-21-ACJ-25	8.8	9.4	7.414	-	1.088
DL02-21-ACJ-26	7.8	8.3	4.192	-	0.883
DL02-21-ACJ-27	7.0	7.4	4.016	-	1.171
DL02-21-ACJ-28	3.9	4.2	0.653	-	1.101
DL02-21-ACJ-29	7.1	7.5	3.148	-	0.880
DL02-21-ACJ-30	10.4	11.1	9.167	2+	0.815
DL02-21-ACJ-31	7.2	7.6	3.481	-	0.933
DL02-21-ACJ-32	8.3	8.8	4.941	-	0.864
DL02-21-ACJ-33	7.3	7.8	3.196	-	0.822
DL02-21-ACJ-34	7.3	7.8	4.102	-	1.054
DL02-21-ACJ-35	6.4	6.8	2.476	-	0.945
DL02-21-ACJ-36	7.6	8.1	4.331	-	0.987
DL02-21-ACJ-37	7.0	7.5	3.433	-	1.001
DL02-21-ACJ-38	4.3	4.6	0.783	-	0.985
DL02-21-ACJ-39	7.0	7.5	3.258	-	0.950
DL02-21-ACJ-40	6.3	6.7	2.336	1+	0.934
DL02-21-ACJ-41	6.5	6.9	2.674	-	0.974
DL02-21-ACJ-42	10.6	11.4	10.277	-	0.863
DL02-21-ACJ-43	6.6	7.0	2.809	-	0.977
DL02-21-ACJ-44	6.4	6.8	2.909	-	1.110
DL02-21-ACJ-45	6.3	6.7	2.444	-	0.977
DL02-21-ACJ-46	6.2	6.8	2.116	-	0.888
DL02-21-ACJ-47	6.6	7.0	2.976	-	1.035
DL02-21-ACJ-48	7.5	7.9	3.574	-	0.847
DL02-21-ACJ-49	4.3	4.6	0.871	-	1.096
DL02-21-ACJ-50	6.3	6.7	2.338	1+	0.935
DL02-21-ACJ-51	6.5	7.0	3.481	-	1.268
DL02-21-ACJ-52	6.0	6.4	2.263	-	1.048
DL02-21-ACJ-53	6.6	7.0	3.077	-	1.070
DL02-21-ACJ-54	6.4	6.8	2.934	-	1.119
DL02-21-ACJ-55	6.8	7.2	3.159	-	1.005
DL02-21-ACJ-56	11.3	12.2	13.892	-	0.963
DL02-21-ACJ-57	11.5	12.4	12.592	-	0.828
DL02-21-ACJ-58	6.0	6.3	0.269	-	0.125
DL02-21-ACJ-59	6.2	6.6	2.143	-	0.899
DL02-21-ACJ-60	10.0	10.6	8.123	2	0.812
DL02-21-ACJ-61	5.8	6.1	2.310	-	1.184
DL02-21-ACJ-62	7.2	7.6	3.674	-	0.984
DL02-21-ACJ-63	6.3	6.7	2.512	-	1.005
DL02-21-ACJ-64	6.3	6.6	2.735	-	1.094

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.19: Arctic Charr Measurements from Fish Captured at Sheardown Lake SE by Electrofishing, Mary River Project CREMP, August 2021

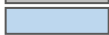
Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
DL02-21-ACJ-65		6.3	6.6	2.149	-	0.859
DL02-21-ACJ-66		10.3	11.1	8.163	-	0.747
DL02-21-ACJ-67		6.7	7.2	2.914	-	0.969
DL02-21-ACJ-68		6.0	6.4	1.867	-	0.864
DL02-21-ACJ-69		10.2	11.0	10.385	-	0.979
DL02-21-ACJ-70		7.4	7.8	4.056	1	1.001
DL02-21-ACJ-71		10.0	10.9	8.046	-	0.805
DL02-21-ACJ-72		3.7	4.0	0.612	-	1.208
DL02-21-ACJ-73		7.4	7.8	3.897	-	0.962
DL02-21-ACJ-74		7.0	7.4	3.190	-	0.930
DL02-21-ACJ-75		3.4	3.6	0.430	-	1.094
DL02-21-ACJ-76		4.4	4.7	0.880	-	1.033
DL02-21-ACJ-77		6.9	7.4	3.172	-	0.966
DL02-21-ACJ-78		5.7	6.1	1.752	-	0.946
DL02-21-ACJ-79		7.2	8.8	3.022	-	0.810
DL02-21-ACJ-80		7.4	7.7	3.853	1	0.951
DL02-21-ACJ-81		3.9	4.2	0.562	-	0.947
DL02-21-ACJ-82		5.8	6.1	1.977	-	1.013
DL02-21-ACJ-83		3.6	3.8	0.489	-	1.048
DL02-21-ACJ-84		3.9	4.2	0.653	-	1.101
DL02-21-ACJ-85		3.5	3.8	0.506	-	1.180
DL02-21-ACJ-86		4.3	4.5	0.780	-	0.981
DL02-21-ACJ-87		4.2	4.4	0.681	-	0.919
DL02-21-ACJ-88		4.2	4.5	0.731	-	0.987
DL02-21-ACJ-89		4.5	4.7	0.427	-	0.469
DL02-21-ACJ-90		3.9	4.2	0.636	-	1.072
DL02-21-ACJ-91		6.4	6.7	2.470	1++	0.942
DL02-21-ACJ-92		3.2	3.4	0.398	-	1.215
DL02-21-ACJ-93		3.7	4.0	0.534	-	1.054
DL02-21-ACJ-94		3.8	4.1	0.591	-	1.077
DL02-21-ACJ-95		3.7	4.0	0.609	-	1.202
DL02-21-ACJ-96		3.6	3.9	0.648	-	1.389
DL02-21-ACJ-97		3.5	3.7	0.469	-	1.094
DL02-21-ACJ-98		10.0	10.8	8.901	2	0.890
DL02-21-ACJ-99		6.8	7.2	3.276	-	1.042
DL02-21-ACJ-100		7.1	7.5	3.762	-	1.051
Overall Catch Summary	Sample Size (N)	100	100	100	10	100
	Mean	6.7	7.2	3.672	1.3	0.977
	Median	6.6	7.1	2.955	1.0	0.977
	Standard Deviation	2.1	2.3	3.612	0.5	0.153
	Standard Error	0.21	0.23	0.361	0.15	0.015
	Minimum	3.2	3.4	0.269	1.0	0.125
	Maximum	14.1	15.3	23.518	2.0	1.389
Young-of-the-Year Catch Summary	proportion of YOY	23%				
	Sample Size (N)	23	23	23	-	23
	Mean	3.9	4.2	0.6	-	1.1
	Median	3.9	4.2	0.6	-	1.1
	Standard Deviation	0.4	0.4	0.1	-	0.2
	Standard Error	0.1	0.1	0.0	-	0.0
	Minimum	3.2	3.4	0.4	-	0.5
	Maximum	4.5	4.7	0.9	-	1.4

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.20: Results of Nearshore Arctic Charr Non-Young-of-the-Year (YOY) Health Endpoint Statistical Comparisons between Sheardown Lake SE (DL0-02) and Reference Lake 3 (REF), Mary River Project CREMP, August 2021

Group	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
			Response	Covariate	REF	DL0-02		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
								Interaction P-value	Covariate P-value		Statistic	REF	DL0-02		
All Fish	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	103	100	K-S	-	-	-	-	-	-	<0.001	-
YOY	Body Size	Fork Length	Fork Length (cm)	-	11	23	tequal	-	-	-	Mean	3.26	3.89	<0.001	19
		Body Weight	Body Weight (g)	-	11	23	tequal	-	-	-	Mean	0.288	0.625	<0.001	117
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	11	23	ANCOVA	0.073	<0.001	3.66	Adjusted Mean	0.352	0.534	<0.001	52
		Condition	log[Body Weight (g)]	log[Fork Length (cm)]	11	22 ^d	ANCOVA	0.278	<0.001	3.63	Adjusted Mean	0.359	0.534	<0.001	48
Non-YOY	Survival	Length Frequency Distribution	Fork Length (cm)	-	92	77	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	92	77	M-W	-	-	-	Median	5.55	7.00	<0.001	26
		Body Weight	Body Weight (g)	-	92	77	M-W	-	-	-	Median	1.47	3.30	<0.001	124
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	92	77	ANCOVA	0.210	<0.001	6.74	Adjusted Mean	2.67	2.85	0.043	6.5
		Condition	log[Body Weight (g)]	log[Fork Length (cm)]	92	76 ^e	ANCOVA	<0.001 ^f	<0.001	6.74	Adjusted Mean	2.67	2.94	<0.001	10

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

 Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

^d One outlier (DL02-21-ACJ-89, Stdnt resid: -5.951) removed from analysis.

^e One outlier (DL02-21-ACJ.58, Stdnt resid: -20.448) removed from analysis.

^f ANCOVA proceeded under the assumption that the slopes are practically parallel (R2 of interaction model = 0.9831 and R2 of parallel slope model = 0.9811; a difference < 0.02) following Environment Canada (2012).

Table G.21: Arctic Charr Estimated Sample Sizes to Detect Various Effect Sizes as a Percentage Change in Respective Fish Health Endpoints at Sheardown Lake SE (DL0-02) Using 2021 Data Relative to Reference Lake 3 Data (2021) or Sheardown Lake SE Baseline Data (2006 to 2013) with $\alpha=\beta=0.1$, Mary River Project 2021 CREMP

Comparison	Group	Indicator	Endpoint	Variables		Test ^a	S ^b	COV (%) ^c	Minimum Sample Size to Detect an Effect Size (% Increase/Decrease Relative to Reference) with α=β=0.1									
				Response	Covariate				log(Response)	5%	10%	20%	25%	30%	33%	40%	50%	100%
										-5%	-9%	-17%	-20%	-23%	-25%	-29%	-33%	-50%
										Response	±5%	±10%	±20%	±25%	±30%	±33%	±40%	±50%
Nearshore Arctic Charr (Electrofishing) versus Ref. Lake 3, 2021 Data	Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.103	30.1	Response	473	125	35	25	18	16	12	9	4
			Body Weight	Body Weight (g)	-	M-W	0.321	137	Response	4,547	1193	327	219	159	132	98	68	25
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0825	-	log(Response)	262	70	21	15	11	10	8	6	4
Nearshore Arctic Charr (Electrofishing) 2021 versus Baseline	Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0799	24.6	Response	284	76	22	16	12	10	7	6	4
			Body Weight	Body Weight (g)	-	M-W	0.260	131	Response	2,976	782	215	144	105	87	64	44	17
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.110	-	log(Response)	461	122	35	24	18	15	12	9	5
			Condition ^d	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0467	-	log(Response)	85	24	8	6	5	5	4	4	3
Littoral/Profundal Arctic Charr (Gill Netting) versus Ref. Lake 3, 2021 Data	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0650	17.0	Response	188	50	16	11	9	7	6	4	3
			Body Weight	Body Weight (g)	-	M-W	0.183	81.8	Response	1,480	389	108	72	53	44	33	24	10
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0435	-	log(Response)	74	21	7	6	5	5	4	4	3
			Condition ^d	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0413	-	log(Response)	67	19	7	6	5	4	4	4	3
Littoral/Profundal Arctic Charr (Gill Netting) 2021 versus Baseline	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0571	12.1	Response	119	31	10	6	5	5	4	4	3
			Body Weight	Body Weight (g)	-	M-W	0.175	34.4	Response	941	237	61	40	28	22	17	11	5
		Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0443	-	log(Response)	77	22	8	6	5	5	4	4	3
			Condition ^d	log[Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0390	-	log(Response)	60	17	7	5	5	4	4	4	3

^a Sample size estimates for the M-W test were estimated based for a two-sample t-test using sample sizes multiplied by 0.864. The 0.864 is the lower bound of the asymptotic relative efficiency of the Mann-Whitney test and the two-sample t-test (Hodges and Lehmann 1956). Estimates were generated for the response variable on the untransformed and log₁₀-transformed scales and the lowest sample size is reported.

^b Pooled standard deviation of the regression residuals

^c Coefficient of variation (pooled standard deviation/reference mean)×100%

^d Outliers removed from analysis.

Table G.22: Gill Netting Catch Records for Sheardown Lake SE, Mary River Project CREMP, August 2021

Gill Net Set ID	Location (NAD83, UTM Zone 17N)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Fishing Hours	Effort (m*hrs/100 m)	Arctic Charr Catch Per Mesh Size			Total Catch	CPUE
	Easting	Northing								1½"	2"	3"		
DL02-21-GN-01A	561596	7911813	91.4	8-Aug-21	8-Aug-21	10:15	11:20	1.08	0.991	2	4	2	8	8.08
DL02-21-GN-01B	561596	7911813	91.4	8-Aug-21	8-Aug-21	11:55	13:30	1.58	1.45	2	4	6	12	8.29
DL02-21-GN-01C	561596	7911813	91.4	8-Aug-21	8-Aug-21	14:15	15:45	1.50	1.37	0	3	3	6	4.37
DL02-21-GN-02A	561469	7911843	91.4	8-Aug-21	8-Aug-21	10:25	12:05	1.67	1.52	1	6	3	10	6.56
DL02-21-GN-02B	561469	7911843	91.4	8-Aug-21	8-Aug-21	12:40	14:20	1.67	1.52	2	3	3	8	5.25
DL02-21-GN-02C	561469	7911843	91.4	8-Aug-21	8-Aug-21	14:45	16:20	1.58	1.45	2	3	3	8	5.53
DL02-21-GN-03A	561386	7911937	91.4	8-Aug-21	8-Aug-21	10:40	12:45	2.08	1.90	2	5	4	11	5.77
DL02-21-GN-03B	561386	7911937	91.4	8-Aug-21	8-Aug-21	13:20	15:00	1.67	1.52	0	8	5	13	8.53
DL02-21-GN-04A	561061	7912027	91.4	10-Aug-21	10-Aug-21	9:10	10:00	0.833	0.762	6	12	6	24	31
DL02-21-GN-05A	561147	7911992	91.4	10-Aug-21	10-Aug-21	9:17	10:55	1.63	1.49	5	12	10	27	18.08
DL02-21-GN-06A	561377	7911893	91.4	10-Aug-21	10-Aug-21	9:24	11:20	1.93	1.77	8	9	4	21	11.88
Total									15.8	30	69	49	148	10.35

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m-hours of net.

Table G.23: Arctic Charr Measurements from Fish Captured at Sheardown Lake SE by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
DL02-21-AC-01	DL02-21-GN-01A	3	37.2	40.5	515	-	1.000
DL02-21-AC-02	DL02-21-GN-01A	3	39.7	43.0	590	-	0.943
DL02-21-AC-03	DL02-21-GN-01A	2	26.5	29.1	165	-	0.887
DL02-21-AC-04	DL02-21-GN-01A	2	31.0	33.6	270	-	0.906
DL02-21-AC-05	DL02-21-GN-01A	2	35.5	38.6	415	-	0.928
DL02-21-AC-06	DL02-21-GN-01A	2	26.9	29.1	180	-	0.925
DL02-21-AC-07	DL02-21-GN-01A	1.5	45.8	49.9	840	-	0.874
DL02-21-AC-08	DL02-21-GN-01A	1.5	37.6	40.9	535	-	1.006
DL02-21-AC-09	DL02-21-GN-02A	3	35.8	38.7	420	-	0.915
DL02-21-AC-10	DL02-21-GN-02A	3	39.7	43.5	610	-	0.975
DL02-21-AC-11	DL02-21-GN-02A	3	37.0	39.9	490	-	0.967
DL02-21-AC-12	DL02-21-GN-02A	2	29.7	31.9	230	-	0.878
DL02-21-AC-13	DL02-21-GN-02A	2	30.7	33.6	262	-	0.905
DL02-21-AC-14	DL02-21-GN-02A	2	38.5	41.7	490	-	0.859
DL02-21-AC-15	DL02-21-GN-02A	2	38.7	41.8	530	-	0.914
DL02-21-AC-16	DL02-21-GN-02A	2	34.5	37.7	390	-	0.950
DL02-21-AC-17	DL02-21-GN-02A	2	33.8	36.9	350	-	0.906
DL02-21-AC-18	DL02-21-GN-02A	1.5	45.8	49.9	840	-	0.874
DL02-21-AC-19	DL02-21-GN-03A	1.5	35.7	38.5	435	-	0.956
DL02-21-AC-20	DL02-21-GN-03A	1.5	37.4	40.5	550	-	1.051
DL02-21-AC-21	DL02-21-GN-03A	2	41.0	44.6	610	-	0.885
DL02-21-AC-22	DL02-21-GN-03A	2	36.0	39.1	440	-	0.943
DL02-21-AC-23	DL02-21-GN-03A	2	30.0	32.6	270	-	1.000
DL02-21-AC-24	DL02-21-GN-03A	2	31.8	34.6	285	-	0.886
DL02-21-AC-25	DL02-21-GN-03A	2	37.5	40.7	515	-	0.977
DL02-21-AC-26	DL02-21-GN-03A	3	37.5	41.0	555	-	1.052
DL02-21-AC-27	DL02-21-GN-03A	3	37.0	40.0	490	-	0.967
DL02-21-AC-28	DL02-21-GN-03A	3	34.5	37.3	390	-	0.950
DL02-21-AC-29	DL02-21-GN-03A	3	39.1	42.5	545	-	0.912
DL02-21-AC-30	DL02-21-GN-01B	3	38.4	41.9	495	-	0.874
DL02-21-AC-31	DL02-21-GN-01B	3	39.7	42.5	560	-	0.895
DL02-21-AC-32	DL02-21-GN-01B	3	35.0	37.6	425	-	0.991
DL02-21-AC-33	DL02-21-GN-01B	3	39.9	42.9	635	-	1.000
DL02-21-AC-34	DL02-21-GN-01B	3	40.8	44.1	770	-	1.134
DL02-21-AC-35	DL02-21-GN-01B	3	37.0	40.1	490	-	0.967
DL02-21-AC-36	DL02-21-GN-01B	2	43.5	40.0	630	-	0.765
DL02-21-AC-37	DL02-21-GN-01B	2	45.2	48.8	905	-	0.980
DL02-21-AC-38	DL02-21-GN-01B	2	35.8	38.5	460	-	1.003
DL02-21-AC-39	DL02-21-GN-01B	2	41.0	44.4	515	-	0.747
DL02-21-AC-40	DL02-21-GN-01B	1.5	35.0	37.9	390	-	0.910
DL02-21-AC-41	DL02-21-GN-01B	1.5	32.1	35.0	310	-	0.937
DL02-21-AC-42	DL02-21-GN-02B	3	37.3	40.6	495	-	0.954
DL02-21-AC-43	DL02-21-GN-02B	3	39.0	41.9	540	-	0.910
DL02-21-AC-44	DL02-21-GN-02B	3	39.0	42.0	555	-	0.936
DL02-21-AC-45	DL02-21-GN-02B	2	38.5	41.8	580	-	1.016
DL02-21-AC-46	DL02-21-GN-02B	2	32.4	35.1	325	-	0.956
DL02-21-AC-47	DL02-21-GN-02B	2	33.3	36.2	345	-	0.934
DL02-21-AC-48	DL02-21-GN-02B	1.5	38.3	41.2	525	-	0.934
DL02-21-AC-49	DL02-21-GN-02B	1.5	32.2	34.8	305	-	0.914
DL02-21-AC-50	DL02-21-GN-03B	2	37.9	41.2	540	-	0.992
DL02-21-AC-51	DL02-21-GN-03B	2	33.5	36.5	355	-	0.944
DL02-21-AC-52	DL02-21-GN-03B	2	36.6	39.9	435	-	0.887
DL02-21-AC-53	DL02-21-GN-03B	2	31.4	33.7	255	-	0.824

Note: "-" indicates measurement not taken or no comment.

Table G.23: Arctic Charr Measurements from Fish Captured at Sheardown Lake SE by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
DL02-21-AC-54	DL02-21-GN-03B	2	37.0	40.0	510	-	1.007
DL02-21-AC-55	DL02-21-GN-03B	2	36.3	40.4	440	-	0.920
DL02-21-AC-56	DL02-21-GN-03B	2	41.0	44.3	570	-	0.827
DL02-21-AC-57	DL02-21-GN-03B	2	34.1	37.2	350	-	0.883
DL02-21-AC-58	DL02-21-GN-03B	3	34.8	37.9	485	-	1.151
DL02-21-AC-59	DL02-21-GN-03B	3	47.9	52.0	985	-	0.896
DL02-21-AC-60	DL02-21-GN-03B	3	38.7	41.9	570	-	0.983
DL02-21-AC-61	DL02-21-GN-03B	3	39.5	42.2	550	-	0.892
DL02-21-AC-62	DL02-21-GN-03B	3	38.0	41.4	550	-	1.002
DL02-21-AC-63	DL02-21-GN-01C	3	37.5	40.9	505	-	0.958
DL02-21-AC-64	DL02-21-GN-01C	3	53.5	57.1	1,280	-	0.836
DL02-21-AC-65	DL02-21-GN-01C	3	39.0	41.8	515	-	0.868
DL02-21-AC-66	DL02-21-GN-01C	2	37.3	40.3	485	-	0.935
DL02-21-AC-67	DL02-21-GN-01C	2	40.0	43.6	590	-	0.922
DL02-21-AC-68	DL02-21-GN-01C	2	44.5	47.9	795	-	0.902
DL02-21-AC-69	DL02-21-GN-02C	3	38.0	41.0	510	-	0.929
DL02-21-AC-70	DL02-21-GN-02C	3	39.5	43.0	530	-	0.860
DL02-21-AC-71	DL02-21-GN-02C	3	39.9	42.6	505	-	0.795
DL02-21-AC-72	DL02-21-GN-02C	2	35.9	39.2	360	-	0.778
DL02-21-AC-73	DL02-21-GN-02C	2	38.7	38.8	460	-	0.794
DL02-21-AC-74	DL02-21-GN-02C	2	35.4	38.3	395	-	0.890
DL02-21-AC-75	DL02-21-GN-02C	1.5	43.5	47.1	780	-	0.948
DL02-21-AC-76	DL02-21-GN-02C	1.5	33.0	35.6	420	-	1.169
DL02-21-AC-77	DL02-21-GN-04A	1.5	36.1	39.0	460	-	0.978
DL02-21-AC-78	DL02-21-GN-04A	1.5	31.9	34.0	285	-	0.878
DL02-21-AC-79	DL02-21-GN-04A	1.5	34.5	37.3	365	-	0.889
DL02-21-AC-80	DL02-21-GN-04A	1.5	35.6	38.2	435	-	0.964
DL02-21-AC-81	DL02-21-GN-04A	1.5	38.4	41.5	525	-	0.927
DL02-21-AC-82	DL02-21-GN-04A	2	31.5	33.5	285	-	0.912
DL02-21-AC-83	DL02-21-GN-04A	2	31.8	34.1	290	-	0.902
DL02-21-AC-84	DL02-21-GN-04A	2	31.0	33.5	270	-	0.906
DL02-21-AC-85	DL02-21-GN-04A	2	33.4	35.9	335	-	0.899
DL02-21-AC-86	DL02-21-GN-04A	2	33.3	36.0	355	-	0.961
DL02-21-AC-87	DL02-21-GN-04A	2	32.1	35.0	310	-	0.937
DL02-21-AC-88	DL02-21-GN-04A	2	31.9	34.3	290	-	0.893
DL02-21-AC-89	DL02-21-GN-04A	2	33.1	35.9	345	-	0.951
DL02-21-AC-90	DL02-21-GN-04A	2	32.5	35.1	325	-	0.947
DL02-21-AC-91	DL02-21-GN-04A	2	40.3	43.5	600	-	0.917
DL02-21-AC-92	DL02-21-GN-04A	2	41.2	44.1	560	-	0.801
DL02-21-AC-93	DL02-21-GN-04A	2	40.8	44.4	600	-	0.883
DL02-21-AC-94	DL02-21-GN-04A	2	37.5	40.8	435	-	0.825
DL02-21-AC-95	DL02-21-GN-04A	2	33.6	36.0	420	-	1.107
DL02-21-AC-96	DL02-21-GN-04A	2	38.9	42.2	515	-	0.875
DL02-21-AC-97	DL02-21-GN-04A	3	36.8	39.3	520	-	1.043
DL02-21-AC-98	DL02-21-GN-04A	3	28.7	31.1	235	-	0.994
DL02-21-AC-99	DL02-21-GN-04A	3	37.1	39.8	470	-	0.920
DL02-21-AC-100	DL02-21-GN-04A	3	38.9	41.4	580	-	0.985
Overall Catch Summary	Sample Size (N)		100	100	100	-	100
	Average		36.8	39.7	480	-	0.930
	Median		37.1	40.0	490	-	0.926
	Standard Deviation		4.4	4.7	172	-	0.074
	Standard Error		0.44	0.47	17.2	-	0.007
	Minimum		26.5	29.1	165	-	0.747
		Maximum	53.5	57.1	1,280	-	1.169

Note: "-" indicates measurement not taken or no comment.

Table G.24: Results of Littoral/Profundal Arctic Charr Health Endpoint Statistical Comparisons between 2021 Sheardown Lake SE (DLO-02) and 2021 Reference Lake 3 (REF) Data, and for Sheardown Lake SE between 2021 and the Mine Baseline Period (2006 to 2013), Mary River Project 2021 CREMP

Comparison	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
			Response	Covariate	REF 2021 or DL0-02 Baseline	DL0-02 2021		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a	Statistic	REF 2021 or DL0-02 Baseline	DL0-02 2021		
Sheardown Lake SE versus Reference Lake 3, 2020	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	56	100	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	56	100	M-W	-	-	-	Median	29.2	37.0	<0.001	27
		Body Weight	Body Weight (g)	-	56	100	M-W	-	-	-	Median	190	490	<0.001	158
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	56	100	ANCOVA	0.088	<0.001	33.0	Adjusted Mean	276	342	<0.001	24
					56	99 ^d	ANCOVA	0.013 ^e	<0.001	32.9	Adjusted Mean	275	340	<0.001	24
Sheardown Lake SE 2020 versus Baseline	Survival	Length Frequency Distribution	Fork Length (cm)	-	70	100	K-S	-	-	-	-	-	-	0.171	-
	Body Size	Fork Length	Fork Length (cm)	-	70	100	M-W	-	-	-	Median	37.4	37.0	0.512	-0.80
		Body Weight	Body Weight (g)	-	70	100	M-W	-	-	-	Median	500	490	0.214	-2.0
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	70	100	ANCOVA	0.055	<0.001	36.4	Adjusted Mean	470	448	0.003	-4.7
					69 ^f	99 ^g	ANCOVA	0.322	<0.001	36.3	Adjusted Mean	464	447	0.009	-3.6

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

^d One outlier (DL02-21-AC-56, Stdnt resid:-4.643) was removed from the analysis.

^e ANCOVA proceeded under the assumption that the slopes are practically parallel (R2 of interaction model = 0.9789 and R2 of parallel slope model = 0.9781; a difference < 0.02) following Environment Canada (2012).

^f One outlier (SDSE-08-AC-11, Stdnt resid: 4.536) was removed from the analysis.

^g One outlier (DL02-21-AC-56, Stdnt resid: -4.536) was removed from the analysis.

Table G.25: Arctic Charr Measurements from Fish Captured at Mary Lake by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
BL0-21-ACJ-01	10.7	11.5	12.629	-	1.031
BL0-21-ACJ-02	3.6	3.8	0.417	-	0.894
BL0-21-ACJ-03	4.8	5.0	0.974	-	0.881
BL0-21-ACJ-04	8.5	9.0	5.979	-	0.974
BL0-21-ACJ-05	10.3	11.1	10.185	-	0.932
BL0-21-ACJ-06	9.6	10.3	8.108	-	0.916
BL0-21-ACJ-07	3.7	3.8	0.428	-	0.845
BL0-21-ACJ-08	3.8	4.0	0.552	-	1.006
BL0-21-ACJ-09	11.0	11.8	11.554	-	0.868
BL0-21-ACJ-10	10.3	11.1	10.865	-	0.994
BL0-21-ACJ-11	9.1	9.8	6.947	-	0.922
BL0-21-ACJ-12	6.7	7.1	2.757	-	0.917
BL0-21-ACJ-13	10.8	11.6	10.966	-	0.871
BL0-21-ACJ-14	8.3	8.8	5.166	-	0.903
BL0-21-ACJ-15	8.8	9.4	6.792	-	0.997
BL0-21-ACJ-16	8.5	9.0	4.789	-	0.780
BL0-21-ACJ-17	5.4	5.6	1.464	-	0.930
BL0-21-ACJ-18	4.8	5.0	1.024	-	0.926
BL0-21-ACJ-19	3.9	4.0	0.547	-	0.922
BL0-21-ACJ-20	4.0	4.1	0.536	-	0.838
BL0-21-ACJ-21	10.9	11.9	14.510	-	1.120
BL0-21-ACJ-22	7.8	8.2	4.135	-	0.871
BL0-21-ACJ-23	8.3	8.8	4.966	-	0.869
BL0-21-ACJ-24	5.7	6.0	1.663	-	0.898
BL0-21-ACJ-25	9.6	10.3	7.980	-	0.902
BL0-21-ACJ-26	9.4	10.2	7.726	-	0.930
BL0-21-ACJ-27	5.3	5.5	1.373	-	0.922
BL0-21-ACJ-28	9.4	10.0	6.720	-	0.809
BL0-21-ACJ-29	6.1	6.5	2.114	-	0.931
BL0-21-ACJ-30	3.8	4.0	0.533	0++	0.971
BL0-21-ACJ-31	9.0	9.8	7.892	2	1.083
BL0-21-ACJ-32	10.9	11.5	12.329	3	0.952
BL0-21-ACJ-33	5.8	6.2	1.852	-	0.949
BL0-21-ACJ-34	7.7	8.2	4.096	-	0.897
BL0-21-ACJ-35	5.6	5.8	1.667	-	0.949
BL0-21-ACJ-36	8.7	9.2	4.770	2	0.724
BL0-21-ACJ-37	6.4	6.7	2.047	1	0.781
BL0-21-ACJ-38	6.2	6.6	2.334	1	0.979
BL0-21-ACJ-39	9.8	10.4	7.952	2	0.845
BL0-21-ACJ-40	5.0	5.3	1.227	-	0.982
BL0-21-ACJ-41	5.7	6.0	1.708	-	0.922
BL0-21-ACJ-42	8.5	9.2	5.750	-	0.936
BL0-21-ACJ-43	4.8	5.1	1.050	-	0.949
BL0-21-ACJ-44	6.8	7.2	2.782	-	0.885
BL0-21-ACJ-45	7.2	7.6	3.315	-	0.888
BL0-21-ACJ-46	6.7	7.1	2.727	-	0.907
BL0-21-ACJ-47	6.1	6.5	2.021	-	0.890
BL0-21-ACJ-48	4.8	5.1	1.030	-	0.931
BL0-21-ACJ-49	9.1	9.8	7.635	-	1.013
BL0-21-ACJ-50	3.9	4.0	0.527	0++	0.888
BL0-21-ACJ-51	5.4	5.7	1.632	-	1.036
BL0-21-ACJ-52	9.6	10.2	9.163	-	1.036
BL0-21-ACJ-53	9.9	10.7	8.281	-	0.853
BL0-21-ACJ-54	5.9	6.3	1.929	-	0.939
BL0-21-ACJ-55	5.3	5.6	1.489	-	1.000
BL0-21-ACJ-56	6.4	6.8	2.341	-	0.893
BL0-21-ACJ-57	11.2	12.0	13.013	-	0.926
BL0-21-ACJ-58	7.1	7.6	3.156	-	0.882
BL0-21-ACJ-59	8.4	9.0	5.959	-	1.005
BL0-21-ACJ-60	6.2	6.5	2.179	-	0.914
BL0-21-ACJ-61	7.7	8.2	4.260	-	0.933
BL0-21-ACJ-62	10.1	10.8	7.680	-	0.745
BL0-21-ACJ-63	7.8	8.3	3.556	-	0.749
BL0-21-ACJ-64	3.9	4.1	0.540	-	0.910

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.25: Arctic Charr Measurements from Fish Captured at Mary Lake by Electrofishing, Mary River Project CREMP, August 2021

Specimen ID		Fork Length (cm)	Total Length (cm)	Body Weight (g)	Age (years)	Fulton's Condition Factor (K)
BL0-21-ACJ-65		9.9	10.6	8.163	-	0.841
BL0-21-ACJ-66		9.6	10.3	8.118	-	0.918
BL0-21-ACJ-67		9.3	9.9	6.751	-	0.839
BL0-21-ACJ-68		8.5	9.1	5.878	-	0.957
BL0-21-ACJ-69		5.4	5.7	1.623	-	1.031
BL0-21-ACJ-70		6.3	6.7	2.165	-	0.866
BL0-21-ACJ-71		3.7	3.8	0.472	-	0.932
BL0-21-ACJ-72		5.5	5.8	1.370	-	0.823
BL0-21-ACJ-73		7.4	7.9	4.751	-	1.172
BL0-21-ACJ-74		10.7	11.4	9.964	-	0.813
BL0-21-ACJ-75		7.7	8.2	3.948	-	0.865
BL0-21-ACJ-76		8.6	9.2	7.430	-	1.168
BL0-21-ACJ-77		7.6	8.1	5.033	-	1.147
BL0-21-ACJ-78		5.3	5.5	1.330	-	0.893
BL0-21-ACJ-79		9.2	9.9	6.973	-	0.895
BL0-21-ACJ-80		6.1	6.5	1.859	-	0.819
BL0-21-ACJ-81		9.8	10.5	8.939	-	0.950
BL0-21-ACJ-82		5.3	5.6	1.501	-	1.008
BL0-21-ACJ-83		6.3	6.7	2.133	-	0.853
BL0-21-ACJ-84		7.2	7.6	3.392	-	0.909
BL0-21-ACJ-85		9.4	10.1	7.472	-	0.900
BL0-21-ACJ-86		6.4	6.8	2.233	-	0.852
BL0-21-ACJ-87		5.5	5.8	1.488	-	0.894
BL0-21-ACJ-88		3.6	3.7	0.428	-	0.917
BL0-21-ACJ-89		8.9	9.5	8.666	-	1.229
BL0-21-ACJ-90		7.1	7.5	3.256	-	0.910
BL0-21-ACJ-91		11.2	12.1	15.023	3	1.069
BL0-21-ACJ-92		11.9	12.7	13.500	3	0.801
BL0-21-ACJ-93		14.7	15.9	32.748	-	1.031
BL0-21-ACJ-94		11.8	12.7	16.213	-	0.987
BL0-21-ACJ-95		7.0	7.4	2.889	-	0.842
BL0-21-ACJ-96		5.0	5.3	1.250	-	1.000
BL0-21-ACJ-97		6.3	6.7	2.253	-	0.901
BL0-21-ACJ-98		5.5	5.8	1.536	-	0.923
BL0-21-ACJ-99		5.6	5.9	1.650	-	0.940
BL0-21-ACJ-100		8.1	8.7	5.926	-	1.115
Overall Catch Summary	Sample Size (N)	100	100	100	10	100
	Mean	7.4	7.9	5.026	1.7	0.928
	Median	7.2	7.6	3.354	2.0	0.917
	Standard Deviation	2.3	2.6	4.793	1.2	0.091
	Standard Error	0.23	0.26	0.479	0.37	0.009
	Minimum	3.6	3.7	0.417	0.0	0.724
	Maximum	14.7	15.9	32.748	3.0	1.229
Young-of-the-Year Catch Summary	proportion of YOY	10%				
	Sample Size (N)	10	10	10	2	10
	Mean	3.8	3.9	0.5	0.0	0.9
	Median	3.8	4.0	0.5	0.0	0.9
	Standard Deviation	0.1	0.1	0.1	-	0.1
	Standard Error	0.0	0.0	0.0	-	0.0
	Minimum	3.6	3.7	0.4	0.0	0.8
	Maximum	4.0	4.1	0.6	0.0	1.0

Note: "-" indicates measurement not taken or fish not submitted for aging.

Table G.26: Results of Nearshore Arctic Charr Non-Young-of-the-Year (YOY) Health Endpoint Statistical Comparisons between Mary Lake (BL0) and Reference Lake 3 (REF3), Mary River Project CREMP, August 2021

Group	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
			Response	Covariate	REF	BL0		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
								Interaction P-value	Covariate P-value		Statistic	REF	BL0		
All Fish	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	103	100	K-S	-	-	-	-	-	-	<0.001	-
YOY	Body Size	Fork Length	Fork Length (cm)	-	11	10	tunequal	-	-	-	Mean	3.26	3.79	0.002	16
		Body Weight	Body Weight (g)	-	11	10	tequal	-	-	-	Mean	0.288	0.498	<0.001	73
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	11	10	ANCOVA	0.996	<0.001	3.49	Adjusted Mean	0.328	0.394	0.019	20
Non-YOY	Survival	Length Frequency Distribution	Fork Length (cm)	-	92	90	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	92	90	M-W	-	-	-	Median	5.55	7.70	<0.001	39
		Body Weight	Body Weight (g)	-	92	90	M-W	-	-	-	Median	1.47	4.20	<0.001	185
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	92	90	ANCOVA	0.405	<0.001	6.87	Adjusted Mean	2.85	2.99	0.002	5.1

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

Table G.27: Arctic Charr Estimated Sample Sizes to Detect Various Effect Sizes as a Percentage Change in Respective Fish Health Endpoints at Mary Lake (BL0) Using 2021 Data Relative to Reference Lake 3 Data (2021) or Mary Lake Baseline Data (2006 to 2013) with $\alpha=\beta=0.1$, Mary River Project 2021 CREMP

Comparison	Group	Indicator	Endpoint	Variables		Test ^a	S ^b	COV (%) ^c	Minimum Sample Size to Detect an Effect Size (% Increase/Decrease Relative to Reference) with α=β=0.1									
				Response	Covariate				log(Response)	5%	10%	20%	25%	30%	33%	40%	50%	100%
										-5%	-9%	-17%	-20%	-23%	-25%	-29%	-33%	-50%
									Response	±5%	±10%	±20%	±25%	±30%	±33%	±40%	±50%	±100%
Nearshore Arctic Charr (Electrofishing) versus Ref. Lake 3, 2021 Data	Non-YOY	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.116	32.8	Response	600	159	44	31	22	19	14	11	4
			Body Weight	Body Weight (g)	-	M-W	0.356	149	Response	5,588	1,466	402	269	195	163	120	83	29
		Energy Storage	Condition	log[Adjusted Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0446	-	log(Response)	78	22	8	6	5	5	4	4	3
Littoral/Profundal Arctic Charr (Gill Netting) versus Ref. Lake 3, 2021 Data	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0728	17.6	Response	235	63	17	12	9	7	6	5	3
			Body Weight	Body Weight (g)	-	M-W	0.202	69.5	Response	1,796	472	130	87	64	54	40	28	11
		Energy Storage	Condition	log[Adjusted Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0648	-	log(Response)	162	44	14	10	8	7	6	5	4
			Condition ^d	log[Adjusted Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0432	-	log(Response)	73	21	7	6	5	5	4	4	3
Littoral/Profundal Arctic Charr (Gill Netting) 2021 versus Baseline	All fish	Body Size	Fork Length	Fork Length (cm)	-	M-W	0.0955	19.8	Response	312	79	21	14	11	9	7	5	3
			Body Weight	Body Weight (g)	-	M-W	0.273	61.7	Response	3,019	756	190	122	86	70	49	32	10
		Energy Storage	Condition	log[Adjusted Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0664	-	log(Response)	170	46	14	10	8	7	6	5	4
			Condition ^d	log[Adjusted Body Weight (g)]	log[Fork Length (cm)]	ANCOVA	0.0603	-	log(Response)	141	39	12	9	7	6	5	5	3

^a Sample size estimates for the M-W test were estimated based for a two-sample t-test using sample sizes multiplied by 0.864. The 0.864 is the lower bound of the asymptotic relative efficiency of the Mann-Whitney test and the two-sample t-test (Hodges and Lehmann 1956). Estimates were generated for the response variable on the untransformed and log₁₀-transformed scales and the lowest sample size is reported.

^b Pooled standard deviation of the regression residuals

^c Coefficient of variation (pooled standard deviation/reference mean)×100%

^d Outliers removed from analysis.

Table G.28: Gill Netting Catch Records for Mary Lake, Mary River Project CREMP, August 2021

Gill Net Set ID	Location (NAD83, UTM Zone 17N)		Length (m)	Set Date	Lift Date	Set Time	Lift Time	Fishing Hours	Effort (m*hrs/100 m)	Arctic Charr Catch per Mesh Size			Total Catch	CPUE
	Easting	Northing								1½"	2"	3"		
BL0-21-GN-01A	555030	7906035	91.4	12-Aug-21	12-Aug-21	10:10	11:40	1.500	1.372	0	2	3	5	3.65
BL0-21-GN-01B	555030	7906035	91.4	12-Aug-21	12-Aug-21	11:55	13:40	1.750	1.600	1	2	0	3	1.87
BL0-21-GN-02A	554727	7905998	91.4	12-Aug-21	12-Aug-21	10:15	12:00	1.75	1.60	1	2	0	3	1.87
BL0-21-GN-02B	554727	7905998	91.4	12-Aug-21	12-Aug-21	12:25	14:25	2.000	1.829	3	2	3	8	4.37
BL0-21-GN-02C	554727	7905998	91.4	12-Aug-21	12-Aug-21	14:50	17:50	3.000	2.743	0	0	0	0	0.00
BL0-21-GN-03A	554645	7906033	91.4	12-Aug-21	12-Aug-21	10:40	12:25	1.750	1.600	2	0	1	3	1.87
BL0-21-GN-03B	554645	7906033	91.4	12-Aug-21	12-Aug-21	15:10	17:10	2.000	1.829	7	2	3	12	6.6
BL0-21-GN-03C	554645	7906033	91.4	15-Aug-21	15-Aug-21	9:35	10:45	1.17	1.07	1	1	1	3	2.81
BL0-21-GN-03D	554645	7906033	91.4	15-Aug-21	15-Aug-21	11:05	12:50	1.75	1.60	1	1	1	3	1.87
BL0-21-GN-03E	554645	7906033	91.4	15-Aug-21	15-Aug-21	13:15	15:00	1.75	1.60	1	0	1	2	1.25
BL0-21-GN-04A	555099	7905852	91.4	12-Aug-21	12-Aug-21	13:07	15:20	2.22	2.03	0	3	2	5	2.47
BL0-21-GN-05A	551020	7905637	91.4	12-Aug-21	12-Aug-21	13:15	16:00	2.75	2.51	1	12	11	24	9.54
BL0-21-GN-05B	551020	7905637	91.4	15-Aug-21	15-Aug-21	9:45	11:10	1.42	1.30	0	2	9	11	8.49
BL0-21-GN-05C	551020	7905637	91.4	15-Aug-21	15-Aug-21	11:40	13:20	1.67	1.52	1	2	3	6	3.94
BL0-21-GN-05D	551020	7905637	91.4	15-Aug-21	15-Aug-21	13:40	15:30	1.83	1.68	0	0	0	0	0.00
Total									25.9	19	31	38	88	3.37

Note: Catch-per-unit-effort (CPUE) represents the number of fish captured per 100 m-hours of net.

Table G.29: Arctic Charr Measurements from Fish Captured at Mary Lake by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
BL0-21-AC-01	BL0-21-GN-01A	2	32.0	34.7	310	-	0.946
BL0-21-AC-02	BL0-21-GN-01A	2	32.3	34.9	340	-	1.009
BL0-21-AC-03	BL0-21-GN-01A	3	38.4	42.0	530	-	0.936
BL0-21-AC-04	BL0-21-GN-01A	3	39.0	42.6	520	-	0.877
BL0-21-AC-05	BL0-21-GN-01A	3	37.0	40.3	480	-	0.948
BL0-21-AC-06	BL0-21-GN-02A	2	33.2	35.6	300	-	0.820
BL0-21-AC-07	BL0-21-GN-02A	2	35.4	38.3	470	-	1.059
BL0-21-AC-08	BL0-21-GN-02A	1.5	20.1	22.0	95	-	1.170
BL0-21-AC-09	BL0-21-GN-03A	3	41.0	44.0	630	-	0.914
BL0-21-AC-10	BL0-21-GN-03A	1.5	18.0	19.6	75	-	1.286
BL0-21-AC-11	BL0-21-GN-03A	1.5	23.6	25.4	110	-	0.837
BL0-21-AC-12	BL0-21-GN-01B	1.5	40.1	44.0	560	-	0.868
BL0-21-AC-13	BL0-21-GN-01B	2	37.0	39.5	200	-	0.395
BL0-21-AC-14	BL0-21-GN-01B	2	36.3	39.5	460	-	0.962
BL0-21-AC-15	BL0-21-GN-02B	3	43.8	47.6	700	-	0.833
BL0-21-AC-16	BL0-21-GN-02B	3	37.5	40.6	520	-	0.986
BL0-21-AC-17	BL0-21-GN-02B	3	38.7	41.9	570	-	0.983
BL0-21-AC-18	BL0-21-GN-02B	2	38.7	39.7	520	-	0.897
BL0-21-AC-19	BL0-21-GN-02B	2	31.2	33.8	290	-	0.955
BL0-21-AC-20	BL0-21-GN-02B	1.5	39.7	42.4	550	-	0.879
BL0-21-AC-21	BL0-21-GN-02B	1.5	43.8	47.0	710	-	0.845
BL0-21-AC-22	BL0-21-GN-02B	1.5	31.7	34.3	510	-	1.601
BL0-21-AC-23	BL0-21-GN-04A	3	38.6	42.2	515	-	0.895
BL0-21-AC-24	BL0-21-GN-04A	3	37.6	40.5	520	-	0.978
BL0-21-AC-25	BL0-21-GN-04A	2	32.5	35.4	375	-	1.092
BL0-21-AC-26	BL0-21-GN-04A	2	40.8	44.1	685	-	1.009
BL0-21-AC-27	BL0-21-GN-04A	2	36.2	39.1	438	-	0.923
BL0-21-AC-28	BL0-21-GN-05A	1.5	23.4	25.4	110	-	0.859
BL0-21-AC-29	BL0-21-GN-05A	2	39.0	42.5	630	-	1.062
BL0-21-AC-30	BL0-21-GN-05A	2	39.5	42.2	580	-	0.941
BL0-21-AC-31	BL0-21-GN-05A	2	39.1	42.6	595	-	0.995
BL0-21-AC-32	BL0-21-GN-05A	2	36.8	39.9	475	-	0.953
BL0-21-AC-33	BL0-21-GN-05A	2	41.0	44.0	620	-	0.900
BL0-21-AC-34	BL0-21-GN-05A	2	40.3	44.2	530	-	0.810
BL0-21-AC-35	BL0-21-GN-05A	2	40.2	43.6	590	-	0.908
BL0-21-AC-36	BL0-21-GN-05A	2	40.8	44.2	615	-	0.906
BL0-21-AC-37	BL0-21-GN-05A	2	37.0	40.6	520	-	1.027
BL0-21-AC-38	BL0-21-GN-05A	2	44.0	47.0	640	-	0.751
BL0-21-AC-39	BL0-21-GN-05A	2	37.2	40.3	560	-	1.088
BL0-21-AC-40	BL0-21-GN-05A	2	38.7	42.2	550	-	0.949
BL0-21-AC-41	BL0-21-GN-05A	3	41.2	44.5	580	-	0.829
BL0-21-AC-42	BL0-21-GN-05A	3	40.6	43.9	570	-	0.852
BL0-21-AC-43	BL0-21-GN-05A	3	41.5	44.9	590	-	0.825
BL0-21-AC-44	BL0-21-GN-05A	3	37.1	40.2	520	-	1.018
BL0-21-AC-45	BL0-21-GN-05A	3	38.2	41.3	600	-	1.076
BL0-21-AC-46	BL0-21-GN-05A	3	39.0	41.4	610	-	1.028
BL0-21-AC-47	BL0-21-GN-05A	3	39.9	43.0	540	-	0.850
BL0-21-AC-48	BL0-21-GN-05A	3	39.1	42.5	545	-	0.912
BL0-21-AC-49	BL0-21-GN-05A	3	38.0	41.2	480	-	0.875

Note: "-" indicates measurement not taken or no comment.

Table G.29: Arctic Charr Measurements from Fish Captured at Mary Lake by Gill Netting, Mary River Project CREMP, August 2021

Specimen ID	Net ID	Net Mesh Size (inches)	Fork Length (cm)	Total Length (cm)	Body Weight (g)	Abnormalities	Fulton's Condition Factor (K)
BL0-21-AC-50	BL0-21-GN-05A	3	38.4	41.3	510	-	0.901
BL0-21-AC-51	BL0-21-GN-05A	3	41.5	45.0	650	-	0.909
BL0-21-AC-52	BL0-21-GN-03B	1.5	34.3	37.1	400	-	0.991
BL0-21-AC-53	BL0-21-GN-03B	1.5	37.5	40.5	440	-	0.834
BL0-21-AC-54	BL0-21-GN-03B	1.5	39.9	43.3	620	-	0.976
BL0-21-AC-55	BL0-21-GN-03B	1.5	41.0	44.8	700	-	1.016
BL0-21-AC-56	BL0-21-GN-03B	1.5	36.0	39.5	480	-	1.029
BL0-21-AC-57	BL0-21-GN-03B	1.5	38.0	41.4	550	-	1.002
BL0-21-AC-58	BL0-21-GN-03B	1.5	40.0	43.4	580	-	0.906
BL0-21-AC-59	BL0-21-GN-03B	2	38.0	41.2	465	-	0.847
BL0-21-AC-60	BL0-21-GN-03B	2	37.7	40.5	490	-	0.914
BL0-21-AC-61	BL0-21-GN-03B	3	38.3	41.8	575	-	1.023
BL0-21-AC-62	BL0-21-GN-03B	3	38.5	41.6	545	-	0.955
BL0-21-AC-63	BL0-21-GN-03B	3	34.0	36.8	395	-	1.005
BL0-21-AC-64	BL0-21-GN-03C	3	35.2	38.1	460	-	1.055
BL0-21-AC-65	BL0-21-GN-03C	2	40.0	43.7	540	-	0.844
BL0-21-AC-66	BL0-21-GN-03C	1.5	40.8	44.0	630	-	0.928
BL0-21-AC-67	BL0-21-GN-05B	2	39.1	42.5	540	-	0.903
BL0-21-AC-68	BL0-21-GN-05B	2	37.5	40.5	495	-	0.939
BL0-21-AC-69	BL0-21-GN-05B	3	42.0	46.0	690	-	0.931
BL0-21-AC-70	BL0-21-GN-05B	3	41.3	45.0	630	-	0.894
BL0-21-AC-71	BL0-21-GN-05B	3	43.0	46.4	635	-	0.799
BL0-21-AC-72	BL0-21-GN-05B	3	38.0	42.7	520	-	0.948
BL0-21-AC-73	BL0-21-GN-05B	3	36.0	39.7	510	-	1.093
BL0-21-AC-74	BL0-21-GN-05B	3	36.5	39.8	495	-	1.018
BL0-21-AC-75	BL0-21-GN-05B	3	39.6	42.8	600	-	0.966
BL0-21-AC-76	BL0-21-GN-05B	3	42.2	45.5	650	-	0.865
BL0-21-AC-77	BL0-21-GN-05B	3	39.9	43.4	595	-	0.937
BL0-21-AC-78	BL0-21-GN-03D	3	40.5	43.7	585	-	0.881
BL0-21-AC-79	BL0-21-GN-03D	2	37.6	40.9	440	-	0.828
BL0-21-AC-80	BL0-21-GN-03D	1.5	39.7	44.0	645	-	1.031
BL0-21-AC-81	BL0-21-GN-05C	1.5	31.4	34.0	325	-	1.050
BL0-21-AC-82	BL0-21-GN-05C	2	38.6	42.2	480	-	0.835
BL0-21-AC-83	BL0-21-GN-05C	2	41.0	44.2	625	-	0.907
BL0-21-AC-84	BL0-21-GN-05C	3	40.7	44.1	620	-	0.920
BL0-21-AC-85	BL0-21-GN-05C	3	41.7	45.5	630	-	0.869
BL0-21-AC-86	BL0-21-GN-05C	3	34.5	37.9	465	-	1.132
BL0-21-AC-87	BL0-21-GN-03E	3	41.0	44.1	605	-	0.878
BL0-21-AC-88	BL0-21-GN-03E	1.5	43.0	46.9	645	-	0.811
Overall Catch Summary	Sample Size (N)		88	88	88	-	88
	Average		37.7	40.9	517	-	0.942
	Median		38.7	42.1	540	-	0.929
	Standard Deviation		4.6	5.0	134	-	0.130
	Standard Error		0.49	0.53	14	-	0.014
	Minimum		18.0	19.6	75	-	0.395
	Maximum		44.0	47.6	710	-	1.601

Note: "-" indicates measurement not taken or no comment.

Table G.30: Results of Littoral/Profundal Arctic Charr Health Endpoint Statistical Comparisons between 2021 Mary Lake (BL0) and 2021 Reference Lake 3 (REF3) Data, and for Camp Lake between 2021 and the Mine Baseline Period (2005 to 2013), Mary River Project 2021 CREMP

Comparison	Indicator	Endpoint	Variables		Sample Size		Test	ANCOVA Model Statistics			Summary Statistics ^b			Test P-value	Magnitude of Difference (%) ^c
			Response	Covariate	REF 2021 or BL0 Base	BL0 2021		Interaction Model	Parallel Slope Model	Covariate Value for Comparisons ^a					
								Interaction P-value	Covariate P-value		Statistic	REF 2021 or BL0 Base	BL0 2021		
Mary Lake versus Reference Lake 3, 2021	Recruitment/ Survival	Length Frequency Distribution	Fork Length (cm)	-	56	88	K-S	-	-	-	-	-	-	<0.001	-
	Body Size	Fork Length	Fork Length (cm)	-	56	88	M-W	-	-	-	Median	29.2	38.7	<0.001	32
		Body Weight	Body Weight (g)	-	56	88	M-W	-	-	-	Median	190	542	<0.001	186
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	56	88	ANCOVA	0.637	<0.001	33.1	Adjusted Mean	273	357	<0.001	31
		Condition	log[Body Weight (g)]	log[Fork Length (cm)]	56	84 ^d	ANCOVA	0.737	<0.001	33.1	Adjusted Mean	275	352	<0.001	28
Mary Lake 2021 versus Baseline	Survival	Length Frequency Distribution	Fork Length (cm)	-	183	88	K-S	-	-	-	-	-	-	0.155	-
	Body Size	Fork Length	Fork Length (cm)	-	183	88	M-W	-	-	-	Median	38.4	38.7	0.659	0.78
		Body Weight	Body Weight (g)	-	183	88	M-W	-	-	-	Median	500	542	0.067	8.5
	Energy Storage	Condition	log[Body Weight (g)]	log[Fork Length (cm)]	183	88	ANCOVA	0.062	<0.001	36.3	Adjusted Mean	433	453	0.020	4.8
		Condition	log[Body Weight (g)]	log[Fork Length (cm)]	183	87 ^e	ANCOVA	0.077	<0.001	36.3	Adjusted Mean	432	458	0.001	6.0

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

Absolute Magnitude of Difference ≥ 10% for Condition (EEM effect endpoint).

^a The mean value of the covariate (that corresponds to the adjusted means for the response variable) for the parallel slope ANCOVA model or the minimum and maximum values of the overlap in covariate values for the interaction ANCOVA model.

^b The median, mean (geometric mean for log₁₀-transformed variables), and adjusted mean are reported for Mann-Whitney, t-test and ANCOVA, respectively, and the predicted mean values from the regression line equations for minimum and maximum values of the covariate (where the data sets overlap) for ANCOVAs where a significant interaction was detected.

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

^d Four outliers (BL0-21-AC-13, Stdnt resid: -8.646; BL0-21-AC-22, Stdnt resid: 4.034; BL0-21-AC-44, Stdnt resid: 4.634; BL0-21-AC-16, Stdnt resid: 4.351) was removed from the analysis.

^e One outlier (BL0-21-AC-13, Stdnt resid: -7.57) was removed from analysis.

APPENDIX H
SPECIAL
INVESTIGATION DATA

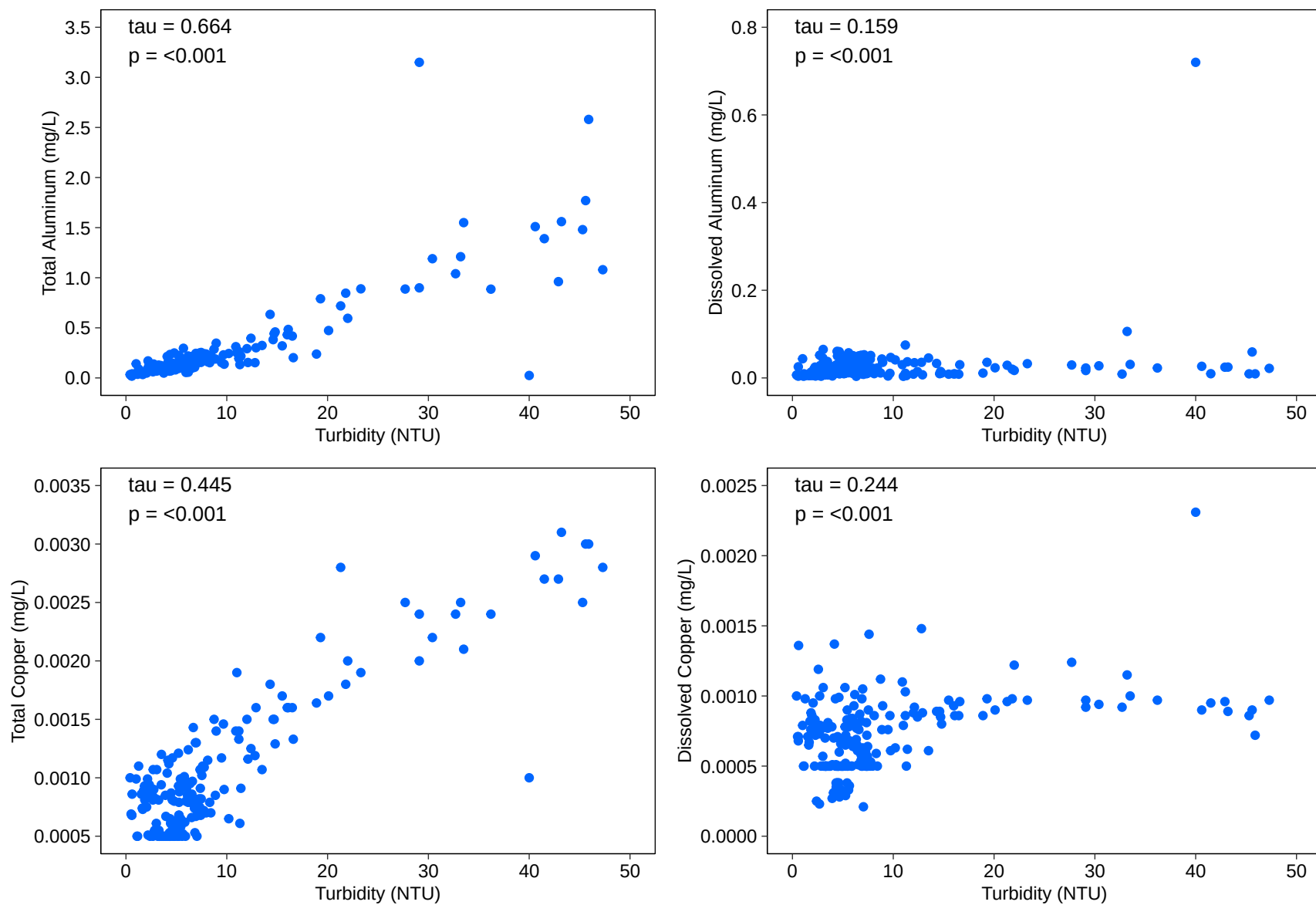


Figure H.1: Kendall Correlations between Parameters of Interest and Turbidity at Mary River Stations, Operational Years (2015 to 2021)

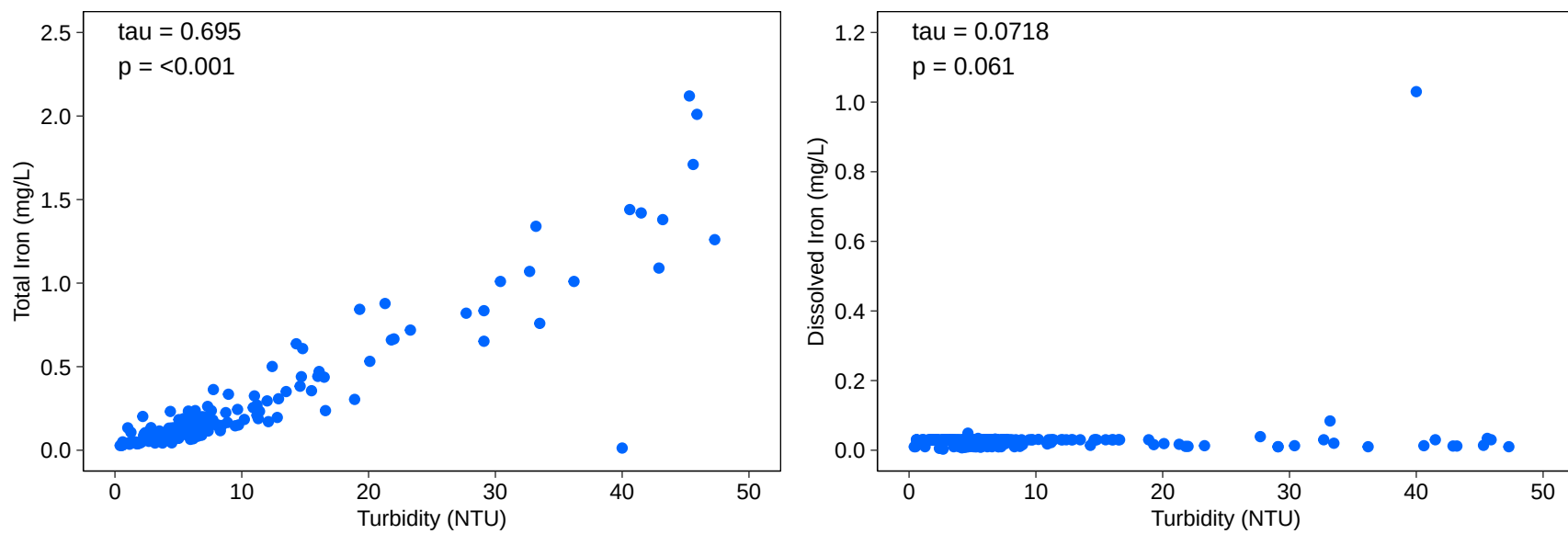


Figure H.1: Kendall Correlations between Parameters of Interest and Turbidity at Mary River Stations, Operational Years (2015 to 2021)

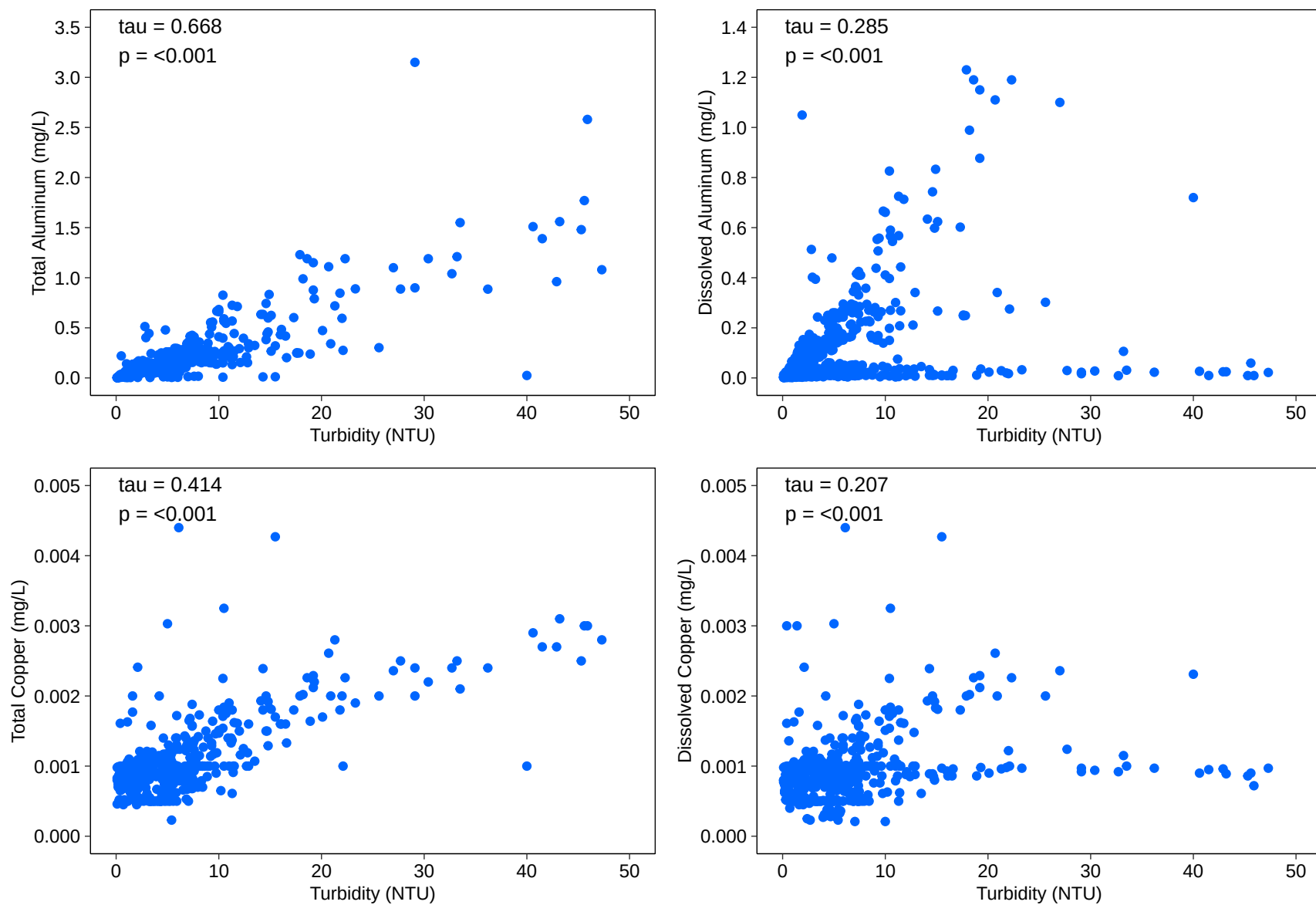


Figure H.2: Kendall Correlations between Parameters of Interest and Turbidity at Mary River Stations, All Years (2005 to 2021)

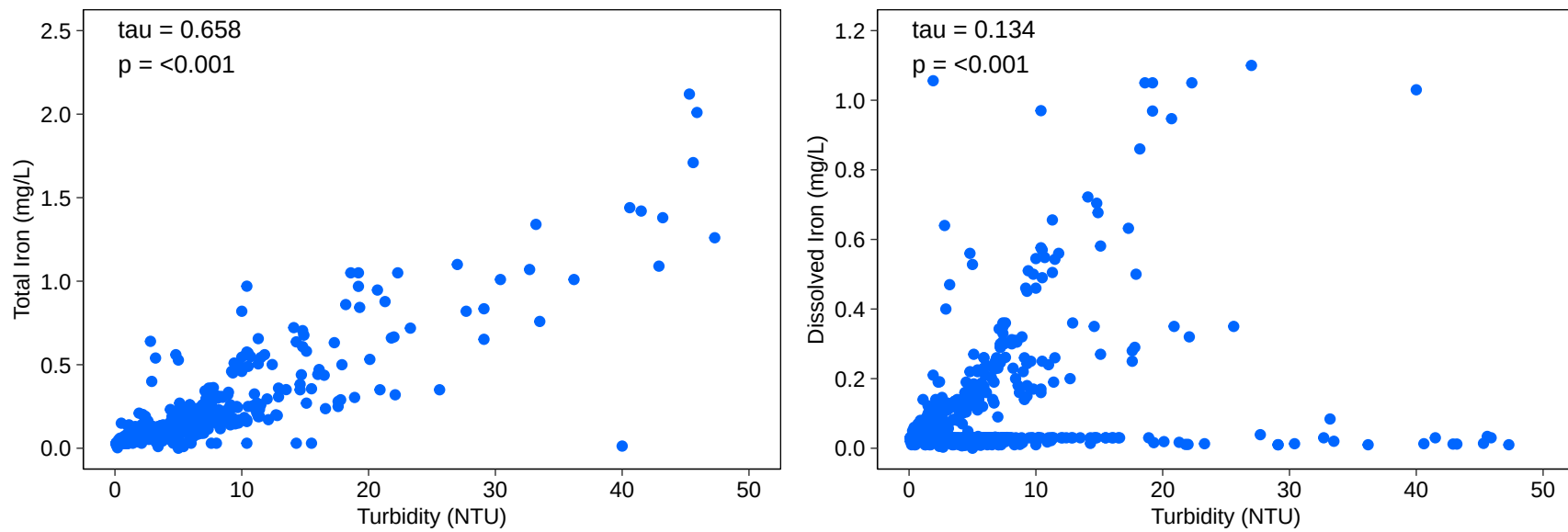


Figure H.2: Kendall Correlations between Parameters of Interest and Turbidity at Mary River Stations, All Years (2005 to 2021)

Table H.1: Water Chemistry at Lotic Camp Lake Tributary (CLT) North Branch Monitoring Stations, Monitored for the Copper Special Investigation, Mary River Project CREMP, Fall 2021

Parameters	Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	CLT1 North Branch				
				L1-CUSI-A ^c	LI-08	L1-CUSI-T1 ^c	L1-CUSI-T2 ^c	L1-02
				6-Sep-21	3-Sep-21	5-Sep-21	5-Sep-21	5-Sep-21
Total Copper (Cu)	mg/L	0.002	0.0022	0.00342	0.00212	0.00190	0.00169	0.00198
Dissolved Copper (Cu)	mg/L	-	-	0.00248	0.00201	0.00190	0.00174	0.00198

 Indicates parameter concentration above applicable Water Quality Guideline.

 Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

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

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

^c Monitoring stations L1 CUSI T1, L1-CUSI-T2, and L1-CUSI-A were sampled during fall 2021 only as a special investigation into elevated aqueous total copper concentrations in the CLT1 north branch (see Section 2.5.2).

Table H.2: Water Chemistry at Lotic Sheardown Lake Tributary 1 (SDLT1) Monitoring Stations, Monitored for the Copper Special Investigation, Mary River Project CREMP, Fall 2021

Parameters	Units	Water Quality Guideline (WQG) ^a	AEMP Benchmark ^b	Sheardown Lake Tributary 1							
				D1-CUSI-A ^c	D1-CUSI-B ^c	D1-CUSI-C ^c	MS-C-F ^c	MS-C-B ^c	D1-05	MS-C-A ^c	D1-00
				06-Sep-21	06-Sep-21	06-Sep-21	02-Sep-21	01-Sep-21	26-Aug-21	02-Sep-21	26-Aug-21
Turbidity	NTU	-	-	10.0	8.98	28.4	28.8	2.98	6.21	3.02	3.08
Total Copper (Cu)	mg/L	0.002	0.0022	0.00286	0.00312	0.00405	0.00407	0.00279	0.00297	0.00266	0.00209
Dissolved Copper (Cu)	mg/L	-	-	0.00193	0.00210	0.00224	0.00258	0.00277	0.00265	0.00270	0.00203

 Indicates parameter concentration above applicable Water Quality Guideline.

BOLD Indicates parameter concentration above the AEMP benchmark.

Note: "-" indicates no WQG benchmark applicable.

^a Canadian Water Quality Guideline for the protection of aquatic life (CCME 1987, 1999). See Table 2.2 for information regarding WQG criteria.

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

^c Stations D1 CUSI-A, D1-CUSI-B, D1-CUSI-C, MS-C-F, MS-C-B, and MS-C-A were sampled in fall 2021 as part of a special investigation in elevated copper concentrations (see Section 2.5.2)