Appendix 18: 2021 Aquatic Effects Monitoring Program (AEMP) Report

Aquatic Effects Monitoring Program 2021 Annual Report

Meliadine Gold Mine

Prepared for:

Agnico Eagle Mines Limited
Meliadine Division
Rankin Inlet, Nunavut X0C 0G0

FINAL

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Azimuth Consulting Group Inc.
218-2902 West Broadway
Vancouver, B.C., V6K 2G8

PLAIN LANGUAGE SUMMARY

Introduction

This document presents findings of the 2021 Aquatic Effects Monitoring Program (AEMP) for Agnico Eagle's Meliadine Gold Mine (the Mine) near Rankin Inlet, Nunavut. The AEMP is a requirement of the Type A Water Licence (2AM-MEL-1631) and is the primary monitoring program used to evaluate short-term and long-term effects of the mine on the aquatic environment. The AEMP was developed in consultation with community and regulatory stakeholders and was designed around the Environmental Effects Monitoring (EEM) program. EEM is an effluent monitoring program designed to evaluate the adequacy of the *Metal and Diamond Mining Effluent Regulations* (MDMER) governing the discharge of mining effluent to aquatic receiving environments. Biological studies are conducted every three years to assess the health of fish and benthic invertebrates living in Meliadine Lake. There is considerable overlap between the AEMP and EEM, but the scope of the AEMP goes beyond what is required under EEM to include additional study areas for fish and benthic invertebrate community monitoring in Meliadine Lake and monitoring for contaminants in fish tissue that may affect useability of the fishery.

The AEMP is conducted in two areas near the mine: Meliadine Lake and three lakes near the mine that are collectively referred to as the Peninsula Lakes. The Meliadine Lake and Peninsula Lakes studies share similar methods and approaches to monitoring, but differ with respect to the scope and frequency of monitoring due to the dominant pathways of exposure and potential impacts to the aquatic environment.

- **Meliadine Lake** is the receiving environment for surface contact water collected at the mine. The study area was selected based on the spatial extent of effects predicted in the Final Environmental Impact Statement (FEIS), concerns raised about potential downstream effects, and requirements under the federal MDMER EEM requirements. The core components of the Meliadine Lake study include annual water quality and phytoplankton community monitoring. Changes in sediment chemistry, benthic invertebrate communities, fish health, and fish tissue chemistry are monitored on a 3-year cycle coinciding with the EEM program.
- **Peninsula Lakes** – Three small lakes close to the mine are included in the AEMP to monitor changes caused by non-point source discharges such as dust, aerial emissions, and changes in water flow caused by development of the mine. The Peninsula Lakes study currently applies to Lake A8, Lake B7, and Lake D7 and focuses exclusively on monitoring changes in water quality. Biological studies may be undertaken if changes in water quality approach levels that may be harmful for aquatic life.

To help focus the decision-making process, key questions (**Table ES-1**) were developed as a way of evaluating mine-related changes to the aquatic environment.

Table ES-1. Key Questions for the Meliadine Lake and Peninsula Lakes Studies

Component	Key Questions
Meliadine Lake	
Water Quality	Are concentrations of key parameters in effluent less than limits specified in the Water Licence?
	Has water quality in the exposure areas changed over time, relative to reference/baseline areas?
	Is water quality consistent with predictions in the FEIS and below guidelines to protect aquatic life and human health?
Phytoplankton Community	Is the phytoplankton community affected by potential mine-related changes in water quality in Meliadine Lake?
Benthic Invertebrate Community	Is the benthic invertebrate community affected by potential mine-related changes in water and sediment quality in Meliadine Lake?
Fish Health	Is fish health affected by changes in water and sediment quality in Meliadine Lake?
Fish Tissue Chemistry	Are tissue metal concentrations in fish from Meliadine Lake increasing due to mining activities?
Peninsula Lakes	
Water Quality	Is water quality consistent with predictions in the FEIS and below guidelines to protect aquatic life and human health?
	Has water quality in the exposure areas changed over time, relative to baseline conditions?

Overview of Aquatic Monitoring Studies in 2021

The scope of the 2021 AEMP for Meliadine Lake included water quality monitoring, a phytoplankton study, sediment chemistry and benthic invertebrate community monitoring, small-bodied fish and Lake Trout population surveys, and a fish tissue chemistry study. The scope of the Peninsula Lakes study focused on monitoring changes in water quality in Lake A8, Lake B7, and Lake D7.

Fish population and benthic invertebrate community studies conducted for the AEMP were harmonized with biological monitoring for the Cycle 2 EEM program where possible. However, the two studies have distinct requirements, and for this reason, the results are delivered in separate reports rather than in a harmonized report. An overview of the 2021 AEMP and Cycle 2 EEM is provided in **Table ES-2**.

Table ES-2. Overview of the 2021 AEMP and Cycle 2 EEM Program

Component	2021 AEMP	Cycle 2 EEM
Meliadine Lake		
Effluent Quality (Throughout the discharge period July to October)	- Weekly chemistry and acute toxicity testing using Rainbow Trout and *Daphnia magna* effluent discharged to Meliadine Lake - Chronic toxicity tests in August and September on an aquatic plant (*Lemna minor*), aquatic invertebrates (*D. magna* and *Hyalella azteca*), and fish (Fathead Minnow) - A plume delineation survey in the east basin of Meliadine Lake (August)	
Water Quality (March, July, August, September)	- Limnology profiles and water samples collected for chemistry - 1 winter sampling event at the near-field area (MEL-01) and MF area (MEL-02) - Monthly sampling during the open-water period at MEL-01, MEL-02 and reference areas in Meliadine Lake	
Phytoplankton (August)	- Assess differences in primary productivity among exposure and reference areas	- Not required
Benthic Invertebrates & Sediment Chemistry (August)	- Assess differences in benthic invertebrate community metrics among the exposure (MEL-01 and MEL-02) and reference areas (MEL-03 and MEL-05)	- MF area MEL-02 is not included in the Cycle 2 EEM
Threespine Stickleback Health Assessment (August)	- Compare survival, growth, and condition of unparasitized fish at the exposure area (MEL-01) compared to reference areas (MEL-03 and MEL-04)	- Same study as the AEMP, plus an additional study on survival, growth, and condition of parasitized Threespine Stickleback
Threespine Stickleback Chemistry (August)	- Compare metals concentrations in Threespine Stickleback (carcass) between exposure and reference areas and over time	- Not required
Lake Trout Health (August)	- Assess changes in survival, growth, condition in Lake Trout collected in Meliadine Lake in 2021 compared to baseline	- Compare survival, growth, condition in Lake Trout from Meliadine Lake against two reference lakes sampled in 2021 (Peter Lake and Atulik Lake)
Lake Trout Chemistry	- Compare metals concentrations in Lake Trout caught in 2021 from Meliadine Lake with Lake Trout caught before the mine was built	- Not required
Peninsula Lakes		
Water Quality (July, August)	- Limnology profiles and water samples collected for chemistry - 3 lakes: Lake A8, Lake B7, and D7	- Not required

Meliadine Lake Water Quality

Water sampling is conducted in Meliadine Lake each year to verify that the mine is operating as planned and not causing changes in water quality that has the potential to impact the health of fish and other aquatic life, or affect people’s ability to use Meliadine Lake for drinking water or fishing. The Key questions for the Meliadine Lake water quality monitoring program are outlined in **Table ES-1**.

Effluent Quality

The mine discharged effluent (contact water) to Meliadine Lake from mid-July through early October. During this period, effluent was collected weekly and submitted for chemistry analysis. Toxicity tests were also conducted on Rainbow Trout and an aquatic invertebrate, *Daphnia magna*. Chemistry results were compared against limits in the Water Licence, and there were no exceedances in 2021. No effects to Rainbow Trout and *D. magna* survival were noted in any of the weekly tests conducted in 2021.

Chronic (sublethal) toxicity tests were conducted in August and September to determine if effluent has the potential to affect growth of aquatic plants (*Lemna minor*), growth and survival of aquatic invertebrates (*D. magna* and *Hyalella azteca*), and growth and survival of fish (Fathead Minnow). The August and September chronic toxicity tests confirmed that full-strength effluent discharged to Meliadine Lake does not affect survival and growth for fish and aquatic invertebrates. Minor effects to *L. minor* growth, as indicated by frond yield, were observed in the August and September tests. However, no effects were observed for biomass, which is a more relevant endpoint for assessing impacts to primary productivity.

The August plume delineation survey showed effluent present at concentrations above 1% throughout most of the near-field study area around the diffuser. Effluent was well-mixed in most areas as indicated by uniform conductivity readings throughout the water column. The plume extended as far as the esker to the north of the diffuser and approximately 1,300 m, to the northwest. Effluent concentrations between 2% and 3% were noted as far as 400 m to the SE of the diffuser. The plume appeared to migrate in a northwest to southeast direction in a relatively confined area, likely due to the influence of the northwesterly winds that occurred in late August. The prevailing pattern of water flow in the east basin on an annual basis is from the southeast to northwest.

Water Quality

Results from the 2021 AEMP confirm that the concentrations of some parameters have changed in Meliadine Lake coinciding with discharge of effluent to Meliadine Lake. The change in water quality is most evident in higher concentrations of some major ions, such as calcium, sodium, magnesium, and chloride in the east basin of Meliadine Lake. Other parameters that have increased in the east basin since the baseline and pre-construction period include arsenic, strontium, and uranium. The changes in water quality in 2021 for total dissolved solids (TDS) are well within what was predicted in the FEIS and in the water quality model that was updated in 2020 as part of the Emergency Amendment. Furthermore, concentrations were measured at levels well below guidelines associated with adverse effects to aquatic life or health-based guidelines to protect drinking water quality.

Peninsula Lakes Water Quality

Water quality monitoring at the Peninsula Lakes (Lake A8, Lake B7, and Lake D7) was completed twice in July and August to evaluate whether non-point source discharges (i.e., dust, or alteration of watersheds) are affecting water quality beyond the minor changes that were predicted in the FEIS.

Results from 2021 indicate some parameters have increased relative to the baseline period consistent with timing and magnitude of changes predicted during the permitting phase. Importantly, the spatial extent of potential non-point source mine-related changes to water quality in lakes on the peninsula appear to be localized to the lakes near the mine, and do not extend farther out to Lake D7. The current strategy for water and waste management, combined with on-going efforts to control dust, will help keep water quality within the range of minor changes predicted in the FEIS.

Phytoplankton Community

Phytoplankton, or algae, form the base of the aquatic food web, providing energy and nutrients for various aquatic invertebrates that are important sources of food for fish. A phytoplankton study is conducted annually in August at the near-field, MF, and reference areas to help understand if water discharged to Meliadine Lake is affecting the health of phytoplankton community.

Species richness – or the number of taxa – was within the range of results reported during the pre-construction and operations phases in the exposure and reference areas. Results from 2020 were lower across all stations, and the lake-wide increase in richness across all areas in 2021 highlights the inherent seasonal and annual variability in the phytoplankton community.

Chlorophyll-a trended higher at the near-field and MF exposure areas in 2021 compared to previous years. The pattern of change at MEL-01 and MEL-02 diverged from the reference areas where chlorophyll-a remained stable relative to previous years. Historically, chlorophyll-a concentrations in the near-field exposure area measured between 1 µg/L and 2.5 µg/L, whereas in 2021, concentrations were between 2.5 µg/L and 3.3 µg/L. Phytoplankton biomass was also slightly higher in the near-field area in 2021, although compared to chlorophyll-a, the year-over-year change was less evident.

The phytoplankton community in the east basin has consistently differed from other areas of Meliadine Lake dating back to the start of monitoring under the AEMP in 2015. The pattern of higher chlorophyll-a and biomass suggest the east basin may be becoming more productive over time, but whether this change is natural or related to mining activities is unclear. Discharge of effluent has resulted in higher loading for some nutrients, in particular nitrogen. However, concentrations of phosphorus and nitrogen parameters have not increased appreciably over time in the east basin. Overall, any minor change in nutrient concentrations in the near-field area aligns with predicted changes in the Water Licence Application that stated nutrient concentrations would increase relative to baseline, but there would be no adverse effects on aquatic life.

Benthic Invertebrate Community

Benthic invertebrates serve several important ecosystem functions and are an important food source for fish. Benthic macroinvertebrates provide insight into changes in water and sediment quality given their life history. Characterizing the benthic invertebrate community also provides insight into the overall health of the lake ecosystem. Benthic invertebrate community and supporting sediment chemistry sampling was conducted at the two exposure areas (MEL-01 and MEL-02) and reference areas MEL-03 and MEL-05.

Sediment Chemistry

Sediment was collected to characterize the physical habitat and concentrations of metals in each area. Habitat characteristics such as water depth, grain size, and organic carbon influence the composition and abundance of the benthic invertebrate community. Sampling locations were established in areas that had similar habitat characteristics to avoid the confounding effect of grain size and total organic carbon (TOC) when assessing differences in the benthic invertebrate communities among the exposure and reference areas.

Concentrations of arsenic, manganese, and strontium were higher in sediment collected in the east basin in 2021 compared to 2018. Concentrations of some metals in sediment – arsenic and manganese in particular – can vary significantly over small distances in lakes located in mineralized areas. For example, the highest measured concentration of arsenic in the east basin was 150 mg/kg in a sample collected in 2016. Another sample, collected in the east basin during the same sampling event had a 5-fold lower concentration of arsenic (30 mg/kg). The apparent increase observed between 2021 and 2018 is likely related to naturally variable concentrations of some metals in the east basin of Meliadine Lake. Absolute concentrations of metals in sediment do not pose a risk to the health of the benthic invertebrate community.

Benthic Invertebrate Community

The 2021 sampling program found that the density of benthic invertebrates was higher at all locations sampled in Meliadine Lake relative to previous sampling years, and that most of the increase in total density was due to an increase in the density of chironomid (non-biting midge). The next most abundant taxa have been Mollusca (clams), particularly genera of the family Sphaeriidae (fingernail clams). Oligochaete worms and gastropods (snails) are also relatively common in the lake sediments.

The increase in invertebrate density was observed both in areas near the mine and in reference areas and is unlikely to be related to effluent discharged to Meliadine Lake. The structure of the benthic invertebrate communities was similar in both reference and exposure areas and were typical of northern lakes. In summary, there was no evidence to suggest discharge of effluent to Meliadine Lake is adversely affecting the structure of the benthic invertebrate community in the east basin. Routine monitoring is scheduled for 2024 on the existing 3-year cycle.

Threespine Stickleback

Threespine Stickleback was the small-bodied sentinel fish species used for the AEMP as well as the Cycle 2 EEM study. Unlike Lake Trout that migrate throughout the entire lake, Threespine Stickleback have a small home range, which makes them well-suited for monitoring the health of fish exposed to effluent discharged to the east basin of Meliadine Lake. Threespine Stickleback were collected from the near-field exposure area (< 200 m from the diffuser) and reference areas MEL-03 and MEL-04.

Health Assessment

Measurements were collected from each fish (e.g., total length, total weight, liver weight, age). These measurements were compared among areas to determine if the health of the Threespine Stickleback population in the east basin is impacted by exposure to effluent discharged to Meliadine Lake. Mature females from the exposure area were very similar to mature females from the two reference areas. Mature males from the exposure area were older, larger, and heavier than the mature males collected at the two other reference locations. The condition of the male fish at the exposure area was similar to the condition of fish from the reference areas. Condition is a measure of energy use that describes the weight of a fish relative to its length. Similar condition in Threespine Stickleback from exposure and reference areas provides direct evidence that changes in primary productivity in the east basin, if it is occurring, is not resulting in effects to Threespine Stickleback energy use.

The health of Threespine Stickleback in Meliadine Lake will continue to be monitored every three years coinciding with the EEM program. Recommendations to improve the AEMP study design for Threespine Stickleback will be developed after completion of the Cycle 2 interpretive report.

Chemistry

Tissue chemistry sampling of Threespine Stickleback was conducted in 2021 at the near-field area (MEL-01) and two reference areas (MEL-03 and MEL-04). Threespine Stickleback were included in the study design for fish tissue chemistry to determine if mining activity is affecting bioaccumulation of metals into local fish populations. Historical data was collected in 2015 from the near-field exposure area. References areas MEL-03 and MEL-04 were sampled in 2017. Tissue chemistry was analyzed for spatial differences between MEL-01 and the reference areas in 2021. Temporal changes in tissue metals concentrations were evaluated by comparing baseline chemistry results from MEL-01 in 2015 with results from MEL-01 in 2021. Higher concentrations of calcium, arsenic, manganese, strontium, and uranium were observed in Threespine Stickleback from MEL-01 in 2021 compared to the reference areas and compared to baseline tissue chemistry results from 2015. These parameters are constituents present in water discharged from CP1 to Meliadine Lake. However, the observed change in tissue chemistry for arsenic, strontium, and uranium may be partly related to natural changes in water quality over time at MEL-01.

These changes in tissue chemistry do not appear to be causing any adverse effects to the Threespine Stickleback. The detailed health assessment conducted in 2021 found no consistent adverse effects at MEL-01 relative to MEL-03 and MEL-04. Further, the main differences identified were higher survival and growth of males at MEL-01. Thus, while changes in tissue concentrations coincide with mining activity have been observed, these changes do not appear to be causing any adverse effects to the population of Threespine Stickleback living in the east basin of Meliadine Lake, near the mine.

The program is clearly sufficiently robust to detect changes/differences in tissue chemistry over time and space. Given the lack of any adverse health effects to the local Threespine Stickleback population, the timing of the next study is scheduled for 2024.

Lake Trout

Health Assessment

Lake Trout were collected from the exposure area near the effluent diffuser in Meliadine Lake in 2015, prior to mine operations, and again in 2021, during operations. Measurements were collected from each fish for fork length, total weight, liver weight, and age. These measurements were compared between years to see if effluent was affecting the health of Lake Trout in Meliadine Lake. Lake Trout captured in 2021 were older, larger, and heavier than those captured in 2015, although these differences may be a result of different types of fishing gear used between years. In 2021 Lake Trout also had higher condition, relative liver size, and relative gonad size (males only) compared to 2015, which indicates greater energy storage, and suggests greater availability, and/or quality of food for Lake Trout in Meliadine Lake in 2021 compared to 2015. The Lake Trout data from Meliadine Lake will be compared to two external reference lakes as part of the Cycle 2 EEM. The external reference area comparison will help determine if the increases in energy storage over time are unique to Meliadine Lake.

Chemistry

Samples of liver, kidney, and muscle tissue were submitted for metals analysis from 42 Lake Trout captured during the fish population survey in Meliadine Lake in 2021. Chemistry results from 2021 were compared against chemistry data from the baseline period in 1997/1998 and 2015 to determine if Lake Trout are accumulating metals present in effluent discharged to Meliadine Lake.

Sodium was the only parameter that was detected at higher concentrations in Lake Trout muscle, liver, and kidney in 2021 compared to Lake Trout from the baseline period – 1997/98 and 2015. Sodium is an essential mineral, and together with potassium, helps maintain a healthy ion balance. Sodium uptake is actively regulated at the gill to prevent net loss of sodium from the fish to the surrounding low TDS environment. From a fish health perspective, the apparent increase in sodium does not appear to be causing any adverse effects to fish condition, as noted in the health assessment. Lake Trout from two reference lakes were submitted for analysis as part of a regional assessment of Lake Trout tissue chemistry. Those data may be incorporated into the next study on changes in tissue chemistry in Lake Trout from Meliadine Lake tentatively planned for 2024.

Key Messages

- Discharge of contact water to Meliadine Lake has contributed to higher concentrations of some major ions, nutrients, and metals in surface water in the east basin of Meliadine Lake over time.
- Changes in water quality in the east basin align with what was predicted in the FEIS.
- Water quality is below Action Levels meant to protect aquatic life and drinking water quality.
- The east basin of Meliadine Lake may be becoming more productive, although there is a high degree of uncertainty due to the inherent variability in chlorophyll-a and phytoplankton community endpoints.
- The benthic invertebrate community in the east basin is diverse and healthy compared to baseline conditions and reference areas despite higher concentrations of some metals in sediment, namely arsenic and manganese, measured in the east basin in 2021.
- Threespine Stickleback living in the east basin of Meliadine Lake show evidence of being more exposed to metals found in effluent, such as arsenic, manganese, strontium, and uranium. There is no evidence of effects to survival, growth, or energy use consistent with toxicological impairment.
- The Lake Trout had higher condition, relative liver size, and relative gonad size (males only) in 2021 compared to 2015. This suggests greater energy storage, which in turn suggests greater availability, and/or quality of food for Lake Trout in Meliadine Lake. It is unclear if the differences observed in Lake Trout endpoints are attributable to mining activities or natural variability. Comparisons against external reference areas as part of the Cycle 2 EEM will answer this question.

Based on the results of the 2021 AEMP, no follow-up actions beyond routine monitoring are recommended in 2022.

TABLE OF CONTENTS

PLAIN LANGUAGE SUMMARY II

TABLE OF CONTENTS XI

LIST OF FIGURES XVII

LIST OF TABLES XXII

LIST OF APPENDICES XXVI

USE & LIMITATIONS OF THIS REPORT XXVII

ACRONYMS & GLOSSARY OF TERMS XXVIII

1 INTRODUCTION 1
- 1.1 Aquatic Monitoring Programs at Meliadine 1
  - 1.1.1 Aquatic Effects Monitoring Program 1
  - 1.1.2 Environmental Effects Monitoring (MDMER) 2
- 1.2 Objectives and Key Questions 2
- 1.3 Report Structure 4
- 1.4 References 5

2 AEMP STUDY DESIGN AND ACTIVITES ON SITE 6
- 2.1 Mine Site and Environmental Setting 6
- 2.2 Meliadine Lake Study 10
  - 2.2.1 Monitoring Areas 10
  - 2.2.2 Monitoring Components 10
- 2.3 Peninsula Lakes Study 11
- 2.4 Scope of the 2021 AEMP 11
- 2.5 Activities on Site in 2021 16
  - 2.5.1 Construction and Operations 16
  - 2.5.2 Water Management 16
  - 2.5.3 Discharge from CP1 to Meliadine Lake 19
- 2.6 References 21

3 EFFLUENT QUALITY 22
- 3.1 Introduction 22
- 3.2 Objectives and Key Questions 22
- 3.3 Effluent Chemistry 22
- 3.4 Effluent Mixing in the Receiving Environment 28

3.5 Effluent Toxicity Testing 32
3.5.1 Acute Toxicity Testing 32
3.5.2 Chronic (Sublethal) Toxicity Testing 33
3.6 Loadings to Meliadine Lake 37
3.7 Conclusions and Recommendations 38
3.8 References 39
4 WATER QUALITY – MELIADINE LAKE 40
4.1 Introduction 40
4.2 Objectives and Key Questions 40
4.3 Findings from the 2021 Water Quality Program 41
4.4 Methods 43
4.4.1 Study Areas 43
4.4.2 Sample Collection 43
4.4.3 Laboratory Methods 43
4.4.4 Data Analysis 45
4.4.5 Quality Assurance and Quality Control 47
4.5 Results and Discussion 48
4.5.1 *In-situ* Water Quality 48
4.5.2 Water Quality Screening Assessment 54
4.5.3 Spatial and Temporal Trends 58
4.5.4 Comparison to Water Quality Predictions 74
4.6 Conclusions and Recommendations 77
4.7 References 79
4.8 Condensed Temporal Water Quality Plots 80
5 WATER QUALITY – PENINSULA LAKES 87
5.1 Introduction 87
5.2 Objectives and Key Questions 87
5.3 Findings from the 2021 Peninsula Lakes Water Quality Program 87
5.4 Methods 88
5.4.1 Study Areas and Sample Collection 88
5.4.2 Snow Pack Chemistry Assessment 89
5.4.3 Data Analysis 89
5.5 Results and Discussion 91
5.5.1 Snow Pack Chemistry Results 91
5.5.2 Field-Measured Water Quality Parameters 92
5.5.3 Lake D7 94

5.5.4 Lake A8 94
5.5.5 Lake B7 95
5.6 Conclusions and Recommendations 100
5.7 References 101
5.8 Condensed Temporal Water Quality Plots 101
6 PHYTOPLANKTON COMMUNITY 108
6.1 Introduction 108
6.2 Objectives and Key Question 108
6.3 Findings from the 2021 Phytoplankton Study 109
6.4 Methods 109
6.4.1 Field Methods 110
6.4.2 Laboratory Methods 111
6.4.3 Data Analysis 112
6.5 Quality Assurance and Quality Control 115
6.6 Results and Discussion 116
6.6.1 Background – Historical Data 116
6.6.2 Nutrient Loading to Meliadine Lake 117
6.6.3 Chlorophyll-a 118
6.6.4 Phytoplankton Community 119
6.6.5 Nutrient-Productivity Relationships 130
6.6.6 Trophic Status Index 134
6.7 Conclusions and Recommendations 136
6.8 References 137
7 SEDIMENT CHEMISTRY 139
7.1 Introduction 139
7.2 Findings from the 2021 Sediment Chemistry Program 139
7.3 Objectives and Key Question 140
7.4 Methods 140
7.4.1 Study Areas 140
7.4.2 Sample Collection 143
7.4.3 Laboratory Methods 143
7.4.4 Data Analysis 144
7.5 Quality Assurance and Quality Control 145
7.6 Results and Discussion 145
7.6.1 General Observations 145
7.6.2 Temporal Assessment 151

7.7 Conclusions and Recommendations 156
7.8 References 156
8 BENTHIC INVERTEBRATE COMMUNITY 157
8.1 Introduction 157
8.2 Objectives and Key Question 157
8.3 Findings from the 2021 Benthic Invertebrate Community Program 158
8.4 Methods 159
8.4.1 Study Areas and Field Methods 159
8.4.2 Laboratory Methods 159
8.4.3 Data Analysis 159
8.5 Quality Assurance and Quality Control 162
8.5.1 Field QA 162
8.5.2 Laboratory QC 162
8.6 Results and Discussion 163
8.6.1 Benthic Invertebrate Community – General Discussion 163
8.6.2 Community Composition 164
8.7 Conclusions and Recommendations 180
8.8 References 180
9 THREESPINE STICKLEBACK HEALTH 182
9.1 Introduction 182
9.2 Objectives and Key Question 182
9.3 Findings from the 2021 Threespine Stickleback Study 183
9.4 Methods 183
9.4.1 Fish Collection 183
9.4.2 Ageing 185
9.4.3 Data Analysis 186
9.4.4 Power Analysis 187
9.5 Results and Discussion 188
9.5.1 Sampling Effort and Catches 188
9.5.2 Threespine Stickleback Characteristics 188
9.5.3 Survival 190
9.5.4 Size 191
9.5.5 Growth 195
9.5.6 Energy Storage 198
9.5.7 Reproduction 203
9.6 Conclusions and Recommendations 205

9.7 References 208

10 THREESPINE STICKLEBACK CHEMISTRY 209

10.1 Introduction 209

10.2 Objectives and Key Question 209

10.3 Key Findings from the 2021 Threespine Stickleback Chemistry Study 210

10.4 Methods 210

10.4.1 Collection, Processing, Analysis 210

10.4.2 Data Analysis 210

10.5 Quality Assurance and Quality Control 211

10.6 Results and Discussion 213

10.7 Conclusions and Recommendations 221

10.8 References 222

11 LAKE TROUT HEALTH 223

11.1 Introduction 223

11.2 Objectives and Key Question 223

11.3 Findings from the 2021 Lake Trout Health Assessment 224

11.4 Methods 225

11.4.1 Field Methods 225

11.4.2 Age determination 227

11.4.3 Data Analysis 228

11.4.4 Power Analysis 229

11.5 Results and Discussion 230

11.5.1 Sampling Effort and Catches 230

11.5.2 Lake Trout Characteristics 230

11.5.3 Survival 235

11.5.4 Size 236

11.5.5 Growth 239

11.5.6 Energy Storage 240

11.5.7 Reproduction 244

11.6 Conclusions and Recommendations 248

11.7 References 251

12 LAKE TROUT CHEMISTRY 252

12.1 Introduction 252

12.2 Objectives and Key Question 252

12.3 Findings from the 2021 Lake Trout Tissue Chemistry Program 253

12.4 Methods 253

12.4.1 Sample Collection, Processing, and Analysis 253
12.4.2 Data Analysis 253
12.5 Quality Assurance and Quality Control 254
12.6 Results and Discussion 256
12.7 Conclusions and Recommendations 257
12.8 References 266
13 RESPONSE FRAMEWORK AND LOW ACTION LEVEL ASSESSMENT 267
13.1 Response Framework 267
13.2 Low Action Level Assessment – Toxicological Impairment 268
13.3 Low Action Level Assessment – Nutrient Enrichment 274
13.4 Scope of the 2022 AEMP 277
13.5 References 278

LIST OF FIGURES

Figure 2-1. Study Area for the Aquatic Effects Monitoring Program. 8

Figure 2-2. Surface Features at the Meliadine Mine. 9

Figure 2-3. Daily Discharge (m^3) from CP1 to Meliadine Lake, 2018-2021. 20

Figure 3-1. Total dissolved solids and constituent ions in end-of-pipe effluent at MEL-14, 2018-2021. 25

Figure 3-2. Concentrations of selected nutrients in end-of-pipe effluent at MEL-14, 2018-2021. 26

Figure 3-3. Concentrations of selected metals in samples collected at MEL-14 during the open-water discharge period, 2018-2021. 27

Figure 3-4. Effluent concentrations in the near-field area of Meliadine Lake on August 29, 2021. 30

Figure 3-5. Selected profiles where % effluent was greater than 2% beyond the edge of the mixing zone. 31

Figure 3-6. *Lemna minor* sublethal toxicity test results compared to measured concentrations of TDS in effluent from MEL-14. 35

Figure 4-1. Meliadine Lake Water Quality Sampling Stations. 42

Figure 4-2 Dissolved Oxygen, pH, and temperature results from the 2021 limnology profiles. 51

Figure 4-3 Specific conductivity (µS/cm) results from the 2021 limnology profiles. 52

Figure 4-4 Temperature and specific conductivity readings from MEL-01-01 in 2021. 53

Figure 4-5. Copper screening quotients in Meliadine Lake surface water compared to the AEMP Benchmark (ECCC, 2021). 56

Figure 4-6. Zinc screening quotients in Meliadine Lake surface water compared to the CCME (2018) chronic Water Quality Guideline. 57

Figure 4-7. Spatial and temporal changes in TDS and constituent major ions in Meliadine Lake from 2013 to 2021 60

Figure 4-8. Spatial and temporal changes in key nutrients and organic carbon in Meliadine Lake from 2013 to 2021 63

Figure 4-9. Concentrations of metals that exceed the normal range in Meliadine Lake from 2013 to 2021. 71

Figure 4-10. Arsenic concentrations in Meliadine Lake from 2018 to 2021 compared to concentrations measured in effluent (MEL-14) and in the mixing zone (MEL-13). 72

Figure 4-11. Manganese concentrations in Meliadine Lake from 2018 to 2021 compared to concentrations measured in effluent (MEL-14) and in the mixing zone (MEL-13). 73

Figure 4-12. Predicted Changes in Total Dissolved Solids (calculated; mg/L) in the East Basin of Meliadine Lake Compared to Observed Results 75

Figure 4-13. Predicted Changes in Chloride (mg/L) in the East Basin of Meliadine Lake Compared to Observed Results........ 76

Figure 4-14. Concentrations of TDS and constituent ions (Ca, Mg, K, Na, Cl, SO_4) since 2013. 81

Figure 4-15. Conductivity, hardness, and concentrations of selected nutrients since 2013. 82

Figure 4-16. Concentrations of aluminum, arsenic, barium, and boron since 2013. 83

Figure 4-17. Concentrations of cobalt, copper, iron, and lead since 2013. 84

Figure 4-18. Concentrations of lithium, manganese, molybdenum, and nickel since 2013. 85

Figure 4-19. Concentrations of strontium, titanium, uranium, and zinc since 2013. 86

Figure 5-1. *In-situ* limnology profiles at the Peninsula Lakes, 2018 – 2021 93

Figure 5-2. Total dissolved solids and constituent major Ions in surface water samples from the Peninsula Lakes since 2015. 102

Figure 5-3. Conductivity and concentrations of selected nutrients in surface water samples from the Peninsula Lakes since 2015. 103

Figure 5-4. Concentrations of aluminum, arsenic, barium, and boron in surface water samples from the Peninsula Lakes since 2015. 104

Figure 5-5. Concentrations of cobalt, copper, iron, and lead in surface water samples from the Peninsula Lakes since 2015. 105

Figure 5-6. Concentrations of lithium, manganese, molybdenum, and nickel in surface water samples from the Peninsula Lakes since 2015. 106

Figure 5-7. Concentrations of strontium, titanium, uranium, and zinc in surface water samples from the Peninsula Lakes since 2015. 107

Figure 6-1. Annual loadings (kg/year) of nitrogen and total phosphorus to Meliadine Lake. 117

Figure 6-2 Chlorophyll-a Concentrations (µg/L) in Meliadine Lake from 2015 to 2021. 118

Figure 6-3 Phytoplankton richness, biomass (mg/m^3), and density (cells/L), 2013-2021. 123

Figure 6-4. Mean phytoplankton richness, biomass (mg/m^3), and density (cells/L) by major taxa, 2013-2021. 124

Figure 6-5. Relative richness, biomass (mg/m^3), and density (cells/L) by major taxa, 2013-2021. 125

Figure 6-6. Ordination of the reference and exposure area phytoplankton results by year for Meliadine Lake. 128

Figure 6-7. Non-metric multidimensional scaling (nMDS) results showing ordination of the reference and exposure area phytoplankton results by year for Meliadine Lake. 129

Figure 6-8. Relationship between chlorophyll-a and phytoplankton biomass for Meliadine Lake by year, 2016 through 2021 ... 131

Figure 6-9. Relationship between nutrient concentrations (DOC, nitrogen, and phosphorus) and phytoplankton biomass and chlorophyll-a in Meliadine Lake, 2013-2021. ... 132

Figure 6-10. Relationship between nutrient concentrations (DOC, nitrogen, and phosphorus) and phytoplankton biomass and chlorophyll-a at the near-field area (MEL-01), 2013-2021. ... 133

Figure 6-11. Trophic Status Index values for Meliadine Lake, 2013 through 2021 ... 135

Figure 7-1. Sediment sampling locations in Meliadine Lake in 2021. ... 142

Figure 7-2. Clay, sand, silt and total organic carbon content in sediment collected from the Meliadine Lake AEMP study areas. ... 147

Figure 7-3. Stacked bar chart showing the particle size distribution in the Meliadine Lake AEMP study areas. ... 148

Figure 7-4. Sediment chemistry compared to CCME sediment quality guidelines. ... 150

Figure 7-5. Arsenic, manganese, and strontium sediment concentrations at MEL-01 sampling locations in 2018 and 2021 ... 153

Figure 7-6. Arsenic, manganese and strontium sediment concentrations at near-field (MEL-01), mid-field (MEL-02), and reference stations (MEL-03, MEL-05) since 2015 ... 154

Figure 7-7. Arsenic, manganese, and strontium sediment concentrations in relation to percent fines at near-field (MEL-01), mid-field (MEL-02), and reference stations (MEL-03, MEL-05) since 2015. ... 155

Figure 8-1. Benthic invertebrate density in Meliadine Lake since 2015 ... 167

Figure 8-2. Absolute benthic invertebrate density by major taxa, 2018 and 2021 ... 168

Figure 8-3. Relative benthic invertebrate density by major taxa, 2018 and 2021 ... 169

Figure 8-4. Benthic invertebrate density compared to total organic carbon and percent fine substrate in sediments for Meliadine Lake since 2015 ... 170

Figure 8-5. Benthic invertebrate richness in Meliadine Lake since 2015. ... 172

Figure 8-6. Benthic invertebrate richness by major taxa, 2018 and 2021. ... 173

Figure 8-7. Relative benthic invertebrate richness by major taxa, 2018 and 2021. ... 174

Figure 8-8. Benthic community diversity indices by year for Meliadine Lake stations since 2015. ... 176

Figure 8-9. Scatter plot of Axis 1 and Axis 2 scores and associated taxa scores for Non-Metric Multidimensional Scaling (nMDS) analysis ... 178

Figure 8-10. nMDS ordination plot for benthic invertebrate community (family level) for Meliadine Lake stations since 2015 ... 179

Figure 9-1. Monitoring Areas and Minnow Trap Subsites for the Small-Bodied Fish Program in Meliadine Lake in 2021. 184
Figure 9-2. Age of mature Threespine Stickleback by sex and area. 191
Figure 9-3. Length-frequency distribution of Threespine Stickleback for each area. 192
Figure 9-4. Cumulative length-frequency distribution of Threespine Stickleback for each area. 192
Figure 9-5. Length of mature Threespine Stickleback, by sex and area. 193
Figure 9-6. Weight of mature Threespine Stickleback, by sex and area. 195
Figure 9-7. Total Length of mature Threespine Stickleback at age 3 and age 4, by sex and area. 196
Figure 9-8. Weight of mature Threespine Stickleback at age 3 and age 4, by sex and area. 197
Figure 9-9. Plot of weight (total weight and carcass weight) versus total length (log scales) for mature female and male Threespine Stickleback. 199
Figure 9-10. Plot of liver weight versus carcass weight (log scales) with ANCOVA results for the full model (mature female) and reduced models (mature female and mature male). 202
Figure 9-11. Plot of liver weight versus total length (log scales) with ANCOVA results for the full model (mature male) and reduced models (mature female and mature male). 203
Figure 9-12. Plot of gonad weight versus carcass weight and gonad weight versus total length (log scales). 204
Figure 10-1 Calcium concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021. 216
Figure 10-2 Arsenic concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021. 217
Figure 10-3 Manganese concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021. 218
Figure 10-4 Strontium concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021. 219
Figure 10-5 Uranium concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021. 220
Figure 11-1. Lake Trout Sampling Areas in the East Basin of Meliadine Lake in 2015 and 2021. 226
Figure 11-2. Age of Lake Trout by sex and year. 236
Figure 11-3. Length-frequency distribution of Lake Trout for each year. 237
Figure 11-4. Cumulative length-frequency distribution of Lake Trout for each year. 238
Figure 11-5. Fork length of Lake Trout, by sex and year. 238
Figure 11-6. Total weight of Lake Trout, by sex and year. 240

Figure 11-7. Lake Trout fork length versus age, by sex and year. 241

Figure 11-8. Lake Trout fork weight versus age, by sex and year. 241

Figure 11-9. Plot of total weight versus fork length (log scales) for female and male Lake Trout in 2015 and 2021. 242

Figure 11-10. Plot of liver weight versus fork length (log scales) for male and female Lake Trout in 2015 and 2021. 243

Figure 11-11. Plot of liver weight versus total weight (log scales) for male and female Lake Trout in 2015 and 2021. 244

Figure 11-12. Plot of gonad weight versus total weight and gonad weight versus total length (log scales) for female Lake Trout. 245

Figure 11-13. Plot of gonad weight versus total weight and gonad weight versus fork length (log scales) for male Lake Trout. 246

Figure 12-1. Sodium concentrations (mg/kg ww) in Lake Trout kidney tissue collected from Meliadine Lake in 1997/98, 2015, and 2021. 260

Figure 12-2. Sodium concentrations (mg/kg ww) in Lake Trout liver tissue collected from Meliadine Lake in 1997/98, 2015, and 2021. 261

Figure 12-3. Sodium concentrations (mg/kg ww) in Lake Trout muscle tissue collected from Meliadine Lake in 1997/98, 2015, and 2021. 262

Figure 12-4. Molybdenum concentrations (mg/kg ww) in Lake Trout kidney tissue collected from Meliadine Lake in 1997/98, 2015, and 2021. 263

Figure 12-5. Strontium concentrations (mg/kg ww) in Lake Trout liver tissue collected from Meliadine Lake in 1997/98, 2015, and 2021. 264

Figure 12-6. Relationships between mercury concentrations (mg/kg ww) and fork length for Lake Trout kidney, liver and muscle tissue collected from Meliadine Lake in 1997/98, 2015, and 2021. 265

LIST OF TABLES

Table 1-1. Key Questions for the Meliadine Lake Study (from Agnico Eagle, 2021). 3

Table 2-1. Scope of the 2021 AEMP in Meliadine Lake and the Peninsula Lakes. 13

Table 2-2. Summary of Major Development Activities Since the Start of Construction in 2015........... 17

Table 2-3. Surface Contact Water Management Plan. 19

Table 2-4. Monthly discharge (m^3) from CP1 to Meliadine Lake, 2018-2021. 20

Table 3-1 Limits for Effluent (MEL-14) specified in the Type A Amended Water Licence (2AM-MEL1631). 23

Table 3-2. Total dissolved solids and chloride concentrations in MEL-14 samples from 2021. 24

Table 3-3. Acute toxicity test results for MEL-14 in 2021. 32

Table 3-4. Sublethal toxicity test results for MEL-14 in August and September, 2021. 34

Table 3-5. IC25 for TDS and chloride corresponding to a 25% reduction in *Lemna minor* frond yield. . 34

Table 3-6. Average number of neonates from the 21-day *Daphnia magna* tests in 2020. 36

Table 4-1. Meliadine Lake water sampling events in 2021. 44

Table 4-2. Distance between the diffuser and fixed sampling stations in the near-field and mid-field exposure areas in Meliadine Lake. 44

Table 4-3. Water quality parameters collected for the AEMP. 45

Table 4-4. Samples that exceeded AEMP Benchmarks and Action Levels in 2021. 55

Table 4-5. Long-list of parameters that exceeded the normal range in at least 1 sample from MEL-01 or MEL-02 in 2021. 58

Table 4-6. Normal Range assessment for the open-water season in 2021. 59

Table 4-7. Chloride concentrations (mg/L) and percent change within and among the exposure areas and Reference Area 1 during the open water period from 2015 to 2021. 62

Table 4-8. Total Phosphorus concentrations (mg/L) and percent change within and among the exposure areas and Reference Area 1 from 2013 to 2021. 64

Table 4-9. Manganese concentrations (µg/L) in surface water samples from MEL-01 in July, August, and September since 2018. 68

Table 4-10. Strontium concentrations (µg/L) and percent change within and among the near-field and mid-field exposure areas and Reference Area 1 from 2013 to 2021. 69

Table 4-11. Lithium concentrations (µg/L) at MEL-01, MEL-02, MEL-03 from 2016 to 2021. 70

Table 5-1. Peninsula Lake area monitoring stations sampled in 2021 88

Table 5-2. Lake D7 Water Quality Assessment. 96

Table 5-3. Lake A8 Water Quality Assessment 97

Table 5-4. Lake B7 Water Quality Assessment. 98

Table 5-5. Temporal assessment of parameters exceeding the normal range at Lake A8 during early operations (2019-2021). 99

Table 5-6. Temporal assessment of parameters exceeding the normal range at Lake B7 during early operations (2019-2021). 99

Table 6-1 Secchi depth from the open-water sampling events in 2021. 110

Table 6-2. Trophic classification for lakes based on ranges of total phosphorus, chlorophyll-a and Secchi depth (Vollenweider, 1968). 114

Table 6-3. Trophic classification for lakes based on total phosphorus trigger ranges (CCME, 2004) 114

Table 6-4. Trophic status index and general trophic classifications for lakes (Carlson, 1977). 114

Table 6-5. Phytoplankton Community Data from Locations Sampled in Meliadine Lake in 1997 and 1998. 116

Table 6-6. Chlorophyll-a (µg/L; mean ± 1SD) in Meliadine Lake from 2015 to 2021 119

Table 6-7. Phytoplankton biomass (mg/m^3; mean ± 1SD) in Meliadine Lake from 2013-2021 120

Table 6-8 Phytoplankton biomass (mg/m^3) and density (cells/L) by major taxa in 2021. 122

Table 7-1. Coordinates for sediment and benthic invertebrate samples collected in 2021. 141

Table 7-2 Percent fines and TOC in sediment from Meliadine Lake. 146

Table 7-3. Sediment chemistry screening summary, 2021. 149

Table 8-1. Sorting efficiency for the 2021 benthic invertebrate community samples. 163

Table 8-2. Summary of t-test results comparing benthic invertebrate metrics between the two reference areas (MEL-03 and MEL-05) in 2021 164

Table 8-3. Summary of ANOVA tests for benthic invertebrate community endpoints in 2021. 164

Table 8-4. Results of statistical tests for the benthic invertebrate community endpoints in 2021. 165

Table 8-5. Benthic invertebrate density (organisms/m^2) in Meliadine Lake since 2015. 166

Table 8-6. Benthic invertebrate richness at the lowest practical level of identification in Meliadine Lake since 2015. 171

Table 8-7. Simpson's Evenness for the benthic invertebrate community. 175

Table 8-8. List of taxa that were significantly correlated in the Non-Metric Multidimensional Scaling (nMDS) analysis 178

Table 9-1. Statistical procedures used for various monitoring endpoints to compare Threespine Stickleback populations between exposure and reference areas. 186
Table 9-2. Minnow trap effort and catch summary. 189
Table 9-3. Number of unparasitized Threespine Stickleback examined from each area, by maturity and sex. 190
Table 9-4. Summary of Threespine Stickleback parasitism by area. 190
Table 9-5. ANOVA results for the Threespine Stickleback study. 194
Table 9-6. Summary of Threespine Stickleback among area comparisons using ANCOVA. 200
Table 9-7. Between-area comparisons calculated with ANOVA and reduced ANCOVA models, as appropriate, with no outliers removed. 207
Table 10-1 Laboratory QC summary for 2021 Threespine Stickleback tissue samples. 212
Table 10-2 Threespine Stickleback tissue chemistry comparisons (spatial [NF vs Reference] and temporal [2021 vs 2015]). 215
Table 11-1. Statistical procedures used for various monitoring endpoints to compare Lake Trout populations between baseline (2015) and operational (2021) sampling periods. 229
Table 11-2. Catch summaries for angling and gill netting during baseline (2015) and operational (2021) large-bodied sampling programs. 231
Table 11-3. Angling conditions, effort, and catch summary. 232
Table 11-4. Gill net set conditions, effort, and catch summary. 233
Table 11-5. Number of Lake Trout examined each year, by sex and maturity 234
Table 11-6. Number of mature individuals that were developing gonads to spawn in the current year (ripe) and that were not sufficiently developed to spawn in the current year (resting). 234
Table 11-7. Summary of encysted cestodes present in Lake Trout by sex and year. 235
Table 11-8. Summary of Lake Trout between year comparisons using t-tests. 237
Table 11-9. Summary of Lake Trout between year comparisons using ANCOVA. 247
Table 11-10. Summary of between-site comparisons calculated with ANOVA and reduced ANCOVA models, with no outliers removed (except for male relative gonad size). 250
Table 12-1 Laboratory QC summary for 2021 Lake Trout tissue samples. 255
Table 12-2 ANOVA results for differences in the concentration of sodium, molybdenum, and strontium in Lake Trout tissue between 2021 and the baseline period (1997/98 and 2015). 258
Table 12-3 ANCOVA results for differences in the concentration of mercury and selenium in Lake Trout tissue between 2021 and the baseline period (1997/98 and 2015). 259
Table 13-1. 2021 AEMP Action Level Assessment – Toxicological Impairment 272

Table 13-2. 2021 AEMP Action Level Assessment – Nutrient Enrichment 276
Table 13-3. Scope of the 2022 AEMP for Meliadine Lake and the Peninsula Lakes. 277

LIST OF APPENDICES

AAO . / 0T1 T2 3 4 0 5 6T 7 7 3 8 . 9 0T : T2 3 T 4 0 5 6T 9 ; . 5 8 ; 4

AAO . / 0T<1 T0 = = 4 3 0 . 5T 2 3 L 4 0 5 6

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USE & LIMITATIONS OF THIS REPORT

This report has been prepared by Azimuth Consulting Group Inc. for the use of Agnico Eagle Mines Ltd., who has been party to the development of the scope of work for this project and understands its limitations. The extent to which previous investigations were relied on is detailed in the report.

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ACRONYMS & GLOSSARY OF TERMS

Acronym / Term	Definition
AEMP	Aquatic Effects Monitoring Program is the primary instrument for determining if the mine is causing changes in the aquatic environment.
AEMP Benchmark	The AEMP Benchmarks are screening guidelines that are protective of aquatic life and human drinking water quality for the project.
AEMP Action Level	The AEMP Action Level is an early warning trigger equal to 75% of the AEMP Benchmark.
AWAR	All-weather Access Road connecting the mine site to Rankin Inlet.
Benthic Invertebrates	Benthic invertebrates refer to the diverse community of small animals that live in these lake bottom sediments (benthic means bottom, and invertebrates are small animals without bones).
Biomass	Biomass is the amount or weight of phytoplankton in per unit of water (µg/L).
Blanks (for quality control)	TB = these samples are analyzed to assess cross contamination occurring during the transport of samples. These samples comprise analyte-free deionized water prepared in the lab by ALS, and travel to the site and back to the lab without being opened. DB = Deionized blanks (or field blanks) are analyzed to verify the “analyte-free” status of the deionized water to help interpret the equipment blank results. These samples are comprised of deionized water poured directly into the sampling containers. EB= Equipment blanks are analyzed to assess cross contamination in the sampling equipment that could lead to elevated concentrations or false positive data. These samples are comprised of analyte-free deionized water passed through the sampling equipment.
CCME	Canadian Council of Ministers of the Environment
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada
CP	Containment pond / collection pond / control pond: Pond constructed for the collection and temporary storage of surface contact water that is eventually treated and discharged to Meliadine Lake.
DO	Dissolved oxygen
DOC	Dissolved organic carbon: a measure of the amount of organic matter present in water that passes through a 0.45 µm filter.
DQO	Data quality objective: are statements that define the degree of confidence in conclusions from data produced from a sampling program.
ECCC	Environment and Climate Change Canada

Acronym / Term	Definition
EEM	Environmental Effects Monitoring is a science-based monitoring program developed by Environment and Climate Change Canada. EEM describes monitoring that mining companies must undertake to detect and measure changes in aquatic ecosystems (i.e., receiving environments).
EWTP	Effluent Water Treatment Plant treats surface contact water from Collection Pond 1 (CP1) to lower TSS prior to discharge to Meliadine Lake.
FEIS	Final Environmental Impact Statement
FEQG	Federal Environmental Quality Guidelines are water quality guidelines developed by Environment and Climate Change Canada.
IQ	Inuit Qaujimaningit and Inuit Qaujimajatuqangit: -> Inuit Qaujimaningit encompasses Inuit traditional knowledge (and variations thereof or Inuit Qaujimajatuqangit), local and community-based knowledge, as well as Inuit epistemology as it relates to Inuit Societal Values and Inuit Knowledge. -> Inuit Qaujimajatuqangit are the guiding principles of Inuit social values (NIRB 2018).
KivIA	Kivalliq Inuit Association
MDMER	Metal and Diamond Mining Effluent Regulations
MF	Mid-field area in Meliadine Lake (MEL-02)
NF	Near-field in Meliadine Lake (MEL-01)
nMDS	Non-Metric Multidimensional Scaling: a multivariate statistical method used to condense information with multiple variables into a two-dimensional representation of the data. Used here to visually assess differences in benthic invertebrate community structure over space.
NPAG	Non-potentially acid generating refers to rock that is not expected to contribute to low pH conditions in runoff (i.e., surface contact water) that is eventually collected, treated, and discharged to Meliadine Lake.
NML	Non-metals leaching refers to rock that is not expected to contribute to metals concentrations in runoff (i.e., surface contact water) that is eventually collected, treated, and discharged to Meliadine Lake.
NIRB	Nunavut Impact Review Board: The government agency responsible for reviewing and assessing the potential ecosystemic and socio-economic effects of the Meliadine Gold mine Project presented in the Final Environmental Impact Statement.
Normal Range	The normal range refers to the range of baseline/reference conditions within the study area lakes. For the water quality monitoring program, the normal range is use to identify parameters that may have increased in concentration due to activities at the mine.

Acronym / Term	Definition
NWB	Nunavut Water Board: The government agency responsible for regulating water use and management in the Nunavut Settlement Area. Terms and Conditions regarding water use for the Meliadine Gold Project are outlined in Water Licence No: 2AM-MEL1631.
Overburden	Overburden is soil and till that need to be removed prior to developing the open pits.
Parameters	The term used to describe what gets measured in samples of surface water, sediment, and fish tissue collected in the various monitoring programs. Calcium, magnesium, iron, and aluminum are examples of parameters.
Phytoplankton	Phytoplankton are a diverse group of aquatic plant species (algae) that form the base of the food web in Meliadine Lake. Like other plants, they use sunlight, nutrients, and carbon sources to grow.
QA/QC	Quality Assurance are the practices employed (e.g., use of experienced field staff, standard operating procedures (SOPs), field data sheets, and certified laboratories) to collect scientifically defensible samples meeting pre-defined data quality objectives (DQOs). Quality control (QC) refers to samples that are used to evaluate whether field sampling methods and laboratory analytical procedures are producing data that meet DQOs.
REF	Reference areas in Meliadine Lake (MEL-03, MEL-04, and MEL-05)
Safe drinking water	In the context of the AEMP, water is considered safe for drinking if measured concentrations of parameters are below guidelines published by Health Canada.
SETP	Saline Effluent Treatment Plant: treats excess saline groundwater stored in SP1 and SP4 prior to discharge to Melvin Bay. Treated effluent from the SETP is temporarily stored in SP3 before being trucked to Itivia Harbour and discharged to Melvin Bay.
Significance threshold	Significance thresholds are narrative statements that represent attributes of the aquatic environment that must be preserved as the Project develops.
SP	Saline pond: pond constructed for the collection and temporary storage of saline groundwater prior to treatment at the Saline Water Treatment Plant or the Saline Effluent Treatment Plant.
Species richness	Species richness refers to the number of different (distinct) species in a sample. Use to describe the diversity of the phytoplankton and benthic invertebrate communities in Meliadine Lake.
SSWQO	Site-specific water quality objectives are guidelines developed specifically for the lakes around Meliadine that take into consideration background water quality in the region. SSWQOs were developed for fluoride, arsenic, and iron as part of the AEMP (Golder 2014).

Acronym / Term	Definition
Surface contact water	Runoff from rain and snow melt that is collected on site. This water is collected, treated, and discharged to Meliadine Lake.
SWTP	Saline Water Treatment Plant: treatment of saline groundwater to remove excess TSS, salts ($CaCl_2$, NaCl), metals, phosphorus, and nitrogenous compounds.
Tailings	Residual particulate waste left over after ore is processed to extract gold
TDS	Total Dissolved Solids: the total concentration of dissolved substances in water, including inorganic salts and small organic matter (e.g., calcium, magnesium, potassium, carbonates, chlorides).
TGD	Metal Mining Technical Guidance Document for Environmental Effects Monitoring
TKN	Total Kjeldahl nitrogen is the sum of organic nitrogen in water and total ammonia (NH_3)
TN	Total nitrogen is the sum of organic and inorganic nitrogen in water. Total nitrogen = TKN + nitrate + nitrite
TOC	Total Organic Carbon: a measure of the amount of organic matter present
TP	Total phosphorus is the sum of all forms of phosphorus in aquatic systems: inorganic phosphorus, particulate organic phosphorus, and dissolved (soluble) organic phosphorus.
TSF	Tailings Storage Facility is the engineered structure used to store and contain tailings produced during the milling of ore
TSS	Total Suspended Solids: the total concentration of suspended solids that are undissolved in water, including silt, clay, metals, and other organic and inorganic materials.
Waste rock	Waste rock is fragment rock with no economic value that is initially removed during development of the open pit and underground mine workings
WQG	Water quality guideline; generic term referring to guidelines developed by various agencies for protection of aquatic life
Water Licence	The Amended Type A Water Licence (2AM-MEL1631) authorizes Agnico Eagle to use waters and deposit waste in support of mining operations at Meliadine
WMWG	Water Management Working Group: a technical advisory group comprised of regulatory agencies, Agnico Eagle representatives, and consultants that was formed in 2020 as part of the Emergency Amendment to discharge surface contact water with higher concentrations of TDS
WQ-MOP	Water Quality Monitoring and Optimization Plan: a 3-phase plan to develop TDS Benchmarks for end of pipe effluent quality and surface water quality at the edge of the mixing zone in Meliadine Lake.
WRSF	Waste rock and overburden storage facilities

1 INTRODUCTION

This document presents findings of the 2021 Aquatic Effects Monitoring Program (AEMP) for the Meliadine Gold Mine (the Mine) located approximately 25 km north of Rankin Inlet, Nunavut on the southeast shore of Meliadine Lake, on Inuit Owned Land. The Project was approved by the Nunavut Impact Review Board (NIRB) on February 26, 2015, subject to terms and conditions stated in Project Certificate No. 006 (NIRB, 2019) and the Type A Water Licence (2AM-MEL1631) granted by the Nunavut Water Board (NWB) on April 1, 2016 and amended on June 23, 2021.

1.1 Aquatic Monitoring Programs at Meliadine

1.1.1 Aquatic Effects Monitoring Program

The AEMP is the integrated monitoring program used to determine if discharge of treated effluent or other activities at the mine are causing changes in water quality and impacts to aquatic life beyond those changes that were predicted in the Final Environmental Impact Statement (FEIS; Agnico Eagle, 2014). All project phases, from construction to operations to closure were considered when the AEMP was developed in consultation with communities, stakeholders, and regulators. Inuit Qaujimajatuqangit (IQ; Traditional Knowledge) helped define and improve the scope of the AEMP, as stated in Section 1.5.1: *Summary of Inuit Qaujimajatuqangit Knowledge, Traditional Land Use, and Concerns of Inuit regarding the Project* in the Main Application for the Type A Water Licence (Agnico Eagle, 2015).

The AEMP is currently focused on assessing potential changes related to on-going construction and early operations, but the design also considers later phases of the Project (i.e., late operations to closure), and potential development of other deposits. The AEMP Design Plan (Golder, 2016) outlines how the monitoring program is conducted, and applies to aquatic monitoring in Meliadine Lake and three lakes located close to the mine (referred to collectively as the Peninsula Lakes). The Meliadine Lake study and the Peninsula Lakes study are similar in their mandate, but differ with respect to the frequency and scope monitoring. An overview of each study is provided below.

The core elements of the AEMP are water quality, sediment quality, benthic invertebrate community, and fish (health and tissue chemistry). To improve efficiency and reduce redundancy, the scope of biological monitoring under the AEMP was harmonized with the Environmental Effects Monitoring (EEM) program required under MDMER. There are however, certain aspects of the AEMP that go beyond what is required under EEM including fish tissue chemistry monitoring and additional study areas for both the small-bodied fish and benthic invertebrate community studies. The expanded monitoring under the AEMP compared to the EEM program reflects commitments made during the regulatory approval process.

1.1.2 Environmental Effects Monitoring (MDMER)

The EEM program is the mechanism used to evaluated the adequacy of the regulations governing discharge of effluent to aquatic receiving environments at metal and diamond mines in Canada. Schedule 5 of the MDMER outlines the requirements for and conditions of EEM studies investigating the effect of effluent on the health of health of fish populations, fish habitat (benthic invertebrates), or the usability of fisheries by people (fish tissue chemistry). Guidance on best practices for designing, implementing, and interpreting data from EEM studies is outlined in the Metal Mining Technical Guidance Document (TGD) published by Environment Canada in 2012. This document featured prominently in the development of the AEMP. The guiding principles of the EEM program are that the studies are scientifically defensible, cost effective, flexible, and safe.

1.2 Objectives and Key Questions

The primary objective of the AEMP is to assess potential mine-related effects on the aquatic ecosystem and to meet regulatory requirements outlined in the Type A Amended Water Licence (2AM-MEL1631; NWB 2021) while also meeting commitments made during the environmental permitting process[1]. Specific objectives of the AEMP are to:

- Determine the short- and long-term effects of the mine on the aquatic receiving environment,
- Evaluate the accuracy of predictions made in the FEIS, including the final significance statements regarding impact to the aquatic ecosystem,
- Assess the efficacy of planned mitigation incorporated into the mine design, and
- Collect data required to identify the need for potential additional mitigation of mine effects within the Management Response Framework.

The key questions in **Table 1-1** were developed in the AEMP Design Plan (Golder, 2016) to focus the analysis of mine-related changes to water quality, the health of lower trophic level communities, fish health, and impacts to traditional and non-traditional use of the fishery in Meliadine Lake.

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[1] Refer to Table 1-1 in the *AEMP Design Plan* (Golder, 2016)

Table 1-1. Key Questions for the Meliadine Lake Study (from Agnico Eagle, 2021).

Component	Key Questions
Meliadine Lake	
Water Quality	Are concentrations of key parameters in effluent less than limits specified in the Water Licence?
	Has water quality in the exposure areas changed over time, relative to reference/baseline areas?
	Is water quality consistent with predictions in the FEIS and below guidelines to protect aquatic life and human health?
Phytoplankton Community	Is the phytoplankton community affected by potential mine-related changes in water quality in Meliadine Lake?
Benthic Invertebrate Community	Is the benthic invertebrate community affected by potential mine-related changes in water and sediment quality in Meliadine Lake?
Fish Health	Is fish health affected by changes in water and sediment quality in Meliadine Lake?
Fish Tissue Chemistry	Are tissue metal concentrations in fish from Meliadine Lake increasing due to mining activities?
Peninsula Lakes	
Water Quality	Is water quality consistent with predictions in the FEIS and below guidelines to protect aquatic life and human health?
	Has water quality changed over time relative to baseline conditions?

1.3 Report Structure

This report presents the results of 2021 annual AEMP. Findings from the Cycle 2 EEM program are being prepared as a standalone deliverable according to the specific reporting requirements for EEM studies. Results of the 2021 AEMP are organized in the following Sections and their associated appendices.

1. Introduction
2. Overview of the AEMP
3. Effluent Quality (Appendix B)
4. Meliadine Lake Water Quality (Appendix C)
5. Peninsula Lakes Water Quality (Appendix D)
6. Phytoplankton Community (Appendix E)
7. Sediment Chemistry (Appendix F)
8. Benthic Invertebrate Community (Appendix G)
9. Threespine Stickleback Health (Appendix H)
10. Threespine Stickleback Chemistry (Appendix H)
11. Lake Trout Health (Appendix I)
12. Lake Trout Chemistry (Appendix I)
13. Response Framework and Action Level Assessment

1.4 References

Agnico Eagle (Agnico Eagle mines Ltd.) 2015. Meliadine Gold Project – Type A Water Licence Main Application Document. April 2015. Version 1.

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Azimuth and Portt. 2021. Environmental Effects Monitoring Cycle 2 Study Design – Meliadine Gold Project. Report prepared by Azimuth Consulting Group and C. Portt & Associates. July 5, 2021.

Golder. 2019. Cycle 1 Environmental Effects Monitoring Report and 2018 Aquatic Effects Monitoring Program Annual Report. Submitted to Agnico Eagle mines Ltd – Meliadine Gold mine. March 27, 2019.

Golder. 2016. Aquatic Effects Monitoring Program (AEMP) Design Plan. Doc 485-1405283 Ver. 1. Submitted to Agnico Eagle mines Limited. June 2016.

Golder. 2012. Aquatics Baseline Synthesis Report, 1994 to 2009 – Meliadine Gold Project, Nunavut. Report Number: Doc 327-1013730076 Ver. 0, Submitted to Agnico Eagle Mines Ltd. October 16, 2012.

NIRB (Nunavut Impact Review Board). 2019. Project Certificate [No.: 006]. February 26, 2019.

Tetra Tech. 2020. Meliadine Lake – Updated 3-D Modelling of the Discharge Assessment. November 12, 2020.

2 AEMP STUDY DESIGN AND ACTIVITES ON SITE

The AEMP is comprised of two related, yet distinct monitoring programs: the Meliadine Lake study and the Peninsula Lakes study. The two programs share common field methods, analytical methods, quality assurance and quality control protocols, and similar strategies for evaluating the water quality data, but there are some notable differences. An overview study design for Meliadine Lake and the Peninsula Lakes as described in the AEMP Design Plan is provided below.

2.1 Mine Site and Environmental Setting

Mine Site

Meliadine entered commercial production in 2019 with ore sourced from the underground mining of the Tiriganiaq deposit. Two open pits (Tiriganiaq Pits 1 & 2) are also part of the approved project. The extent of the mine development as of 2021 is shown in **Figure 2-2**. Other deposits that were included in the original mine plan include Pump, Fzone, Wesmeg and Discovery (Agnico Eagle, 2015).

Infrastructure at the Mine consists of the process plant (mill), emulsion plant, underground workings, Tiriganiaq Pits 1 and 2, a permanent camp to house staff, an exploration camp, ore stock piles, waste rock storage facilities (WRSF 1&3), a tailings storage facility (TSF), a water management system comprised of Containment Ponds (CPs), dikes, channels, water treatment plants, discharge locations, and other infrastructure to support mining operations. An All-Weather-Access-Road (AWAR) connects the mine to Rankin Inlet.

Meliadine Lake Watershed

The Mine is located on the southwest shore of Meliadine Lake. The Meliadine watershed encompasses approximately 560 km^2. Meliadine Lake has two outlets, both of which ultimately drain into Hudson Bay. The largest outflow is the Meliadine River, located in the south basin of the lake. The Meliadine River flows through a series of small water bodies and Little Meliadine Lake before draining into Hudson Bay, north of Rankin Inlet (**Figure 2-1**). The second outlet is in the northwest basin. Water flows northwest to Peter Lake, which ultimately drains into Melvin Bay via the Diana River system.

Meliadine Lake is among the larger lakes in the region with a surface area of approximately 107 km^2 and a maximum length of 31 km (southeast to northwest). The lake is characterized by a highly convoluted shoreline, numerous islands, and shallow reefs. Approximately 1/3 of the volume is contributed by lake areas that are less than 2 m in depth, which indicates a considerable reduction in lake volume and overwintering potential during winter (Golder, 2019). Maximum ice thickness is about 2 m and occurs in March/April, increasing the concentration of some ions, such as chloride, in the water near the ice-water interface. This occurs due to cryo-concentration, where ice formation excludes certain ions and increases their concentration in the water column (Wetzel, 2001). This phenomenon is well documented at reference lakes and exposure areas sampled as part of the water quality monitoring program for the Meadowbank mine, situated north of Baker Lake, Nunavut.

Meliadine Lake is separated into three basins based on its morphology. Descriptions of each basin provided below were adapted from information presented in the 2019 AEMP/EEM report (Golder, 2019), information collected during the baseline period (Agnico Eagle, 2014).

- The east basin is 2,212 ha and contributes approximately 21% to the entire area of Meliadine Lake. The total volume water in the east basin is approximately 53 Mm^3 (Tetra Tech, 2020). Stations in the near-field area MEL-01 are located 100 m to 250 m from the permanent diffuser. The east basin is separated from the lake to north by a narrow channel with a highly variable depth and numerous rocky islands and reefs. Fish migration may be restricted between the east basin and the rest of the lake during the winter months (Agnico Eagle, 2014).
- The northwest basin covers an area of approximately 7,100 ha, representing 68% of the surface area of Meliadine Lake. The mid-field study area (MEL-02) and two reference areas (MEL-03 and MEL-04) are included in this basin. MEL-02 is located just past the narrows connecting the east basin with the west basin. MEL-03 is in an isolated bay north of MEL-02. MEL-04 is located near the outlet to Peter Lake at the northwest end of the west basin. Water depths greater than 8 m are more common in this area of Meliadine Lake than the east and south basins. Bathymetric surveys have not been conducted in this part of the lake.
- The southwest basin of Meliadine Lake is located west of the Meliadine Peninsula near the outlet to the Meliadine River. The estimated surface area of this basin is 1,135 ha, representing approximately 11% of the surface area of Meliadine Lake. Reference Area 3, or MEL-05, is in this basin near the outlet to the Meliadine River. The area around the outlet to the Meliadine River is shallow with total water depth less than 4 m in most places.

Peninsula Lakes Watersheds

Several small watersheds are located on the Meliadine peninsula between the south and east basins of the lake. These peninsula watersheds comprise an extensive network of lakes, ponds, and interconnecting streams that ultimately drain into Meliadine Lake (**Figure 2-1**). The lakes within the Peninsula are generally small (<90 ha in area) and shallow (<5 m in maximum depth). They are connected to each other and to Meliadine Lake by short streams but are often isolated by limited flow during summer/fall and frozen stream conditions during winter (Golder, 2012).

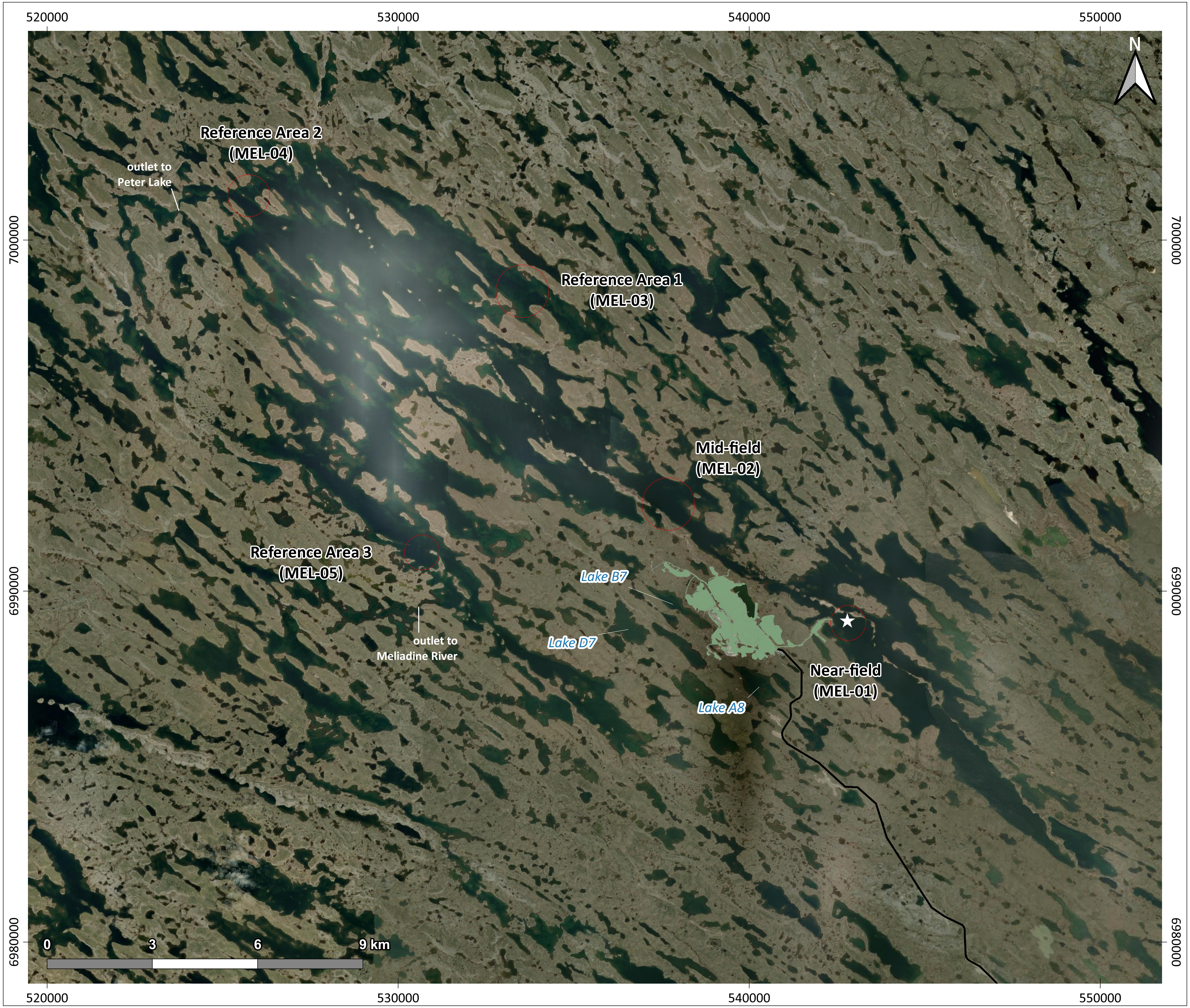


Figure 2-1

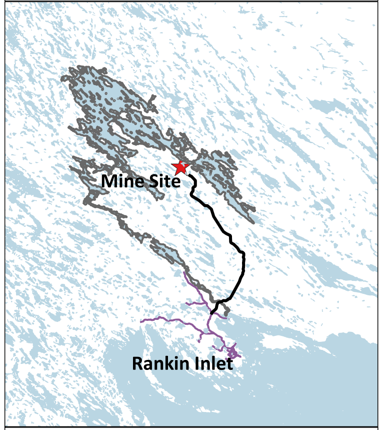
Study Area for the Aquatic Effects Monitoring Program

2021 Aquatic Effects Monitoring Program
Annual Report

AZIMUTH

Date:	March 1, 2022
Datum:	NAD 83 UTM Zone 15N
Scale:	1:140,000
Software:	QGIS version 3.16.0-Hannover
Produced by:	E. Franz

REFERENCES:
1. Basemap imagery from Google
2. Mine Plan provided by Agnico Eagle
3. Roads and waterbodies from NRC



Legend

- ▬ All weather access road
- 🟩 Meliadine Mine (2021)
- ☆ Diffuser

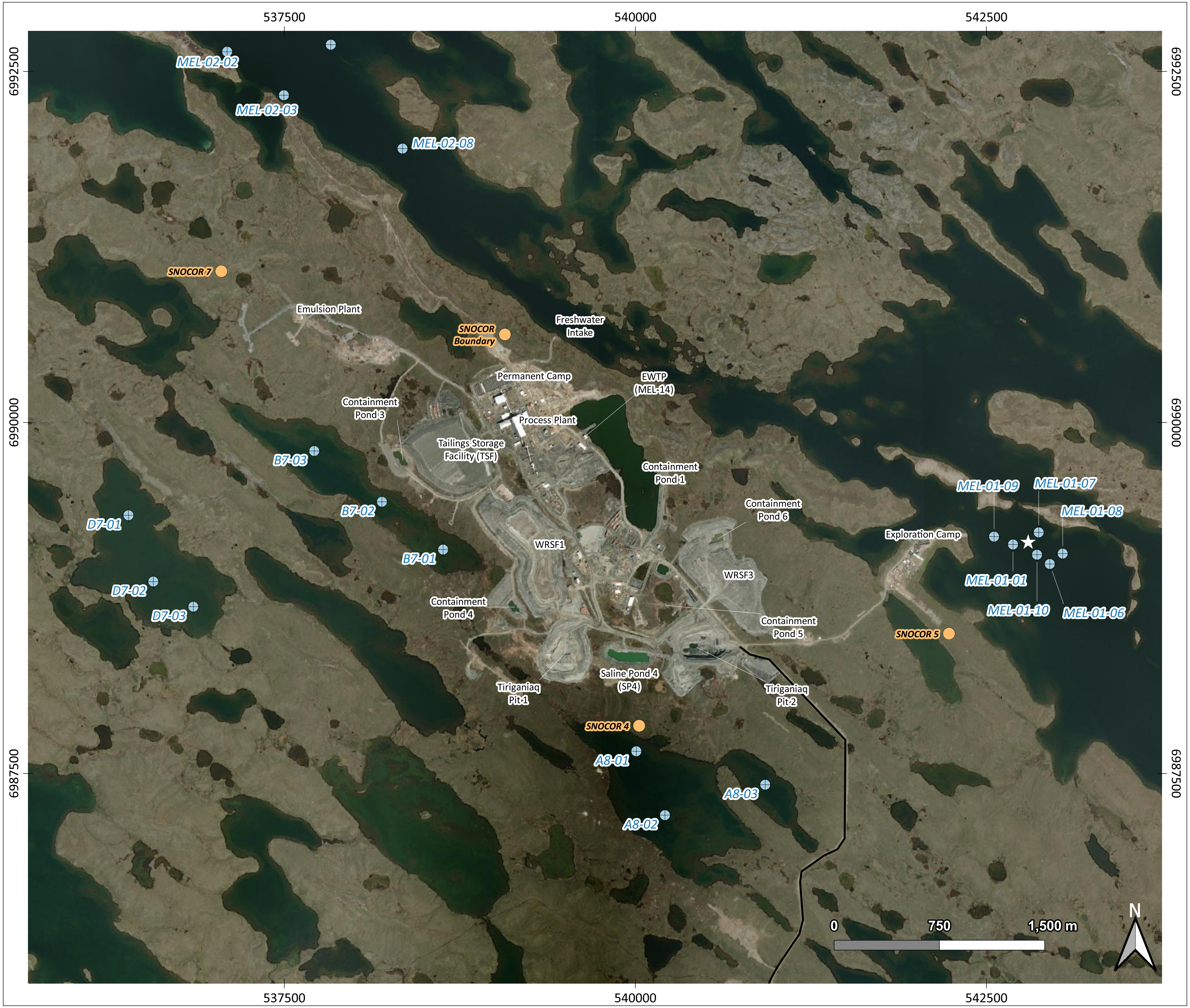


Figure 2-2

Surface Features at the Meliadine Mine

2021 Aquatic Effects Monitoring Program
Annual Report

AZIMUTH

Date:	April 8, 2022
Datum:	NAD 83 UTM Zone 15N
Scale:	1:35,000
Software:	QGIS version 3.16.0-Hannover
Produced by:	E. Franz

REFERENCES:
1. Basemap imagery from Google
2. Mine Plan provided by Agnico Eagle
3. Roads and waterbodies from NRC

Legend

- ▬ All weather access road
- ☆ Diffuser
- ⊕ Water Quality Station
- ● Snow Core Stations

2.2 Meliadine Lake Study

2.2.1 Monitoring Areas

The Meliadine Lake study was designed to detect mine-related changes and define the spatial and temporal extent of those changes. The study design uses multiple control-impact study design with two exposure areas (near-field [NF], mid-field [MF]) and three reference areas to provide spatial context when interpreting potential changes within and between years. Conceptually, NF areas provide an early-warning for introductions of stressors into the receiving environment and are situated near the primary sources of exposure at a site (i.e., the edge of the mixing zone for effluent). MF areas are located farther downstream from the NF monitoring areas and help define the spatial extent of potential changes observed at NF area(s). Finally, reference areas provide insights into regional trends (e.g., climatic events) that would be expected to influence all sampling areas (i.e., natural temporal changes).

- Near-field (MEL-01) – The NF area (MEL-01) is in the east basin around the diffuser. Changes in water quality and effects to the biological communities caused by discharge of effluent to Meliadine Lake would be expected to occur at MEL-01 first.
- Mid-field (MEL-02) – The MF area (MEL-02) is located approximately 6 km downstream from MEL-01 past the narrows that separates the east and northwest basins. Monitoring data from MEL-02 helps define the spatial extent of potential changes observed at MEL-01.
- Three internal reference areas are included in the study design to provide insights into regional trends that would be expected to influence all sampling areas. Reference Area 1 (MEL-03) is in a bay in the northwest basin[2] of Meliadine Lake. Reference Area 2 (MEL-04) is in northwest area of the lake near the outlet to Peter Lake. Reference Area 3 (MEL-05) is in the southwest basin near the outlet to Meliadine River.

2.2.2 Monitoring Components

The current scope of the Meliadine Lake study includes monitoring water, sediment, phytoplankton, benthic invertebrates, fish health, and fish tissue chemistry. To improve efficiency and reduce redundancy, the scope of biological monitoring under the AEMP was harmonized with the EEM program required under MDMER. Biological monitoring studies (benthic invertebrates and fish) are conducted every 3-years to assess whether discharge of effluent is causing an effect to fish and benthic invertebrate communities. Certain aspects of the AEMP go beyond what is required under EEM (e.g.,

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[2] Use of east, west and south basins for Meliadine Lake as per Golder (2019).

fish tissue chemistry monitoring and additional study areas). The expanded monitoring under the AEMP compared to the EEM program reflects commitments made during the regulatory approval process.

2.3 Peninsula Lakes Study

The water quality component of the Peninsula Lakes AEMP is designed to detect changes in water quality related primarily to the deposition of aerial emissions and alteration of watersheds (i.e., changes to natural drainage paths or hydrologic balance) (Agnico Eagle, 2014). Importantly, changes in water quality in the Peninsula Lakes area were predicted to be local and to not extend to Meliadine Lake.

- Watershed A – Lakes in watershed A are located mainly to the south and east of the mine. Lake A8 is the largest of the lakes in the subdrainage. The outlet to Lake A8 is located at the southeast end of the lake. Water from Lake A8 ultimately flows into Meliadine Lake, approximately 2 km south of sampling area MEL-01.
- Watershed B – Lakes in watershed B are located west and south of the mine site. Lake B7, located adjacent to the TSF, is the largest lake in the subdrainage and represents the lake that is most suitable for monitoring changes in water quality related to dust from the TSF. Surface water flows from north to south, eventually emptying into Meliadine Lake south east of MEL-05.
- Watershed D – Lakes in watershed D are located west of watershed B. The direction of flow is from east to west, with Lake D1 emptying into Meliadine Lake across from where Meliadine Lake drains into the Meliadine River.

Water quality monitoring at three headwater lakes (Lake A8, Lake B7 and Lake D7; **Figure 2-1**) is conducted during the open water season to assess whether the Mine is indirectly causing changes in water quality. If changes in water quality are detected, follow-up investigations may be conducted to determine the significance of changes in water quality and potential impacts to aquatic life.

2.4 Scope of the 2021 AEMP

An overview of the 2021 AEMP is provided in **Table 2-1**. The 2021 field program in Meliadine Lake included water quality sampling in NF and MF areas during the ice-cover season as well as open water sampling at the exposure and reference areas in July, August, and September. Similar to previous years, the phytoplankton study was conducted at the exposure and reference areas in August, coinciding with the water sampling event. Sediment quality sampling and benthic invertebrate community surveys were conducted in the NF and MF exposure areas and two reference areas (MEL-03 and MEL-05) in August. Fish health studies on Threespine Stickleback (*Gasterosteus aculeatus*) and Lake Trout (*Salvelinus namaycush*) were conducted in Meliadine Lake in August. A subset of the fish sampled for each program were sampled for tissue chemistry. Water quality sampling during the open-water season was also conducted in the Peninsula Lakes in July and August as in previous years.

Biological studies for the Cycle 2 EEM study were carried out in parallel with the 2021 AEMP. The study design for the Cycle 2 EEM included a benthic invertebrate community survey and two lethal fish population studies using Threespine Stickleback (*Gasterosteus aculeatus*) as the small-bodied species and Lake Trout (*Salvelinus namaycush*) as the large-bodied species. There is considerable overlap between the AEMP and the Cycle 2 EEM, and the two programs were harmonized to the extent possible. There are, however, two notable differences between the AEMP and EEM that relate to specific study design requirements for the Cycle 2 EEM (Azimuth and Portt, 2021). First, two external reference area lakes – Peter Lake and Atulik Lake – were included in the Lake Trout study design that was approved by the Technical Advisory Panel (ECCC) in July 2021. Second, the Threespine Stickleback study for the Cycle 2 EEM included separate studies on unparasitized fish (same as AEMP) as well as parasitized fish. For these reasons, results for the Cycle 2 EEM are being prepared as a separate deliverable according the reporting schedule under MDMER (Azimuth, 2022 in prep).

Table 2-1. Scope of the 2021 AEMP in Meliadine Lake and the Peninsula Lakes.

Area	Component	Stations per Area	Samples per Station	Parameters	Sample Type	Collection Frequency within Program
Meliadine Lake Study						
MEL-01 Near-field Exposure	Water Quality	6	1	field measurements, conventional parameters, major ions, nutrients, metals, cyanides	discrete; mid-depth	Winter (Mar or Apr) Open-water (Jul, Aug, Sep)
	Phytoplankton	6	3	chlorophyll-a	composite; from depth-integrated	August
		6	1	phytoplankton taxonomy, biomass, and density		
	Benthic Invertebrates	5	1	benthic invertebrate taxonomy	composite from 5 grabs	August
	Sediment Quality	5	1	particle size, moisture, total organic carbon, nutrients, metals	composite from up to 5 grabs	August
	Threespine Stickleback (THST) Health Assessment[a]	n/a	Target: 30 adult females 30 adult males 20 juveniles	age, length, weight, condition, sex, fecundity, size at age, external and internal health (including gonad and liver weights)	individual fish	August
	Lake Trout (LKTR) Health Assessment[a]	n/a	Target: 20 adult females & 20 adult males	age, length, weight, condition, sex, fecundity, size at age, external and internal health (including gonad and liver weights)	individual fish	August
	Fish Tissue Chemistry	n/a	~40 (THST)	moisture and metals	THST = carcass	August
			~40 (LKTR)		LKTR = muscle, liver, and kidney	
MEL-02 Mid-field Exposure	Water Quality	5	1	field measurements, conventional parameters, major ions, nutrients, metals, cyanides	discrete; mid-depth	Winter (Mar or Apr) Open-water (Jul, Aug, Sep)
	Phytoplankton	5	3	chlorophyll-a	composite; from depth-integrated	August
		5	1	phytoplankton taxonomy, biomass, and density		
	Benthic Invertebrates	5	1	benthic invertebrate taxonomy	composite from 5 grabs	August
	Sediment Quality	5	1	particle size, moisture, total organic carbon, nutrients, metals	composite from up to 5 grabs	August

Table 2-1. Scope of the 2021 AEMP in Meliadine Lake and the Peninsula Lakes.

Area	Component	Stations per Area	Samples per Station	Parameters	Sample Type	Collection Frequency within Program
MEL-03 Reference Area 1 (Northeast bay)	Water Quality	5	1	field measurements, conventional parameters, major ions, nutrients, metals, cyanides	discrete; mid-depth	Open-water (Jul, Aug, Sep)
	Phytoplankton	5	3	chlorophyll *a*	composite; from depth-integrated	August
		5	1	phytoplankton taxonomy and biomass		
	Benthic Invertebrates	5	1	benthic invertebrate taxonomy	composite from 5 grabs	August
	Sediment Quality	5	1	particle size, moisture, total organic carbon, nutrients, metals	composite from up to 5 grabs	August
	Threespine Stickleback (THST) Health Assessment[a]	n/a	30 adult females 20 adult males 20 juveniles	age, length, weight, condition, sex, fecundity, size at age, external and internal health (including gonad and liver weights)	individual fish	August
	Fish Tissue Chemistry	n/a	~40 (THST)	moisture and metals	THST = carcass	August
MEL-04 Reference Area 2 (Northwest Bay near lake outlet)	Water Quality	5	1	field measurements, conventional parameters, major ions, nutrients, metals, cyanides	discrete; mid-depth	August
	Phytoplankton	5	3	chlorophyll-a	composite; from depth-integrated	August
		5	1	phytoplankton taxonomy		
	Threespine Stickleback (THST) Health Assessment[a]	n/a	30 adult females 20 adult males 20 juveniles	age, length, weight, condition, sex, fecundity, size at age, external and internal health (including gonad and liver weights)	individual fish	August
	Fish Tissue Chemistry	n/a	~40 (THST)	moisture and metals	THST = carcass	
MEL-05 Reference Area 3 (Southwest bay near lake outlet)	Water Quality	5	1	field measurements, conventional parameters, major ions, nutrients, metals, cyanides	discrete; mid-depth	August
	Phytoplankton	5	3	chlorophyll-a	composite; from depth-integrated	August
		5	1	phytoplankton taxonomy and biomass		
	Benthic Invertebrates	5	1	benthic invertebrate taxonomy	composite from 5 grabs	August
	Sediment Quality	5	1	particle size, moisture, total organic carbon, nutrients, metals	composite from up to 5 grabs	August

Table 2-1. Scope of the 2021 AEMP in Meliadine Lake and the Peninsula Lakes.

Area	Component	Stations per Area	Samples per Station	Parameters	Sample Type	Collection Frequency within Program
Peninsula Lakes Study						
Lake D7 Lake A8 Lake B7	Water Quality	3	1	field measurements, conventional parameters, major ions, nutrients, metals, cyanides	discrete; mid-depth	Open-water (Jul, Aug)

Notes:

[a] Sample sizes for the 2021 fish health assessments were based on a review of the existing data conducted as part of the Cycle 2 EEM Study Design (Azimuth and Portt, 2021).

2.5 Activities on Site in 2021

Mining operations have the potential to affect water quality in the aquatic receiving environment through discharge of treated effluent (surface contact water to Meliadine Lake), accidental spills, altered hydrology due to construction activities, and aerial emissions and dust deposition. An overview major construction activities, spills, and effluent discharge in 2021 is provided below as context for assessing potential mining-related changes in water quality in Meliadine Lake and the Peninsula Lakes. A summary of major construction activities from 2015 to 2021 are provided in **Table 2-2**.

2.5.1 Construction and Operations

Mining of Tiriganiaq Open Pit 2 (TIR02) continued from Q4 2020 through Q2 2021. Mining was paused in Q2 so that the pit could be used to temporarily store saline contact water prior to discharge to Melvin Bay at Itivia Harbour. Mining of Tiriganiaq Open Pit 1 (TIR01) started in 2021 and is still ongoing. Overburden and waste rock from TIR01 was placed in Waste Rock Storage Facility 1 (WRSF1).

A few minor spills occurred in 2021, none of which had the potential to impact water quality in Meliadine Lake or the Peninsula Lakes. Follow-up monitoring was conducted as per the standard guidance for reporting spills.

2.5.2 Water Management

Water management in 2021 followed the strategy outlined in the Water Management Plan (Appendix B; Agnico Eagle, 2022). The water management objectives are to minimize potential impacts to the quantity and quality of surface water at the Mine and surrounding waterbodies. Water management for the containment ponds (CPs) involves drawing down the water levels prior to the ponds freezing over in the winter. This strategy ensures there is reserve capacity to store runoff collected during freshet.

Five CPs are currently used to manage surface contact water collected on Site (**Table 2-3**); CP3 through CP6 are located adjacent to major infrastructure (**Figure 2-2**). Surface contact water is ultimately directed toward CP1 prior to treatment and discharge to Meliadine Lake. Other sources of water to CP1 include direct runoff from the CP1 catchment and treated wastewater from the Sewage Treatment Plant (STP). Water in CP1 is discharged to Meliadine Lake after treatment at the Effluent Water Treatment Plant (EWTP). The purpose of the EWTP is to reduce total suspended solids (TSS) to below 15 mg/L (Actiflo® model ACP-700R). The EWTP may also remove some phosphorus.

Table 2-2. Summary of Major Development Activities Since the Start of Construction in 2015.

Mine Year	Mine Development Activities and Sequence[a]
Q4 of Yr -5 (2015)	- Started construction of industrial pad - Developed ramp to Tiriganiaq underground mine - Constructed portion of rock pad for stockpiles to store ore from Tiriganiaq underground ramp development
Yr -4 (2016)	- Continued construction of industrial pad - Constructed and operated the temporary landfill - Started temporary storage of waste rock in the future WRSF2 footprint for construction purposes - **Continuous dewatering of Lake H17 between August 21 and October 1 via a temporary diffuser located between MEL-01 and MEL-02 study areas (Golder 2017)**
Yr -3 (2017)	- Constructed and utilized Type A landfarm - Constructed and began operation of Type A landfill - Erected and closed all main buildings except crusher, paste plant, and crushed ore storage - Erected incinerator - Erected and operated effluent water treatment plant (EWTP) - Installed fuel tanks 3 ML and 250 kL at Portal1 - Erected fuel tank 13.5 ML in Rankin Inlet - **Discharge from CP1 planned for September to October 2017 did not occur due to exceedance of the maximum average concentration (MAC) for TDS of 1,400 mg/L** - **Sewage effluent from the exploration camp STP transported to main camp STP for treatment beginning in November (Golder 2019)**
Yr -2 (2018)	- Started construction of Ore Storage Pad 2 (OP2) - Erected and closed crusher, paste plant, and crushed ore storage buildings - Erected fuel tank 20 ML in Rankin Inlet - Erected fuel tanks 6 ML and 250 kL at industrial pad - Started process commissioning at end of Q4 - **Discharge of treated surface contact water from CP1 from June 21 to September 3**

Table 2-2. Summary of Major Development Activities Since the Start of Construction in 2015.

Mine Year	Mine Development Activities and Sequence[a]
Yr -1 (2019)	- Completed industrial pad - Completed construction of OP2 - Started to place filtered tailings in Cell 1 of TSF at end of Q1 - Started full capacity ore processing early Q2 - Created temporary waste rock storage area within footprint of Tiriganiaq Pit 2 from construction of Saline Pond 2 (SP2) - Began placement of waste materials from Saline Pond 4 (SP4) in WRSF1 - **Discharge of treated surface contact water from CP1 from July 9 to October 5**
Yr 1 (2020)	- Place waste rock from temporary storage within footprint of Tiriganiaq Pit 2 to construct haul roads for open pits and to WRSFs - Create temporary waste rock storage area between footprints of Tiriganiaq Pits 1 and 2 from construction of SP4 - Start to mine Tiriganiaq Pit 2 - Begin placement of waste materials from Tiriganiaq Pit 2 within WRSF3 - **Discharge of treated surface contact water from CP1 from June 5 to October 4**
Yr 2 (2021)	- Start to mine Tiriganiaq Pit 1 - Begin placement of waste rock and overburden from Tiriganiaq Pit 1 in WRSF1 - Continue placement of waste rock and overburden from Tiriganiaq Pit 2 in WRSF1 - Pause mining of Tiriganiaq Pit 2 - **Discharge of treated surface contact water from CP1 between July 13 and October 16**

Notes:

Key water management activities are **bolded**.

[a] This table was adapted from the mine Waste Management Plan (Agnico Eagle 2020).

Table 2-3. Surface Contact Water Management Plan.

Source	Collection Pond
Industrial Site Pad, Ore Stockpile (OP2), Landfill	CP1
WRSF1	CP1, CP4, CP5
WRSF3	CP2 and CP6
Tiriganiaq Pits 1* and 2	CP4 unless high salinity measured, in which case Tiriganiaq Pit 2
TSF	CP1 and CP3

Notes:
Adapted from Table 9 in Appendix C of the Type A Water Licence Amendment (Agnico Eagle 2020a).

2.5.3 Discharge from CP1 to Meliadine Lake

The volume of water (m^3) discharged from CP1 to Meliadine Lake is recorded daily. Daily discharge volume from CP1 to Meliadine Lake since 2018 is shown in **Figure 2-3**. Monthly discharge volumes to Meliadine through the permanent diffuser from 2018 through 2021 are presented in **Table 2-4**.

Approximately 851,000 m^3 of treated contact water was discharged to Meliadine Lake between July 13th and October 16th. Discharge was continuous except for August 8th and 9th when the EWTP was shut down for routine maintenance. Less water was discharged in July 2021 compared to previous years, in part, because there was reserved capacity in CP1 due to the significant draw down that occurred in September 2020. The largest cumulative monthly discharge in any year occurred in August 2021 when approximately 400,000 m^3 was discharged to Meliadine Lake. Approximately 30% of the total volume of water discharged to Meliadine Lake in 2021 occurred over a two-week period between August 19th and September 2nd. The highest volume discharged in a single day was just over 17,241 m^3 on August 29th, well below peak EWTP capacity of 22,000 m^3/day. Discharge to Meliadine occurred later into October compared to previous years, which created additional capacity to manage runoff from the upcoming spring 2022 freshet.

Figure 2-3. Daily Discharge (m^3) from CP1 to Meliadine Lake, 2018-2021.

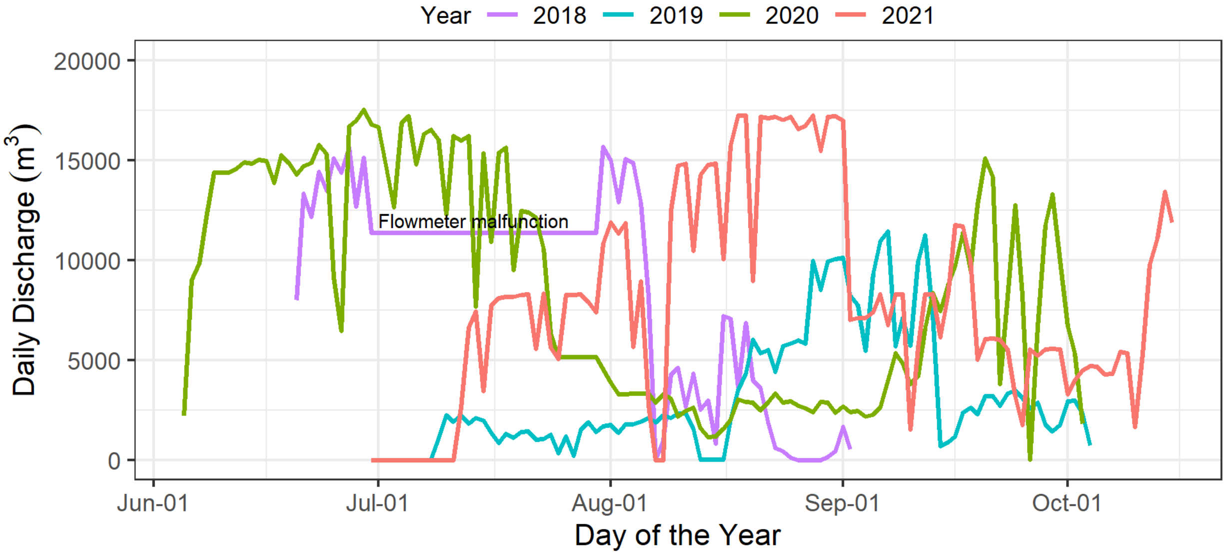

Table 2-4. Monthly discharge (m^3) from CP1 to Meliadine Lake, 2018-2021.

Year	Month	Days	Volume (m^3)
2018	June	10	134,272
	July	na*	352,551
	August	26	153,066
	September	3	2,632
	Totals for 2018	***70***	***642,521***
2019	July	24	30,614
	August	31	107,540
	September	30	157,912
	October	5	10,707
	Totals for 2019	***89***	***306,773***
2020	June	26	352,954
	July	31	366,094
	August	31	83,454
	September	30	214,845
	October	3	13,829
	Totals for 2020	***121***	***1,031,177***
2021	July	19	133,439
	August	29	397,398
	September	30	221,210
	October	16	99,079
	Totals for 2021	***94***	***851,126***

Notes:
* Daily discharge volumes and the number of days were unavailable for July 2018 due to a flowmeter malfunction. Daily discharge data for July 2018 was averaged from the monthly total provided in Appendix 2A in Golder (2019).

2.6 References

Agnico Eagle. 2022. Water Management Plan.

Agnico Eagle. 2014. Meliadine Gold Project, Nunavut. Final Environmental Impact Statement. Submitted to the Nunavut Impact Review Board. April 2014.

Azimuth and Portt. 2021. Environmental Effects Monitoring Cycle 2 Study Design – Meliadine Gold Project. Report prepared by Azimuth Consulting Group and C. Portt & Associates. July 5, 2021.

Golder. 2020. Meliadine Site Water Balance and Water Quality Model. Type A 2AM-MEL1631 Water Licence Amendment. August 21, 2020.

Golder. 2019. Cycle 1 Environmental Effects Monitoring Report and 2018 Aquatic Effects Monitoring Program Annual Report. Submitted to Agnico Eagle mines Ltd – Meliadine Gold mine. March 27, 2019.

Golder. 2016. Aquatic Effects Monitoring Program (AEMP) Design Plan. Doc 485-1405283 Ver. 1. Submitted to Agnico Eagle mines Limited. June 2016.

NIRB (Nunavut Impact Review Board). 2019. Project Certificate [No.: 006]. February 26, 2019.

NWB (Nunavut Water Board). 2021. Amended Water Licence No: 2AM-MEL1631. June 23, 2021.

Tetra Tech. 2020. Meliadine Lake – Updated 3-D Modelling of the Discharge Assessment. November 12, 2020.

3 EFFLUENT QUALITY

3.1 Introduction

Agnico Eagle is permitted to discharge treated contact water to Meliadine Lake according to terms in the Amended Type A Water Licence (2AM-MEL1631; **Table 3-1**). Effluent must not be acutely toxic to Rainbow Trout (*Oncorhynchus mykiss*) or zooplankton (*Daphnia magna*). The final discharge point for treated contact water (effluent) is Mel-14. Water from MEL-14 is collected for chemistry and toxicity testing specified under MDMER and the Type A Amended Water Licence after being treated at the Effluent Water Treatment Plant (EWTP). The first receiving environment station is MEL-13, located at directly above the diffuser within the mixing zone in MEL-01[3]. MEL-13 is sampled in compliance with MDMER and Water Licence reporting. Discharge volumes to Meliadine Lake, effluent chemistry data from MEL-14, toxicity test results from MEL-14, and loadings estimates are reported quarterly by Agnico Eagle to the Minister of the Environment as per MDMER (Section 21 and Section 22; Government of Canada, 2022). These results are presented below.

3.2 Objectives and Key Questions

The objective of the effluent characterization program is to ensure that water discharged to Meliadine Lake is not harmful to aquatic life. The following topics are discussed in this section of the report:

- Effluent Chemistry at the final discharge point (MEL-14).
- Toxicity Test Results.
- Effluent mixing in the near-field (NF).

The discharge data, coupled with effluent chemistry and toxicity testing results from MEL-14, provide context when assessing changes in water quality in Meliadine Lake.

3.3 Effluent Chemistry

Water from MEL-14 was sampled approximately weekly between July 14th and October 11th. In total, 17 samples were submitted for chemistry and screened against the effluent limits of the Water Licence (2AM-MEL1631). Summary statistics and individual sample results are provided in **Appendix B1**. Key findings from the 2021 effluent chemistry data that are relevant for the Meliadine Lake water quality assessment are:

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[3] The diffuser is located at N 6,989,147.41 and E 542,797.91(UTM NAD83 Zone 15).

- No exceedances of effluent limits were reported in 2021.
- Total dissolved solids (TDS) concentrations were below the authorized limit of 3,500 mg/L in 2021. At the onset of discharge in mid-July, TDS concentrations were in the 1,000 mg/L range. Concentrations trended higher throughout the discharge period, peaking at 2,260 mg/L on October 3rd (**Table 3-2**).
- Chloride, sodium, calcium, and sulphate are the dominant constituent ions that comprise TDS[4] (**Figure 3-1**). Chloride makes up the majority of TDS at between 40% and 46% followed by sodium, calcium, and sulphate. The relative contribution of chloride in effluent samples from MEL-14 is consistent with findings reported by Golder in 2020 and well below the 60% threshold that would trigger development of a site-specific water quality objective (SSWQO) under the *Adaptive Management Plan for Water Management* (Agnico Eagle, 2021).

Table 3-1 Limits for Effluent (MEL-14) specified in the Type A Amended Water Licence (2AM-MEL1631).

Parameter	Units	Maximum Average Concentration	Maximum Concentration in a Grab Sample
Conventional Parameters			
pH [a]	-	6.0 | 9.5	6.0 | 9.5
Total Dissolved Solids (calculated) [b]	mg/L	3,500	4,500
Total Suspended Solids [a]	mg/L	15	30
Nutrients			
Total Phosphorus [c]	mg/L	2	4
Total Ammonia [c]	mg/L	14	18
Metals			
Total Aluminum [c]	mg/L	2	3
Total Arsenic	mg/L	0.3	0.6
Total Copper [d]	mg/L	0.2	0.4
Total Nickel [a]	mg/L	0.5	1
Total Lead [a]	mg/L	0.1	0.2
Total Zinc [d]	mg/L	0.4	0.8
Other Parameters			
Total Cyanide	mg/L	0.5	1
Total Petroleum Hydrocarbons [c]	mg/L	5	5

Notes:
All concentrations are total values (i.e., unfiltered).
[a] Adopted from Metal and Diamond Mining Effluent Regulations (Government of Canada, 2022).
[b] Increased limits for TDS in 2020 as per the Amendment Water Licence (NWB, 2020).
[c] Not a parameter included in MDMER Schedule 4 (authorized limits of deleterious substances).

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[4] Refer to Golder (2020) for a thorough review of measured vs calculated TDS.

[d] Limit for the Water Licence is lower than authorized limits in MDMER.

Table 3-2. Total dissolved solids and chloride concentrations in MEL-14 samples from 2021.

		Chloride	Calculated TDS		Measured TDS	
Month	**Date**	**mg/L**	**mg/L**	**% Cl**	**mg/L**	**% Cl**
July	7/14/2021	390	890	44%	990	39%
	7/18/2021	400	900	44%	995	40%
	7/25/2021	450	1000	45%	1180	38%
August	8/1/2021	480	1100	44%	1230	39%
	8/6/2021	530	1200	44%	1250	42%
	8/10/2021	530	1200	44%	1480	36%
	8/16/2021	530	1200	44%	1380	38%
	8/22/2021	590	1400	42%	1520	39%
	8/29/2021	670	1600	42%	1730	39%
September	9/5/2021	630	1500	42%	1670	38%
	9/12/2021	640	1600	40%	1540	42%
	9/19/2021	770	1800	43%	1820	42%
	9/20/2021	780	1800	43%	2020	39%
	9/27/2021	810	1900	43%	2110	38%
October	10/3/2021	920	2000	46%	2260	41%
	10/5/2021	840	2000	42%	2020	42%
	10/11/2021	840	1900	44%	2140	39%

Figure 3-1. Total dissolved solids and constituent ions in end-of-pipe effluent at MEL-14, 2018-2021.

Notes: The limit for TDS in the Amended Type A Water Licence applies to calculated TDS. Prior to 2020, calculated TDS was not reported by the lab.

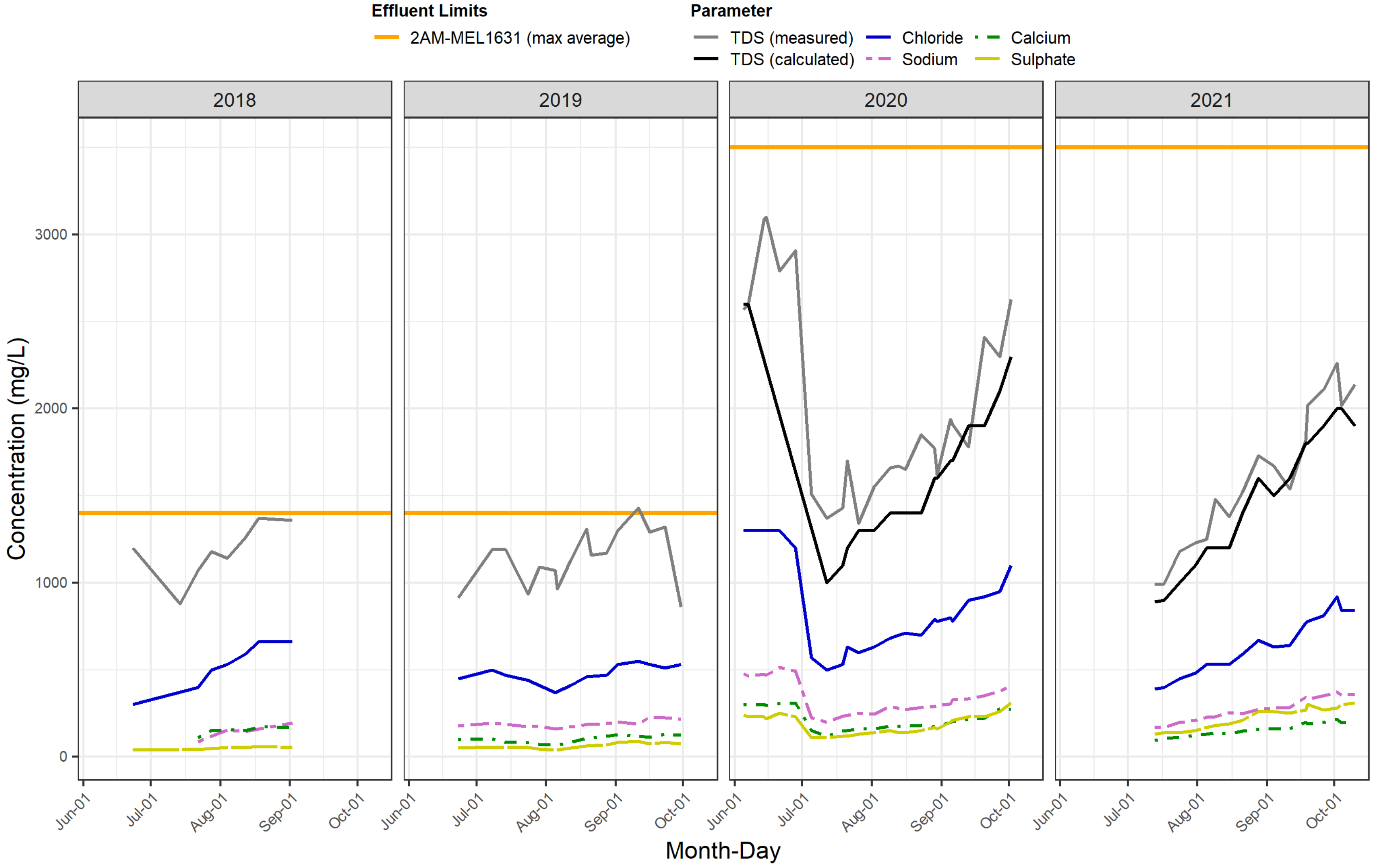


Figure 3-2. Concentrations of selected nutrients in end-of-pipe effluent at MEL-14, 2018-2021.

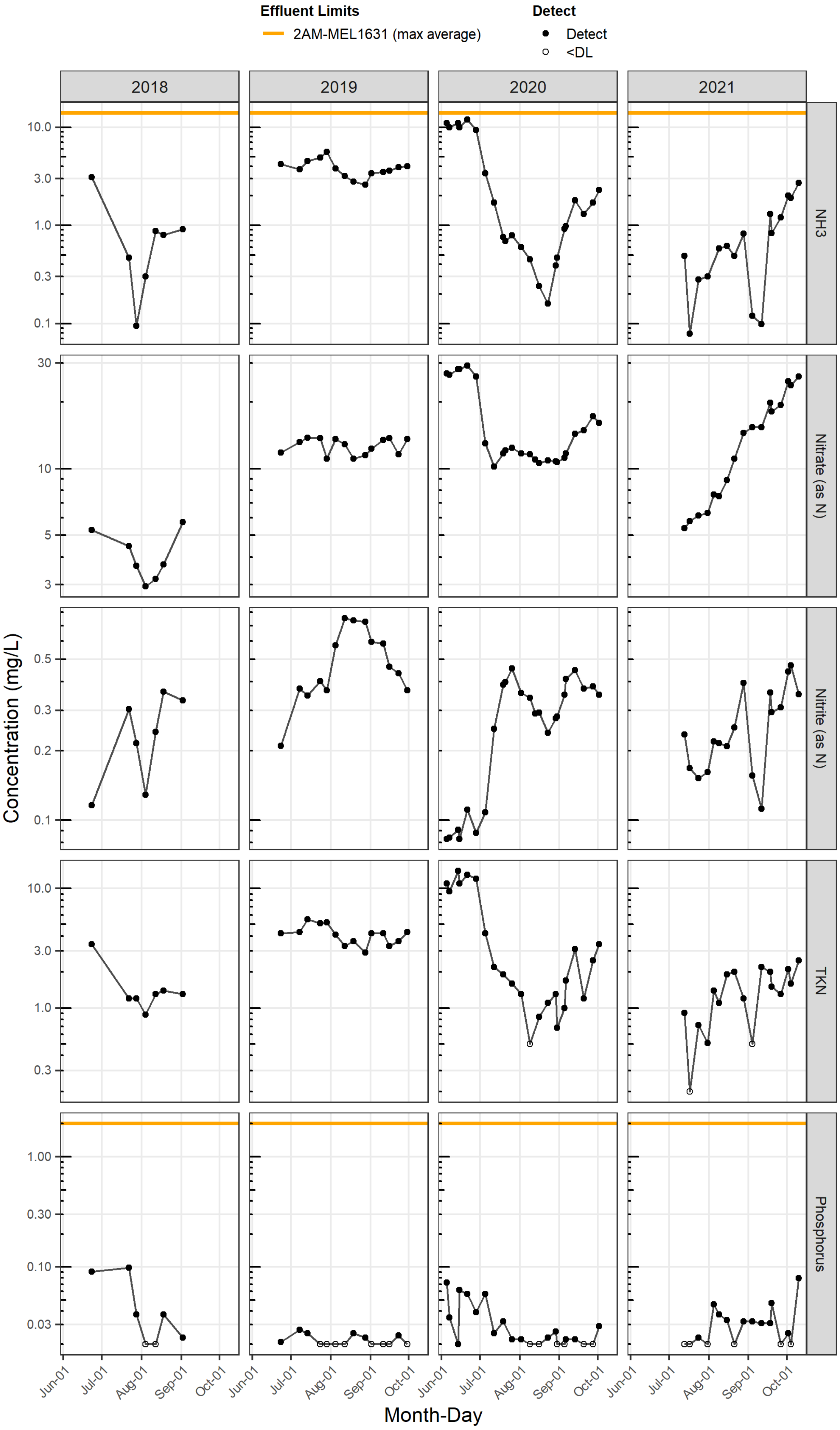
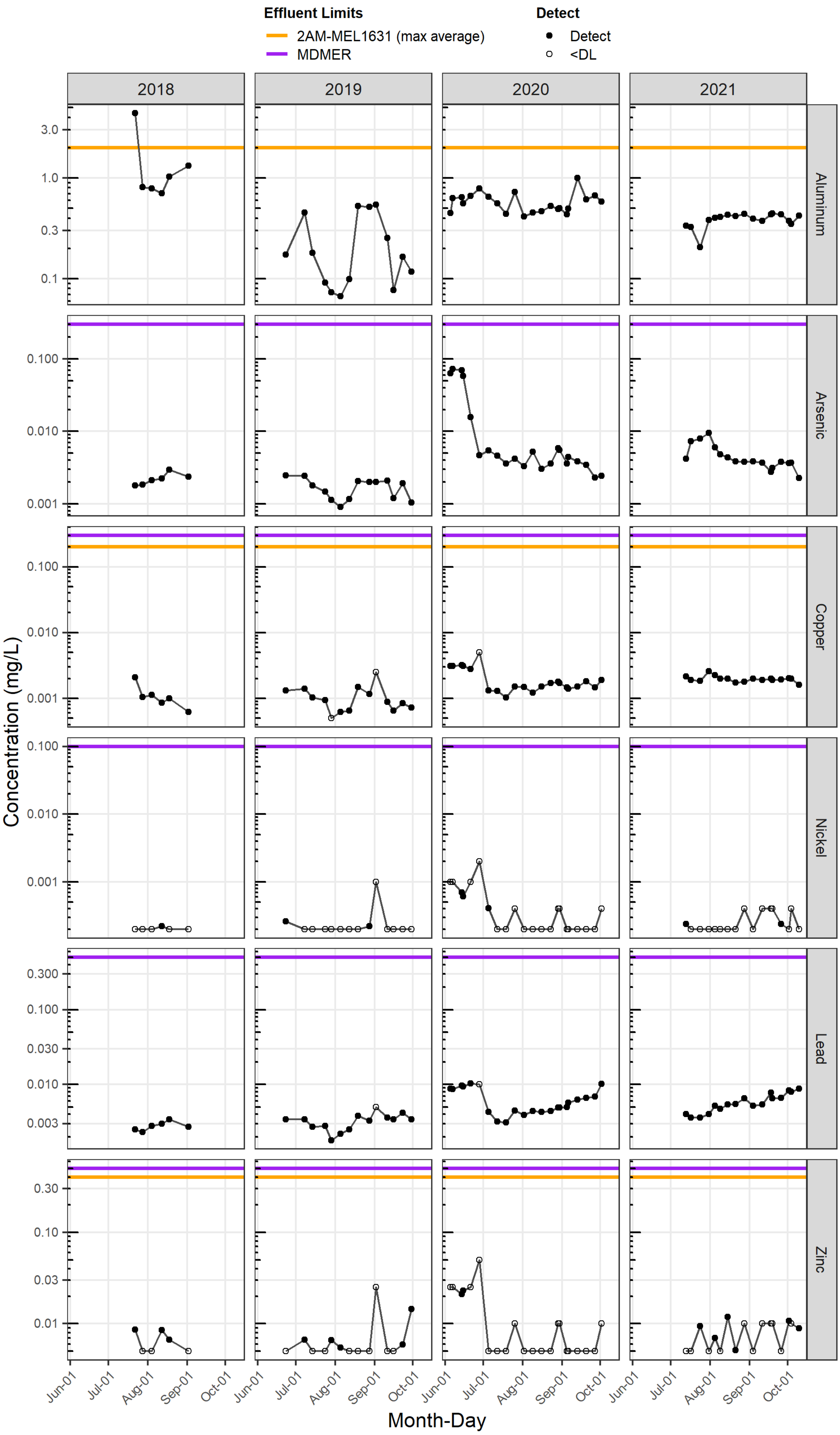


Figure 3-3. **Concentrations of selected metals in samples collected at MEL-14 during the open-water discharge period, 2018-2021.**



3.4 Effluent Mixing in the Receiving Environment

Treated contact water (effluent) from CP1 is discharged to Meliadine Lake through the permanent diffuser that was installed in August 2017. The diffuser is approximately 30 m in length, 40 cm in diameter, and sits 2 m above the lake bed in approximately 11 m of water. Effluent is released through 10 x 5 cm diameter ports spaced evenly every 3 m along the length of the diffuser (Tetra Tech, 2020).

An effluent plume survey was conducted in the NF area MEL-01 as part of the Cycle 2 EEM to describe effluent mixing within the exposure area. The survey was conducted using field conductivity as the tracer, which was previously shown to be a reliable method for estimating the spatial extent of effluent in Meliadine Lake (Golder, 2019; Golder, 2020). Specific conductivity, depth, and temperature were recorded from surface to within 1 m of the sediment using a SonTek Castaway© - CTD (Xylem Inc) at 103 locations in the MEL-01 study area on 29 August 2021 (locations are shown in **Figure 3-4**). Specific conductance in effluent from MEL-14 was 2,849 µS/cm to 2,851 µS/cm in triplicate samples collected on the same day as the field survey. Background conductivity in Meliadine Lake was measured at MEL-03 during AEMP water sampling on August 7th.

Percent effluent concentration at each location was calculated using the formula:

$$K_x = \frac{K_L \times (100 - x) + (K_e \times x)}{100}$$

Where:
K_X=specific conductance of solution containing x% effluent,
K_L= reference area conductivity (75 µS/cm), and
K_e= specific conductance of the effluent at MEL-14 (2,850 µS/cm).

To solve for percent effluent (x) at each location, the equation is rearranged as follows:

$$x = \frac{(K_x - K_L)}{(K_e - K_L)} \times 100$$

The spatial extent of effluent concentrations in the NF area is shown in **Figure 3-4**. Plots of selected casts where the percent effluent was greater than 2% are shown in **Figure 3-5**. Summary data (min, max, average) for specific conductivity and temperature at each location are provided in **Table B1-4**.

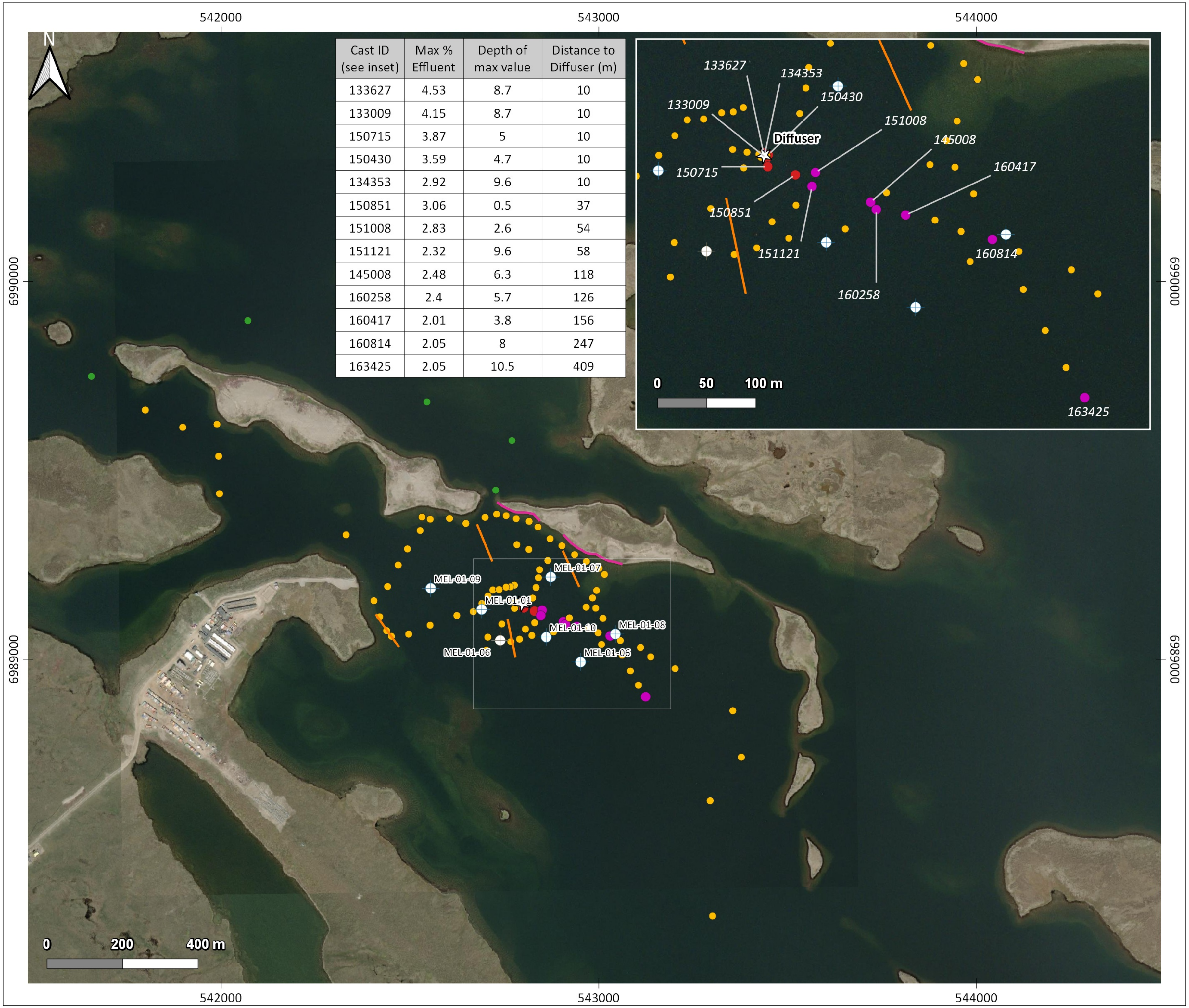
The 1% effluent zone extended throughout the NF study area, including the area along the esker where minnow traps were set to collect Threespine Stickleback and the AEMP sampling locations for water/phytoplankton and sediment/benthic invertebrate community. The plume was detected at less than 1% north of the esker and approximately 1,300 m to the northwest. The spatial extent of effluent in the east basin aligns with predicted changes in water quality in the most recent model of the discharge to Meliadine Lake (Tetra Tech, 2020).

Effluent was generally completely or nearly completely mixed vertically in most of the profiles taken in the near-field area beyond the edge of the mixing zone. The plume was detected at a few locations predominantly southeast of the diffuser (**Figure 3-4**). The prevailing wind direction was from the NW during the August field program, and the direction of travel is consistent with this pattern of mixing in the east basin. Maximum conductivity readings were recorded at various depths, depending on the distance from the diffuser. As expected, the highest conductivity readings were measured in profiles taken close to the diffuser and near the bottom of the lake. The plume showed neutral buoyancy in the profiles taken between 100 m and 150 m to the SE of the diffuser. Farther to the SE at 250 m and 400 m, the plume was detected closer to the sediment (**Figure 3-5**).

Figure 3-4
Effluent concentrations in the near-field area of Meliadine Lake on August 29, 2021

2021 Aquatic Effects Monitoring Program
Annual Report

AZIMUTH



Cast ID (see inset)	Max % Effluent	Depth of max value	Distance to Diffuser (m)
133627	4.53	8.7	10
133009	4.15	8.7	10
150715	3.87	5	10
150430	3.59	4.7	10
134353	2.92	9.6	10
150851	3.06	0.5	37
151008	2.83	2.6	54
151121	2.32	9.6	58
145008	2.48	6.3	118
160258	2.4	5.7	126
160417	2.01	3.8	156
160814	2.05	8	247
163425	2.05	10.5	409

Date:	February 21, 2022
Datum:	NAD 83 UTM Zone 15N
Scale:	1:13,000 (inset 1:5,00)
Software:	QGIS version 3.16.0-Hannover
Produced by:	E. Franz; J. Ellenor

REFERENCES:
1. Basemap imagery from Google
2. Lake extents from NRCan
3. Plume delineation data collected by Azimuth and C. Portt

Legend

☆ Diffuser

— 2021 Gill net sets

— 2021 Minnow trap areas

⊕ AEMP Stations

⊕ MEL-01-06 sediment/benthos (relocated in 2021)

Sp. Conductivity (µS/cm) percent above background (75 µS/cm)

● < 1%

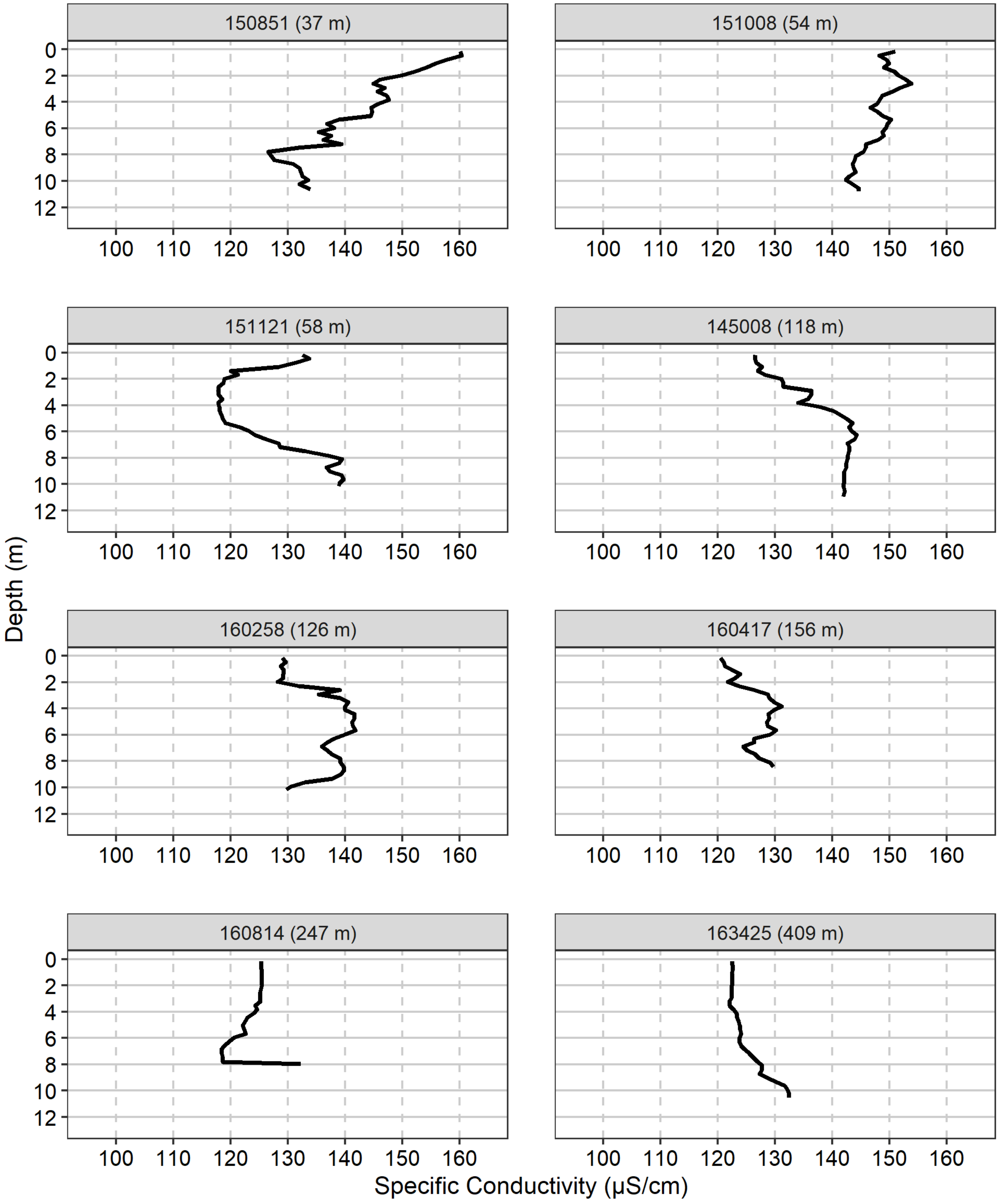
● 1 - 2%

● 2 - 3%

● 3 - 5%

Figure 3-5. Selected profiles where % effluent was greater than 2% beyond the edge of the mixing zone.

Notes: Cast IDs and distance from the diffuser shown in the banner for each profile.



3.5 Effluent Toxicity Testing

Acute and sublethal toxicity testing on effluent from MEL-14 was conducted in 2021 according to the scope of the toxicity testing program carried out in 2020. The expanded toxicity testing program was one of the conditions of the Emergency Amendment to discharge water from CP1 to Meliadine Lake with TDS concentrations of up to 3,500 mg/L. The study design was developed in consultation with stakeholders and formally presented in the *Water Quality Management and Optimization Plan* (Golder, 2020). The scope of the expanded toxicity testing program included more frequent acute toxicity testing with the standard test species (Rainbow Trout and *Daphnia magna*) and a suite of sublethal tests on fish, aquatic invertebrates, and aquatic plants with effluent and receiving environment samples from Meliadine Lake. The purpose of the program was to validate higher concentrations of TDS in effluent are not acutely toxic and that TDS concentrations at the edge of the mixing zone, 100 m from the diffuser, are not associated with chronic effects to aquatic life.

3.5.1 Acute Toxicity Testing

Weekly acute toxicity tests with Rainbow Trout (96-hr survival) and *D. magna* (48-hr survival) were conducted between July 18th and October 11th, coinciding with discharge to Meliadine Lake. Testing was done by Bureau Veritas in Burnaby, BC according to standard test methods in the MDMER.

The 2021 test results are presented in **Table 3-3** along with the TDS and chloride concentrations measured in each sample. Water from MEL-14 was not acutely toxic to Rainbow Trout or *D. magna* in any of the 13 tests conducted in 2021. These findings add to the multi-year dataset that shows effluent discharged to Meliadine Lake does not pose a direct risk to fish or invertebrate survival.

Table 3-3. Acute toxicity test results for MEL-14 in 2021.

Date	TDS (measured, mg/L)	Chloride (mg/L)	Rainbow Trout	*D. magna*
			LC50	LC50
18-Jul-21	995	400	> 100	> 100
25-Jul-21	1,180	450	> 100	> 100
1-Aug-21	1,230	480	> 100	> 100
10-Aug-21	1,480	530	> 100	> 100
16-Aug-21	1,380	530	> 100	> 100
22-Aug-21	1,520	590	> 100	> 100
29-Aug-21	1,730	670	> 100	> 100
5-Sep-21	1,670	630	> 100	> 100
12-Sep-21	1,540	640	> 100	> 100
20-Sep-21	2,020	780	> 100	> 100
27-Sep-21	2,110	810	> 100	> 100
3-Oct-21	2,260	920	> 100	> 100
11-Oct-21	2,140	840	> 100	> 100

Notes:
LC50 = concentration that causes a 50% reduction in survival.

3.5.2 Chronic (Sublethal) Toxicity Testing

The purpose of sublethal toxicity testing is to provide an estimate of the potential effects on biological components (phytoplankton, zooplankton, benthic invertebrates, fish, macrophytes) in aquatic environments receiving mine effluent regardless of whether these receptor groups are being directly monitored in the field (Environment Canada, 2012). MDMER specifies the frequency of testing and methods/species to use when evaluating potential sublethal effects to aquatic life. mines that demonstrate effluent is not causing sublethal effects in the standard tests are allowed to focus the sublethal tests on the most sensitive species rather than conduct tests on fish, aquatic invertebrates, and primary producers[5]. In 2019, Environment and Climate Change Canada (ECCC) agreed that future sublethal toxicity testing only needed to be conducted on *L. minor*, the species with the lowest IC25. However, as a condition of the Emergency Amendment to discharge water with higher TDS concentrations in 2020, ECCC and the KivIA requested that the full complement of sublethal tests be completed as part of the verification sampling under the WQ-MOP. In addition to 7-d *L. minor* test for effects to growth, full strength effluent tests were conducted on Fathead Minnow (7-d survival and growth), the epibenthic invertebrate *Hyalella azteca* (14-d survival and growth), and the pelagic zooplankton species *Daphnia magna* (21-d survival and reproduction).

Two rounds of toxicity tests were completed in 2021. The first event was completed on water collected on August 18th. The second test was conducted on water collected on September 20th. The tests were conducted at Bureau Veritas' facility in Burnaby, BC. Sublethal toxicity test results are provided in **Table 3-4** and summarized below. A complete record of sublethal toxicity test results since the start of discharge from CP1 to Meliadine Lake in 2018 are provided in **Appendix B1**.

Lemna minor (7-day growth)

This 7-day test measures growth inhibition in the form of reduced frond yield and dry weight biomass. Prior to the 2019 AEMP, representatives with ECCC were consulted on their interpretation of the most sensitive species for sublethal testing for effluent discharged to Meliadine Lake. Sublethal toxicity tests performed in 2018 indicated *L. minor* was more sensitive to effluent from MEL-14 than the other standard test species. ECCC agreed to this interpretation of the data, and since 2019 *L. minor* has been the species used to evaluate end-of-pipe effluent quality for the Action Level Assessment (described below).

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[5] Schedule 5, subsection 6(3): "After three years, the tests shall be conducted once per calendar quarter on the species referred to in subsection 5(1) or (2), as the case may be, whose results for all the tests conducted in accordance with subsections (1) and (2) — including such tests conducted in addition to the number required by those subsections — produce the lowest geometric mean, taking into account the inhibition concentration that produces a 25% effect or an effective concentration of 25%."

Fewer fronds (leaves) were produced relative to the control treatments in the August and September tests. The concentration of effluent that caused a 25% reduction number of fronds (IC25) was 61% in August (95th CI = 34.5 to 80.7) and 44% in September (95th CI = 28.9 to 60.9). The corresponding IC25 values for chloride and TDS are shown in **Table 3-5** along with the results from previous tests where effects were observed in less than full strength effluent. Reductions to *L. minor* frond yield have occurred in full-strength effluent with TDS concentrations as low as 1,140 mg/L, but as shown in **Figure 3-6**, the dose-response relationship is highly variable. For example, in 2020, there was no impairment to *L. minor* frond yield at TDS concentrations between 1,400 mg/L and 1,850 mg/L. Based on the past two years of sublethal test results, which are representative of current effluent quality, effects to frond yield may occur when TDS and chloride concentrations exceed 1,300 mg/L and 500 mg/L, respectively.

Table 3-4. Sublethal toxicity test results for MEL-14 in August and September, 2021.

Test	Month	August	September
	Collection Date	8/16/2021	9/20/2021
	MEL-14 TDS (measured, mg/L)	1,380	2,020
	MEL-14 Chloride (mg/L)	530	780
Lemna minor	Biomass (IC25)	>97 (72.8, N/A)	>97
	Frond Increase (IC25)	60.7 (34.5, 80.7)	44.0 (28.9, 60.9)
Hyalella azteca	Survival (LC50)	>100	>100
	Growth (IC25)	>100	>100
Daphnia magna	Survival (LC50)	100	Invalid
	Growth (IC25)	100	
	Reproduction (IC25)	49.5 (8.6, >100)	
Fathead Minnow UV Treated	Survival (LC50)	>100	>100
	Growth (IC25)	>100	>100
Fathead Minnow Untreated	Survival (LC50)	>100	3.1 (2.5, 3.8)
	Growth (IC25)	86.8 (41.7, N/A)	1.56 (<1.56, 2.3)

Notes:
IC25/LC50 = effluent concentrations corresponding to a 25% effect to sublethal endpoints and 50% mortality.
N/A = upper 95th confidence interval not calculated (i.e., >100% effluent).

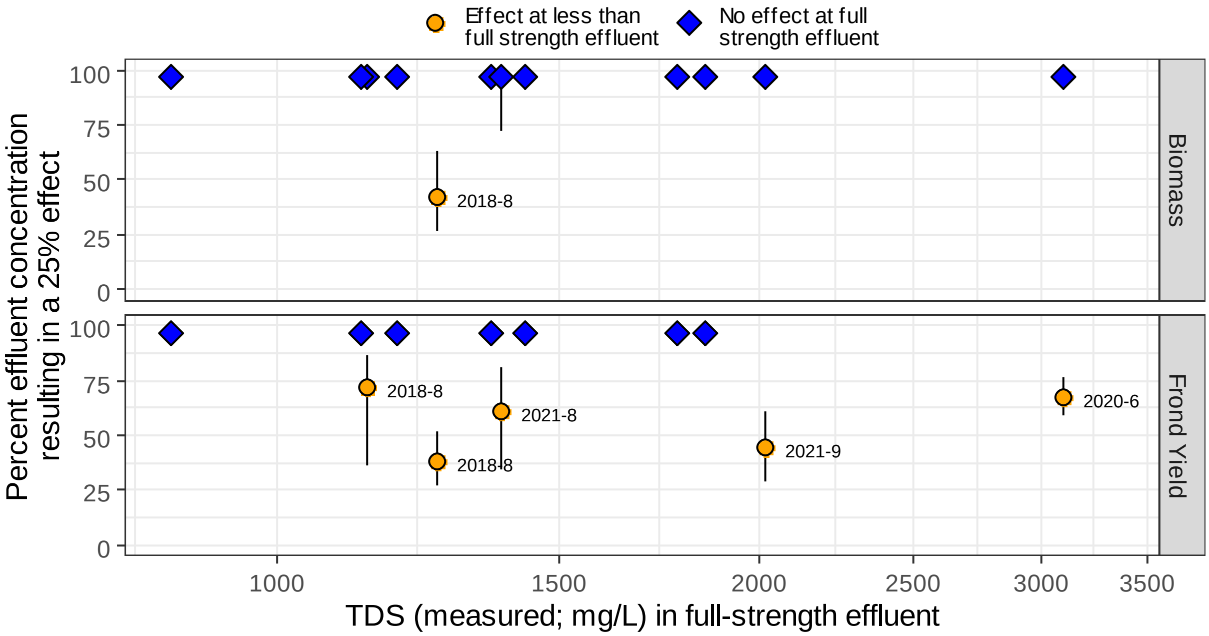
Table 3-5. IC25 for TDS and chloride corresponding to a 25% reduction in *Lemna minor* frond yield.

Date	Full strength effluent IC25 (frond yield) [a]	Chloride		TDS (Measured)	
		Concentration	IC25[b]	Concentration	IC25[b]
7-Aug-18	72.3 (36.4-86.5)	530	382	1,140	824
13-Aug-18	38.2 (26.6-52.1)	590	224	1,260	481
15-Jun-20	67.2 (58.9-76.4)	1,300	871	3,100	2,083
16-Aug-21	60.7 (34.5-80.7)	530	323	1,380	838
20-Sep-21	44.0 (28.9-60.9)	780	343	2,020	889

Notes:
[a] Mean IC25 and 95% confidence interval in parentheses.
[b] IC25 for chloride and TDS = concentration * mean IC25 value for frond yield.

Figure 3-6. ***Lemna minor*** **sublethal toxicity test results compared to measured concentrations of TDS in effluent from MEL-14.**

Notes: The vertical bars represent the 95th percent confidence interval for samples where effects to biomass or frond yield were observed at less than full strength effluent. Labels indicate the year and month of the test.



Hyalella azteca (14-d survival and growth)

This epibenthic invertebrate is not a standard test species for evaluating chronic effluent toxicity. It was included in the suite of toxicity tests in 2020 because it is a well-studied and sensitive species for monitoring effluent quality (Golder, 2020). No effects to survival or growth were documented in 2021 or 2020.

Daphnia magna (21-d survival and reproduction)

Sublethal testing was carried out using *D. magna* rather than the standard test species *Ceriodaphia dubia* (7-day survival and reproduction) based on recommendations put forward by stakeholders during the consultations held for the Emergency Amendment Application. *D. magna* is endemic to Meliadine Lake and a more representative species for evaluating effects of effluent to aquatic invertebrates in the water column.

No effect to survival or growth were observed in the 21-d test in August, but a 25% reduction in reproduction (# of neonates) was observed relative to the laboratory control treatment. The corresponding effect concentration (IC25) for this test was 49.5% effluent (v/v). Results from the test conducted in September were considered invalid due to low reproduction in the laboratory control treatment.

The August results suggest that exposure to full-strength effluent (MEL-14) caused a reduction in reproduction in *D. magna*. However, a closer look at the pattern of results from the last two years suggests that broader differences between all project samples (i.e., effluent, mixing zone or Meliadine Lake) and the laboratory controls, rather than effluent chemistry, are responsible for the observed response. This is supported by the following information:

- The August 2021 dilution series results showed little change in mean reproduction from 100% to 12.5% effluent concentration. Mean reproduction was 70.4 neonates (100%), 69.8 (50%), 72.1 (25%), and 72.9 (12.5%). Thus, there was no meaningful increase in reproduction in the 12.5% ion despite an 8-fold dilution of effluent. In contrast, mean reproduction was 84.6 in the 6.25% sample and 94.7 in the laboratory control (0% effluent).
- The 2020 testing program included samples collected at the end-of-pipe (MEL-14), the edge of the mixing zone (MEL-13 series) as well as mid-field (MF) and far-field (FF) stations in Meliadine Lake (MF area MEL-02 and FF areas MEL-03, MEL-04 and MEL-05). Samples were collected at all these areas in July, August, and September. Mean reproduction results for these events are provided in **Table 3-6**.

Table 3-6. Average number of neonates from the 21-day *Daphnia magna* tests in 2020.

Area	Sample	July	August	September
Effluent	MEL-14	50.4	49.8	35.1
Near-field[a] (Mixing zone)	MEL-13-01	43.2	58.8	55.0
	MEL-13-07	46.2	65.6	54.2
	MEL-13-10	26.7	57.4	69.8
Mid-Field	MEL-02	35.1	55.0	63.4
Reference	MEL-03	37.0	56.6	73.9
	MEL-04	34.4	33.9	72.0
	MEL-05	31.5	41.7	82

Notes:
[a] MEL-13 stations are equivalent to the MEL-01 stations sampled for the Meliadine Lake water quality component of the AEMP.

If effluent toxicity was responsible for the apparent reduction in neonates, the lowest reproductive output would be expected at MEL-14, with reproduction increasing in samples farther away from the source. As shown above, the 2020 results show variable reproduction in water collected from MEL-14, the edge of the mixing zone, the MF area, and the reference areas.

Collectively, these results do not support effluent toxicity as the cause of lower reproduction in the samples tested in either 2020 or 2021. Rather, they suggest a possible limitation in key nutrients or essential elements relative to the laboratory control water. Consequently, this endpoint is not considered suitable for further use tracking potential chronic effluent toxicity.

Fathead Minnow (*Pimephales promelas*; 7-d larval growth and survival)

Fathead Minnow is one of two standard test species specified in the MDMER for assessing effects of effluent on fish (the other species is Rainbow Trout). Fathead Minnow was included in the sublethal testing program in 2018 and included in the expanded toxicity testing program in 2020. One of the challenges with the Fathead Minnow test is controlling for sporadic mortality caused by pathogens such as fungi and bacteria that can confound the assessment of effluent-related effects (USEPA, 2002). This phenomenon is well document for this test species and was observed during the initial round of tests conducted in 2020 (Golder, 2020). To control for the confounding effect of pathogen-induced mortality, fish in one set of replicate treatments were exposed to water from MEL-14 that was pretreated with ultra-violet (UV) light. A second treatment was run with Fathead Minnow exposed to non-UV treated water. UV treatment is one of the approaches recommended by the US EPA (2002) to control for the confounding effect sporadic mortality cause by fungi and bacteria.

Sporadic mortality was observed in the August and September tests on non-UV treated effluent in 2021. The lab technicians noted that dead Fathead Minnow larvae had a “fuzzy” appearance, a hallmark of pathogen-induced mortality. No effects to survival or growth were observed in the August and September tests when MEL-14 water was pre-treated with UV light to remove pathogens. The 2021 Fathead Minnow results on full strength effluent demonstrate that fish inhabiting the NF area of Meliadine Lake are at low risk of impaired growth or survival where effluent concentrations are between 1% and 2% beyond the 100 m mixing zone.

3.6 Loadings to Meliadine Lake

Loadings from CP1 to Meliadine Lake are calculated monthly (during discharge months) as per Part 2, Division 2, Section 20 of the MDMER (Government of Canada, 2022). Monthly loadings are calculated according to the following equation:

$$ML = \frac{(C \times V)}{1{,}000}$$

Where:
ML = monthly loading in kg,
C = monthly mean concentration of parameters measured in MEL-14 samples in mg/L, and
V = is the total monthly volume of water discharged to Meliadine Lake from CP1 in m^3.

Monthly and cumulative loadings are provided in **Appendix B2** going back to 2018. Daily discharge data and monthly mean concentrations in MEL-14 samples are also shown for each parameter to put the monthly and cumulative loadings in context. A high-level overview of the loadings information is provided below, but the results for individual parameters of interest are discussed in greater detail within Meliadine Lake water quality section and, in the case of nutrients, the phytoplankton community section.

TDS and constituent ions loadings in 2021 were comparable to 2020; however, loadings were more evenly distributed throughout the discharge period in 2021, unlike in 2020 when most of the annual loading to Meliadine Lake occurred over the initial six-week period of discharge from early June to mid-July. Loadings to Meliadine Lake were lower for several parameters of interest in 2021, including arsenic (**Figure B2-19**), manganese (**Figure B2-31**), and strontium (**Figure B2-38**). Not all metals saw a decrease in loadings in 2021 compared to 2020. Of the parameters with effects-based thresholds, annual loadings of copper, nickel, molybdenum, selenium, and uranium were approximately equal to, or slightly higher than loadings observed in 2020. Understanding the magnitude and timing of loadings to Meliadine Lake is important when determining the cause of changes in water quality.

3.7 Conclusions and Recommendations

- There were no exceedances in 2021 of limits specified in the Water Licence.
- Water discharged to Meliadine Lake was not acutely toxic to fish or aquatic invertebrates in 13 separate weekly tests. TDS concentrations ranged from 990 mg/L to 2,260 mg/L.
- Two rounds of sublethal toxicity testing in August and September confirm that effluent discharged to Meliadine Lake does not pose a risk to growth and survival for fish and aquatic invertebrates.
- Minor impairment to *L. minor* frond yield was observed in the August and September sublethal tests. Effects to frond yield were evident when TDS concentrations were between 840 and 880 mg/L. No impairment to *L. minor* biomass was observed in the August or September tests. Biomass is another metric for evaluating the effects of effluent on aquatic plant growth. Considering the discharge water has not elicited a biomass response in *L. minor* at full strength and is rapidly diluted in the mixing zone, potential effects to primary producers in Meliadine Lake are unlikely.
- Effluent was well-mixed throughout most of the NF study area as indicated by uniform conductivity readings from near the surface to near the sediment. Effluent was detected at concentrations above 1% throughout most of the MEL-01 study area in late August. Concentrations below 1% were observed north of the esker and 1,300 m downstream of the diffuser towards the narrows. Effluent concentrations between 2% and 3% were noted as far as 400 m southeast of the diffuser. The plume appeared to travel in a relatively narrow path. Prevailing northwesterly winds in late August were likely a major factor influencing the dispersal of the plume. These findings align with predictions in the most recent discharge model (Tetra Tech, 2020).

Recommendations

Monthly sublethal toxicity testing is recommended on *Lemna minor* as the most sensitive species for evaluating the potential chronic effects to aquatic life from exposure to surface contact water in 2022. Sublethal testing with Fathead Minnow, *D. magna*, and *H. azteca* is not required under MDMER in 2022 based on the absence of sublethal effects in 2020 and 2021. Sublethal toxicity testing on one species is allowed under Schedule 5, subsection 6(3) of the MDMER:

> *After three years, the frequency of sublethal testing can be reduced to once per calendar quarter using the most sensitive species listed in subsection 5(1). The most sensitive species is the species that shows an effect (e.g., growth, survival) at the lowest effluent concentration.*

If the low action level for end-of-pipe toxicity is reached in future AEMP cycles, additional investigations may be undertaken, which may include increased frequency of testing to confirm the effect, assessing the spatial extent of the effect within the mixing zone in MEL-01 (similar to the WQ-MOP study), or if necessary, other targeted investigations to identify the underlying cause of the effect (e.g., toxicity identification evaluation testing).

3.8 References

Agnico Eagle. 2021. Adaptive Management Plan for Water Management. Version 1. February 2021.

Environment Canada. 2012. Metal Mining Technical Guidance Document for Environmental Effects Monitoring.

Golder. 2019. Cycle 1 Environmental Effects Monitoring Report and 2018 Aquatic Effects Monitoring Program Annual Report. Submitted to Agnico Eagle mines Ltd – Meliadine Gold mine. March 27, 2019.

Golder 2020. Water Quality Management and Optimization Plan. Progress Update Rev4. Phase 3: Meliadine mine Effluent Discharge Benchmarks for Total Dissolved Solids. Submitted to Agnico Eagle mines Ltd – Meliadine mine Operations. November 13, 2020.

Government of Canada. 2022. Metal and Diamond Mining Effluent Regulations. SOR/2002-222; current to 7 March, 2022.

Tetra Tech. 2020. Meliadine Lake – Updated 3-D Modelling of the Discharge Assessment. November 12, 2020.

US EPA. 2002. Method 1000.0: Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth; Chronic Toxicity. Office of Water. October 2002.

4 WATER QUALITY – MELIADINE LAKE

4.1 Introduction

This chapter presents findings of the 2021 water quality monitoring program in Meliadine Lake. Sampling areas and stations within each area are shown in **Figure 4-1**. The Meliadine Lake water sampling program is designed primarily to detect changes in water quality during the open-water season, coinciding with discharge of effluent from CP1. Samples are collected monthly in July, August, and September from the near-field around the diffuser (NF; MEL-01), the mid-field area (MF; MEL-02) located to the northwest, past the narrows, and Reference Area 1 (REF1; MEL-03). Two more reference areas (REF2; MEL-04 and REF3; MEL-05) are sampled in August to provide additional insight into spatial and temporal changes in water quality.

The open-water season in the region is short, typically from early to mid-June until the end of October. Because the open-water season is short, one winter (through-ice) sampling event is completed at the NF and MF exposure areas to assess the spatial extent of changes in water quality closer to the mine. Water samples are not collected from reference areas in the winter due to health and safety concerns associated with safely accessing these remote areas. This precludes a more formal assessment of mine-related vs natural changes in water quality during the prolonged ice-covered season.

4.2 Objectives and Key Questions

As identified in the AEMP Design Plan (Golder, 2016), the objectives of the Meliadine Lake water quality program are to:

- Determine if the Mine is causing changes to water quality in Meliadine Lake,
- Evaluate the accuracy of predicted changes in water quality,
- Assess whether mitigation measures are effective at reducing impacts to the aquatic environment, and
- Provide recommendations (as required) for follow-up monitoring or mitigation to lower the impact of mining-related activities on changes in water quality.

The approach to meeting these objectives centered around answering these key questions:

1. *Are concentrations of parameters in the effluent less than limits specified in the Water Licence?*

   Approach – This question was answered in **Section 3.3**. There were no exceedances of limits in the Water Licence in 2021.

2. *Has water quality in the exposure areas changed over time, relative to reference/baseline areas?*

   Approach – This question is answered using information from the normal range screening assessment and scatter plots showing spatial and temporal trends between and within the exposure and reference areas.

3. *Is water quality consistent with predictions outlined in the Final Environmental Impact Statement (FEIS) and less than AEMP Action Levels[6]?*

   Approach – This two-part question relies on information presented in the normal range assessment (i.e., is water quality similar to, or different from baseline) and water quality screening against the AEMP Action Levels (aka trigger values).

4.3 Findings from the 2021 Water Quality Program

- Water quality in Meliadine Lake is safe for aquatic life and for human health.
- Copper and zinc were naturally-elevated above their respective aquatic life guidelines in a few samples from the NF and reference areas in 2021.
- The concentrations of some parameters have increased in the east basin of Meliadine Lake compared to baseline and reference conditions. The timing broadly overlaps with mining activities for strontium, lithium, and uranium, but there is also evidence that natural factors have resulted in lake-wide changes for some parameters. For example, higher concentrations of arsenic and chloride in 2019 across much of Meliadine Lake coincide with an unusually high amount of rain in July and August that year.
- Current concentrations of TDS and chloride in the east basin of Meliadine are below predictions in the FEIS (Agnico Eagle, 2014) and the more recent hydrodynamic model (Tetra Tech, 2020).
- No management actions are required to address concerns with water quality as per the Low Action Level assessment and AEMP Response Framework. The scope of the 2022 AEMP will continue to track changes in water quality in Meliadine Lake according to the AEMP Design Plan.

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[6] AEMP Action Levels refer to 75% of the AEMP Benchmark for a given parameter. The AEMP Benchmarks correspond to the lowest water quality guideline for protection of aquatic life and human health, or site-specific water quality objectives in the case of fluoride, arsenic, and iron. AEMP Action Levels and Benchmarks for the Meliadine Lake AEMP are listed in **Table C1-1**.

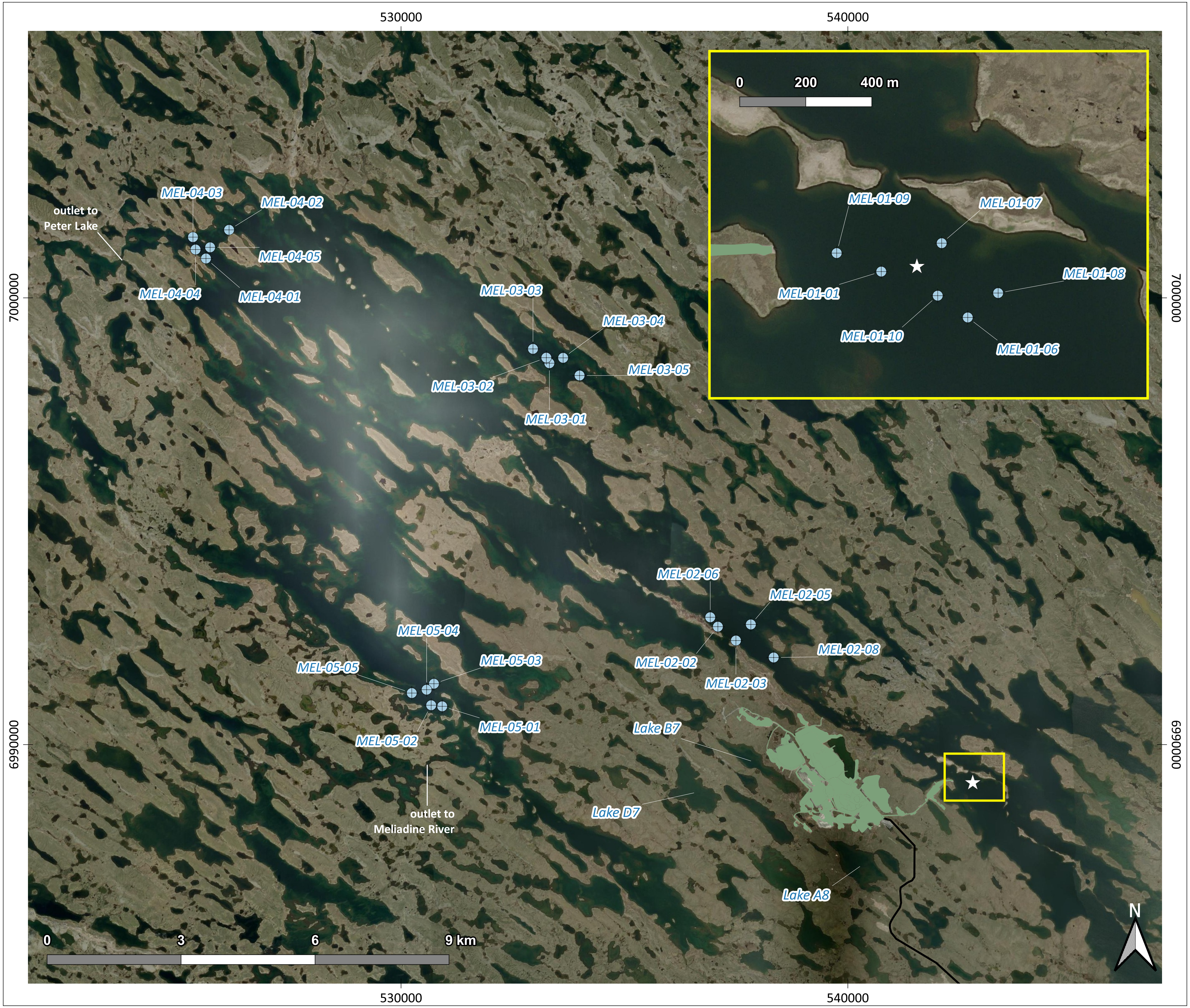


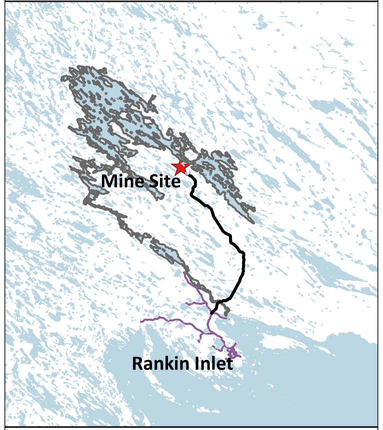
Figure 4-1

Meliadine Lake Water Quality Sampling Stations

2021 Aquatic Effects Monitoring Program
Annual Report

Date:	March 1, 2022
Datum:	NAD 83 UTM Zone 15N
Scale:	1:120,000 ; inset =1:15,000
Software:	QGIS version 3.16.0-Hannover
Produced by:	E. Franz

REFERENCES:
1. Basemap imagery from Google
2. Mine Plan provided by Agnico Eagle
3. Roads and waterbodies from NRC



Legend

—	All weather access road
🟩	Meliadine Mine (2021)
☆	Diffuser
⊕	Water Quality Station

4.4 Methods

4.4.1 Study Areas

Water sampling for the 2021 program was carried out according to schedule in the AEMP Design Plan and recommendations in the 2020 AEMP report (Azimuth, 2021).

- Winter sampling event (March 12th and 15th): MEL-01 and MEL-02.
- July: MEL-01, MEL-02, and MEL-03.
- August: MEL-01, MEL-02, MEL-03, MEL-04, and MEL-05. Phytoplankton community sampling was conducted simultaneously at each station.
- September: MEL-01, MEL-02, and MEL-03.

Station-specific information (coordinates and depths) are provided in **Table 4-1**. The only notable change to the study design in 2021 involved adding MEL-01-10 to the list of stations sampled each month. MEL-01-10, together with MEL-01-01 and MEL-01-07, are positioned at the edge of the mixing zone. The distance between the diffuser and the sampling stations in the NF and MF areas is provided in **Table 4-2**.

4.4.2 Sample Collection

Limnology measurements (temperature, dissolved oxygen, pH, and specific conductivity) were taken at 1 m depth intervals from the surface to within approximately 1 m of the sediment. Water samples were collected from approximately mid-depth at each station (~4 to 5 m below the surface) using a Kemmerer grab sampler during the open-water sampling events or an electric submersible pump connected to a length of C-Flex (Cole Parmer) silicon tubing for the winter sampling event. Bottles for chemistry analysis were pre-labelled before going into the field and handled (i.e., preserved and filtered) according to specifications provided by ALS Environmental. The list of parameters included in the AEMP are provided in **Table 4-3**. Water for dissolved organic carbon, dissolved nutrients, and dissolved metals were filtered in the field using a syringe and 0.45 µm disc filter provided by ALS. A checklist is included with the field data sheet to verify the samples requiring filtration and to ensure preservation is handled correctly.

4.4.3 Laboratory Methods

Water quality samples for the AEMP are sent to ALS Environmental in Winnipeg, MB. The lab in Winnipeg arranges sample shipping to Edmonton, Vancouver, and Fort Collins, Colorado based on the analytical capabilities at these locations and the detection limits for the project. ALS is an analytical laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA).

Table 4-1. Meliadine Lake water sampling events in 2021.

Area	Station ID	Depth[a]	Easting	Northing	March	July	August	September
MEL-01 Near-field	MEL-01-01	9.4	542690	6989132	**March 12** LP, WQ	**July 18** LP, WQ	**August 14** LP, WQ, Phyto	**September 2** LP, WQ
	MEL-01-06	8.8	542952	6988993				
	MEL-01-07	7.7	542873	6989218				
	MEL-01-08	7.5	543044	6989067				
	MEL-01-09	7.1	542555	6989188				
	MEL-01-10	10.5	542861	6989059				
MEL-02 Mid-field	MEL-02-02	10.0	537093	6992642	**March 15** LP, WQ	**July 19** LP, WQ	**August 15** LP, WQ, Phyto	**September 2** LP, WQ
	MEL-02-03	9.8	537497	6992332				
	MEL-02-05	9.4	537831	6992692				
	MEL-02-06	10.2	536922	6992853				
	MEL-02-08	9.7	538342	6991952				
MEL-03 Reference Area 1	MEL-03-01	9.5	533321	6998540	Not sampled	**July 15** LP, WQ	**August 7** LP, WQ, Phyto	**September 5** LP, WQ, Phyto
	MEL-03-02	10.5	533253	6998664				
	MEL-03-03	10.5	532954	6998860				
	MEL-03-04	8.0	533629	6998660				
	MEL-03-05	8.1	533997	6998265				
MEL-04 Reference Area 2	MEL-04-01	8.3	525634	7000884	Not sampled	Not sampled	**August 6** LP, WQ, Phyto	Not sampled
	MEL-04-02	9.8	526151	7001525				
	MEL-04-03	10.7	525343	7001363				
	MEL-04-04	8.9	525401	7001085				
	MEL-04-05	8.5	525727	7001134				
MEL-05 Reference Area 3	MEL-05-01	9.6	530922	6990859	Not sampled	Not sampled	**August 10** LP, WQ, Phyto	Not sampled
	MEL-05-02	9.8	530675	6990883				
	MEL-05-03	8.6	530737	6991365				
	MEL-05-04	9.9	530573	6991231				
	MEL-05-05	10.5	530241	6991156				

Notes:
[a] Depth in meters; fixed monitoring location depths shown for the August 2021 sampling event.
LP = limnology profile (temperature, dissolved oxygen, pH, and specific conductivity).
WQ = water chemistry.
Phyto = phytoplankton community survey and chlorophyll-a.

Table 4-2. Distance between the diffuser and fixed sampling stations in the near-field and mid-field exposure areas in Meliadine Lake.

MEL-01 (Near-field)		MEL-02 (Mid-field)	
Station	Distance (m)	Station	Distance (m)
MEL-01-01	109	MEL-02-02	6,689
MEL-01-06	219	MEL-02-03	6,183
MEL-01-07	102	MEL-02-05	6,101
MEL-01-08	259	MEL-02-06	6,946
MEL-01-09	246	MEL-02-08	5,264
MEL-01-10	110		

Table 4-3. Water quality parameters collected for the AEMP.

AEMP Water Quality Parameters
Field Measurements. Depth, pH, specific conductivity, dissolved oxygen, temperature, Secchi depth (open-water), ice thickness
Conventional Parameters and Major Ions. Bicarbonate alkalinity, chloride, carbonate alkalinity, turbidity, conductivity, hardness, calcium, potassium, magnesium, sodium, sulphate, pH, total alkalinity, total dissolved solids (TDS) and total suspended solids (TSS).
Nutrients and Organic Carbon. Ammonia-nitrogen, total Kjeldahl nitrogen, nitrate-nitrogen, nitrite-nitrogen, orthophosphate, total phosphorus, total organic carbon, dissolved organic carbon, reactive silica.
Total and Dissolved metals. Aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, iron, lead, lithium, manganese, mercury, molybdenum, nickel, selenium, silver, strontium, thallium, tin, titanium, uranium, vanadium, and zinc.
Other Parameters. Total cyanide, free cyanide, and weak acid dissociable (WAD) cyanide, radium-226

4.4.4 Data Analysis

Data Management and Summary Statistics

Water quality data for the Meliadine project are managed within the EQuIS database administered by Agnico Eagle. Water quality data are uploaded directly to EQuIS by the different laboratories. Data analysis, including summary statistics, plotting, and statistical analyses were conducted using R (Core Team, 2022). Descriptive summary statistics for the current year are provided in **Appendix C1**. Summary statistics are calculated separately for the winter and open-water sampling events in Meliadine Lake. Parameters with more than 50% of the samples below the DL were not carried forward for further analysis.

Water Quality Screening Assessment (Benchmarks and Action Levels)

Individual samples collected from Meliadine Lake were screened against the AEMP Benchmarks and corresponding Low-Action-Levels (aka triggers). Benchmarks and corresponding Action Levels are provided in **Table C1-1**.

Spatial and Temporal Trends

Changes in water quality in Meliadine Lake were evaluated by comparing current water quality to the normal range and using plots. *Normal range* refers to the natural water quality conditions in Meliadine Lake using data collected during the baseline period (1995 to 2013) and chemistry data from the three reference areas[7]. The upper 90th percentile is used as the limit for determining whether current

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[7] Reference area data up to and including 2020 were included when calculating the normal range of conditions in Meliadine Lake.

concentrations have changed relative to baseline/reference conditions. Parameters measured in water from the NF and MF areas (MEL-01 and MEL-02) were considered outside the normal range if the median concentration of samples collected during the open water period exceeded the 90th percentile of reference/baseline concentrations. The approach to calculating the normal range for water quality parameters was outlined in detail in the 2019 AEMP report (Azimuth, 2020).

A generalized workflow was developed to short-list the number of parameters that were carried forward in the discussion:

- Parameters with fewer than 50% detected concentrations in 2021 were excluded from the spatial and temporal trend assessment. Monthly water quality results were examined to verify that the frequency of non-detects was consistent in each month (**Appendix C2**).
- A long-list of parameters was developed that included any parameter that exceeded the normal range in samples collected from MEL-01 or MEL-02 in the current year. Sample-by-sample screening is a coarse tool for assessing changes in water quality because in any given event there may be results that exceed the normal range naturally, as opposed to the mine being the underlying cause of the change. In any case, sample-by-sample screening provides a long-list of parameters to carry forward for closer scrutiny.
- The normal range assessment involved comparing the annual median concentration to normal range. If the median concentration was greater than the normal range, there is a high degree of certainty that the parameter has increased over time. Whether the change is due to mining activities, natural variability, or a combination of the two was primarily assessed using plots showing the changes over time.

Comparison to Predicted Changes in Water Quality

An important aspect of the water quality assessment for Meliadine Lake is determining if the pattern, timing, and magnitude of changes in water quality generally align with the predicted changes based on the approved design plan for the mine. Predicted future changes in water quality also provide a point of comparison with which to evaluate how effectively the mine is managing water quality on site.

Water quality in the NF area MEL-01 in the east basin was evaluated against the following statement:

> *Water quality in the east basin of Meliadine Lake is predicted to change relative to baseline conditions, but aquatic life and health-based guidelines would be met at 100 m from the diffuser.*

The narrative statement of “water quality meeting guidelines at the edge of the mixing zone” was based on modelling of effluent mixing and dilution estimates completed as part of the FEIS in 2014. Predicted concentrations were developed for several parameters at the edge of the mixing zone, as well as for TDS, chloride, and sodium beyond the mixing zone in the east basin of Meliadine Lake. The model was based on the extent of the approved mine plan in the 2014 FEIS, conservative assumptions regarding effluent quality, and the preliminary diffuser design. The *far-field*[8] effluent mixing model in Volume 7 of the FEIS predicted TDS, chloride, and sodium would increase gradually over time in the east basin to maximum concentrations of 176 mg/L for TDS, 66 mg/L for chloride, and 19 mg/L for sodium in the last year of operations.

The major inputs to the 2014 model (e.g., mine plan and effluent quality) are no longer valid, and in 2020, Agnico Eagle commissioned Tetra Tech to complete a multi-year simulation of effluent mixing in the sub-basin of the east basin (termed the *model domain* in Tetra Tech's report) that included the final diffuser design, updated bathymetry in the model domain, and the conservative assumption that effluent discharged to Meliadine Lake would have a MAC of TDS of 3,500 mg/L, equal to the proposed limit in the Water Licence Amendment application. Two multi-year scenarios were modelled, a base case "normal" precipitation scenario, in which TDS concentrations were predicted to increase to 170 mg/L, and a wet-year scenario, in which where TDS concentrations were predicted to increase to 183 mg/L, to provide a more accurate prediction of changes in TDS between 2020 and 2028 (current life-of-mine) for the east basin. Comparisons of observed results to predicted concentrations will include both the original FEIS model and the updated model.

4.4.5 Quality Assurance and Quality Control

Water chemistry QA/QC involved following appropriate sampling procedures, collecting field duplicates and blanks, laboratory QC, and data analysis QA/QC procedures as outlined in the AEMP Design Plan. A detailed summary of the QA/QC results for the 2021 AEMP water chemistry program is provided in **Appendix A** for Meliadine Lake and the Peninsula Lakes.

Results from the water chemistry QA/QC assessment in 2021 are summarized as follows:

- Field Duplicates –Two field duplicates were collected in each sampling event for a total of eight duplicates. The field duplicates met DQO objectives in 94% of the comparisons in 2021, demonstrating a low variability (high consistency) in the sampling method.
- Blanks – Six deionized water blanks (DI) and three equipment blanks (EB) were submitted across the four sampling events. Some analytes were detected in the DI and EB samples in 2021. The magnitude of the detected concentrations in the various blanks was typically less than 10-times the DL. In a few instances, the measured concentration in the blanks was greater than 10-times the DL. Detected concentrations of various parameters in the blanks merely indicates the *potential* for

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[8] Far-field in this case means the broader east basin. This is not to be confused with the reference areas in Meliadine Lake

cross-contamination. Examination of the water quality data from 2021 blanks indicated a low likelihood that cross-contamination could bias the interpretation of the 2021 water quality data.

- Laboratory QC Assessment – The laboratory QC assessment included laboratory duplicates, methods blanks, matrix spikes, and control/reference samples. DQOs were met in most QC samples, and in the few instances where a DQO was exceeded, ALS concluded the results were reliable and fit for use in the water quality assessment.
- Detection Limits – Samples submitted in August and September were analyzed with a higher DL for ammonia (as N) of 0.05 mg/L rather than the routine DL of 0.005 mg/L. The issue has been corrected ahead of the 2022 AEMP.

The water quality data passed the QA/QC assessment and are reliable for interpreting changes in water quality in Meliadine Lake and the Peninsula Lakes.

4.5 Results and Discussion

Water quality results for Meliadine Lake are discussed in the following sections:

- *In-situ* water quality from the limnology profiles in 2021 (**Section 4.5.1**),
- Water chemistry compared to AEMP Action Levels and Benchmarks (**Section 4.5.2**),
- Comparison to FEIS Predictions (**Section 4.5.4**),
- Temporal and spatial trends (**Section 4.5.3**), and
- Low Action Level assessment (**Section 4.5.4**).

Supplemental boxplots and point plots showing the concentration of key water quality parameters are provided in **Appendix C**.

- Summary statistics for 2021: **Appendix C1.**
- Plots showing concentrations over time for each parameter: **Appendix C2.**
- 2021 water chemistry results: **Appendix C3.**

4.5.1 *In-situ* Water Quality

Field-measured water quality parameters provide important “real-time” information on potential changes to water quality and are an important tool for assessing water quality in Meliadine Lake. Limnology profiles were taken concurrently with water sampling at the NF, MF, and reference areas in 2021. Dissolved oxygen (DO), temperature, and pH results are presented in **Figure 4-2**. Specific conductivity reading are shown in **Figure 4-3**.

In addition to the monthly limnology profiles, Agnico Eagle deployed a sonde at each of the three monitoring stations at the edge of the mixing zone to continuously record specific conductivity and water temperature. The sondes were position 2 m above the sediment in the water column. The sonde at MEL-01-01 generated hourly water temperature and conductivity readings between deployment on July 21st and retrieval on September 23rd. The other two sondes at MEL-01-07 and MEL-01-10 malfunctioned and did not record any data. Hourly water temperature and conductivity readings from the MEL-01-01 data logger are shown in **Figure 4-4**. Daily discharge from CP1 to Meliadine Lake is included in this plot for context.

Temperature, Dissolve Oxygen, and pH

Temperature, dissolved oxygen (DO), and pH varied naturally according to seasonal patterns of change that are typical for northern lakes. Based on the continuous data logger at MEL-01-01, peak water temperature in Meliadine Lake occurred in late July at approximately 13°C (**Figure 4-4**). MEL-03 was a few degrees colder than MEL-01 and MEL-02 in late July, suggesting ice came off later in this area of the lake. By August, water temperature was uniform throughout the lake at 10 to 11°C (**Figure 4-2**).

Dissolved oxygen (DO) data collected in 2021 show the lake is well-oxygenated (**Figure 4-2**). The profile taken at MEL-02-02 on July 19th showed minor vertical stratification with percent DO dropping to approximately 60% near the sediment. The other stations in the MF area were uniformly well oxygenated. Profiles taken in March 2021 at MEL-01 and MEL-02 were highly variable and indicative of variability in the instrument. At standard temperature and atmospheric pressure (0°C and 1 atm or 760 mmHg), the theoretical limit of DO in freshwater is approximately 14 mg/L. DO readings above 14 mg/L and 100% saturation should be interpreted as fully-oxygenated.

Field pH readings in 2021 were within the range reported in previous years. During the open water period, pH was consistently on the slightly basic side of circumneutral at between 7 and 7.75. Minor drift in pH was observed consistent with instrument variability. There was no evidence of vertical stratification in the form of abrupt changes in pH within or between areas.

Conductivity

Conductivity is a measure of the electrical conductivity in water, and as the amount of salt (ionic parameters) increases, conductivity also rises. *In-situ* conductivity readings are an effective way of assessing changes in water quality related to mining effluent.

Pre-Discharge Period (March)

The March 2021 profiles taken at MEL-01 and MEL-02 provide insight into the spatial extent of effluent dispersal from the 2020 discharge season. Approximately 250,000 m^3 of water was discharged from CP1 to Meliadine Lake in September and early October 2020 to create capacity for freshet (**Figure 2-3**).

The winter event generally showed evidence of cryo-concentration within most profiles, where the process of ice formation drives out ions into the surrounding water, resulting in higher conductivity of the water immediately under the ice. The winter profiles also highlighted differences in conductivity between MEL-01 and MEL-02, with the former having conductivity about 40 µS/cm higher than the latter. One of the MF stations, MEL-02-08, was more intermediate, occurring between the two areas. Conductivity readings taken at MEL-02-08 on March 15th showed surface conditions similar to the other MEL-02 stations (~125 µS/cm), but conductivity increased to 146 µS/cm by the bottom of the profile (**Figure 4-3**). These results suggest discharge at the NF area in September/October 2020 may have migrated into the MF area over the winter. From a spatial perspective, this explanation is plausible because MEL-02-08 is the eastern-most of the MEL-02 stations (**Figure 4-1**).

Early Discharge (mid-July to mid-August)

Field conductivity results from the MEL-01 stations in late July were between 97 to 99 µS/cm at the six stations with no evidence of vertical stratification in the profiles recorded on July 18th (**Figure 4-3**). Conductivity readings from the data logger at MEL-01-01 between July 21st and mid-August confirm that ambient conductivity at the edge of the mixing zone was approximately 100 µS/cm. Peaks in conductivity, typically between 10 to 25 µS/cm higher than the general results for that period (**Figure 4-4**), indicate the plume was detected. The transient nature of the increase in conductivity highlights the dynamic mixing conditions during the open water season at the NF area that quickly disperse the plume.

There was no evidence of the plume at the MF stations in the July conductivity profiles. Absolute conductivity readings were consistent among the 5 stations at 90 µS/cm indicating fully-mixed conditions. July conductivity at MEL-03 was 75 µS/cm from top to bottom in the water column.

Late-Season Discharge (mid-August through September)

Conductivity started to increase in the NF area in mid-to-late August coinciding with increased discharge at CP1. As expected, there were more instances of the plume being detected at the edge of the mixing zone. In July, there were no instances of conductivity greater than 130 µS/cm; by September, 12% of the hourly readings measured greater than 130 µS/cm. Absolute conductivity also increased in August and September, mirroring the overall increase in conductivity and TDS observed in the end-of-pipe effluent samples at MEL-14. The highest conductivity measured with the continuous sonde at MEL-01-01 was 150 µS/cm. It was recorded over a 2-hour period from 11 am to 1 pm on September 22nd. Four hours later, conductivity had dropped to 118 µS/cm, demonstrating the transient nature of the plume.

Figure 4-2 Dissolved Oxygen, pH, and temperature results from the 2021 limnology profiles.

Notes: n=6 limnology profiles at MEL-01; n=5 limnology profiles at the other areas.

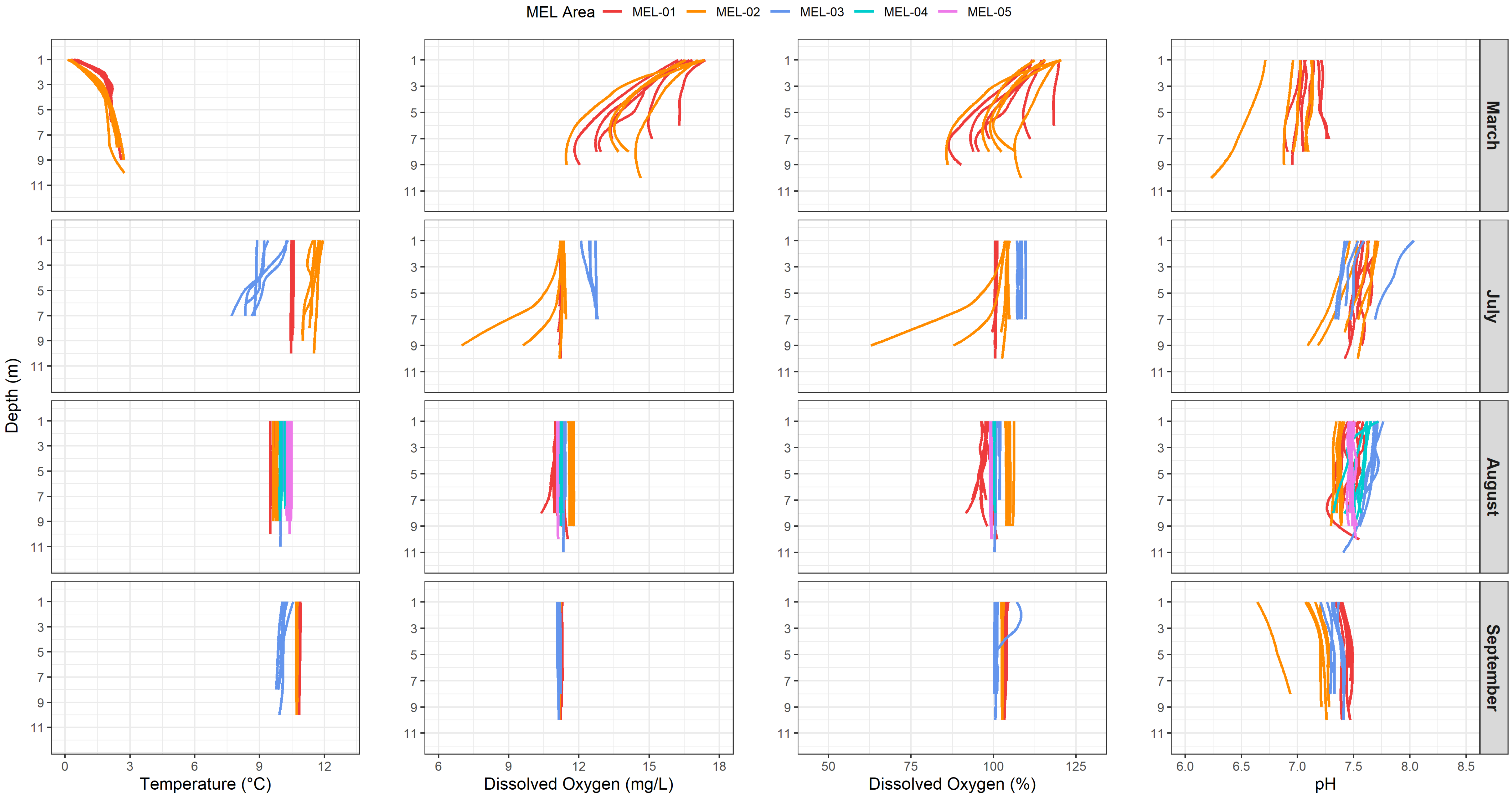


Figure 4-3 Specific conductivity (µS/cm) results from the 2021 limnology profiles.

Notes: n=6 limnology profiles at MEL-01; n=5 limnology profiles at the other areas.

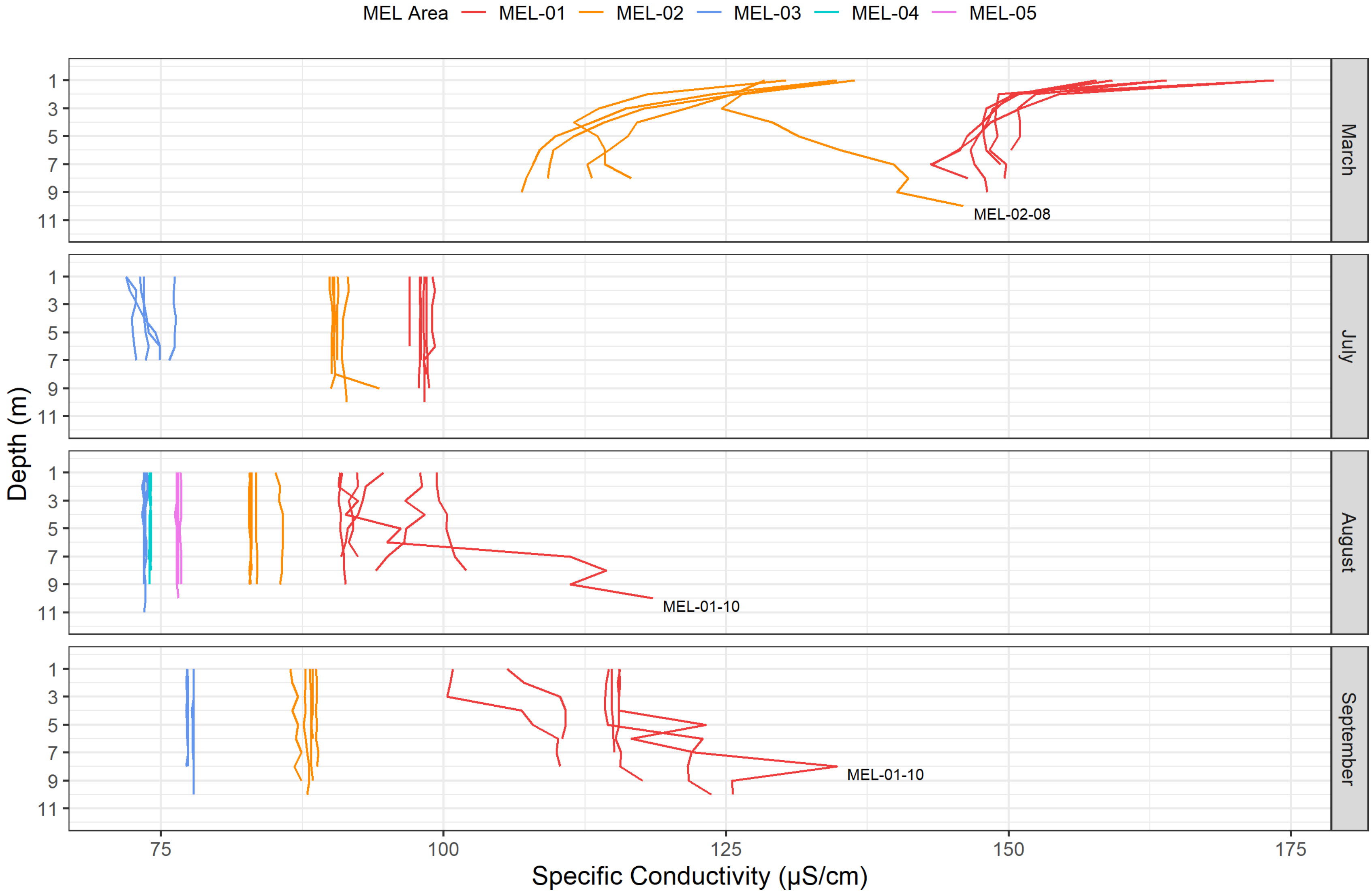
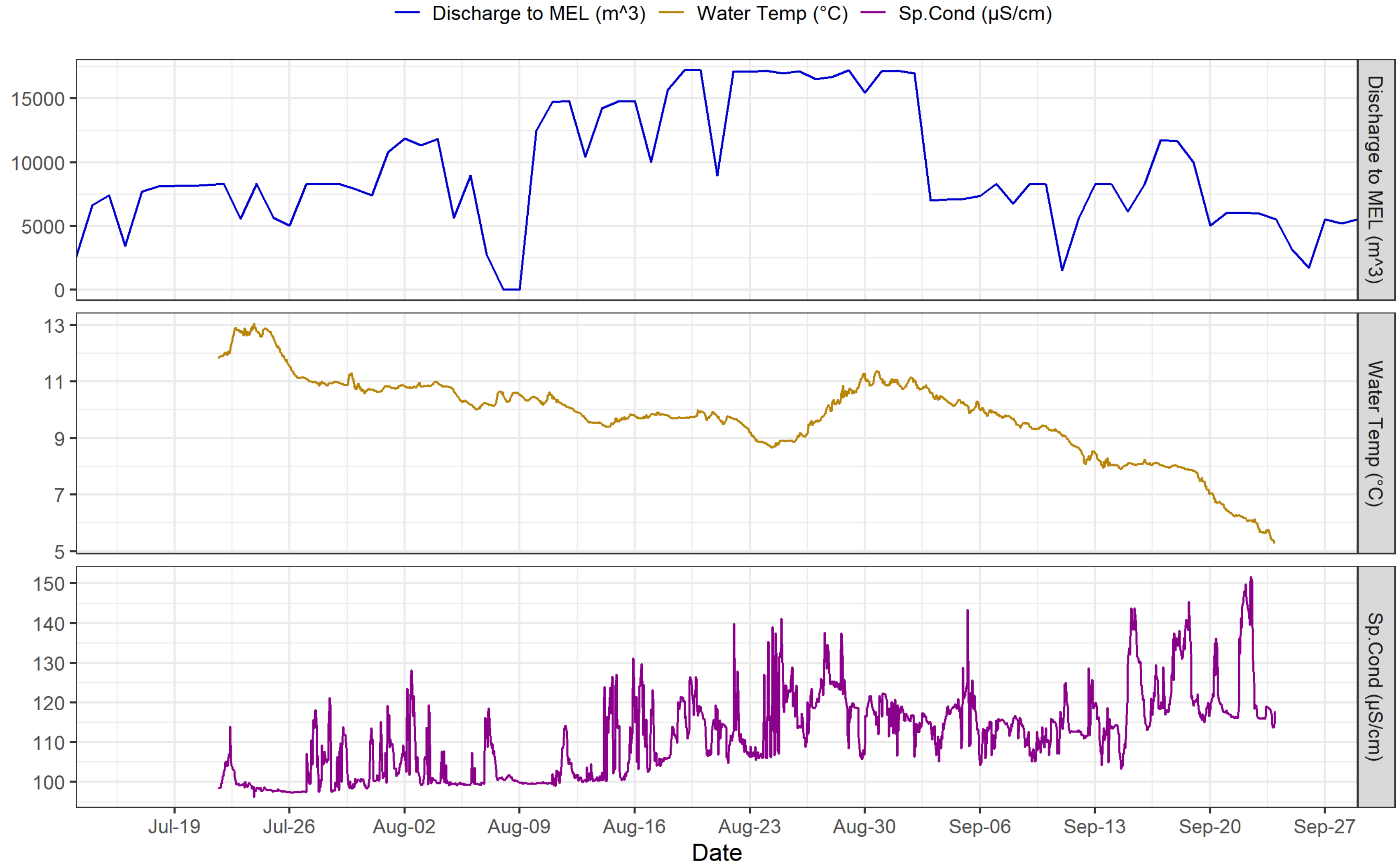


Figure 4-4 Temperature and specific conductivity readings from MEL-01-01 in 2021.

Notes: Daily discharge from CP1 to Meliadine Lake is shown for the period overlapping with continuous data logging at MEL-01-01.



4.5.2 Water Quality Screening Assessment

The 2021 water quality results were screened against the AEMP Benchmarks and corresponding Action Levels. AEMP Benchmarks are equivalent to the guidelines for protection of freshwater aquatic life (FWAL). Action Levels are set below the AEMP Benchmarks and serve as an early warning of changes that warrant closer scrutiny. To simplify the screening assessment, screening quotients (SQs) were calculated by dividing the absolute concentration by either the AEMP Benchmark or Action Level. SQ values >1 indicate the measured concentration was greater than the respective comparator (AEMP Benchmark or Action Level).

Dissolved copper and dissolved zinc exceeded the Action Level in a small number of samples in 2021. The FWAL guidelines for dissolved copper and dissolved zinc vary depending on the concentrations of various water quality parameters such as pH, DOC, and hardness, that are known to modify the bioavailability and toxicity of each metal to aquatic life. Individual samples that exceeded Action Levels for copper and zinc are listed in **Table 4-4** along with the absolute concentration. Plots showing the SQs for dissolved copper and dissolved zinc dating back to the baseline period are shown in **Figure 4-5** and **Figure 4-6**, respectively.

Dissolved copper and dissolved zinc rarely exceed their respective water quality guidelines dating back to the baseline period before the mine was constructed. Importantly, there is no evidence that copper or zinc concentrations are trending higher compared to baseline/reference conditions for samples collected during the open-water season. There is, however, a seasonal pattern for copper with most exceedances occurring during the winter. The copper exceedances in MEL-01 and MEL-02 in the 2021 winter samples are partly related to lower FWAL guidelines based on slightly lower field pH values measured under ice compared to the open-water period. pH is an important variable in the copper BLM, with lower pH values corresponding to a lower FWAL guideline. Absolute dissolved copper concentrations have trended higher at MEL-01 and MEL-02 during recent winter sampling events (**Figure C2-53**), but the similar pattern and magnitude of the increase in concentration at MEL-01 and MEL-02 suggests dissolved copper is predominantly natural rather than mining-related. A summary of the new FEQG for copper is provided in **Appendix C1**. The species sensitivity distribution and corresponding dissolved Copper BLM water quality guideline for sample MEL-01-06 in March 2021 is provided to illustrate how the guideline is calculated for each sample.

Exceedances of the AEMP Benchmark (FWAL guidelines) for copper and zinc observed in 2021 are natural, transient, and low in magnitude. Furthermore, current concentrations are well within the range observed during the baseline and construction phases before contact water was discharged to Meliadine Lake. Current concentrations of copper and zinc do not pose a risk to the health of aquatic life in Meliadine Lake.

Table 4-4. Samples that exceeded AEMP Benchmarks and Action Levels in 2021

Month	Area	Station	Parameter	Dissolved Concentration (µg/L)	Action Level		Benchmark	
					Screening Value	Screening Quotient	Screening Value	Screening Quotient
March	MEL-01	MEL-01-06	Copper (D)	2.46	1.58	1.56	2.11	1.17
		MEL-01-07	Copper (D)	1.93	1.9	1.01	2.54	0.761
		MEL-01-09	Copper (D)	2.14	1.8	1.19	2.4	0.893
		MEL-01-10	Copper (D)	1.72	1.6	1.08	2.13	0.807
	MEL-02	MEL-02-02	Copper (D)	1.96	1.36	1.44	1.82	1.08
		MEL-02-03	Copper (D)	1.64	1.28	1.28	1.7	0.964
		MEL-02-05	Copper (D)	1.65	1.31	1.26	1.74	0.948
		MEL-02-06	Copper (D)	2.02	0.904	2.23	1.21	1.68
		MEL-02-08	Copper (D)	1.11	0.685	1.62	0.913	1.22
July	MEL-01	MEL-01-07	Zinc (D)	10.8	6.79	1.59	9.06	1.19
	MEL-03	MEL-03-05	Zinc (D)	13.2	4.76	2.77	6.35	2.08
September	MEL-02	MEL-02-01	Copper (D)	0.733	0.223	3.29	0.297	2.47

Notes:
Benchmark = FWAL guideline; Action Level = 75% of the Benchmark.
Screening Quotient = dissolved concentration ÷ screening value.

Figure 4-5. Copper screening quotients in Meliadine Lake surface water compared to the AEMP Benchmark (ECCC, 2021).

Notes: Screening quotients = concentration (µg/L) ÷ AEMP Benchmark.
Samples above the orange line exceed the AEMP Benchmark for dissolved copper.

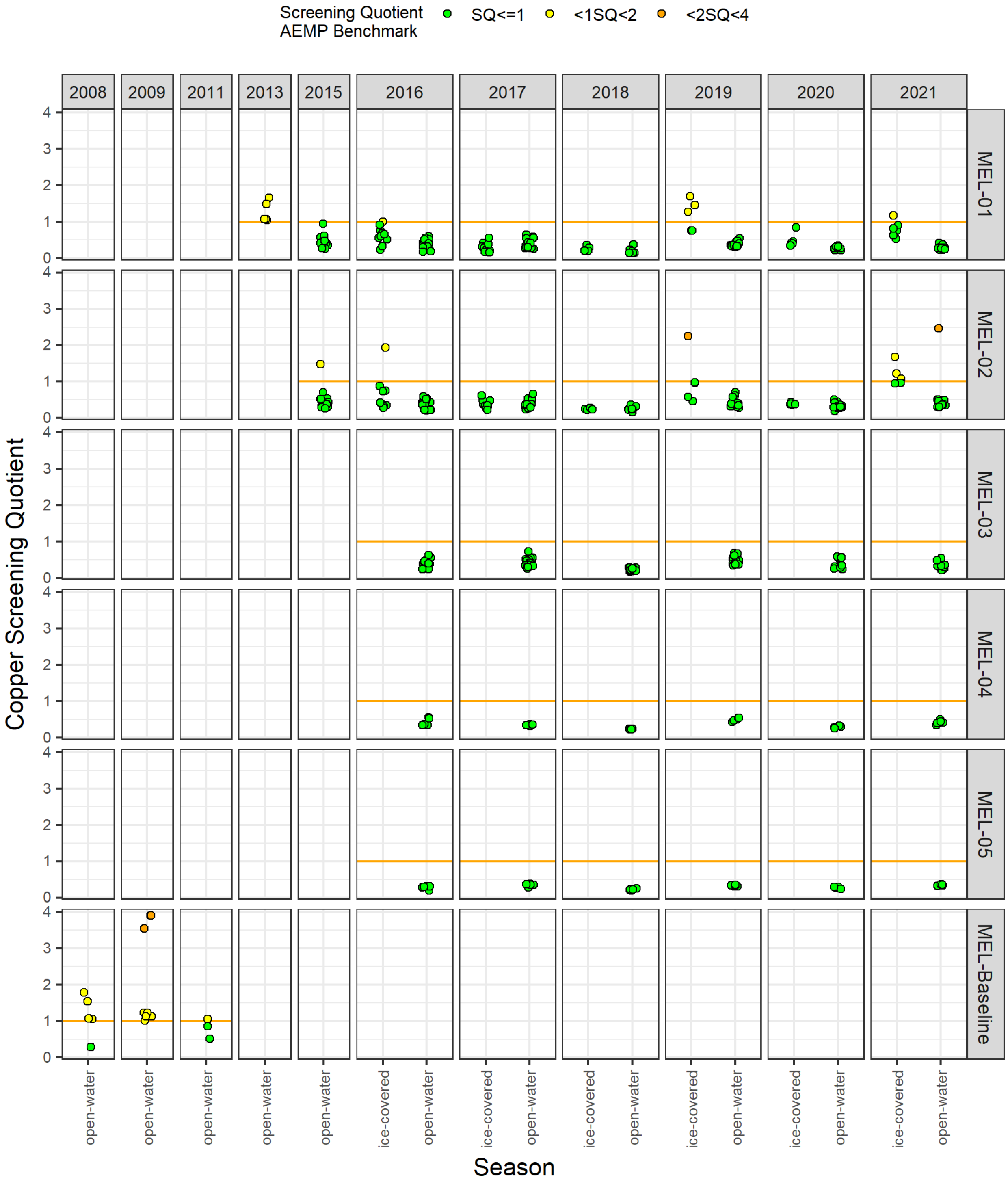
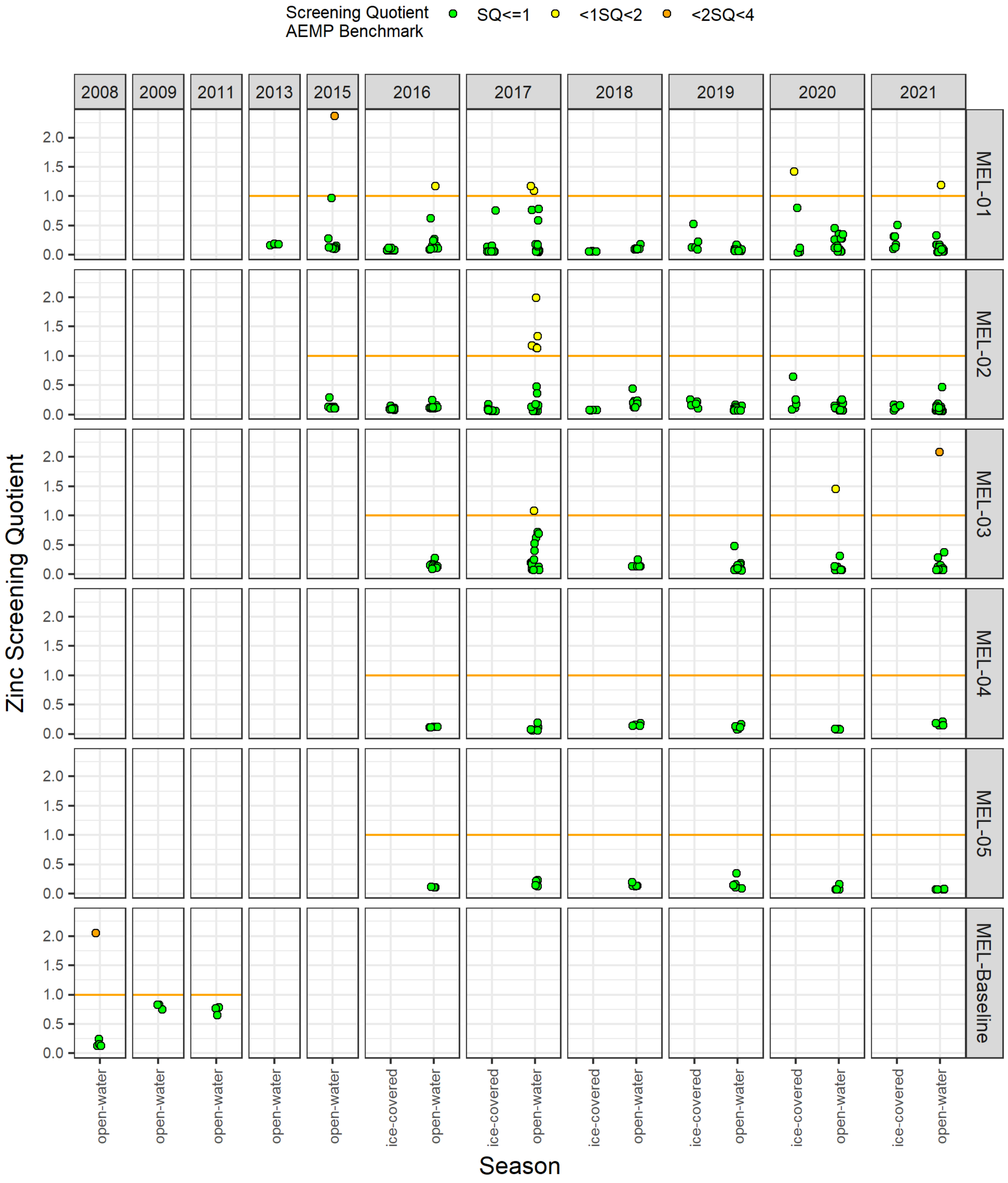


Figure 4-6. Zinc screening quotients in Meliadine Lake surface water compared to the CCME (2018) chronic Water Quality Guideline.

Notes: Screening quotients = concentration (µg/L) ÷ AEMP Benchmark.
Samples above the orange line exceed the AEMP Benchmark for dissolved zinc.



4.5.3 Spatial and Temporal Trends

This section describes spatial and temporal changes in water quality in Meliadine Lake using a combination of the normal range assessment and plots showing concentrations dating back to 2013. Condensed temporal plots for parameters of interest are provided in **Figure 4-14** to **Figure 4-19** to support the assessment. The condensed temporal plots, as the name implies, condense sampling events on the x axis to help visual changes in water quality during the open-water sampling events among the exposure and reference areas and differences over time. The assessment focuses on data collected during the open-water sampling events in July, August, and September for two reasons. First, discharge to Meliadine Lake is limited to when Meliadine Lake is free of ice. Second, normal ranges were not developed for the winter period because of limited data. Concentration plots for all samples collected in the open water and winter sampling events dating back to the 1990s are provided in **Appendix C2**.

Normal Range Assessment

Parameters that exceeded the normal range in at least one sample collected in 2021 are listed in **Table 4-5**. Most of the parameters that were above their respective normal ranges in samples from MEL-01 exceeded by at least 10% (**Table 4-6**). Spatial and temporal trends associated with major ions, nutrients, and metals that exceeded the normal range in 2021 are discussed in the following sections.

Table 4-5. Long-list of parameters that exceeded the normal range in at least 1 sample from MEL-01 or MEL-02 in 2021.

Conventional Parameters	**Nutrients**	**Total Metals (Con't)**
Conductivity (lab)	Ammonia (as N)*	Cobalt (T)
Hardness	Nitrate (as N)	Copper (T)
TDS (Calculated)	Total Phosphorus	Cobalt (T)
		Copper (T)
Major Ions	**Organic Carbon**	Iron (T)
Calcium (T)	DOC	Lithium (T)
Chloride	TOC	Manganese (T)
Magnesium (T)		Molybdenum (T)
Potassium (T)	**Total Metals**	Nickel (T)
Reactive Silica (SiO2)	Aluminum (T)	Strontium (T)
Sodium (T)	Arsenic (T)	Titanium (T)
Sulphate	Boron (T)	Uranium (T)

* Ammonia results for 2021 should be interpreted with caution because the higher detection limit (0.05 mg/L) exceeded the normal range in samples collected in August and September.

Table 4-6. Normal Range assessment for the open-water season in 2021.

Parameter	Units	DL	Normal Range	MEL-01		MEL-02		MEL-Ref	
				Mean	Percent diff	Mean	Percent diff	Mean	Percent diff
Conventional Parameters									
Conductivity (lab)	uS/cm	1	77.5	107	38	88.9	15	77.9	1
Hardness	mg/L	0.2 | 1	23.4	28.1	20	24.5	5	22.8	-3
Total Dissolved Solids	mg/L	13	54	56.9	5	52.3	-3	49	-9
TDS (Calculated)	mg/L	1	39.6	51.8	31	42.8	8	38	-4
Total Suspended Solids	mg/L	1	1	-	na	-	na	-	na
Major Ions									
Alkalinity, Bicarbonate	mg/L	1.2	25	21.4	-14	20.8	-17	21.8	-13
Alkalinity, Total	mg/L	1	20.5	17.5	-15	17	-17	17.9	-13
Calcium (T)	mg/L	0.01	7.33	8.4	15	7.54	3	7.1	-3
Chloride	mg/L	0.1	9.56	16.2	69	12.2	28	9.39	-2
Magnesium (T)	mg/L	0.004	1.18	1.63	38	1.36	15	1.16	-2
Potassium (T)	mg/L	0.02	0.954	1.12	17	1.02	7	0.937	-2
Reactive Silica (SiO2)	mg/L	0.01	0.268	0.357	33	0.244	-9	0.218	-19
Sodium (T)	mg/L	0.02	4.85	7.7	59	5.96	23	4.74	-2
Sulphate	mg/L	0.3	3.87	5.8	50	4.48	16	3.68	-5
Nutrients									
Ammonia (as N) *	mg/L	0.005 | 0.05	0.0174	0.0474	172*	0.0471	171*	-	na
Nitrate (as N)	mg/L	0.005	0.018	0.0263	46	-	na	-	na
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	0.00317	1	0.00258	-18	0.00229	-27
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	0.244	-2	0.222	-11	0.157	-37
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.00731	22	0.00529	-12	0.00391	-35
Organic Carbon									
Dissolved Organic Carbon	mg/L	0.5	2.72	3.47	28	3.02	11	2.57	-6
Total Organic Carbon	mg/L	0.5	3	3.4	13	2.92	-3	2.5	-17
Total Metals									
Aluminum (T)	ug/L	1	5.32	8.37	57	3.24	-39	2.5	-53
Antimony (T)	ug/L	0.02	0.02	-	na	-	na	-	na
Arsenic (T)	ug/L	0.02	0.275	0.524	91	0.56	104	0.336	22
Barium (T)	ug/L	0.02	8.05	8.44	5	8.15	1	7.9	-2
Boron (T)	ug/L	5	6.52	7.46	14	5.48	-16	-	na
Chromium (T)	ug/L	0.1	0.103	-	na	-	na	-	na
Cobalt (T)	ug/L	0.005	0.016	0.0361	126	0.0183	14	0.0117	-27
Copper (T)	ug/L	0.05	0.86	1.07	24	0.907	5	1.04	21
Iron (T)	ug/L	1	15	31.4	109	15.7	5	10.3	-31
Lead (T)	ug/L	0.01	0.0222	0.0218	-2	0.0195	-12	0.0174	-22
Lithium (T)	ug/L	0.5	0.72	1.28	78	0.949	32	0.746	4
Manganese (T)	ug/L	0.05	3.06	9.46	209	3.91	28	2.6	-15
Molybdenum (T)	ug/L	0.05	0.107	0.437	308	0.0847	-21	0.0783	-27
Nickel (T)	ug/L	0.05	0.441	0.733	66	0.582	32	0.42	-5
Selenium (T)	ug/L	0.04	0.049	-	na	-	na	-	na
Strontium (T)	ug/L	0.02	36.1	58.5	62	46.2	28	36.9	2
Titanium (T)	ug/L	0.05 | 0.35	0.17	0.335	97	0.115	-32	0.0834	-51
Uranium (T)	ug/L	0.001	0.0164	0.0215	31	0.0159	-3	0.0152	-7
Vanadium (T)	ug/L	0.05	0.05	-	na	-	na	-	na
Zinc (T)	ug/L	0.5	1.7	1.55	-9	1.41	-17	1.22	-28
Dissolved Metals									
Manganese (D)	ug/L	0.05	1.2	1.2	0	0.527	-56	0.534	-56
Zinc (D)	ug/L	0.5	1.9	1.54	-19	1.03	-46	1.38	-27

Notes:

Percent diff = the difference between the annual mean concentration and the normal range: ((mean – normal range)/normal range) *100

na = annual mean not calculated because more the 50% of the values were < DL.

Light shaded values indicate the mean concentration exceeded the normal range by 10%

Dark shaded values indicate the mean concentration exceeded the normal range by 50% or more.

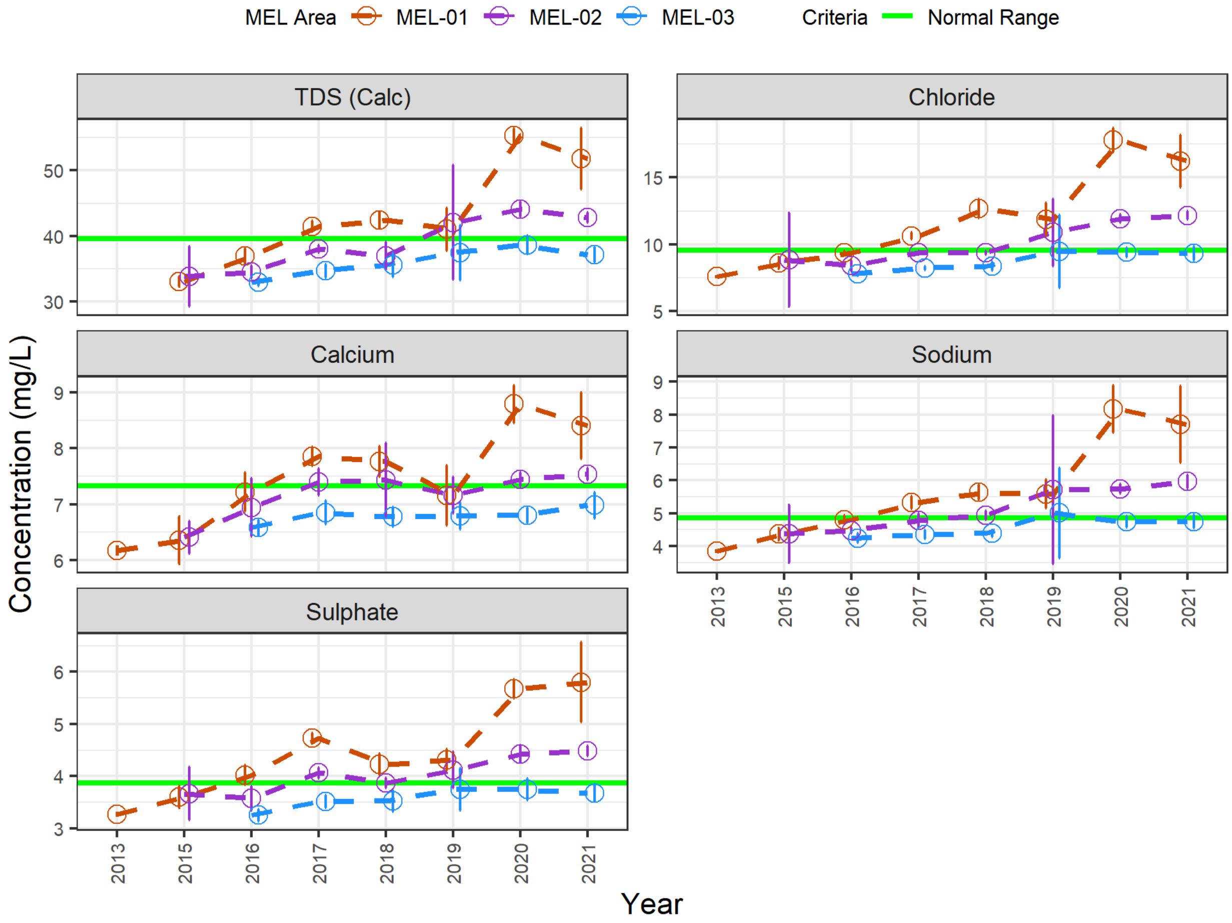
* A higher detection limit (0.05 mg/L) was reported in samples collected in August and September. The normal range assessment should be interpreted with caution.

TDS and Major Ions

Concentrations of total dissolved solids and the key constituent ions chloride, calcium, sodium, and sulphate are shown in **Figure 4-7**. Chloride is the dominant ion comprising TDS, and spatial/temporal changes in the concentration of other major ions broadly followed the same pattern as chloride. Reference Area 1 (MEL-03) is used as the point of comparison in the spatial and temporal assessment because this area is sampled on the same schedule as MEL-01 and MEL-02 in July, August, and September. The other reference areas MEL-04 and MEL-05 are sampled only in August. Concentrations of TDS and major constituent ions for the monthly sampling events are shown in condensed temporal plot **Figure 4-14** at the end of this chapter.

Figure 4-7. Spatial and temporal changes in TDS and constituent major ions in Meliadine Lake from 2013 to 2021

Notes: Points represent the annual mean concentration (July, August, and September). Error bars represent 1 standard deviation of the annual mean concentration. Points are horizontally jittered to avoid overplotting.



TDS and constituent ion concentrations have increased lake-wide over the past 6 years. However, while mining-related changes to water quality in Meliadine Lake have occurred, particularly at MEL-01 and to a lesser degree at MEL-02, there is evidence that natural factors may be responsible for the changes observed at the reference areas. The reference area data is sparse, but there is some evidence of a subtle lake-wide changes in water quality going back to the baseline period in the late 1990’s (**Figures C2-6** [measured TDS]; **Figure C2-16** [chloride]). Chloride was generally between 3 mg/L and 5 mg/L in samples collected throughout the lake in the late 1990s. By 2011, chloride concentrations had doubled to between 7 mg/L and 10 mg/L (**Figure C2-16**). TDS and other ions followed the same pattern.

More recently, lake-wide chloride concentrations have continued to increase, changing by approximately 1.5 mg/L from 2016 to 2021 based on the results from reference area MEL-03 (**Table 4-7**). An increase in conductivity of 1.5 mg/L at MEL-03 implies a lake-wide change in conductivity of 13% since 2016. The biggest change occurred between 2018 and 2019 when chloride increased from 8.3 mg/L to 9.4 mg/L. This change coincides with the unusually wet year in 2019 in this region of the Kivalliq, which would have generated higher-than-normal runoff. This observation is supported by the substantial volume of water collected on Site in 2019. A year when only 306,773m^3 of water was discharged from CP1. Despite the discharge of over 1.8 million m^3 of water to Meliadine Lake in the proceeding years (2020 and 2021), the average chloride concentration at the MEL-03 has remained constant at just over 9 mg/L. Collectively, these results suggest that natural factors have resulted in broad-scale changes to TDS and its constituent major ions over the past six years and possibly extending to the late 1990s. The magnitude of these changes, however, is much lower than those seen in the NF and MF areas due to mining-related discharges to Meliadine Lake.

Mining activities, as predicted, have resulted in higher concentrations of TDS in the east basin of Meliadine Lake. Chloride concentrations have increased in the east basin of Meliadine Lake from 8.6 mg/L in 2015 to 16.2 mg/L in 2021 (**Table 4-7**). Unlike MEL-03, where the largest year-over-year change was seen between 2018 and 2019, the largest change at MEL-01 occurred between 2019 and 2020, increasing from 12.7 mg/L to 17.8 mg/L, coinciding with the period when more water with higher TDS was discharged under the Emergency Amendment. The annual mean chloride concentration at MEL-01 decreased 6% in 2021 compared with 2020. The same pattern was reflected in most of the constituent ions except for sulphate where concentrations remained elevated at 5 to 6.5 mg/L.

Table 4-7. Chloride concentrations (mg/L) and percent change within and among the exposure areas and Reference Area 1 during the open water period from 2015 to 2021.

Year	NF		MF		REF1		Relative Percent Difference in Chloride Between Areas		
	MEL-01		MEL-02		MEL-03				
	Mean	Yearly % Increase	Mean	Yearly % Increase	Mean	Yearly % Increase	NF vs MF	NF vs REF1	MF vs REF1
2015	8.6	-	8.8	-	na	-	-2%	-	-
2016	9.4	9%	8.4	-5%	7.8	-	12%	21%	8%
2017	10.6	13%	9.4	12%	8.2	5%	13%	29%	15%
2018	12.7	20%	9.4	0%	8.3	1%	35%	53%	13%
2019	11.9	-6%	10.9	16%	9.4	13%	9%	27%	16%
2020	17.8	50%	11.9	9%	9.4	0%	50%	89%	27%
2021	16.2	-9%	12.2	3%	9.3	-1%	33%	74%	31%

Notes:
“na” indicates sampling was not conducted. “-“ indicates % change between years and areas was not possible.

Nutrients & Organic Carbon

Temporal and spatial trends in key nutrient parameters and organic carbon are presented below. The assessment focuses on parameters that exceeded the normal range in 2021, namely nitrate, total Kjeldahl nitrogen (TKN), phosphorus (total [TP] and dissolved [TDP]), and organic carbon. The ecological significance of the changes in nutrient concentrations are discussed in the context of the phytoplankton community study in **Section 6**.

Total Phosphorus

The biggest increase in total phosphorus occurred between 2013 (0.0037 mg/L) and 2015 (0.0064 mg/L). Prior to 2017, treated sewage from the exploration camp was discharged to the NF area. (**Figure 4-8, Table 4-8**). Installation of the sewage treatment plant at the main camp in 2017 has significantly reduced TP loading to Meliadine Lake and helped maintain consistent and less variable TP concentrations in the NF area. A more in-depth discussion on nutrient loading to Meliadine Lake is provided in **Section 6** as supporting information for interpreting changes in primary productivity in Meliadine Lake.

Phosphorus concentrations in the NF area have been more stable since 2015. Recent monitoring results from 2020 and 2021 show considerably less variable TP concentrations across all study areas in Meliadine Lake, with concentrations above the normal range of baseline/reference conditions and near the AEMP Action Leve of 0.0075 mg/L at the NF area (**Figure 4-8**). Mean concentrations of TP at the reference areas straddled the ultra-oligotrophic classification of 0.004 mg/L (CCME, 2004). The annual mean concentration at MEL-03 based on data collected in in samples collected in July, August, and September was 0.00397 mg/L. In August, concentrations at MEL-04 and MEL-05 were 0.00488 mg/L and 0.00274 mg/L, respectively.

Figure 4-8. Spatial and temporal changes in key nutrients and organic carbon in Meliadine Lake from 2013 to 2021

Notes: NO3 = nitrate (as N); TKN = total Kjeldahl nitrogen; TDP = total dissolved phosphorus; TP = total phosphorus; TOC = Total Organic Carbon; DOC = Dissolved Organic Carbon.
The Action Level for nitrate is 2.17 mg/L. Points are horizontally jittered to avoid overplotting.

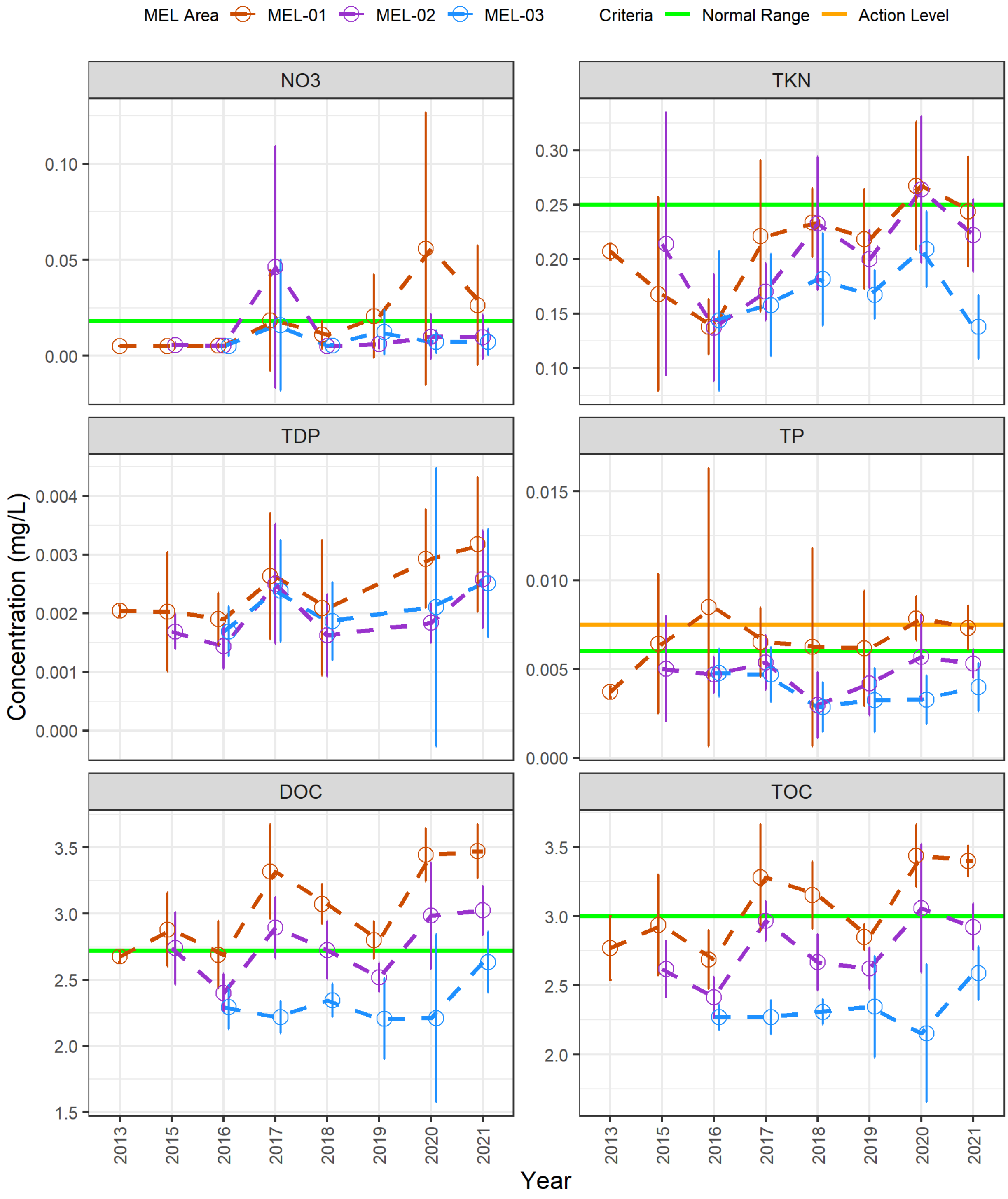


Table 4-8. Total Phosphorus concentrations (mg/L) and percent change within and among the exposure areas and Reference Area 1 from 2013 to 2021.

Year	NF		MF		REF1		Relative Percent Difference in Phosphorus Between Areas		
	MEL-01		MEL-02		MEL-03				
	Mean	Yearly % Increase	Mean	Yearly % Increase	Mean	Yearly % Increase	NF vs MF	NF vs FF	MF vs FF
Baseline	1997 = 0.017 ; 1998 = 0.0055 ; 1999 = 0.004 2000 = 0.012 ; 2008 = 0.0042 ; 2009 = 0.0047 ; 2011 = 0.0043						-	-	-
2013	0.0037	-	na	-	na	-	-	-	-
2015	0.00644	74%	0.005	-	na	-	-2%	-	-
2016	0.00848	32%	0.00468	-6%	0.00479	-	81%	77%	-2%
2017	0.00652	-23%	0.00537	15%	0.00468	-2%	21%	39%	15%
2018	0.00624	-4%	0.00298	-45%	0.00286	-39%	109%	118%	4%
2019	0.00617	-1%	0.00417	40%	0.00325	14%	48%	90%	28%
2020	0.00785	27%	0.00569	36%	0.00327	1%	38%	140%	74%
2021	0.00731	-7%	0.00529	-7%	0.00397	21%	38%	84%	33%

Notes:
"na" indicates sampling was not conducted in a given year. "-" indicates % change between years and areas was not possible.

Total dissolved phosphorus (TDP) concentrations have tracked more similarly over time among NF, MF, and reference areas (**Figure 4-8**). While not clearly evident in the plot due to scale differences, TDP concentrations have generally been considerably less variable, even at the NF area in 2015 and 2016. This highlights that most of the variability observed in TP in 2015 and 2016 was likely related to phosphorus bound to particulate matter in the water column.

Nitrogen

Spatial and temporal trends in nitrogen focus on nitrate, the dominant inorganic form of nitrogen in effluent, and on total Kjeldahl nitrogen, which is the sum of organic nitrogen and ammonia. Total nitrogen is the sum of nitrate, nitrite, and TKN.

Annual mean concentrations for nitrate and TKN were lower in 2021 at MEL-01 compared to 2020 (**Figure 4-8**). This was due to the combined effect of less water discharged to Meliadine Lake and lower concentrations of nitrogen in surface contact water, particularly in July and August (**Appendix B2**).

The mean concentration of nitrate at MEL-01 in 2021 was 0.0263 mg/L, which equates to a 46% increase above the normal range (0.018 mg/L). There was considerable seasonal variability in nitrate concentrations at MEL-01 in 2021. Nitrate data from MEL-01 in July were below the normal range (**Figure C2-19**). Concentrations started trending higher in August and by September, only MEL-01-07 had nitrate concentrations less than the normal range. The timing of the increase aligns with higher daily discharge to Meliadine Lake in August and September (**Figure B2-11**).

Nitrate concentrations were typically below detection at MEL-02 and MEL-03 in 2021 (**Figure C2-19**). These results align with previous results showing the spatial extent of changes in nitrogen do not extend beyond the east basin. The increase in nitrogen at MEL-01 shows some evidence of a mining-related change, although considering baseline data dating back to 1997, nitrogen concentrations have, historically, been at levels similar to current concentrations for nitrate (**Figure C2-19**) and TKN (**Figure C2-21**).

Organic Carbon

Long-term monitoring of organic carbon suggests there are basin-specific differences extending back to the baseline period, with concentrations of both TOC and DOC highest at the NF and lowest at the reference areas (**Figure C2-24** [DOC] and **Figure C2-25** [TOC]). The annual mean concentrations reflect this pattern (**Figure 4-8**) and the similarity between DOC and TOC indicates that most carbon is present in dissolved form. Since 2013, there are been distinct increases seen in 2017 and 2020. The change seen in 2017 decreased over 2018 and 2019, but the change in 2020 persisted through 2022. While concentrations of DOC and TOC remain similar to baseline conditions, it is not clear whether mining activity is influencing spatial-temporal patterns for these parameters.

Metals

Metals that exceed the normal range at MEL-01 broadly fall in one of two categories: those that have consistently exceeded the normal range dating back to the baseline period, and those that have recently exceeded the normal range. Metals that have *always* exceeded the normal range at MEL-01 going back to 2013 include arsenic, cobalt, iron, manganese, and nickel. Metals that have trended above the normal range *recently* include lithium, molybdenum, strontium, and uranium. The temporal and spatial trends are illustrated in **Figure 4-9** and discussed in more detail below.

Arsenic

Arsenic has consistently exceeded the upper limit of the normal range in the east basin of Meliadine Lake since the baseline period (**Figure 4-9**). Arsenic concentrations in surface water are likely naturally different among the different basins. The east basin is closest to the mineralized area. From 2013 to 2018, arsenic concentrations in the east basin were stable at 0.3 µg/L to 0.4 µg/L. The normal range of baseline and reference conditions for Meliadine Lake is 0.275 µg/L.

Arsenic concentrations have increased in the east basin of Meliadine since 2019. While this period coincides with the increased discharge volumes that occurred in 2020, the spatial and temporal pattern of the change at MEL-01 compared to other areas in Meliadine Lake points to natural factors rather than mining effluent as the primary source. The case for natural variability as the primary source of arsenic to Meliadine Lake rather than mining activities is outlined below.

- While the annual mean concentrations suggest that the biggest increase occurred between 2019 and 2020 (**Figure 4-9**), the actual monthly data show that concentrations at MEL-01 changed most in 2019, increasing from 0.3 µg/L in July to 0.47 µg/L by September (**Figure 4-10**). The timing of the increase coincided with low rates of discharge and relatively low loadings to Meliadine Lake, particularly compared to 2020. Cumulative discharge was 130,000 m^3 in July and August, among the lowest volume observed over a two-month period since discharge started in 2018. Monthly loadings estimates were similarly low during this two-month period (**Figure B2-19**). By comparison, 2020 saw the largest cumulative load of arsenic, yet concentrations in MEL-01 in 2020 remained stable throughout the open-water period (**Figure 4-10**). For example, the average concentration reported in September 2021 of 0.47 µg/L is unchanged compared to September 2019.
- Arsenic results for MEL-02 are less clear. Unlike MEL-01, concentrations at MEL-02 decreased over 2019, then increased substantially in 2020 to levels comparable to MEL-01 (**Figure 4-9**). While this pattern is consistent with arsenic loading from the mine from a temporal perspective, it does not match from a spatial perspective. If effluent was the source, arsenic concentrations at MEL-01 would far exceed MEL-02 based on how effluent mixes with water in the east basin mixing (Tetra Tech, 2020). The plume survey confirmed that effluent is not detected above background towards the narrows separating the east basin of Meliadine Lake from the MF area (**Section 3.4**).
- 2019 was an unusually wet year in the region. In total, 222 mm of precipitation fell in July and August based on climate data from Rankin Inlet (Agnico Eagle, 2020). By comparison, 179 mm of precipitation was recorded for the entire year in 2020.
- Arsenic concentrations appear to have increased to some degree on a lake-wide basis from 2019 through 2021. The temporal pattern of these changes, with a bigger year-to-year change occurring in 2020, is consistent with that seen at MEL-02. Further, the broad spatial extent and magnitude of change across the reference areas is not consistent with effluent discharge as a source.
- Soils around the mine are naturally enriched in some metals, notably arsenic, cobalt, copper, and selenium (Agnico Eagle, 2014[9]). Waste management practices effectively curtail the uncontrolled release of runoff from the mine to the tundra. However, natural erosion of soil from the tundra outside the footprint of the mine is a plausible source of metals to Meliadine, particularly in wet years like 2019.

While the above evidence points to natural factors as the cause of spatial and temporal patterns in arsenic concentrations, there is uncertainty that warrants continued attention on this issue. If arsenic concentrations at MEL-02 continue to trend higher compared to MEL-01, follow-up studies may be

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[9] FEIS Volume 6 Section 6.4.2.4.

conducted to better understand the relative importance of mining vs natural sources of arsenic to Meliadine Lake. Follow-up studies are not recommended for 2022 given current concentrations have remained stable at MEL-01 and are below both the site-specific water quality guideline (25 µg/L) and the human health-based drinking water guideline (10 µg/L).

Manganese (and Iron, Cobalt, and Nickel)

Manganese, iron, cobalt, and nickel are discussed together because similar biogeochemical factors determine their mobility, fate, and partitioning in aquatic environments. In well-oxygenated waters, dissolved manganese and iron are oxidized to form particulate oxyhydroxides (MnO_2 and FeO_2). These particulate forms of iron and manganese are capable of scavenging (aka binding with) dissolved cobalt and nickel, thereby coupling the water column transport of these trace metals with iron and manganese (Little et al. 2015; Vance et al., 2016).

Two observations stand out when examining the concentration data for manganese, cobalt, iron, and nickel in Meliadine Lake. First, these metals, like arsenic, are naturally-elevated in the east basin and have consistently exceeded their respective normal ranges dating back to the baseline period. Second, direct discharge of effluent to Meliadine Lake does not appear to be a significant factor influencing concentrations of manganese, iron, and nickel in the east basin (i.e., concentrations of these metals have not increased in proportion to effluent loading). Evidence in support of these two statements is presented below based on the manganese data.

- Manganese, iron, and nickel concentrations at MEL-01 have consistently exceed their respective normal ranges during the AEMP years (2015-2021; **Figure 4-9**) and in the baseline period (manganese [**Figure C2-40**], iron [**Figure C2-37**] and nickel [**Figure C2-43**]). Manganese has trended higher since 2013, but concentrations of iron and nickel in 2021 are not appreciably higher than what was reported in August 2013. In the case of manganese, the biggest increase occurred from 2013 to 2016 when the annual mean concentration approximately doubled from 3.5 µg/L to 7 µg/L. There were no activities on Site at the time that explain this magnitude of change.
- Manganese, iron, and nickel show similar patterns of seasonal change from July to September, irrespective of concentrations in effluent discharged to Meliadine Lake. The pattern for manganese is more evident than iron and nickel, but the same observations apply to all three metals. The highest concentrations occur in July after the ice breakup. The lowest concentrations are typically reported in the September sampling event. The seasonal pattern is evident throughout Meliadine Lake at MEL-01, MEL-02, and MEL-03[10] and is not consistent with effluent as the primary source. For example, effluent samples collected from MEL-14 in 2019 had relatively low concentration of

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[10] MEL-04 and MEL-05 are sampled only in August each year.

manganese with the highest concentrations to date reported at MEL-01 (**Table 4-9**). Manganese concentrations measured in MEL-14 samples in mid-July were 25 µg/L, only marginally higher than concentrations measured in Meliadine Lake at the diffuser (MEL-13) and MEL-01 stations (**Figure 4-11**). In 2020, manganese concentrations in effluent were consistently greater than 100 µg/L and in early June exceeded 1,000 µg/L in some samples. The 10-fold increase in manganese measured at MEL-14 in 2020 compared to 2019 did not result in a proportional increase at MEL-01. The data from 2021 broadly follows the same pattern as previous years, although absolute concentrations show considerable inter-annual variability.

Table 4-9. Manganese concentrations (µg/L) in surface water samples from MEL-01 in July, August, and September since 2018.

Month	Average Manganese Concentrations (µg/L)			
	2018	2019	2020	2021
July	7.4 (6.7 to 8.6)	19.0 (18.5 to 19.6)	9.6 (9.2 to 9.8)	16.2 (15.9 to 16.5)
August	4.6 (4.3 to 5.07)	5.0 (4.8 to 5.2)	8.8 (8.2 to 9.4	6.2 (5.3 to 6.8)
September	na	4.0 (3.9 to 4.1)	6.5 (6.3 to 6.6)	5.9 (5.1 to 7.6)

Notes:
Minimum and maximum concentrations in parentheses.
"na" indicates the September sampling event was not completed in 2018 due to poor weather and unsafe conditions.

Strontium

Strontium concentrations at MEL-01 were relatively stable during the pre-construction and construction phases from 2015 to 2017 compared to the baseline period (**Table 4-10**). Concentrations started to increase in 2018, coinciding with the onset of discharge from CP1 to Meliadine Lake. The largest year-over-year increases occurred between 2017 and 2018 (36%) and between 2019 and 2020 (48%). Concentrations have also trended higher at the MF area. Strontium concentrations are naturally increasing throughout the lake as noted in the baseline data and reference area data from more recent AEMP cycles. Based on data from MEL-03 from 2016 to 2021, natural variability accounts for 3% to 6% of the year-over-year change in strontium observed at MEL-01 and MEL-02. Strontium decreased at MEL-01 in 2021 compared to 2020, further demonstrating the assimilative capacity of the east basin of Meliadine Lake.

The AEMP Benchmark for strontium is 2,500 µg/L for the protection of aquatic life (ECCC, 2020). Concentrations measured at MEL-01 in 2021 correspond to less than 2% of the AEMP Benchmark, indicating there was no risk of adverse effects to fish and other aquatic life.

Table 4-10. Strontium concentrations (µg/L) and percent change within and among the near-field and mid-field exposure areas and Reference Area 1 from 2013 to 2021.

Year	NF		MF		REF1		Relative Percent Difference in Strontium Between Areas		
	MEL-01		MEL-02		MEL-03				
	Mean	Yearly % Increase	Mean	Yearly % Increase	Mean	Yearly % Increase	NF vs MF	NF vs FF	MF vs FF
Baseline	Annual mean from 1997 to 2011 = 21.4 µg/L to 36.6 µg/L						-	-	-
2013	29.0	-	na	-	na	-	-	-	-
2015	29.0	0%	29.0	-	na	-	-2%	-	-
2016	32.6	12%	31.3	8%	30.1	-	4%	8%	4%
2017	37.3	14%	35.5	13%	31.4	4%	5%	19%	13%
2018	50.7	36%	37.7	6%	32.3	3%	34%	57%	17%
2019	45.4	-10%	39.6	5%	33.7	4%	15%	35%	18%
2020	67.1	48%	43.5	10%	35.6	6%	54%	88%	22%
2021	58.5	-13%	46.2	6%	37.1	4%	27%	58%	25%

Notes:
"na" indicates sampling was not conducted in a given year.
"-" indicates % change between years and areas was not possible.

Lithium

During the baseline and construction phases, lithium concentrations[11] at MEL-01 were typically between 0.5 µg/L and 0.8 µg/L (**Figure 4-18**). Concentrations at MEL-01 and MEL-02 increased significantly between August and September 2016, coinciding with dewatering of Lake H17 to create CP1 between August 26 and October 1. Water was released through a diffuser located in the narrows between the MEL-01 and MEL-02 study areas, and concentrations increased approximately 0.6 µg/L at each area, from 0.71 to 1.36 µg/L at MEL-01 and from 0.5 to 1.2 µg/L at MEL-02 (**Table 4-11**). By August 2017, lithium concentrations had decreased to baseline/preconstruction levels (**Figure C2-39**) and the annual mean concentration at MEL-01 and MEL-02 in 2017 was below the normal range. Somewhat surprisingly, no other parameters showed similar patterns of change at MEL-01 or MEL-02 in response to dewatering of H17 in 2016.

Lithium concentrations increased in 2018, this time coinciding with discharge of contact water from CP1 to Meliadine Lake. However, discharge of effluent to Meliadine Lake does not appear to be causing concentrations to increase year-over-year at MEL-01. The annual mean concentration at MEL-01 in 2021 was 1.3 µg/L, lower than the monthly mean reported in September 2016 during dewatering of H17 (**Table 4-11**). Lithium concentrations have increased slightly at MEL-02 since 2017, but remain below the peak observed in September 2016.

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[11] There are no aquatic life or health-based water quality guidelines for lithium.

Table 4-11. Lithium concentrations (µg/L) at MEL-01, MEL-02, MEL-03 from 2016 to 2021.

Area	Jul-16	Aug-16	Sep-16	2017	2018	2019	2020	2021
MEL-01	0.71 ± 0.06	0.71 ± 0.22	1.4 ± 0.13	0.67 ± 0.09	1.5 ± 0.25	1.1 ± 0.138	1.5 ± 0.12	1.3 ± 0.15
MEL-02	0.68 ± 0.10	0.53 ± 0.03	1.2 ± 0.34	0.68 ± 0.15	0.82 ± 0.32	0.85 ± 0.05	0.94 ± 0.05	0.95 ± 0.04
MEL-03	0.52 ± 0.04	0.56 ± 0.05	0.53 ± 0.05	0.62 ± 0.15	0.56 ± 0.06	0.65 ± 0.06	0.68 ± 0.03	0.74 ± 0.07

Notes:
The monthly mean for July, August, and September 2016 is based on 5 samples per area. The annual mean fro 2017-2021 is based on all open-water samples.

Molybdenum and Uranium

Molybdenum and uranium concentrations have been variable throughout the AEMP study period from 2015 to 2021, but both parameters trended higher in 2021, particularly between August and September (see condensed temporal plots; molybdenum [**Figure 4-18**] and uranium [**Figure 4-19**]). The timing of the increase and relatively stable concentrations at reference area MEL-03 points to effluent as the underlying cause of the observed change. Current concentrations remain well below levels associated with effects to aquatic life (Mo = 73 µg/L; U = 15 µg/L) and human health (U = 20 µg/L). Monitoring in 2022 will help determine if the change observed in 2021 is part of a regional change associated with natural factors or related to mining activities.

Figure 4-9. Concentrations of metals that exceed the normal range in Meliadine Lake from 2013 to 2021.

Notes: Results are plotted in log10 scale. Points represent the annual mean concentration (July, August, and September). Error bars represent 1 standard deviation of the annual mean concentration. Points are horizontally jittered to avoid overplotting.

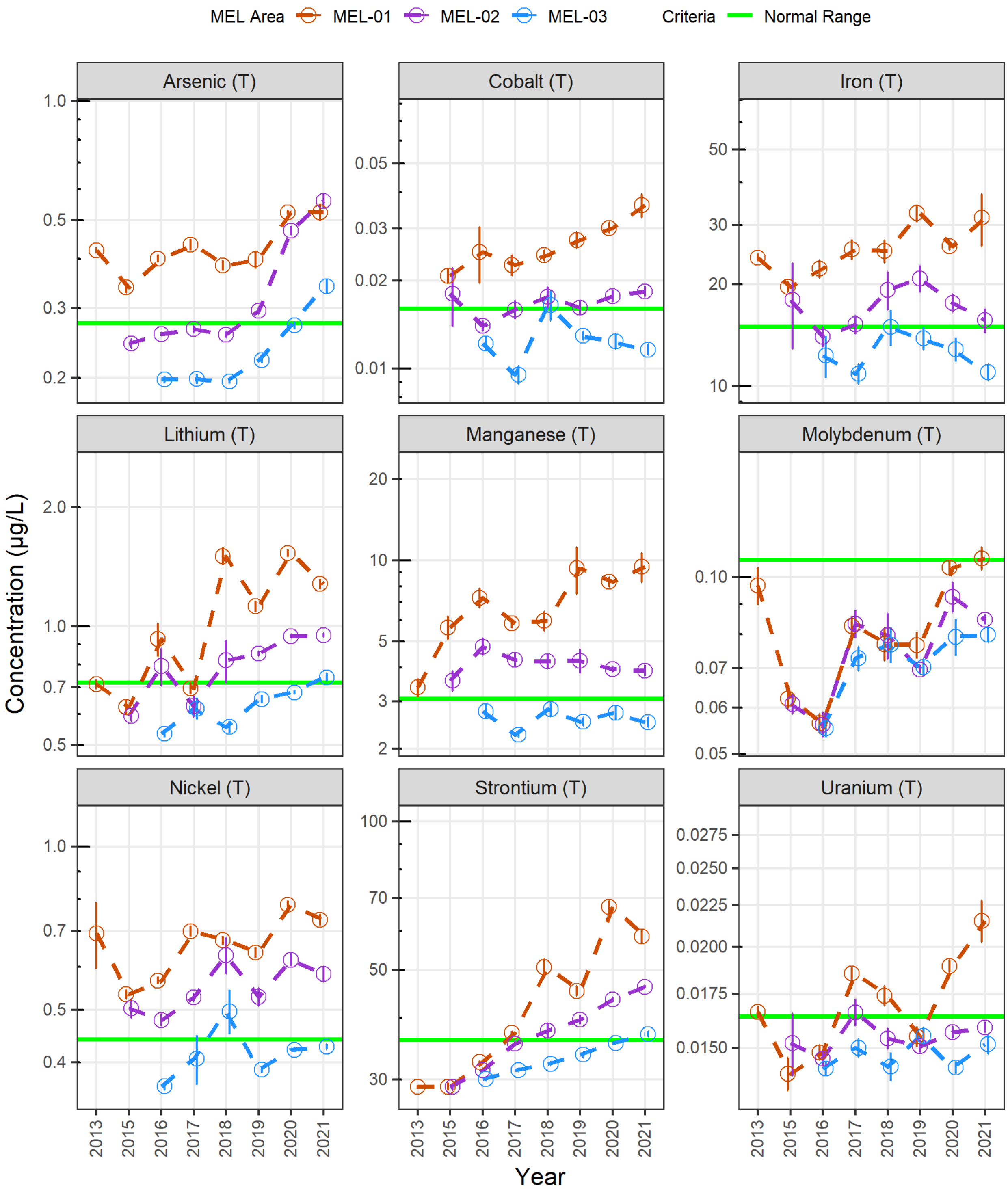


Figure 4-10. Arsenic concentrations in Meliadine Lake from 2018 to 2021 compared to concentrations measured in effluent (MEL-14) and in the mixing zone (MEL-13).

Notes: WQ-MOP = *Water Quality Management and Optimization Plan*. Samples were collected as part of the WQ-MOP in 2020 at the edge of the mixing zone in Meliadine Lake at stations MEL-01-01, MEL-01-07, and MEL-01-10.

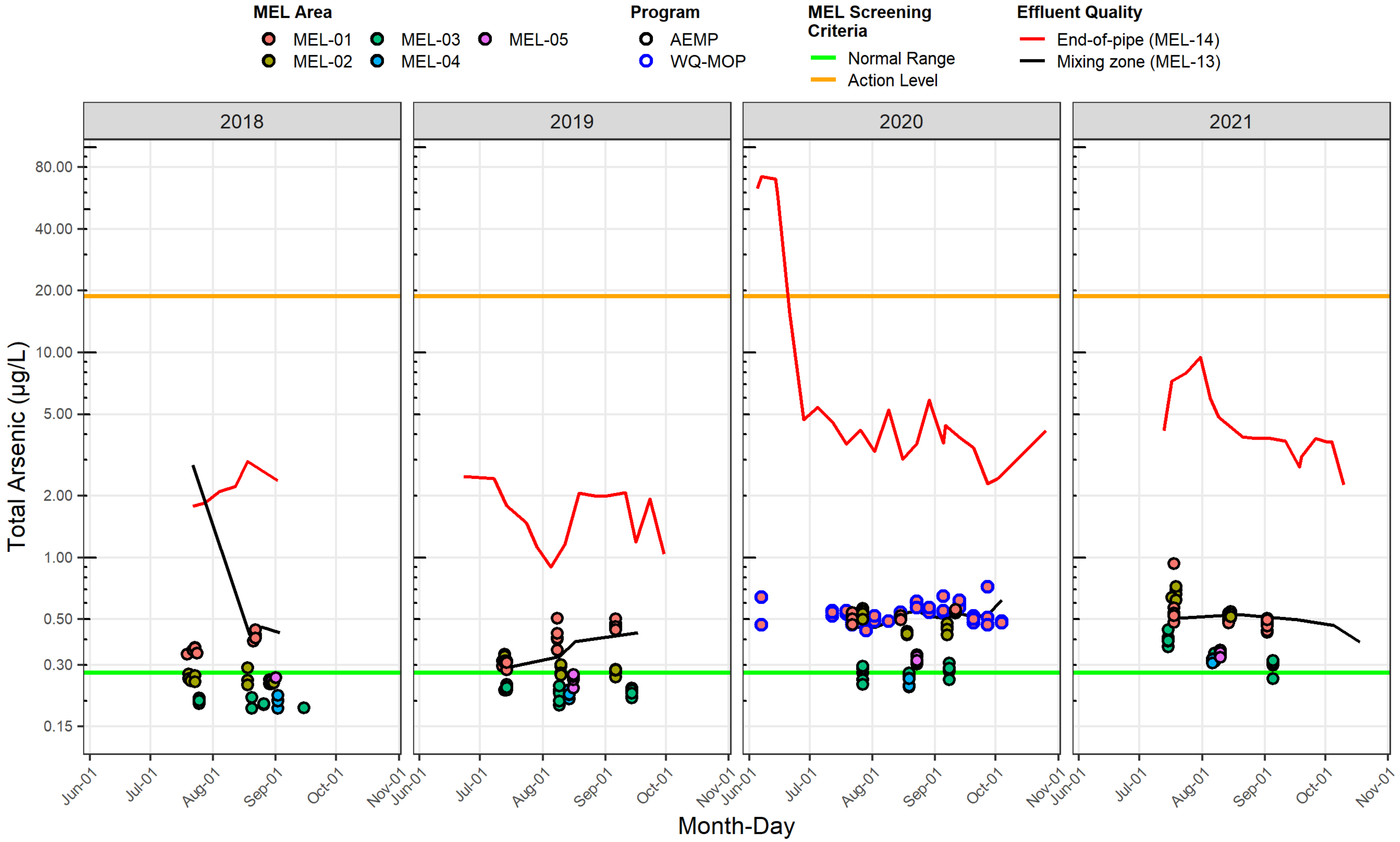
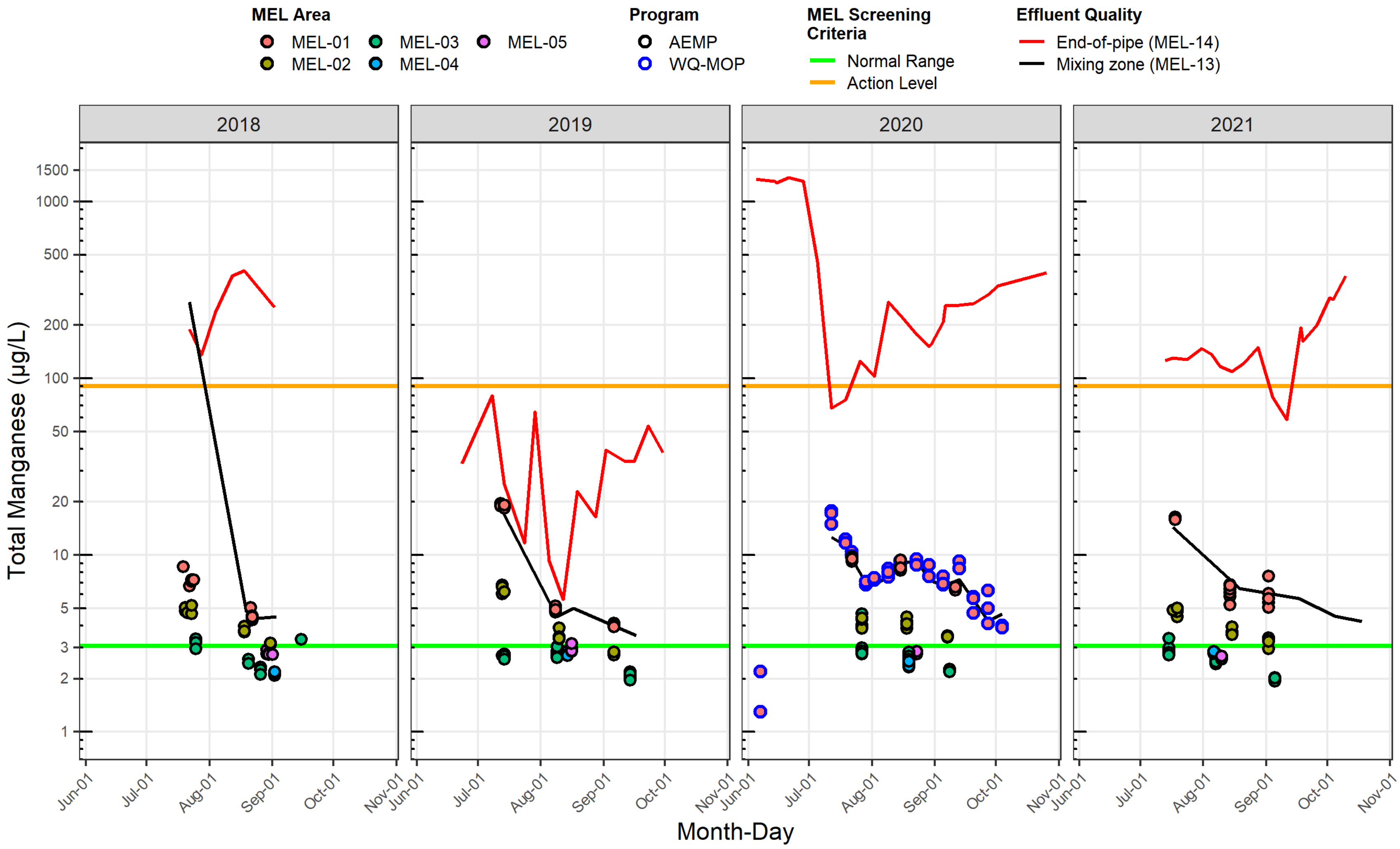


Figure 4-11. Manganese concentrations in Meliadine Lake from 2018 to 2021 compared to concentrations measured in effluent (MEL-14) and in the mixing zone (MEL-13).

Notes: WQ-MOP = *Water Quality Management and Optimization Plan*. Samples were collected as part of the WQ-MOP in 2020 at the edge of the mixing zone in Meliadine Lake at stations MEL-01-01, MEL-01-07, and MEL-01-10.



4.5.4 Comparison to Water Quality Predictions

The prediction for TDS and chloride in the 2014 FEIS and the updated Tetra Tech model are shown in **Figure 4-12** and **Figure 4-13**, respectively. Current TDS and chloride concentrations in MEL-01 were compared against both sets of predictions to determine if water management activities on Site are functioning as intended.

Total Dissolved Solids

The Tetra Tech model predicts TDS will increase more rapidly compared to the original far-field mixing model in the 2014 FEIS. The Tetra Tech base case[12] model predicted maximum TDS concentrations at the edge of the mixing zone would increase rapidly from 89 mg/L in 2020 to 153 mg/L in 2021. From 2022 to 2028, a relatively minor increases in TDS of 17 mg/L is expected. The 2014 FEIS predicted a more gradual increase in TDS from early through late operations, with peak TDS of 176 mg/L occurring around 2030-31, before gradually decreasing as the mine transitions from operations to closure. The timing of mine development in the 2014 FEIS is slightly different than the current life of the mine based on development of the Tiriganiaq deposit.

Calculated TDS concentrations in the 18 samples collected at MEL-01 in July, August, and September 2021 ranged from 48 mg/L to 63 mg/L. The average concentration during the open-water period was 51 mg/L, approximately 66% lower than the predicted concentration at the edge of the mixing zone for 2021 in the Tetra Tech model. TDS has increased gradually, as predicted in the 2014 FEIS, as opposed to the dramatic increase predicted in the Tetra Tech model (**Figure 4-12**). The discrepancy between the observed increase and the Tetra Tech model is partly explained by the lower-than-predicted TDS in effluent discharged into Meliadine Lake. The measured TDS concentration in effluent discharged into Meliadine Lake ranged from 900 mg/L to 2,000 mg/L in 2021, whereas the model assumed a continuous concentration of 3,500 mg/L, equal to the maximum average concentration in the Water Licence.

Chloride

Chloride concentrations were predicted to increase from between 22 and 28 mg/L in 2020 to between 36 mg/L and 41 mg/L in 2021 assuming median effluent concentrations and average dilution at the edge of the mixing zone (Tetra Tech, 2020). In 2021, chloride concentrations in the 18 samples collected at MEL-01 in July, August, and September ranged from 14 mg/L to 20 mg/L, about 50% lower than the concentration of chloride predicted for 2021 (**Figure 4-13**).

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[12] The base case scenario used estimates for mean precipitation. The wet year scenario corresponds to wet conditions applied to years 2021, 2025 and 2026, with year 2025 corresponding to a 100-year return period precipitation (Golder, August 2020). Other years present an average trend in terms of precipitation.

Figure 4-12. Predicted Changes in Total Dissolved Solids (calculated; mg/L) in the East Basin of Meliadine Lake Compared to Observed Results

Notes: The FEIS (2014) predictions (purple line) were presented in Volume 7.4-A of Agnico Eagle (2014). The blue dashed line represents the updated model prediction for changes in TDS from 2018 to 2028 (Tetra Tech 2020). The pink dots represent the observed TDS calculated data collected to date from the NF area as part of the AEMP.

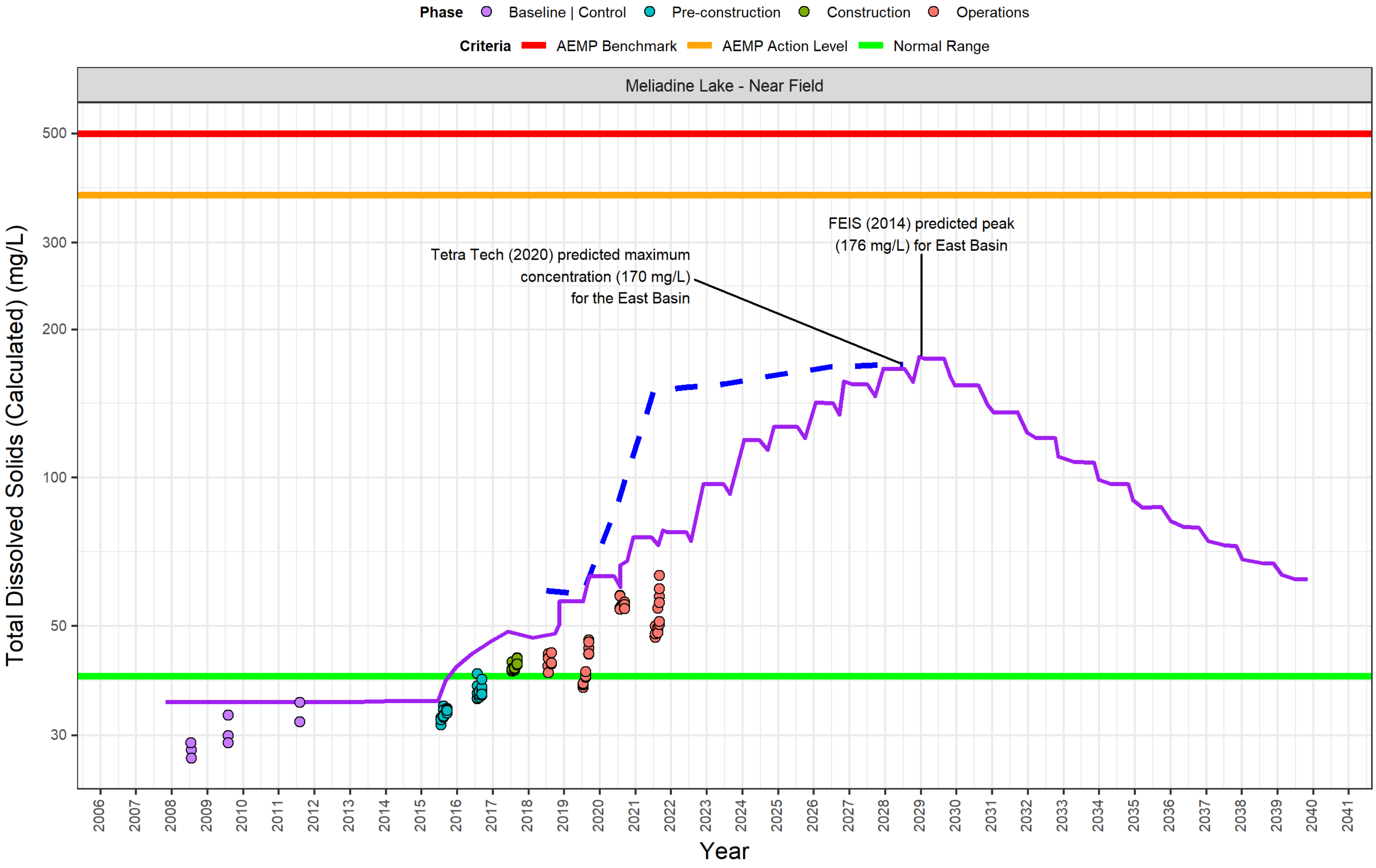
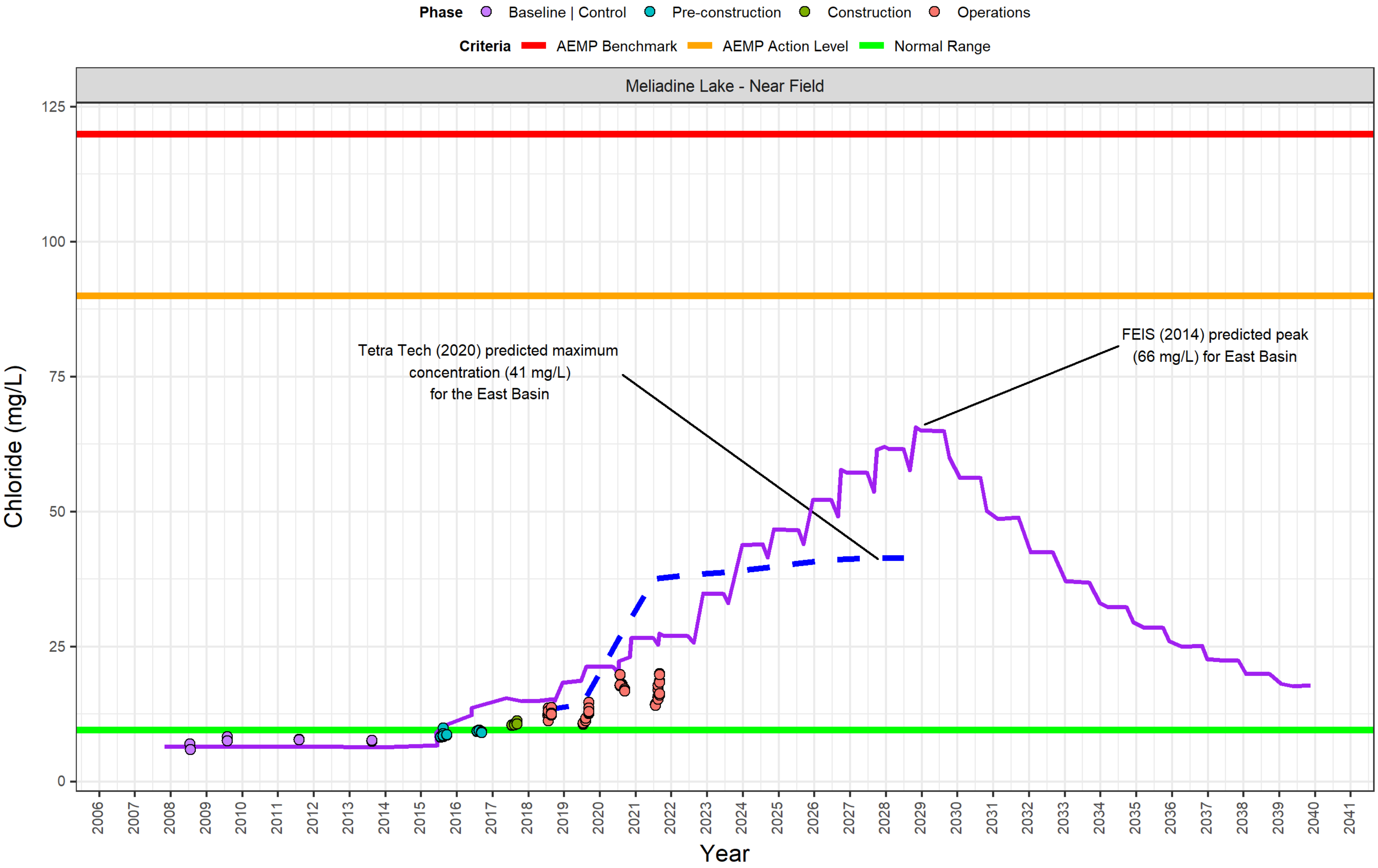


Figure 4-13. Predicted Changes in Chloride (mg/L) in the East Basin of Meliadine Lake Compared to Observed Results

Notes: The FEIS (2014) predictions (purple line) were presented in Volume 7.4-A of Agnico Eagle (2014). The blue dashed line represents the updated model prediction for changes in chloride from 2018 to 2028 (Tetra Tech 2020). The dots represent the observed chloride data collected to date from the NF area as part of the AEMP.



4.6 Conclusions and Recommendations

Results of the 2021 Meliadine Lake water quality monitoring program are summarized below in the context of the key questions stated in **Section 4.2**. The Low Action Level assessment for the Meliadine Lake water quality results is presented in **Section 13.2**.

Key Question: Are concentrations of parameters in the effluent less than limits specified in the Water Licence?

There were no exceedances of limits in the Water Licence in 2021 (**Section 3.3**).

Key Question: Has water quality in the exposure areas changed over time, relative to reference/baseline areas?

This question is answered using information from the normal range screening assessment and scatter plots showing spatial and temporal trends between and within the exposure and reference areas. Several parameters have increased over time in the east basin of Meliadine Lake compared to the baseline dataset. The change in water quality over time is most evident for TDS and constituent major ions such as chloride and sodium. Some parameters, such as arsenic, cobalt, iron, manganese, and nickel have consistently exceeded the normal range of baseline conditions at MEL-01 over time, indicating concentrations are naturally higher compared to the MF and reference areas. There area, however, a few metals that have recently exceeded the normal range including lithium, molybdenum, strontium, and uranium and the timing of the increase coincides with the onset of effluent discharge to Meliadine Lake.

Key Question: Is water quality consistent with predictions outlined in the Final Environmental Impact Statement (FEIS) and less than AEMP Action Levels?

The 2014 FEIS predicted *minor changes* in water quality at the edge of the mixing zone and no residual impacts from effluent discharge in Meliadine Lake outside the mixing zone (e.g., at the NF area)[13]. *Minor changes* were defined as a measurable increase in a parameter that is outside the range of baseline values (e.g., above the normal range) but below guidelines for the protection of aquatic life and drinking water quality. The TDS and chloride results from 2021 are well below predicted concentrations. Furthermore, the water quality screening assessment (**Section 4.5.2**) showed that current water quality is well below guidelines meant to protect aquatic life and human health. In short, *minor* changes in water quality have occurred, consistent with what was predicted in the FEIS.

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[13] See Section 7.4.7 (Residual Impact Summary) in the FEIS for more information (Volume 7; Agnico Eagle 2014)

Recommendations

Water quality monitoring in 2022 is recommended on the same schedule as outlined in the existing AEMP Design Plan (Golder, 2016) to monitor temporal changes related to mining activities.

A targeted limnology sampling program is planned for the Winter 2022 sampling event to assess if effluent discharged in September and October 2021 is migrating northwest past the narrows towards MEL-02. Limnology profiles will be collected at several locations along a transect from MEL-01, past the narrows, towards MEL-02. If the conductivity profiles diverge from typical under-ice profiles, water samples will be collected at the depth interval with the highest conductivity reading and submitted for the full suite of chemistry analyses.

4.7 References

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4.8 Condensed Temporal Water Quality Plots

The condensed temporal plots show concentrations of major ions, nutrients, and metals in surface water samples from Meliadine Lake going back to 2013. The dates on the x-axis are *condensed* to show the results for samples collected during the open water sampling events (July through September) each year. The green line indicates the normal range, which corresponds to the upper 90th percentile concentration for samples collected during baseline and from the reference areas.

List of Condensed Temporal Plots

Figure 4-14. Concentrations of TDS and constituent ions (Ca, Mg, K, Na, Cl, SO_4) since 2013.

Figure 4-15. Conductivity, hardness, and concentrations of selected nutrients since 2013.

Figure 4-16. Concentrations of aluminum, arsenic, barium, and boron since 2013.

Figure 4-17. Concentrations of cobalt, copper, iron, and lead since 2013.

Figure 4-18. Concentrations of lithium, manganese, molybdenum, and nickel since 2013.

Figure 4-19. Concentrations of strontium, titanium, uranium, and zinc since 2013.

Figure 4-14. Concentrations of TDS and constituent ions (Ca, Mg, K, Na, Cl, SO_4) since 2013.

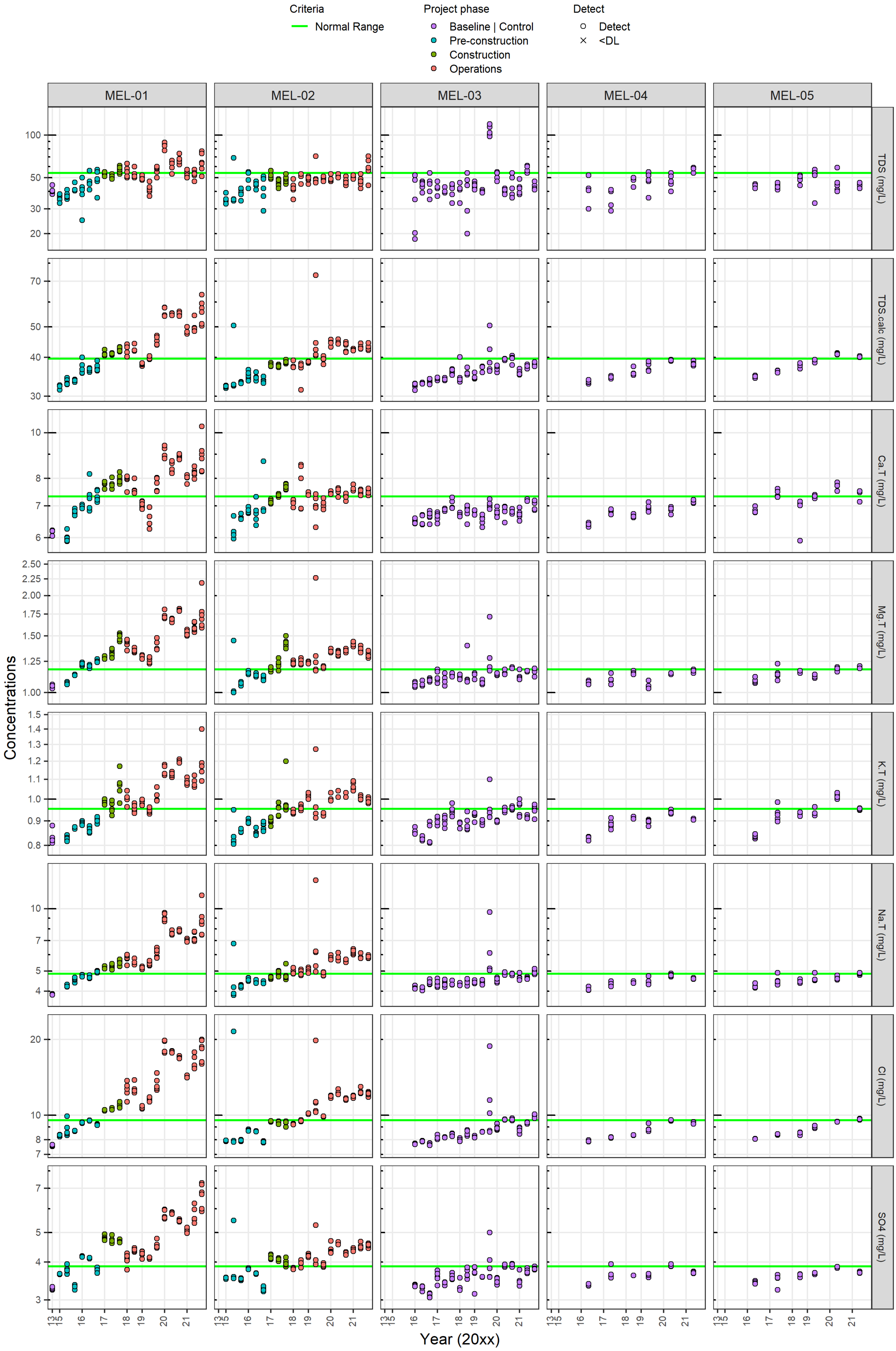


Figure 4-15. Conductivity, hardness, and concentrations of selected nutrients since 2013.

Notes: Ammonia (NH3) concentrations in August and September 2021 should be interpreted with caution because of elevated detection limits at the lab during these two sampling events (see “x” symbols for non-detects in 2021).

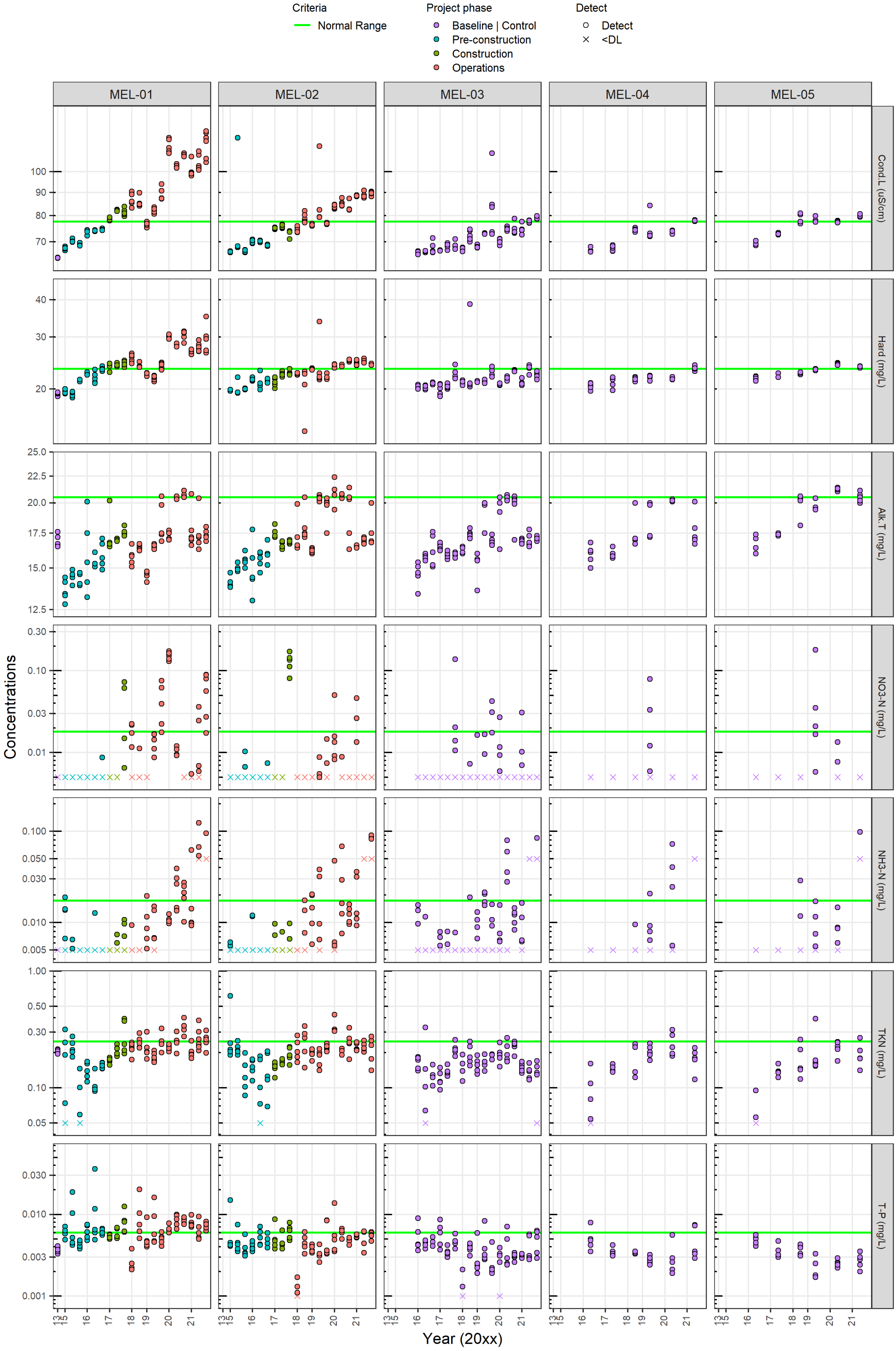


Figure 4-16. Concentrations of aluminum, arsenic, barium, and boron since 2013.

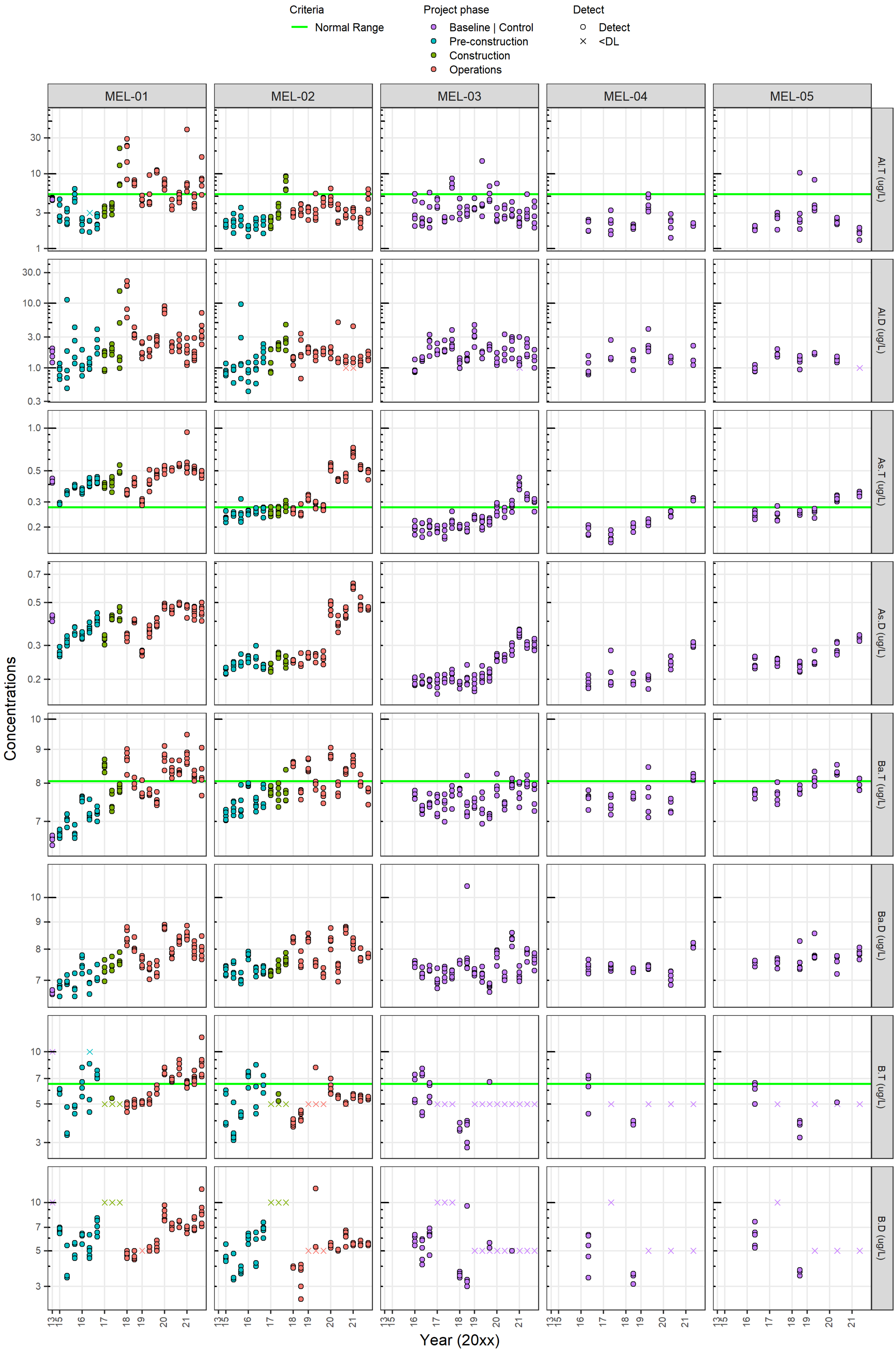


Figure 4-17. Concentrations of cobalt, copper, iron, and lead since 2013.

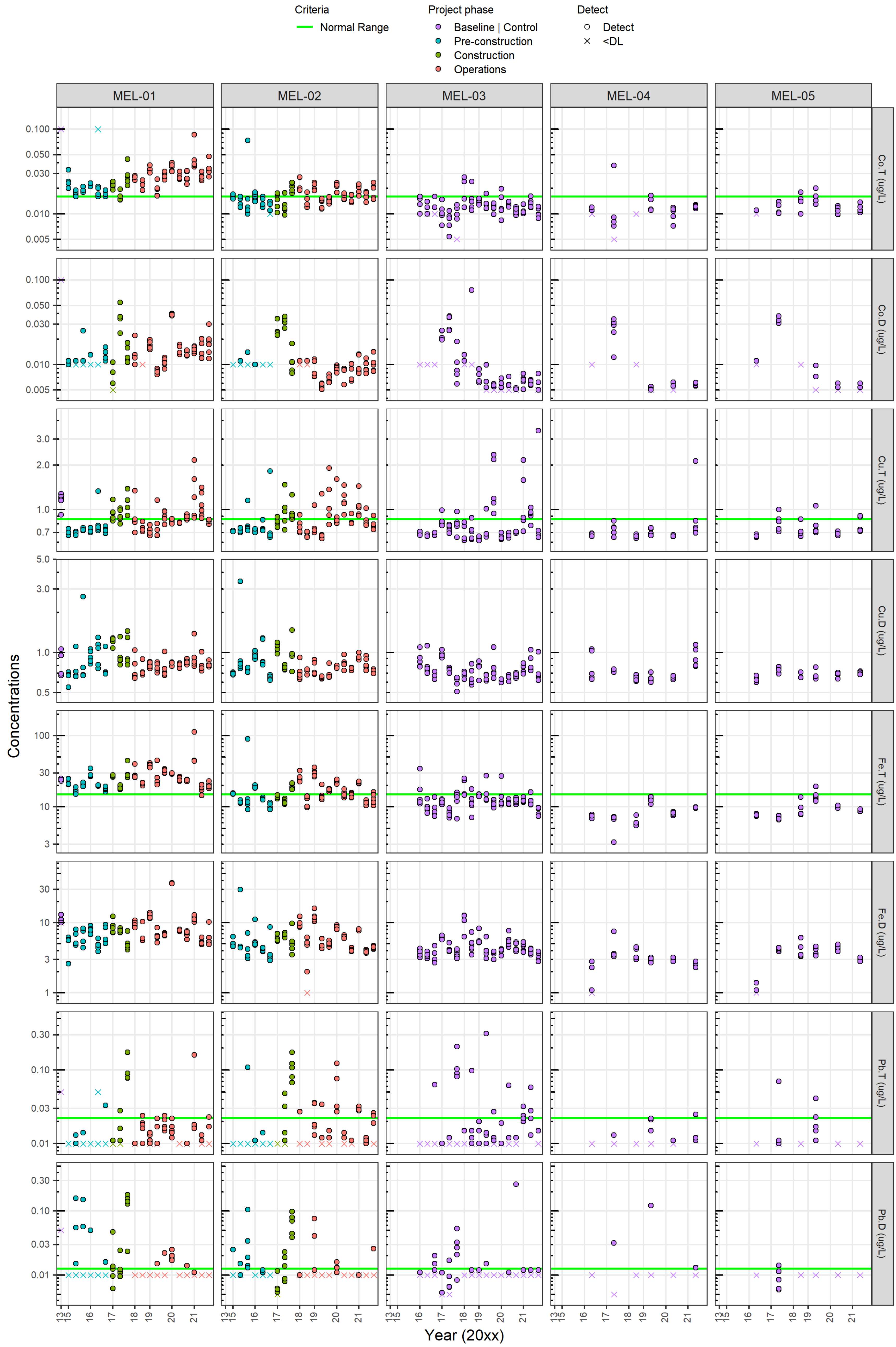


Figure 4-18. Concentrations of lithium, manganese, molybdenum, and nickel since 2013.

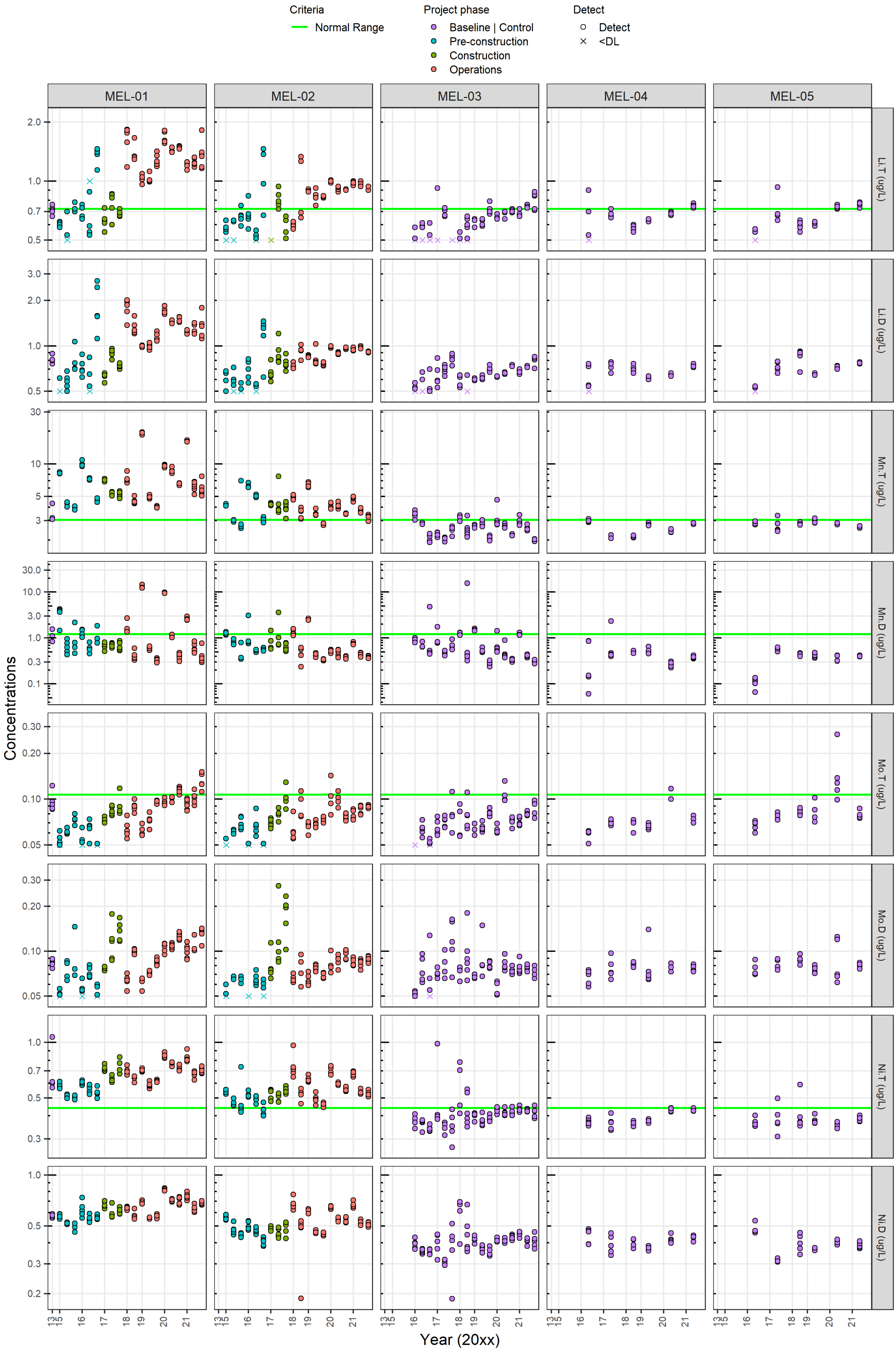
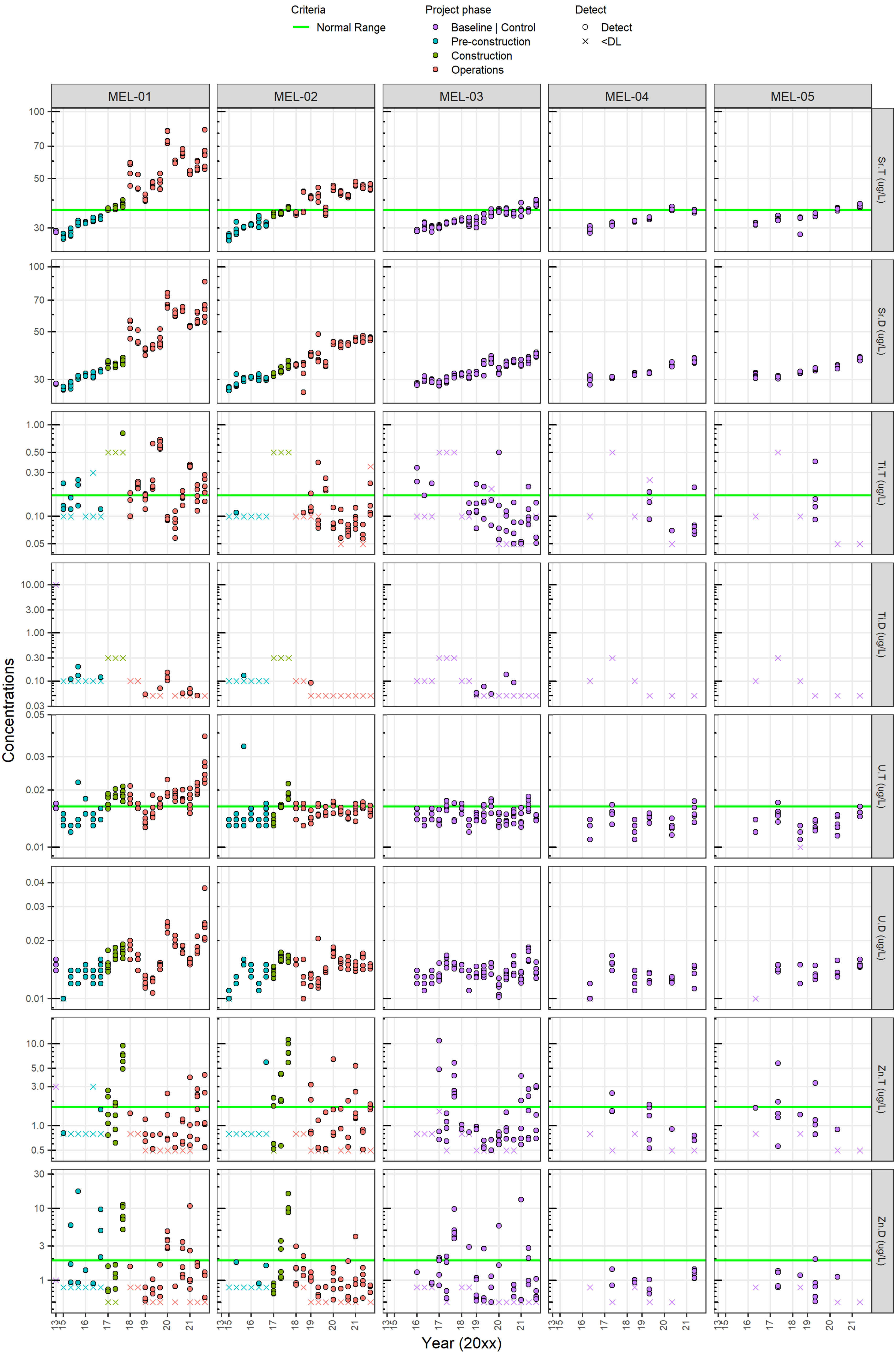


Figure 4-19. Concentrations of strontium, titanium, uranium, and zinc since 2013.



5 WATER QUALITY – PENINSULA LAKES

5.1 Introduction

Lakes A8, B7, and D7, located near the mine, are monitored annually because of the potential for air emissions and alteration of the local hydrology to impact water quality (Golder, 2016). There is no direct discharge of water to these lakes, and for this reason, the current scope of the AEMP for the Peninsula Lakes focuses solely on assessing changes in water quality.

5.2 Objectives and Key Questions

The Peninsula Lakes water quality program has four objectives, as stated in the AEMP Design Plan:

- Determine if water quality in lakes close to the mine is changing,
- Evaluate the accuracy of predicted changes in water quality,
- Assess whether mitigation measures are effective at reducing impacts to the aquatic environment, and
- Provide recommendations (as required) for follow-up monitoring or mitigation to lower the impact of mining-related activities on changes in water quality.

The approach to meeting these objectives is centered around answering the following key questions: *1) Has water quality in the exposure areas changed over time relative to baseline conditions, and 2) are concentrations greater than AEMP Action Levels?*

5.3 Findings from the 2021 Peninsula Lakes Water Quality Program

- Lake D7 is located furthest from the mine, and there is no evidence that mining activities are contributing to changes in water quality. Total aluminum and titanium trended higher in July 2021, but the spatial pattern (i.e., no change at B7 or A8) and timing of the change (i.e., detected in early July) point to runoff from the tundra during freshet as the probable source.
- Water quality at Lake A8 and Lake B7 has changed from baseline conditions given the proximity of these lakes to major infrastructure. The biggest change in water quality at Lake A8 and Lake B7 for most parameters occurred between 2019 and 2020. Year-over-year differences between 2020 and 2021 were relatively minor and for some parameters, concentrations decreased. Parameters that increased year-over-year were limited to Lake B7 (sodium, DOC, sulphate, arsenic, strontium, uranium).
- Water management and source control measures have effectively limited changes in water quality caused by non-point sources (e.g., dust and aerial emissions). Water quality has changed as

predicted in the FEIS with the concentrations of some parameters exceeding the normal range of baseline conditions. However, there were no exceedances of AEMP Action Levels and the observed changes in water quality are well below concentrations associated with effects to aquatic life.

5.4 Methods

5.4.1 Study Areas and Sample Collection

Field collections and sample analyses were conducted according to the AEMP Design Plan. Water sampling was completed in July and August 2021 at Lake A8, Lake B7, and Lake D7 as per the study design (**Figure 2-2**). The three Peninsula Lakes are relatively shallow (1.5 to 2.5 m). Total water depth was measured using a sounding line or portable depth sounder. Secchi depth was not recorded at any of the Peninsula Lakes due the shallow depth of the lakes (i.e., the Secchi disc is visible at the bottom of the lake).

In-situ water quality measurements (temperature, dissolved oxygen (% and mg/L), pH, and specific conductivity) were recorded at the three fixed sampling stations in each lake. Measurements were recorded at discrete intervals just below the surface and every 0.5 m through the water column. The bottom profile was taken within 0.5 m of the sediment water interface.

Surface water samples were collected 1 m below the surface using a Kemmerer grab. Samples were processed and analyzed according to methods described previously for Meliadine Lake. The list of parameters analyzed for the Peninsula Lakes water quality monitoring program are described in **Section 4.4.3**.

Table 5-1. Peninsula Lake area monitoring stations sampled in 2021

		UTM (zone 15V)		Sampling[a]		Depths[b]
Area	Station ID	Easting	Northing	Jul 20	Aug 25	Total
Lake A8	A8-01	540007	6987659	✓	✓ (FD)	2.3
	A8-02	540211	6987204	✓	✓	2.2
	A8-03	540925	6987421	✓	✓	1.7
Lake B7	B7-01	538631	6989096	✓	✓	1.0
	B7-02	538195	6989436	✓	✓	1.7
	B7-03	537713	6989798	✓	✓	1.7
Lake D7	D7-01	536390	6989340	✓ (FD)	✓ (FD)	1.7
	D7-02	536567	6988868	✓	✓	1.7
	D7-03	536852	6988689	✓	✓	1.8

Notes:
[a] Water and limno profiles = ✓ ; Field duplicate sample collected = FD.
[b] Total depths are reported as the average if the station was sampled more than once (Golder, 2018).

5.4.2 Snow Pack Chemistry Assessment

Snow core samples were collected at five dustfall monitoring stations on April 19th, 2021 according to the standard procedure developed by the Environment Department. The snow monitoring program provides insight into off-site dust migration during the winter months and potential impacts to water quality for lakes on the Peninsula. The monitoring stations are shown in **Figure 2-2**. Monitoring station SNOCOR6 is located approximately 4.5 km southeast of Tiriganiaq Pit 1 and provides an estimate of ambient background dust deposition during the winter. The other four locations are located around the perimeter of the Mine. SNOCOR7 is north of the emulsion plant, SNOCOR Boundary is located north of the main camp, SNOCOR4 is located north of the Lake A8, and SNOCOR5 is located east of WRSF3 and south of the Exploration Camp. Evidence of off-site dust migration is mostly to be detected at SNOCOR4 given its proximity to Tiriganiaq Pits 1 and 2 and the prevailing wind direction from the northwest.

Snow samples were sent to BV Labs (Nepean, ON) and analyzed for conventional parameters, organic carbon, and total and dissolved metals.

5.4.3 Data Analysis

Snow Pack Water Chemistry

The potential for off-site dust migration to impact water quality was assessed by comparing the snow chemistry results from the four stations close to the Mine against the background results from SNOCOR6. Off-site dust migration was qualitatively rated according to the magnitude of the difference between samples: negligible (< 5-times background); low (5 to 10-times background); moderate (10 to 20-times background), and high (> 20-times background). Chemistry results from the snow samples are provided in **Table D1-5**.

Water Quality Screening Assessment

The AEMP Benchmarks are the effects thresholds meant to protect aquatic life and drinking water quality for the Project. AEMP Benchmarks and corresponding Action Levels apply equally at Meliadine and the Peninsula Lakes except for sulphate, lead, cadmium, cobalt, copper, manganese, and zinc. Aquatic life guidelines for these parameters vary according to site-specific water quality characteristics, resulting in lake-specific, and in some cases, sample specific guidelines. The phosphorus benchmark of 0.01 mg/L for oligotrophic status is not applied to Peninsula Lakes because phosphorus concentrations naturally exceed 0.01 mg/L in samples collected during the baseline period.

Temporal Trend Assessment

Temporal changes in water chemistry were determined by comparing current water quality result against the normal ranges for each lake/parameter combination. The temporal trend assessment was supported by plots showing changes in water quality over time.

The normal range of baseline conditions for Lake A8, Lake B7, and Lake D7 were defined in the 2018 AEMP (Golder, 2019). Data included in the normal range calculations were collected during the baseline period from 1995 to 2011 and during the pre-construction period from 2015 to 2017 (pre-construction). Golder conducted a review of the baseline data as part of the 2018 normal range assessment and concluded that conventional parameters, major ions, and selected nutrients from 1995 to 2011 were fit for use in the normal range estimation. However, nitrogen and metals data from the baseline were not included in the normal range calculations because detection limits in these samples were not comparable with more recent detection limits. Statistical methods used to estimate the normal range of concentrations for the Peninsula Lakes are described in the 2019 AEMP/EEMP report (Golder, 2019). Parameters where the annual mean/median concentration that *exceeded* the normal range were carried forward for closer examination.

Comparison to FEIS Predictions

Water quality modeling was completed as part of the 2014 FEIS submission to predict how construction and mining activities would affect water quality in small lakes located in the A, B, and D watersheds on the peninsula[14]. The original Project Certificate No.006 included development of deposits that require dewatering of Lake A8 and nearby Lake A6. Based on the expectation that Lake A8 would be dewatered to make way for development of other deposits south of Tiriganiaq, water quality predictions were developed for the baseline phase (pre-development) and post-closure phases (after the lake is flooded) for Lake A8, but not for constructions and operations. For the Type A Water Licence Application, Lake B7, Lake A8, and Lake D7 were removed from the final design because the lakes are underlain by a zone of talik (permanently unfrozen ground) (Agnico Eagle, 2015).

For waterbodies that were included in the water quality model for the construction and operations period, changes to water quality were predicted to occur due to diversion of water, alteration of the watershed size and contributing areas, natural hydrological processes, evaporation, and aerial deposition of particulate matter (modelled as TSS), nutrients from blasting activities, and metals (modelled by individual metal parameter). Similar to Meliadine Lake, water quality was predicted to change in waterbodies closest to the mine (e.g., Lake B7), but for most water quality parameters, these

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[14] Refer to Table 7.4-A2 (Inventory of Waterbodies) in Appendix 7.4-A of the FEIS (Agnico Eagle 2014) for lakes that were carried forward for water quality modelling.

changes were predicted to be *minor*. *Minor* changes are defined as an increase from baseline, which is less than guidelines for the protection of aquatic life, drinking water quality, and SSWQO. The only notable statement in the Type A Water Licence Application with direct relevance for the Peninsula Lakes study applies to arsenic. During operations, water quality was predicted to meet MMER (now MDMER) discharge limits at all CPs on site, except for arsenic in CP3 during operations, which receives runoff from the TSF. Arsenic infiltration and seepage are minimized by dewatering (dry stacking) the tailings and subsequent freezing (Agnico Eagle, 2015).

5.5 Results and Discussion

Results of the snow pack sampling program and field-measured parameters are provided as a preface to the discussion on water chemistry for each of the Peninsula Lakes. The water quality assessment for each lake focuses on parameters that have increased over time based on the normal range assessment. Plots showing the change in concentrations of key major ions, nutrients, and metals are provided in **Section 5.8**. For a comprehensive summary of upper and lower normal range thresholds, along with summary statistics for each of the investigated water quality parameters, refer to **Appendix D1**.

5.5.1 Snow Pack Chemistry Results

Water chemistry results from snow samples collected at SNOCOR7 (NW), SNOCOR Boundary (N), and SNOCOR5 (SE) in April 2021 indicate aerial emissions and dust deposition is not a significant pathway for off-site migration of metals to the north or east of the Mine during the winter (**Table D1-5**). Total suspended solids (TSS) measured 48 mg/L in the background snow sample compared to 51 mg/L at SNOCOR Boundary and 62 mg/L at SNOCOR5. The comparatively low TSS concentrations corresponded to similarly low concentrations of major ions and metals (total and dissolved) compared to background. Arsenic, iron, and lead (at SNOCOR7) were the only parameters detected at between 5- and 10-times background. Corresponding increases were not detected in the dissolved fraction indicating the metals were associated with particulate material.

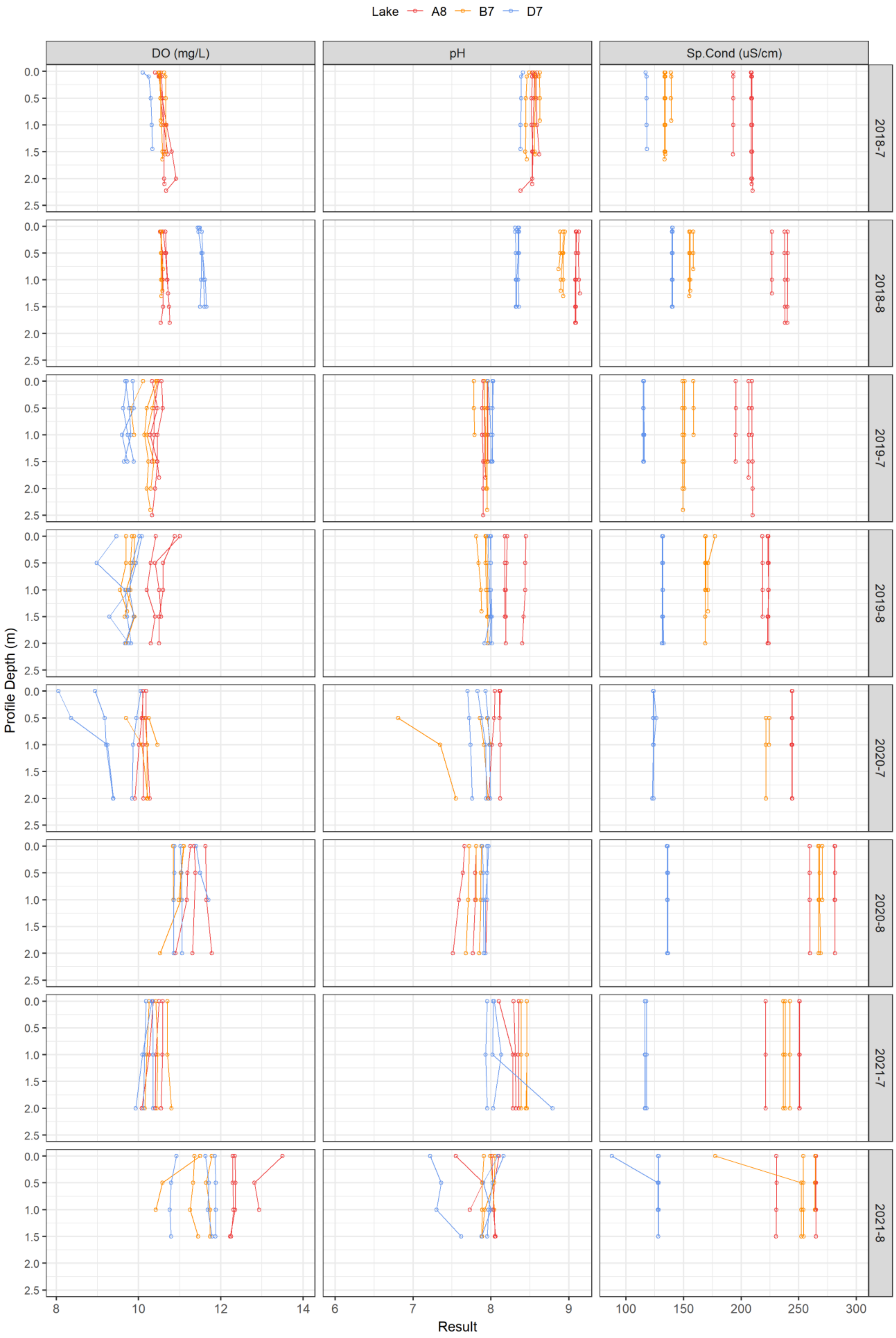
The snow sample collected from SNOCOR4 had higher concentrations of most parameters compared to background. The proximity of this station to the Mine, coupled with the prevailing northwesterly winds, means aerial emissions and dust are more likely to be deposited southeast of the Mine. TSS concentrations at SNOCOR4 were 580 mg/L, more than 10-fold higher than background. Other parameters that were more than 10-fold higher than background included aluminum, arsenic, barium, cobalt, iron, lead, manganese, strontium, and titanium. Cobalt had the highest relative concentration compared to background (21-fold higher). Corresponding increases were not evident in the dissolved fraction for most metals. Only aluminum, arsenic, and strontium were detected at concentrations about background in the dissolved fraction. These results show dust is migrating off-site to the south, but the spatial extent of detectable changes in snow pack chemistry are limited to the area immediately southeast of the Mine and did not extend as far as SNOCOR5 located south of the exploration camp.

5.5.2 Field-Measured Water Quality Parameters

Limnology profiles for the Peninsula Lakes in July and August 2021 are presented in **Figure 5-1**. The small size and shallow depth of the Peninsula Lakes means oxygen, pH, temperature, and specific conductivity are well mixed vertically (top to bottom in the water column) and horizontally (between stations). Dissolved oxygen concentrations were above 10 mg/L in each lake. The Peninsula Lakes are slightly alkaline, with pH typically measuring between 7.5 and 8.5. pH has remained stable during operations.

Specific conductivity was predicably lower at Lake D7 in 2021 compared to Lake B7 and Lake A8 that are located adjacent to the mine. Since 2018, conductivity at Lake D7 has remained stable at 130 to 140 µS/cm. Closer to the mine, at Lake A8, conductivity was between 230 µS/cm and 275 µS/cm in July and August. Conductivity in Lake B7 was less variable than Lake A8 at 240 µS/cm to 250 µS/cm. Conductivity in both lakes appears to have leveled off after successive years where conductivity readings were trending higher.

Figure 5-1. *In-situ* limnology profiles at the Peninsula Lakes, 2018 – 2021



5.5.3 Lake D7

Summary statistics and water quality screening results for Lake D7 are provided in **Table 5-2** for the short-list of parameters that exceeded the normal range in at least one sample in 2021. Aluminum, lead, titanium, and vanadium exceeded the upper limit of baseline concentrations in Lake D7 in 2021 (**Table 5-3**). Of these parameters, only aluminum and titanium exceeded their normal ranges by 10% and were also at least 5 times the analytical detection limit[15]. None of these parameters exceeded their respective AEMP Benchmarks or Action Levels in 2021 and the annual mean concentrations were also below FEIS predictions.

The annual mean concentration of aluminum in 2021 was 13.8 µg/L, nearly double the 7.3 µg/L reported in 2020 and over two-fold greater than the normal range of 6.7 µg/L. The range of concentrations was quite narrow across both months at 12.5 to 15.6 µg/L, which implies the change occurred during freshet. A similar temporal trend was evident for total titanium; the mean concentration in 2021 was 0.83 µg/L, more than double the normal range of 0.34 µg/L. Furthermore, concentrations have increased year-over-year since 2018.

Corresponding increases were not observed for dissolved aluminum (**Figure 5-4**) or dissolved titanium (**Figure 5-7**). The comparatively low and stable concentrations of dissolved aluminum and titanium relative to the unfiltered fraction indicate metals are likely complexed/adsorbed to particulates in the water column rather than existing as free ions. This provides another line of evidence that runoff during freshet was the source of higher concentrations of these metals in 2021.

5.5.4 Lake A8

Summary statistics and water quality screening results for Lake A8 are provided in **Table 5-3** for the short-list of parameters that exceeded the normal range in at least one sample in 2021. No exceedances of AEMP Benchmarks or Action Levels were detected in any of the samples collected from Lake A8 in July and August 2021.

Most parameters in Lake A8 were detected at higher concentrations compared to Lake D7 because Lake A8 closer to the Mine and susceptible to changes in water quality from dust deposition and aerial emissions. Notwithstanding this fact, most parameters were below their respective normal ranges in 2021. Parameters that did exceed their respective normal ranges were ammonia (2.25-fold increase), aluminum (1.8-fold increase), arsenic (2.0-fold increase), lead (1.81-fold increase), and molybdenum (1.2-fold increase). Ammonia results should be interpreted with caution because the detection limit for

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[15] The BC Environmental Laboratory Technical Advisory Committee recommends 5-times the analytical detection limit as a guide for assessing analytical accuracy for laboratory duplicates based on measurement uncertainty estimates from various laboratories (Link to document).

the August sampling event (0.05 mg/L) was nearly 5-times greater than the normal range (0.011 mg/L). In the case of the metals, concentrations exceeded the normal range by more than 10% and were greater than 5-times the detection limit.

Year-over-year changes in the annual mean concentration during early operations (2019-2021) are presented in **Table 5-5** and in **Figure 5-4** [Al, As], **Figure 5-5** [Pb], and **Figure 5-6** [Mo]. The biggest change for most of these parameters occurred between 2019 and 2020 except for aluminum where concentrations decreased between 2019 and 2020. The temporal pattern of changes in water quality during operations coincides with the development of the Tiriganiaq deposit to the north of Lake A8 (**Figure 2-2**; **Table 2-2**). Dust deposition is the likely source as indicated by higher concentrations of metals in the snow core sample collected at the north end of the lake in April 2021. However, the cumulative effect of non-point source discharges to water quality in Lake A8 appears to be minor as metals and other parameters did not show year-over-year increases in 2021 compared to 2020. Lastly, concentrations measured in Lake A8 remain well below the AEMP Benchmarks to protect of aquatic life.

5.5.5 Lake B7

No exceedances of AEMP Benchmarks or Action Levels were detected in any of the samples collected from Lake B7 in July and August 2021 (**Table 5-4**). As expected, Lake B7 had a longer list of parameters that exceed the normal range given its proximity to the TSF. The following parameters exceeded their respective normal ranges in 2021: chloride, sodium, sulphate, ammonia, DOC, antimony, arsenic, barium, cobalt, lithium, molybdenum, strontium, and uranium. Sodium was a new addition to the list of parameters that exceeded the normal range in 2021. The other parameters exceeded the normal range in 2020. Cobalt, which was on the list in 2020, trended lower in 2021 and the annual mean concentration was less than the 90th percentile baseline concentrations (**Figure 5-5**).

Year-over-year changes in the annual mean concentration during early operations (2019-2021) are presented in **Table 5-6**. Similar to Lake A8, the largest increase for most parameters occurred between 2019 and 2020. From 2020 to 2021, the pattern of change varied with some parameters increasing (sodium, sulphate, DOC, arsenic, strontium, and uranium), some decreasing (antimony, lithium, and molybdenum), and others remaining stable (Chloride, lithium, and barium). Overall, water quality results from Lake B7 align with the prediction that water quality would change compared to baseline during construction and operations, but the magnitude of the change would be less than guidelines for the protection of aquatic life and human health (AEMP Benchmarks).

Table 5-2. Lake D7 Water Quality Assessment.

			Screening Criteria				Summary Statistics for Lake A8 in 2021							
Parameter	**Units**	**Detection Limit**	**Normal Range**	**FEIS**	**AEMP Benchmark**	**AEMP Action Level**	**N**	**N<DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**
Nutrients and Organic Carbon														
Ammonia (as N)	mg/L	0.005 | 0.05	0.009	0.086	0.141	0.106	6	3	-	0.0384	-	-	0.0154	0.05
Nitrate (as N)	mg/L	0.005	0.005	1.2	2.9	2.17	6	4	-	0.005	-	-	0.005	0.0164
Dissolved Organic Carbon	mg/L	0.5	5.1	-	-	-	6	0	4.62	4.62	0.636	0.259	3.84	5.27
Total Metals														
Aluminum (T)	ug/L	1	6.7	37	100	75	6	0	**13.8**	13.7	1.27	0.519	12.5	15.6
Antimony (T)	ug/L	0.02	0.03	0.13	6	4.5	6	5	-	0.02	-	-	0.02	0.038
Arsenic (T)	ug/L	0.02	1.2	1.3	25	18.8	6	0	1.13	1.11	0.163	0.0665	0.963	1.32
Cadmium (T)	ug/L	0.005	0.005	0.071	0.0745	0.0559	6	2	0.00473	0.0051	0.00186	0.000759	0.005	0.0068
Chromium (T)	ug/L	0.1	0.06	1.6	5	3.75	6	5	-	0.1	-	-	0.1	0.11
Cobalt (T)	ug/L	0.005	0.05	0.33	0.78	0.585	6	0	0.05	0.0501	0.00253	0.00103	0.0466	0.0536
Lead (T)	ug/L	0.01	0.02	0.14	5	3.75	6	0	**0.0485**	0.046	0.0146	0.00594	0.033	0.072
Molybdenum (T)	ug/L	0.05	0.48	0.61	73	54.8	6	0	0.466	0.475	0.078	0.0319	0.377	0.545
Nickel (T)	ug/L	0.05	0.75	2.3	25	18.8	6	0	0.693	0.697	0.0715	0.0292	0.608	0.762
Titanium (T)	ug/L	0.05	0.34	2.38	-	-	6	0	**0.826**	0.854	0.0893	0.0365	0.688	0.909
Vanadium (T)	ug/L	0.05	0.07	0.71	-	-	6	0	**0.123**	0.121	0.0315	0.0129	0.093	0.154
Zinc (T)	ug/L	0.5	2	5.8	-	-	6	1	1.67	1.57	1.02	0.415	0.5	3.08
Zinc (D)	ug/L	0.5	1.4	-	10.8	8.1	6	3	-	0.86	-	-	0.5	2

Notes:
"-"mean, SD, and SE is not calculated if >50% of the samples were below the detection limit.
Bold values indicate the mean concentration is greater than the upper limit of the normal range.
Gray highlighted cells indicate the mean concentration exceeds the FEIS prediction (Agnico Eagle, 2014).

Table 5-3. Lake A8 Water Quality Assessment

			Screening Criteria			Summary Statistics for Lake A8 in 2021							
Parameter	Units	Detection Limit	Normal Range	AEMP Benchmark	AEMP Action Level	N	N<DL	Mean	Median	SD	SE	Min	Max
Major Ions													
Sodium (T)	mg/L	0.02	8.4	-	-	6	0	7.48	7.46	1.01	0.413	6.33	8.68
Sulphate	mg/L	0.3	9.3	218	164	6	0	9.06	8.35	2.1	0.856	6.43	11.6
Nutrients and Organic Carbon													
Ammonia (as N)	mg/L	0.005 | 0.05	0.011	0.141	0.106	6	2	**0.025**	0.0314	0.0241	0.00984	0.005	0.071
Dissolved Organic Carbon	mg/L	0.5	4.9	-	-	6	0	4.6	4.47	0.79	0.322	3.76	6.01
Total Organic Carbon	mg/L	0.5	4.7	-	-	6	0	4.55	4.44	0.649	0.265	4.01	5.77
Total Metals													
Aluminum (T)	ug/L	1	3	100	75	6	0	**5.38**	5.4	1.16	0.474	4.1	7.3
Arsenic (T)	ug/L	0.02	2.4	25	18.8	6	0	**4.88**	5.15	1.6	0.654	2.76	6.66
Boron (T)	ug/L	5	5	1500	1120	6	2	4.73	5.6	1.75	0.713	5	6.2
Copper (T)	ug/L	0.05	0.89	2.04	1.53	6	0	0.833	0.78	0.138	0.0563	0.722	1.07
Iron (T)	ug/L	1	67	1060	795	6	0	54.2	51.4	15.4	6.3	40.8	82.4
Lead (T)	ug/L	0.01	0.03	5	3.75	6	0	**0.054**	0.0505	0.0182	0.00742	0.032	0.077
Manganese (T)	ug/L	0.05	13	120	90	6	0	7.68	7.14	3.7	1.51	3.9	13.8
Molybdenum (T)	ug/L	0.05	0.22	73	54.8	6	0	**0.27**	0.268	0.0241	0.00985	0.242	0.303
Nickel (T)	ug/L	0.05	0.92	83.6	62.7	6	0	0.768	0.735	0.116	0.0475	0.645	0.976
Selenium (T)	ug/L	0.04	0.02	1	0.75	6	5	-	0.04	-	-	0.04	0.042
Titanium (T)	ug/L	0.05	0.25	-	-	6	1	0.166	0.174	0.11	0.0448	0.05	0.317
Uranium (T)	ug/L	0.001	0.054	15	11.2	6	0	0.0537	0.0526	0.00761	0.00311	0.0418	0.0637
Vanadium (T)	ug/L	0.05	0.01	-	-	6	4	-	0.05	-	-	0.05	0.06

Notes:

"-"mean, SD, and SE is not calculated if >50% of the samples were below the detection limit.

Bold values indicate the mean concentration is greater than the upper limit of the normal range.

Table 5-4. Lake B7 Water Quality Assessment.

			Screening Criteria			Summary Statistics for Lake B7 in 2021							
Parameter	Units	Detection Limit	Normal Range	AEMP Benchmark	AEMP Action Level	N	N<DL	Mean	Median	SD	SE	Min	Max
Major Ions													
Chloride	mg/L	0.1	25	120	90	6	0	**40.2**	40	4.14	1.69	36.2	45.2
Sodium (T)	mg/L	0.02	7.5	-	-	6	0	**7.68**	7.64	0.307	0.125	7.39	8.21
Sulphate	mg/L	0.3	6	218	164	6	0	**9.44**	9.11	2.01	0.822	7.61	12.2
Nutrients and Organic Carbon													
Ammonia (as N)	mg/L	0.005 | 0.05	0.025	0.141	0.106	6	1	**0.055**	0.0323	0.0614	0.0251	0.012	0.151
Nitrate (as N)	mg/L	0.005	0.005	2.9	2.17	6	5	-	0.005	-	-	0.005	0.0089
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	6	4	-	0.001	-	-	0.001	0.0014
Total Phosphorus	mg/L	0.003	0.01	0.01	0.0075	6	0	0.0096	0.00805	0.00402	0.00164	0.0061	0.0162
Dissolved Organic Carbon	mg/L	0.5	5.5	-	-	6	0	**5.56**	5.52	0.697	0.285	4.8	6.29
Total Metals													
Antimony (T)	ug/L	0.02	0.02	6	4.5	6	0	**0.035**	0.035	0.00228	0.000931	0.032	0.039
Arsenic (T)	ug/L	0.02	1.8	25	18.8	6	0	**6.25**	6.24	1.14	0.467	4.97	8.15
Barium (T)	ug/L	0.02	20	1000	750	6	0	**25.4**	25.5	0.299	0.122	25	25.8
Cobalt (T)	ug/L	0.005	0.05	0.936	0.702	6	0	**0.053**	0.0546	0.0068	0.00277	0.043	0.0623
Lithium (T)	ug/L	0.5	7.5	-	-	6	0	**19.8**	19.8	0.632	0.258	18.9	20.6
Molybdenum (T)	ug/L	0.05	0.24	73	54.8	6	0	**0.301**	0.316	0.0348	0.0142	0.244	0.338
Selenium (T)	ug/L	0.04	0.04	1	0.75	6	3	-	0.045	-	-	0.04	0.062
Strontium (T)	ug/L	0.02	155	2500	1880	6	0	**302**	300	10.4	4.23	288	317
Uranium (T)	ug/L	0.001	0.03	15	11.2	6	0	**0.056**	0.0561	0.00756	0.00308	0.048	0.0665
Vanadium (T)	ug/L	0.05	0.01	-	-	6	3	-	0.054	-	-	0.05	0.065
Zinc (T)	ug/L	0.5	1.9	-	-	6	0	1.16	0.995	0.705	0.288	0.58	2.36

Notes:

"-"mean, SD, and SE is not calculated if >50% of the samples were below the detection limit.

Bold values indicate the mean concentration is greater than the upper limit of the normal range.

Table 5-5. Temporal assessment of parameters exceeding the normal range at Lake A8 during early operations (2019-2021).

Parameter	2021		2020		2019
	Annual mean	% Change from	Annual mean	% Change from	Annual mean
Nutrients and Organic Carbon (mg/L)					
Ammonia (as N)	0.0247	-43%	0.0433	39%	0.031
Total Metals (µg/L)					
Aluminum	5.38	20%	4.47	-13%	5.15
Arsenic	4.88	-9%	5.39	131%	2.33
Lead	0.0543	-18%	0.0663	22%	0.055
Molybdenum	0.272	-1%	0.274	44%	0.19

Notes:
% Change = refers to the year change in the mean concentration.

Table 5-6. Temporal assessment of parameters exceeding the normal range at Lake B7 during early operations (2019-2021).

Parameter	2021		2020		2019
	Annual mean	% Change from	Annual mean	% Change from	Annual mean
Major Ions (mg/L)					
Chloride	40.2	3%	38.9	45%	26.9
Sodium	7.68	12%	6.86	28%	5.35
Sulphate	9.44	15%	8.22	39%	5.90
Nutrients and Organic Carbon (mg/L)					
Ammonia (as N)*	0.0549	150%	0.022	20%	0.018
Dissolved Organic Carbon	5.56	13%	4.920	18%	4.162
Total Metals (µg/L)					
Antimony	0.035	-49%	0.069	167%	0.026
Arsenic	6.25	15%	5.45	205%	1.79
Barium	25.4	3%	24.7	28%	19.4
Cobalt	0.053	-24%	0.070	35%	0.052
Lithium	19.8	1%	19.6	55%	12.6
Molybdenum	0.301	-79%	1.42	714%	0.18
Strontium	302	11%	273	33%	205
Uranium	0.0562	29%	0.044	74%	0.025

Notes:
% Change = refers to the year change in the mean concentration.
* Interpret the ammonia (as N) results with caution because of the elevated detection limit in August 2021 (0.05 mg/L).

5.6 Conclusions and Recommendations

Results of the 2021 water quality monitoring program for the Peninsula Lakes are summarized below in the context of the key questions stated in **Section 5.2**. The Low Action Level assessment for the Peninsula Lakes water quality results is presented in **Section 13.2**.

Key Question: Has water quality in the exposure areas changed over time relative to baseline conditions?

The concentrations of some parameters have increased over time, most notably at Lake B7 and Lake A8 which are close to major infrastructure. Overall, water quality results from Lake A8 and Lake B7 align with the prediction that water quality would change during construction and operations relative to baseline, but the magnitude of the change would be minor and concentrations would be less than guidelines meant to protect aquatic life.

Key Question: Are concentrations greater than AEMP Action Levels?

No exceedances of AEMP Action Levels were reported in any of the samples collected from Lake D7, Lake A8, or Lake B7 in 2021.

Snow core samples collected south of the Mine near Lake A8 in 2021 show off-site migration of metals and other parameters is occurring, but the spatial extent appears limited to the area immediately south of Tiriganiaq Pit 1 and 2. Non-point source discharges have likely contributed to the changes in water quality observed at Lake A8 and Lake B7 over time, but there is no evidence of significant year-over-year changes in water quality that pose risks to aquatic life. Overall, efforts to manage and contain contact water and mitigate off-site migration of dust and aerial emissions are working to keep water quality in the Peninsula Lakes safe for aquatic life.

Recommendations

Routine monitoring is recommended at Lake D7, Lake B7, and Lake A8 in 2022 to monitor the effect of mining activities on water quality in the Peninsula Lakes.

5.7 References

Agnico Eagle (Agnico Eagle mines Ltd.) 2021. Conceptual Aquatic Effects Monitoring Program Design Plan – Considerations for the Meliadine Extension. Version 2. December 2021.

Agnico Eagle (Agnico Eagle mines Ltd.) 2021. Conceptual Aquatic Effects Monitoring Program Design Plan – Considerations for the Meliadine Extension. Version 2. December 2021.

Agnico Eagle. 2015. Meliadine Gold Project – Type A Water Licence Main Application Document. April 2015. Version 1.

Agnico Eagle. 2014. Meliadine Gold Project, Nunavut. Final Environmental Impact Statement. Submitted to the Nunavut Impact Review Board. April 2014.

Golder. 2019. Cycle 1 Environmental Effects Monitoring Report and 2018 Aquatic Effects Monitoring Program Annual Report. Submitted to Agnico Eagle mines Ltd – Meliadine Gold mine. March 27, 2019.

Golder. 2018. Aquatic Effects Monitoring Program – 2017 Annual Report. Prepared for Agnico Eagle Mines Limited, Meliadine Division, Rouyn-Noranda, QC. March 2018.

Golder. 2016. Aquatic Effects Monitoring Program (AEMP) Design Plan. Doc 485-1405283 Ver. 1. Submitted to Agnico Eagle mines Limited. June 2016.

5.8 Condensed Temporal Water Quality Plots

The condensed temporal plots show concentrations of major ions, nutrients, and metals in surface water samples from the Peninsula Lakes since 2015. The green line indicates the normal range, which corresponds to the upper 90th percentile concentration for samples collected during baseline and from the reference areas. The orange line represents the AEMP Action Level, which equals 75% of the AEMP Benchmark (aquatic life guideline or human health water quality guideline).

List of Condensed Temporal Plots

Figure 5-2. Total dissolved solids and constituent major Ions in surface water samples from the Peninsula Lakes since 2015.

Figure 5-3. Conductivity and concentrations of selected nutrients in surface water samples from the Peninsula Lakes since 2015.

Figure 5-4. Concentrations of aluminum, arsenic, barium, and boron in surface water samples from the Peninsula Lakes since 2015.

Figure 5-5. Concentrations of cobalt, copper, iron, and lead in surface water samples from the Peninsula Lakes since 2015.

Figure 5-6. Concentrations of lithium, manganese, molybdenum, and nickel in surface water samples from the Peninsula Lakes since 2015.

Figure 5-7. Concentrations of strontium, titanium, uranium, and zinc in surface water samples from the Peninsula Lakes since 2015.

Figure 5-2. Total dissolved solids and constituent major Ions in surface water samples from the Peninsula Lakes since 2015.

Notes: Normal range = the upper 90th prediction interval or percentile of baseline concentrations (pre-2018). Action Level = 75% of the AEMP Benchmark. The second sampling event in 2018 spanned late August (Lake A8 and Lake B7) and early September (Lake D7).

Figure 5-3. **Conductivity and concentrations of selected nutrients in surface water samples from the Peninsula Lakes since 2015.**

Notes: Normal range = the upper limit of baseline concentrations (pre-2018). Action Level = 75% of the AEMP Benchmark. The second sampling event in 2018 spanned late August (Lake A8 and Lake B7) and early September (Lake D7).

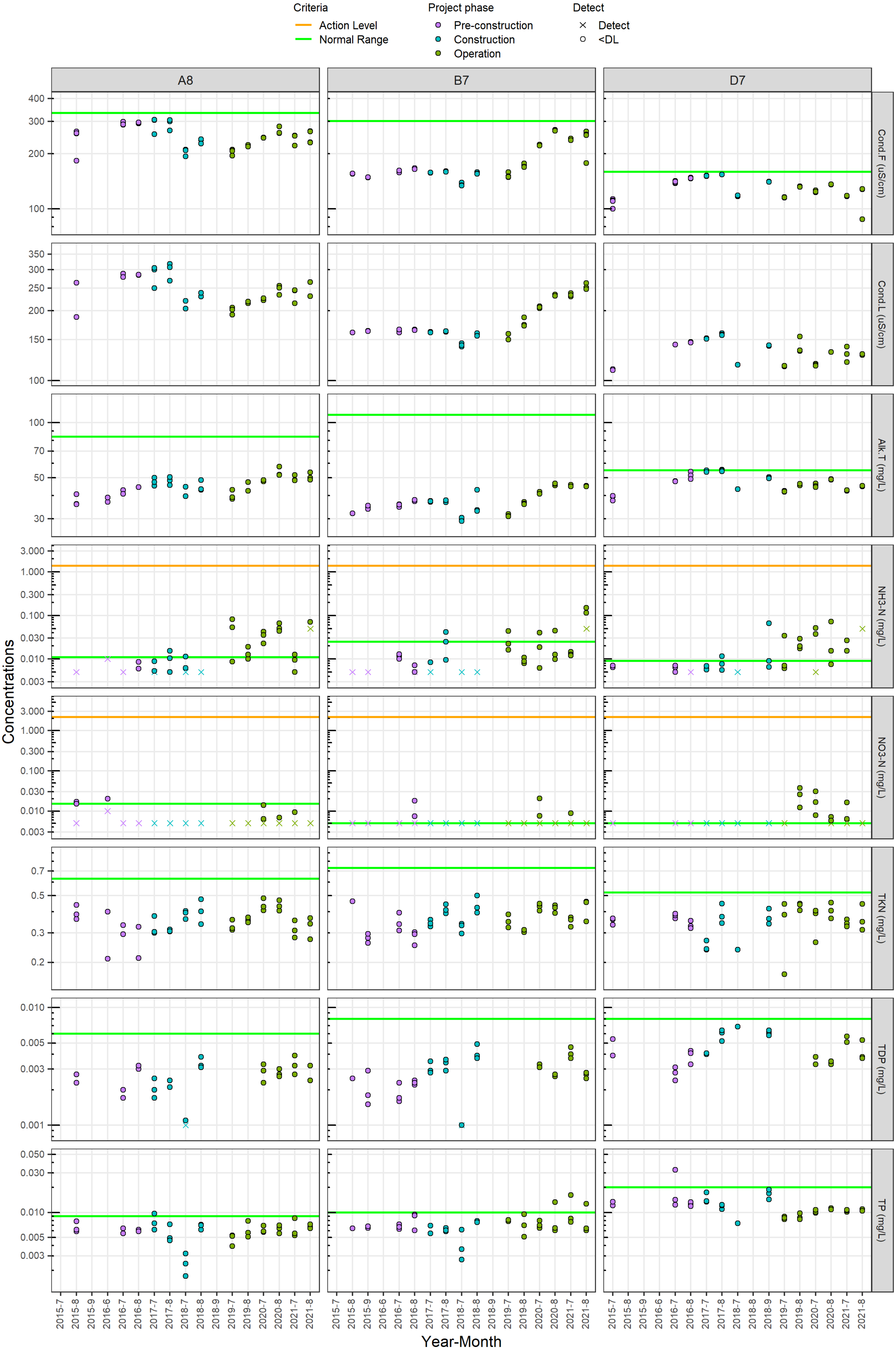


Figure 5-4. Concentrations of aluminum, arsenic, barium, and boron in surface water samples from the Peninsula Lakes since 2015.

Notes: Normal range = the upper limit of baseline concentrations (pre-2018). Action Level = 75% of the AEMP Benchmark. The second sampling event in 2018 spanned late August (Lake A8 and Lake B7) and early September (Lake D7).

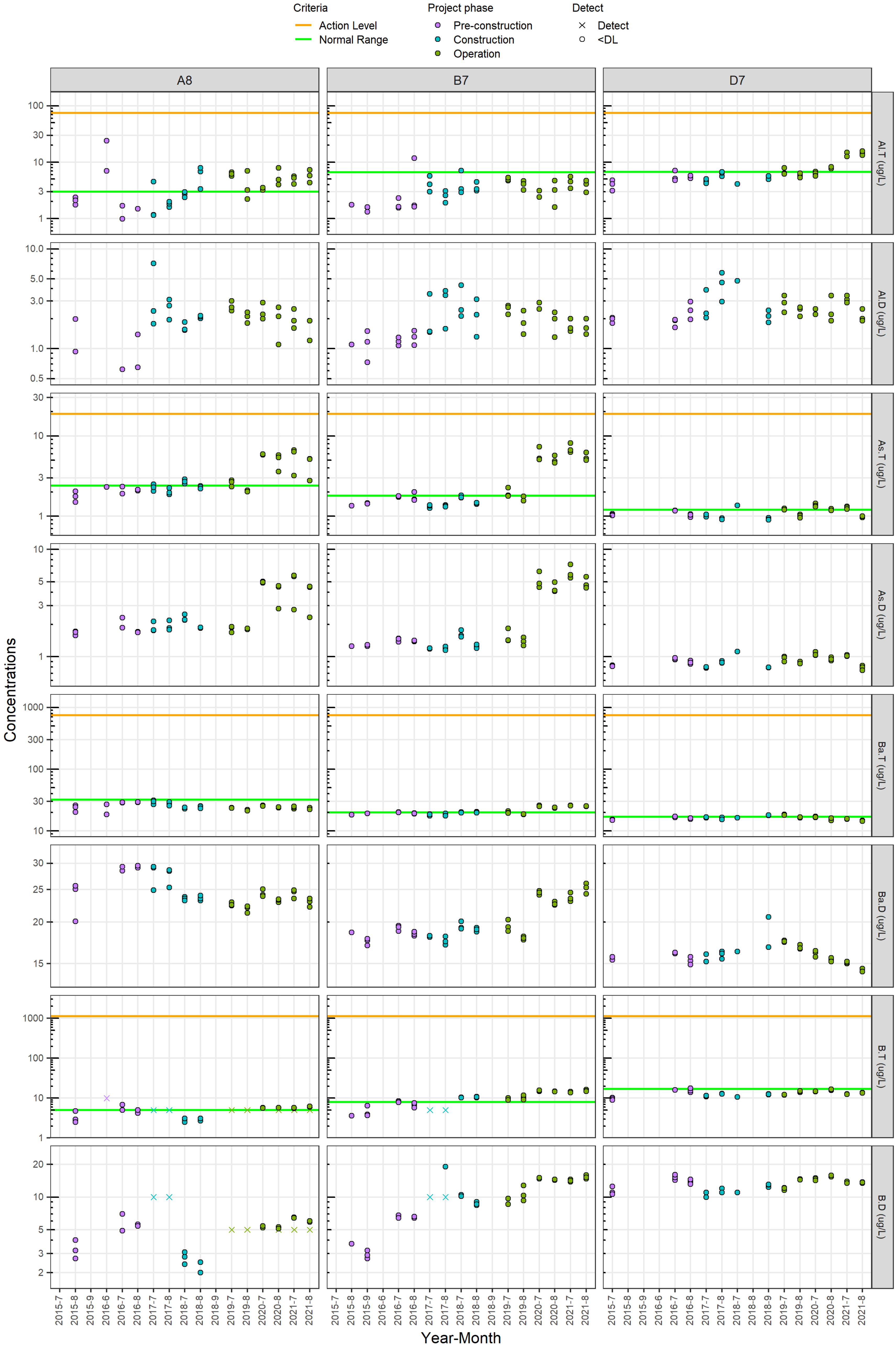


Figure 5-5. **Concentrations of cobalt, copper, iron, and lead in surface water samples from the Peninsula Lakes since 2015.**

Notes: Normal range = the upper limit of baseline concentrations (pre-2018). Action Level = 75% of the AEMP Benchmark. The second sampling event in 2018 spanned late August (Lake A8 and Lake B7) and early September (Lake D7).

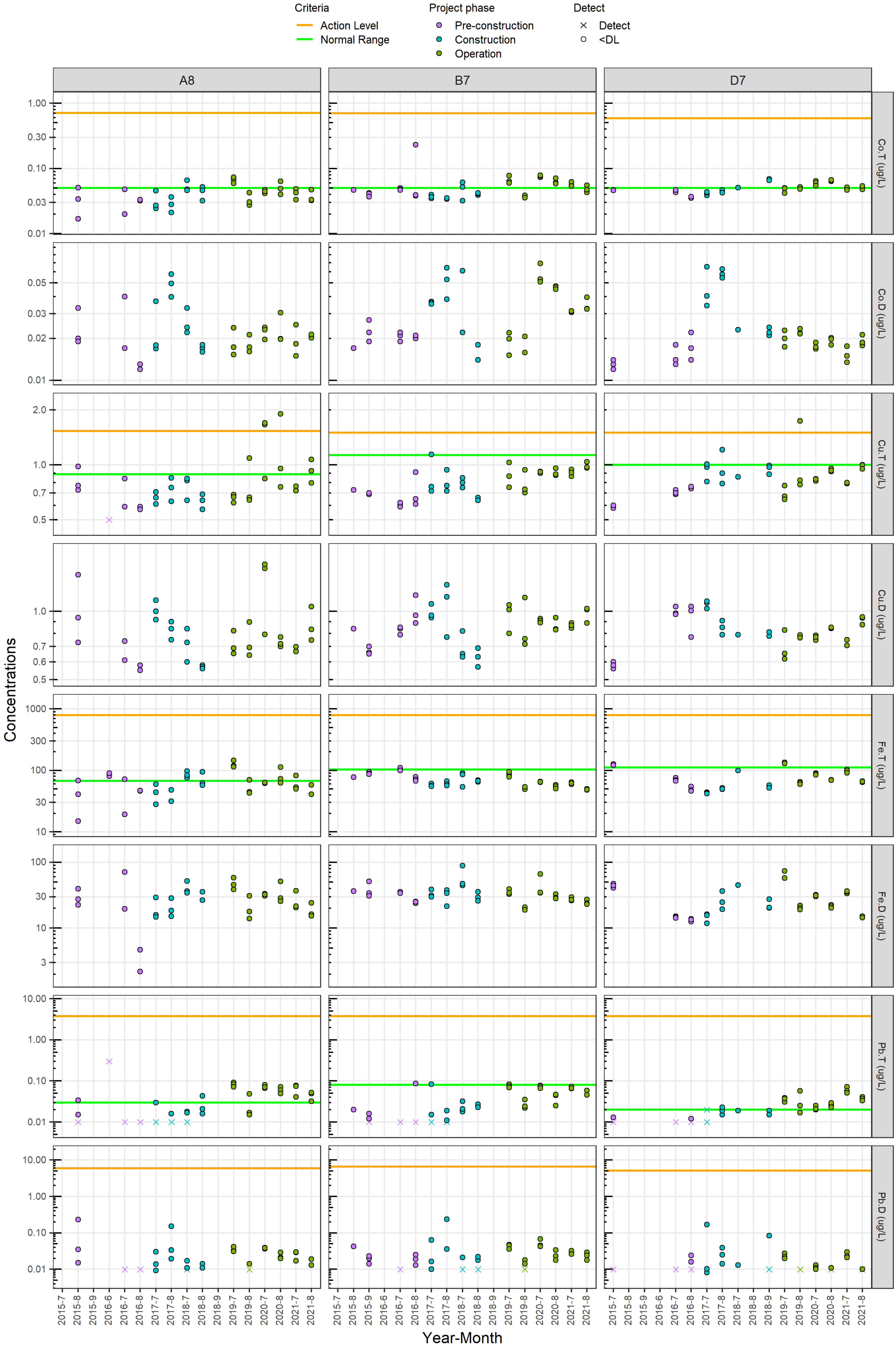


Figure 5-6. Concentrations of lithium, manganese, molybdenum, and nickel in surface water samples from the Peninsula Lakes since 2015.

Notes: Normal range = the upper limit of baseline concentrations (pre-2018). Action Level = 75% of the AEMP Benchmark. The second sampling event in 2018 spanned late August (Lake A8 and Lake B7) and early September (Lake D7).

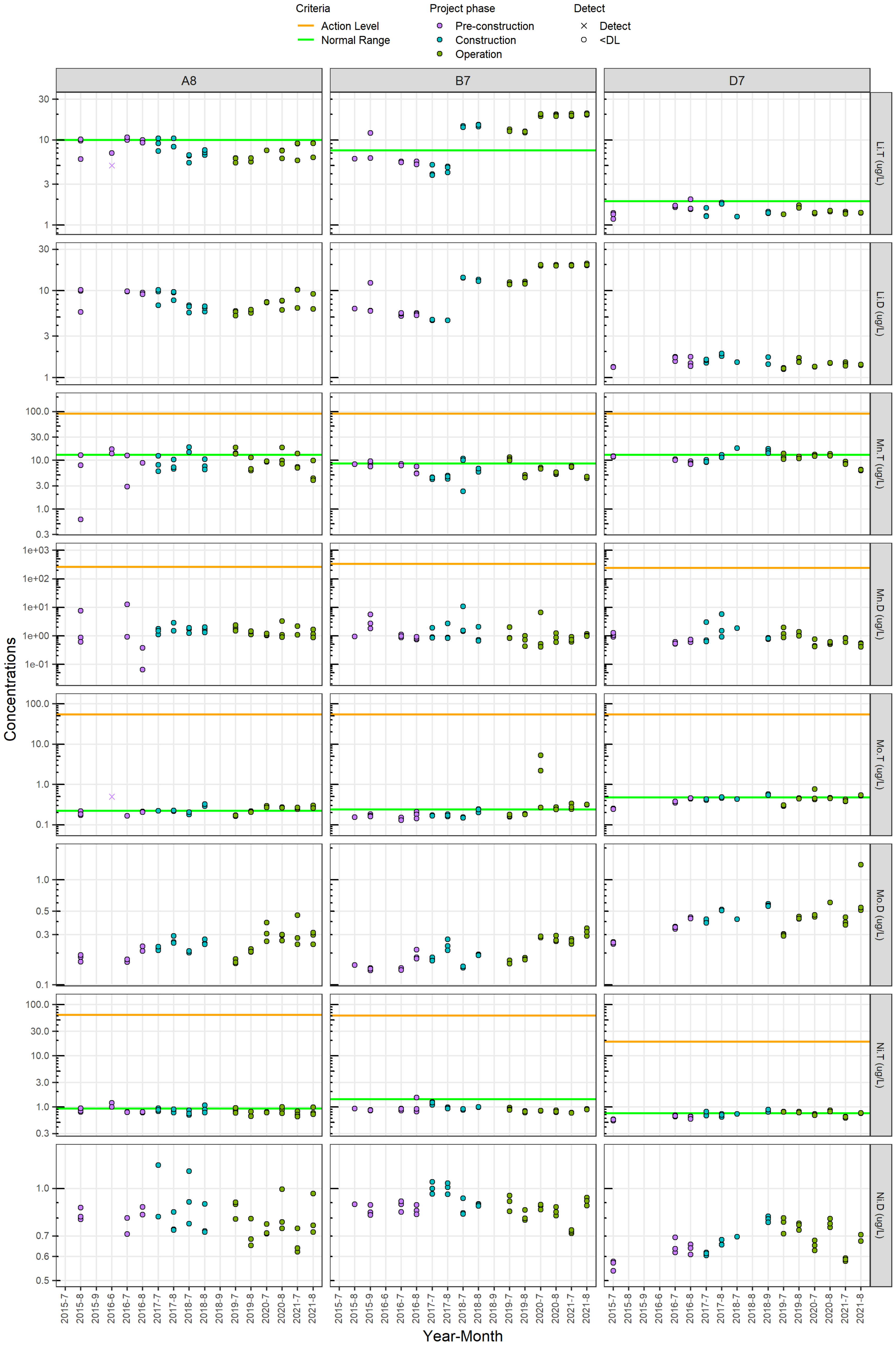
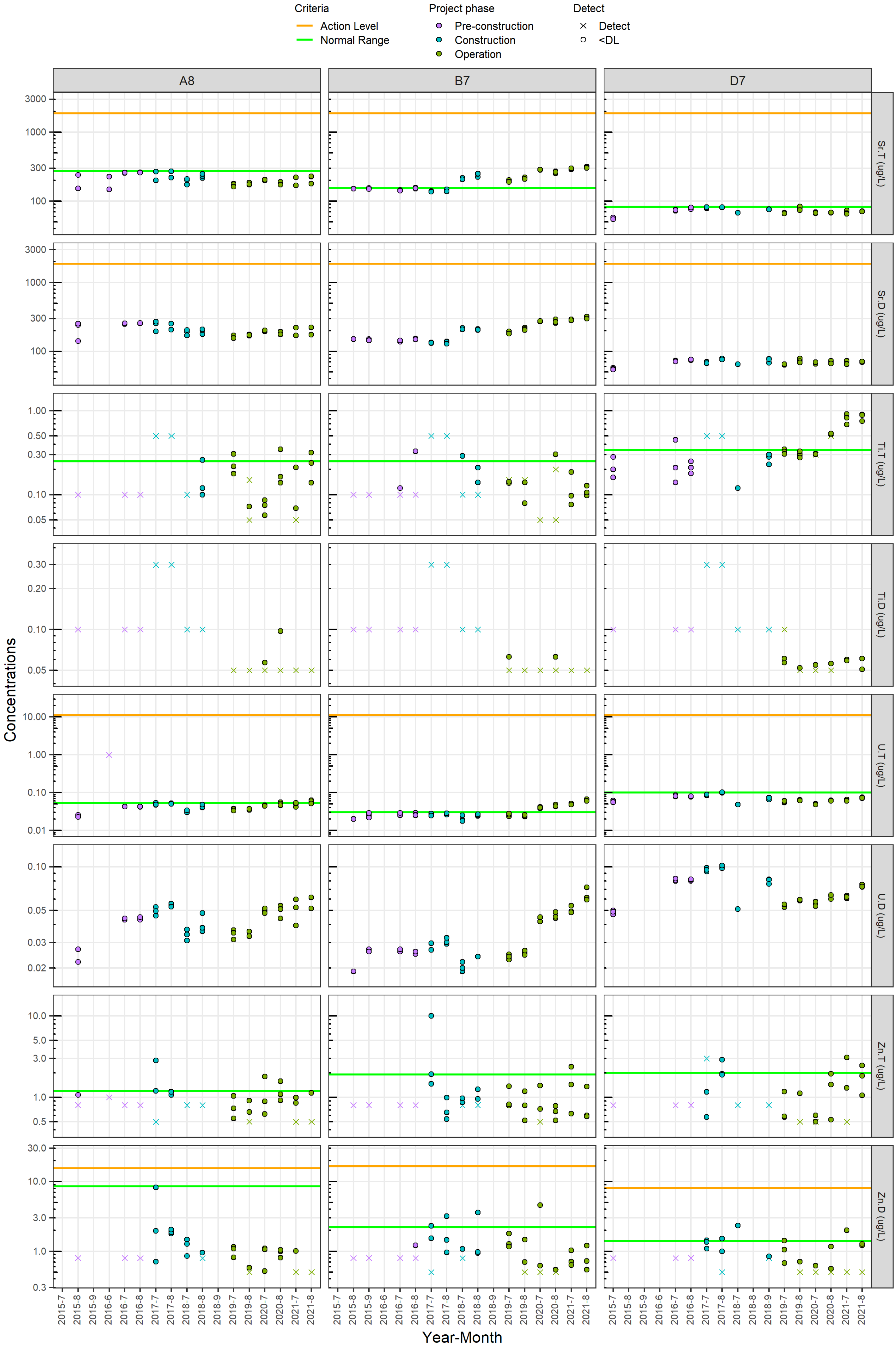


Figure 5-7. Concentrations of strontium, titanium, uranium, and zinc in surface water samples from the Peninsula Lakes since 2015.

Notes: Normal range = the upper limit of baseline concentrations (pre-2018). Action Level = 75% of the AEMP Benchmark. The second sampling event in 2018 spanned late August (Lake A8 and Lake B7) and early September (Lake D7).



6 PHYTOPLANKTON COMMUNITY

6.1 Introduction

This chapter presents findings of the August 2021 phytoplankton study in Meliadine Lake. Sampling areas and stations are collocated with the water quality monitoring stations shown in **Figure 4-1**.

Phytoplankton, or algae, are a diverse group of primary producers that exist freely in the water column, converting sunlight to chemical energy via the photosynthetic pigment chlorophyll-a. Phytoplankton populations and their subsequent photosynthetic productivity will fluctuate due to several factors, most of which are related to seasonal changes. The largest influence on phytoplankton growth is nutrient availability. While sunlight levels affect productivity, nutrient levels affect phytoplankton growth and populations (Wetzel, 2001). The amount of chlorophyll-a in water is one way to estimate the primary productivity of lakes. However, a more direct measurement of primary productivity is phytoplankton biomass, or the weight of all the algae per unit of water (mg/m^3).

Phytoplankton studies have provided meaningful insight into the structure and function of the phytoplankton community in Meliadine Lake as the mine transitioned from the pre-construction phase (2015) to operations. Furthermore, as the only biological monitoring program conducted annually under the AEMP, the phytoplankton study provides important information on the health of the aquatic environment in Meliadine Lake in years when fish and benthic invertebrate studies aren't completed as part of the 3-year AEMP and EEM cycle (2018, 2021, 2024, etc).

6.2 Objectives and Key Question

The key question for the phytoplankton study is,

> *Is the phytoplankton community in Meliadine Lake adversely affected by potential mine-related changes in water quality?*

Various lines of evidence are explored to help answer this question, including:

1. Spatial and temporal patterns in nutrient concentrations. Increased nutrient loads to Meliadine Lake could result in the stimulation of phytoplankton productivity.
2. Spatial and temporal patterns in phytoplankton metrics. This includes looking at key metrics (biomass, density, and taxa richness) across all taxa (i.e., *total*) or by major taxa group (MTG), as well as looking more closely at changes in community structure using multivariate analyses.

3. Nutrient-productivity relationships. This portion of the analysis involves looking at the spatial/temporal patterns in phytoplankton productivity metrics and comparing them to corresponding nutrient concentrations to determine if the patterns are linked.
4. Assess spatial and temporal patterns in Trophic Status Index (TSI). TSI has been used to classify estimated productivity of lakes based on phosphorus, chlorophyll-a, and/or Secchi depth.

6.3 Findings from the 2021 Phytoplankton Study

- Concentrations of nitrogen and phosphorus did not increase in the east basin of Meliadine Lake in 2021. Notwithstanding seasonal and annual variability, concentrations of both nutrients have remained relatively stable since effluent discharge began in 2018.
- Chlorophyll-a concentrations increased at the near-field (NF) and mid-field (MF) areas in 2021. Chlorophyll-a at the reference areas has remained stable over time. The increase in chlorophyll-a observed at the NF and MF areas were not correlated with nitrogen or phosphorus concentrations in surface water. It is important to note that chlorophyll-a is only an indicator of phytoplankton productivity; phytoplankton biomass (see next bullet) is a more direct measure of primary productivity.
- Phytoplankton biomass at the NF area in 2021 was similar to 2019 at approximately 400 mg/m^3. Phytoplankton biomass in the NF area is typically higher than the MF and reference areas, indicating the east basin of Meliadine Lake may be a naturally more productive area.
- Multivariate analysis indicated the NF and MF phytoplankton communities in 2021 were similar to previous years, indicating effluent (specifically nitrate) has not caused a shift in the structure of the phytoplankton community in the NF area as was predicted in the FEIS (Agnico Eagle, 2014).
- Routine monitoring of phytoplankton community and chlorophyll-a is recommended in 2022 to verify that discharge of effluent to Meliadine Lake is not causing changes in primary productivity or significant changes in the structure of the phytoplankton community.

6.4 Methods

Plankton monitoring for the AEMP started in 2015 and involved phytoplankton and zooplankton sampling. A critical review of the data from 2015 to 2017 showed limited value in retaining zooplankton as a core component of the AEMP because of high spatial and temporal variability in abundance and biomass (Golder, 2018). Phytoplankton monitoring was not initially included as a core component of the AEMP because there was some uncertainty about the utility of phytoplankton for monitoring mine-related changes in primary productivity. The use of phytoplankton as a biomonitoring tool for changes in the environment is well established (Pienitz et al., 2004), but there can be considerable spatial and temporal variability in community response to environmental conditions that can confound, or obscure, the identification of changes caused by human activities. To streamline the assessment, Golder recommended one sampling event per year in August, the month with the least variability in phytoplankton community endpoints based on the analysis of three-years' worth of data (2015 – 2017).

6.4.1 Field Methods

The phytoplankton study was conducted in parallel with the Meliadine Lake water quality monitoring program in August 2021. The phytoplankton study involved sampling for taxonomy (biomass, richness, and density) and chlorophyll-a. Secchi depth was also recorded to provide another line of evidence when assessing nutrient/productivity relationships. The annual mean and standard error of the Secchi depth readings in each area are provided in **Table 6-1**.

Sampling areas and stations are shown in **Figure 4-1**. Coordinates are listed in **Table 4-1**.

Table 6-1 Secchi depth from the open-water sampling events in 2021.

Area	Secchi Depth (m)	
	Mean	Standard Error
MEL-01	4.49	0.12
MEL-02	5.27	0.32
MEL-03	7.70	0.14
MEL-04	7.60	0.13
MEL-05	7.50	0.23

Field collections and sample analyses were conducted according to methods outlined in the AEMP Design Plan. Water was collected at two-meter intervals from the surface to within 2 m of the bottom of the lake using the Kemmerer. Discrete samples from each depth interval were combined in a clean 20-L bucket to form a composite sample. Triplicate subsamples of the depth-integrated composite were collected for chlorophyll-a. Chlorophyll-a samples were collected by vacuum filtering 500 mL of water through a Whatman glass fiber type C filter with a nominal pore size of 1.2 µm. Filters were shipped frozen to the Biogeochemical Analytical Service Laboratory at the University of Alberta for analysis. Water samples for phytoplankton taxonomy were preserved with 4 mL of Lugol's solution, sealed, and stored in the dark for transportation to Plankton-R-Us (Winnipeg) for taxonomic identification to the lowest practical level and for density and biomass (based on biovolumes).

Prior to 2021, water from the depth-integrated sample was also submitted for nutrient analysis. This program was discontinued in 2021 given that nutrient data is also collected monthly as part of the routine water quality monitoring program. Nutrients data from the August sampling event was paired with the taxonomy and chlorophyll-a data to explore nutrient/productivity relationships.

6.4.2 Laboratory Methods

Phytoplankton Taxonomy

Phytoplankton taxonomic identification was conducted by certified taxonomists at Plankton R Us Inc. (Winnipeg, MB). Phytoplankton were identified and enumerated using the appropriate keys and procedures listed below:

1. Standard taxonomic keys were used and provided with the final counts.
2. Sub-samples (approximately 100 mL) were dispensed into Utermohl-type settling chambers and allowed to settle for a 24-hour period.
3. Each sub-sample was first scanned at increasing magnification under an inverted microscope.
4. All organisms encountered were identified to the lowest possible taxonomic level.
5. Once the identifications were made, the counts are completed. At least 20 random fields were counted until a total count of at least 100 was made for the dominant species if possible.
6. The data was then enumerated by total cell count (cells/mL):

$$Cells\ mL^{-1} = \mathrm{N} \times \left(\frac{A_t}{A_c}\right) \times \left(\frac{1}{V}\right)$$

Where:
A_t= the area of the settling chamber (mm^2),
A_c= the area of the chamber counted (mm^2),
N= the number of units (cells) counted of a specific species, and
V= the volume settled.

7. Cell counts were converted to wet weight biomass (mg/m^3) by estimating cell volume. Estimates of cell volume for each species were obtained by measurements of up to 50 cells of an individual species and applying the geometric formula best fitted to the shape of the cell (Vollenweider, 1968; Rott, 1981). A specific gravity of 1 was assumed for cellular mass.

Chlorophyll-a

Chlorophyll-a analysis was carried out at the University of Alberta according to the standard method Determination of Chlorophyll-a in Water by Fluorometry (Welschmeyer, 1994). The analytical procedure involved extraction, filtration, and flurometric analysis (Shimadzu RF-1501 Spectrofluorophotometer). Chlorophyll-a concentrations were calculated based on 500 mL of water filtered for each sample.

6.4.3 Data Analysis

Summary statistics and data analyses were conducted using R version 3.6.2 (R Core Team, 2022). Phytoplankton metrics (biomass, density, and taxa richness) for individual taxa were summed across all taxa (i.e., total of all organisms) and across major taxa groups (i.e., dinoflagellates, diatoms, cyanophytes, cryptophytes, chrysophytes, and chlorophytes). Nutrient results from the water quality section were merged with the phytoplankton and chlorophyll-a results to investigate nutrient-productivity relationships.

Temporal and Spatial Trends

Time series plots organized by sampling area were used to highlight spatial and temporal patterns in nutrients, chlorophyll-a, and phytoplankton metrics. Phytoplankton populations grow and shrink seasonally, meaning species richness, biomass, and density are expected to vary annually, in response to regional climate patterns, and spatially in response to basin-specific factors such as morphology, timing of ice-off, and nutrient status. A fundamental premise of the temporal and spatial trend assessment was that the phytoplankton community in the various areas of Meliadine Lake will vary from year-to-year, but the NF, MF, and reference area communities should follow the same pattern of change each year. If, however, the phytoplankton community at the NF and MF areas diverges from previous years and from the reference areas, it may indicate water quality is influencing the structure of the community.

Community Structure

Differences in the phytoplankton community among areas and over time were determined using non-metric multidimensional scaling (nMDS). nMDS is an ordination method that takes multidimensional taxonomic data (e.g., biomass for each taxon by station-year combination) and collapses the information into two or three dimensions that capture major patterns of variation in the underlying data. Azimuth follows a nMDS approach based on the reference condition approach (RCA) outlined in the TGD (Environment Canada, 2012). The fundamental premise of RCA is that a suitably large set of baseline and/or reference data can be used to characterize unimpaired conditions in terms of a variety of biological attributes. Patterns in reference area phytoplankton community structure are examined first, to determine the range of reference conditions. Patterns in community structure at the NF (MEL-01) and MF (MEL-02) areas are explored in the context of the results for the reference areas.

Statistical analyses for nMDS were completed in R using the statistical package ‘vegan’ (version 2.5-6) according to the following workflow:

- Data were compiled for major taxa biomass and major taxa richness
  6 major taxa x 2 endpoints [biomass and richness] = 12 metrics.

- The above data set was turned into a Bray-Curtis distance matrix. Next, nMDS was run on the matrix; Shepard plots and stress values were used to optimize results. Stress, in the context of nMDS, refers to how distorted the representation of the data are in two or three dimensions relative to the original multi-dimensionality of the data. Lower stress means a better fit of the data in the reduced dimensionality. Multiple iterations of the analysis are completed to determine which position (or ordination) of points in two or three dimensions produces the lowest stress value. Clarke (1993) suggests the following guidelines for acceptable stress values: <0.05 = excellent, <0.10 = good, <0.20 = usable, >0.20 = not acceptable.
- nMDS results were visualized by first plotting 90th, 95th and 99th percentile probability ellipses using the reference data only. The next step involved adding nMDS scores for NF (MEL-01) and MF (MEL-02) areas for each year. The 90th, 95th and 99th percentile probability ellipses provide a concise way of visualizing whether the phytoplankton community at the NF and MF areas are within the range of baseline/reference conditions for Meliadine Lake.

In the future, other statistical approaches may be implemented on a case-by-case basis to supplement the RCA analyses if the underlying data supports a more detailed investigation of spatial and temporal trends.

Trophic Status

Trophic status is a means of classifying estimated productivity of a lake based on concentrations of key nutrients and chlorophyll-a, and on water transparency. The three main categories of productivity are:

- Oligotrophic (low nutrients, low productivity),
- Mesotrophic (intermediate productivity), and
- Eutrophic (high nutrients, high productivity).

Three parameters are used in the classification of trophic status: total phosphorus, chlorophyll-a, and water transparency. Phosphorus is the primary nutrient used in trophic status indexes because it often limits primary productivity in freshwater systems. Chlorophyll-a is the primary pigment used for photosynthesis in phytoplankton and is used as a surrogate measure of primary production. Water transparency, measured with a Secchi disk, is also used as a coarse indicator of phytoplankton biomass.

Three trophic status indices are included in the assessment as summarized below.

- Vollenweider (1968) – A general classification scheme based on ranges of TP, chlorophyll-a and Secchi depth (**Table 6-2**).
- CCME (2004) – A total phosphorus-specific scheme using trigger ranges (**Table 6-3**).
- Carlson (1977) – Independent index scores for TP, chlorophyll-a and Secchi depth (**Table 6-4**), calculated as follows:

$$TSI_{TP} = 10\left(6 - \left[\frac{\ln\left(^{48}/_{TP}\right)}{\ln 2}\right]\right)$$

$$TSI_{Chl} = 10\left(6 - \left[\frac{2.04 - 0.68(\ln Chl)}{\ln 2}\right]\right)$$

$$TSI_{Secchi} = 10\left(6 - \left[\frac{\ln \text{ Secchi}}{\ln 2}\right]\right)$$

Table 6-2. Trophic classification for lakes based on ranges of total phosphorus, chlorophyll-a and Secchi depth (Vollenweider, 1968).

Trophic Status	Total Phosphorus (mg/L)		Chlorophyll-a (µg/L)		Secchi Depth (m)	
	Mean	Range	Mean	Range	Mean	Range
Oligotrophic	0.008	0.003 to 0.018	1.7	0.3 to 4.5	9.9	5.4 to 28.3
Mesotrophic	0.027	0.011 to 0.096	4.7	3.0 to 11.0	4.2	1.5 to 8.1
Eutrophic	0.084	0.016 to 0.386	14.3	3.0 to 78.0	2.5	0.8 to 7.0

Notes:
Reference = Vollenweider, 1968.

Table 6-3. Trophic classification for lakes based on total phosphorus trigger ranges (CCME, 2004).

Trophic Status	Total Phosphorus (mg/L)
Ultra-oligotrophic (very nutrient-poor)	<0.004
Oligotrophic (nutrient-poor)	0.004 to 0.010
Mesotrophic (containing a moderate level of nutrients)	0.010 to 0.020
Meso-eutrophic (containing moderate to high levels of nutrients)	0.020 to 0.035
Eutrophic (nutrient-rich)	0.035 to 0.100
Hyper-eutrophic (very nutrient-rich)	>0.100

Notes:
Reference = CCME, 2004.

Table 6-4. Trophic status index and general trophic classifications for lakes (Carlson, 1977).

Trophic State Index	Total Phosphorus (mg/L)	Chlorophyll-a (µg/L)	Secchi Depth (m)	General Trophic Classification
<30 to 40	0 to 0.012	0 to 2.6	>8.0 to 4	Oligotrophic
40 to 50	0.012 to 0.024	2.6 to 20	4 to 2	Mesotrophic
50 to 70	0.024 to 0.096	20 to 56	2 to 0.5	Eutrophic
70 to 100+	0.096 to 0.38+	56 to 155+	0.5 to <0.25	Hyper-eutrophic

Notes:
Reference = Carlson, 1977.

6.5 Quality Assurance and Quality Control

Phytoplankton and chlorophyll-a QA/QC followed the general approach outlined in the AEMP Design Plan. The phytoplankton QA/QC program includes field duplicates, laboratory duplicates, and blanks for chlorophyll-a. Details of the QA/QC program are provided in **Appendix A** and summarized below.

- Two field duplicates were collected for phytoplankton taxonomy and chlorophyll-a in 2021, AUG-DUP-01 associated with MEL-01-10 and AUG-DUP-02 associated with MEL-02-03. The data quality objective for field duplicates is less than 50% relative percent difference between the sample and duplicate. The DQO was met for total phytoplankton biomass, total richness, and chlorophyll-a.
- A laboratory blank was analyzed for chlorophyll-a and registered below detection limits.
- Laboratory QC for phytoplankton samples included three randomly selected replicate subsamples (from MEL-01-08, MEL-03-04, MEL-04-05). The relative percent difference between the sample and laboratory duplicate was less than the DDQ of 25%.
- All the laboratory results used in analysis and reporting were screened in a manner similar to the water quality data. A review of the data entry involved an independent party checking a minimum of 10% of the data for completeness, data entry errors, transcription errors, and invalid data. Two phytoplankton taxonomy samples were inadvertently labelled as MEL-03-03. Area MEL-03 is a reference area and the water quality and phytoplankton community in this basin is well-mixed. Both samples were retained in the data set; one of the samples was assigned to station MEL-03-01.

The phytoplankton and chlorophyll-a QA/QC results indicate good collection and analytical methods and a high degree of replicability in sampling.

6.6 Results and Discussion

6.6.1 Background – Historical Data

Phytoplankton studies in Meliadine Lake and other lakes in the region were completed in the late 1990s to support the environmental assessment process. Four locations were sampled throughout Meliadine Lake in July, August, and September of 1997 and 1998. Chrysophytes (golden brown algae) were the dominant taxa group in terms of density and biomass. The community composition was similar throughout the lake and community succession followed a similar pattern of season change during the open water season each year (Golder, 2012). Biomass estimates in 1997 were in the range of 300 to 600 µg/L in July and August. The following year, biomass was approximately 2-fold higher, with values as high as 1,900 µg /L at the south basin in the vicinity of the current monitoring area MEL-05.

Table 6-5. Phytoplankton Community Data from Locations Sampled in Meliadine Lake in 1997 and 1998.

Site	AEMP Area	Date	Density (No. cells/L)	Biomass (mg/m^3)	Richness (No. taxa/site)
ML-E	MEL-01	19 Jul 97	2,008,000	529	56
		17 Aug 97	3,844,000	636	65
		17 Jul 98	2,593,000	1,887	75
		4 Sep 98	4,933,000	1,362	78
ML-S	MEL-05	20 Jul 97	1,863,000	627	73
		16 Aug 97	1,871,000	437	63
		25 Jul 98	3,736,000	1,119	67
		1 Sep 98	5,713,000	1,996	80
ML-SE	SE of MEL-05	22 Jul 98	2,991,000	1,772	83
ML-W	MEL-04	20 Jul 97	2,175,000	483	46
		16 Aug 97	1,135,000	342	52
		27 Jul 98	3,026,000	828	68

The historical data from the late 1990's was not formally included in the dataset for evaluating spatial and temporal trends in the AEMP because of differences in the collection methods. The data are provided for context only with phytoplankton data collected during the AEMP. One additional baseline phytoplankton sampling event was completed in the NF area in August 2013 as part of a wider program tasked with collecting data to help develop the AEMP. Phytoplankton data from this program were included in the AEMP as a point of comparisons for the recent baseline period because the same taxonomist was used for the analysis. However, due to differences in field sampling methods, the results from the 2013 baseline program should be used with caution when comparing against data collected as part of the AEMP.

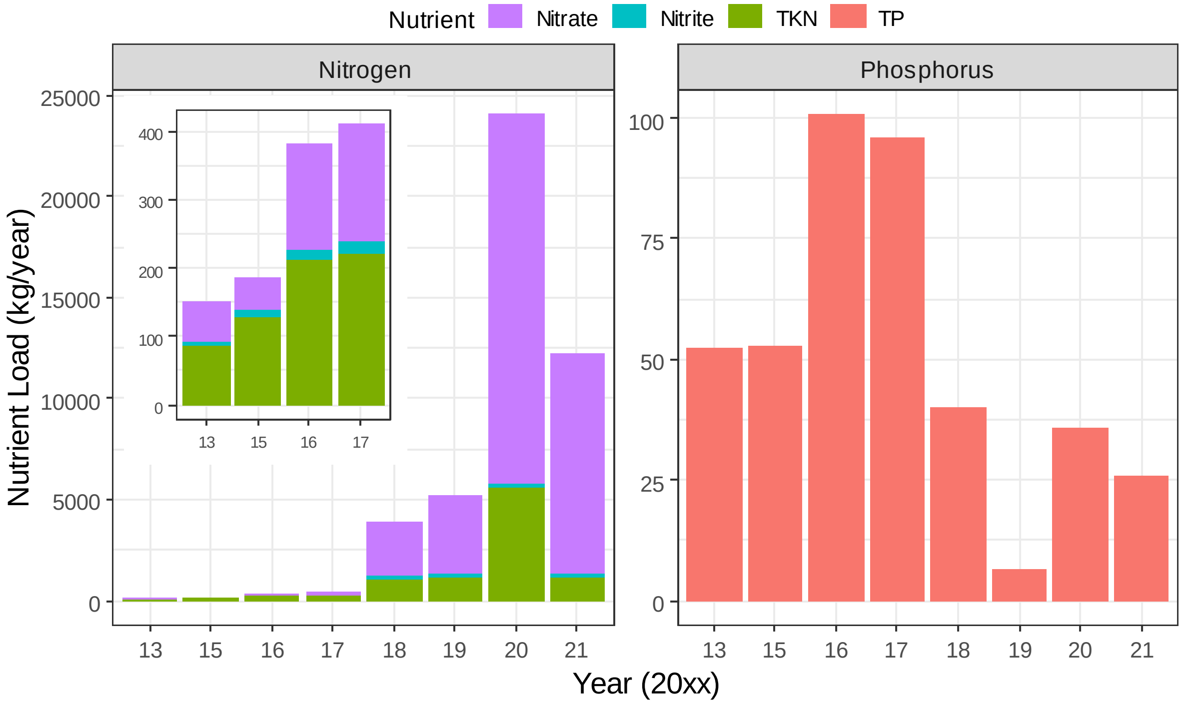
6.6.2 Nutrient Loading to Meliadine Lake

Loadings are calculated each month based on the average monthly concentration measured in samples from MEL-14 and the total volume of effluent discharged to Meliadine Lake. The monthly loadings for key nutrients (e.g., nitrate [NO_3], nitrite [NO_2], total Kjeldahl nitrogen [TKN] [16], and total phosphorous) are presented in this section to help interpret the phytoplankton taxonomy and chlorophyll-a results. Monthly and cumulative loadings for nutrients are provided in **Appendix B**.

Nitrogen loading to Meliadine Lake in 2021 was significantly reduced compared to 2020 (**Figure 6-1**). Residual nitrogen from explosives residue found in waste rock is the primary source of nitrogen in contact water that is ultimately discharged to Meliadine Lake. Inorganic nitrate was the dominant form of nitrogen in the effluent, followed by organic nitrogen as TKN and relatively small amounts of nitrite.

Phosphorus loadings to Meliadine Lake decreased slightly in 2021 compared to 2020. Despite the large volume of water discharged in 2020 and 2021, cumulative phosphorus loading to Meliadine Lake is considerably less than 2013 to 2017 before the main camp sewage treatment plant was operational.

Figure 6-1. Annual loadings (kg/year) of nitrogen and total phosphorus to Meliadine Lake.



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[16] Total Kjeldahl nitrogen is the sum of organic nitrogen and ammonia. Total nitrogen is the sum of nitrate, nitrite, and TKN.

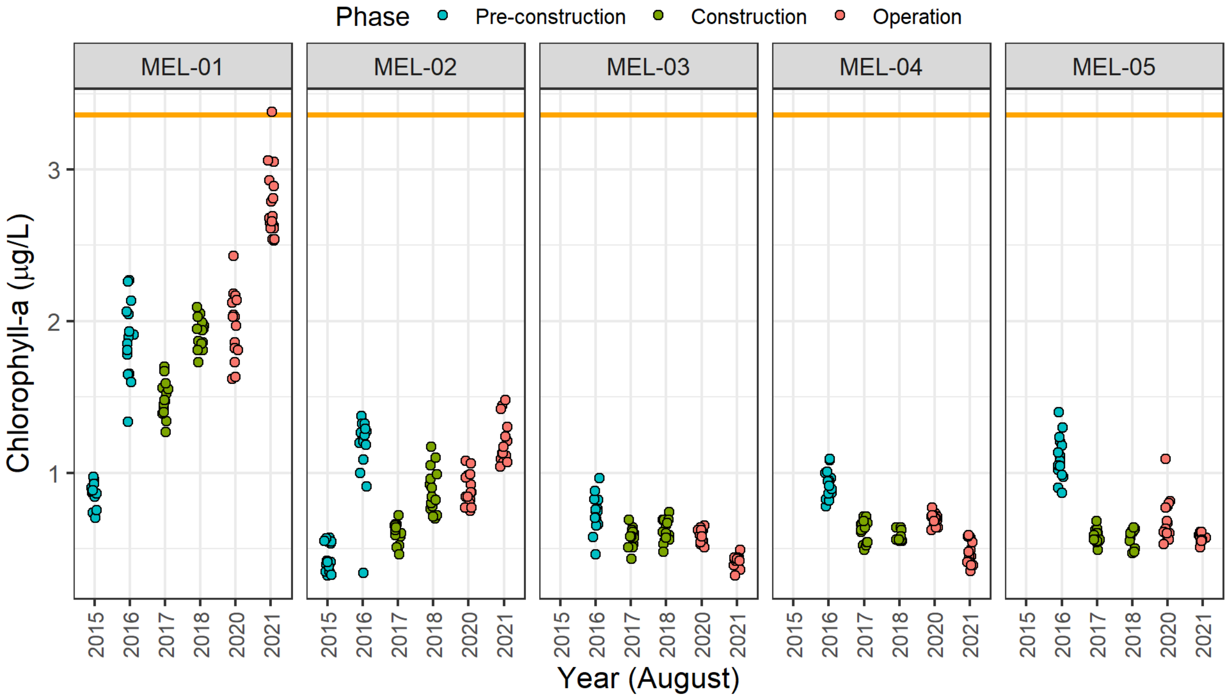
6.6.3 Chlorophyll-a

Chlorophyll-a concentrations from 2015 to 2021 are shown in **Figure 6-2**. The mean and standard deviation by area and year are provided in **Table 6-6**. Six years of monitoring data for chlorophyll-a – not including 2019[17] – indicate the NF and MF areas of Meliadine Lake have become more productive compared to the reference areas. Chlorophyll-a concentrations showed the same year-over-year pattern of increase at MEL-01 and MEL-02. At the NF area (MEL-01), the average chlorophyll-a concentration was 2.8 µg/L in 2021. At the MF area (MEL-02), the average chlorophyll-a concentration was 1.2 µg/L in 2021 and has increased each of the last four years.

The reference areas did not show similar increases in 2021 compared to recent years. All three reference areas had lower chlorophyll-a concentrations in 2021 compared to 2020. Average concentrations at MEL-03 and MEL-04 were the lowest reported since 2015 at 0.42 µg/L and 0.47 µg/L, respectively. Farther downstream at MEL-05, the average concentration in 2021 was 0.57 µg/L, similar to previously-reported results (**Table 6-6**).

Figure 6-2 Chlorophyll-a Concentrations (µg/L) in Meliadine Lake from 2015 to 2021.

Notes: The Yellow Line = AEMP Action Level 3.36 µg/L; Triplicate samples are collected at each area/station replicate in August.



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[17] Chlorophyll-a data from 2019 were flagged during the QC assessment because a different filter type was used in 2019, which resulted in lower-than expected results across all stations.

Table 6-6. Chlorophyll-a (µg/L; mean ± 1SD) in Meliadine Lake from 2015 to 2021.

Area	2015	2016	2017	2018	2020	2021
MEL-01	0.86 ± 0.079	1.9 ± 0.26	1.5 ± 0.12	1.9 ± 0.1	2.0 ± 0.23	2.8 ± 0.23
MEL-02	0.45 ± 0.096	1.1 ± 0.26	0.61 ± 0.067	0.88 ± 0.15	0.89 ± 0.11	1.2 ± 0.15
MEL-03	-	0.73 ± 0.12	0.57 ± 0.066	0.61 ± 0.072	0.58 ± 0.044	0.42 ± 0.039
MEL-04	-	0.93 ± 0.092	0.61 ± 0.073	0.58 ± 0.038	0.69 ± 0.039	0.47 ± 0.081
MEL-05	-	1.1 ± 0.15	0.58 ± 0.045	0.58 ± 0.057	0.68 ± 0.15	0.57 ± 0.029

Notes:
“-“indicates the phytoplankton study was not completed in these areas in 2015.

6.6.4 Phytoplankton Community

The primary metrics used to evaluate the health of the phytoplankton community and potential nutrient enrichment in Meliadine Lake are total biomass and total richness. Phytoplankton density results are tabulated and plotted to support the discussion as needed, but are less informative on their own relative to biomass, which integrates size and density elements.

- Mean phytoplankton biomass from 2013 to 2021 are presented in **Table 6-7**.
- Summary statistics for major taxa group biomass and density for samples collected in 2021 are presented in **Table 6-8**.
- Per-sample richness, biomass, and density are shown in **Figure 6-3**.
- Major taxa richness, biomass, and density are shown in **Figure 6-4** (absolute values) and **Figure 6-5** (percent).
- Summary statistics for richness, biomass, and density across all years are provided in **Appendix E1**.

Biomass

The largest year-over-year increase in total phytoplankton biomass at MEL-01 occurred between 2020 and 2021. Biomass in the NF area nearly doubled from 211 mg/m^3 to 395 mg/m^3 (**Table 6-7**). However, that result was largely due to the depressed biomass seen lake-wide in 2020 rather than an absolute increase at MEL-01 in 2021. Biomass at MEL-01 in 2021 was, on average, slightly lower than results from 2019. Recall that July and August 2019 saw higher-than-normal rain, yet lower-than-normal volumes of water discharged from CP1 to Meliadine Lake. Thus, the 2021 biomass is still within the range of previously reported results during the AEMP years (2015-2021) and well below biomass estimates from the baseline period (529 mg/m^3 to 1,880 mg/m^3 **Table 6-5**).

The MF and reference areas did not show the same magnitude of change in biomass between 2020 and 2021 as the NF area. At MEL-02, average biomass was 205 mg/m^3, similar to previous August sampling events dating back to 2015. The past 6 years of monitoring data indicate phytoplankton biomass at the MF and reference areas has remained relatively consistent at between 150 mg/m^3 to 250 mg/m^3.

Table 6-7. Phytoplankton biomass (mg/m^3; mean ± 1SD) in Meliadine Lake from 2013-2021.

Area	2013[a]	2015	2016	2017	2018	2019	2020	2021
MEL-01	153 ± 8	336 ± 29	350 ± 54	316 ± 39	339 ± 27	426 ± 24	211 ± 26	395 ± 46
MEL-02	-	220 ± 35	252 ± 44	222 ± 42	207 ± 88	260 ± 58	170 ± 28	205 ± 47
MEL-03	-	-	231 ± 17	206 ± 25	276 ± 26	229 ± 18	204 ± 39	185 ± 57
MEL-04	-	-	156 ± 65	201 ± 22	na	214 ± 28	140 ± 29	157 ± 23
MEL-05	-	-	227 ± 71	216 ± 25	147 ± 14	204 ± 36	147 ± 18	156 ± 19

Notes:
"-" = phytoplankton study was not completed in these areas.
na = the 2018 phytoplankton study was not completed at MEL-04 due to poor weather and difficulty accessing this area of Meliadine Lake.
[a] = Sampling methods were different between the baseline program in 2013 and the AEMP (discrete sampling in 2013 vs depth-integrated for the AEMP since 2015). Direct comparisons between 2013 and 2015-2021 should be made with caution.

Chrysophytes were the dominant major taxa in terms of biomass and density, followed by diatoms, dinoflagellates, and chlorophytes (green algae) (**Figure 6-4**). On average, chrysophytes comprised between 52% to 69% of total phytoplankton biomass among the NF, MF, and reference areas in 2021 (**Table 6-7**, **Figure 6-5**). These results are consistent with results from 2015 to 2020 and are similar to other studies on phytoplankton community assemblages in northern latitude lakes (Bergström et al., 2021).

Annual variability in total phytoplankton biomass is primarily related to seasonal variability in chrysophyte biomass. *Dinobryon* was dominant genus in terms of biomass in most samples collected throughout Meliadine Lake in 2021 (**Table E1-2**). This genus forms large chain-like colonies and can swim in a directed fashion using flagella to stay in the photic zone (Dodds and Whiles, 2010). The large colonies are also less susceptible to predation by zooplankton. Together, these attributes explain the dominance of chrysophytes in terms of total phytoplankton biomass as shown in **Figure 6-4**.

Cyanobacteria comprised less than 1% of phytoplankton biomass among the NF and MF areas in 2021 (**Table 6-8**). This is worth highlighting because cyanobacteria are commonly associated with algal blooms related to nutrient enrichment. This phenomenon is well documented in temperate and boreal areas in Canada, and more recently cyanobacteria biomass has been used as line of evidence when investigating eutrophication in Arctic lakes in Canada caused by climate change (Ayala-Borda et al., 2021). Low cyanobacteria biomass points to a healthy phytoplankton community in Meliadine Lake.

Richness

Phytoplankton richness in 2021 was between 40 and 50 taxa at all areas, well within the range reported from 2015 and 2019 (**Figure 6-4**). Richness rebounded in 2021 from the comparative low level of 35-40 taxa observed in 2020. Chrysophytes are the most diverse major taxa with anywhere between 11 and 22 species represented in the in the phytoplankton community in August (**Figure 6-4**). Chlorophytes and diatoms are also well represented in terms of the number of species, but in terms of biomass, diatom and chlorophyte species comprise less than 25% of total phytoplankton biomass in August. This is due to their comparatively small size relative to chrysophytes species. Subtle shifts in species dominance are part of natural succession patterns that phytoplankton communities undergo in response to a variety of physical (e.g., climactic), chemical (e.g., water quality), and biological factors (e.g., trophic interactions). These subtle changes in the phytoplankton community among the different areas and over time are discussed in the following section.

Table 6-8 Phytoplankton biomass (mg/m^3) and density (cells/L) by major taxa in 2021.

Area	Sample ID	Biomass (mg/m^3)							Density (cells/L)						
		Chloro	Chryso	Diatoms	Crypto	Dino	Cyano	Total	Chloro	Chryso	Diatoms	Crypto	Dino	Cyano	Total
MEL-01	MEL-0101	22	219	41	9	77	5	374	456,792	1,994,368	394,968	33,336	10,400	64,656	2,954,520
	MEL-0106	22	227	40	21	75	1	386	325,680	1,999,352	437,088	79,840	12,000	1,600	2,855,560
	MEL-0107	29	224	93	17	66	1	430	256,040	1,972,016	951,984	16,784	10,400	1,200	3,208,424
	MEL-0108	14	210	53	18	60	0	354	234,288	1,814,168	382,400	15,584	9,000	600	2,456,040
	MEL-0109	43	201	46	16	51	0	357	714,416	1,885,208	449,872	63,872	7,200	800	3,121,368
	MEL-0110	51	269	84	13	53	1	470	1,029,912	2,460,328	880,712	20,568	7,000	1,000	4,399,520
	Average	**8%**	**57%**	**15%**	**4%**	**16%**	**<1%**	**395**	**16%**	**64%**	**20%**	**1%**	**<1%**	**<1%**	**3,165,905**
MEL-02	MEL-0202	11	78	38	7	14	0	148	268,208	1,006,560	176,448	24,952	2,200	800	1,479,168
	MEL-0203	19	93	31	9	15	1	168	397,720	1,230,064	212,768	46,904	3,200	7,384	1,898,040
	MEL-0205	23	149	55	14	22	1	265	210,736	1,459,352	221,784	63,672	3,200	28,936	1,987,880
	MEL-0206	11	112	65	12	14	0	214	181,400	1,300,904	344,480	90,008	2,200	200	1,919,192
	MEL-0208	12	96	70	13	38	-	229	367,984	1,050,264	475,608	69,456	4,600	-	1,967,912
	Average	**7%**	**52%**	**25%**	**5%**	**10%**	**<1%**	**205**	**15%**	**65%**	**15%**	**3%**	**<1%**	**<1%**	**1,850,438**
MEL-03	MEL-0301	27	107	14	4	53	-	205	195,368	1,294,520	184,000	2,600	3,000	-	1,679,488
	MEL-0302	17	174	42	19	7	3	262	208,936	1,991,368	278,408	203,552	1,000	35,920	2,719,184
	MEL-0303	3	67	15	8	24	-	116	73,840	886,432	136,712	52,688	2,600	-	1,152,272
	MEL-0304	7	88	11	13	24	-	142	31,536	971,840	119,744	130,912	2,600	-	1,256,632
	MEL-0305	9	110	30	8	46	-	202	68,056	960,272	184,016	59,472	2,000	-	1,273,816
	Average	**7%**	**59%**	**12%**	**6%**	**16%**	**2%**	**185**	**7%**	**76%**	**11%**	**6%**	**<1%**	**<1%**	**1,616,278**
MEL-04	MEL-0401	4	116	15	7	13	0	156	116,744	1,028,912	100,592	23,952	1,800	400	1,272,400
	MEL-0402	4	93	16	8	13	-	134	324,880	814,592	201,968	38,520	1,400	-	1,381,360
	MEL-0403	8	106	26	3	22	2	167	203,752	1,662,904	182,616	8,584	2,600	200	2,060,656
	MEL-0404	29	124	13	8	15	1	189	311,112	1,340,824	177,616	24,552	1,600	7,184	1,862,888
	MEL-0405	7	86	15	10	20	0	138	267,608	993,592	127,728	33,536	2,400	200	1,425,064
	Average	**7%**	**67%**	**11%**	**5%**	**11%**	**<1%**	**157**	**15%**	**73%**	**10%**	**2%**	**<1%**	**<1%**	**1,600,474**
MEL-05	MEL-0501	7	90	55	4	25	-	182	316,696	822,176	187,000	23,952	3,200	-	1,353,024
	MEL-0502	6	84	33	5	22	1	150	152,664	864,080	300,744	10,584	2,600	7,184	1,337,856
	MEL-0503	6	95	18	17	12	0	148	226,104	935,920	96,408	78,840	1,400	200	1,338,872
	MEL-0504	12	90	14	8	7	1	132	173,616	713,216	118,144	54,288	1,400	7,184	1,067,848
	MEL-0505	6	107	18	13	15	5	165	231,888	1,309,688	131,528	83,624	1,800	57,872	1,816,400
	Average	**5%**	**60%**	**18%**	**6%**	**10%**	**<1%**	**156**	**16%**	**67%**	**12%**	**4%**	**<1%**	**<1%**	**1,382,800**

Figure 6-3 Phytoplankton richness, biomass (mg/m^3), and density (cells/L), 2013-2021.

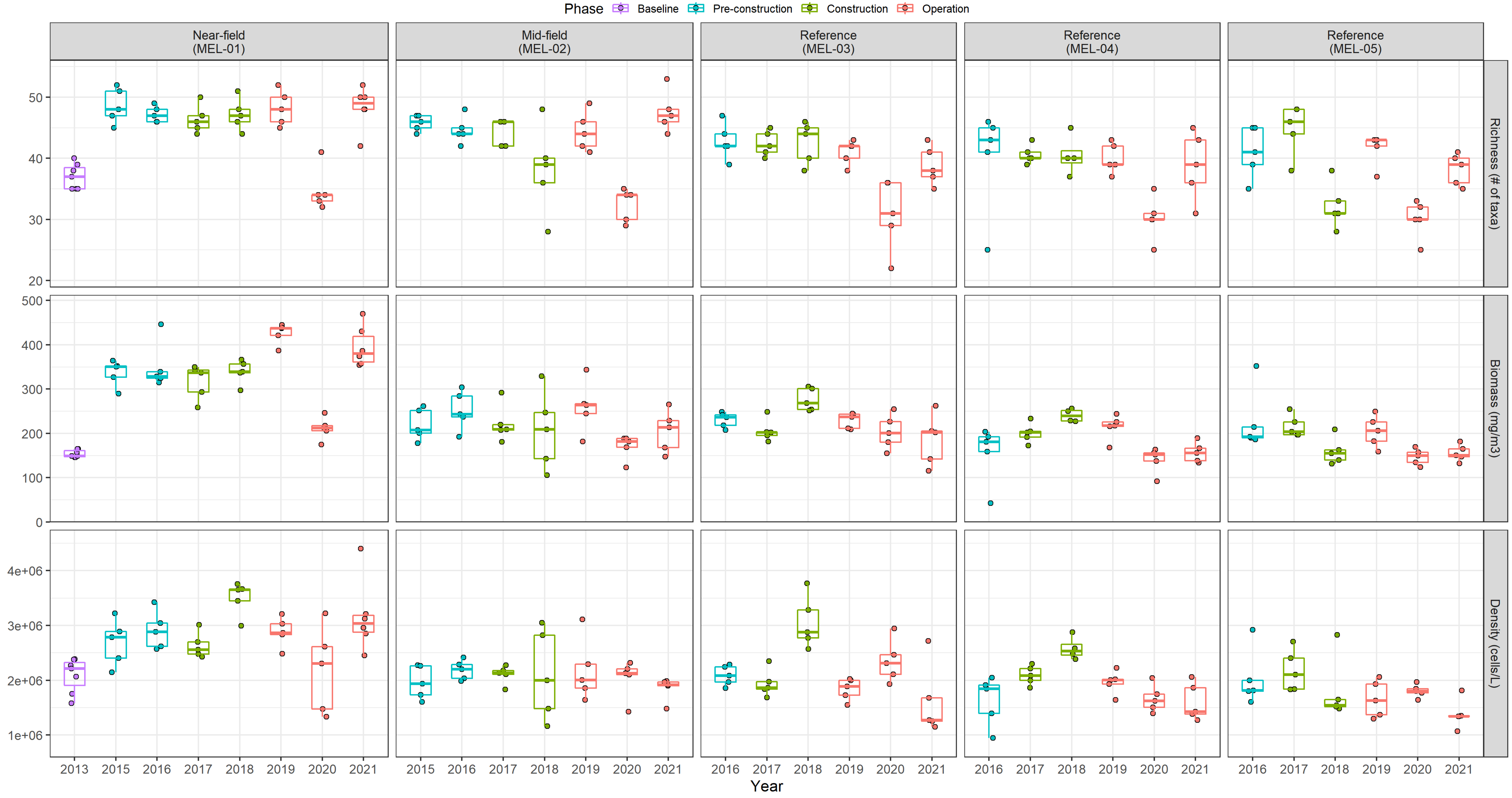
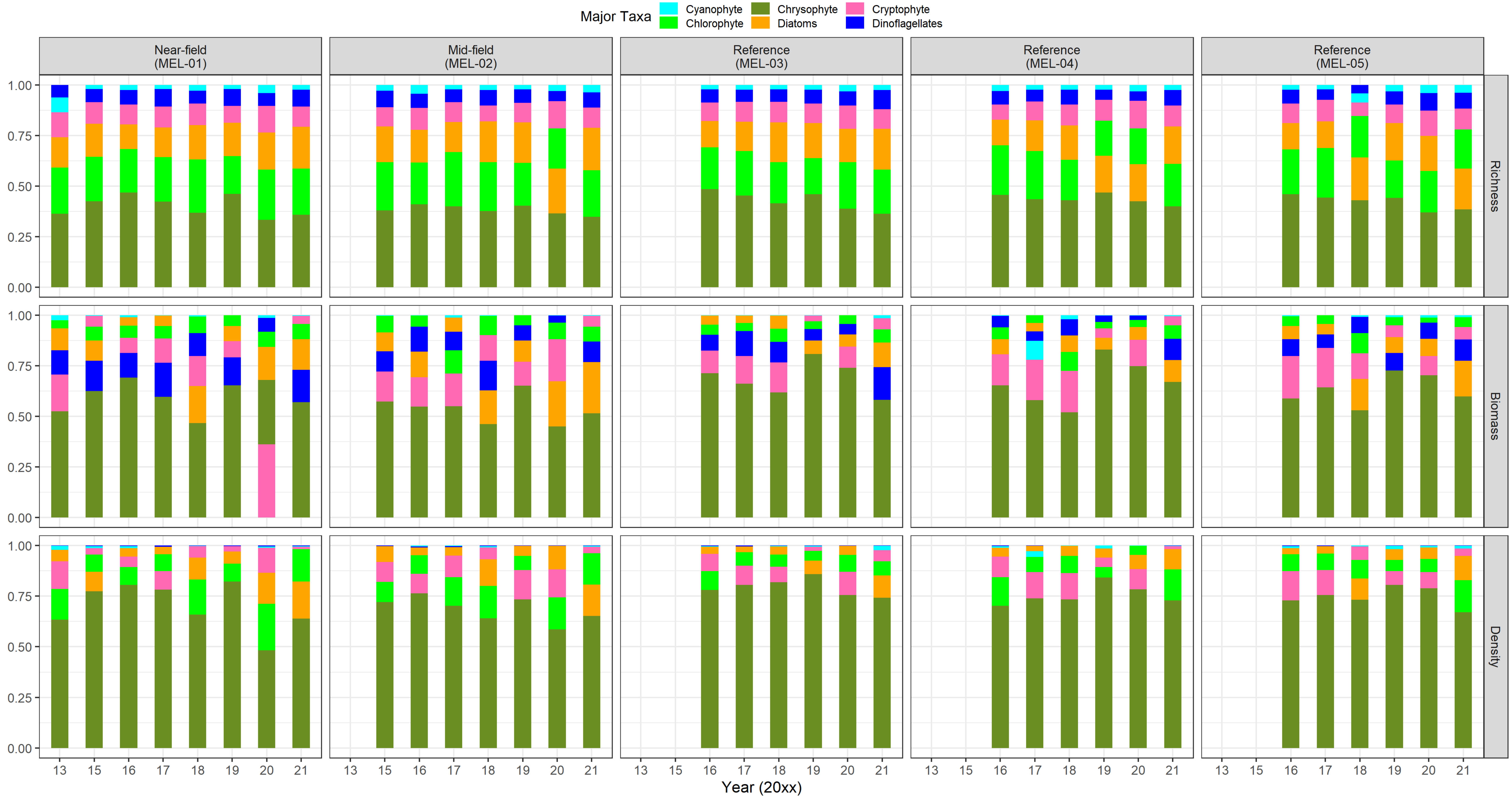


Figure 6-4. Mean phytoplankton richness, biomass (mg/m³), and density (cells/L) by major taxa, 2013-2021.

Notes: Major taxa group endpoints (richness, biomass, and density) for each area-year are based on the average (arithmetic mean) of the individual replicates.

Figure 6-5. Relative richness, biomass (mg/m^3), and density (cells/L) by major taxa, 2013-2021.

Notes: Major taxa richness, biomass, and density shown as the proportion of the total based on the average for each area/year.



Community Structure

Finer patterns in community structure across sampling areas and years were explored with multivariate non-metric multidimensional scaling (nMDS) analysis[18]. Two nMDS dimensions were derived from the transformed phytoplankton community data. The stress value of the final configuration was 0.11, which represents a good fit of the multivariate phytoplankton community data in a 2-dimensional plot (Clarke, 1993).

The ordination plot showing results for *reference* area-year combinations and their associated 90th, 95th and 99th percentile probability ellipses is presented in the left panel of **Figure 6-6**[19]. These probability ellipses represent the phytoplankton community at the reference areas across all sampling events. The reference area ellipse helps identify those area-year combinations that diverge from the normal range of reference conditions in Meliadine Lake. It is important to emphasize that this approach to comparing the NF and MF areas assumes that the phytoplankton communities were similar throughout Meliadine Lake during the baseline period. This assumption cannot be tested because the reference areas were not sampled in 2013 and 2015. For this reason, the probability ellipses may not fully represent the phytoplankton community on a lake-wide basis.

Results for *exposure* area-year combinations relative to the reference area probability ellipses are presented in the right panel of **Figure 6-6**. The ordination results are also presented for each year in **Figure 6-7** to illustrate the relative change of the NF, MF, and reference areas within a given year and across years. Results from the NF area in 2013 and the NF and MF areas in 2015 are shown in the ordination plots for context, but should be interpreted with caution because the reference areas were not sampled concurrently.

The correlation matrix at the bottom of **Figure 6-7** shows which phytoplankton endpoints (i.e., major taxa biomass and richness) are significantly correlated with the nMDS axes ($p>0.05$). Statistically significant correlations for each nMDS Axis and phytoplankton metric are as follows:

Axis 1 –biomass and richness of chrysophytes and dinoflagellates were significantly negatively correlated with Axis 1. Chlorophyte biomass and richness were also negatively correlated. Lower scores on Axis 1 correspond to higher biomass and richness for chrysophytes, dinoflagellates, and chlorophytes (**Figure 6-7**).

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[18] A description of the nMDS analysis using the 'Vegan' software package is presented here: (Link)

[19] The stress value for the best fit of the data in 2-dimensions was 0.088. As discussed in the data analysis section, stress is the measure of the goodness of fit of the transformed multi-dimensional data, and according to Clarke (1993), a stress value <0.1 is considered "good" for visualizing multi-dimensional data in a reduced number of dimensions.

Axis 2 – this axis is dominated by diatom, chlorophyte and cryptophyte biomass. Again, results located above the horizontal dashed line on the ordination plot indicate higher biomass for these major taxa compared points located below the dashed line.

Differences in the community composition are interpreted using the ordination plots in two ways: 1) by comparing the absolute position of each point relative to the probability ellipses, and 2) by comparing the location of each point relative to other areas for a given year. For example, the position of the NF and MF areas relative to one another and to the reference areas varies among years. The following points stand out when looking at spatial and temporal trends in the community composition.

NF (MEL-01) – The phytoplankton community at the NF area in 2021 closely resembled results from 2015 to 2019. The NF has consistently scored lower on nMDS Axis 1, which indicates the phytoplankton community is predominantly chrysophytes and dinoflagellates in terms of biomass. 2013 and 2020 were the exception; the NF had positive scores on Axis 1 in 2013 and 2020, which were also the years with the lowest biomass at the NF area (see top right quadrant in **Figure 6-6** for MEL01-13 and MEL01-20). The phytoplankton community in 2013 and 2020 was characterized by proportionally higher biomass for cryptophytes and diatoms and comparatively low chrysophytes biomass (**Figure 6-4**).

The ordination of the NF phytoplankton community has consistently fallen outside the 95th percentile probability ellipse (orange ellipse) every year going back to the first year of reference area sampling in 2016 (**Figure 6-7**). It is unclear if this divergence has occurred during the AEMP years (since 2015), or if the phytoplankton community in the east basin has always been different than that reflected at MEL-03, MEL-04 and MEL-05. This is unclear, because the reference areas were not sampled during the baseline period in 2013 and 2015.

MF (MEL-02) – The MF area phytoplankton community has more closely resembled the reference areas than the NF area over time, as indicated by the location of the points relative to the 90th percentile ellipse (green ellipse). 2020 was a notable exception, when the MF resembled the NF with higher nMDS Axis 1 and Axis 2 scores (see the upper right quadrant in **Figure 6-6**).

The key message from the nMDS analysis is that the phytoplankton communities at the NF and MF areas in 2021 were similar in structure to their respective communities in 2015-2019. At the NF, where phytoplankton response to mine discharge is expected to be greatest, the phytoplankton community in 2021 was very similar to 2019 and closely resembled community composition in 2015, 2016, and 2018. This is important because the FEIS predicted that increased nitrogen concentrations beyond the mixing zone *could* result in a shift in community structure favoring species that are capable of assimilating nitrogen more efficiently (Agnico Eagle 2014). The lake-wide reduction in chrysophytes biomass observed in 2020 was likely indicative of natural variability in the phytoplankton community rather than a shift in the community composition related to discharge of effluent.

Figure 6-6. Ordination of the reference and exposure area phytoplankton results by year for Meliadine Lake.

Notes: Area-year nomenclature: MEL04-18 = Meliadine Lake area MEL-04 sample collected in 2018.
Left panel (REF) = results for reference area-year combinations and their associated probability ellipses.
Right panel (EXP) = exposure area-year combinations shown relative to reference area probability ellipses.
Green, orange, and red ellipses = 90th, 95th, and 99th percentile of the baseline/reference phytoplankton community.

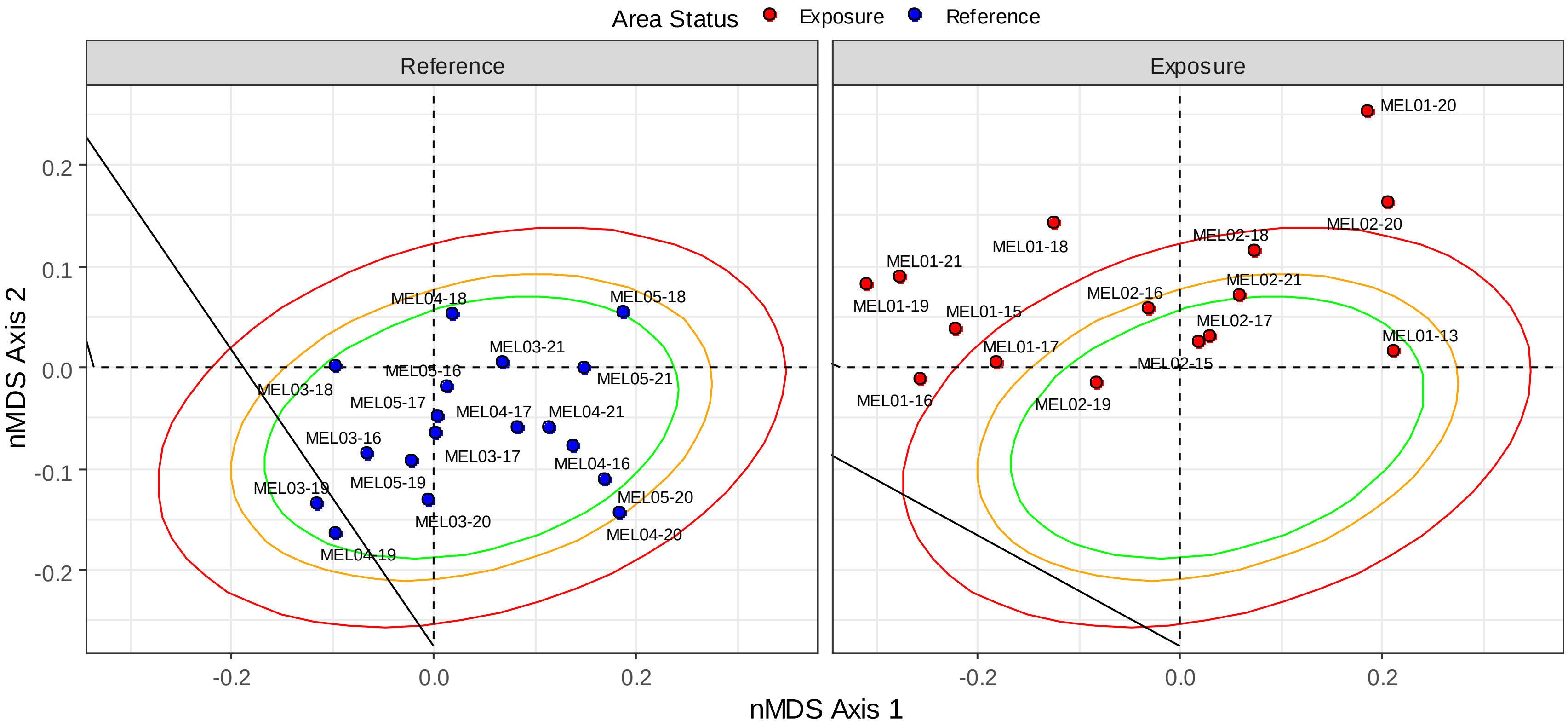
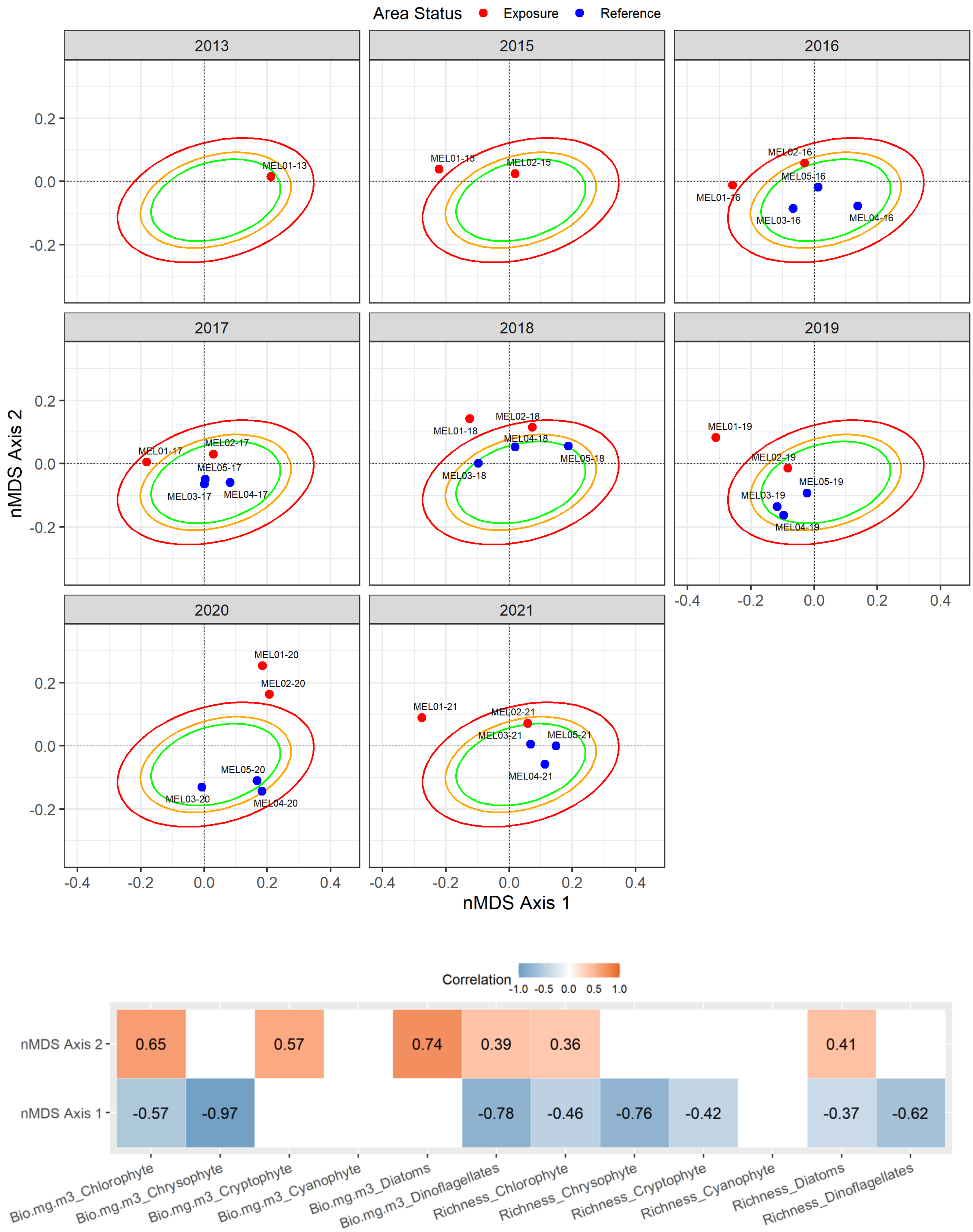


Figure 6-7. Non-metric multidimensional scaling (nMDS) results showing ordination of the reference and exposure area phytoplankton results by year for Meliadine Lake.

Notes: Green, orange, and red ellipses = 90th, 95th, and 99th percentile of the baseline/reference phytoplankton community.
The correlation matrix shows which metrics are significantly correlated (p<0.05). Blue cells are negatively correlated; red cells are positively correlated; blank cells indicate the metric is not statistically significant.



	Bio.mg.m3_Chlorophyte	Bio.mg.m3_Chrysophyte	Bio.mg.m3_Cryptophyte	Bio.mg.m3_Cyanophyte	Bio.mg.m3_Diatoms	Bio.mg.m3_Dinoflagellates	Richness_Chlorophyte	Richness_Chrysophyte	Richness_Cryptophyte	Richness_Cyanophyte	Richness_Diatoms	Richness_Dinoflagellates
nMDS Axis 2	0.65		0.57		0.74	0.39	0.36				0.41	
nMDS Axis 1	-0.57	-0.97				-0.78	-0.46	-0.76	-0.42		-0.37	-0.62

6.6.5 Nutrient-Productivity Relationships

Nutrient-productivity relationships were explored using chlorophyll-a and total phytoplankton biomass as primary productivity endpoints. Key nutrients, DOC, nitrogen, and phosphorus, were used to assess if effluent discharged to Meliadine Lake is contributing to changes in productivity. The current state of science points to phytoplankton productivity being co-limited by nitrogen and phosphorus (Lewis and Wurtsbaugh, 2008) with DOC also influencing primary productivity (Bergström and Karlsson, 2019). Micronutrients such as calcium, iron, silicon, and trace metals are also required for normal growth for some algal species (Fondriest, 2014). The 2020 AEMP Report provided a concise overview of the effect of nitrogen and phosphorus on primary productivity, but new research is continually being published on changes in primary productivity in northern latitude lakes, particularly in response to climate change. DOC was added as a key explanatory variable in 2021 because of possible climate-related increases to DOC associated with higher rainfall, runoff, and erosion of terrestrial soils.

The relationship between biomass and chlorophyll-a across sampling areas within years is shown in **Figure 6-8**. Relationships between the concentrations of DOC, nitrogen, and phosphorus and chlorophyll-a and phytoplankton biomass estimators are shown highlighting areas (**Figure 6-9**; all areas) and years (**Figure 6-10**; NF only).

There was a step-increase in both chlorophyll-a and phytoplankton biomass at the NF area in 2021 compared to 2020, but there is considerable variability in the relationship when looking across all years for at the NF area. Biomass estimates in the range of 350-400 mg/m^3 have been reported each year since 2016, with corresponding chlorophyll-a concentrations typically in the range of 1.5 to 2 µg/L. Photosynthesis is highly variable and chlorophyll-a content is subject to hourly changes based on light intensity, not to mention the other factors that dictate normal community succession. In general, smaller algal cells have proportionately more chlorophyll-a than larger cells, and there is a general shift towards larger size cells during seasonal succession (Felip and Catalan, 2000; Kasprzak et al., 2008).

Nitrogen and phosphorus do not appear to be strongly influencing phytoplankton biomass or chlorophyll-a based on data collected at the NF, MF, and reference areas in Meliadine Lake since 2013 (**Figure 6-9**). There is some evidence of a weak positive relationship between chlorophyll-a and DOC when looking at data from all years and all areas in Meliadine Lake (**Figure 6-9**). However, the relationship is less apparent when looking specifically at the NF area (**Figure 6-10**). For example, chlorophyll-a concentrations were nearly identical in 2020 compared to 2016 despite a difference in DOC of nearly 1 mg/L between 2020 and 2016 (**Figure 6-10**). Based on the available data, nutrients do not appear to be the primary cause of the observed change in chlorophyll-a in 2021 compared to 2020, nor in previous years.

Figure 6-8. Relationship between chlorophyll-a and phytoplankton biomass for Meliadine Lake by year, 2016 through 2021.

Notes: Chlorophyll-a data from 2019 were flagged during the QC assessment because a different filter type was used in 2019, which resulted in lower-than expected results across all stations.

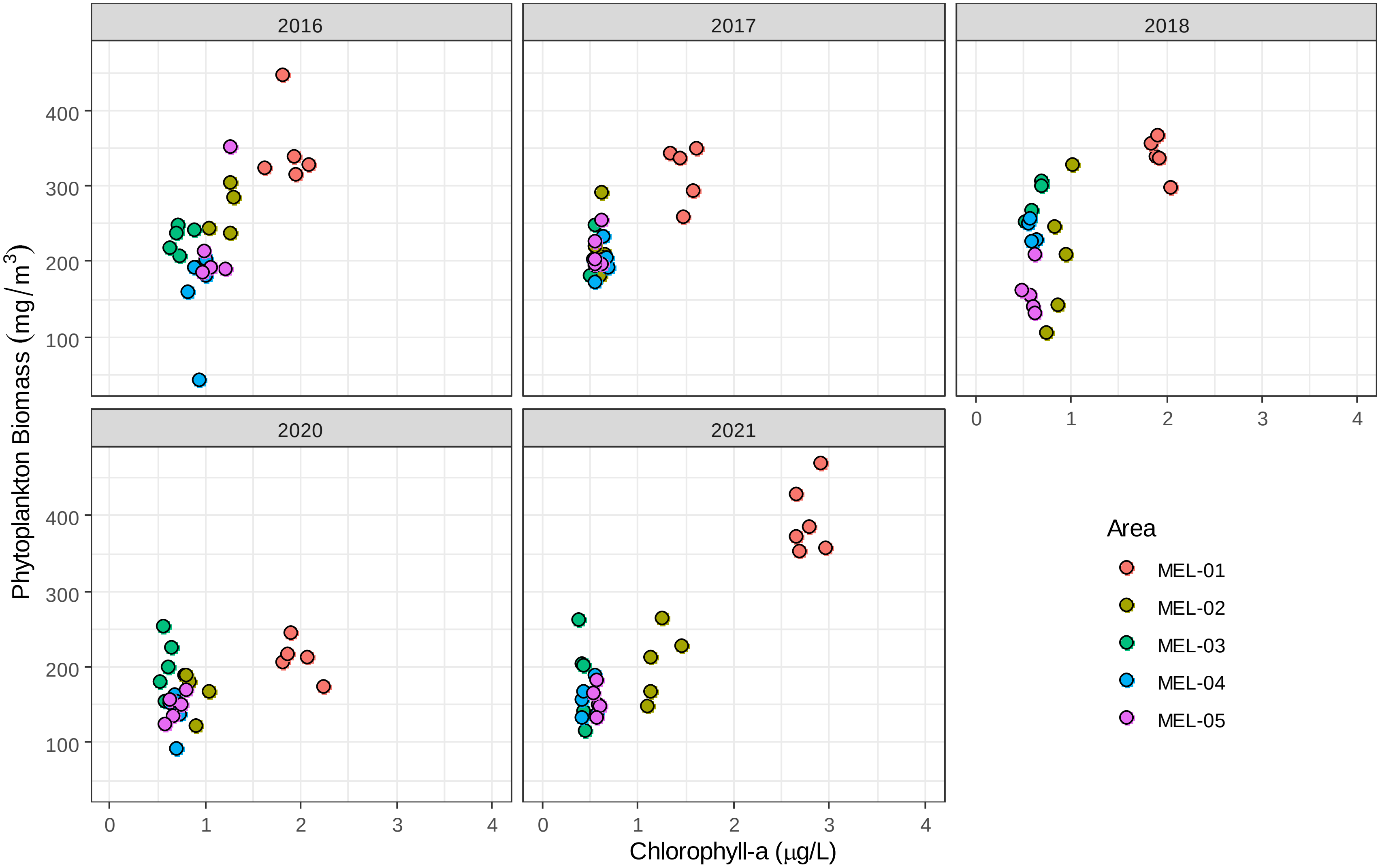


Figure 6-9. Relationship between nutrient concentrations (DOC, nitrogen, and phosphorus) and phytoplankton biomass and chlorophyll-a in Meliadine Lake, 2013-2021.

Notes: The black dots represent total nitrogen concentrations that were measured below the limit of detection in samples from 2015.

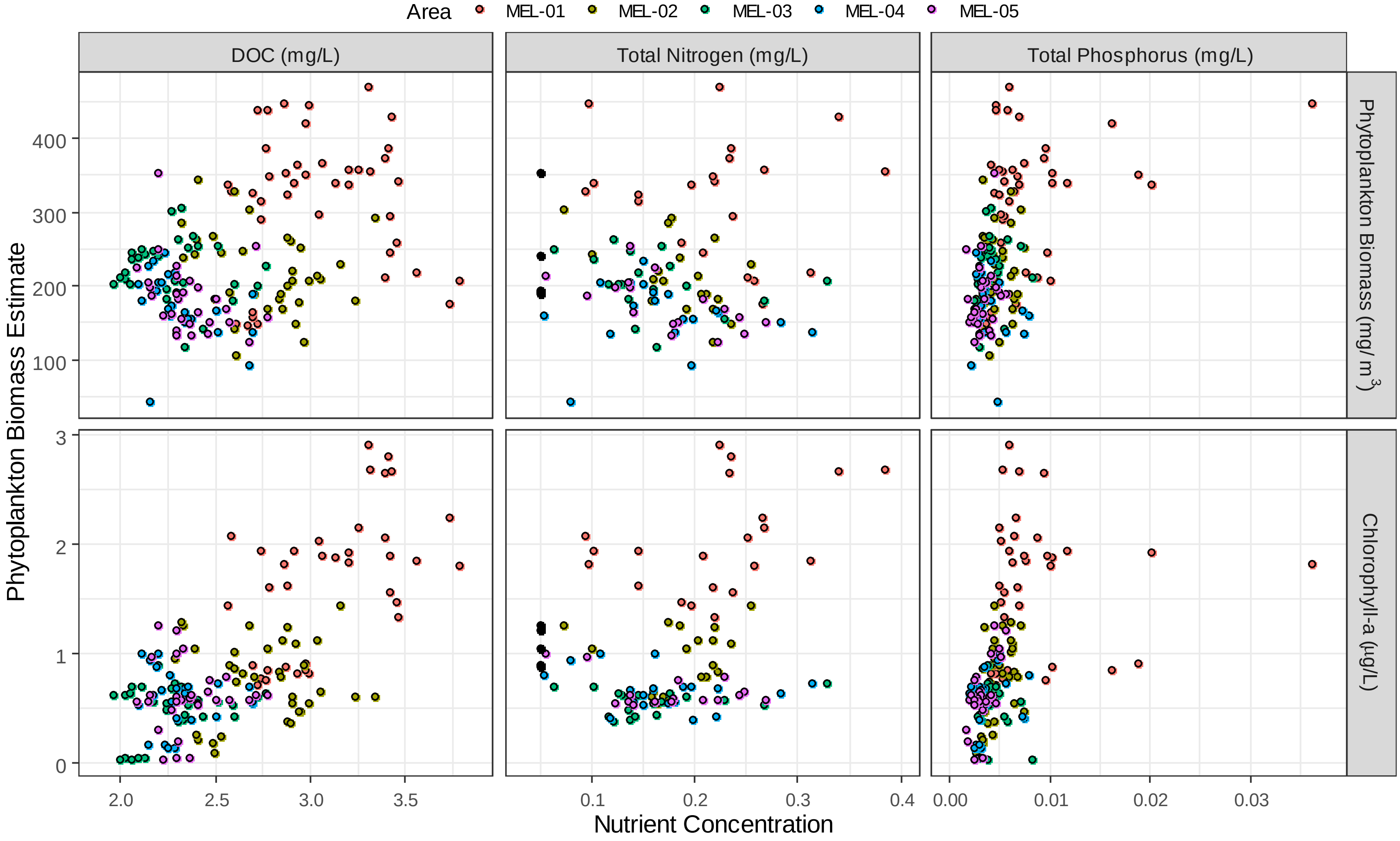
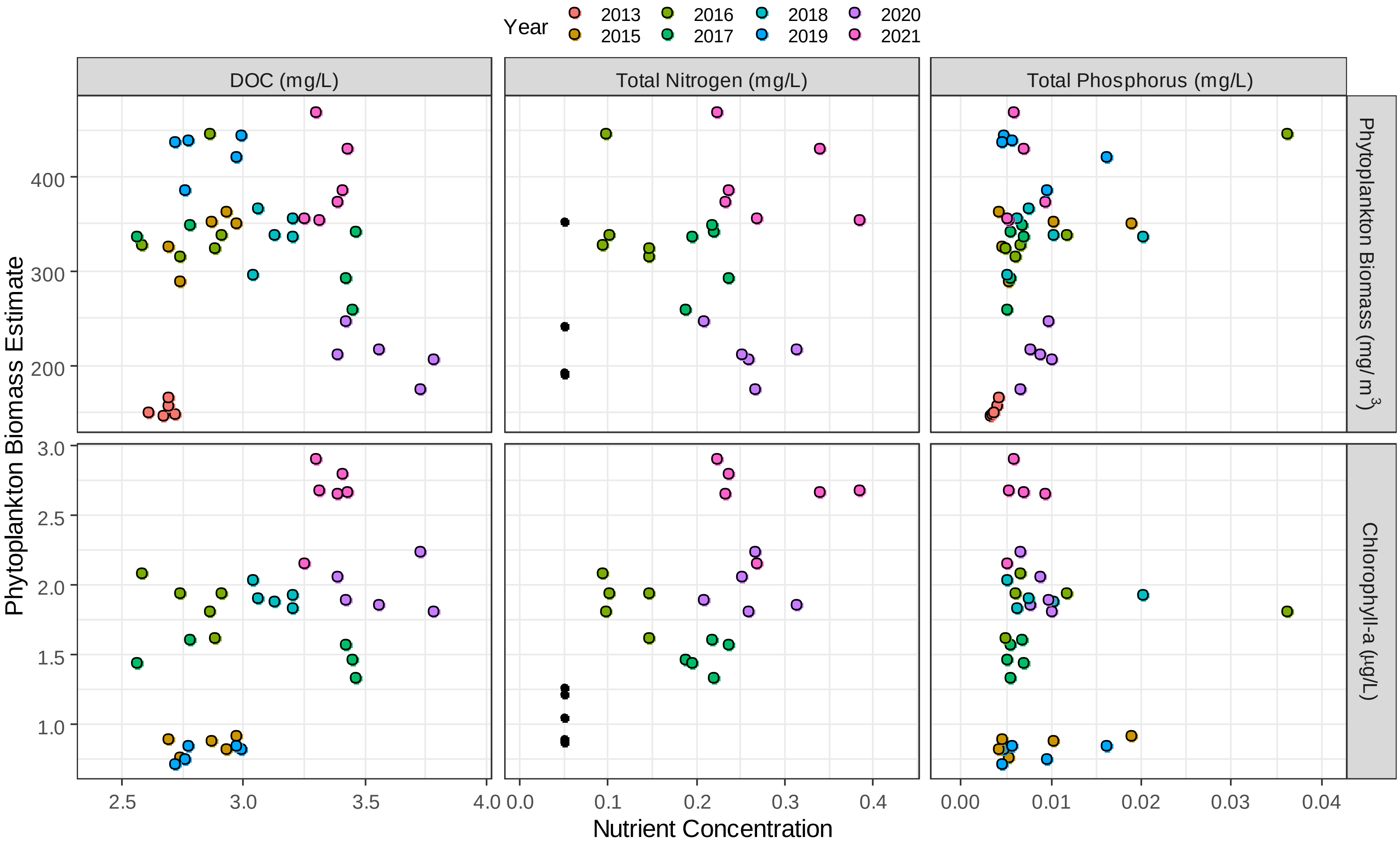


Figure 6-10. Relationship between nutrient concentrations (DOC, nitrogen, and phosphorus) and phytoplankton biomass and chlorophyll-a at the near-field area (MEL-01), 2013-2021.

Notes: The black dots represent total nitrogen concentrations that were measured below the limit of detection in samples from 2015. Total nitrogen was not measured in samples collected in 2013. Chlorophyll-a results from 2019 (blue dots) are presented for context, but should be interpreted with caution as discussed previously.



6.6.6 Trophic Status Index

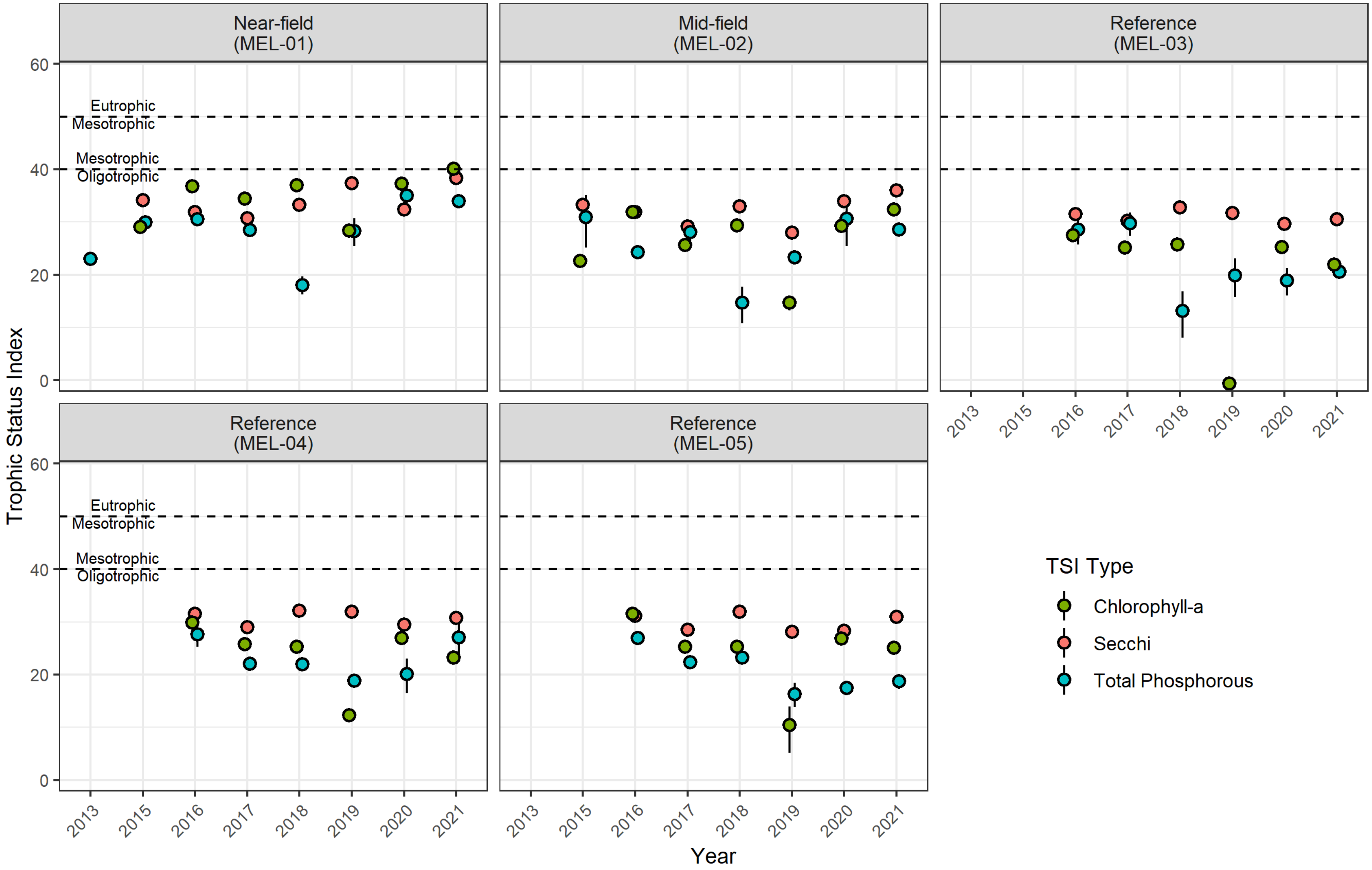
Trophic status index (TSI) results for total phosphorus, chlorophyll-a and Secchi depth are presented in **Figure 6-11.** The data are presented as the mean ± 1 standard error at each sampling area for a given year. The highest TSI values in 2021 were measured at MEL-01, which is consistent with the narrative that the east basin of Meliadine Lake is more productive than the MF and reference areas. TSI results for total phosphorus and Secchi depth indicate the NF area is still considered oligotrophic. The chlorophyll-a TSI value straddles oligotrophic and mesotrophic status. Results are described in more detail below in the context of the underlying metrics.

- Total Phosphorus – the TSI value at the NF area in 2021 dropped slightly compared to 2020. Prior to 2021, TSI for phosphorus had been trending towards the transition between oligotrophic and mesotrophic status. The decline in TSI was also evident at the MF area. The reference areas saw an increase in TSI in 2021 compared to 2020.
- Chlorophyll-a – the TSI value at the NF area in 2021 was 40, marking the transition between oligotrophic and mesotrophic status.
- Secchi Depth – the TSI at the NF and MF areas in 2021 was slightly higher compared to previous years, indicating water clarity has decreased slightly over time. The reference areas show no change in TSI, indicating water clarity has not changed appreciably since 2016.

It is important to note that TSI is simply an index used to predict the trophic status of a lake. The existing TSI, developed by Carlson (1977), has been around for decades and is based, at least in part, on the premise that primary productivity is limited primarily by total phosphorus. Nojavan et al. (2019) published a modified TSI that incorporates TN, TP, Secchi depth, and elevation into a single model that classifies lakes in probabilistic terms. In the absence of direct quantification of phytoplankton communities, as is often the case in water quality studies, the TSI (or new and improved version) can provide useful information on potential spatial or temporal differences in trophic status across locations and/or years. However, when actual phytoplankton data are available, less emphasis should be placed on the TSI values.

Figure 6-11. Trophic Status Index values for Meliadine Lake, 2013 through 2021

Notes: points represent the mean; vertical bars represent 1 standard error.



6.7 Conclusions and Recommendations

Conclusions for the 2021 phytoplankton study are summarized below in the context of the key question stated in **Section 6.2**. The phytoplankton results are incorporated into the Low Action Level assessment for toxicological impairment and nutrient enrichment in **Section 13.2** and **Section 13.3**, respectively.

Key Question: Is the phytoplankton community in Meliadine Lake adversely affected by potential mine-related changes in water quality?

Chlorophyll-a trended higher at the NF and MF areas in 2021, and the pattern of change diverged from the reference areas where chlorophyll-a remained relatively stable compared to previous years. However, phytoplankton indices such as community structure and biomass provide a more direct assessment of whether activities at the Mine are contributing to changes in the primary productivity of the lake. Phytoplankton biomass has been relatively stable in the east basin across the AEMP years. Moreover, neither phytoplankton biomass nor chlorophyll-a were correlated with nutrient concentrations in the east basin. Overall, results from the 2021 phytoplankton study demonstrate that despite higher loadings of some nitrogen parameters since 2018, there is no evidence to suggest nutrient enrichment is occurring in the form of year-over-year increases in total phytoplankton biomass.

The FEIS (Agnico Eagle, 2014) predicted the concentration of nitrogen would increase in the east basin of Meliadine Lake, which in turn *could* result in a shift in phytoplankton community structure. Only a minor change in phytoplankton community structure was predicted compared to baseline conditions and phytoplankton productivity was predicted to remain similar to baseline. Phytoplankton community data from 2021 show that discharge of effluent is not causing a shift in the phytoplankton community in the NF or MF areas of Meliadine Lake as predicted.

Recommendations

Collectively, the phytoplankton community and nutrient data provide useful information to help detect potential effects to primary productivity resulting from nutrient enrichment in Meliadine Lake. Phytoplankton monitoring is recommended for 2022 according to the same study design as 2021.

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7 SEDIMENT CHEMISTRY

7.1 Introduction

This section presents findings of the 2021 sediment quality monitoring program in Meliadine Lake. The program was completed according to the AEMP Design Plan. The sediment chemistry component of the AEMP is conducted on a 3-year cycle to provide supporting data for the benthic invertebrate community monitoring program. On its own, sediment chemistry data are not used as a basis for triggering management actions through the Response Framework.

Sediment sampling was completed at near-field around the diffuser (NF; MEL-01), at mid-field (MF; MEL-02) located past the narrows to the northwest, at Reference Area 1 (REF1; MEL-03), and at Reference Area 3 (REF3; MEL-05). Sediment sampling was conducted at the same time as water and phytoplankton sampling in August. Data collected in 2021 were compared with previous results collected in 2015, 2016, and 2018 to determine if activities at the mine are causing changes in sediment chemistry that may have the potential to affect aquatic life.

7.2 Findings from the 2021 Sediment Chemistry Program

- The 2018 AEMP noted that sediment grain size is variable within and between areas in Meliadine Lake. To minimize the confounding effect of grain size differences on the interpretation of the benthic invertebrate community data, a few stations were relocated in 2021 to locations where the sediment composition was predominantly silt and clay.
- Concentrations of arsenic, manganese, and strontium were higher in sediment collected in the east basin in 2021 compared to 2018. Arsenic and manganese, among other metals, can show considerable within-area spatial heterogeneity in lakes located in naturally-mineralized areas. The apparent increase observed between 2021 and 2018 is likely related to naturally variable concentrations of metals in the east basin of Meliadine Lake near the diffuser.
- Arsenic concentrations exceeded the probable effect level concentration (CCME, 2002). Arsenic is naturally-enriched in sediment in the NF area and concentrations in 2021 were below concentrations measured at other sampling locations in the NF area 2015 and 2016. There are no federal sediment quality guidelines for manganese or strontium for the protection of aquatic life.
- Irrespective of the source of the change in arsenic, manganese, and strontium, sediment conditions at the NF and MF areas support a functional diverse and healthy benthic invertebrate community.

7.3 Objectives and Key Question

The objectives of the sediment quality monitoring program are outline below.

- Characterize sediment quality in Meliadine Lake.
- Verify predictions made in the FEIS[20] in relation to sediment quality in Meliadine Lake (Agnico Eagle, 2014).
- Collect supporting data for the benthic invertebrate community and water quality components to aid in interpretation of results (as per Part 2, Schedule 16 (a) (iii) of the MDMER regulations [Government of Canada 2022]).
- Provide data to inform adaptive management intended to reduce or eliminate mine-related changes to sediment quality.

The sediment chemistry program ultimately addresses the following key question: *is mining activity causing changes in sediment chemistry*? If the answer is yes, the next question is *are the changes in sediment chemistry adversely affecting the benthic invertebrate community?* The second part to this question is evaluated in **Section 8** (Benthic Invertebrate Community).

7.4 Methods

7.4.1 Study Areas

The 2021 sediment sampling program was carried out in accordance with the AEMP Design Plan and recommendations provided in the 2018 AEMP/EEM Interpretive Report (Golder, 2019). Sampling was conducted in August 2021 at the following stations (**Figure 7-1**): MEL-01 (NF), MEL-02 (MF), MEL-03 (REF1), and MEL-05 (REF3)[21]. Station coordinates and total water depths are reported in **Table 7-1**.

The sampling areas target low energy, depositional areas dominated by silt/clay sediment in areas of similar water depth (7–10 m) to try to match the prevailing characteristics of the NF area in the vicinity of the diffuser. To the extent possible, sampling locations at the MF and reference areas were chosen with similar habitat to the NF area. The sediment composition in Meliadine Lake is highly variable among the five study areas, and differences in substrate composition was flagged as a potential confounding factor for assessing differences in the benthic invertebrate community between the exposure and

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[20] The FEIS concluded that if water quality at the edge of the mixing zone is the same or less than guidelines or ambient conditions, sediment quality will also be the same or less than guidelines. There is the potential for sediment quality within the mixing zone to change.

[21] *Area* refers to MEL-01, MEL-02, etc. *Station* refers to the sampling location within each area (unit of replication). *Subsample* refers to individual grabs composited together to make MEL04 (REF2) was dropped from the AEMP study design because of differences in the sediment composition relative to the NF area in 2018, challenges obtaining acceptable grabs, and health and safety concerns associated with accessing this area of the lake by boat.

reference areas. To address this issue, a reconnaissance sediment sampling program was completed in July 2018, ahead of the August field program, to identify candidate stations with less variability in sediment composition. The AEMP water, phytoplankton, and sediment/benthic invertebrate community stations were realigned prior to the 2018 field program.

Stations sampled in 2018 were revisited for the 2021 program to facilitate comparisons between years. If the sediment composition at a given station was too coarse or acceptable grabs were difficult to obtain, the station was relocated to a more suitable location near the previously-sampled location. In general, samples in 2021 were collected in the vicinity of the 2018 locations except for the following:

- NF station MEL-01-06 – sediment substrate was coarse and not representative of the soft, silt/clay sediment at other replicate stations. MEL-01-06 was relocated in 2021 to the edge of the mixing zone approximately 100 m from the diffuser.
- MF station MEL-02-05 – the relief profile on the depth sounder showed an uneven sediment surface. Three test grabs with the Petite Ponar failed to collect an acceptable grab. The sampling location was relocated 200 m to the south of 2018 monitoring station.
- REF1 station MEL-03-01 – sediment at the 2018 station was hard packed sand and clay, which resulted in poor grab success. The station was relocated approximately 200 m to the northeast of the fixed location sampled for water and phytoplankton.
- REF3 station MEL-05-01 – the sediment composition at the 2018 location was predominantly sand. Grabs taken from the fixed location in 2021 repeatedly failed acceptability criteria due to limited volume (< 2 cm of sediment in the grab). MEL-05-01 was relocated approximately 200 m east.

Table 7-1. Coordinates for sediment and benthic invertebrate samples collected in 2021.

Area	Date	Depth (m)	Easting	Northing
MEL-01				
MEL-01-01	14-Aug-21	9	542674	6989120
MEL-01-06	14-Aug-21	8.9	542739	6989050
MEL-01-07	14-Aug-21	8.7	542876	6989070
MEL-01-08	14-Aug-21	8.5	543064	6989183
MEL-01-09	14-Aug-21	7.9	542552	6989120
MEL-03				
MEL-03-01	10-Aug-21	9.5	533492	6998645
MEL-03-02	10-Aug-21	10.5	533310	6998690
MEL-03-03	10-Aug-21	10.5	532989	6998869
MEL-03-04	10-Aug-21	8	533580	6998653
MEL-03-05	7-Aug-21	8.1	533999	6998274
MEL-02				
MEL-02-02	15-Aug-21	10	537103	6992630
MEL-02-03	15-Aug-21	9.8	537497	6992327
MLE-02-05	15-Aug-21	9.4	537774	6992496
MEL-02-06	15-Aug-21	10.2	536951	6992914
MEL-02-08	15-Aug-21	9.7	538324	6991957
MEL-05				
MEL-05-01	10-Aug-21	9.6	530716	6991054
MEL-05-02	10-Aug-21	9.8	530692	6990913
MEL-05-03	10-Aug-21	8.6	530726	6991399
MEL-05-04	10-Aug-21	9.9	530658	6991206
MEL-05-05	10-Aug-21	10.5	530305	6991196

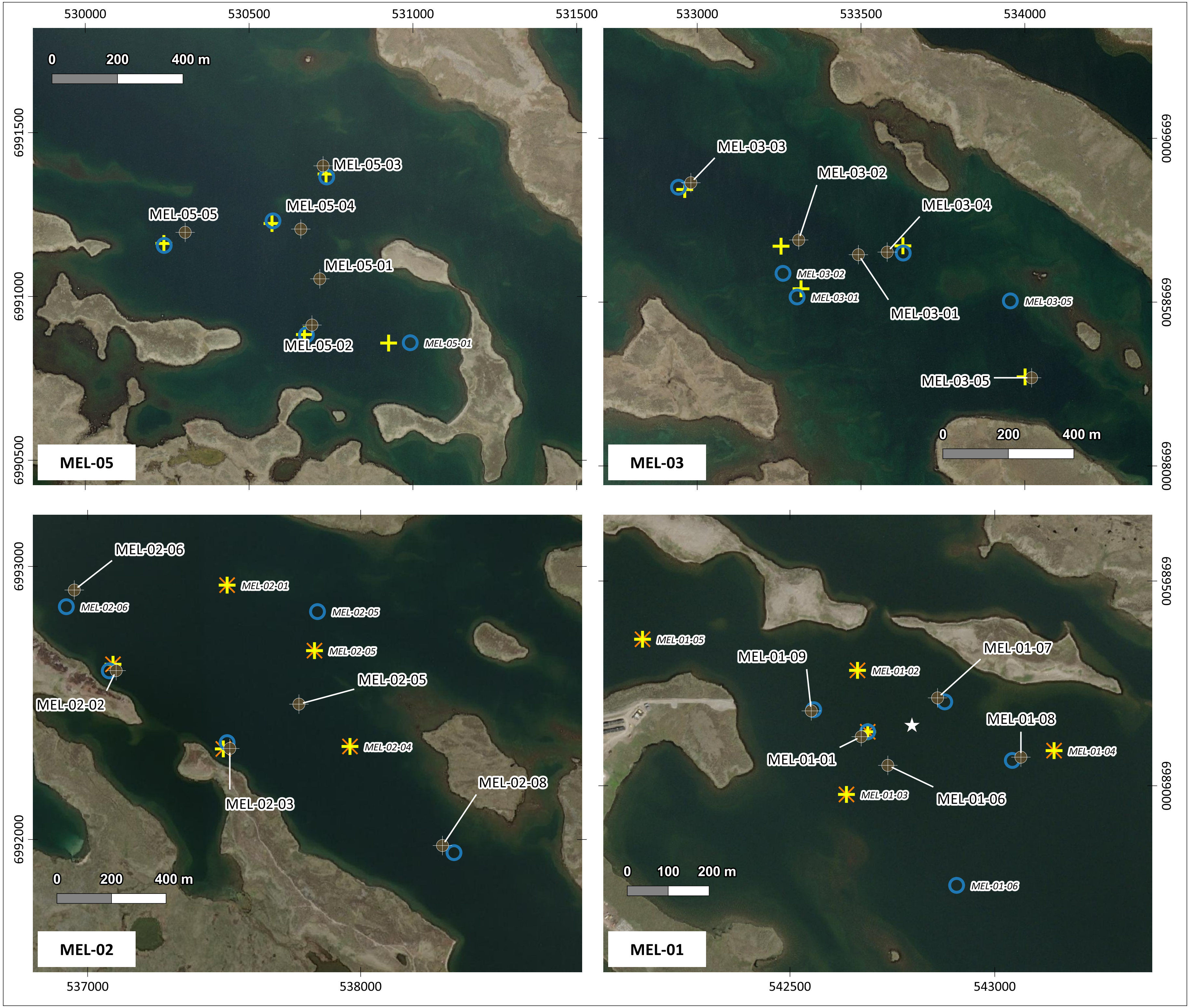


Figure 7-1

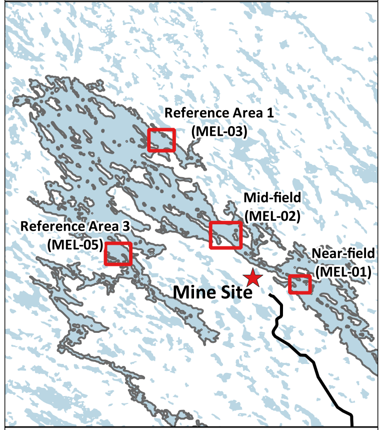
Sediment Sampling Locations in Meliadine Lake

2021 Aquatic Effects Monitoring Program
Annual Report

AZIMUTH

Date:	March 1, 2022
Datum:	NAD 83 UTM Zone 15N
Software:	QGIS version 3.16.0-Hannover
Produced by:	E. Franz

REFERENCES:
1. Basemap imagery from Google
2. Mine Plan provided by Agnico Eagle
3. Roads and waterbodies from NRC



Legend

— All weather access road

🟩 Meliadine Mine (2021)

☆ Diffuser

Sediment & Benthic Invertebrate Stations

✕ 2015

+ 2016

○ 2018

⊕ 2021

7.4.2 Sample Collection

Sediment samples for chemistry were collected at each station using a Petite Ponar (15.24 × 15.24 cm; bottom sampling area of 0.0232 m^2) after sampling for benthic invertebrate taxonomy (**Section 8**). Two individual grab samples (subsamples) were collected at each station from within a radius of approximately 5 m around the waypoint and combined to form a single composite sample. Before collecting sediment from the grab, each grab was evaluated for acceptability. Grabs were deemed unacceptable if the jaws did not fully close or if sediment was leaking from the grab, which can occur when sampling in areas with a higher proportion of coarse sediment. Grabs less than 40% full of sediment were also considered unacceptable. Sediment from unacceptable grabs was placed in a 20-L bucket and discarded after sampling was completed.

Before processing the sediment, field notes were recorded on the datasheet and photos of the grab showing the surface of the sediment were taken. Coordinates were recorded in the hand-held GPS. Field notes included the UTMs, weather observations, total water depth, a qualitative description of the sediment composition, the colour, presence of macrophytes, obvious odour or sheen, and the fullness of the grab.

The Petite Ponar is equipped with removable mesh screens (500 µm). This allows for visual examination of the sediment grab without opening the jaws and disturbing the sediment profile. Stations sampled in 2021 were characterized by soft sediment, and as such, the Ekman grabs were typically full of sediment. The top 5 cm of sediment was collected using a stainless-steel spoon and placed in a stainless-steel bowl. The depth of sediment taken for chemistry matches what was done in 2018. After the top 5 cm were removed, the remaining sediment was discarded in the 20-L bucket, and the grab was rinsed clean before repeating the process. After collecting the top 5 cm from the second grab, the sediment was homogenized and placed in Whirl-Pak® bags. Samples were stored in a refrigerator at the Exploration Camp until shipping to the laboratory.

7.4.3 Laboratory Methods

Sediment samples were shipped to ALS Environmental for analysis. ALS was the service provider for sediment chemistry analysis in 2015, 2016, and 2018. Metals analysis was completed at the Burnaby (BC) lab. Total organic carbon (TOC) and grain size analyses were conducted at the Saskatoon (SK) location. Metals and TOC analyses were completed on the < 2 mm size fraction. Particle size fractions were defined as sand (0.05 mm to 2 mm), silt (2 µm to 0.05 mm), and clay (<2 µm) for consistency with previous cycles. The 2021 sediment chemistry results for each individual sample are provided in **Table F1-1**.

7.4.4 Data Analysis

Analysis and interpretation of Meliadine Lake sediment quality data focused on assessing if activities at the mine are causing changes in sediment chemistry that have the potential to affect the benthic invertebrate community. Sediment data from the exposure areas were evaluated by a multi-step process:

1. Screen chemistry data from 2021 against CCME sediment quality guidelines (i.e., Interim Sediment Quality Guideline [ISQG] and Probable Effects Level [PEL]) for the protection of freshwater aquatic life (CCME, 2002).
2. Identify metals that show evidence of temporal changes that are consistent with mining activities as the underly cause.

Comparing exposure areas to reference areas is not a meaningful for the AEMP. Several metals are naturally elevated in the vicinity of the mine (Golder, 2019) and there is a high degree of spatial heterogeneity in the NF area that can confound efforts to identify meaningful patterns. Focusing on temporal comparisons within each area will focus the statistical analysis and qualitative evaluation on parameters of interest, which provides information most relevant for the Action Level Assessment and to evaluate whether effects are occurring due to the Project.

Sediment metals concentrations were normalized to the percentage of silt and clay sediment in each sample to account for some of the variability in metals associated with differences in grain size.

Summary Statistics and Comparison to Guidelines

Descriptive statistics for sediment chemistry were calculated for each study area and compared to CCME ISQG and PEL guidelines for the protection of freshwater aquatic life (CCME, 2002). The percentage of exceedances above sediment quality guidelines was also calculated. When more than 50% of the data were below DL, the standard deviation and standard error were not calculated.

Comparisons to sediment quality guidelines provide a coarse analysis of whether concentrations of contaminants have the potential to cause adverse effects to benthic invertebrates. Concentrations below the ISQG are not expected to cause impacts to aquatic life. If concentrations exceed the PEL, effects may occur, but not necessarily. CCME sediment quality guidelines are based on toxicological information according to a standard protocol (CCME, 2002). These guidelines apply Canada-wide and do not necessarily account for site-specific factors, such as the natural geology of the study area. Sediment in lakes located close to mines often have naturally-elevated concentrations of metals due to the underlying minerology in the region. Summary statistics and screening results are provided in **Appendix F1** for 2015, 2016, 2018, and 2021.

Temporal Assessment

Sediment chemistry is naturally variable within each basin of Meliadine Lake due to the underlying minerology. The relevant point of comparison is whether concentrations were changing *within* the NF and MF areas over time, as opposed to assessing differences *between* the NF, MF, and reference areas. The reference areas are primarily important for understanding if sediment chemistry is changing naturally.

The normal range assessment was not completed for sediment chemistry because of natural differences in sediment chemistry among the different basins. Normal range estimates from 2018 pooled all reference and baseline data collected in Meliadine Lake, rather than defining the normal range for each basin. Metals in sediment are often highly variable in lakes close to mineralized areas. High spatial heterogeneity in metals concentrations throughout Meliadine Lake precludes establishing a lake-wide Normal Range. Boxplots and scatterplots were used as an alternate approach to assess whether concentrations are changing over time.

7.5 Quality Assurance and Quality Control

Sediment chemistry QA/QC involved following appropriate sampling procedures, collecting field duplicates, laboratory QC, and data analysis QA/QC procedures as outlined in the AEMP Design Plan. An overview of the QA/QC program is provided below.

Two grab sample field duplicates were collected in 2021 for general chemistry (moisture, pH, particle size, TOC and metals), DUP-01 associated with MEL-03-04 and DUP-02 associated with MEL-01-07. The data quality objectives for duplicates were met across all parameters.

Laboratory QC for sediment samples included laboratory control samples, method blanks, matrix spikes, and reference material. All data quality objectives were met across all parameters. The laboratory data used in analysis and reporting was screened in a manner similar to the water quality data (Golder, 2016). A review of the data entry involved an independent party checking a minimum of 10% of the data for completeness, data entry errors, transcription errors, and invalid data.

A full summary of the QA/QC results for sediment chemistry is provided in **Appendix A**. Overall, the QA/QC results indicate good collection and analytical methods and a high degree of replicability in sampling.

7.6 Results and Discussion

7.6.1 General Observations

Several processes can affect the pattern of metals distribution in sediments, including differential deposition of different grain size materials according to wind direction and speed, organic content, water depth, water currents, basin morphometry, bioturbation (i.e., vertical mixing of sediment by burrowing insect larvae), and proximity to heavily mineralized zones.

Particle Size and Organic Carbon

Particle size and TOC results for 2015, 2016, 2018, and 2021 are presented in **Table 7-2** and shown in **Figure 7-2**. The proportion of clay, silt, and sand in each replicate sample is shown in **Figure 7-3**. Summary statistics are included in **Appendix F1**. NF area MEL-01 was predominantly fine textured (average: 77% fines), while MF (MEL-02) and reference stations (MEL-03 and MEL-05) were more of a mix of sand and fines (range of annual means of 48 to 54% fines) (**Table 7-2**). Grain size has a strong influence on the concentration and bioavailability of contaminants and on the benthic invertebrate community. Fine grain size materials typically found in deposition areas have a much greater surface area than coarse material (e.g., sand). While finer sediments typically have higher metal concentrations, the higher surface area often acts to bind metals and make them less bioavailable.

TOC in these study areas ranged from approximately 4.6% to 6.2%; with levels generally comparable across the four stations. TOC is an important site-specific factor when evaluating food for *in situ* benthic invertebrate community and bioavailability of metals in sediments; lower TOC content generally leads to higher metal bioavailability.

Table 7-2 Percent fines and TOC in sediment from Meliadine Lake.

Area	Average ± 1SD			
	2015	2016	2018	2021
Fines (<0.05 mm; %)				
MEL-01	63 ± 31	82 ± 10	79 ± 14	84 ± 7.1
MEL-02	45 ± 29	46 ± 8.6	50 ± 15	75 ± 7.5
MEL-03	na	38 ± 21	43 ± 21	64 ± 11
MEL-05	na	37 ± 20	49 ± 29	65 ± 16
TOC (%)				
MEL-01	4.2 ± 2.3	4.5 ± 1.8	4.5 ± 1.1	5.0 ± 1.2
MEL-02	4.8 ± 4.6	4.6 ± 2.7	6.7 ± 1.6	8.8 ± 0.7
MEL-03	na	3.7 ± 2.5	3.7 ± 2.9	6.4 ± 1.7
MEL-05	na	5.0 ± 2.8	5.7 ± 2.8	7.6 ± 2.6

Notes:
na = samples were not collected in 2015.

Figure 7-2. Clay, sand, silt and total organic carbon content in sediment collected from the Meliadine Lake AEMP study areas.

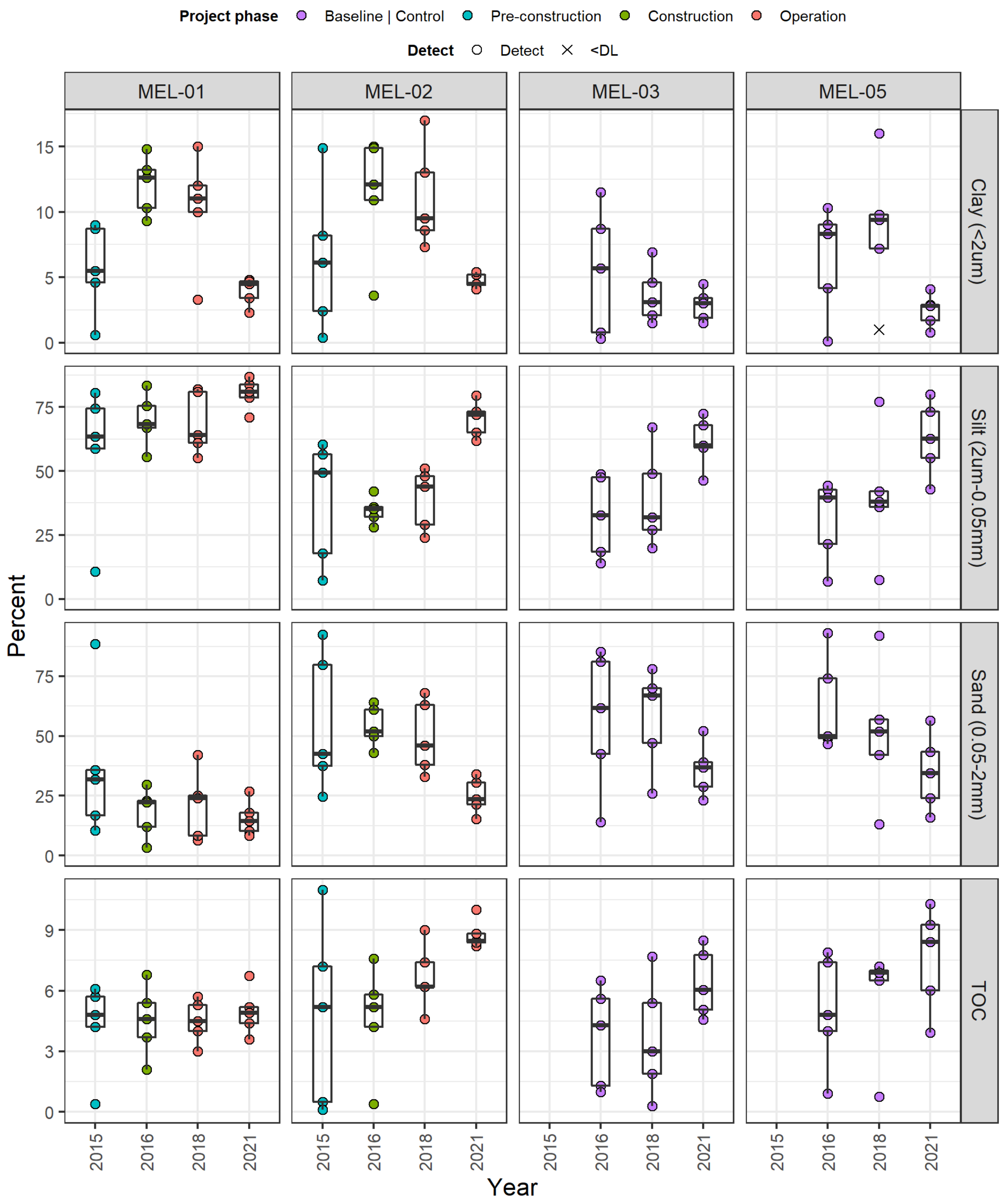
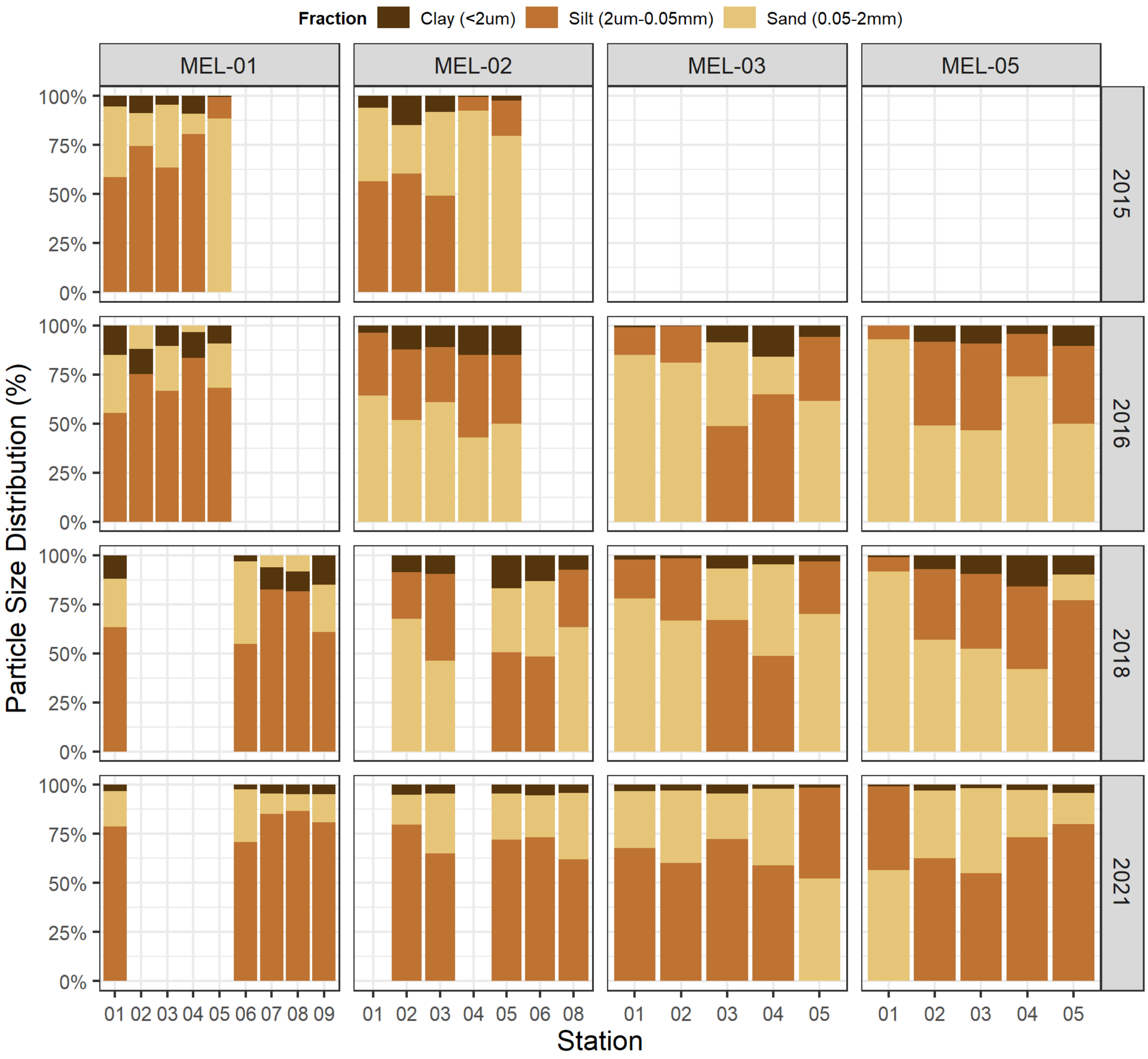


Figure 7-3. **Stacked bar chart showing the particle size distribution in the Meliadine Lake AEMP study areas.**



Metal Concentrations

Seven of the metals analyzed in sediment have CCME ISQG/PEL guidelines: arsenic, cadmium, chromium, copper, lead, mercury, and lead. Metals that exceeded the CCME ISQG in at least 1 sample in 2021 are listed in **Table 7-3**; these included arsenic, chromium, and copper. Concentrations by area and year are shown in **Figure 7-4**. Summary statistics for each parameter and area in 2021 are provided in **Appendix F1**.

Arsenic exceeded the PEL in all five samples collected from MEL-01 and most samples at MEL-02 in 2021. Overall, there was a decreasing gradient in concentrations from the NF, through MF to reference areas (**Table 7-3** and **Figure 7-4**). Elevated concentrations of arsenic are common in lake sediments close to gold deposits (Straskraba and Moran, 1990) and is one of the metals associated with the Meliadine deposit (Agnico Eagle, 2014). While arsenic exceeds the PEL in the NF and MF areas, the absolute concentrations of arsenic observed in Meliadine Lake sediments are much lower than those observed in the north basin of Whale Tail Lake, where concentrations were routinely over 1,000 mg/kg and as high as 1,700 mg/kg dw (Azimuth, 2020).

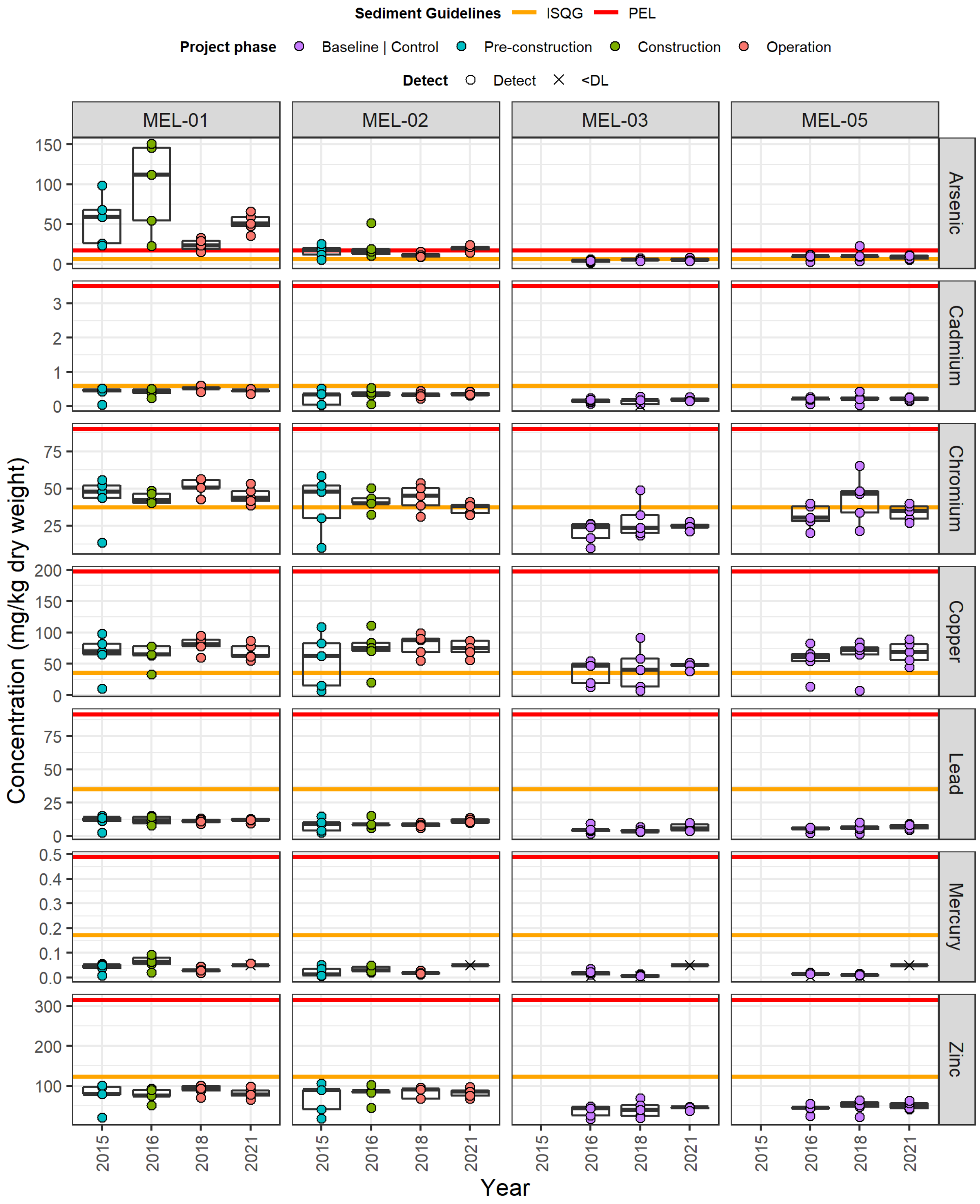
Copper and chromium exceeded their respective ISQGs, but not their PELs. Unlike arsenic, copper and chromium concentrations were more similar across all four study areas.

Table 7-3. Sediment chemistry screening summary, 2021.

Area	Parameter	ISQG	PEL	Mean (mg/kg)	Range (min – max)	N>ISQG	N>PEL
MEL-01	Arsenic	5.9	17	51.7	36 - 66	5	5
	Chromium	37.3	90	**45.1**	39 - 53	5	0
	Copper	35.7	197	**69.1**	56 - 87	5	0
MEL-02	Arsenic	5.9	17	19.4	14 - 24	5	4
	Chromium	37.3	90	36.8	32 - 41	3	0
	Copper	35.7	197	**75**	56 - 87	5	0
MEL-03	Arsenic	5.9	17	5.3	3.4 - 7.8	2	0
	Copper	35.7	197	**46.8**	38 - 52	5	0
MEL-05	Arsenic	5.9	17	**8.28**	5.5 - 11	4	0
	Chromium	37.3	90	33.9	27 - 40	2	0
	Copper	35.7	197	**68**	45 - 89	5	0

Notes:
ISQG = interim sediment quality guideline; PEL = probable effect level.
Bold values indicate parameters where the annual mean exceeded the ISQG.
Shaded values indicate parameters where the annual mean exceeded the PEL.

Figure 7-4. Sediment chemistry compared to CCME sediment quality guidelines.



7.6.2 Temporal Assessment

Temporal trends in sediment concentrations were assessed by visually examining the data using plots for each area. Data were available for pre-construction (2015), construction (2016), and operation phases (2018[22] and 2021). Given the relocation of MEL-01 (see footnote), temporal comparisons initially focused on changes between 2018 and 2021 at the NF and MF areas. Earlier data were also considered, however, to provide a more robust understanding of spatial variability within the sampling areas. In addition, sediment concentrations were normalized to percent fines[23] to reduce the influence of variable substrate size across sampling areas.

The temporal trend assessment looked for patterns that would be expected if there was a mine-related change in sediment chemistry. Those patterns are outlined below.

1. *Temporal change between 2018 and 2021 at NF (MEL-01)* – as noted above, the initial focus on this period considered the change in replicate stations monitored at MEL-01 that occurred prior to the 2018 event. While both these years are within the operational period of the mine, total discharge loadings were substantially higher in 2021, indicating a much higher potential for localized changes in sediment chemistry due to mining activity relative to 2018.
2. *Gradient in response between NF and MF exposure areas* – given that the effluent discharge (MEL-14) is in the NF area, a larger response would be expected at this area relative to the MF area.
3. *Lack of strong evidence of spatial heterogeneity* – lake sediments in depositional zones reflect the influence of sediment inputs to the lake. The underlying geology of the watershed plays a key role in this process. Depositional sediments in many lakes are homogeneous due to the erosion of material with fairly consistent geochemistry. However, in mineralized areas these inputs can be highly variable, leading to substantial heterogeneity in sediment concentrations.
4. *Lack of evidence of sediment particle size influence* – as discussed above, metals have a stronger affinity to bind to smaller particles. Further, efforts have been made during each monitoring event to better match substrate size across sampling areas knowing the influence that it can have on benthic invertebrate communities. This has resulted in substantially finer sediments being sampled at the MF and reference areas over time (**Table 7-2**). Thus, some of the “temporal”

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[22] Note that MEL-01 station locations were relocated following a reconnaissance program to target more homogeneous depositional environments prior to the 2018 sampling event (**Section 8.3.1**). This served to limit the confounding effects of substrate composition which may have been responsible for the high levels of variability observed in 2015 and 2016.

[23] Each sample’s metals concentration was divided by its percent fines as a proportion. For example, if a sample had an arsenic concentration of 10 mg/kg dw and consisted of 80% fines, the fines-normalized concentration would be 10/0.8 = 12.5 mg/kg fines. This adjustment essentially assumes that the metals are all partitioned to the fines fraction and that none are present in sand.

patterns identified could be due to substrate-size changes rather than a true change in sediment chemistry.

The temporal assessment from the first step above was conducted looking at the plots provided in **Appendix F1**. Three metals stood out as increasing over this period. These are discussed below along with the information on the other patterns expected if a mining-related change to sediment chemistry were occurring.

Arsenic

Arsenic concentrations were higher at MEL-01 in 2021 compared to 2018 (**Figure 7-5** and **Figure 7-6**). Arsenic was also higher at the MF area (MEL-02) in 2021 compared to 2018, but the magnitude of the difference was considerably lower than MEL-01 (**Figure 7-6**). The increase in arsenic observed in 2021 compared to 2018 is likely related to natural variability inherent in the sediment. The highest arsenic concentrations reported for the AEMP were collected in 2015 and 2016 at MEL-01 prior to any significant source loading to the lake. Highly variable concentrations of arsenic in sediment at MEL-01 is not surprising given the area around the east basin is natural enriched in metals. The MEL-02 results for arsenic appear to be at least partially explained by sampling much finer sediments in 2021 (75 % fines) than in 2018 (50 % fines) and by natural spatial heterogeneity. This indicates that the difference observed in arsenic concentrations at MEL-02 in 2021 can be explained by a higher percentage of fines (clay and silt) in samples collected in 2021 relative to previous years. In addition, even higher arsenic concentrations were measured in 2016 at MEL-02, indicating that spatial heterogeneity may also be playing a role at the MF area.

Manganese

Manganese concentrations were higher in 2021 relative to 2018 at MEL-01 and to a lesser extent at MEL-02 (**Figure 7-6** and **Figure 7-5**). There was a substantial overlap with concentrations measured previously in 2016 at MEL-01, suggesting that spatial heterogeneity may be a contributing factor for the 2021 results. Manganese, like arsenic, is often enriched in lake sediment close to mining activities mining activities (Heiny and Tate, 1997). Further, the MEL-02 results show a positive relationship between manganese concentrations and percent fines (**Figure 7-7**), which indicates that the increase seen there in 2021 may be due at least in part to the finer sediments sampled this year. Lastly, there was also a slight increasing trend observed at the reference areas, which could indicate the influence of a broader, regional climatic event.

Strontium

Patterns were fairly similar to manganese, except that the largest increase in concentrations in 2021 was seen at the MF stations and even the reference areas changed at a similar to higher degree than seen at the NF area (**Figure 7-6** and **Figure 7-5**). Strontium concentrations generally showed a strong, positive relationship with percent fines, suggesting that increases seen in those locations could be due to sampling finer substrate at those areas over the years to match grain size in the NF area more closely (**Figure 7-7**). Similar to manganese, the increase observed at the reference areas suggests strontium may be accumulating in sediment in response to natural changes occurring in the region. Overall, the spatial-temporal patterns of change for strontium are also uncertain as to the underlying factors responsible.

Figure 7-5. Arsenic, manganese, and strontium sediment concentrations at MEL-01 sampling locations in 2018 and 2021.

Notes: MEL-01-06 was relocated in 2021 due to difficulty obtaining sediment at the 2018 sampling station. The 2021 sampling location is approximately 200 m west of former station and 100 m south of the diffuser (see **Figure 7-1**).

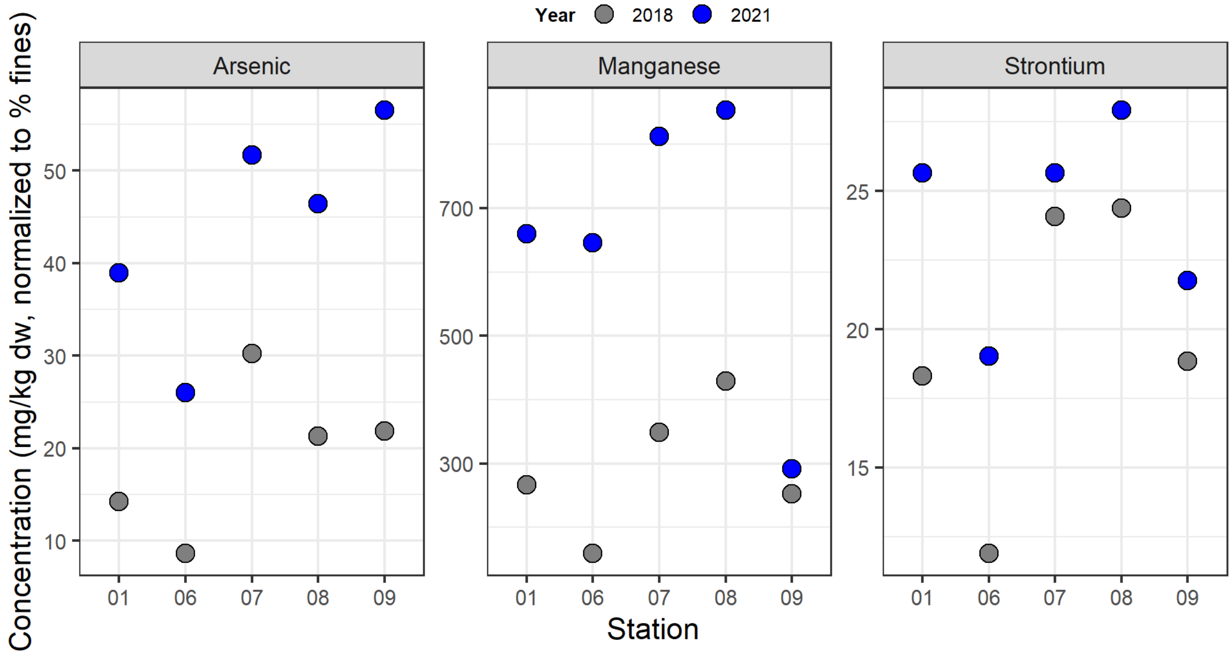


Figure 7-6. Arsenic, manganese and strontium sediment concentrations at near-field (MEL-01), mid-field (MEL-02), and reference stations (MEL-03, MEL-05) since 2015.

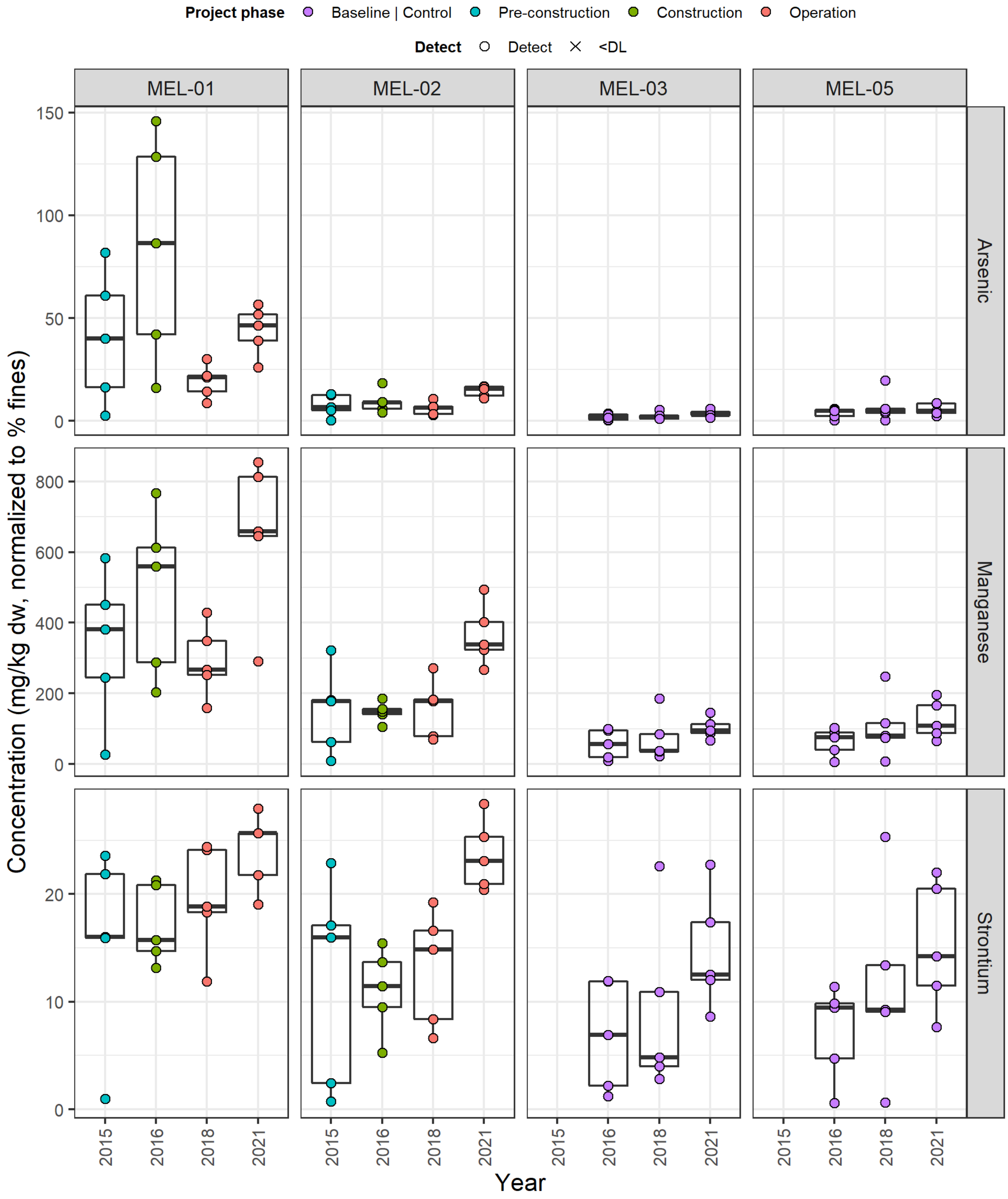
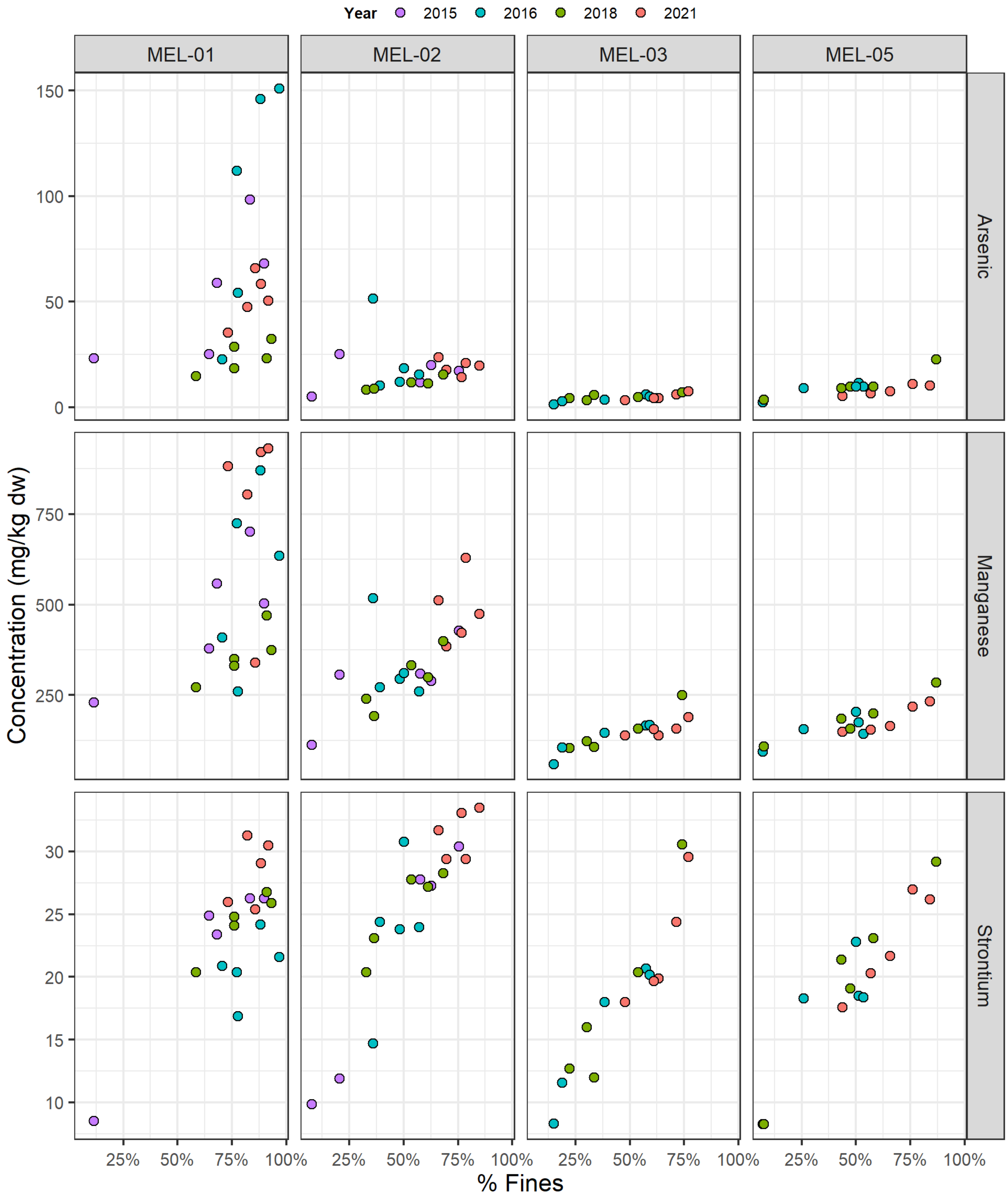


Figure 7-7. **Arsenic, manganese, and strontium sediment concentrations in relation to percent fines at near-field (MEL-01), mid-field (MEL-02), and reference stations (MEL-03, MEL-05) since 2015.**



7.7 Conclusions and Recommendations

Key Question: Is mining activity causing changes in sediment chemistry?

Most metals have not increased significantly at NF and MF areas relative to baseline conditions. Arsenic, manganese, and strontium did show increased concentrations from 2018 to 2021, but change is most likely related to natural spatial heterogeneity rather than temporal increases associated with mining activities. For arsenic, exceedances of the CCME PEL sediment guideline occurred in all samples obtained from 2021 at NF, though there have been no indications of any toxicological effects to the benthic invertebrate community (**Section 8**).

Recommendations

Based on these findings, no follow-up monitoring is recommended. The next sediment sampling program is schedule for 2024.

7.8 References

Agnico Eagle (Agnico Eagle mines Ltd.). 2014. Meliadine Gold Project, Nunavut. Final Environmental Impact Statement. Submitted to the Nunavut Impact Review Board. April 2014.

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Heiny, J.S. and Tate, C.M., 1997. Concentration, distribution, and comparison of selected trace elements in bed sediment and fish tissue in the South Platte River Basin, USA, 1992–1993. Archives of Environmental Contamination and Toxicology, 32(3), pp.246-259.

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8 BENTHIC INVERTEBRATE COMMUNITY

8.1 Introduction

This chapter presents findings of the August 2021 benthic invertebrate study in Meliadine Lake. Sampling areas and stations are collocated with the sediment quality monitoring stations shown in **Figure 7-1**. Benthic invertebrate community monitoring is conducted on a three-year cycle to fulfill requirements of the Water Licence and MDMER.

Benthic invertebrates refer to the group of organisms that live on or in sediments. The benthic invertebrate community in Meliadine Lake is typical of subarctic lakes in the region with generally low overall abundance and richness. Chironomids (midge larvae) are the dominant taxa in depositional areas. Other taxa reflected in the community include fingernail clams, oligochaete worms, and amphipods. The abundance and species composition of benthic invertebrates is strongly affected by water depth, sediment grain size and organic carbon content as well as biological factors, such as foraging by fish and the timing of insect larvae hatches. In terms of the health of Meliadine Lake, benthic invertebrates provide an important source of food for most fish species, especially young-of-the-year and juvenile Lake Trout, Round Whitefish, Lake Whitefish, sculpins and stickleback species (Machniak, 1975; Scott and Crossman, 1979).

Benthic invertebrates are well-suite to monitoring changes in the environment because they are often abundant, easy to collect, and sensitive to change, showing early responses to environmental stress (Reynoldson and Metcalfe-Smith, 1992; Resh and Rosenberg, 1993). Furthermore, unlike water chemistry which provides a “snap-shot” of exposure, benthic invertebrate communities reflect long-term exposure to varying water quality conditions and thus integrate effects of contaminants over time (Wiederholm, 1980; Rosenberg and Resh, 1993). In the context of the Meliadine AEMP, the main stressor(s) of concern are nutrients and metals in effluent. The pattern of change for mild nutrient enrichment would typically be an increase in the abundance and number of benthic invertebrate taxa (taxon richness), whereas elevated concentrations of metals in water or sediment could lead to the loss of sensitive taxa and lower abundance (Environment Canada, 2012).

8.2 Objectives and Key Question

The benthic invertebrate community program ultimately addresses the following key question: *Is the benthic invertebrate community affected by potential mine-related changes in water and sediment quality in Meliadine Lake?*

This key question was addressed by comparing spatial and temporal trends in the benthic invertebrate community relative to mine development. The spatial aspect included comparisons between exposure (near-field [NF] and mid-field [MF] areas) and reference areas (MEL-03 and MEL-05) within Meliadine Lake. Temporal comparisons were made by comparing results from 2021 with data collected in 2015, 2016, and 2018, spanning the period from baseline through operations. Simultaneous consideration of both these aspects allows for a more robust identification of mining-related changes to the community.

Specific objectives for the benthic invertebrate community component identified in the AEMP Design Plan are outlined below.

- Compare benthic invertebrate communities in exposure areas in Meliadine Lake to within-lake reference areas, based on benthic invertebrate effect endpoints (e.g., invertebrate density, taxonomic richness, evenness, and similarity to reference communities).
- Verify predictions made in the FEIS relating to benthic invertebrate communities.
- Meet the requirements of Part 2, Schedule 9 (d) of the MDMER regulations (Government of Canada 2022).
- Assess the efficacy of mitigation strategies proposed in the AEMP Design Plan and the Environmental Management and Protection Plan to minimize the effects of the mine on the aquatic environment.
- Provide data to inform adaptive management intended to reduce or eliminate mine-related effects on benthic invertebrate communities in Meliadine Lake.

8.3 Findings from the 2021 Benthic Invertebrate Community Program

- Benthic invertebrate community density was higher at all study areas in 2021 compared to previous years (2018, 2016 and 2015). The increase was primarily due to more chironomids (midge larvae). Benthic invertebrate abundance can vary widely from year-to-year. Higher abundance observed lake-wide in 2021 compared to previous years demonstrates the range of community responses in relation to natural factors.
- Taxa richness in the NF and MF exposure areas was not significantly different compared to the reference areas in 2021. Furthermore, richness has remained consistent over time throughout Meliadine Lake.
- Multivariate analysis demonstrated that the benthic invertebrate communities at the NF and MF areas in 2021 were similar to the benthic invertebrate communities at the reference areas. Subtle changes in the structure of the community followed the same pattern at all study areas.
- Evidence of mild-nutrient enrichment in the phytoplankton study does not appear to be causing a corresponding increase in the abundance or richness of benthic invertebrates in the east basin of Meliadine Lake.

- Overall, the benthic invertebrate community in 2021 did not trigger Low Action Level for nutrient enrichment or toxicological impairment. Mining activities have not impacted the health of the benthic invertebrate community in the east basin of Meliadine Lake.

8.4 Methods

8.4.1 Study Areas and Field Methods

Benthic invertebrate samples were co-located with samples collected for sediment chemistry. Within each monitoring area, five replicate stations were sampled. Refer to **Section 7.4** for sampling areas and methods common to both programs. Sediment chemistry samples were analyzed for particle size, TOC, and metals concentrations; results are provided in **Appendix F1** and discussed in **Section 8.6**.

Benthic invertebrate samples were collected using a Petite Ponar grab (15.24 × 15.24 cm; bottom sampling area of 0.0232 m^2). At each replicate station, five subsamples were collected and sieved through a 500 µm mesh screen in the field. Subsamples were combined to form a composite sample from material retained by the mesh, placed in a 500 mL HDPE sample bottle, and preserved with neutral buffered formalin to a final concentration of approximate 10%. Individual subsamples were collected at one replicate station MEL-02-08, and were preserved, and eventually analyzed, separately to help characterize within-station variability.

8.4.2 Laboratory Methods

Taxonomic identification and enumeration were completed by Cordillera Consulting (Summerland, British Columbia) to maintain consistency with previous monitoring cycles in 2015, 2016, and 2018. Specimens were identified to the lowest practical level (LPL), typically genus or species. Detailed laboratory methods are provided in **Appendix G2** along with the raw data from 2021.

8.4.3 Data Analysis

Benthic invertebrate samples from the lake stations from 2021 were compiled with data from previous years (2015, 2016, and 2018) in a MS Access database. A “taxonomic filter” was developed to harmonize identifications to a common name to remain consistent across years. In addition, as per recommendations from Environment Canada (2014), an exclusion filter was applied to remove ostracods, cladocerans/rotifers, copepods, sponges, nematodes, flat worms, vertebrates, and non-aquatic taxa prior to analysis.

Benthic Invertebrate Metrics

Raw taxonomy data were imported to R to calculate summary statistics for the benthic invertebrate community metrics listed below.

- Total density (N/m^2) and taxa richness at the lowest practical level (LPL) of identification.
- Density and richness at the level of major taxa group (MTG; Class or Order). The five MTG are Diptera (e.g., chironomids), Oligochaeta, Amphipoda, Bivalvia (clams), and Gastropoda (snails). Species that make up a minor component of the benthic invertebrate community were classified as "Other" for the purpose of calculating summary statistics and plotting. Mayflies (Ephemeroptera) and caddisflies (Trichoptera) were excluded from the dataset to stay consistent with the approach outlined in the 2018 AEMP (Golder, 2019). These taxa are typically found in streams and rivers and are not commonly found in depositional areas in lakes.
- Simpson's Diversity considers both the abundance and taxonomic richness of the community. There are typically two ways that Simpson's Diversity is presented, either by subtracting D from 1 (aka Simpson's Index of Diversity) or taking the reciprocal of D (aka, Simpson's Reciprocal Index [1/D]). D is calculated according to the formula in the TGD:

  $$\mathrm{D} = \sum_{i-1}^{s} (p_i)^2$$

  Where:

  D = Simpson's Diversity,
  pi = the proportion of the ith taxon at the station,
  S = the total number of taxa at the station (i.e., taxa richness),
  1 – D = Simpson's Index of Diversity: this index ranges from 0 to 1 with 0 representing no diversity and 1 representing infinite diversity, and
  1/D = Simpson's Reciprocal Index: this way of presenting the diversity ranges from 1 as the lowest possible value (i.e., only one taxon in the sample) up to the number of taxa represented in the sample.

- Simpson's Evenness is another way of measuring the diversity of the community that takes into consideration how the total abundance is distributed among the various taxa groups. Values range from 0 to 1, with 1 representing a community with completely equal distribution of the number of individuals among the taxa. Evenness was calculated using the density data set as follows:

  $$\mathrm{E} = \frac{1}{D}\, x\, \frac{1}{S}$$

  Where:

  E = Simpson's Evenness,
  D = Simpson's Diversity (see above), and
  S = the total number of taxa at the station (i.e., taxa richness).

- The Bray-Curtis dissimilarity co-efficient is a distance measurement that reaches a maximum value of “1” for two samples that are entirely different and a minimum of “0” for two samples that possess identical descriptors (Bray and Curtis, 1957). Bray-Curtis was calculated according to methods prescribed in the TGD (Environment Canada, 2012):

  $$\mathrm{BC} = \frac{\sum_{i=1}^{n} |y_{i1} - y_{i2}|}{\sum_{i=1}^{n} (y_{i1} + y_{i2})}$$

  Where:

  BC = Bray-Curtis distance between sites 1 and 2,
  Yi1 = count for taxon i at site 1,
  Yi2 = count for taxon i at site 2, and
  n = the total number of taxa at the two sites.
  Note: The Bray-Curtis index is calculated relative to the reference mean on a year/program/habitat-specific basis.

Statistical Analyses

Potential differences in the benthic community between NF, MF, and reference areas were evaluated using univariate statistics calculated for each metric. First, each metric for each sampling year for reference areas MEL-03 and MEL-05 were compared using Student’s t-tests to determine whether pooling of reference area data for the rest of the analysis was appropriate. Following the between-reference comparisons for each metric, analysis of variance (ANOVA) was used to compare results for the NF, MF, and reference areas among years. Comparisons between the NF (i.e., MEL-01) and reference areas were the main interest for the AEMP. Statistical tests were considered significant at $P \leq 0.10$ as recommended by the TGD for EEM (Environment Canada, 2012).

Multivariate Analysis (nMDS)

Non-metric multidimensional scaling (nMDS) was used to identify differences in invertebrate community structure among stations sampled in the NF, MF, and reference areas. The nMDS process uses the original taxonomic dataset, calculates from these data a pairwise Bray-Curtis dissimilarity matrix for each taxonomic sample, and then reduces the dissimilarity matrix to a small number of underlying dimensions of variation among samples. In this way, nMDS can visually simplify a multidimensional taxonomic dataset in two or three dimensions that capture the major patterns of community variability.

Prior to analysis, raw abundance values were $\log_{10}(x + 1)$ transformed to reduce the influence of numerically dominant taxa on the final ordination and to allow the nMDS to capture a more balanced representation of the community. Two dimensions were selected for the nMDS after evaluating the stress value of configurations varying from 1 to 10 dimensions (**Appendix G1**). The results of the nMDS were plotted alongside ellipses representing the 90th, 95th, and 99th percentile of the pooled reference area taxonomy data as well as data from MEL-01 and MEL-02 in 2015 when both areas were considered unimpacted by mining activities.

Normal Range

The AEMP Design Plan (Golder, 2016) included the development of normal ranges calculated using reference and baseline data to help provide context for interpreting the results of key benthic invertebrate community metrics. However, given that the ranges were generally broad and uninformative, these comparisons were not included in the interpretation of the univariate benthic community metrics. Rather, the assessment relied upon a combination of statistical analysis of the univariate metrics (i.e., ANOVAs comparing NF and reference) and the nMDS to identify and interpret potential changes to the benthic invertebrate community.

8.5 Quality Assurance and Quality Control

8.5.1 Field QA

Sampling was conducted by a field team familiar with the study area with multiple years of experience conducing benthic invertebrate community sampling at Agnico Eagle's Meadowbank Mine.

Care was taken to minimize the introduction of foreign material into the samples or loss of material of interest from the samples prior to analysis. Field notes were maintained to document the field sampling program, including date and location of sample collection, sampler's initials, and method of sample collection. Each sample was labelled with a unique identifier and the date sampled. Chain-of-custody forms were updated as samples were collected, and were checked to verify the information recorded before samples were submitted. Five samples were collected per area and composited to capture spatial variability within each of the NF, MF and reference areas.

8.5.2 Laboratory QC

Laboratory QA/QC procedures for the benthic sampling program involved evaluations of sorting efficiency and sub-sampling efficiency. Sorting efficiency was evaluated for 10% of the samples to determine the percentage of organisms missed by the initial sorter. The taxonomic laboratory's data quality objective for sorting efficiency between the initial sort and the QC re-sort is 95%. Sorting efficiency was 99% in both samples that were re-sorted (**Table 8-1**). Sub-sampling efficiency was evaluated for 10% of the samples to confirm that any fraction of the total sample that was examined was representative of the sample. The laboratory's data quality objective for sub-sampling efficiency is for the number of organisms in each sub-sample to be within 20% of the number expected based on the original sample. Both samples evaluated for sub-sample efficiency were within the laboratory's target.

Table 8-1. Sorting efficiency for the 2021 benthic invertebrate community samples.

Sample	% Sorted	Total From Sample	Organisms in *Re-sort*	Precision	Taxa Found in QA/QC Sorting
MEL-02-06	62.5%	325	2	99%	Chironomidae
MEL-05-02	25%	335	3	99%	Chironomidae, Bivalvia, Gastropoda

Notes:
Precision between the initial sample sort and the QA replicate is calculated by: (1-(Missed organisms / Total from sample))*100.

8.6 Results and Discussion

Summary statistics and supporting data for the benthic invertebrate community assessment are provided in **Appendix G1**. Raw taxonomic data from the 2021 field sampling program are provided in **Appendix G2**.

8.6.1 Benthic Invertebrate Community – General Discussion

The abundance and species composition of benthic invertebrate communities are influenced by multiple habitat variables, including water depth, substrate size, and organic carbon. Other factors, such as water temperature and nutrient influx, can influence larval development rates and timing of hatch for insect larvae over time. Collectively, these factors can result in substantial spatial and temporal variability in the benthic invertebrate community.

Historically, benthic invertebrate community samples collected at both control and impact areas in Meliadine Lake have had densities less than 5,000 organisms/m^2. However, densities measured in the 2021 sampling program were higher than in previous years in both control and impact stations, with some replicate samples upwards of 10,000 organisms/m^2. Although the measured density values were higher than those previously observed at Meliadine Lake, invertebrate density above 10,000 organisms/m^2 is not uncommon for lakes in the region. For example, invertebrate densities above 10,000 organisms/m^2 have been identified at both the Meadowbank and Whale Tail Pit study lakes and in some cases density as high as 31,000 organisms/m^2 have been measured (Azimuth, 2018, 2021). Thus, while the observed densities are high relative to previous monitoring at Meliadine Lake, the relative increase observed in 2021 is well within the range seen elsewhere in the region.

Benthic invertebrate communities in the Meliadine Lake study area, similar to those of other northern lakes, are characterized by relatively few taxa and variable density. As is typical of most Arctic lakes, the benthic invertebrate community in Meliadine Lake has historically been dominated by the aquatic larval stages of insects, especially chironomids (Family Chironomidae), both in terms of abundance and taxa richness. The next most abundant group has been Mollusca (clams), particularly genera of the family Sphaeriidae (fingernail clams). Oligochaete worms and gastropods (snails) are also relatively common in the lake sediments; generally, one or both have been present in each lake area sampled in previous years. Results from the 2021 sampling program indicate that the dominant taxa in Meliadine Lake are similar to those of previous years, with communities dominated by chironomids, fingernail clams, snails, and oligochaete worms (see **Section 8.6.2** for further discussion).

8.6.2 Community Composition

Comparisons of benthic invertebrate endpoints between the two reference areas are summarized in **Table 8-2**. There were no significant differences between MEL-03 and MEL-05 for total density, taxa richness, Simpson's Evenness, or Simpson's Diversity (**Table 8-2**). Therefore, reference data was pooled and ANOVAs were conducted to compare total density in NF and MF areas to both the individual reference locations and pooled reference data. Statistical test results from the ANOVA for the primary benthic invertebrate community endpoints in 2021 are provided in **Table 8-3**. Significance of the pairwise comparisons between the exposure and reference areas are provided in **Table 8-4**.

Table 8-2. Summary of t-test results comparing benthic invertebrate metrics between the two reference areas (MEL-03 and MEL-05) in 2021.

Endpoint	t-statistic	p value
Total Density (organism/m^2)	0.441	0.53
Taxa Richness (LPL)	0.720	0.42
Simpson's Evenness	0.398	0.55
Simpson's Diversity (1-D)	0.575	0.47

Notes
LPL = lowest practical level of taxonomic identification

Table 8-3. Summary of ANOVA tests for benthic invertebrate community endpoints in 2021.

Endpoint	Source of Variation	DF	Sum of Squares	Mean Square	F	p value	Significant at p<0.1
Total Density (organism/m^2)	Between Groups (Areas)	4	14340774	3585194	0.28	0.886	No
	Within Groups (Residual)	25	315566618	12622665			
Taxa Richness (LPL)	Between Groups (Areas)	4	14.7	3.67	0.61	0.656	No
	Within Groups (Residual)	25	149	5.97			
Simpson's Evenness	Between Groups (Areas)	4	0.17	0.043	3.17	0.031	Yes
	Within Groups (Residual)	25	0.34	0.014			
Simpson's Diversity (1-D)	Between Groups (Areas)	4	0.043	0.011	1.25	0.315	No
	Within Groups (Residual)	25	0.22	0.0087			
Bray-Curtis (pooled)	Between Groups (Areas)	4	0.33	0.081	2.98	0.038	Yes
	Within Groups (Residual)	25	0.68	0.027			

Notes:
LPL = lowest practical level of taxonomic identification; DF = degrees of freedom; F = statistical F ratio

Table 8-4. Results of statistical tests for the benthic invertebrate community endpoints in 2021.

Endpoint	ANOVA (p value)	Exposure vs Pooled Reference Areas (REF)		Reference Area Comparisons (REF1 vs REF3)
		MEL-01 vs REF	MEL-02 vs REF	
Total Density	0.886	-	-	-
Taxa Richness (LPL)	0.656	-	-	-
Simpson's Evenness	**0.031**	0.998	**0.029**	0.964
Simpson's Diversity	0.315	-	-	-
Bray-Curtis (Pooled REF)	**0.038**	0.272	0.992	**0.097**
Bray-Curtis (REF1)	**0.032**	**0.032**	0.760	0.985
Bray-Curtis (REF3)	**0.054**	0.493	0.998	**0.074**

Notes:
LPL = lowest practical level of taxonomic identification.
B-C = Bray-Curtis.
NF = MEL-01; MF = MEL-02; REF1= MEL-03; REF3 = MEL-05; REF = Pooled reference areas MEL-03 and MEL-05
Significant differences in the ANOVA and pairwise comparisons at P≤0.10.

Density

No statistically significant differences (P≤0.10) in total density were identified between any of the sampling locations in 2021 (**Table 8-3**).

Density was generally higher in 2021 than previously observed in 2015, 2016, or 2018 (**Table 8-5**; **Figure 8-1**). On average, density was similar at MEL-01, MEL-02, and MEL-05 at 5,100 to 5,300 organisms/m^2. MEL-03 had a slightly more abundant community on average at 7010 organisms/m^2. The observed increase in total density in 2021 was primarily due to chironomids (order Diptera) (**Figure 8-1**). No other taxa consistently increased across all stations in 2021 relative to previous sampling years. The increase in chironomid density is clearly visible in **Figure 8-2**. Despite increases in total density and chironomid density across all stations in 2021 relative to 2018, the relative density of major benthic invertebrate taxa was similar for each area between the sampling years (**Figure 8-3**). Communities in both sampling years consisted primarily of chironomids and bivalve clams, with amphipods and snails present in samples from at least one station in most areas.

Table 8-5. Benthic invertebrate density (organisms/m²) in Meliadine Lake since 2015.

Area	Year	N	Mean	Median	SD	SE	Min	Max
MEL-01	2015	5	493	500	97	217	190	802
	2016	5	2,290	2,430	382	854	1,170	3,490
	2018	5	695	802	194	434	233	1,280
	2021	5	5,090	3,410	1,320	2,960	3,160	10,100
MEL-02	2015	5	224	207	65	145	60	457
	2016	5	759	690	250	558	224	1,670
	2018	5	859	802	225	503	276	1,450
	2021	5	5,170	4,800	473	1,060	4,340	6,930
MEL-03	2016	5	1,680	1,230	336	750	1,110	2,770
	2018	5	1,270	1,240	326	729	241	2,300
	2021	5	7,010	5,430	2,070	4,630	2,660	12,400
MEL-05	2016	5	910	1,040	171	383	500	1,390
	2018	4[b]	1,610	1,600	224	449	1,080	2,170
	2021	5	5,290	3,830	1,560	3,490	3,370	11,500

Notes:
Density results are rounded to 3 significant figures.
[a] One sample from MEL-05 was excluded from the 2018 data set due to abnormally low abundance.

The change in density in 2021 compared to previous years was consistent across both reference and exposure areas indicating the changes are natural and not related to mining activities. Habitat characteristics such as substrate particle size and total organic carbon (TOC) content can influence both the abundance and composition of the benthic invertebrate community. The potential influence of particle size (represented by % fines, which is the combined silt and clay fractions) and TOC on invertebrate density was explored in **Figure 8-4** (note: density shown by point size). The 2021 samples generally overlapped well with the historical data from a TOC/particle size perspective, except for MEL-05, where three replicates had higher values. It should be noted, however, that TOC/particle size results among the stations were less variable in 2021 compared to previous years. Overall, the 2021 benthic invertebrate community had higher densities than observed in previous years but the increase does not appear related to habitat.

The difference in chironomid density between years is likely partly related to the normal life-cycle progression. Chironomids have four life-history stages (egg, larvae, pupae, adult), and most of their life cycle is spent in the larval stage. In northern latitude lakes, chironomids may up to seven years to complete their life cycle from egg to emerged adult insect (Butler, 1982), although two to three years is typical for most species (Porinchu and MacDonald, 2003). The sampling method (500 µm mesh) preferentially selects late instar (mature) individuals (BC MOE, 2006), and for this reason, estimates of chironomid abundance retained in the 500 µm mesh are expected to vary naturally from year-to-year. The most important point of comparison is that total density at the NF, MF, and reference areas showed the same pattern of increase from 2018 to 2021.

Figure 8-1. Benthic invertebrate density in Meliadine Lake since 2015

Notes: MEL-05-05 was flagged as not reportable in the 2018 AEMP (Golder, 2019) due to unusually low density.

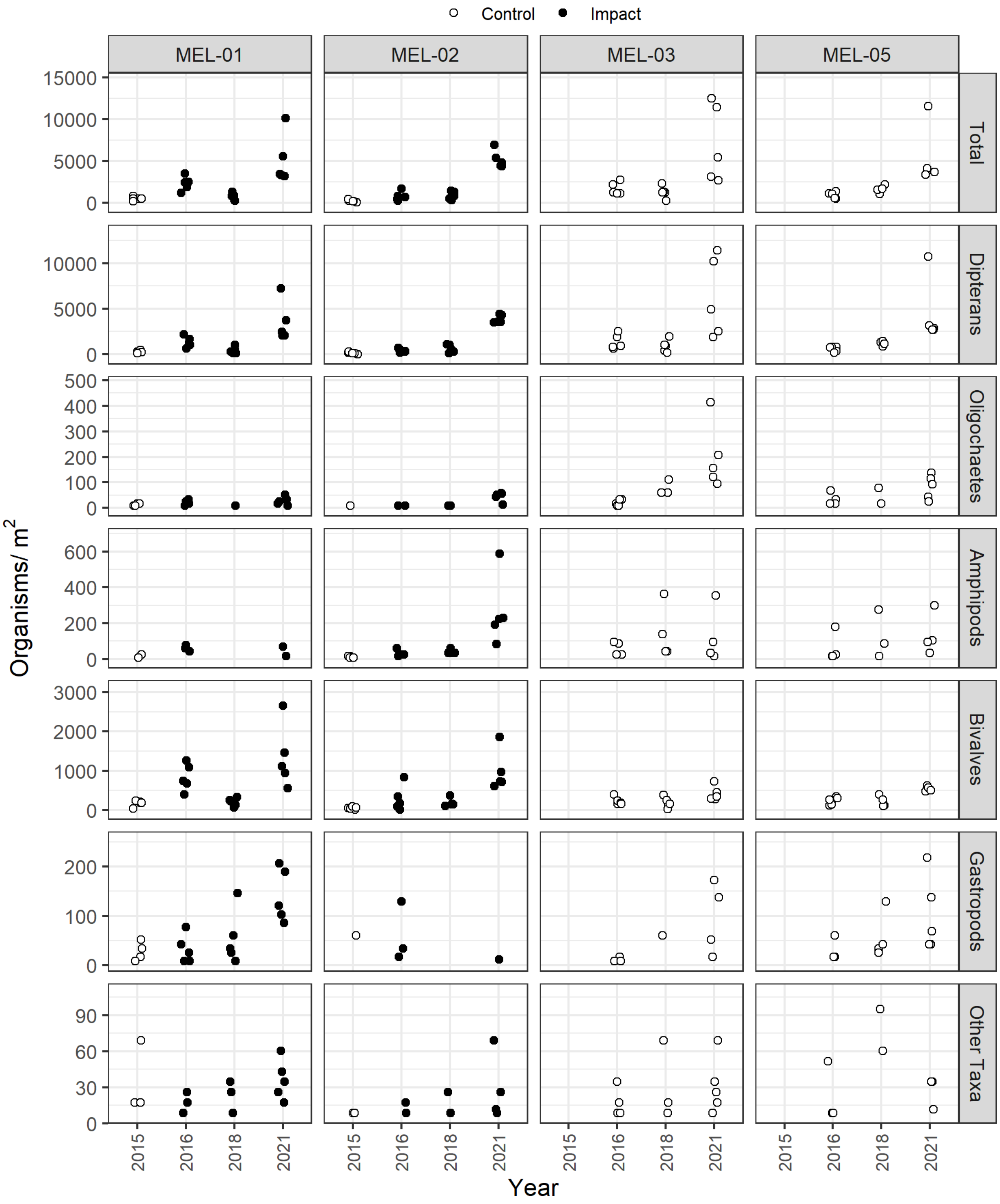


Figure 8-2. Absolute benthic invertebrate density by major taxa, 2018 and 2021

Notes: MEL-05-05 was flagged as not reportable in the 2018 AEMP (Golder, 2019) due to unusually low density.

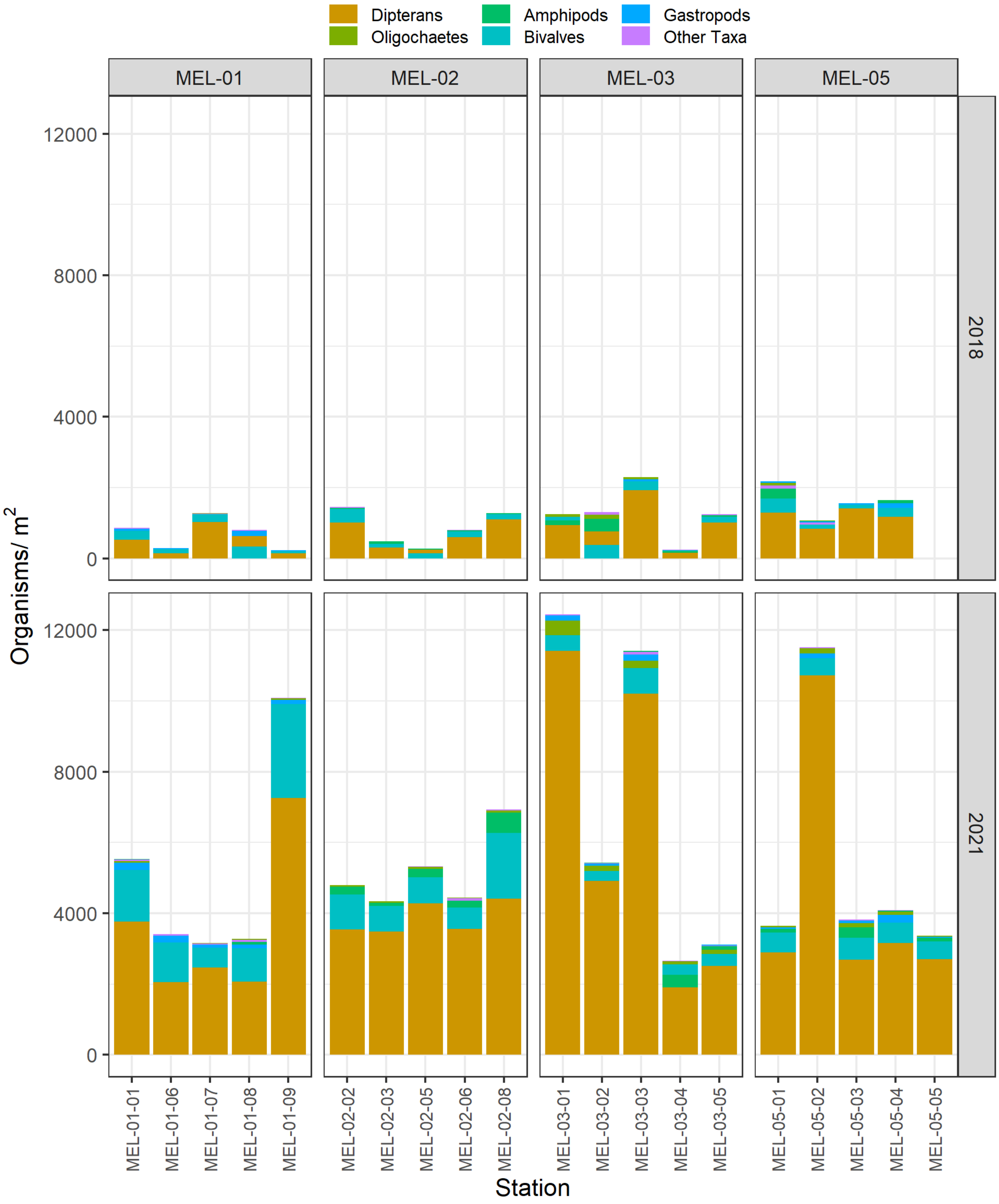


Figure 8-3. Relative benthic invertebrate density by major taxa, 2018 and 2021

Notes: MEL-05-05 was flagged as not reportable in the 2018 AEMP (Golder, 2019) due to unusually low density.

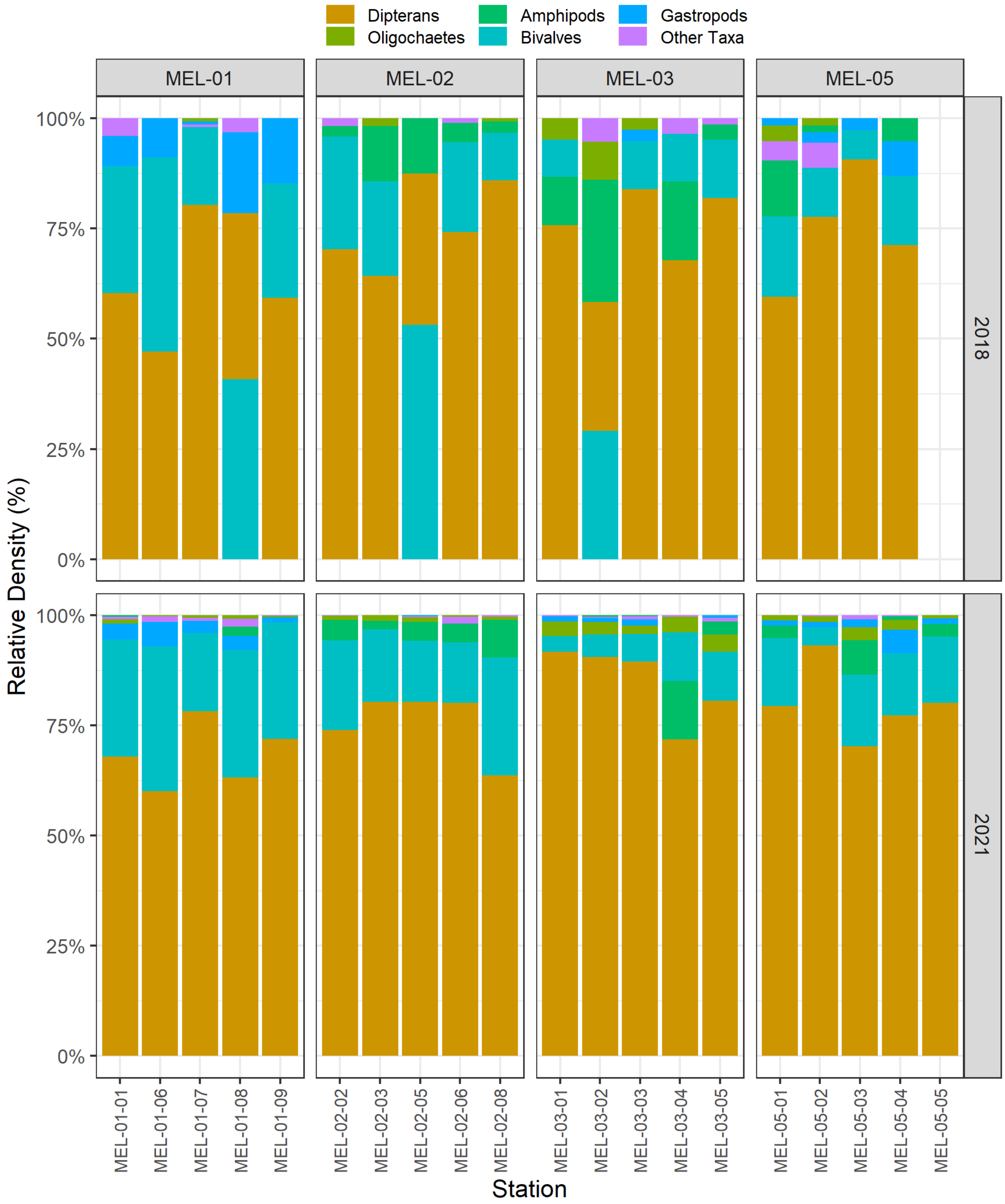
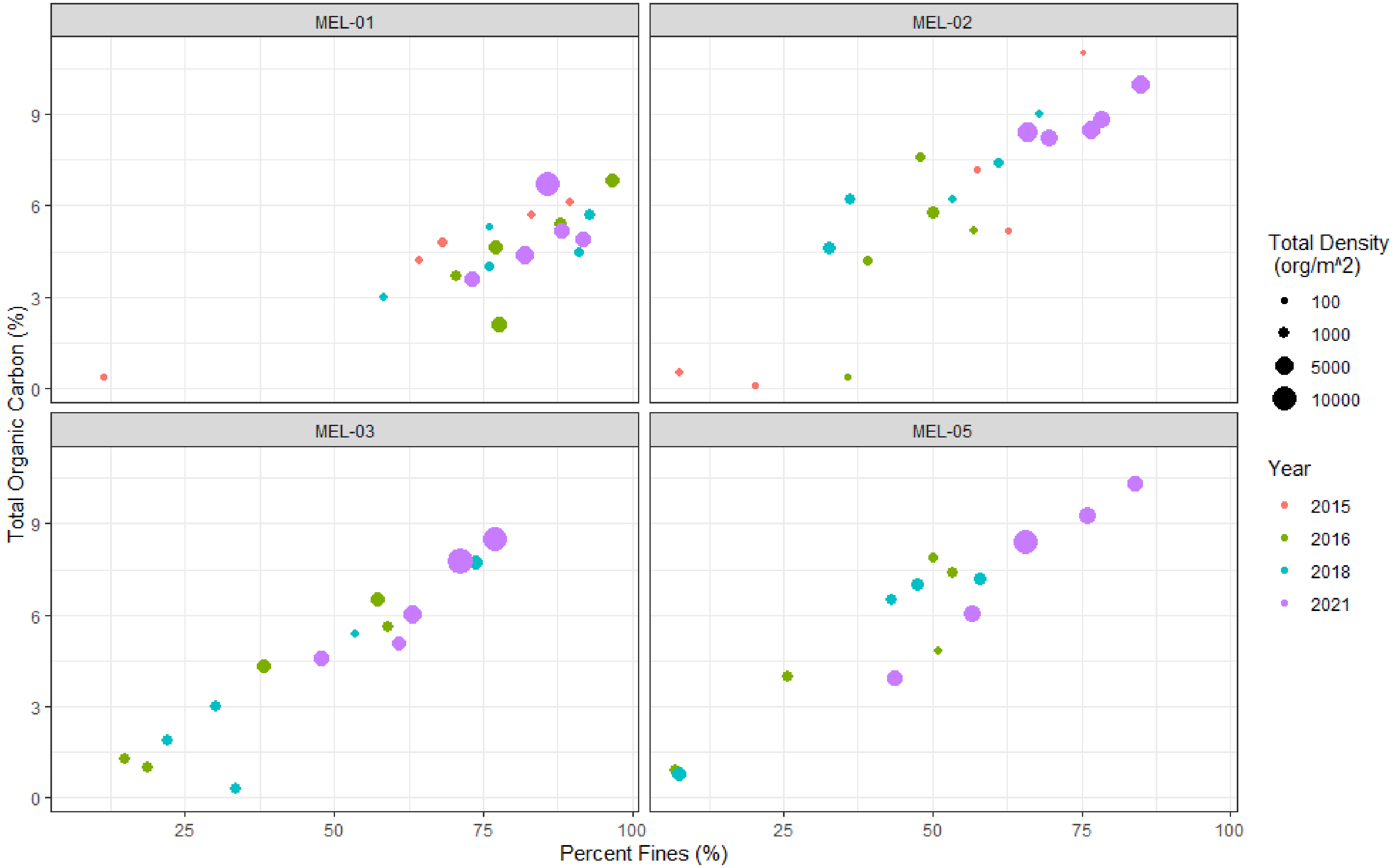


Figure 8-4. **Benthic invertebrate density compared to total organic carbon and percent fine substrate in sediments for Meliadine Lake since 2015**



Richness

No statistically significant differences (P≤0.10) in taxa richness were identified among the NF, MF, and reference areas in 2021 (**Table 8-4**). Total richness and major taxa richness in 2021 were similar to previous sampling years (**Table 8-6**, **Figure 8-5**). Mean total LPL richness ranged from 16 taxa at MEL-02 and MEL-05 to 18 taxa at MEL-01. The majority of total LPL richness was accounted for by various genera of chironomids. Mean chironomid richness ranged from 10 taxa at MEL-02 and MEL-05 to 12 taxa at MEL-01 (**Figure 8-6**); chironomid taxa accounted for >60% of mean total LPL richness in all areas in 2021 (**Figure 8-7**). Slight increases in mean LPL richness in 2021 relative to 2018 were observed at MEL-01 and MEL-02. These increases were primarily due to increases in the number of chironomid genera. Overall, the LPL richness and major taxa richness results for Meliadine Lake areas in 2021 do not indicate mine-related impairment of the benthic invertebrate community.

Table 8-6. Benthic invertebrate richness at the lowest practical level of identification in Meliadine Lake since 2015.

Area	Year	N	Mean	Median	SD	SE	Min	Max
MEL-01	2015	5	11.8	11	1.39	3.11	9	17
	2016	5	15.4	15	0.927	2.07	13	18
	2018	5	11.2	11	1.53	3.42	8	16
	2021	5	18.2	19	1.11	2.49	14	20
MEL-02	2015	5	9	9	1.22	2.74	6	13
	2016	5	11	9	1.45	3.24	8	15
	2018	5	11.8	11	2.08	4.66	7	18
	2021	5	16.2	17	1.43	3.19	12	20
MEL-03	2016	5	14.8	15	1.02	2.28	12	17
	2018	5	14.2	15	1.77	3.96	8	18
	2021	5	17.4	17	1.12	2.51	14	21
MEL-05	2016	5	13	13	1.58	3.54	9	17
	2018	4	16.8	16	2.06	4.11	13	22
	2021	5	16.2	17	0.86	1.92	13	18

Figure 8-5. Benthic invertebrate richness in Meliadine Lake since 2015.

Notes: MEL-05-05 was flagged as not reportable in the 2018 AEMP (Golder, 2019) due to unusually low density.

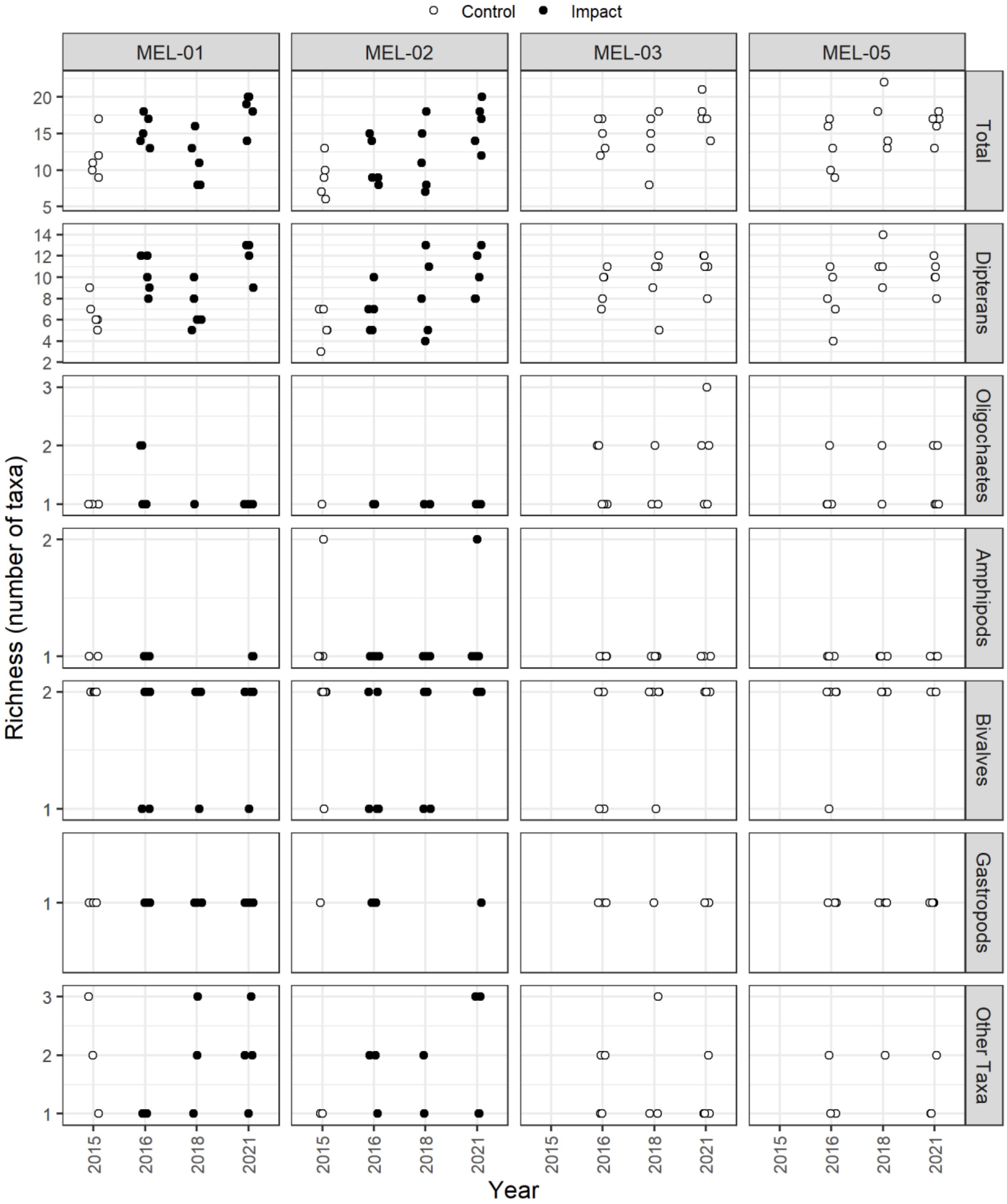


Figure 8-6. Benthic invertebrate richness by major taxa, 2018 and 2021.

Notes: MEL-05-05 was flagged as not reportable in the 2018 AEMP (Golder, 2019) due to unusually low density.

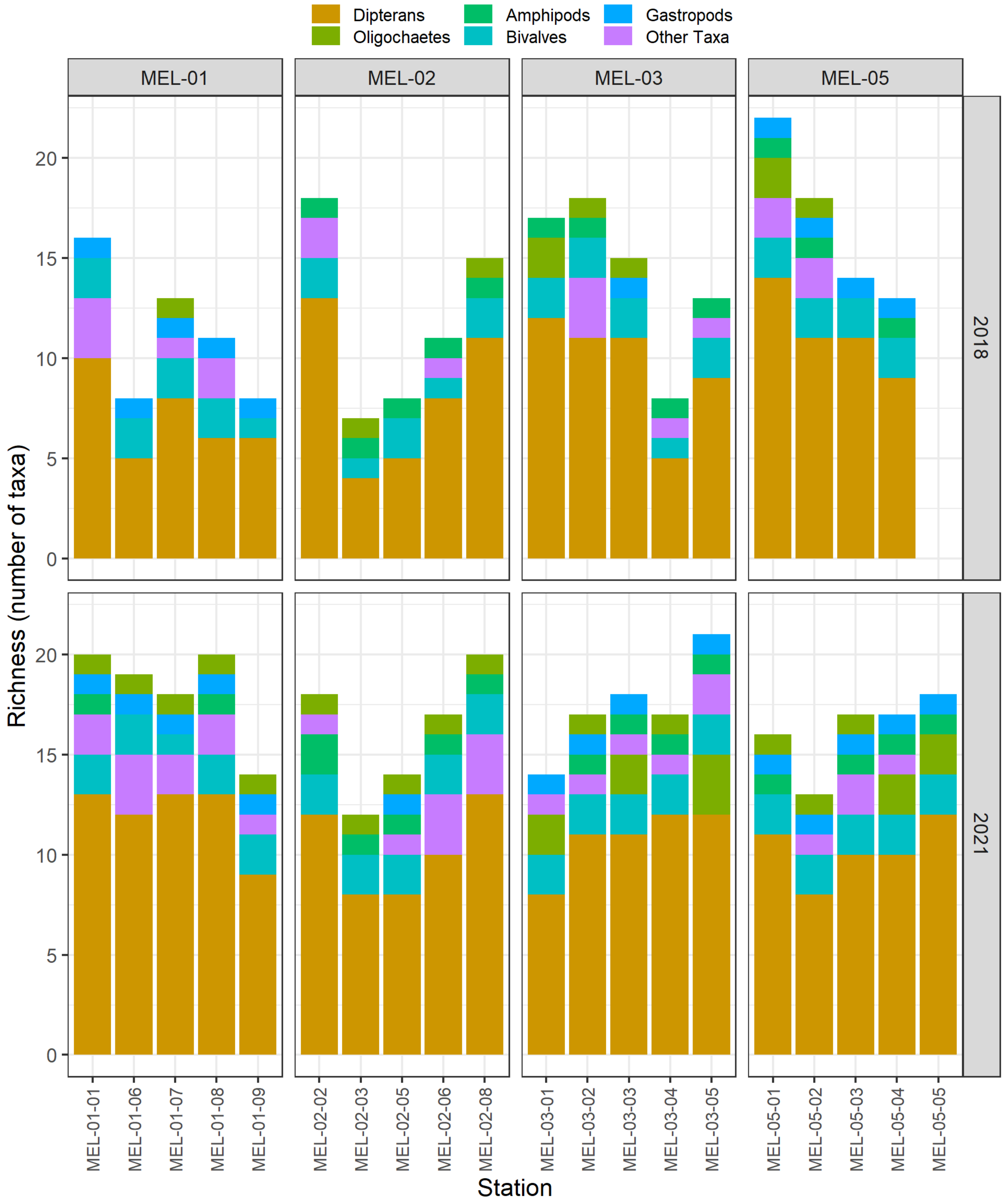
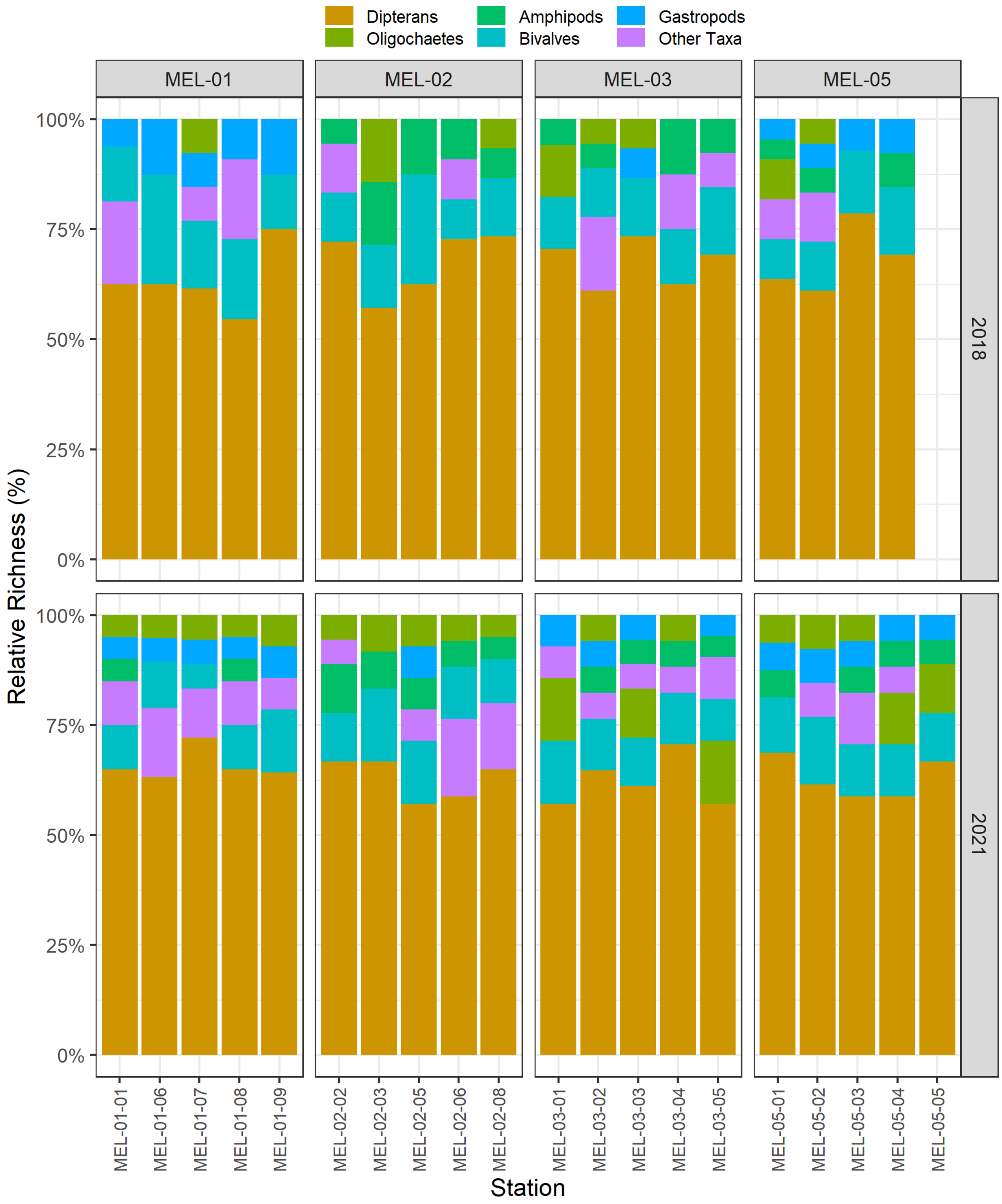


Figure 8-7. Relative benthic invertebrate richness by major taxa, 2018 and 2021.

Notes: MEL-05-05 was flagged as not reportable in the 2018 AEMP (Golder, 2019) due to unusually low density.



Diversity Indices

Major diversity indices for benthic invertebrate community samples collected in 2021 were generally similar to those observed in previous sampling years (**Table 8-7**, **Figure 8-8**). Mean Simpson's Evenness was lower in all areas in 2021 relative to previous years, indicating that the benthic invertebrate community in 2021 samples was less evenly distributed than in previous years. The decrease in Simpson's Evenness was due to the increase in chironomid density relative to other taxa.

Table 8-7. Simpson's Evenness for the benthic invertebr

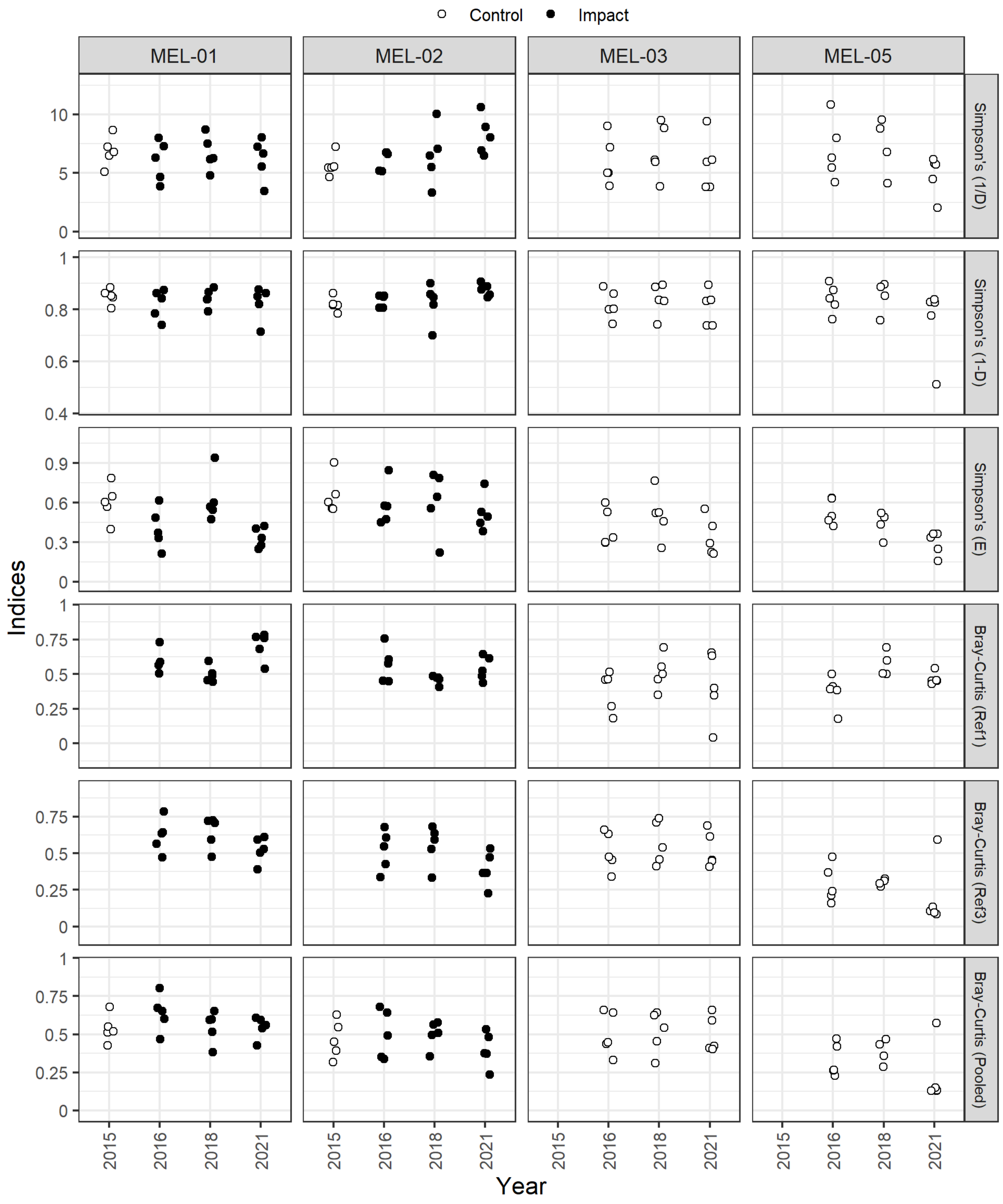
Area	Year	N	Mean	Median	SD	SE	Min	Max
MEL-01	2015	5	0.601	0.605	0.0626	0.14	0.399	0.786
	2016	5	0.404	0.371	0.0685	0.153	0.214	0.616
	2018	5	0.626	0.569	0.081	0.181	0.476	0.939
	2021	5	0.337	0.332	0.034	0.076	0.249	0.424
MEL-02	2015	5	0.657	0.606	0.0657	0.147	0.554	0.907
	2016	5	0.583	0.574	0.0702	0.157	0.45	0.845
	2018	5	0.604	0.644	0.106	0.238	0.222	0.81
	2021	5	0.52	0.496	0.0613	0.137	0.383	0.744
MEL-03	2016	5	0.412	0.336	0.0637	0.142	0.295	0.599
	2018	5	0.506	0.52	0.0812	0.182	0.258	0.766
	2021	5	0.342	0.292	0.0652	0.146	0.213	0.555
MEL-05	2016	5	0.532	0.5	0.0438	0.098	0.422	0.637
	2018	4	0.435	0.462	0.0503	0.101	0.295	0.523
	2021	5	0.294	0.337	0.04	0.0895	0.158	0.363

Bray-Curtis dissimilarity scores for MEL-01 and MEL-02 were lower in 2021 compared to previous years, indicating that the benthic invertebrate communities in the NF and MF area were more similar to the reference areas (**Figure 8-8**).

Results of the Student's t-tests indicate that there were no significant differences between the major diversity indices for reference locations MEL-03 and MEL-05 in any sampling year (**Table 8-2**). Reference data were pooled and ANOVAs were conducted to compare major diversity indices in NF and MF areas to both the individual reference locations and pooled reference data for each sampling year. Simpson's Evenness was significantly higher at MEL-02 relative to MEL-05 and the pooled reference data, indicating more equal distribution of the number of individuals among the taxa at MEL-02 (**Table 8-4**). No other significant pairwise differences for major diversity indices were observed in 2021. Overall, the major diversity indices in Meliadine Lake stations in 2021 do not indicate mine-related impairment of the benthic invertebrate community.

Figure 8-8. Benthic community diversity indices by year for Meliadine Lake stations since 2015.

Notes: MEL-05-05 was flagged as not reportable in the 2018 AEMP (Golder, 2019) due to unusually low density.



Multivariate Analysis

Two nMDS dimensions were derived from the transformed benthic community data, which together accounted for 89% of the variance in the original Bray-Curtis distance matrix. The stress value of the final configuration was 0.17, which represents a good fit of the ordination results to the input data (Clarke, 1993).

Results of the nMDS ordination showing the taxa correlations with axis scores are illustrated in **Figure 8-9**. This figure helps interpret which taxa contribute to the degree of similarity in community composition among replicate stations across years in **Figure 8-10**. Midge larvae (Chironoidae) and fingernail clams (Pisidiidae) abundances were most strongly and positively associated with Axis 1 scores, whereas amphipods (Hyalellidae) were most strongly and negatively associated with Axis 1 scores (**Table 8-8**). In other words, samples with higher Axis 1 scores had higher chironomid and fingernail clam abundance, while samples with lower Axis 1 scores had higher numbers of amphipods. Axis 2 scores were most strongly positively associated with amphipods from the Gammaridae family. Strong negative correlations on Axis 2 were associated with higher abundance of abundance of snails (Valvatidae).

Samples that appear close together on **Figure 8-10** had relatively similar benthic communities, whereas samples that are far apart were relatively dissimilar. In general, samples exhibited some clustering by area for each sampling year. The ellipses in each panel represent the 90th (green), 95th (orange), and 99th (red) percentile of the pooled reference data and data from the NF and MF area in 2015.

Most individual samples fell within the 90th percentile ellipse and all samples from NF and MF impacted areas fell within the 99th percentile ellipse. One sample from MEL-02-02 in 2015, representing baseline conditions, fell outside of all ellipses. The two most dominant taxa at this location were fingernail clams (*Pisidium* sp.) and amphipod crustaceans (*Hyalella* sp.). Looking at the taxa correlations in **Figure 8-9**, the higher abundance of amphipods, and corresponding lower abundance of chironomids indicates this community was different than other areas in the MF area in 2015. This demonstrates the natural variability in benthic invertebrate communities within a given year and within the same study area.

Relative to previous years, the 2021 results indicate a slight shift on nMDS axis 1 towards more positive scores, which correlates with higher abundance of taxa such as chironomids and fingernail clams. The position of the NF samples in 2021 relative to the taxa correlations also shows a higher abundance of snails (Valvatidae) relative to other taxa at the NF area in 2021 compared to previous years (**Figure 8-9**).

The results of the nMDS show that the benthic invertebrate community varies naturally between years, but the pattern of change is similar among the NF, MF and reference areas. This finding is consistent with results for density, richness, and diversity indices and provides more evidence that mining activities are not adversely impacting the structure of the benthic invertebrate community.

Table 8-8. List of taxa that were significantly correlated in the Non-Metric Multidimensional Scaling (nMDS) analysis

Taxa	Axis 1 Score	Axis 2 Score	P value	R^2
Chironomidae	0.912	-0.0899	0.001	0.84
Gammaridae	0.303	0.833	0.001	0.785
Pisidiidae	0.879	-0.0322	0.001	0.773
Valvatidae	0.351	-0.791	0.001	0.749
Amphipoda.indet.	0.177	0.571	0.001	0.358
Tubificidae	0.589	-0.0203	0.001	0.347
Oxidae	0.458	0.135	0.002	0.228
Lumbriculidae	0.39	0.228	0.001	0.204
Limnephilidae	0.0235	0.362	0.006	0.132
Triopsidae	0.12	-0.314	0.011	0.113
Hydropsychidae	0.171	0.261	0.022	0.0974
Hyalellidae	-0.137	0.252	0.043	0.0824

Figure 8-9. Scatter plot of Axis 1 and Axis 2 scores and associated taxa scores for Non-Metric Multidimensional Scaling (nMDS) analysis

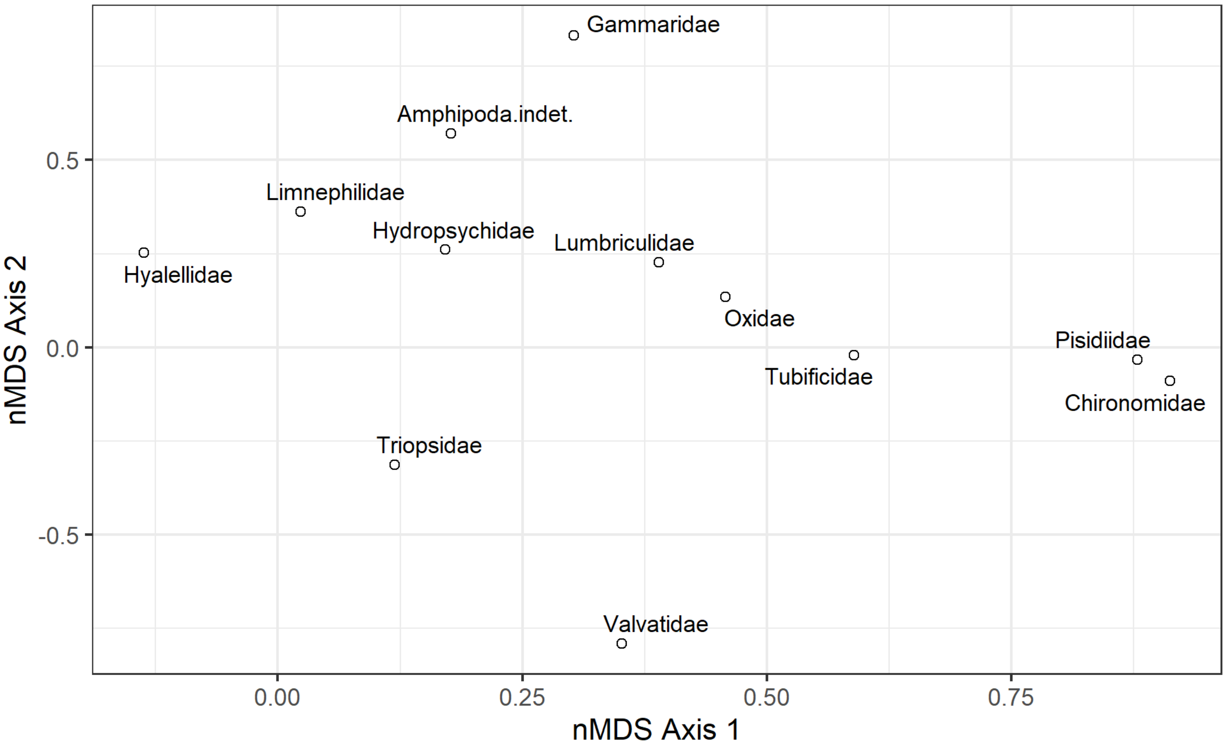
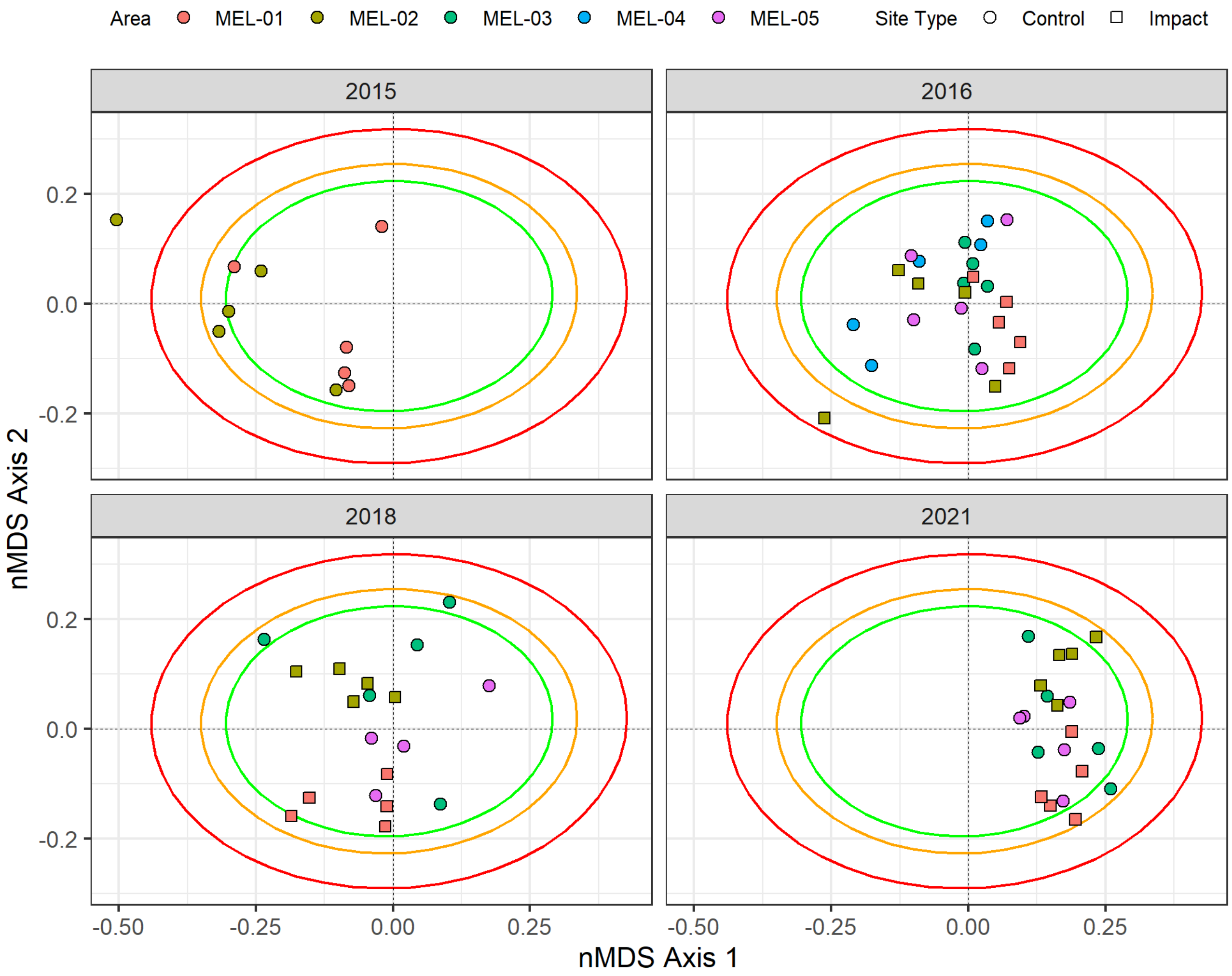


Figure 8-10. nMDS ordination plot for benthic invertebrate community (family level) for Meliadine Lake stations since 2015.

Notes: Site Type *Control* refers to samples collected from the reference areas (MEL-03, MEL-04, and MEL-05) and from the exposure areas during the preconstruction phase in 2015. *Impact* refers to samples collected from MEL-01 and MEL-02 in 2016, 2018, and 2021.



8.7 Conclusions and Recommendations

Conclusions for the 2021 benthic invertebrate community study are summarized below in the context of the key question stated in **Section 8.2**. The benthic invertebrate community results are incorporated into the Low Action Level assessment for toxicological impairment and nutrient enrichment in **Section 13.2** and **Section 13.3**, respectively.

Key Question: Is the benthic invertebrate community affected by potential mine-related changes in water and sediment quality in Meliadine Lake?

Increased total density, mainly due to chironomids, was observed throughout Meliadine Lake in 2021 compared to previous sampling years. The increase in chironomids corresponded to a decrease in Simpson's Evenness (community diversity) and in the multivariate analysis of the community structure. The direction of change in the benthic community density was consistent across both reference and exposure areas and is therefore not related to mining activities.

These findings align with the effects analysis in the FEIS that predicted no changes would occur to the structure of the benthic invertebrate community despite higher concentrations of nutrients in the east basin and potential changes in primary productivity (Agnico Eagle, 2014). Overall, activities at the mine are not impacting the structure or function of the benthic invertebrate community in Meliadine Lake.

Recommendations

The next cycle of benthic invertebrate community monitoring for the AEMP is planned for 2024.

8.8 References

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9 THREESPINE STICKLEBACK HEALTH

9.1 Introduction

The fish health assessment component of the AEMP includes a lethal study on one small-bodied fish species and one large-bodied fish species, conducted on a three-year cycle. Threespine Stickleback (*Gasterosteus aculeatus*) were selected as the small-bodied fish species due to their relatively high abundance in Meliadine Lake and early age-of-maturity. Threespine Stickleback represented over 60% of the total catch in baseline fish sampling in Meliadine Lake between 1997 and 2009 (Azimuth and Portt, 2021). The Threespine Stickleback study compared differences in survival, energy use, and energy storage for mature male and female fish from the exposure area (MEL-01) with mature fish from reference areas MEL-03 and MEL-04 (**Figure 9-1**).

The FEIS (Agnico Eagle, 2014) predicted that nutrients in effluent discharge to Meliadine Lake could have residual effects to fish habitat, which would include forage fish such as Threespine Stickleback. Adverse effects from exposure to contaminants were not predicted because water quality was expected to meet aquatic life guidelines by the edge of the mixing zone around the diffuser.

9.2 Objectives and Key Question

The Threespine Stickleback health assessment is ultimately focused on answering this key question: *are activities at the mine causing changes in Meliadine Lake that are impacting the health of small-bodied fish?* Findings from other components of the 2021 AEMP were used to help interpret the Threespine Stickleback health data on a case-by-case basis.

The objectives of Threespine Stickleback program were outlined in the AEMP Design Plan:

- Determine whether water discharged to Meliadine Lake influences survival, energy use (growth), and energy storage (condition) of small-bodied fish in Meliadine Lake,
- Verify predictions made in the FEIS pertaining to fish health,
- Meet the requirements of Schedule 5, Part 2, Subsection 9 (a) of the MDMER regulations (Government of Canada, 2022),
- Recommend appropriate changes to the fish health program for future years, and
- Provide data to inform adaptive management intended to reduce or eliminate mine-related effects for fish health in Meliadine Lake.

9.3 Findings from the 2021 Threespine Stickleback Study

- The 2021 AEMP Threespine Stickleback fish study focused on unparasitized fish because parasitism has the potential to confound the interpretation of effect indicators and the assessment of potential mining-related effects.
- Male Threespine Stickleback at MEL-01 were older, larger, and heavier compared to males from the reference areas in 2021. This finding suggests higher survival and growth for male fish at MEL-01 compared to male fish from the two reference areas. No differences were observed for female fish.
- The FEIS predicted that effluent discharged to Meliadine Lake *may* result in changes to fish community composition or increased growth or production of forage species such as Threespine Stickleback. Similar results for condition and relative liver size for male and female fish among exposure and reference areas suggest the availability and quality of food available to Threespine Stickleback is similar among the study areas.
- There is no evidence of adverse effects to Threespine Stickleback survival, growth, or energy storage that are consistent with toxicological impairment caused by exposure to metals in effluent.
- A parallel study with parasitized Threespine Stickleback was conducted as part of the Cycle 2 EEM to assess if there are differences in fish health endpoints between parasitized and unparasitized Threespine Stickleback in Meliadine Lake. These results will be presented in the Cycle 2 EEM report (Azimuth, in prep).

9.4 Methods

9.4.1 Fish Collection

Threespine Stickleback were collected from the near-field (NF) exposure area of Meliadine Lake (MEL-01) and two within-lake reference areas (REF1; MEL-03 and REF2; MEL-04) from August 5 to August 28, 2021. The location of minnow trap sites in MEL-01, MEL-03, and MEL-04 are shown in **Figure 9-1**. The NF area was located along the south shoreline of the esker nearest to the effluent diffuser, and within the 1% effluent plume (**Figure 3-4**), as delineated on August 29, 2021. Reference area sampling locations were selected based on habitat considerations (e.g., depth, substrate, lake morphometry) to maximize catch-per-unit-effort (CPUE) and to achieve sample size requirements.

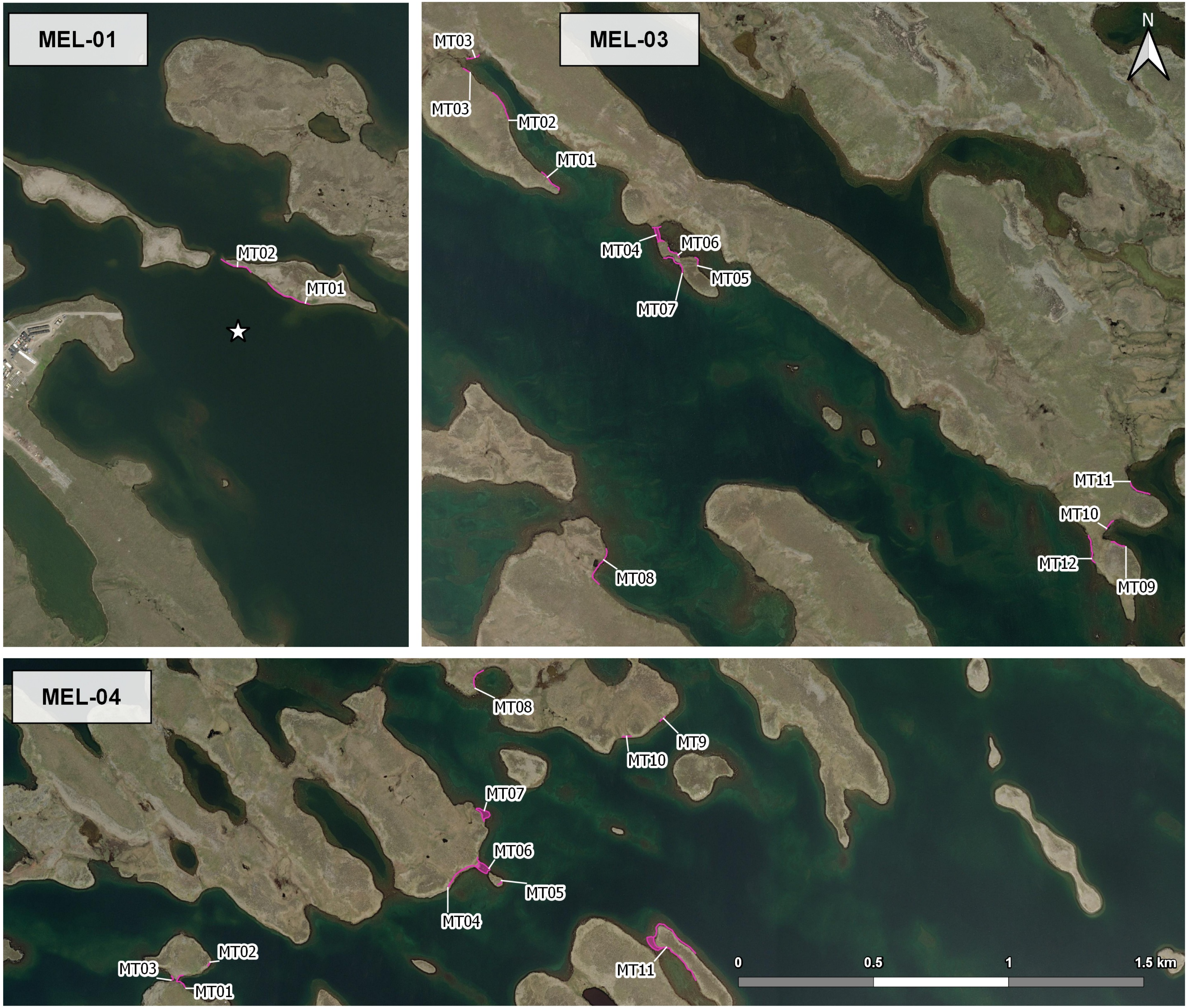
Figure 9-1
Monitoring Areas and Minnow Trap Subsites for the Small-Bodied Fish Program in Meliadine Lake in 2021

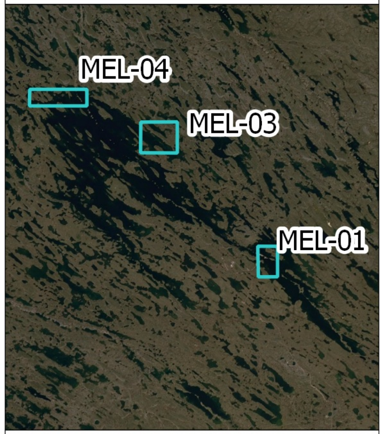
2021 Aquatic Effects Monitoring Program Annual Report

AZIMUTH

Date:	February 15, 2022
Datum:	NAD 83 UTM Zone 15N
Scale:	1:40,000
Software:	QGIS version 3.16.0-Hannover
Produced by:	E. Franz; J. Ellenor

REFERENCES:
1. Basemap imagery from Google





Legend

▨ Minnow Trap Subsites

☆ Diffuser

Fish were collected from the wadable shoreline using unbaited gee-style minnow traps (1/4" square mesh; 9" x 16"). Set date and time, lift date and time, water depth, substrate (dominant and sub-dominant), and the number of individuals captured of each species were recorded for each trap set. Non-target species were released.

Target sample sizes for each area were 30 mature males, 20 mature females, and 20 juveniles from each area. The majority of Threespine Stickleback in Meliadine Lake are infected by a tapeworm (65% of individuals captured in 2018), believed to be *Schistocephalus solidus*. This parasite competes with the host for available resources and decreases energy allocated to storage and spawning (Schultz et al., 2006; Rushbrook and Barber, 2006; Heins and Brown-Peterson, 2010a; Heins et al., 2010).

Target fish were euthanized with a concussive blow to the head, measured (total length) to the nearest 1 mm using a standard fish measuring board, and weighed to the nearest 0.0001 g using an Ohaus PR64/E electronic balance. Each fish was examined externally for lesions or other anomalies. The body cavity of each fish was opened, and the viscera were examined for abnormalities, lesions, tumors, and parasites. If one or more tapeworms were present, the fish was excluded from the study. For unparasitized fish, livers and gonads were extracted and weighed to the nearest 0.0001 g using the same balance.

As expected, ovaries were in various stages of development in August. Threespine Stickleback are multiple spawners, and both spawning and resting individuals have been captured during August sampling in previous years (Golder, 2019; Golder, 2016b). Females were classified as mature if eggs could be identified at 3.0 times magnification. Fecundity (number of eggs within the ovaries) was determined for ripe females, distinguished by the presence of larger yellow eggs which could be readily separated, by counting all eggs. Males were identified by the presence of lobular testes. Individuals with opaque testicles were identified as mature, while individuals with translucent testicles were immature. Indistinguishable gonads were characterized as sex unknown.

Following removal of the viscera carcass weight was recorded (± 0.0001g) and the specimen was labelled and frozen for future aging (using otoliths) and tissue chemistry analysis.

9.4.2 Ageing

Ageing of fish was completed by North/South Consultants Inc. Otoliths (inner ear bones) were extracted from each specimen, set on a slide, and placed under a microscope. Age was estimated by counting the number of annuli present. Age was independently estimated (QA/QC) by a second reader for approximately 7% of the total number of samples.

9.4.3 Data Analysis

Data were entered into a spreadsheet and compared with original datasheets. Boxplots and scatterplots were constructed to review data, and transcription errors or omissions were corrected. Condition (K) was calculated using the formula:

$$K = \frac{weight}{total\ length^3} \times 100{,}000.$$

Statistical analyses were carried out using R (Core Team, 2022). Summary statistics (sample size, mean, median, minimum, maximum, standard deviation, standard error) were generated for total length, total weight, carcass weight, condition, liver weight, gonad weight, fecundity, and age for each area. Those same summary statistics were generated according to maturity, sex, and area.

Threespine Stickleback monitoring endpoints assess the survival, energy use, and energy storage of individuals captured in the exposure area (MEL-01) compared to reference areas MEL-03 and MEL-04. A summary of the various monitoring endpoints is provided in **Table 9-1**. Monitoring endpoints were assessed separately for mature males and mature females except for length-frequency distributions, which includes data from all individuals (regardless of sex and maturity). Reproductive endpoints, including relative gonad size, and relative fecundity (# of eggs/female) were not assessed. Threespine Stickleback spawn multiple times during the summer, and mature individuals were in various stages of reproductive development, confounding comparisons of reproductive endpoints across areas.

Size-at-age was assessed using one-factor ANOVAs for the strongest age classes, rather than using an analysis of covariance across all ages; Threespine Stickleback are short lived, and therefore assessing size-at-age using an ANCOVA can provide misleading results (Environment Canada, 2012).

Table 9-1. Statistical procedures used for various monitoring endpoints to compare Threespine Stickleback populations between exposure and reference areas.

Effect Indicator	Endpoint	Dependent Variable	Covariate	Statistical Procedure	Critical Effect Size
Survival	Age	-	-	ANOVA	25%
Size	Length-frequency distribution	-	-	Kolmogorov-Smirnov Test	-
	Length	-	-	ANOVA	-
	Total Weight	-	-	ANOVA	-
Growth (Energy Use)	Size-at-age	Total Weight	-	ANOVA	25%
		Length	-	ANOVA	25%
Condition (Energy Storage)	Condition	Total Weight	Length	ANCOVA	10%
		Carcass Weight	Length	ANCOVA	10%
	Relative Liver Size	Liver Weight	Length	ANCOVA	25%
		Liver Weight	Carcass Weight	ANCOVA	25%

If analysis of variance (ANOVA) results were significant (P≤0.10), pair-wise comparisons were made using Tukey's honestly significant difference test. For the analysis of covariance (ANCOVA) analyses, both the complete model, which includes the interaction term (area x covariate) and the reduced model, which excludes the interaction term, were run. Significant interactions can be difficult to interpret, and complicate the computation of effect size. In cases where the interaction term accounted for < 2% of the total variation in the response variable the reduced model was appropriate and was used directly to assess significance and effect sizes, as per Barrett et al. (2010). If ANCOVA results were significant, (P≤ 0.10), pair-wise comparisons were made using Tukey's honestly significant difference test.

Residuals from each ANCOVA were examined for normality and outliers. Observations producing large Studentized residuals (i.e., > 4) were removed from the data set, and the analyses were repeated and variations in conclusions considered.

The percent difference in means (ANOVA) and least-square means (ANCOVA) between the exposure area (MEL-01) and each of the two reference areas (MEL-03 and MEL-04) was calculated as:

$$\%\ Difference = \frac{\bar{x}_{exposure} - \bar{x}_{reference}}{\bar{x}_{reference}}$$

When log transformed data were analyzed, the least-mean square values used were antilogs of the calculated values. The % difference was compared to the critical effect size for each endpoint. A critical effect size is a threshold above which an effect may be indicative of a higher risk to the environment (Environment Canada, 2012).

9.4.4 Power Analysis

Power analysis is used to determine, *a posteriori*, the probability of detecting a change greater than or equal to the critical effect size (see **Table 9-1**), assuming a 10% probability of committing a Type I or Type II error, and given the sample sizes, mean values, and unexplained variability (i.e., the population standard deviation) from this study. Power is calculated by re-arranging the following power equation (Green, 1989):

$$n = \frac{1.5(t_{\alpha} + t_{\beta})^2 \sigma^2}{\delta^2}$$

Where:
n is the number of fish,
σ is the population standard deviation,
δ is the specified effect size,
t_{α} is the Students *t* statistic for a two-tailed test with significance level α, and
t_{β} is the Students *t* statistic for a one-tailed test with significance level β.

Results of the power analysis will be presented in the Cycle 2 EEM interpretive report for both unparasitized and parasitized Threespine Stickleback as part of recommendations to improve the small-bodied fish health program for future AEMP and EEM cycles.

9.5 Results and Discussion

9.5.1 Sampling Effort and Catches

Minnow traps were set at MEL-01 from August 11 to August 21, 2021, at MEL-03 from August 7 to August 13 and August 21 to August 26, 2021, and at MEL-04 from August 5 to August 7 and August 16 to August 29, 2021. Minnow trap catches and effort are summarized in **Table 9-2**. Threespine Stickleback was the most abundant species in the catches at all three areas, with a total of 4,188 captured. Ninespine Stickleback (*Pungitius pungitius*) and Slimy Sculpin (*Cottus cognatus*) were also captured at all three areas. Juvenile Lake Trout (*Salvelinus namaycush*) and Burbot (*Lota lota*) were captured at MEL-03 and MEL-04, and juvenile Round Whitefish (*Prosopium cylindraceium*) were captured at MEL-04. Average CPUE of Threespine Stickleback for each area ranged from 0.085 fish/hr soak time (MEL-01) to 0.158 fish/hr soak time (MEL-03) (**Table 9-2**). Within an area, CPUE of Threespine Stickleback varied considerably depending on minnow trap locations (i.e., sub-area). At MEL-03, for example CPUE ranged from 0.007 fish/hr soak time (MT11) to 0.416 fish/hr soak time (MT05).

9.5.2 Threespine Stickleback Characteristics

Overview

The number of unparasitized Threespine Stickleback processed by area, maturity, and sex is provided in **Table 9-3**. Target sample sizes were achieved for all groups at all areas except for mature females at MEL-04, where 18 individuals, two less than the target of 20, were captured.

A summary of the total number of fish examined from each area, by parasite status is presented in **Table 9-4**. Most dissected fish were parasitized, averaging 79.1% of all fish across all areas, and ranging from 71.6% (MEL-01) to 85.1% (MEL-03). Note that the number of unparasitized fish examined at each area (**Table 9-4**) does not match the total sample sizes at each area (**Table 9-3**), as some unparasitized fish that were dissected were within groups that had already reached the target sample size; these additional fish were not processed if the target sample size had already been met.

Summary statistics (sample size, mean, median, minimum, maximum, standard deviation, standard error) were generated for length, weight, condition, liver weight, gonad weight, fecundity, and age for mature Threespine Stickleback, by area (**Table H1-1**), and for all individuals by maturity, sex, and area (**Table H1-2**). The gonads could not be discerned in some immature individuals; consequently, there are no weights for these. The data for each specimen are provided in **Appendix H-1**.

Ageing QA/QC

Ageing QA/QC data are provided in **Table H1-3**. The difference between the ages estimated by the primary ager and the secondary ager were identical for 44 of 49 fish that were checked. The 5 fish where the primary and secondary ages differed were identified as 1 year older by the secondary ager.

Lesions, deformities, and external parasites

No lesions, deformities, or external parasites were observed on Threespine Stickleback in 2021.

Table 9-2. Minnow trap effort and catch summary.

Area	Sub-site	Total Soak Time (hrs)	Catch Summary						THST Catch-per-Unit-Effort (fish/hr soak time)
			THST	NSST	SLSC	LKTR	BURB	RNWF	
MEL-01	MT01	2537.5	218	7	1	0	0	0	0.086
	MT02	3730.7	315	2	0	0	0	0	0.084
	Total	**6268.2**	**533**	**9**	**1**	**0**	**0**	**0**	**0.085**
MEL-03	MT01	1097.0	70	26	3	0	0	0	0.064
	MT02	557.6	28	15	0	1	0	0	0.050
	MT03	518.0	143	13	0	1	0	0	0.276
	MT04	919.0	376	23	1	0	0	0	0.409
	MT05	377.0	157	12	0	0	0	0	0.416
	MT06	455.9	131	12	1	0	1	0	0.287
	MT07	841.2	293	8	2	0	1	0	0.348
	MT08	854.7	16	0	0	0	1	0	0.019
	MT09	2609.8	254	64	4	0	1	0	0.097
	MT10	1776.7	90	9	2	1	1	0	0.051
	MT11	2213.0	15	4	0	0	1	0	0.007
	MT12	1377.0	570	141	1	3	0	0	0.414
	Total	**13596.9**	**2143**	**327**	**14**	**6**	**6**	**0**	**0.158**
MEL-04	MT01	188.8	10	2	0	0	0	0	0.053
	MT02	94.8	0	0	0	0	0	0	0.000
	MT03	185.6	159	2	0	0	0	0	0.857
	MT04	463.8	32	2	0	0	1	0	0.069
	MT05	226.3	0	0	0	0	0	0	0.000
	MT06	4493.3	614	58	3	3	7	2	0.137
	MT07	4313.6	320	46	1	1	7	0	0.074
	MT08	157.9	4	2	0	0	0	0	0.025
	MT09	156.2	79	2	0	0	0	0	0.506
	MT10	131.1	2	2	0	0	0	0	0.015
	MT11	3080.6	292	88	4	2	3	0	0.095
	Total	**13492.0**	**1512**	**204**	**8**	**6**	**18**	**2**	**0.112**

Notes:
THST: Threespine Stickleback, NSST: Ninespine Stickleback, SLSC: Slimy Sculpin, LKTR: Lake Trout, BURB: Burbot, RNWF: Round Whitefish

Table 9-3. Number of unparasitized Threespine Stickleback examined from each area, by maturity and sex.

Maturity	Sex	Target Sample Size	Achieved Sample Size		
			MEL-01	MEL-03	MEL-04
Mature	Female	20	23	26	18
	Male	30	33	36	34
Immature	-	20	22	22	25

Table 9-4. Summary of Threespine Stickleback parasitism by area.

Area	Number of Fish Dissected			Percent Parasitized (%)
	No Parasites	Parasites	Total Count	
MEL-01	107	322	429	75.1
MEL-03	135	772	907	85.1
MEL-04	141	356	497	71.6
Total	383	1450	1833	79.1

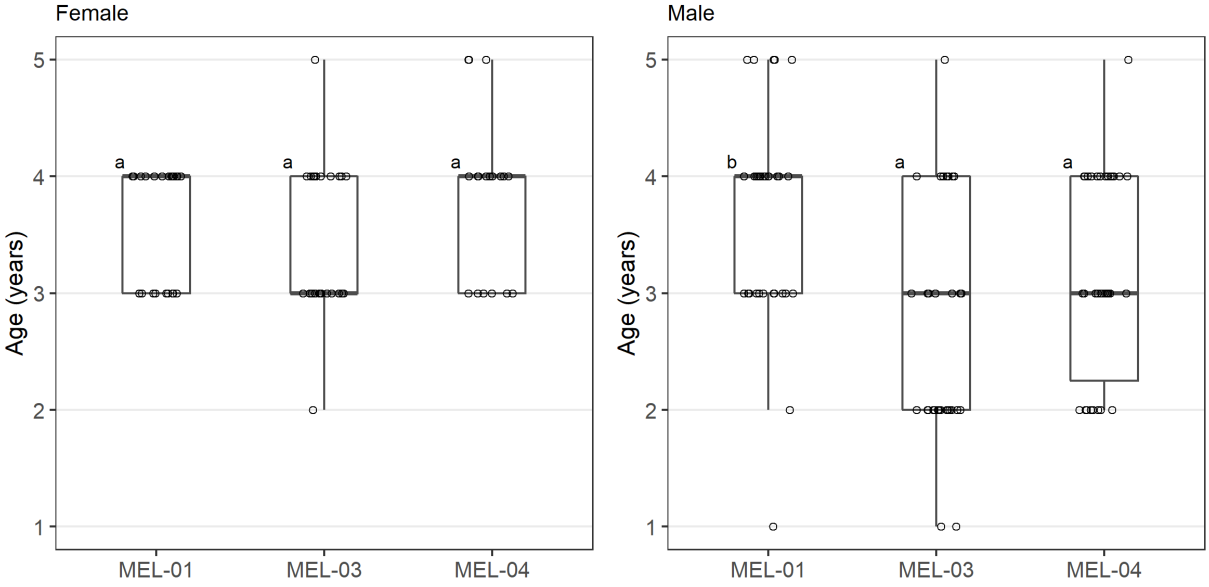
9.5.3 Survival

Age

Threespine Stickleback captured across all areas ranged from 1 to 5 years of age. Immature individuals ranged from 1 to 3 years of age, while mature females ranged from 2 years to 5 years of age, and mature males ranged from 1 year to 5 years of age (**Figure 9-2**, **Table H1-2**). ANOVA results show that there was no significant difference in the average age of mature females among areas (p = 0.1496), however there was a significant difference in the average age of mature males among areas (p = 0.0006) (**Table 9-5**). Mature males captured at MEL-01 were significantly older than fish captured at MEL-03 and MEL-04. Compared to MEL-03, mature males captured at MEL-01 were 0.89 years older, on average (32.0% difference). Compared to MEL-04, mature males captured at MEL-01 are, on average, 0.62 years older (15.4% difference).

Figure 9-2. Age of mature Threespine Stickleback by sex and area.

Notes: Letters represent groups that are significantly different (P≤0.10) from each other, which are determined separately for each sex.



9.5.4 Size

Length-frequency

The length-frequency distributions are presented by area in (**Figure 9-3**). Pairwise comparisons using the two-sample Kolmogorov-Smirnov test indicated that there was a significant difference in the length-frequency distribution between MEL-01 and MEL-03 (p = 0.0132) and MEL-01 and MEL-04 (p = 0.0009), but no significant difference between MEL-03 and MEL-04 (p = 0.4644). Cumulative length-frequency distributions (**Figure 9-4**) show that a greater proportion of the catch at MEL-01 consisted of large individuals (i.e., ~ 55-65 mm) compared to at MEL-03 and MEL-04.

Figure 9-3. Length-frequency distribution of Threespine Stickleback for each area.

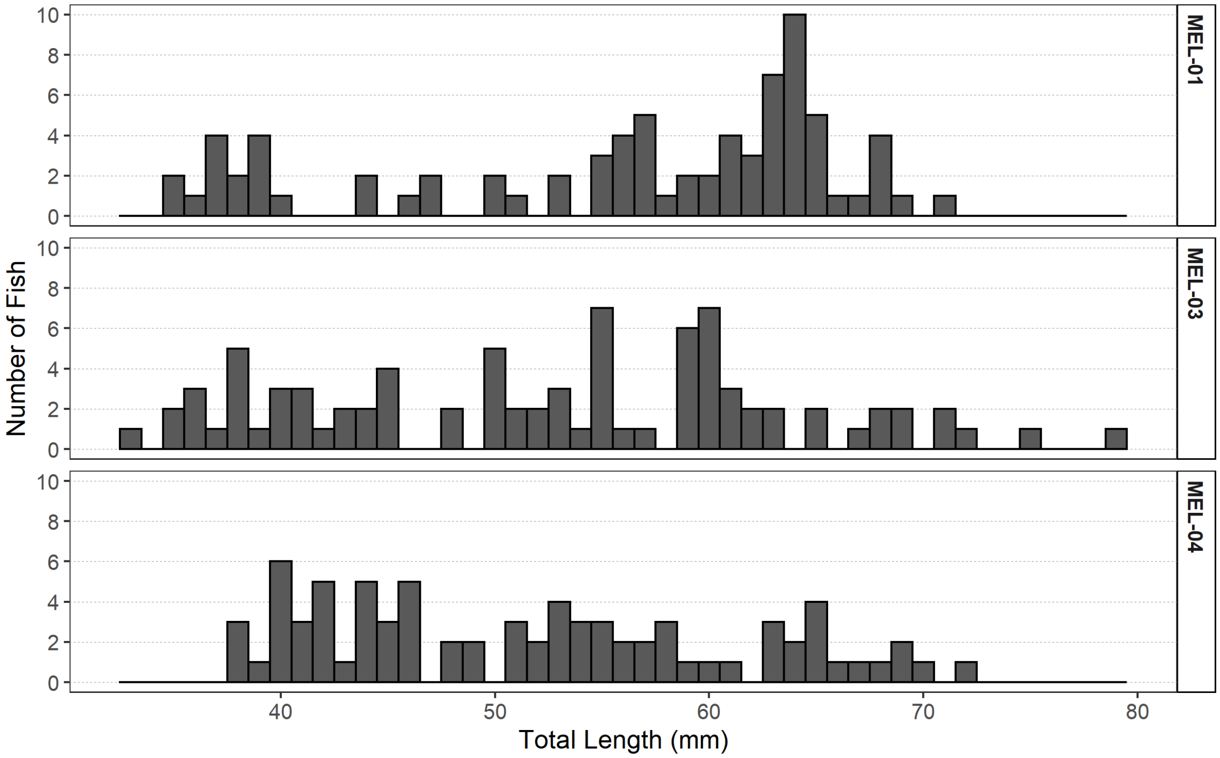
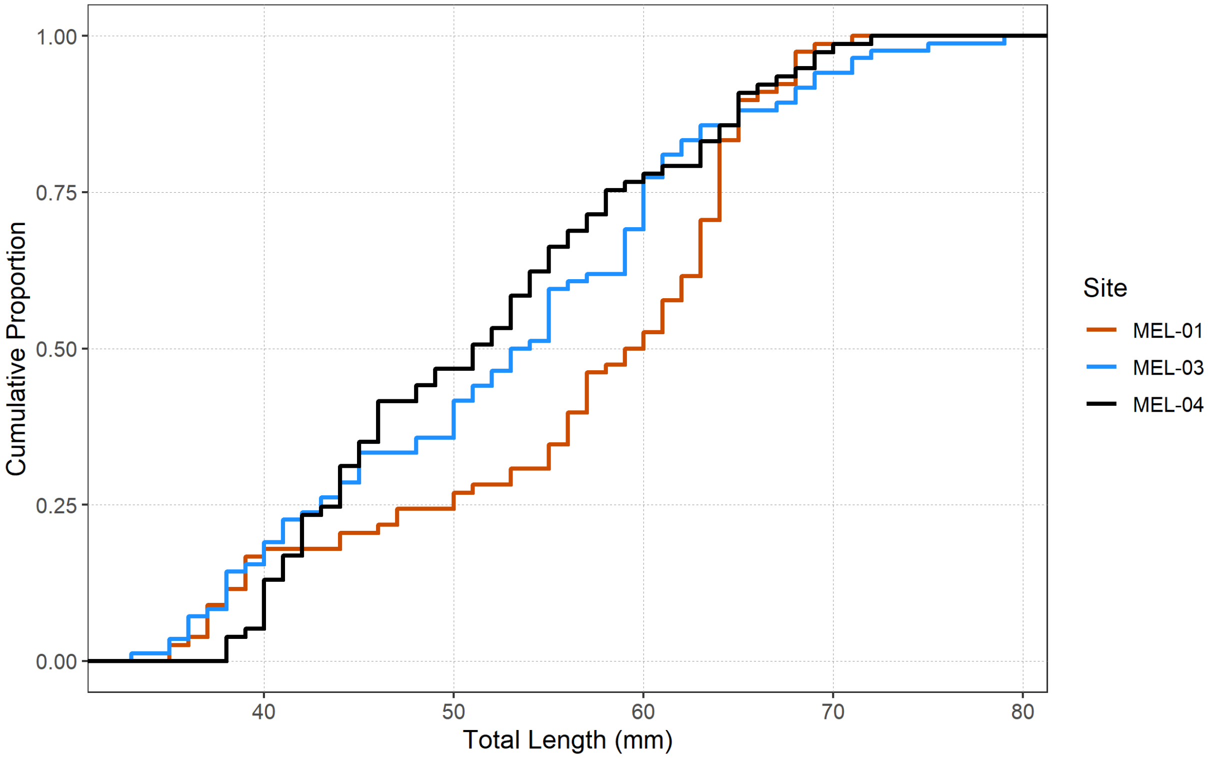


Figure 9-4. Cumulative length-frequency distribution of Threespine Stickleback for each area.

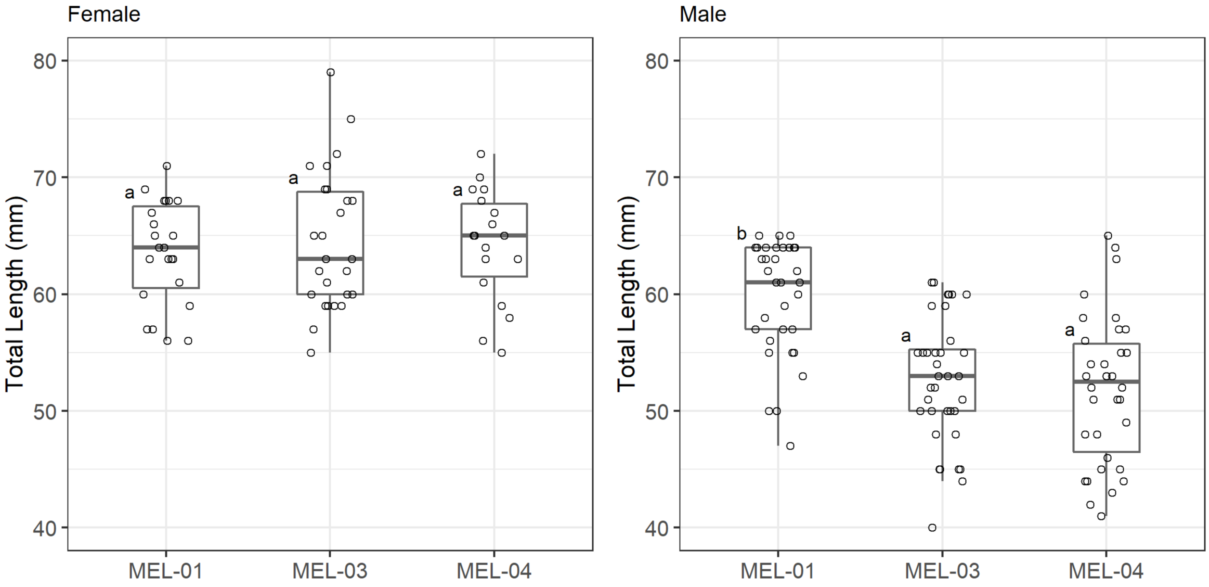


Length

Across all areas, the length of mature males ranged from 40 mm to 65 mm, while the length of mature females ranged from 55 mm to 79 mm (**Figure 9-5, Table H1-2**). ANOVA results show that there was no significant difference in the average length of mature females among areas (p = 0.789), however there was a significant difference in the average length of mature males among areas (p <0.0001; **Table 9-5**). Mature males captured at MEL-01 were significantly longer than those captured at MEL-03 and MEL-04. Compared to MEL-03, mature males captured at MEL-01 were 7.1 mm longer, on average (13.5% difference). Compared to MEL-04, mature males captured at MEL-01 are 7.9 mm longer (15.2% difference).

Figure 9-5. Length of mature Threespine Stickleback, by sex and area.

Notes: Letters represent groups that are significantly different (P≤0.10) from each other, which are determined separately for each sex.



Total Weight

Across all areas, the weight of mature females ranged from 1.09 g to 5.53 g, while the weight of mature males ranged from 0.458 g to 2.75 g (**Figure 9-6, Table H1-2**). ANOVA results show that there was no significant difference in the average weight of mature females among areas, including with all data (p = 0.599), and when removing an outlier at MEL-03 (p = 0.315). There was a significant difference in the average weight of mature males among areas (p <0.0001) (**Table 9-5**). Mature males captured at MEL-01 were significantly heavier than those captured at MEL-03 and MEL-04. Compared to MEL-03, mature males captured at MEL-01 were 0.638 g heavier, on average (53.1 % difference). Compared to MEL-04, mature males captured at MEL-01 were 0.623 g heavier (51.1 % difference).

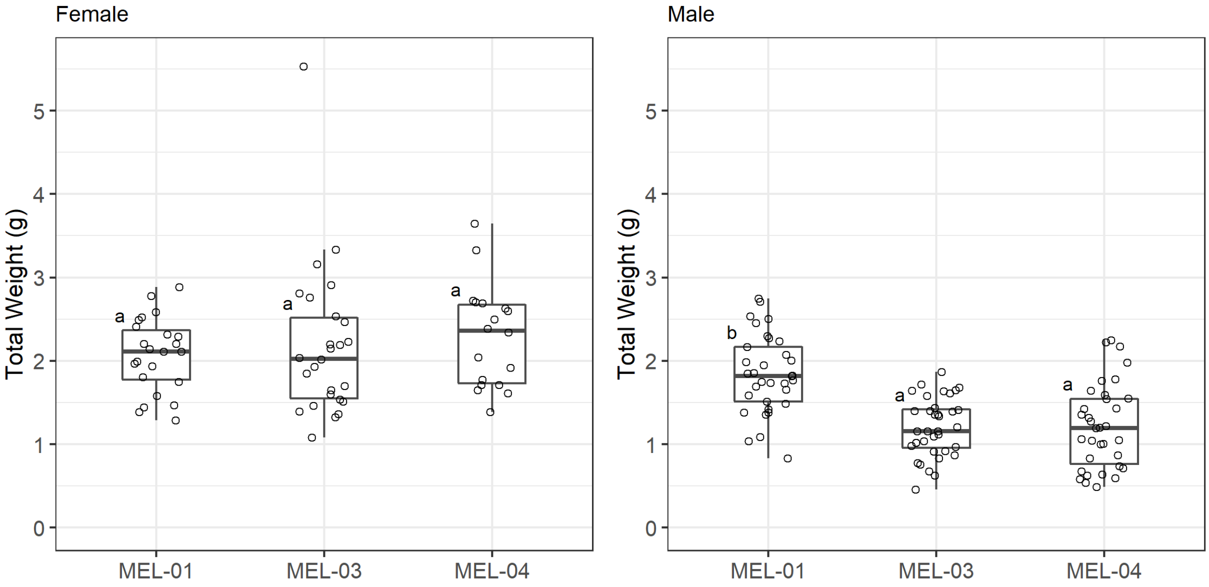
Table 9-5. ANOVA results for the Threespine Stickleback study.

Variable	Sex	Data Excluded	Age	n	Error MS	p-value	MEL-01 % Difference		Tukey HSD Pairwise Comparisons Difference in Means Between Areas (adjusted p-value)		
							MEL-03	MEL-04	MEL-01 - MEL-03	MEL-01 - MEL-04	MEL-03 - MEL-04
Total Length (mm)	Female	None	-	67	26.823	0.7890	-1.6	-1.0	-	-	-
	Male	None	-	103	31.539	**<0.0001**	13.5	15.2	**7.119 (<0.0001)**	**7.875 (<0.0001)**	0.757 (0.840)
Body Weight (g)	Female	None	-	67	0.492	0.5989	-5.0	-9.8	-	-	-
		TS218	-	66	0.315	0.3147	1.2	-9.8	-	-	-
	Male	None	-	103	0.199	**<0.0001**	53.1	51.1	**0.638 (<0.0001)**	**0.623 (<0.0001)**	-0.0159 (0.988)
Age (Years)	Female	None	-	67	0.385	0.1496	3.0	-7.0	-	-	-
	Male	None	-	103	0.845	**0.0006**	32.0	15.4	**0.889 (0.0003)**	**0.490 (0.0792)**	-0.399 (0.170)
Length-at-age	Female	None	3	29	18.339	0.7918	1.2	2.5	-	-	-
		None	4	33	16.226	0.2666	-4.0	-2.1	-	-	-
	Male	None	3	31	27.417	**0.0222**	8.6	12.7	4.535 (0.1498)	**6.455 (0.0195)**	1.919 (0.697)
		None	4	37	13.007	**0.0086**	5.7	7.7	**3.289 (0.0924)**	**4.349 (0.0085)**	1.060 (0.778)
Weight-at-age	Female	None	3	29	0.214	0.7748	7.0	-0.7	-	-	-
		TS230	3	28	0.131	0.2294	15.1	-0.7	-	-	-
		None	4	33	0.229	0.4877	-8.4	-8.4	-	-	-
	Male	None	3	31	0.171	**0.0112**	33.6	51.3	**0.412 (0.0858)**	**0.555 (0.0105)**	0.143 (0.723)
		None	4	37	0.123	**0.0430**	22.5	17.7	**0.342 (0.0674)**	0.279 (0.1045)	-0.063 (0.911)

Notes:
P-values ≤0.10 are in **bold**.

Figure 9-6. Weight of mature Threespine Stickleback, by sex and area.

Notes: Letters (a,b) represent groups that are significantly different (P≤0.10) from each other, determined separately for each sex.



9.5.5 Growth

Size-at-age

Size-at-age was compared among areas using one-way ANOVA for mature age 3 and age 4 fish, as these ages are well represented across areas for both females and males. For mature females, there was no significant difference in length-at-age among areas for age 3 fish (p = 0.792) or age 4 fish (p = 0.267) (**Figure 9-7**, **Table 9-5**). There was also no significant difference in weight-at-age among areas for age 3 mature females (p = 0.229) or age 4 mature females (p = 0.488) (**Figure 9-8**, **Table 9-5**).

Significant differences were detected in length-at-age for age 3 mature males (p = 0.022) and age 4 males (p = 0.0086) (**Figure 9-7**, **Table 9-5**). Age 3 mature males at MEL-01 were an average of 6.45 mm longer than at MEL-04 (12.7% difference). There was no significant difference in length between MEL-01 and MEL-03 for age 3 mature males. Age 4 mature males at MEL-01 were an average of 3.29 mm longer than at MEL-03 (5.7% difference) and 4.35 mm longer than at MEL-04 (7.7% difference).

There was also a significant difference in weight-at-age among areas for age 3 mature males (p = 0.0112) and age 4 mature males (p = 0.0430) (**Figure 9-8**, **Table 9-5**). Age 3 mature males at MEL-01 were an average of 0.412 g heavier than at MEL-03 (33.6% difference) and 0.555 g heavier than at MEL-04 (51.3 % difference). Age 4 mature males at MEL-01 were an average of 0.342 g heavier than at MEL-03 (22.5% difference). There was no significant difference in weight between MEL-01 and MEL-04 for age 4 mature males.

Figure 9-7. Total Length of mature Threespine Stickleback at age 3 and age 4, by sex and area.

Notes: Letters represent groups that are significantly different (P<0.10) from each other.

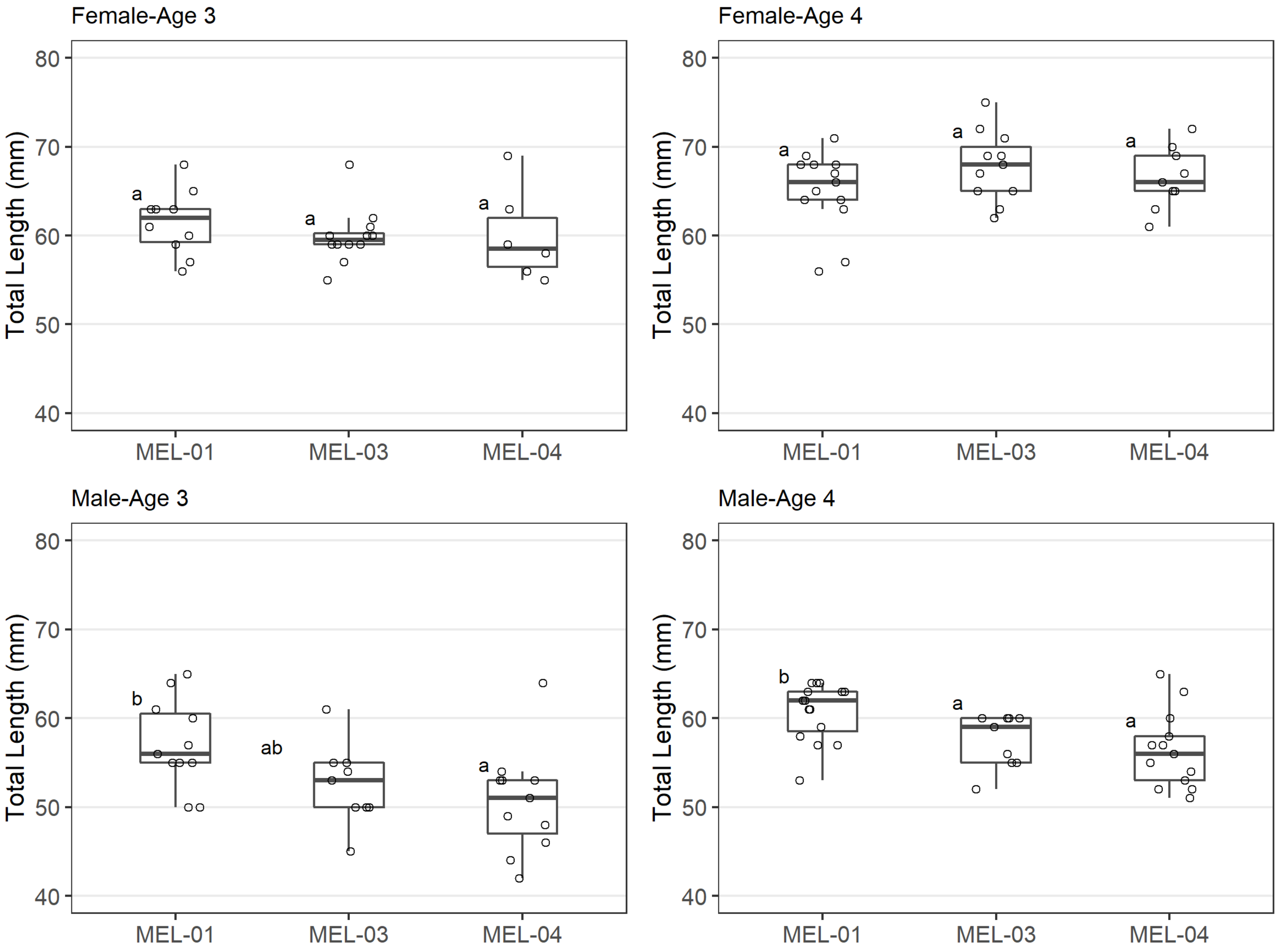
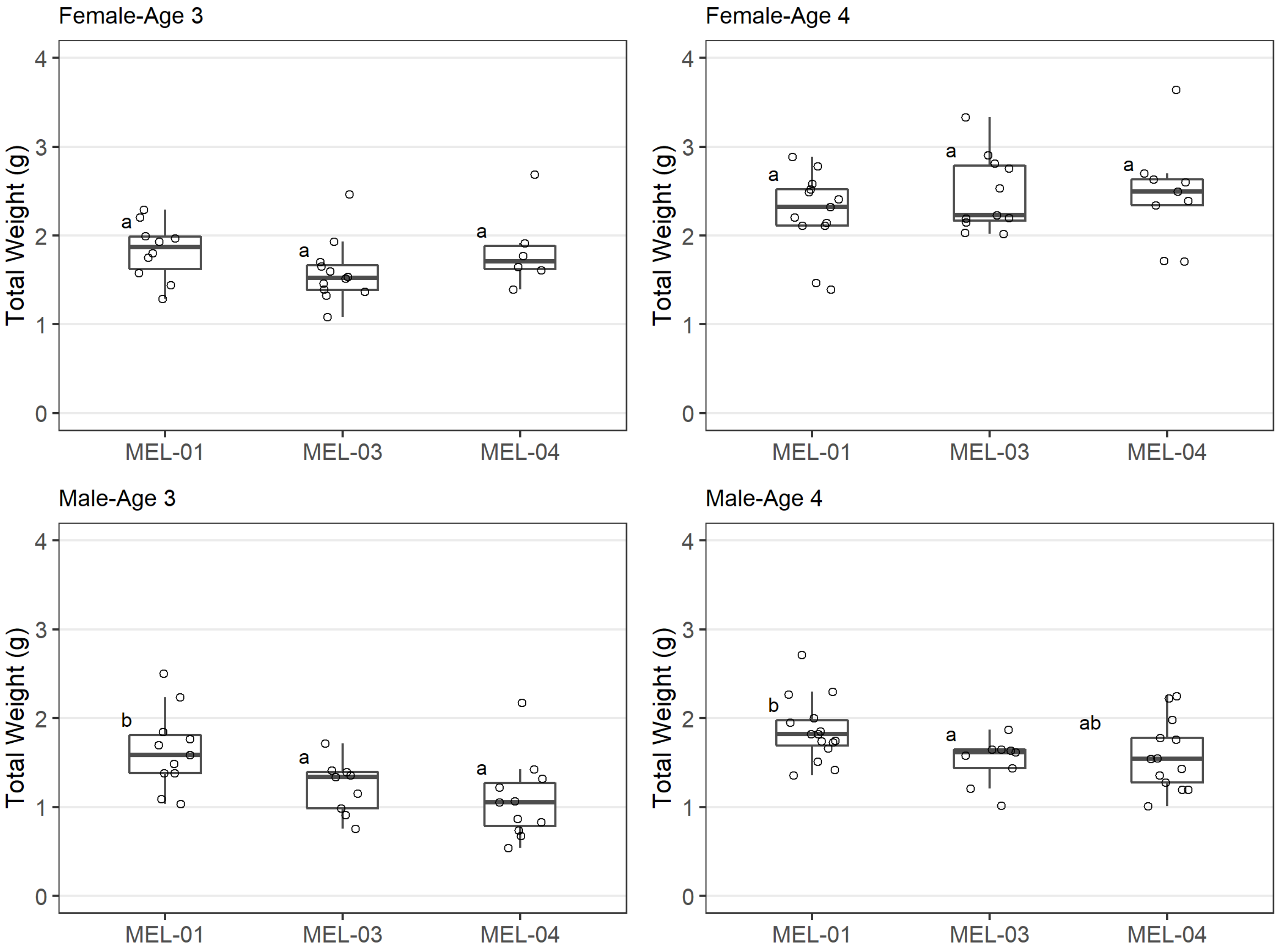


Figure 9-8. Weight of mature Threespine Stickleback at age 3 and age 4, by sex and area.

Notes: Letters represent groups that are significantly different (P<0.10) from each other.



9.5.6 Energy Storage

Condition

Fish weight (total and carcass) is plotted against total length in **Figure 9-9**. Differences in condition among areas were completed by ANCOVA analyses using $\log_{10}$ transformed data. For ANCOVA analyses with significant differences in slopes among areas (i.e., significant interaction term), the reduced models (i.e., homogeneous slopes) were good approximations, as the coefficient of determination (R^2) of the reduced models were within 0.02 of the full models in all instances (**Table 9-6**). The results of the reduced models show that there is no significant difference in the condition of mature females or mature males among areas, except for mature females when assessing total weight versus total length. However, pairwise comparisons between areas show that the significant difference in mature female condition (total weight versus total length) is between the two reference areas (MEL-03 and MEL-04, $p = 0.0237$). There were no significant differences in condition between MEL-01 and MEL-03 ($p = 0.498$) or MEL-01 and MEL-04 ($p = 0.252$) (**Table 9-6**).

Figure 9-9. Plot of weight (total weight and carcass weight) versus total length (log scales) for mature female and male Threespine Stickleback.

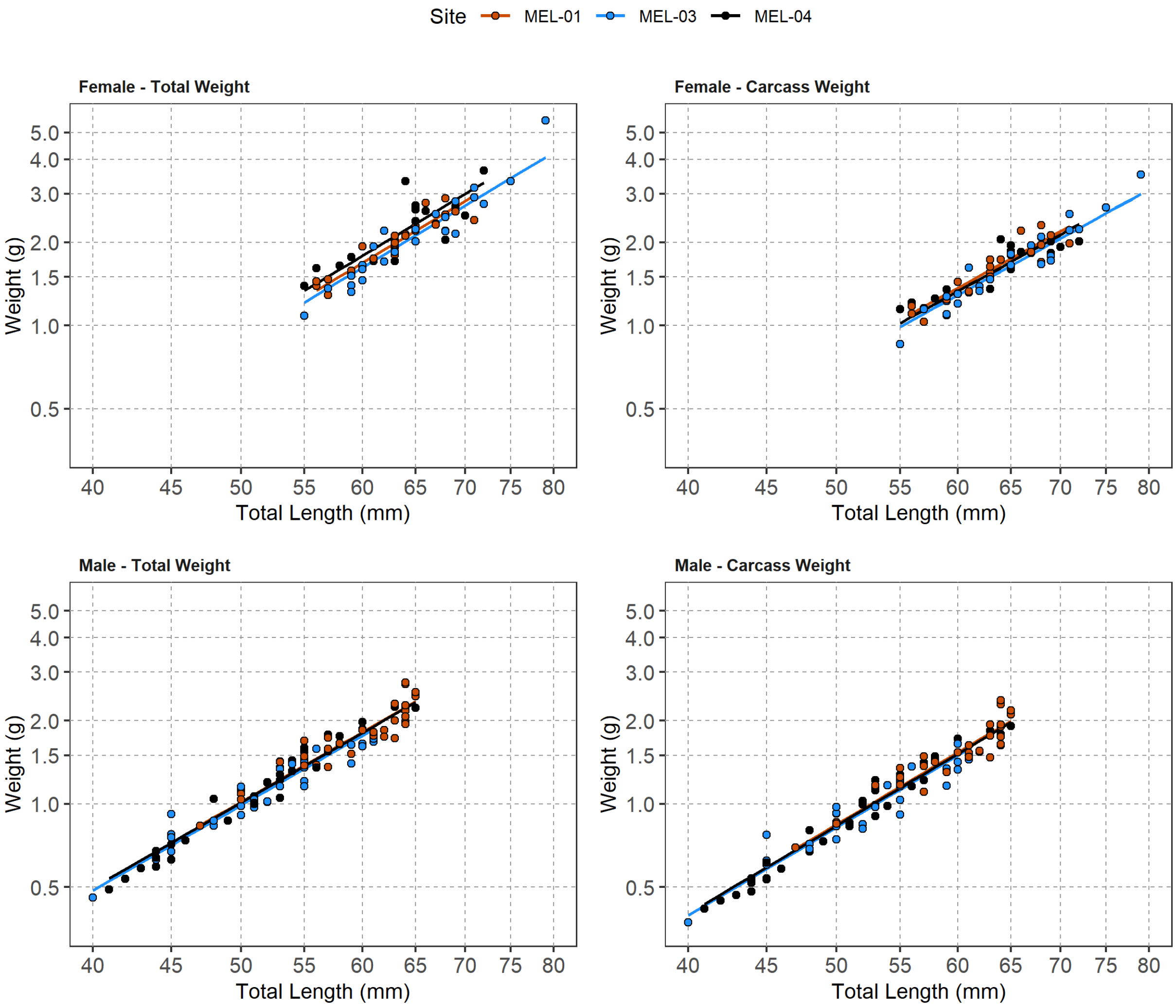


Table 9-6. Summary of Threespine Stickleback among area comparisons using ANCOVA.

Variable ($\log_{10}$ transformed)		Sex	ANCOVA Procedure[a]	Data Excluded	Error MS	p-value		Adjusted R^2	Least Squares Mean (LS Mean) (grams)				MEL-01 % Difference		Tukey Pairwise Comparisons (adjusted p-value)		
Dependent	**Covariate**					**Interaction**	**Area**		**Taken At (grams)**	**MEL-01**	**MEL-03**	**MEL-04**	**MEL-03**	**MEL-04**	**MEL-01 - MEL-03**	**MEL-01 - MEL-04**	**MEL-03 - MEL-04**
Total Weight (g)	Total Length (mm)	Female	Full	None	0.0025	**0.0697**	-	0.8429	-	-	-	-	-	-	-	-	-
				TS31	0.0022	0.2599	-	0.8259	-	-	-	-	-	-	-	-	-
			Reduced	None	0.0027	-	**0.0315**	0.8340	-	2.08	2.00	2.21	3.9	-5.8	0.0167 (0.4980)	-0.0261 (0.2518)	**-0.0428 (0.0237)**
		Male	Full	None	0.0017	**0.0069**	-	0.9474	-	-	-	-	-	-	-	-	-
			Reduced	None	0.0018	-	0.4725	0.9429	-	1.32	1.29	1.31	2.9	0.6	-	-	-
Carcass Weight (g)	Total Length (mm)	Female	Full	None	0.0015	**0.0062**	-	0.8807	-	-	-	-	-	-	-	-	-
			Reduced	None	0.0017	-	0.1022	0.8635	-	1.66	1.56	1.61	6.2	2.9	-	-	-
		Male	Full	None	0.0018	**0.0412**	-	0.9463	-	-	-	-	-	-	-	-	-
			Reduced	None	0.0019	-	0.6194	0.9438	-	1.10	1.08	1.09	2.6	1.1	-	-	-
Liver Weight (g)	Carcass Weight (g)	Female	Full[b]	None	0.0095	**0.0059**	-	0.7339	1.15	0.0578	0.0514	0.0530	12.5	12.9	0.0514 (0.5081)	0.0380 (0.8014)	-0.0133 (0.9677)
									2.1	0.0999	0.1061	0.1766	-5.8	**-144.7**	-0.0262 (0.7711)	**-0.248 (<0.0001)**	**-0.221 (<0.0001)**
			Reduced	None	0.0108	-	**0.0001**	0.6952	-	0.0794	0.0785	0.108	1.1	**-26.3**	0.0048 (0.9855)	**-0.132 (0.0004)**	**-0.137 (0.0002)**
		Male	Full	None	0.0152	0.0755	-	0.6958	-	-	-	-	-	-	-	-	-
			Reduced	None	0.0157	-	0.2649	0.6856	-	0.0386	0.0343	0.0372	12.6	3.7	-	-	-
Liver Weight (g)	Total Length (g)	Female	Full	None	0.0117	0.1533	-	0.6707	-	-	-	-	-	-	-	-	-
			Reduced	None	0.0121	-	**<0.0001**	0.6610	-	0.0828	0.0756	0.108	9.5	**-23.4**	0.0394 (0.4259)	**-0.116 (0.0039)**	**-0.155 (<0.0001)**
		Male	Full	None	0.0168	**0.0082**	-	0.6644	47	0.0227	0.0245	0.0221	-7.3	0.6	-0.0341 (0.8886)	0.0112 (0.9868)	0.0453 (0.5252)
									61	0.0573	0.0405	0.0610	**41.5**	-16.7	**1.499 (0.0034)**	-0.0275 (0.8129)	**-0.177 (0.0041)**
			Reduced	None	0.0182	-	0.1720	0.6369	-	0.0393	0.0338	0.0372	16.2	5.6	-	-	-

Notes:
P-values ≤0.10 are in **bold**.
[a] The full model includes the interaction term (area x covariate). The reduced model excludes the interaction term.
[b] The full model was not well represented by a simplified, reduced model with homogeneous slopes. Two ANCOVA were conducted on female Threespine Stickleback on two sizes: smaller mass (1.15 g) and larger mass (2.1 g).

Relative Liver Size

Relative liver size is compared among areas by assessing differences in liver weight versus carcass weight (**Figure 9-10**) and differences in liver weight versus total length (**Figure 9-11**), using ANCOVAs. For mature females, there was a significant difference in the slopes of liver weight versus carcass weight among areas (p = 0.0059) and the difference in R^2 between the full and reduced ANCOVA was >0.02, indicating that the full model was not well represented by a simplified, reduced model with homogeneous slopes. Least squares mean comparisons based on the full model indicate that smaller (lighter) Threespine Stickleback (1.15 g carcass weight) did not have significantly different liver weights among areas. However, larger (heavier) Threespine Stickleback (2.05 g carcass weight) from MEL-04 had significantly larger livers than those from MEL-01 (p <0.0001) and from MEL-03 (p<0.0001). The reduced model, although not as accurate the full model, shows a similar result, as Threespine Stickleback livers are significantly heavier at MEL-04 than at MEL-01 (p = 0.0004) and MEL-03 (p = 0.0002) at all carcass weights (**Figure 9-10**). A comparison of mature female liver weight versus total length among areas yields similar results; there were significant differences in liver weight among areas (p = <0.0001), where mature females from MEL-04 had significantly larger livers than mature females from MEL-01 (p = 0.0034) and MEL-03 (p = 0.0041) across all lengths. There was no significant difference in length-adjusted liver weight between MEL-01 and MEL-03 (p = 0.426).

For mature males, there was no significant difference in liver weight versus carcass weight among areas (p = 0.265) (**Figure 9-10**). There was, however, a significant difference in the slopes of liver weight versus total length among areas (p = 0.0082) (**Figure 9-11**). The difference in R^2 between the full and reduced model was >0.02, indicating that the full model was not sufficiently represented by a simplified, reduced model with homogeneous slopes. Least squares mean comparisons based on the full model indicate that small Threespine Stickleback (47 mm total length) did not have significantly different liver weights among areas. However, large Threespine Stickleback (61 mm total length) from MEL-03 had significantly smaller livers than those from MEL-01 (p = 0.0034) and from MEL-04 (p = 0.0041). The reduced model, which assumes homogeneous slopes among areas, was not significant (p = 0.172).

Figure 9-10. Plot of liver weight versus carcass weight (log scales) with ANCOVA results for the full model (mature female) and reduced models (mature female and mature male).

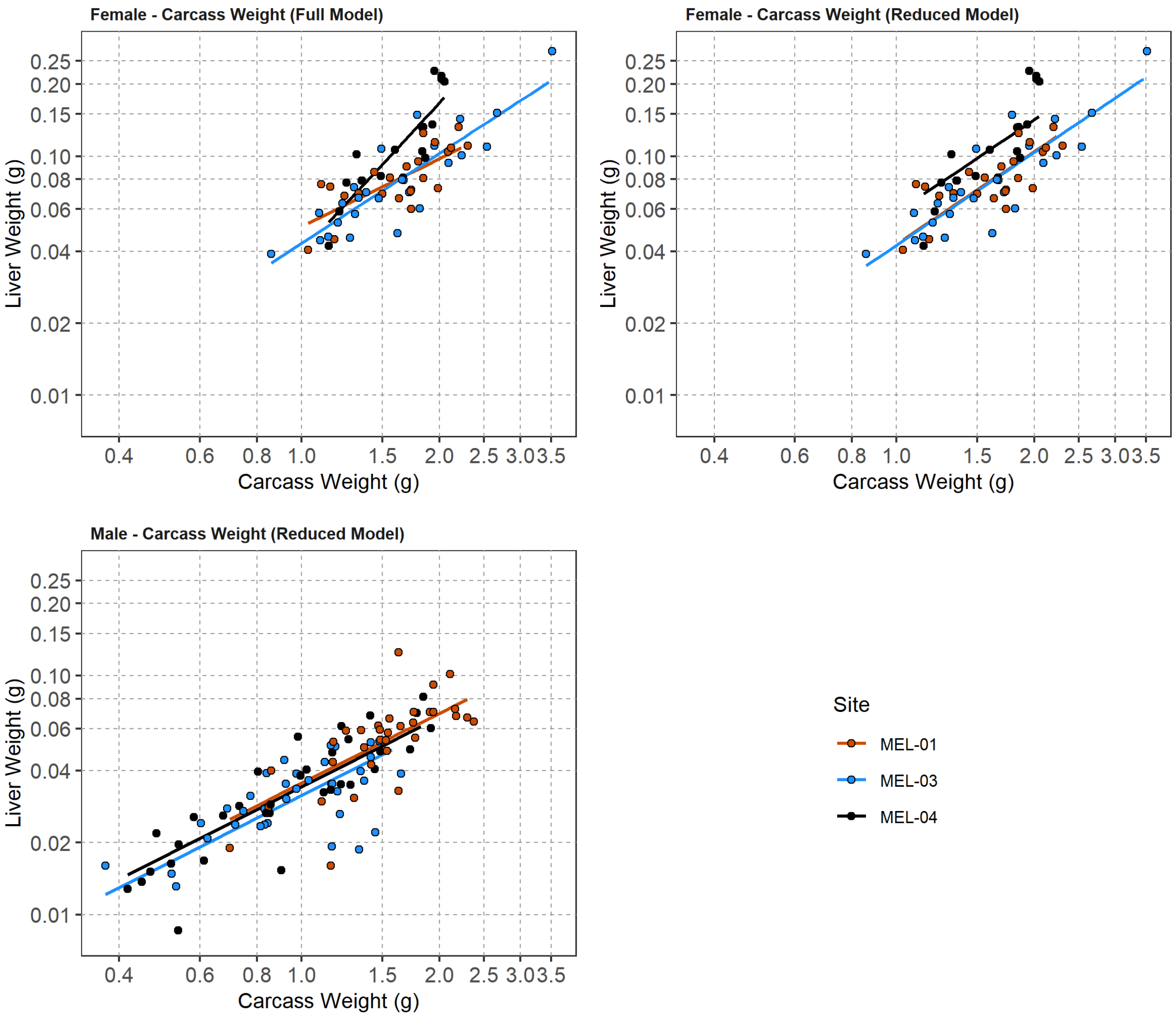
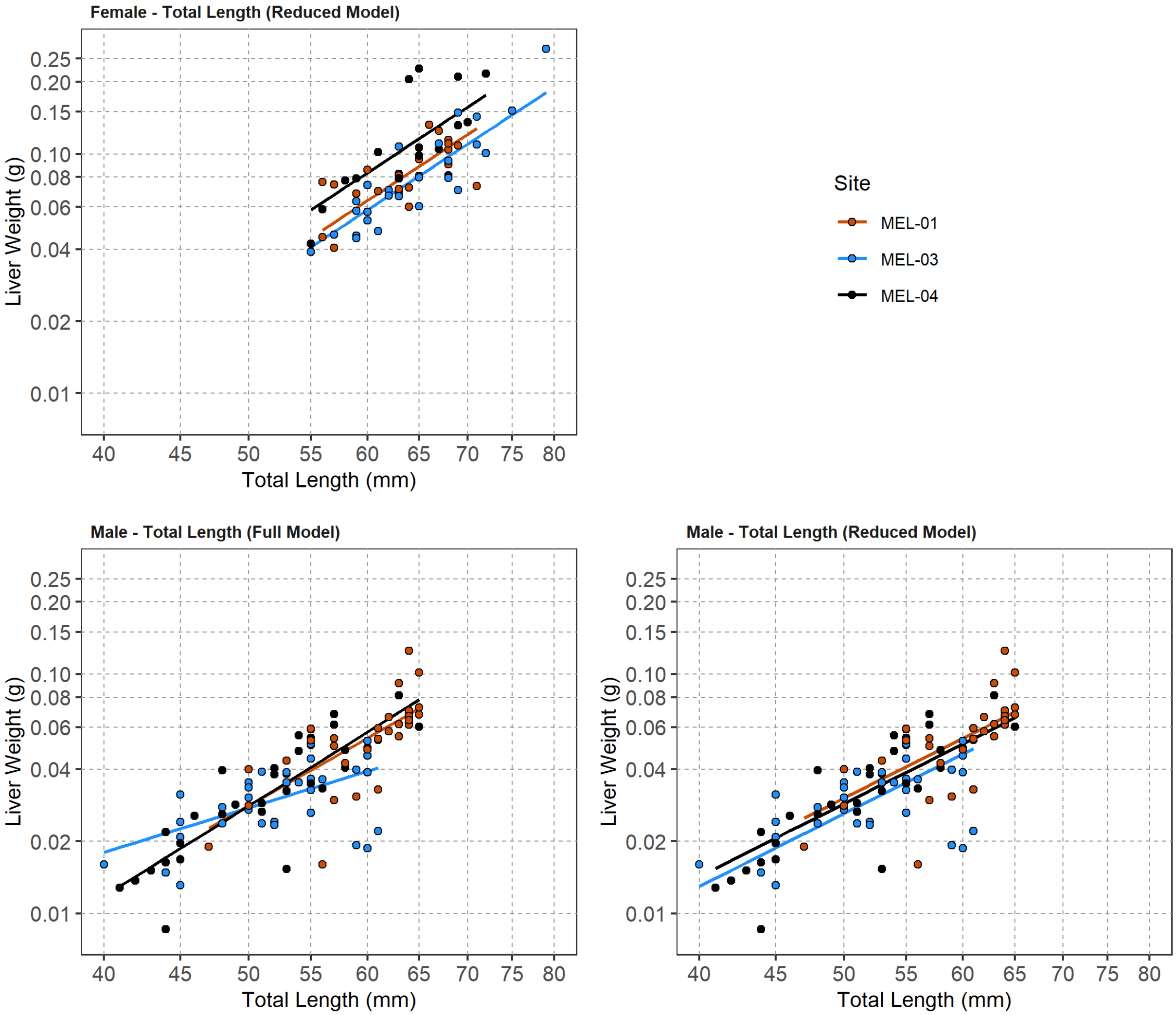


Figure 9-11. Plot of liver weight versus total length (log scales) with ANCOVA results for the full model (mature male) and reduced models (mature female and mature male).

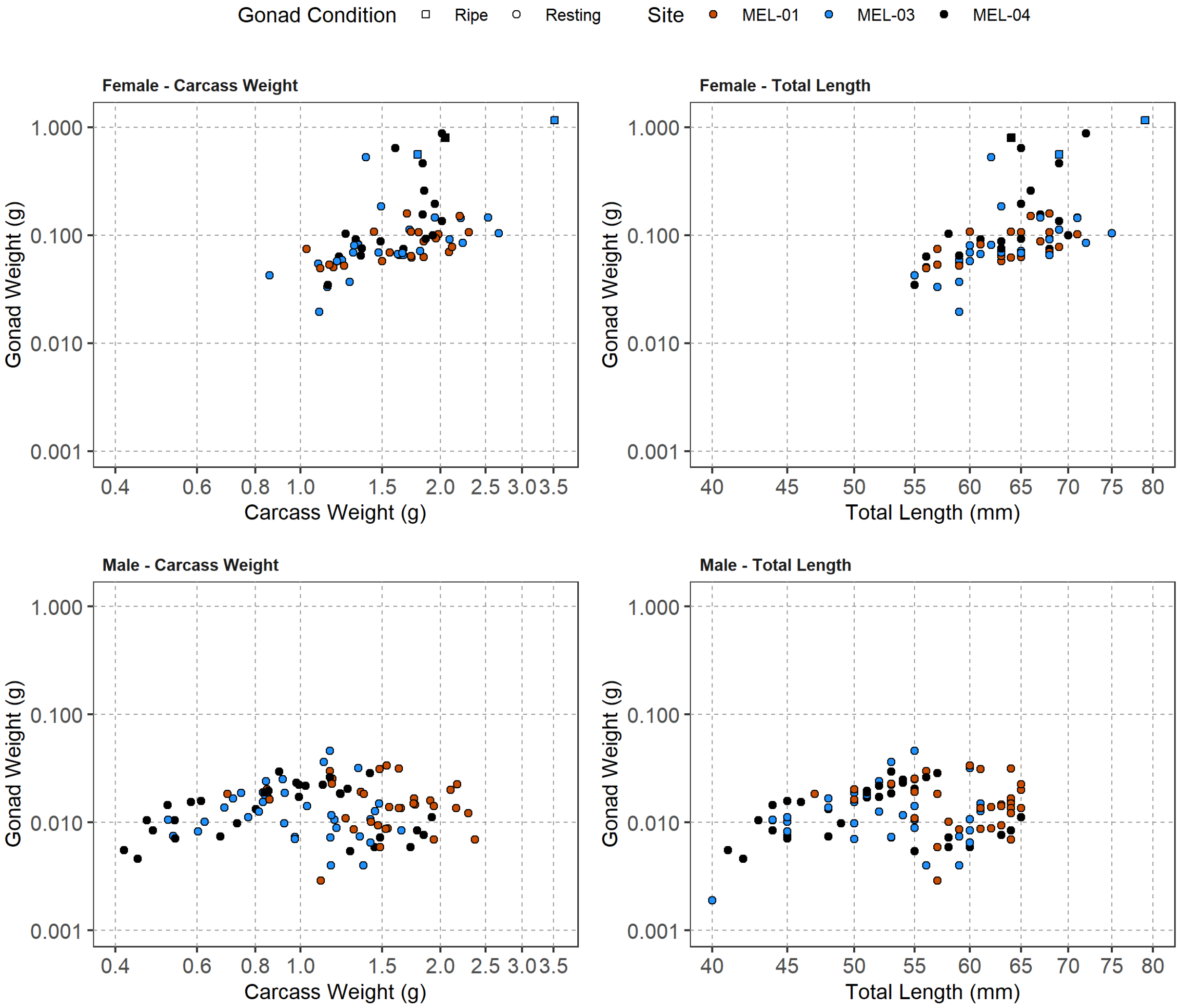


9.5.7 Reproduction

Relative gonad size

Plots of gonad weight versus carcass weight and gonad weight versus total length for both mature male and mature females are presented in **Figure 9-12**. Threespine Stickleback are multiple spawners, and samples collected during August sampling were at various stages of gonad development. Most male and female fish were resting. Only 6 of 67 mature females were ripe, and no ripe females were captured at MEL-01. Of the 103 mature males sampled, 10 exhibited secondary sex characteristics (e.g., orange colouring, blue eyes), however all were resting, suggesting spawning was no longer occurring. An assessment of relative gonad size among areas was not completed based on the high number of resting individuals, and variability in gonad development.

Figure 9-12. Plot of gonad weight versus carcass weight and gonad weight versus total length (log scales).



Fecundity

Fecundity (# of eggs) was assessed for the 6 ripe, mature female Threespine Stickleback captured during this study (2 from MEL-03 and 4 from MEL-04). Fecundity ranged from 58 to 211 eggs (**Table H1-1**). No ripe females were captured from MEL-01.

9.6 Conclusions and Recommendations

Conclusions for the 2021 Threespine Stickleback health assessment are summarized below in the context of the key question stated in **Section 9.2**. A summary of results of ANOVA and ANCOVA analyses comparing between area relationships for the AEMP endpoints examined in this study are presented in **Table 9-7**. The findings are incorporated into the Low Action Level assessment for toxicological impairment and nutrient enrichment in **Section 13.2** and **Section 13.3**, respectively.

Key Question: Are activities at the Mine causing changes in Meliadine Lake that are impacting the health of small-bodied fish?

For mature females, there were no significant differences in survival or growth (energy use) endpoints among areas. For energy storage endpoints, the relative liver size of females at MEL-01 was significantly lower ($P \leq 0.10$) compared to MEL-04. However, the relative liver size of females at MEL-01 was not significantly different than MEL-03. These results demonstrate why the TGD recommends including more than one reference area when assessing the effect of effluent exposure on fish health (Environment Canada, 2012). A case in point is the 2018 Threespine Stickleback health study where only one reference area was sampled (MEL-03) and female fish from MEL-01 had higher condition and liver weight compared to MEL-03 (Golder, 2019). The 2018 study looked at health endpoints for all fish (pooled parasitized and unparasitized) and for unparasitized fish only and found them to be similar. Conclusions on fish health were based on pooled data to improved sample numbers and associated statistical power. Overall, the findings from 2018 and 2021 demonstrate that condition (length to weight relationships) and relative liver size for female Threespine Stickleback from MEL-01 are within the range of values observed among the reference areas.

Mature males were significantly older, larger, and heavier at MEL-01 compared to the two reference areas, MEL-03 and MEL-04. These data imply higher survival and size at MEL-01 compared to the two reference areas. When comparing weights among areas and lengths among areas for a single age class as a measure of growth, mature males from MEL-01 are longer and heavier than fish of the same age from MEL-03 and MEL-04, and differences are generally statistically significant. The percent difference in the weight of age 3 fish was greater than 25% for both MEL-03 and MEL-04, which is classified as an effect under EEM. It's unclear why differences in growth were observed in mature males but not in females, but the inconsistency in the response between sexes suggests factors other than effluent discharge are responsible. Similar to female fish, there were no significant differences in energy storage (condition and relative liver size endpoints) for male Threespine Stickleback from MEL-01 compared to males from the reference areas.

Energy storage metrics provide valuable information on the *availability* and *quality* of food that is available to Threespine Stickleback, whereas size-at-age provides information on how fish *use* food available to grow (Environment Canada, 2012). Based on the energy storage endpoints for male and female fish, it appears that effluent discharged to Meliadine Lake is not affecting food availability or quality in the east basin of Meliadine Lake compared to the reference areas.

There were no toxicological impacts to survival, growth, or condition in Threespine Stickleback from MEL-01 compared to the reference areas in 2021. These results align with predictions in the FEIS that stated direct and indirect effects to fish in Meliadine Lake from exposure to effluent are unlikely because water quality will meet water quality guidelines beyond the mixing zone. Effluent discharged to Meliadine Lake does not appear to be adversely affecting the health of the unparasitized Threespine Stickleback population.

Recommendations

This study focused on unparasitized Threespine Stickleback and required considerable fishing effort to reach the target sample sizes for each sex. Minnow trapping in Meliadine Lake occurred from August 5 to August 29, 2021. A total of 33,357 minnow trap hours resulted in a total catch of 4,188 Threespine Stickleback, with an overall CPUE of 0.126 fish/hr soak time. Approximately 79% of Threespine Stickleback were parasitized, and therefore could not be used in this study. The Cycle 2 EEM will compare the results of this study, to the results of the parallel study using parasitized Threespine Stickleback (Azimuth, in prep). Results from this comparison will assess using parasitized Threespine Stickleback in future fish programs, which would reduce the number of fish that are lethally sampled.

Table 9-7. Between-area comparisons calculated with ANOVA and reduced ANCOVA models, as appropriate, with no outliers removed.

Sex	Effect Indicator	Endpoint	Dependent Variable	Covariate	Statistical Procedure	p-value	% Difference MEL-01 vs:		CES
							MEL-03	MEL-04	
Female	Survival	Age	-	-	ANOVA	0.1496	3.0	-7.0	25%
	Size	Length	-	-	ANOVA	0.7890	-1.6	-1.0	-
		Total Weight	-	-	ANOVA	0.5989	-5.0	-9.8	-
	Growth (Energy Use)	Size-at-age (age 3)	Total Weight	-	ANOVA	0.7748	7.0	-0.7	25%
			Length	-	ANOVA	0.7918	1.2	2.5	25%
		Size-at-age (age 4)	Total Weight	-	ANOVA	0.4877	-8.4	-8.4	25%
			Length	-	ANOVA	0.2666	-4.0	-2.1	25%
	Condition (Energy Storage)	Condition	Total Weight	Length	ANCOVA	**0.0315**	3.9	-5.8	10%
			Carcass Weight	Length	ANCOVA	0.1022	6.2	2.9	10%
		Relative Liver Size	Liver Weight	Length	ANCOVA	**<0.0001**	9.5	**-23.4**	25%
			Liver Weight	Carcass Weight	ANCOVA	**<0.0001**	1.1	**-26.3**	25%
Male	Survival	Age	-	-	ANOVA	**0.0006**	**32.0**	**15.4**	25%
	Size	Length	-	-	ANOVA	**<0.0001**	**13.5**	**15.2**	-
		Total Weight	-	-	ANOVA	**<0.0001**	**53.1**	**51.1**	-
	Growth (Energy Use)	Size-at-age (age 3)	Total Weight	-	ANOVA	**0.0112**	**33.6**	**51.3**	25%
			Length	-	ANOVA	**0.0222**	8.6	**12.7**	25%
		Size-at-age (age 4)	Total Weight	-	ANOVA	**0.0430**	**22.5**	17.7	25%
			Length	-	ANOVA	**0.0086**	**5.7**	**7.7**	25%
	Condition (Energy Storage)	Condition	Total Weight	Length	ANCOVA	0.4725	2.9	0.6	10%
			Carcass Weight	Length	ANCOVA	0.6194	2.6	1.1	10%
		Relative Liver Size	Liver Weight	Length	ANCOVA	0.1720	16.2	5.6	25%
			Liver Weight	Carcass Weight	ANCOVA	0.2649	12.6	3.7	25%

Notes:
Critical effect sizes (CES) are from Environment Canada (2012).
P-values and pairwise % differences ≤0.10 are **bolded**.
Blue shading indicates differences greater than the critical effect size.

9.7 References

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10 THREESPINE STICKLEBACK CHEMISTRY

10.1 Introduction

Some of the Threespine Stickleback captured at the near-field (NF) area MEL-01 and reference areas MEL-03, and MEL-04 in 2021 for the health assessment (**Section 9**) were submitted for tissue chemistry analysis to determine if effluent is contributing to changes in fish tissue chemistry. Small-bodied fish species like Threespine Stickleback are well-suited for directly assessing exposure to contaminants in aquatic environments because they have a relatively small home range, and are therefore more consistently exposed to point-source discharges than large-bodied pelagic species like Lake Trout, Arctic Char, and Round Whitefish. In this respect, Threespine Stickleback provide an early indication of potential changes in fish tissue chemistry at Meliadine Lake.

Tissue chemistry data from the 2021 study were compared to chemistry results from baseline studies in 2015 (MEL-01) and 2017 (MEL-03 and MEL-04). The 2021 chemistry data, together with the baseline data, provide insight into spatial and temporal changes in tissue chemistry and whether the changes are related to mining activities or other factors. Forecasting changes in fish tissue chemistry was an area of uncertainty highlighted in the FEIS[24] (Agnico Eagle, 2014). The FEIS cited research suggesting the combined effect of warmer temperatures and increased precipitation may lead to higher concentrations of metals in Arctic fish species (Carrie et al., 2010; Barletta et al., 2012; Dijkstra et al., 2013). Ultimately, the FEIS concluded that the effect of the Project on fish, including changes in tissue chemistry, would be negligible relative to the spatial and temporal scale of climate-related changes.

10.2 Objectives and Key Question

The Threespine Stickleback tissue chemistry study is ultimately focused on answering this key question: *are activities at the mine contributing to changes in Threespine Stickleback tissue chemistry relative to reference areas or baseline?* Objectives of Threespine Stickleback program were outlined in the AEMP Design Plan:

- Determine whether mine effluent has an effect on metal concentrations in fish tissue in Meliadine Lake,
- Verify predictions made in the FEIS pertaining to fish tissue metal concentrations (see above),
- Aid in the interpretation of the fish health study,

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[24] Refer to Volume 7, Section 7.5.8.3.

- Recommend appropriate changes to the fish tissue chemistry program for future years, and
- Provide data to inform adaptive management intended to reduce or eliminate mine-related effects to fish tissue chemistry in Meliadine Lake.

10.3 Key Findings from the 2021 Threespine Stickleback Chemistry Study

- Forty (40) Threespine Stickleback from each study area in Meliadine Lake were analyzed for metals concentrations in their tissue (carcass).
- Threespine Stickleback living in the east basin of Meliadine Lake near the diffuser are accumulating higher concentrations of calcium, arsenic, manganese, strontium, and uranium in their tissues than fish inhabiting the reference areas in Meliadine Lake. Arsenic, manganese, strontium, and uranium occur in higher concentrations in water in the east basin.
- Mining activities as well as natural climatic events, such as the wet year in 2019, have contributed to changes in water quality in the east basin of Meliadine Lake. It is unclear whether mining or natural variability is primarily responsible for the observed change over time (2015 to 2021) and the difference between areas (MEL-01 vs MEL-03 and MEL-04).
- The Threespine Stickleback health assessment confirmed that concentrations of these parameters are not associated with toxicological effects.

10.4 Methods

10.4.1 Collection, Processing, Analysis

Forty (40) Threespine Stickleback were selected from the fish health assessment study for the tissue chemistry study. The 40 fish included 10 males and 10 females that were unparasitized and 10 males and 10 females with parasites. The decision to include parasitized fish as part of the program was based on the possibility that the Cycle 2 EEM results may recommend future Threespine Stickleback health studies target parasitized fish.

Specimens ranging in size from 52 mm to 72 mm in length were selected for analysis. This range in size corresponds to age 3 and 4 fish. Prior to analysis, ALS confirmed that individual fish were large enough and compositing samples was not necessary. Samples were submitted frozen to ALS Environmental after the otoliths were extracted by technicians at North/South Consultants (Winnipeg, MB). Metals and moisture analyses were conducted on individual fish with their viscera removed (carcass only).

10.4.2 Data Analysis

Statistical analyses were performed in R (Core Team, 2022). Summary statistics (e.g., mean, median, standard deviation, etc.) were calculated by area and year as described for other components of the

AEMP. Parameters with more than 50% of the samples less than the DL were not carried forward for statistical analysis. Differences in concentrations among areas and over time were determined by analysis of variance (ANOVA). If ANOVA results were significant ($P \leq 0.10$), pair-wise comparisons were made using Tukey's honestly significant difference test as described in the Threespine Stickleback health assessment. The magnitude of the difference in the mean concentration for the various pairwise comparisons was calculated as follows:

$$\% \, Difference = \frac{\bar{x}_{MEL01('21)} - \bar{x}_{reference/baseline}}{\bar{x}_{reference/baseline}}$$

Temporal and spatial patterns were evaluated in the following step-wise approach:

- Identify patterns that show a temporal increase at MEL-01 compared to baseline (MEL-01'21 vs. MEL-01'15).
- Compare the 2021 tissue chemistry results from MEM-01 with the two reference areas (MEL-01'21 vs. MEL-03'21 and MEL-04'21).

10.5 Quality Assurance and Quality Control

Tissue chemistry QA/QC involved following appropriate sampling procedures, laboratory QC, and data analysis QA/QC procedures in the AEMP Design Plan.

ALS analyzed blanks, matrix spikes, laboratory duplicates, and certified reference material in each batch of Threespine Stickleback. The results of these internal QA/QC processes were reported with the laboratory data. Laboratory QC results are summarized in **Table 10-1**. A few parameters were flagged in the laboratory duplicates because they exceeded their respective data quality objectives based on RPD limits. The DQO exceedances for the laboratory duplicate samples were attributed to heterogeneity in the sample. ALS concluded the results did not impact the quality of the tissue chemistry data.

Table 10-1 Laboratory QC summary for 2021 Threespine Stickleback tissue samples.

Lab ID	# of Samples	Date sampled	Laboratory QC Summary								
			Elevated DLs	Laboratory Duplicates [a]		Method Blanks		Matrix Spike		LCS / CRM	
			Parameters	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier
VA21C5042	120	7-27 Aug 2021	Titanium	Barium Calcium Manganese Phosphorus Strontium Uranium	Sample Heterogeneity	No flags	-	No flags	-	No flags	-

Notes:

[a] Laboratory duplicates data quality objectives are set by the lab (generally 20 +/- for moisture and 40-60 +/- for metals including mercury).

LCS / CRM = laboratory control sample / certified reference material.

10.6 Results and Discussion

Summary statistics for the Threespine Stickleback tissue chemistry results from 2021, 2017, and 2015 are provided in **Appendix H-3**. ANOVA test results and pairwise comparisons for all area/year combinations are also provided in (**Appendix H-3**). Parameters that showed a significant increase at MEL-01 in 2021 relative to baseline conditions and a significant increase compared to the reference areas in 2021 are discussed below.

Calcium, arsenic, manganese, strontium, and uranium were statistically significantly higher ($P \leq 0.10$) at MEL-01 in 2021 compared to baseline (2015) and compared to the reference areas in 2021. Results of the pairwise comparisons between MEL-01 and the reference areas in 2021 and MEL-01 from 2021 to 2015 are provided in **Table 10-2** along with the magnitude of the difference. Boxplots and point plots showing the concentration of these five parameters by area and year are provided in **Figure 10-1** to **Figure 10-5**. The plots show the results of the pairwise comparisons for all area-year combinations.

The clear differences in tissue concentrations of these metals at MEL-01 in 2021 relative to the reference areas in 2021 and compared to baseline suggest either a mine-related change or possibly a coincidental natural change differentially affecting the east basin. Changes in water quality at MEL-01 are explored in detail in **Section 4.5.3**, with much discussion on the underlying causes of the observed changes. Arsenic and manganese were identified as parameters that have *always* exceeded the normal range of baseline/reference conditions at MEL-01 and temporal trends are likely driven by natural factors. For example, the concentration of both parameters changed substantially in relation to abnormally high precipitation in the summer of 2019, when effluent discharge was limited. Strontium and uranium, on the other hand, were identified as parameters that *recently* exceeded the normal range at MEL-01. Neither of these parameters appeared to respond to the summer 2019 rain event and both saw substantial increases year-over-year between 2019 and 2020, which would have coincided with when effluent loading into the east basin was highest. Even for these parameters, the patterns are not fully clear in terms of what factors are contributing to the observed trends. Strontium started to trend higher in surface water samples from MEL-02 and MEL-03 in 2016, prior to the onset of discharge from CP1. Ultimately, the observed trends in surface water quality may be due to the combined influence of both mining-related discharges and natural processes.

Arsenic, strontium, and uranium are all non-essential metals, meaning they have no known function in living organisms (Wood et al., 2012). Manganese, on the other hand, is essential for growth, vertebral development and anti-oxidant metabolism in fish (Prabhu et al., 2019). It is important to note that while these results reflect differences in exposure to these metals, they do not necessarily indicate adverse effects to the Threespine Stickleback. For example, arsenic tissue concentrations associated with chronic effects have been shown to be approximately 2 to 6 mg/kg ww (McIntyre and Linton, 2012), which is much higher than the tissue concentrations measured at MEL-01 in 2021. The detailed health assessment of Threespine Stickleback (**Section 9**) found no consistent adverse effects at MEL-01 relative to MEL-03 and MEL-04. Further, the main differences observed were higher survival and growth of males at MEL-01.

Table 10-2 Threespine Stickleback tissue chemistry comparisons (spatial [NF vs Reference] and temporal [2021 vs 2015]).

Parameter	ANOVA Model p-value	Mean Concentration (mg/kg ww)				Pairwise Comparisons (Tukey)					
		MEL-01		MEL-03	MEL-04	MEL-01 (2021 vs 2015)		MEL-01 v MEL-03 (2021)		MEL-01 v MEL-04 (2021)	
		2021	2015	2021	2021						
		n=40	n=60	n=40	n=40	p-value	% Change	p-value	% Change	p-value	% Change
Calcium	<0.001	33600	24000	29200	27800	<0.001	40%	0.005	15%	<0.001	21%
Arsenic	<0.001	0.272	0.186	0.193	0.181	<0.001	46%	<0.001	41%	<0.001	50%
Manganese	<0.001	42.3	27.4	30.5	29.7	<0.001	54%	<0.001	39%	<0.001	42%
Strontium	<0.001	35.3	19.1	24.3	23	<0.001	85%	<0.001	45%	<0.001	53%
Uranium	<0.001	0.00867	0.00444	0.00615	0.00677	<0.001	95%	<0.001	41%	0.011	28%

Notes:

Statistically significant differences in the ANOVA and pairwise comparisons at P≤0.1.

MEL-01 = Near-field station; MEL-03 and MEL-04 = reference stations.

Figure 10-1 Calcium concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021.

Notes: Tissue analysis completed on carcasses with viscera removed.
Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years ($p \leq 0.1$).
MEL-01 = Near-field station; MEL-03 and MEL-04 = reference stations.

Figure 10-2 Arsenic concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021.

Notes: Tissue analysis completed on carcasses with viscera removed.
Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (p≤0.1).
MEL-01 = Near-field station; MEL-03 and MEL-04 = reference stations.

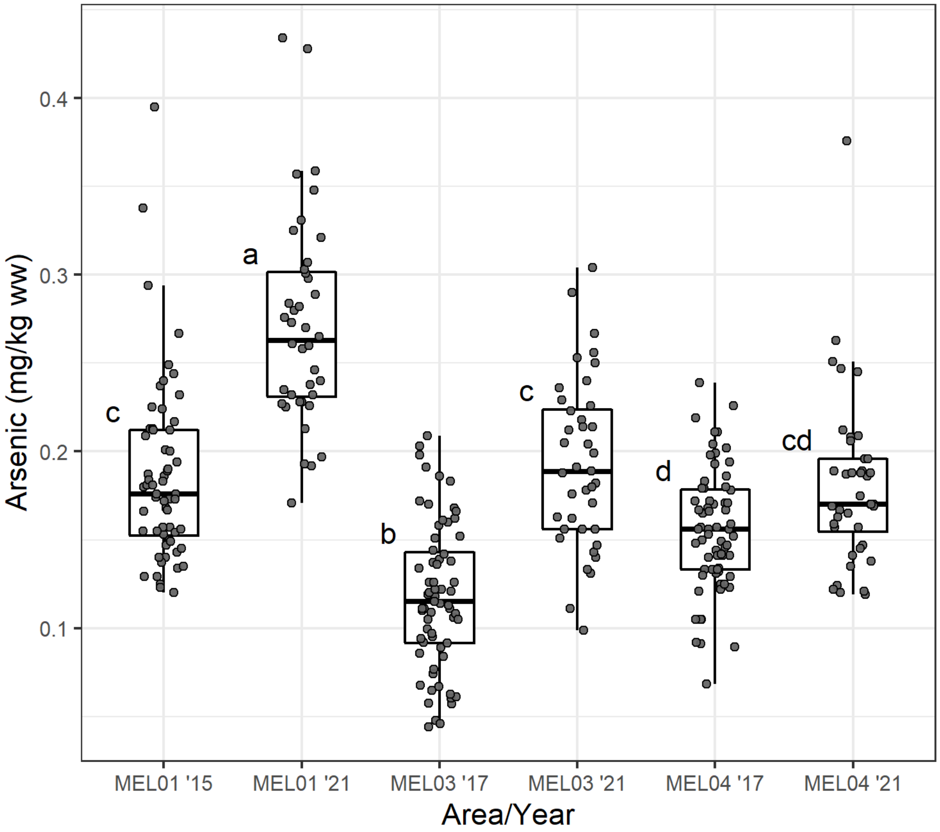


Figure 10-3 Manganese concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021.

Notes: Tissue analysis completed on carcasses with viscera removed.
Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (p≤0.1).
MEL-01 = Near-field station; MEL-03 and MEL-04 = reference stations.

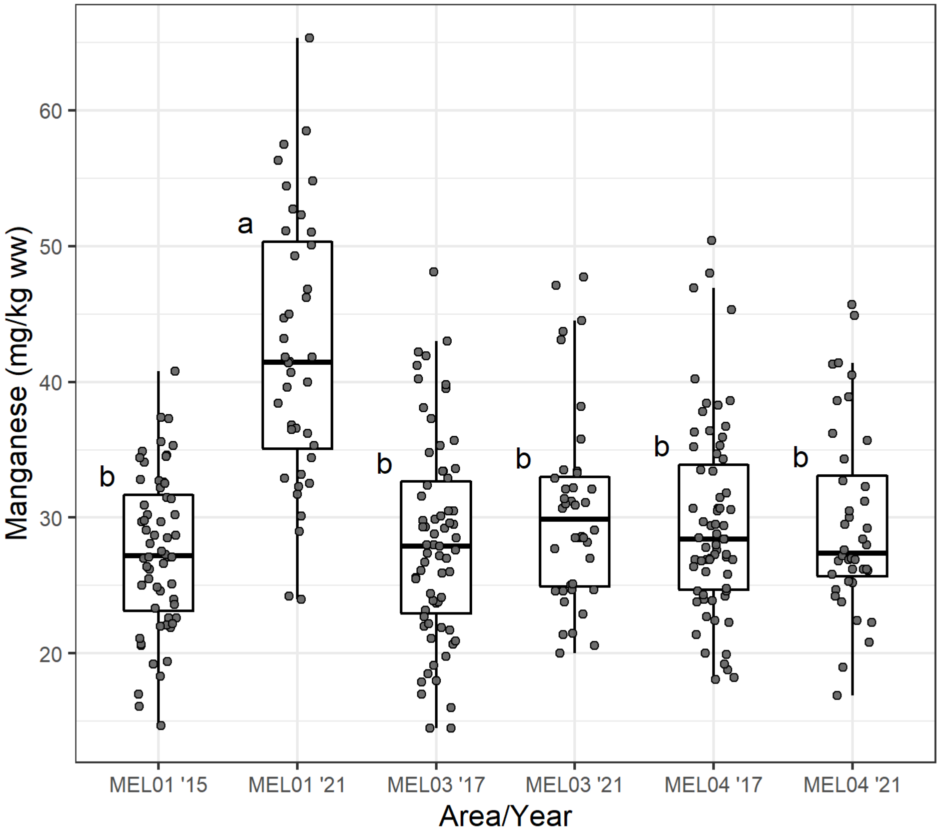


Figure 10-4 Strontium concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021.

Notes: Tissue analysis completed on carcasses with viscera removed.
Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (p≤0.1).
MEL-01 = Near-field station; MEL-03 and MEL-04 = reference stations.

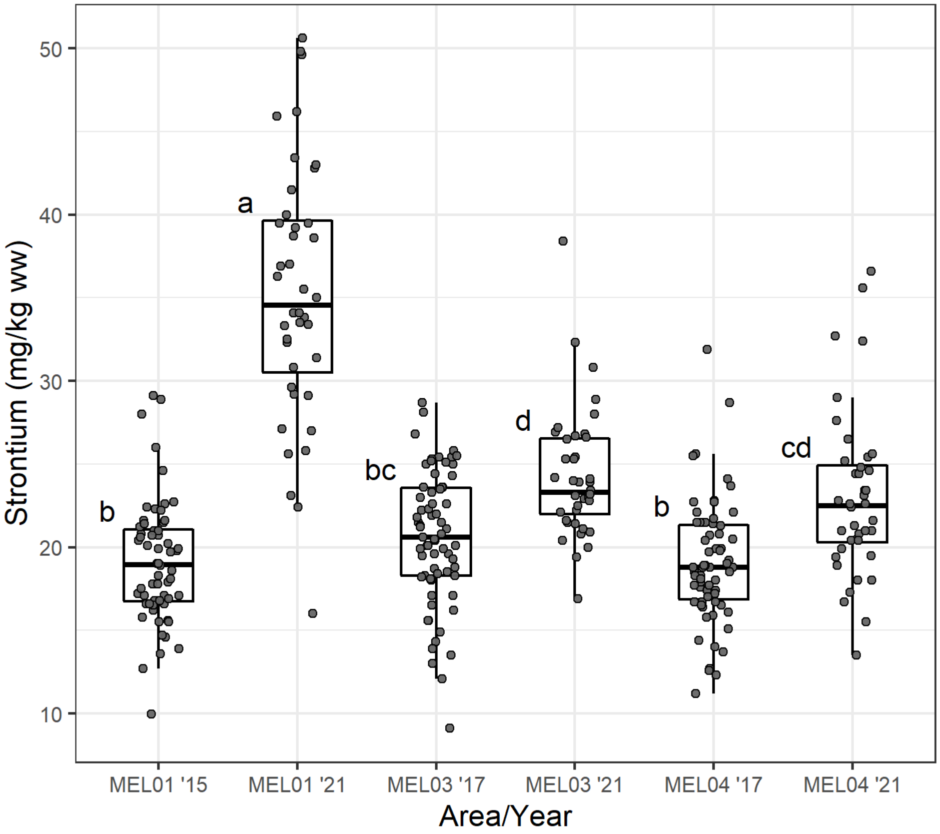
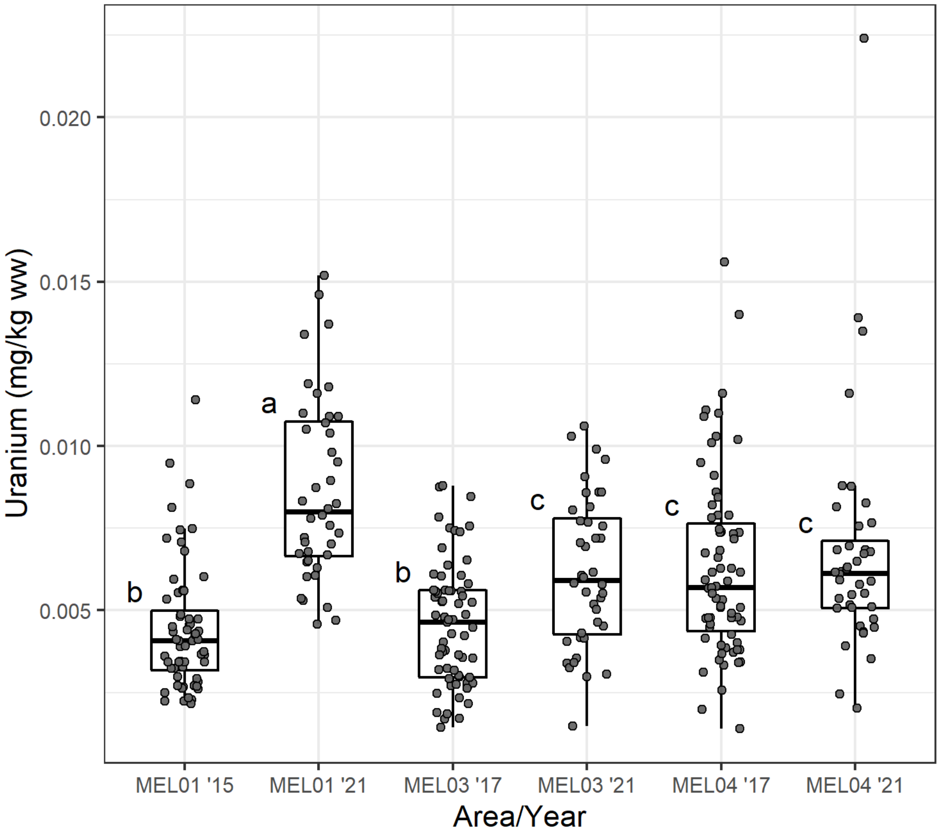


Figure 10-5 Uranium concentrations (mg/kg ww) in Threespine Stickleback collected from Meliadine Lake in 2015, 2017, and 2021.

Notes: Tissue analysis completed on carcasses with viscera removed.
Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (p≤0.1).
MEL-01 = Near-field station; MEL-03 and MEL-04 = reference stations.



10.7 Conclusions and Recommendations

Calcium, arsenic, manganese, strontium, and uranium were detected at higher concentrations in Threespine Stickleback from MEL-01 in 2021 compared to the reference areas in Meliadine Lake and compared to the baseline period. There is some uncertainty about whether the underlying cause is mining-related, natural, or a combination of the two. However, the detailed health assessment did not find changes in health endpoints consistent with toxicological impairment related to exposure to metals (**Section 9**). Indeed, the main differences observed between MEL-01 and the reference areas were higher survival and growth of males at MEL-01. Comparisons of unparasitized vs parasitized fish will be presented in the forthcoming Cycle 2 EEM report (Azimuth, in prep), so these conclusions should be deemed preliminary at this time. Thus, while changes in tissue concentrations consistent with mining activity have been observed, these changes do not appear to be causing any adverse effects to unparasitized fish in local Threespine Stickleback populations.

As mentioned in the introduction, forecasting changes in fish tissue is uncertain given the various climate-related factors at play. At a high level, the findings from the 2021 Threespine Stickleback tissue chemistry study align with key conclusions in the FEIS, namely, that Project-related effects to fish are negligible relative to the temporal and spatial scales that are associated with climate change processes.

Recommendations

No modifications of the current study design for the Threespine Stickleback tissue chemistry program are recommended. The program is clearly sufficient to detect changes/differences in tissue chemistry over time and space. Given the lack of any adverse health effects to unparasitized fish in the local Threespine Stickleback population, no changes are currently recommended to the timing of the next study (2024); this conclusion may be revisited pending the results of the full fish in the Cycle 2 EEM report (Azimuth, in prep).

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11 LAKE TROUT HEALTH

11.1 Introduction

Lake Trout were selected as the large-bodied fish species for the AEMP due to their importance to the community members of Rankin Inlet and because of their relatively high abundance and catch-per-unit-effort in Meliadine Lake (Golder, 2016a). The Lake Trout program for the AEMP is a *before-after* study design meant to assess changes in Lake Trout health endpoints such as survival, growth, and condition over time. The 2021 study is the first to look at changes in Lake Trout health endpoints since the start of effluent discharge to Meliadine Lake in 2018. The FEIS (Agnico Eagle, 2014) predicted low risk of effects the health of Lake Trout and other large-bodied fish species such as Arctic Char and Arctic Grayling from development of the mine. Furthermore, no major changes were predicted for traditional and non-traditional use of fish in Meliadine Lake relative to natural changes in the fish population.

A key aspect of fish population studies under EEM is the selection of suitable reference areas to compare against the exposure area. In the case of small-bodied fish species such as Threespine Stickleback, internal reference areas within Meliadine Lake were suitable because the spatial extent of effluent-related changes in the environment are small relative to their home range. However, in the case of Lake Trout, use of internal reference areas in Meliadine Lake is problematic because Lake Trout are highly mobile within and between basins (Golder, 2012). This means it cannot be assumed that Lake Trout captured near the effluent discharge location have been exposed to effluent for an extended period. Neither can it be assumed that Lake Trout captured elsewhere in Meliadine Lake have never spent time in the east basin, and thus exposed to effluent. For this reason, the before-after study design cannot determine if a change in a particular Lake Trout health endpoint is related to mining activities (i.e., effluent) or natural factors that are influencing Lake Trout populations throughout the region.

The Cycle 2 EEM study, which was conducted in parallel with the AEMP in 2021, included two reference lakes in a *control-impact* study design to compare differences in Lake Trout health endpoints between Meliadine Lake and lakes unimpacted by mining activities (Azimuth and Portt, 2021). The Lake Trout health assessment for the Cycle 2 EEM was designed to comply with monitoring requirements under MDMER. Findings from the Cycle 2 EEM are being prepared as a separate deliverable (Azimuth, in prep).

11.2 Objectives and Key Question

The Lake Trout health assessment is focused on answering this key question: *are activities at the mine causing changes in Meliadine Lake that are impacting the health of large-bodied fish?* Findings from other components of the 2021 AEMP were used to help interpret the Lake Trout health data on a case-by-case basis.

Objectives of Lake Trout program are similar to those outlined for Threespine Stickleback and included:

- Determining whether Project effluent influences the survival, energy use (growth and reproduction), and energy storage (condition) of large-bodied fish in Meliadine Lake,
- Verifying predictions made in the FEIS pertaining to fish health,
- Meeting the requirements of Schedule 5, Part 2, Subsection 9 (a) of the MDMER regulations (Government of Canada 2022),
- Recommending appropriate changes to the fish health program for future years, and
- Providing data to inform adaptive management intended to reduce or eliminate mine-related effects for fish health in Meliadine Lake.

11.3 Findings from the 2021 Lake Trout Health Assessment

- Lake Trout were collected in 2021 by setting gill nets in the area around the diffuser in the east basin of Meliadine Lake. Lake Trout were captured in 2015 by a combination of angling and gill netting in this area. A single collection method (gill netting, rather than angling) was chosen in 2021 to avoid pooling data from different sampling techniques as recommended in the EEM guidance (Environment Canada, 2012).
- The Lake Trout study looked at the health of mature male and female fish separately. In general, the comparisons yielded similar results for both sexes.
- Male and females Lake Trout in 2021 were older, longer, and heavier compared to Lake Trout collected in 2015. These findings should be interpreted with caution because of the different capture methods used each year.
- No differences were detected for the size-at-age endpoint for either males or females between years. This suggests that while older, larger, and heavier Lake Trout were captured in 2021 compared to 2015, the growth rate for Lake Trout in 2021 has not significantly changed.
- Lake Trout captured in 2021 showed higher condition, larger relative liver size, and larger relative gonad size (males only) compared to fish from 2015. These findings point to higher energy storage and suggest there may be an increase in the availability and/or quality of food for Lake Trout in the east basin of Meliadine Lake. Importantly, the observed response across all the Lake Trout health endpoints is not consistent with toxicological impairment from exposure to effluent.
- The Cycle 2 EEM (Azimuth, in prep) will help determine if the observed change in Lake Trout energy storage in 2021 compared to 2015 is related to nutrient enrichment caused by effluent or natural variability/regional changes.

11.4 Methods

Field collections and data analyses were conducted based on methods outlined in the AEMP Design Plan, and summarized below.

11.4.1 Field Methods

Lake Trout were collected from the exposure area of Meliadine Lake in 2015 (prior to the onset of mine operations) and 2021. Detailed methods for the 2015 program are presented elsewhere (Golder, 2016a); some details are provided here for comparison to the 2021 methods. An overview of the angling and gill net sampling locations for 2015 and 2021 are provided in **Figure 11-1**.

- **2015**
    - Lake Trout were captured using a combination of angling and gill netting.
    - Angling occurred during the daytime from August 14 to August 18.
    - Gill netting occurred from August 17 to August 18 and consisted of both short duration daytime and overnight sets. Gill nets were 1 m x 30 m with a mesh size of 10 mm.
    - Fishing effort was focused near shoals within 3 km of the proposed location of the mine effluent diffuser (Golder, 2016b).
- **2021**
    - Lake Trout were captured exclusively by gill netting on August 14. Nets were set in the daytime.
    - The nets consisted of a gang of three North American standard large mesh gill nets (1.83 m x 74.1 m, total dimensions). Each standard net consisting of 8 panels of different mesh sizes (76 mm, 114 mm, 51 mm, 89 mm, 38 mm, 127 mm, 64 mm, and 102 mm).
    - Fishing effort was focused within 0.4 km of the effluent diffuser, and within the 1% effluent plume, as delineated on August 29, 2021 (**Figure 3-4**).

The date and time of gill net deployments and lifts were recorded in 2021. UTM coordinates at each end of each net were recorded (Garmin model GPSmap 76CSx in 2021) and measurement of water depth, temperature, and specific conductance were determined using a CastAway-CTD® in 2021, Xylem Inc.

The number of individuals of each species captured that were dead, or killed and retained in the case of Lake Trout, and the number that were alive and released was recorded for each net set. During 2021 sampling, all dead Lake Trout were retained and Lake Trout captured alive were euthanized and retained until it was clear that the target sample size of 30 fish would be acquired. Once the target size was reached, or it was apparent that it would be, Lake Trout that were alive were released. Retained Lake Trout were taken to the laboratory at the mine site for processing.

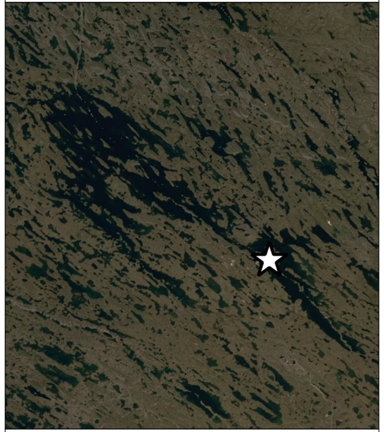
Figure 11-1
Lake Trout Sampling Areas in the East Basin of Meliadine Lake in 2015 and 2021

2021 Aquatic Effects Monitoring Program Annual Report

AZIMUTH

Date:	February 15, 2022
Datum:	NAD 83 UTM Zone 15N
Scale:	1:30,000
Software:	QGIS version 3.16.0-Hannover
Produced by:	E. Franz; J. Ellenor

REFERENCES:
1. Basemap imagery from Google



Legend

- 2015 Angling
- 2015 Gill Nets
- 2021 Gill Nets
- ☆ Diffuser

Lake Trout were evaluated at the field laboratory according to the approach outlined below.

- Each fish was examined externally and any lesions or other abnormalities that were not consistent with gill net capture were recorded.
- Fork length and total length were determined to the nearest mm using a standard fish measuring board.
- Fish weighing less than 200 g were weighed to the nearest 0.01 g using an Ohaus Scout Pro Model SP202 electronic balance. Fish weighing between 200 and 6,000 grams were weighed to the nearest 1 g using an Ohaus Scout Pro Model SP6001 electronic balance. Fish weighing more than 6,000 g were weighed to the nearest 10 g using a Rapala digital hanging scale.
- The body cavity of each fish was opened and the viscera were examined for any anomalies or parasites.
- The gonads were examined to determine the sex, maturity, and gonad condition of the specimen. Females with opaque ovaries containing developing eggs visible to the naked eye were sexually mature. Females with translucent ovaries that did not contain eggs visible to the naked eye were immature. Mature females with opaque ovaries, and in some cases atretic eggs from the previous spawning, but which did not appear to be developing eggs to spawn in the fall of 2021 are referred to as resting females. Mature females with large eggs that appeared to be ready to spawn in the current year were termed ripe females. Males with opaque testes were mature, and males with small translucent testes were immature.
- The liver and gonads were removed and weighed to the nearest 0.01 g using an Ohaus Scout Pro Model SP202 electronic balance or, if they weighed more than 200 grams, to the nearest 0.1 g using an Ohaus Scout Pro Model SP6001 electronic balance. A sample of eggs was taken from each ripe female and weighed to the nearest 0.01 g using an Ohaus Scout Pro Model SP202 electronic balance. The eggs in each sample were counted twice. If the counts differed, the eggs were recounted until two identical counts occurred. Egg weight was determined by dividing the weight of the egg sample by the number of eggs. Fecundity was estimated by dividing the ovary weight by the egg weight.

11.4.2 Age determination

Otoliths (inner ear bones) were extracted from each fish and placed in envelopes. Otoliths were processed by Louise Stanley, a fish ageing expert. Otoliths were mounted whole on a glass slide with CrystalBond thermoplastic adhesive. Otoliths which could not be aged whole were ground to the core on one side, flipped to adhere the core area to the glass, and then ground to a thin section on the other side. Age was estimated based on the number of annuli counted using transmitted light and a Leica GZ6

Stereo Zoom microscope. Age was independently estimated by C. Portt from otoliths from 10 randomly selected fish.

11.4.3 Data Analysis

Data were entered into a spreadsheet and compared with original datasheets. Boxplots and scatterplots were constructed to review data, and transcription errors or omissions were corrected. Condition (K) was calculated using the formula:

$$K = \frac{total\ weight}{fork\ length^3} \times 100{,}000.$$

Statistical analyses were carried out using R (R Core Team, 2022). Summary statistics (sample size, mean, median, minimum, maximum, standard deviation, standard error) were generated for fork length, total length, total weight, condition, liver weight, gonad weight, fecundity, and age for each year. Those same summary statistics were generated according to maturity, sex, and year.

Lake Trout monitoring endpoints assess the survival, energy use, and energy storage of individuals captured in the exposure area during the baseline period (2015) compared to individuals captured in the exposure area during the operational period (2021). A summary of the monitoring endpoints is provided in **Table 11-1**. Except for length-frequency distributions, which includes data from all individuals (regardless of sex), monitoring endpoints are assessed separately for males and females (regardless of maturity). Reproductive endpoints for females, including relative gonad size, and relative fecundity (# of eggs/female) were not assessed due to inadequate sample sizes, as anticipated.

For the analysis of covariance (ANCOVA) analyses, both the complete model, which includes the interaction term (year x covariate) and the reduced model, which excludes the interaction term, were run. Significant interactions can be difficult to interpret, and complicate the computation of effect size. In cases where the interaction term was significant but accounted for < 2% of the total variation in the response variable the reduced model was used to assess significance and effect sizes, as per Barrett et al. (2010).

Residuals from each ANCOVA were examined for normality and outliers. Observations producing large Studentized residuals (i.e., > 4) were removed from the data set, and the analyses were repeated and variations in conclusions considered.

Table 11-1. Statistical procedures used for various monitoring endpoints to compare Lake Trout populations between baseline (2015) and operational (2021) sampling periods.

Effect Indicator	Endpoint	Dependent Variable	Covariate	Statistical Procedure	Critical Effect Size
Survival	Age	-	-	t-test	25%
Growth (Energy Use)	Length-frequency distribution	-	-	KS Test	-
	Fork Length	-	-	t-test	-
	Total Weight	-	-	t-test	-
	Size-at-age	Total Weight	-	ANCOVA	25%
		Fork Length	-	ANCOVA	25%
Condition (Energy Storage)	Condition	Total Weight	Fork Length	ANCOVA	10%
	Relative Liver Size	Liver Weight	Fork Length	ANCOVA	25%
Reproduction (Energy Use)	Relative Gonad Size	Gonad Weight	Total Weight	ANCOVA	25%
		Gonad Weight	Fork Length	ANCOVA	25%

The percent difference in means (t-test) and least-square means (ANCOVA) between the operational period (2021) and the baseline period (2015) was calculated as:

$$\%\, Difference = \frac{\bar{x}_{operational} - \bar{x}_{baseline}}{\bar{x}_{baseline}}$$

When log-transformed data were analyzed, the least-mean square values used were antilogs of the calculated values. The percent difference was compared to the critical effect size for each endpoint, where applicable. A critical effect size is a threshold above which an effect may be indicative of a higher risk to the environment (Environment Canada, 2012).

11.4.4 Power Analysis

Power analysis for the Lake Trout study follows the approach outlined in **Section 9.4.4** for Threespine Stickleback. Results of the Lake Trout power analysis will be presented in the Cycle 2 EEM interpretive report as part of recommendations to improve the large-bodied fish health program for future AEMP and EEM cycles.

11.5 Results and Discussion

11.5.1 Sampling Effort and Catches

The location of angling (2015 only) and gill net sets (2015 and 2021) are shown in **Figure 11-1**. Catch summaries for 2015 and 2021 sampling are summarized in **Table 11-2**. Sampling conditions, effort, and Lake Trout catch details for angling and gill netting are presented in **Table 11-3** and **Table 11-4**, respectively. Catch data from the gill net sets in 2021 are provided in **Appendix I-1**.

Regardless of catch method, Lake Trout was the most abundant species caught in both years, with a total of 101 Lake Trout captured in 2015 and 65 captured in 2021. While no species other than Lake Trout were caught during angling, Round Whitefish were captured in gill nets in 2015 (1 total) and in 2021 (2 total), and 7 Cisco (*Coregonus artedi*) were captured in gill nets in 2021. Lake Trout CPUE was very similar between years, with an average of 31.0 fish/100m^2/24hr in 2015 and an average of 30.1 fish/100 m^2/24hr in 2021. Direct comparisons of gill net CPUE between years should be interpreted with caution, however, as different sizes of gill nets with different sizes of mesh were used. Also, net sets in 2015 occurred during both the daytime (2 sets), and overnight (4 sets), while net sets in 2021 occurred only during the day (4 total).

11.5.2 Lake Trout Characteristics

The numbers of Lake Trout processed by year, sex, and maturity are presented in **Table 11-5**. In 2021, the target sample size of 30 individuals from within the exposure area was achieved, with a total of 42 individuals processed. In 2015, a total of 67 individuals were processed. The data for each specimen are provided in **Appendix I-1**. Individuals that were too small for their sex to be determined account for 0% (2021) and 9% (2015) of the total catch. Of the individuals for which sex could be determined, 100% of the females were mature, while 97% (2015) and 58% (2021) of the males were mature.

Table 11-2. Catch summaries for angling and gill netting during baseline (2015) and operational (2021) large-bodied sampling programs.

Year	Method	Trawl/Net	Catch Summary		
			Lake Trout	Round Whitefish	Cisco
2015	Angling	MEL-1500	5	0	0
		MEL-1501	6	0	0
		MEL-1502	5	0	0
		MEL-1503	19	0	0
		MEL-1504	18	0	0
		MEL-1505	2	0	0
		MEL-1506	16	0	0
	Gill Net	MEL-1600	6	1	0
		MEL-1601	15		0
		MEL-1602	2		0
		MEL-1603	7		0
	Total		**101**	**1**	**0**
2021	Gill Net	MEL-GN01	7	1	0
		MEL-GN02	29	0	3
		MEL-GN03	13	0	3
		MEL-GN04	16	1	1
	Total		**65**	**2**	**7**

Table 11-3. Angling conditions, effort, and catch summary.

Year	Trawl	Depth (m)		Water Temp (°C)	Specific Cond. (µS/cm)	Number of Anglers	Number of Trawls	Duration (hrs)	Effort (angler hrs)	Lake Trout Catch			
		Min.	Max.							Retained	Released	Total	CPUE (fish/angler hour)
2015	MEL-1500	1	12	10.16	49	2	1	1.25	2.50	5	0	5	2.0
	MEL-1501	2	15.2	10.21	49	3	1	0.50	1.50	6	0	6	4.0
	MEL-1502	1.5	10	-	-	3	1	1.33	4.00	5	0	5	1.3
	MEL-1503	0.5	10	10.09	49	2	2	3.17	6.33	11	8	19	3.0
	MEL-1504	1	10	10.36	49	2	4	4.58	9.17	7	11	18	2.0
	MEL-1505	1.4	13	-	-	2	1	0.50	1.00	2	0	2	2.0
	MEL-1506	0	10	7.34	46	2	4	3.30	6.60	16	0	16	2.4
	Total						**14**	**14.63**	**31.10**	**52**	**19**	**71**	**2.3**

Table 11-4. Gill net set conditions, effort, and catch summary.

Year	Net	Location	Depth	Water Temp. (°C)		Specific Cond. (µS/cm)		Net Dimensions	Soak Time (hrs)	Number of Lifts	Set Type	Lake Trout Catch			
				Min.	Max.	Min.	Max.					Retained	Released	Total	CPUE (fish/100m^2/24hrs)
2015	MEL-1600	Start	8.2	10.36		49		1.0 m x 30.0 m	14.5	1	overnight	6	0	6	33.2
		End	10.4												
	MEL-1601	Start	9.2	10.27		49		1.0 m x 30.0 m	40.2	3	daytime (1) overnight (2)	13	2	15	29.8
		End	11.2												
	MEL-1602	Start	6	10.36		49		1.0 m x 30.0 m	7.1	1	daytime	1	1	2	22.5
		End	8												
	MEL-1603	Start	17.2	10.70		50		1.0 m x 30.0 m	15.5	1	overnight	7	0	7	36.1
		End	17.7												
	Total								**77.3**	**6**	**-**	**27**	**3**	**30**	**31.0**
2021	MEL-GN01	Start	1.8	9.96	10.1	104	105	1.83 m x 74.1 m	10.5	1	daytime	2	5	7	11.8
		End	1.9	9.60	9.6	101	101								
	MEL-GN02	Start	9.3	9.44	9.6	101	101	1.83 m x 74.1 m	9.7	1	daytime	11	18	29	53.1
		End	10.2	9.51	9.8	101	104								
	MEL-GN03	Start	3.4	9.55	9.0	112	116	1.83 m x 74.1 m	9.3	1	daytime	13	0	13	24.9
		End	6.4	9.56	9.8	107	111								
	MEL-GN04	Start	1.4	9.65	9.8	109	113	1.83 m x 74.1 m	8.8	1	daytime	16	0	16	32.1
		End	6.7	9.55	9.8	105	111								
	Total								**38.3**	**4**	**-**	**42**	**23**	**65**	**30.1**

Table 11-5. Number of Lake Trout examined each year, by sex and maturity

Year	Sex	Maturity		Total
		Immature	Mature	
2015	Female	0	32	32
	Male	1	28	29
	Unknown	6	0	6
	Total	**7**	**60**	**67**
2021	Female	0	18	18
	Male	10	14	24
	Unknown	0	0	0
	Total	**10**	**32**	**42**

Based on the stage of egg development, 6 of 32 mature females (19%) in 2015 and 4 of 18 mature females (22%) in 2021 were ripe and would have spawned in the sample year (**Table 11-6**). Fourteen (14) of 28 mature males (50%) in 2015 and 13 of 14 mature males (93%) in 2021 appeared to have developing testes in preparation for spawning in the current year (**Table 11-6**). The numbers of mature females that were developing gonads in preparation to spawn in the current year were too low to permit meaningful comparisons of gonad weights between years. However, a comparison of ripe male gonad weights between years was conducted.

Table 11-6. Number of mature individuals that were developing gonads to spawn in the current year (ripe) and that were not sufficiently developed to spawn in the current year (resting).

Year	Female		Male	
	Resting	Ripe	Resting	Ripe
2015	26	6	14	14
2020	14	4	1	13
Total	**40**	**10**	**15**	**27**

Summary statistics (sample size, mean, median, minimum, maximum, standard deviation, standard error) were generated for fork length, total length, weight, age, condition, liver weight, gonad weight, fecundity for all Lake Trout processed, by year (**Table I1-1**), and for Lake Trout separated by maturity, sex, and year (**Table I1-2**).

Ageing QA/QC

Ageing QA/QC data are provided in **Table I1-3**.

Lesions, deformities, and parasites

No lesions were observed that were not consistent with having occurred while the fish was entangled in a gill net. Encysted cestodes were present on the stomachs or livers of Lake Trout captured in both 2015 and 2021. A summary of the number and percentage of Lake Trout with encysted cestodes by year and sex is provided in **Table 11-7**.

Table 11-7. Summary of encysted cestodes present in Lake Trout by sex and year.

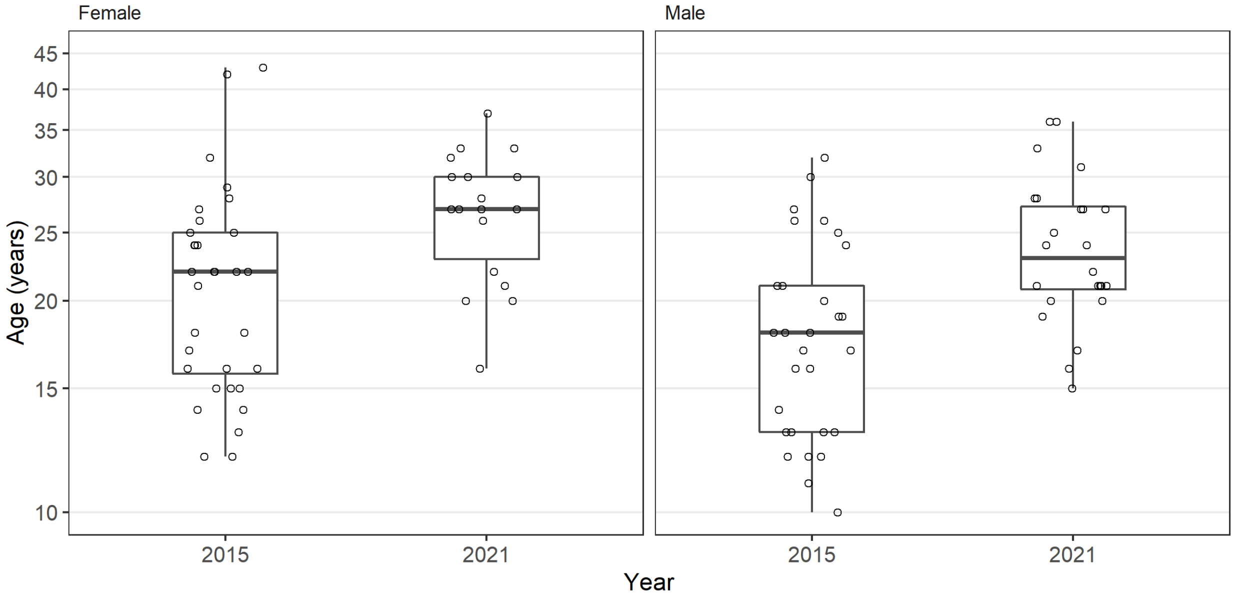
Year	Sex	n	Encysted Cestodes	
			n	%
2015	Female	32	19	59
	Male	28	15	54
	Unknown	7	2	29
	Total	**67**	**36**	**54**
2021	Female	18	2	11
	Male	24	4	17
	Unknown	0	0	0
	Total	**42**	**6**	**14**

11.5.3 Survival

Age

Lake Trout ranged from 10 to 43 years of age across the full dataset (2015 and 2021). Immature individuals ranged from 10 to 33 years of age, while mature females ranged from 12 to 43 years of age, and mature males ranged from 10 year to 36 years of age (**Figure 11-2, Table I1-2**). T-test results show that there was a significant difference in the average age of females between years (p = 0.0049), and males between years (p = 0.0004) (**Table 11-8**). The average age of females captured in 2021 was 29.4% older than those captured in 2015. Similarly, the average age of males captured in 2021 was 34.5% older than those captured in 2015. For both males and females, the % difference between years is greater than the critical effect size of 25%.

Figure 11-2. Age of Lake Trout by sex and year.



11.5.4 Size

Length-frequency

Length-frequency distributions (**Figure 11-3**) were compared between years using the two-sample Kolmogorov-Smirnov test, which indicated that there was a significant difference in the length distribution between 2015 and 2021 (p = 0.0084). The cumulative length-frequency distributions (**Figure 11-4**) show that a greater proportion of the catch in 2015 were small individuals (~400 to 550 mm) than in 2021.

Length

Comparisons of total length between years for both males and females yielded similar results (**Table 11-8).** Across both years, fork length of males ranged from 398 mm to 826 mm and of females ranged from 487 mm to 915 mm (**Figure 11-5, Table I1-2**). T-test results show there was a significant difference in the average fork length of females between years (p = 0.0.0485), and males between years (p = 0.0097) (**Table 11-8**). Compared to 2015, females captured in 2021 were an average of 59 mm longer (8.8% difference). Males captured in 2021 were an average of 73 mm longer (13.0% difference) than those captured in 2015.

Figure 11-3. Length-frequency distribution of Lake Trout for each year.

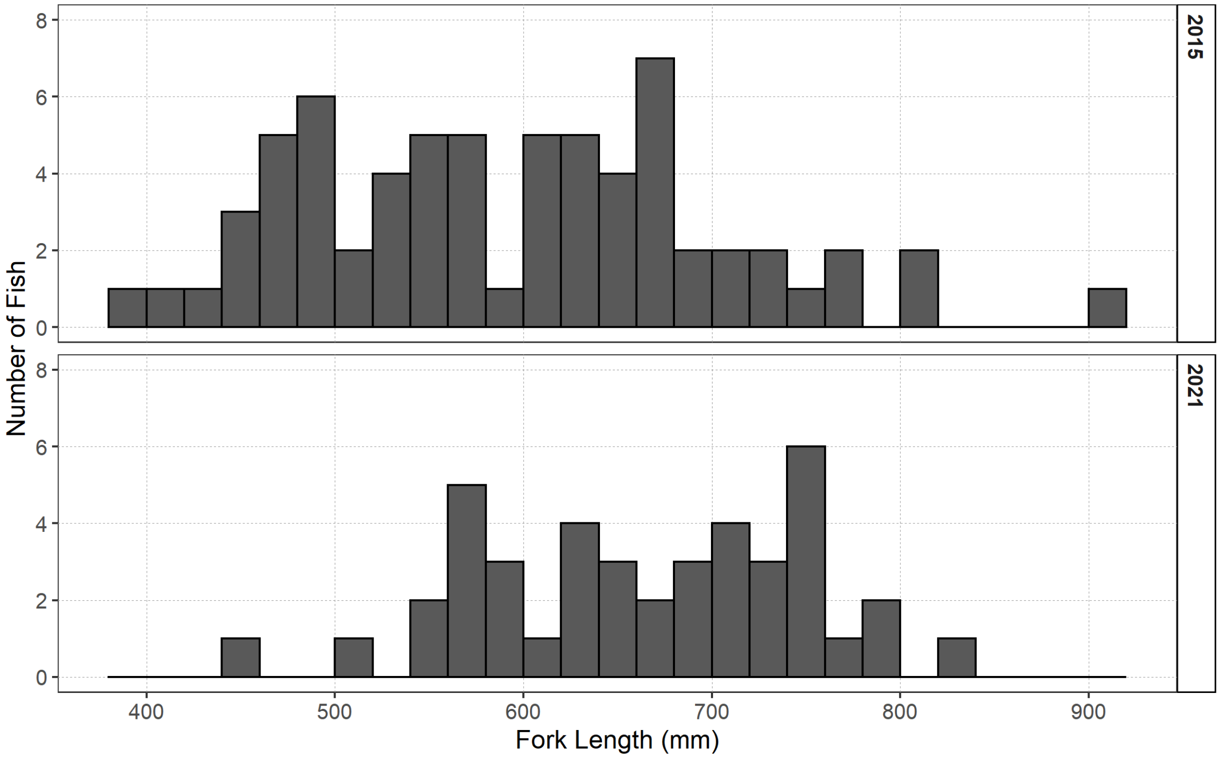


Table 11-8. Summary of Lake Trout between year comparisons using t-tests.

Variable	Sex	Mean		p-value	Difference (%)
		2015	2021		
Fork Length	Female	628 mm	684 mm	**0.0485**	8.8
	Male	568 mm	641 mm	**0.0097**	13.0
Total Length	Female	692 mm	752 mm	**0.0470**	8.7
	Male	626 mm	705 mm	**0.0101**	12.7
Total Weight	Female	2607 g	3578 g	**0.0103**	37.2
	Male	1952 g	3023 g	**0.0022**	54.8
Age	Female	20 yrs	26 yrs	**0.0049**	29.4
	Male	17 yrs	24 yrs	**0.0004**	34.5

Notes:
P-values ≤0.10 are in **bold**.

Figure 11-4. Cumulative length-frequency distribution of Lake Trout for each year.

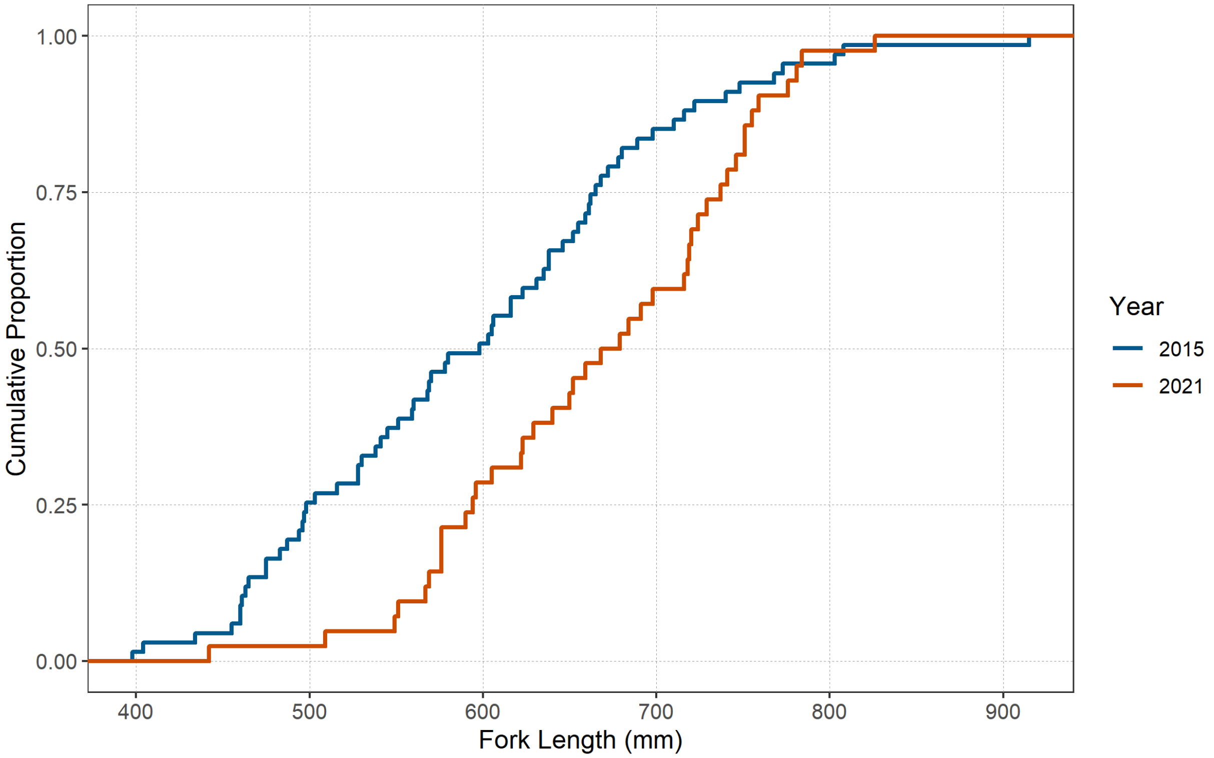
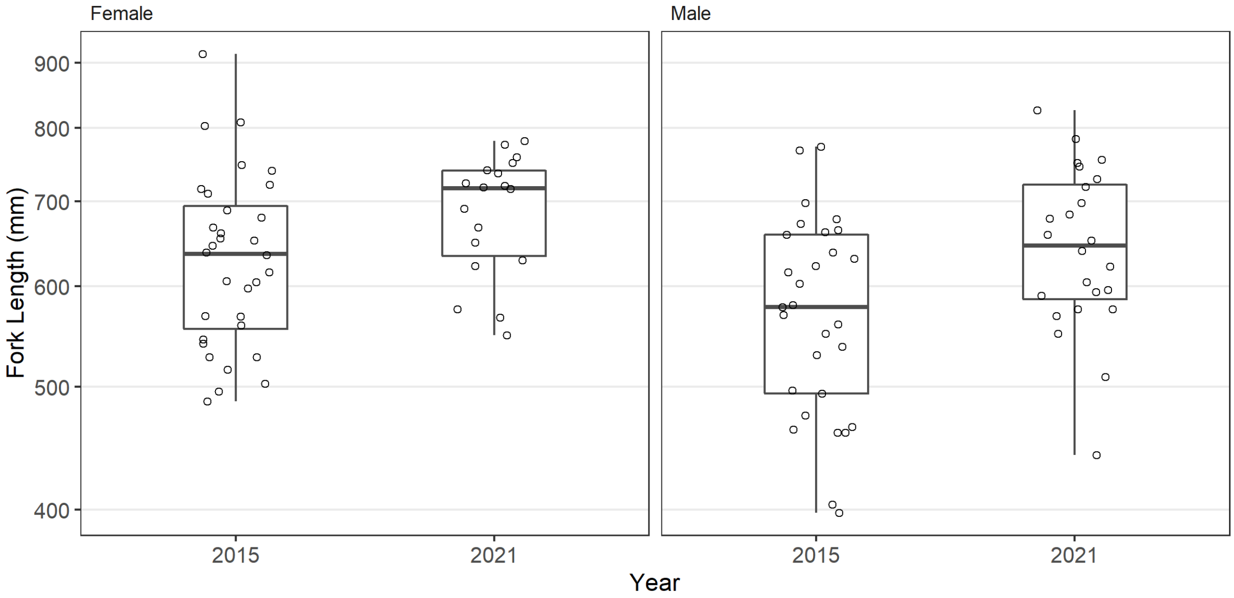


Figure 11-5. Fork length of Lake Trout, by sex and year.



Total Weight

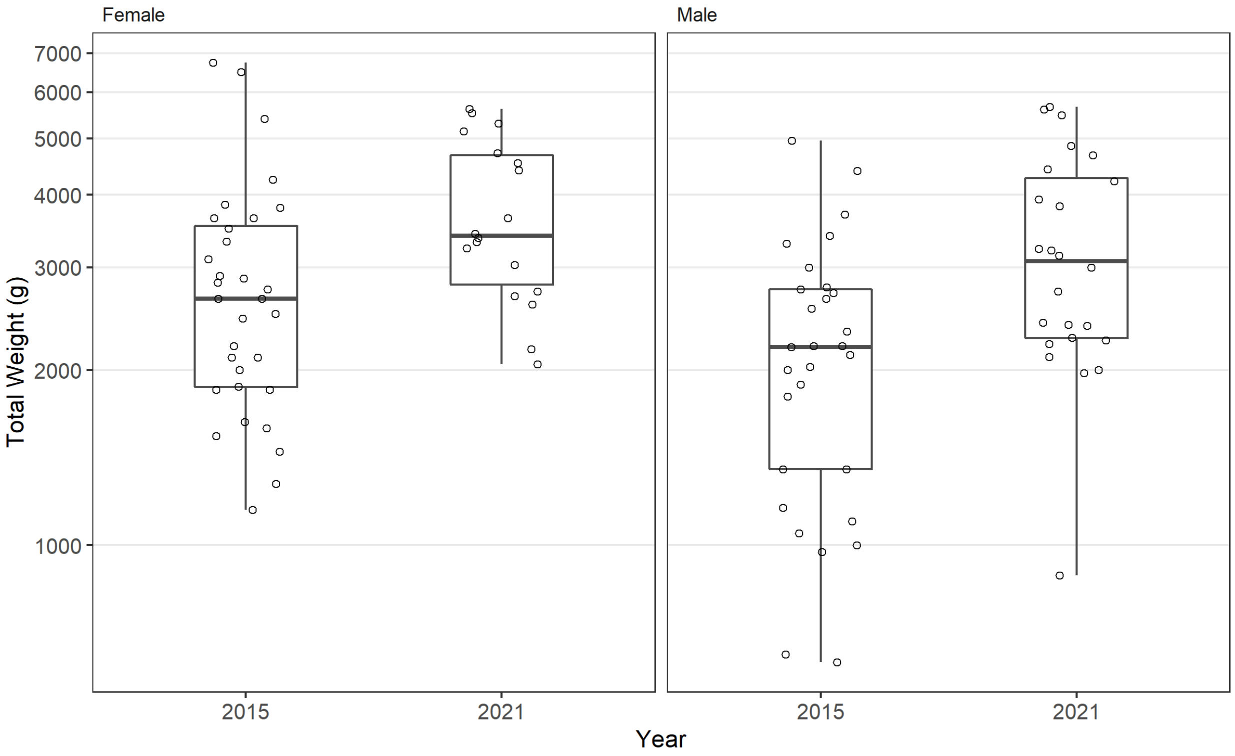
Including both 2015 and 2021 data, the weight of females ranged from 1,150 g to 6,750 g, while the weight of males ranged from 630 g to 5,660 g (**Figure 9-6**, **Table I1-1**). T-test results show that there is a significant difference in the average weight of females between years (p = 0.0103), and in the average weight of males between years (p = 0.0022) **(Table 11-8**). Compared to 2015, females captured in 2021 were an average of 971 g heavier (37.2% difference). Males captured in 2021 were an average of 1,071 g heavier (54.8% difference) compared to those captured in 2015.

11.5.5 Growth

Size-at-age

Size-at-age was assessed by comparing fork length versus age (length-at-age) between years and total weight versus age (weight-at-age) between years, for both male and female Lake Trout. ANCOVA analyses assessing the differences in size-at-age between years were completed using $\log_{10}$ transformed data. ANCOVA results of reduced models show there was no significant difference in length-at-age between years for females (p = 0.290) or males (p = 0.610) (**Table 11-9**, **Figure 11-7**). Similarly, there was no significant difference in weight-at-age between years for females (p = 0.740) or males (p = 0.755) (**Table 11-9**, **Figure 11-8**). This suggests that the increases in the average weight, and average length of Lake Trout in 2021 compared to 2015 are a result of the increase in the age of the fish captured in 2021 compared to 2015.

Figure 11-6. Total weight of Lake Trout, by sex and year.



11.5.6 Energy Storage

Condition

Fish weight is plotted against fork length in **Figure 11-9**, for both male and female Lake Trout, to assess the differences in fish condition between years. ANCOVA analyses assessing the difference in condition between years were completed using $\log_{10}$ transformed data. For all ANCOVA analyses, the interaction term of the full model was not significant, so the parallel-slope reduced models used (**Table 11-9**). The results show that there is a significant difference in the condition of females ($p = 0.0215$) and males ($p = 0.0267$) between years, with both sexes having higher condition in 2021 compared to 2015. Condition in 2021 was 9.1% greater than in 2015 for females, and 8.8% greater than in 2015 for males. These increases are less than the critical effect size of 10%.

Figure 11-7. Lake Trout fork length versus age, by sex and year.

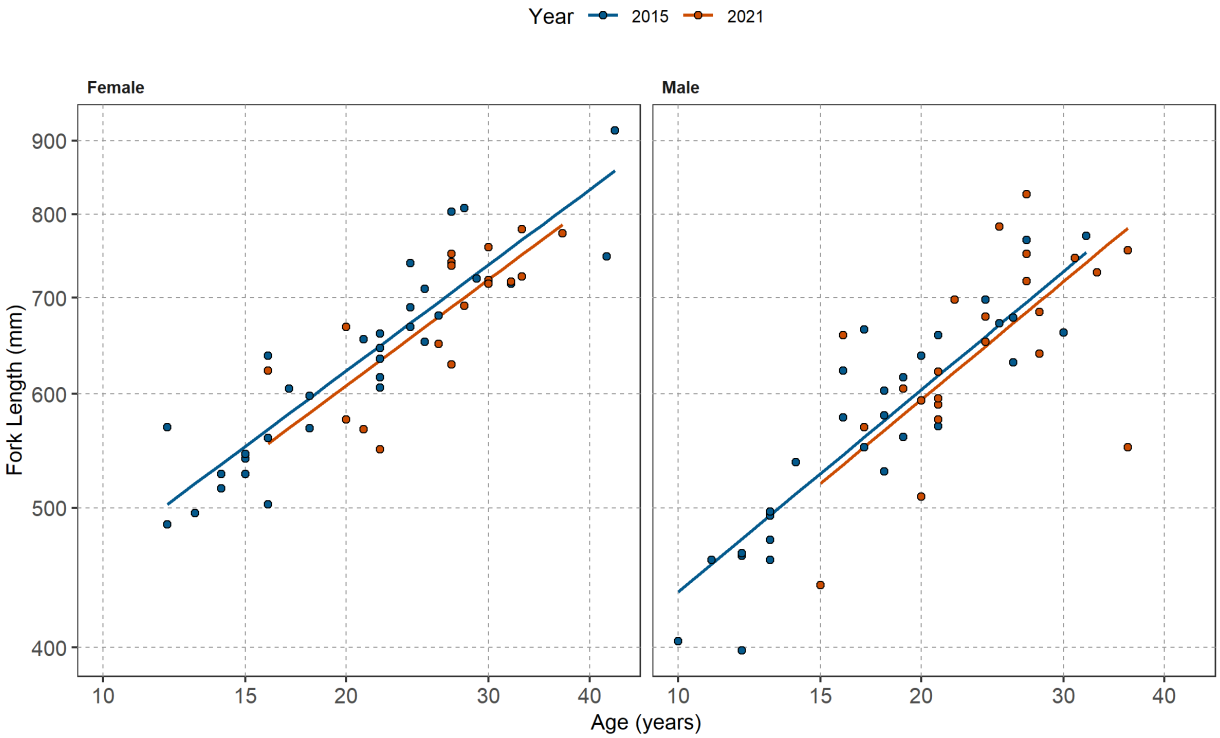


Figure 11-8. Lake Trout fork weight versus age, by sex and year.

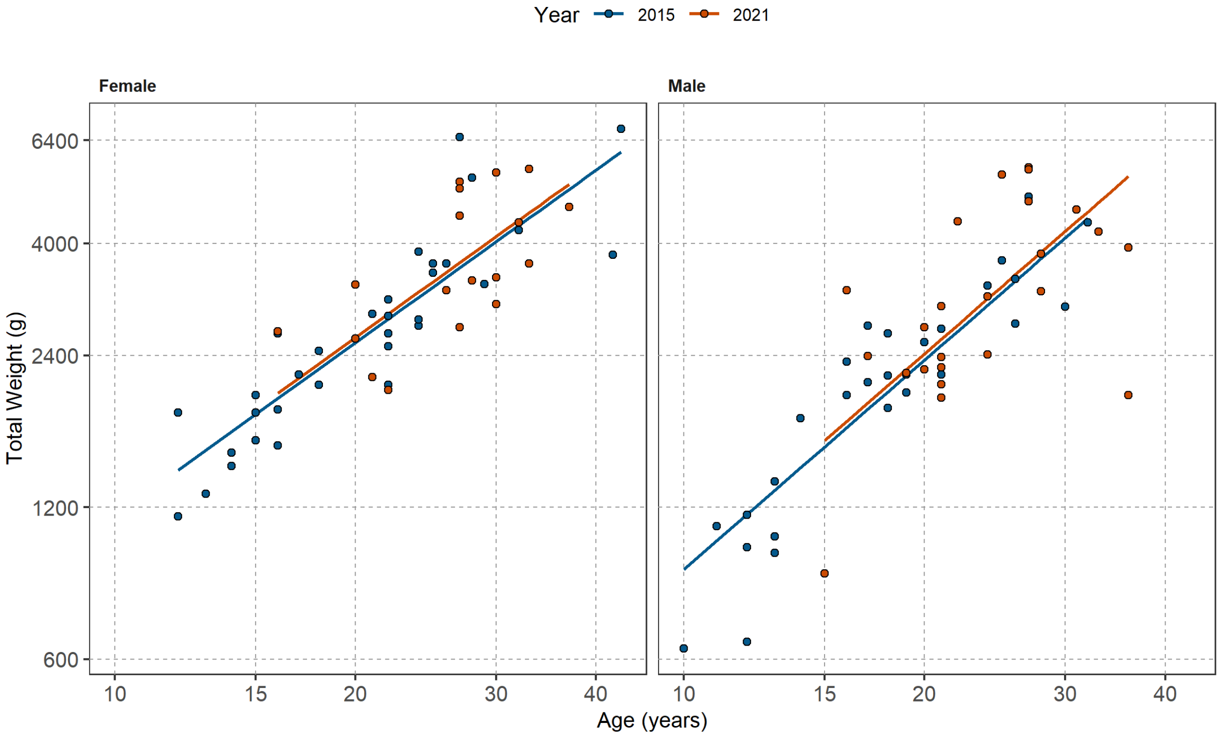
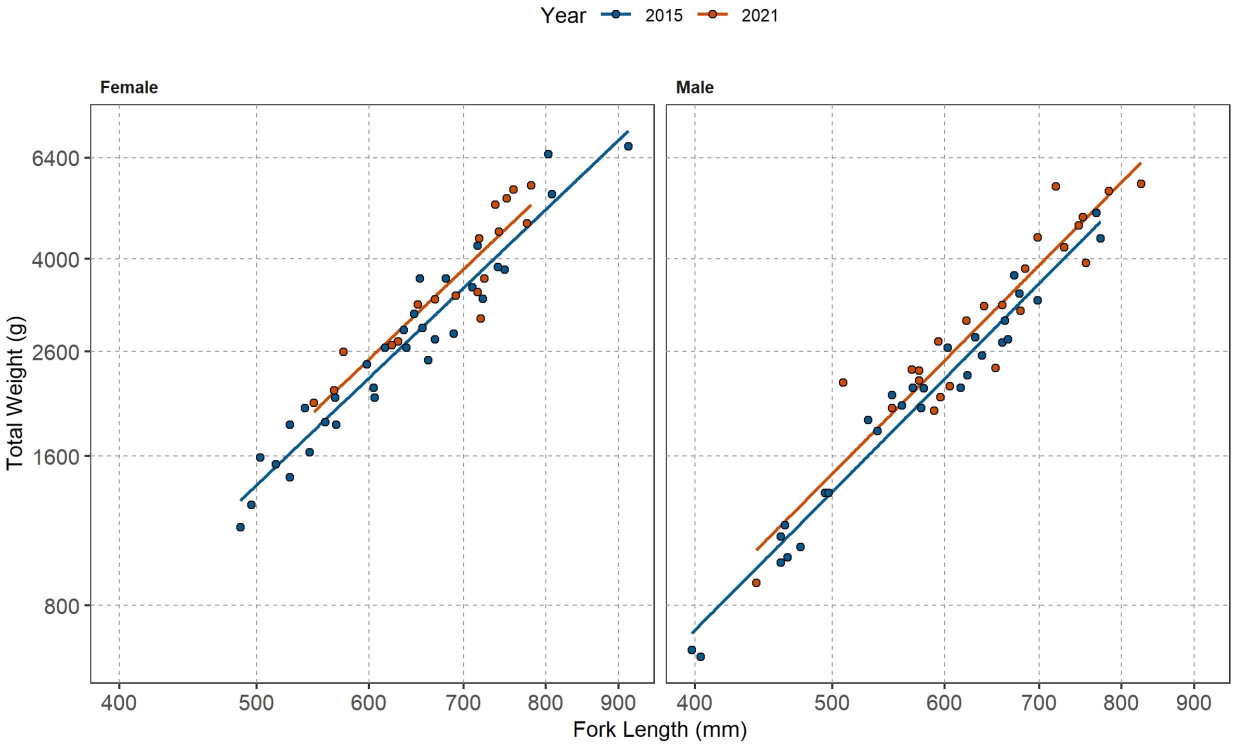


Figure 11-9. Plot of total weight versus fork length (log scales) for female and male Lake Trout in 2015 and 2021.



Relative Liver Size

Relative liver size is compared between years by assessing differences in liver weight versus fork length (**Figure 11-10**) and differences in liver weight versus total weight (**Figure 11-11**) using ANCOVAs. None of the interaction terms of the full models were significant, so the parallel-slope reduced models were used. ANCOVA results for show there is a significant difference in liver weight versus fork length between years for females (p = 0.0029) and males (p <0.0001) (**Table 11-9**, **Figure 11-10**). Liver weight at a given fork length in 2021 increased by 49.0% compared to 2015 for females, and increased by 69.2 % compared to 2015 for males. Similar results are observed for liver weight versus total weight. There is a significant difference in the liver weight versus total weight between years for females (p = 0.0121) and males (p <0.0001) (**Table 11-9**, **Figure 11-11**). Liver weight at a given total weight in 2021 was 30.6% greater than in 2015 for females, and 55.7% greater than in 2015 for males. Increases in relative liver size are greater than the critical effect size of 25%.

Figure 11-10. Plot of liver weight versus fork length (log scales) for male and female Lake Trout in 2015 and 2021.

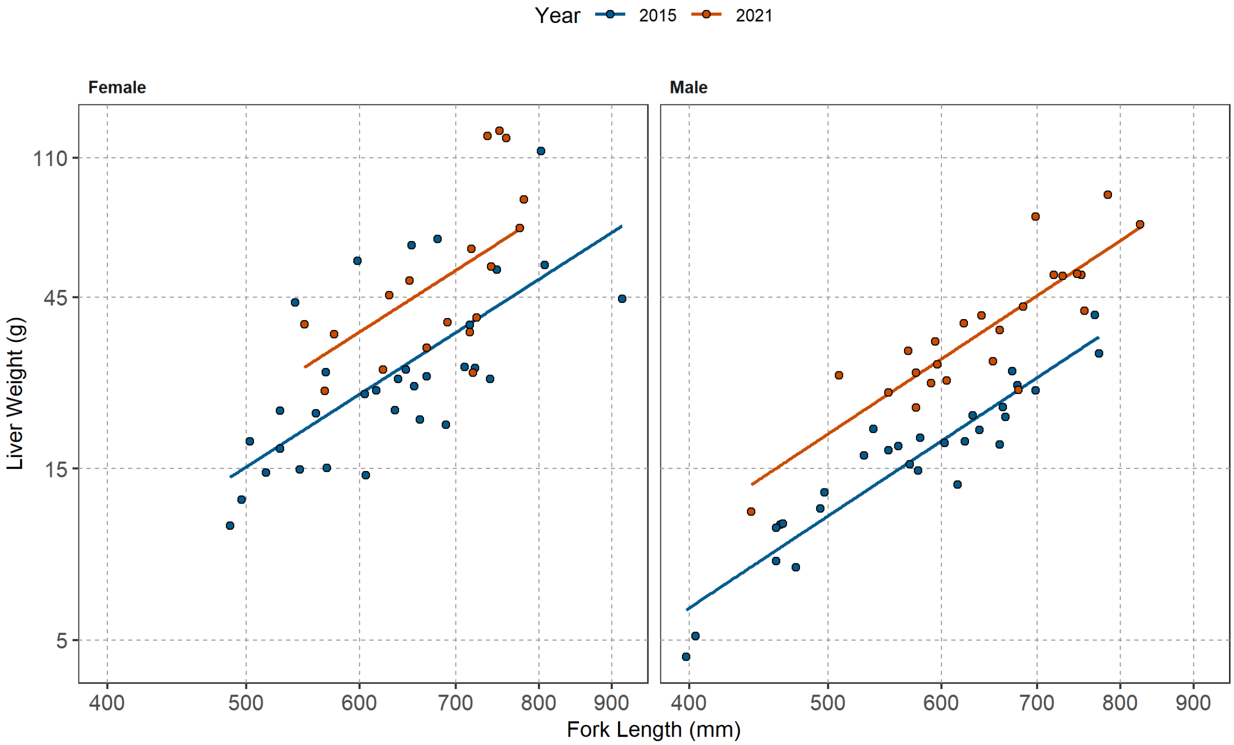
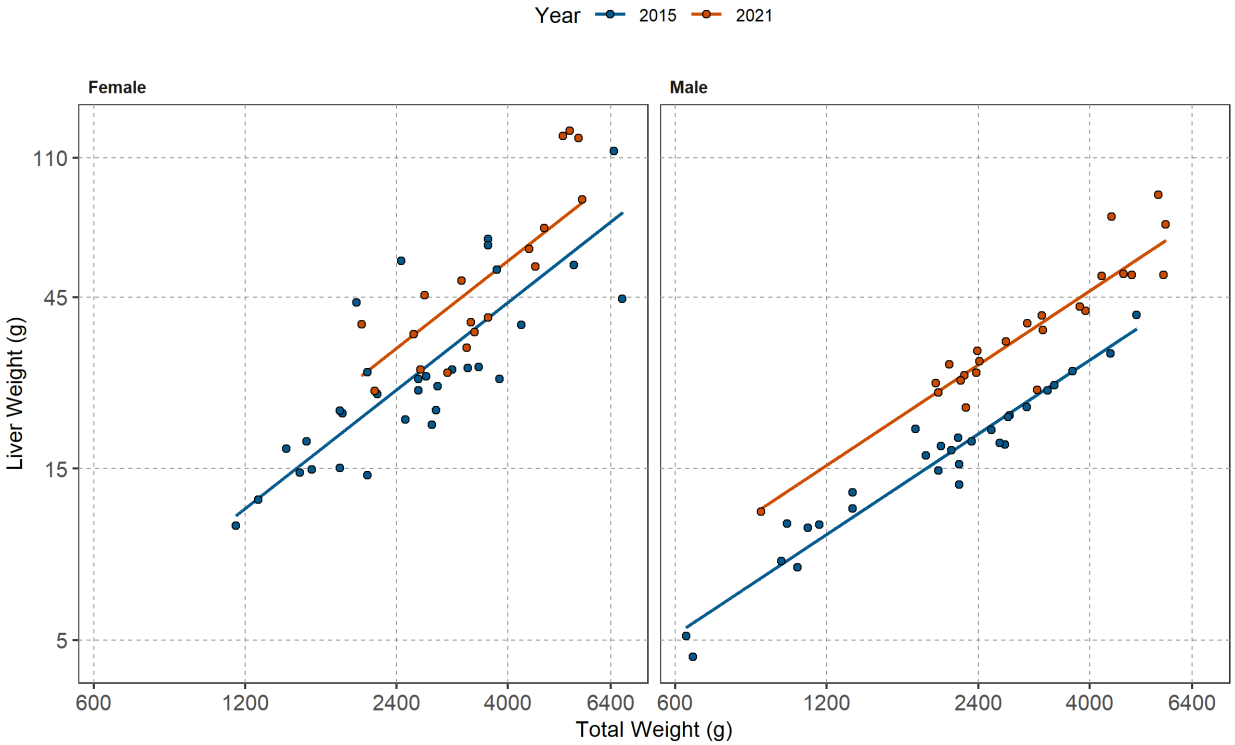


Figure 11-11. Plot of liver weight versus total weight (log scales) for male and female Lake Trout in 2015 and 2021.



11.5.7 Reproduction

Relative gonad size

Plots of gonad weight versus total weight and gonad weight versus fork length for mature fish spawning in the current year are presented in **Figure 11-12** for females and in **Figure 11-13** for males. The numbers of mature females that were developing gonads in preparation to spawn in the year of capture were too low for meaningful comparisons of gonad weights between years. However, there were enough males captured in 2015 and 2021 that were developing gonads and would likely spawn. ANCOVA results show there is a significant difference in gonad weight versus fork length between years for these males (p = 0.0206, outlier data point from 2015 removed) (**Table 11-9**, **Figure 11-13**). In 2021, male gonad weight at a given fork length was 33.1% greater than in 2015. Comparisons of male gonad weight versus total weight are less definitive, however. With all data included, there is a significant difference in gonad weight versus total weight between years (p = 0.033), as male gonads in 2021 were 41% heavier at a given body weight than in 2015. However, after removing an outlier from 2015, there is no significant difference in gonad weight versus total weight between years (p = 0.146).

Figure 11-12. Plot of gonad weight versus total weight and gonad weight versus total length (log scales) for female Lake Trout.

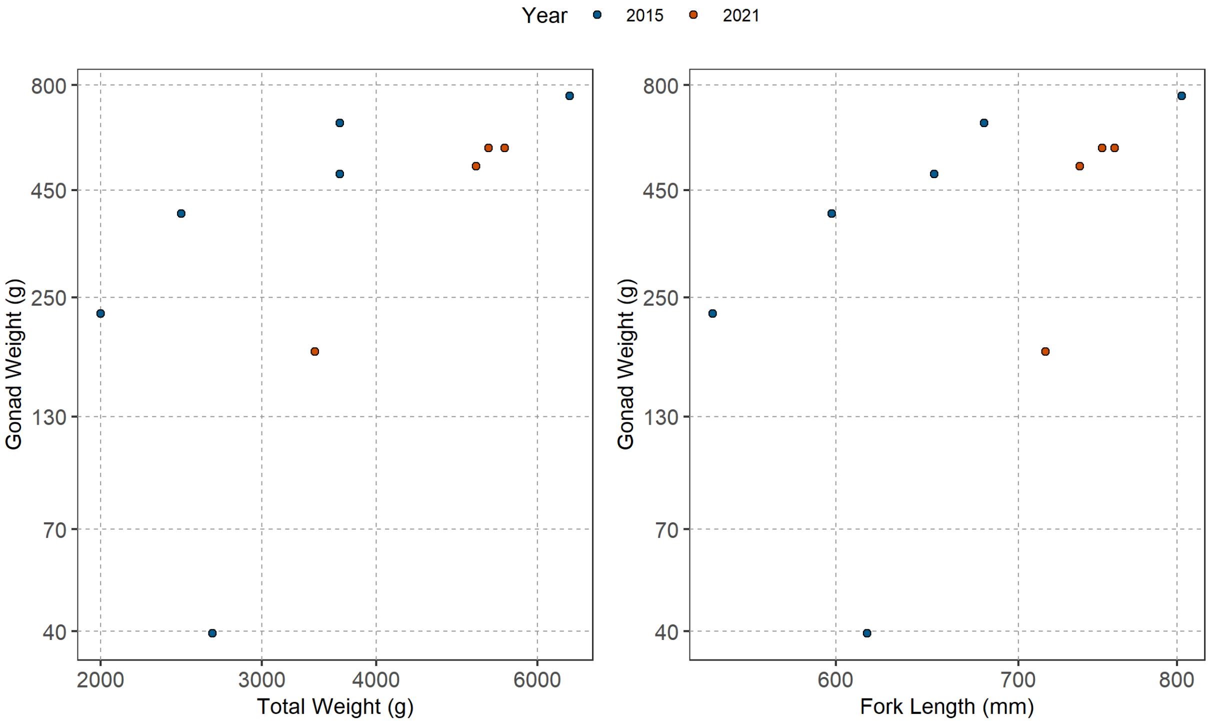


Figure 11-13. Plot of gonad weight versus total weight and gonad weight versus fork length (log scales) for male Lake Trout.

Notes: An outlier, circled in red, was removed prior to completing the ANCOVA.

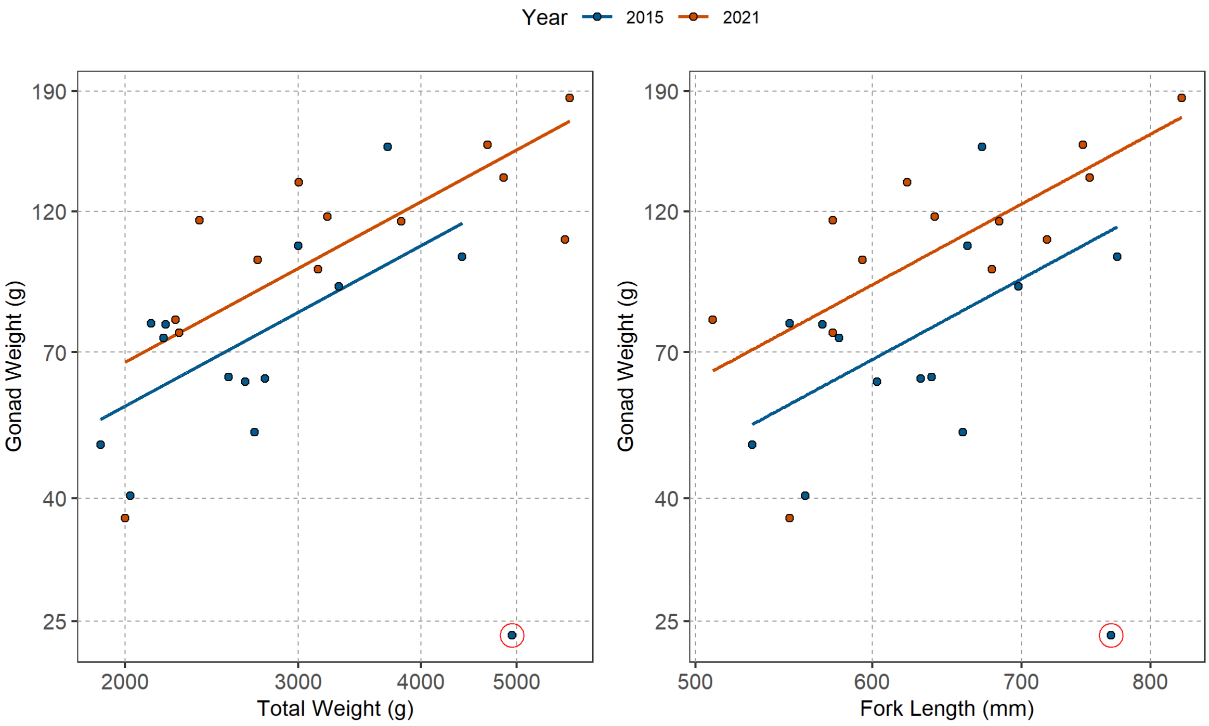


Table 11-9. Summary of Lake Trout between year comparisons using ANCOVA.

Variable (log_{10} transformed)		Sex	ANCOVA Procedure	Data Excluded	Error MS	p-value		Adjusted R^2	LS Mean		% Difference
Dependent	**Independent**					**Interaction**	**Year**		**2015**	**2021**	
Total Weight	Fork Length	Female	Full	None	0.0027	0.7731	-	0.9207	-	-	-
			Reduced	None	0.0027	-	**0.0215**	0.9222	2832	3089	9.1
		Male	Full	None	0.0030	0.4461	-	0.9444	-	-	-
			Reduced	None	0.0030	-	**0.0267**	0.9448	2291	2492	8.8
Liver Weight	Fork Length	Female	Full	None	0.0326	0.4954	-	0.5454	-	-	-
			Reduced	None	0.0322	-	**0.0029**	0.5505	29.43	43.85	49.0
		Male	Full	None	0.0075	0.8726	-	0.9022	-	-	-
			Reduced	None	0.0073	-	**<0.0001**	0.9041	17.91	30.30	69.2
Liver Weight	Total Weight	Female	Full	None	0.0192	0.1264	-	0.7325	-	-	-
			Reduced	None	0.0198	-	**0.0121**	0.7244	30.86	40.30	30.6
		Male	Full	None	0.0038	0.4434	-	0.9497	-	-	-
			Reduced	None	0.0038	-	**<0.0001**	0.9502	18.59	28.96	55.7
Fork Length	Age	Female	Full	None	0.0009	0.6663	-	0.7747	-	-	-
			Reduced	None	0.0009	-	0.2900	0.7786	653	638	-2.3
		Male	Full	None	0.0018	0.1970	-	0.6861	-	-	-
				LT23	0.0014	0.9086	-	0.7636	-	-	-
			Reduced	None	0.0018	-	0.6100	0.6817	604	595	-1.6
				LT23	0.0014	-	0.6673	0.7684	604	597	-1.1
Total Weight	Age	Female	Full	None	0.0094	0.4026	-	0.7250	-	-	-
			Reduced	None	0.0094	-	0.7396	0.7267	2897	2967	2.4
		Male	Full	None	0.0163	0.1179	-	0.6976	-	-	-
			Reduced	None	0.0168	-	0.7546	0.6883	2349	2418	3.0
Gonad Weight	Fork Length	Male	Full	Resting fish	0.0295	0.1528	-	0.3156	-	-	-
				Resting fish, LT1354	0.0166	0.8683	-	0.4901	-	-	-
			Reduced	Resting fish	0.0310	-	**0.0144**	0.2818	68.4	103.4	51.2
				Resting fish, LT1354	0.0159	-	**0.0206**	0.5116	75.9	101.1	33.1
Gonad Weight	Total Weight	Male	Full	Resting fish	0.0293	0.1515	-	0.3220	-	-	-
				Resting fish, LT1354	0.0139	0.6096	-	0.5708	-	-	-
			Reduced	Resting fish	0.0307	-	**0.0392**	0.2880	70.4	100.2	42.2
				Resting fish, LT1354	0.0135	-	0.1463	0.5844	75.9	101.1	33.1

Notes:
P-values ≤0.10 are in **bold**.

11.6 Conclusions and Recommendations

A summary of between-year comparisons for Lake Trout is presented in **Table 11-10**. Analyses were conducted separately for male and female Lake Trout, and in general, the comparisons yielded similar results for both sexes. Key results are summarized below for each health endpoint

Survival

The average age of fish captured in 2021 were significantly older than fish captured in 2015. The average age of females was 29% more, while the average age of males was 34% more, both of which are higher than the critical effect size of 25%. However, these comparisons should be made with caution, however, because the gear used in 2021 would be expected to capture fewer small fish compared to the gear used in 2015.

Size & Growth (Energy Use)

Fish of both sexes caught in 2021 were longer and heavier than the 2015 fish. Comparisons of size-at-age (i.e., length-at-age, weight-at-age), however, showed no significant differences for either males or females between years. This suggests that while older, larger, and heavier Lake Trout were captured in 2021 compared to 2015, the rate of growth is not significantly different between sample years.

Condition & Reproduction (Energy Storage)

Increases in endpoints assessing energy storage, including condition, relative liver size, and relative gonad size (males only) were observed for both female and male Lake Trout. In 2021, female Lake Trout were, on average, 9.1% heavier at a given length than in 2015, while male Lake Trout were an average of 8.8% heavier at a given length. The differences in condition are less than the critical effect size of 10%. Relative liver size of female Lake Trout in 2021 was an average of 30.6% heavier at a given length, and 49.0% heavier at a given weight, compared to 2015. Similarly, male Lake Trout livers in 2021 were an average of 55.7% heavier at a given length, and 69.2% heavier at a given weight, compared to 2015. All relative liver weight differences were greater than the critical effect size of 25%.

The gonad weight of mature males expected to spawn in the current year was higher in 2021 (compared to 2015) by an average 33.1% at a given fork length, however no significant difference in gonad weight was observed between years at a given total weight.

The higher condition, relative liver size, and relative gonad size (males only) in Lake Trout captured in 2021 compared to 2015 indicate greater energy storage, and suggests greater availability, and/or quality of food for Lake Trout in Meliadine Lake. Comparing these results to other regional lakes, will help determine if the temporal increases in energy storage are unique to Meliadine Lake. The Cycle 2 EEM

(Azimuth, in prep) included fish sampling at two regional reference lakes in 2021 and this analysis will provide a spatial comparison of Lake Trout monitoring endpoints within the operational period.

Recommendations

Preliminary analysis of the Lake Trout results for the EEM suggests Lake Trout data from regional reference lakes is valuable for understanding changes in the Lake Trout health endpoints both temporally and spatially. In turn, this will lead to improved understanding of whether differences in Lake Trout monitoring endpoints are a result of Project effluent, or indicative of natural changes affecting lakes throughout the region. Changes to the AEMP study design may be recommended depending on the findings of the Cycle 2 EEM report (Azimuth, in prep).

Table 11-10. Summary of between-site comparisons calculated with ANOVA and reduced ANCOVA models, with no outliers removed (except for male relative gonad size).

Sex	Effect Indicator	Endpoint	Dependent Variable	Covariate	Statistical Procedure	p-value	% Difference in 2021	Critical Effect Size (%)
Female	Survival	Age	-	-	t-test	**0.0049**	**29.4**	25
	Size	Fork Length	-	-	t-test	**0.0485**	8.8	-
		Total Weight	-	-	t-test	**0.0103**	37.2	-
	Growth (Energy Use)	Size-at-age	Total Weight	Age	ANCOVA	0.7396	2.4	25
			Fork Length	Age	ANCOVA	0.2900	-2.3	25
	Condition (Energy Storage)	Condition	Total Weight	Fork Length	ANCOVA	**0.0215**	**9.1**	10
		Relative Liver Size	Liver Weight	Total Weight	ANCOVA	**0.0121**	**30.6**	25
			Liver Weight	Fork Length	ANCOVA	**0.0029**	**49.0**	25
Male	Survival	Age	-	-	t-test	**0.0004**	**34.5**	25
	Size	Fork Length	-	-	t-test	**0.0097**	13.0	-
		Total Weight	-	-	t-test	**0.0022**	54.8	-
	Growth (Energy Use)	Size-at-age	Total Weight	Age	ANCOVA	0.7546	3.0	25
			Fork Length	Age	ANCOVA	0.6100	-1.6	25
	Condition (Energy Storage)	Condition	Total Weight	Fork Length	ANCOVA	**0.0267**	**8.8**	10
		Relative Liver Size	Liver Weight	Total Weight	ANCOVA	**<0.0001**	**55.7**	25
			Liver Weight	Fork Length	ANCOVA	**<0.0001**	**69.2**	25
	Reproduction (Energy Storage)	Relative Gonad Size	Gonad Weight	Total Weight	ANCOVA	0.1463	18.1	25
			Gonad Weight	Fork Length	ANCOVA	**0.0206**	**33.1**	25

Notes:
Critical effect sizes (CES) are from ECCC (2012).
P-values and pairwise % differences ≤0.10 are **bolded**.
Blue shading indicates differences greater than the critical effect size.

11.7 References

Agnico Eagle (Agnico Eagle mines Ltd.). 2014. Meliadine Gold Project, Nunavut. Final Environmental Impact Statement. Submitted to the Nunavut Impact Review Board. April 2014.

Azimuth and Portt. 2021. Environmental Effects Monitoring Cycle 2 Study Design – Meliadine Gold Project. Report prepared by Azimuth Consulting Group and C. Portt & Associates. July 5, 2021.

Barrett, T.J., Tingley, M.A., Munkittrick, K.R., and Lowell, R.B. 2010. Dealing with heterogeneous regression slopes in analysis of covariance: new methodology applied to environmental effects monitoring fish survey data. Environ Monit Assess 166(1–4): 279–291. doi:10.1007/s10661-009-1001-y.

Environment Canada. 2012. Metal Mining Technical Guidance for Environmental Effects Monitoring.

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Golder. 2016b. 2015 Meliadine Fish Health Summary Report. February 1, 2016.

Golder 2012. Aquatics Baseline Synthesis Report, 1994 to 2009 – Meliadine Gold Project, Nunavut. Appendix SD7-1 of the Final Environmental Impact Statement.

12 LAKE TROUT CHEMISTRY

12.1 Introduction

Lake Trout tissue chemistry is completed every three years to verify that the mine is not contributing to changes in tissue chemistry that would affect the useability of the fishery for traditional and recreational purposes. The study is conducted in parallel with the Lake Trout health assessment and involves analysis of metals in muscle, liver, and kidney. Data from the muscle samples (i.e., fillets) are used primarily to support decisions regarding changes to the useability of the fishery. Liver and kidney samples are used to help support findings from the Lake Trout health assessment if adverse effects to survival, energy use, and/or energy storage are identified that are consistent with toxicological impairment.

The Lake Trout tissue chemistry program is a *before-after* study, meaning it is designed to determine if metals concentrations are higher in the operations phase compared to the baseline phase. Baseline tissue chemistry data were collected from Meliadine Lake in 1997/1998 and 2015 to establish natural background levels prior to development of the mine. External reference area lakes were not included in the AEMP Design Plan mainly because of logistical challenges with safely accessing suitable reference lakes in the region. Without data from external reference areas, it is difficult to determine if potential changes in chemistry (or health endpoints) are related to mining activities or natural variability. As mentioned in the introduction to the Threespine Stickleback chemistry section, the mine is not expected to have cause changes in tissue chemistry relative to the spatial and temporal scale of climate-related changes.

12.2 Objectives and Key Question

The Lake Trout tissue chemistry focuses on answering this key question: *are activities at the mine contributing to changes in tissue chemistry relative to baseline and affecting the useability of the fishery by people?* Specific objectives, as stated in the AEMP Design Plan are:

- Determine whether mine effluent has an effect on metal concentrations in fish tissue in Meliadine Lake, including whether fish tissue chemistry has been altered in such a way as to limit fish use by humans,
- Verify predictions made in the FEIS pertaining to fish tissue metal concentrations,
- Meet the requirements of the MDMER,
- Aid in the interpretation of the fish health study,
- Recommend appropriate changes to the fish tissue chemistry program for future years, and

- Provide data to inform adaptive management intended to reduce or eliminate mine-related effects to fish tissue chemistry in Meliadine Lake.

12.3 Findings from the 2021 Lake Trout Tissue Chemistry Program

- Most of the metals measured in Lake Trout muscle, liver, and kidney in 2021 were similar to concentrations measured during the baseline period (1997/98 and/or 2015).
- Sodium concentrations were slightly higher in muscle samples and significantly higher in liver, and kidney tissue in 2021 compared to baseline. Higher concentrations of sodium in liver and kidney were not associated with adverse effects to Lake Trout health.
- Mercury concentrations in Lake Trout muscle (i.e., fillets) increased during the baseline period from 1997/98 to 2015, but no increase in concentration was detected between 2015 and 2021. Mercury is not a contaminant of concern related to mining activities, and the change over time is reflective of the natural changes that are evident in other northern latitude lakes. Mercury concentrations were the highest in large, old Lake Trout because of the propensity for mercury to biomagnify in aquatic food webs.
- The next Lake Trout tissue chemistry program is scheduled for 2024. Analysis of muscle tissue is recommended, but liver and kidney tissue should be archived unless effects to Lake Trout health are observed that suggest elevated exposure to metals is the likely/plausible cause.

12.4 Methods

12.4.1 Sample Collection, Processing, and Analysis

Muscle, liver, and kidney samples were collected from 42 Lake Trout captured during the fish health survey (field collection methods are outlined in **Section 11.4.1**). Specimens were selected for tissue chemistry to cover a wide range of size classes. Tissues samples were shipped frozen to ALS Environmental (Burnaby, BC) for analysis of moisture content and metals, including mercury. Data are reported on a wet-weight basis.

12.4.2 Data Analysis

The 2021 fish tissue chemistry results were compared against chemistry data from baseline studies in 2015 (Golder, 2016b) and 1997/1998 (RL&L 1998, 1999). Lake Trout tissue samples from the 2015 study were reported in wet weight concentrations along with percent moisture content. The 1997/1998 data were reported in dry weight concentrations. Moisture content was not reported for the 1997/1998 data; we assumed 78% moisture to convert concentrations from dry weight to wet weight.

Differences between years followed the same approach outlined in **Section 10.4.2** for Threespine Stickleback (ANOVA and Tukey's *post-hoc* pairwise comparisons). Lake Trout have longer lifespans than small-bodied fish species like Threespine Stickleback, and progressively accumulate bioaccumulative metals such as mercury and selenium in their tissue over time. This can lead to size-related differences in tissue concentrations, which can lead to biased results if the underlying size-metal relationships are not considered. ANCOVA explicitly considers the influence of size-related covariates (i.e., length) when testing for differences in tissue metals concentrations between or among years. ANCOVA analysis was conducted with length as the covariate according to approach outlined in the Lake Trout health assessment (**Section 11.4.3**). Cesium and thallium were identified as potentially bioaccumulative substances in the AEMP Design Plan, although neither of these parameters are site-related contaminants of concern.

ANOVAs or ANCOVAs (bioaccumulative metals only) were conducted for each tissue-metal combination where more than 50% of the samples in the 2021 dataset were measured above the laboratory DL. Analyses were conducted across all three events (1997/98, 2015, and 2021), but only metals that showed significant increase ($P \leq 0.1$) between 2021 and 2015 were discussed. This decision was made because: (a) this period includes the transition from baseline to operations and associated effluent discharge and (b) there was higher confidence in the comparability of these data sets given they were both analyzed by ALS using similar analytical methods and DLs. The data from 1997/98 data were included in the discussion to provide context for the parameters that did show increases between 2015 and 2021.

12.5 Quality Assurance and Quality Control

Lake Trout tissue chemistry QA/QC followed methods outlined in the AEMP Design Plan. Laboratory QC results are summarized in **Table 12-1**.

The results of these internal QA/QC processes were reported with the laboratory data. A few parameters were flagged in the laboratory duplicates because they exceeded their respective data quality objectives based on RPD limits. The DQO exceedances for the laboratory duplicate samples were attributed to heterogeneity in the sample. ALS concluded the results did not impact the quality of the tissue chemistry data.

Table 12-1 Laboratory QC summary for 2021 Lake Trout tissue samples.

Lab ID	# of Samples	Tissue Type	Date sampled	Laboratory QC Summary								
				Detection Limits	Laboratory Duplicates [a]		Method Blanks		Matrix Spike		LCS / CRM	
				Parameters	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier
VA21B9009	42	Liver	14-Aug-21	No flags	Calcium Chromium Lead Strontium	Sample Heterogeneity	No flags	-	No flags	-	No flags	-
VA21B9011	42	Muscle	14-Aug-21	No flags	Calcium Chromium Strontium	Sample Heterogeneity	No flags	-	No flags	-	No flags	-
VA21B9012	42	Kidney	14-Aug-21	No flags	No flags	-	No flags	-	No flags	-	No flags	-

Notes:

[a] Laboratory Duplicates RPDs are set by the lab (generally 20 +/- for moisture and 40-60 +/- for metals including mercury).

LCS / CRM = laboratory control sample / certified reference material.

12.6 Results and Discussion

Descriptive statistics are provided in **Appendix I-1**. In total, 136 fish have been analyzed from Meliadine Lake in the three studies: 34 in 1997/1998, 60 in 2015, and 42 in 2021. Tissue concentrations for most parameters were similar in 2021 compared to 2015. Sodium (muscle, liver, and kidney), molybdenum (kidney), and strontium (liver) were the only parameters that increased in 2021 compared to 2015 (**Table 12-2**). Results are discussed for mercury given its potential to biomagnify in large Lake Trout (ANCOVA; **Table 12-3**), but as mentioned in the introduction, mercury is not a contaminant of concern associated with mining activities at Meliadine. Selenium, cesium, and thallium are potentially bioaccumulative, but none of these parameters showed temporal increases in 2021 consistent with mining-related changes (see ANCOVA results and plots in **Appendix I-3**).

Sodium

Sodium was higher in kidney, liver, and muscle in 2021 compared to 2015. The largest changes were observed in liver (38%; $P<0.001$) and muscle (30%; $P<0.001$). The magnitude of the increase in sodium in kidney was less pronounced at 9% ($P=0.0014$). Compared to the baseline data from 1997/98, sodium concentrations in kidney and liver tissue were 20% and 16% higher, respectively in 2021 (**Figure 12-1** and **Figure 12-2**). Muscle, however, was only 5% higher in 2021 compared to 1997/98 and the results were not significant (**Table 12-2**; **Figure 12-3**).

It is unclear if the observed increase in sodium in kidney and liver is a physiological response to higher concentrations in surface water or if the 15-20% increase in 2021 compared to 1997/98 represents the range of natural variability. Fish can adapt their osmoregulatory and ion transport strategies depending on their surrounding environment (Vargas-Chacoff et al., 2015) without showing adverse effects. Furthermore, moderate increases in salinity have been linked to less energy expended on osmoregulation, which is one factor that can contribute to optimal growth (Bœuf and Payan, 2001). Irrespective of whether Lake Trout are more exposed to sodium, higher concentrations in liver and kidney are not manifesting as adverse effects to Lake Trout health based on results of the health assessment.

Molybdenum

Molybdenum was elevated in kidney tissue in 2021 compared to 2015 ($P<0.001$), but concentrations were nearly identical (-1% change) compared to results from 1997/98 (**Table 12-2**; **Figure 12-4**). Liver molybdenum concentrations were lower in 2021 compared to 2015, and concentrations in edible muscle (fillets) were below detection (0.004 mg/kg ww) in all 42 samples. There is some degree of interannual variability in molybdenum, particularly for liver and kidney, that points to natural variability. Blood/plasma is a major source of the internal molybdenum concentration in fish, and liver and kidney have a higher proportion of blood/plasma compared to muscle, and therefore comparatively higher concentrations of molybdenum (Munger et al., 1991). Overall, the results from 2021 are consistent with other studies that have demonstrated molybdenum bioaccumulation in aquatic food webs is negligible. At background concentrations in water, molybdenum concentrations in muscle tissue are typically low, defined as 0.22 mg/kg ww (1 mg/kg dw; Regoli et al., 2012).

Strontium

Strontium concentrations in liver samples from 2021 were 28% higher compared to 2015, but when compared to results from 1997/98, concentrations were 16% lower in 2021 (**Table 12-2**; **Figure 12-5**). These results highlight the range of natural variability for strontium in these tissue types. Strontium and calcium share similar chemical properties, and nearly all the strontium accumulated by animals, including fish, is incorporated into bone (Amata et al., 2004).

Mercury

Size-mercury relationships are shown in **Figure 12-6**. There are strong, positive length-mercury relationships for all three tissue types, indicating that longer (and hence bigger and older) fish have higher tissue mercury concentrations compared to smaller Lake Trout. For muscle tissue, ANCOVA analysis showed that mercury concentrations rose significantly between the baseline years 1997/1998 and 2015, but from 2015 to 2021, the concentration remained unchanged (0.2 % increase; **Table 12-3**). The temporal change between 1997/98 and 2021 reflects changes in mercury evident in high latitude lakes in the Arctic (Obrist et al., 2018).

12.7 Conclusions and Recommendations

Most of the metals measured in Lake Trout muscle, liver, and kidney in 2021 were similar to concentrations measured during the baseline period. Sodium was the exception, with minor temporal increases observed in liver and kidney from 1997/98 to 2021. The timing of the change coincides with effluent discharge, and sodium concentrations have increased in the east basin since 2018. However, without external reference area tissue chemistry data, it is unclear to what extent natural variability may have influenced the 15-20% increase in sodium since 1997/98. What is clear is that Lake Trout health is not adversely affected by the minor increase. Overall, there is no evidence that effluent discharge is causing a change in tissue chemistry that would negatively impact the useability of the fishery by people in the community.

Recommendations

The next Lake Trout tissue chemistry sampling program is scheduled for 2024, coinciding with the Lake Trout health assessment. For subsequent programs, we recommend analyzing muscle and archiving liver and kidney tissue samples. Analysis of the liver and kidney samples may be undertaken if the Lake Trout health assessment identifies effect to fish that are consistent with toxicological impairment.

Table 12-2 ANOVA results for differences in the concentration of sodium, molybdenum, and strontium in Lake Trout tissue between 2021 and the baseline period (1997/98 and 2015).

Parameter	Tissue	Detection Limit (2021)	ANOVA Model p-value	Mean Concentration (mg/kg ww)			Pairwise Comparisons			
				2021	2015	1997/98[a]	2021 v 2015		2021 v 1997/98	
				n=42	n=60	n= 34 (L&M) n=33 (K)	p-value	% Change	p-value	% Change
Sodium	Kidney	4	<0.001	2160	1990	1800	**0.0014**	9%	**<0.001**	20%
	Liver	4	<0.001	1710	1240	1480	**<0.001**	38%	**0.003**	16%
	Muscle	4	<0.001	357	274	341	**<0.001**	30%	0.556	5%
Molybdenum	Kidney	0.004	<0.001	0.0753	0.0534	0.0763	**<0.001**	41%	0.986	-1%
	Liver	0.004	<0.001	0.134	0.179	0.0786	**<0.001**	-25%	**<0.001**	70%
	Muscle	0.004	NC	*<0.004*	0.00465	0.00278	NC	-14%	NC	44%
Strontium	Kidney	0.01	0.058	0.411	0.34	0.347	0.186	21%	0.358	18%
	Liver	0.01	0.026	0.102	0.0795	0.121	**0.050**	28%	0.185	-16%
	Muscle	0.01	0.228	0.0631	0.145	0.102	0.278	-56%	0.803	-38%

Notes:

P-values ≤0.10 are **bolded**.

NC = Differences between years were not assessed for molybdenum in muscle because 100% of the samples were less than detection in 2021.

[a] Samples sizes are 34 for liver (L) and muscle (M) and 33 for kidney (K).

Table 12-3 ANCOVA results for differences in the concentration of mercury and selenium in Lake Trout tissue between 2021 and the baseline period (1997/98 and 2015).

Parameter	Tissue	Covariate	ANCOVA Procedure	p-value		Adjusted R[b]	Least Squares Mean (mg/kg ww)			% Change Compared to 2021	
				Interaction	Year		97/98	2015	2021	2015	97/98
Mercury	Kidney	Fork Length	Full	0.095	-	0.769	-	-	-	-	-
		Fork Length	Reduced	-	**<0.001**	0.764	0.623	0.948	1.11	17.7%	79%
	Liver	Fork Length	Full	0.502	-	0.697	-	-	-	-	-
		Fork Length	Reduced	-	**<0.001**	0.699	0.399	0.821	0.938	14.2%	135%
	Muscle[a]	Fork Length	Full	0.348	-	0.711	-	-	-	-	-
		Fork Length	Reduced	-	**<0.001**	0.711	0.330	0.578	0.579	0.2%	76%
Selenium	Kidney	Fork Length	Full	0.442	-	0.432	-	-	-	-	-
		Fork Length	Reduced	-	0.601	0.435	NA	2.33	2.40	3.0%	NA
	Liver[2]	Fork Length	Full	0.065	-	0.309	-	-	-	-	-
		Fork Length	Reduced	-	**<0.001**	0.291	NA	3.192	1.98	-38.0%	NA
	Muscle	Fork Length	Full	0.027	-	0.095	-	-	-	-	-
		Fork Length	Reduced	-	**<0.001**	0.058	NA	0.472	0.426	-9.7%	NA

Notes:

Least squares mean computed from the linear model.

P-values ≤0.10 are **bolded**.

The reduced model without (covariate x year) was used to determined differences across years. Refer to **Section 11.4.3** for information on full vs reduced model selection.

[a] One outlier was removed from the 2015 dataset: ML15UNFLKTR1131.

[b] One outlier was removed from the 2015 dataset: ML15UNFLKTR1248.

Figure 12-1. Sodium concentrations (mg/kg ww) in Lake Trout kidney tissue collected from Meliadine Lake in 1997/98, 2015, and 2021.

Notes: Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (P≤0.1).

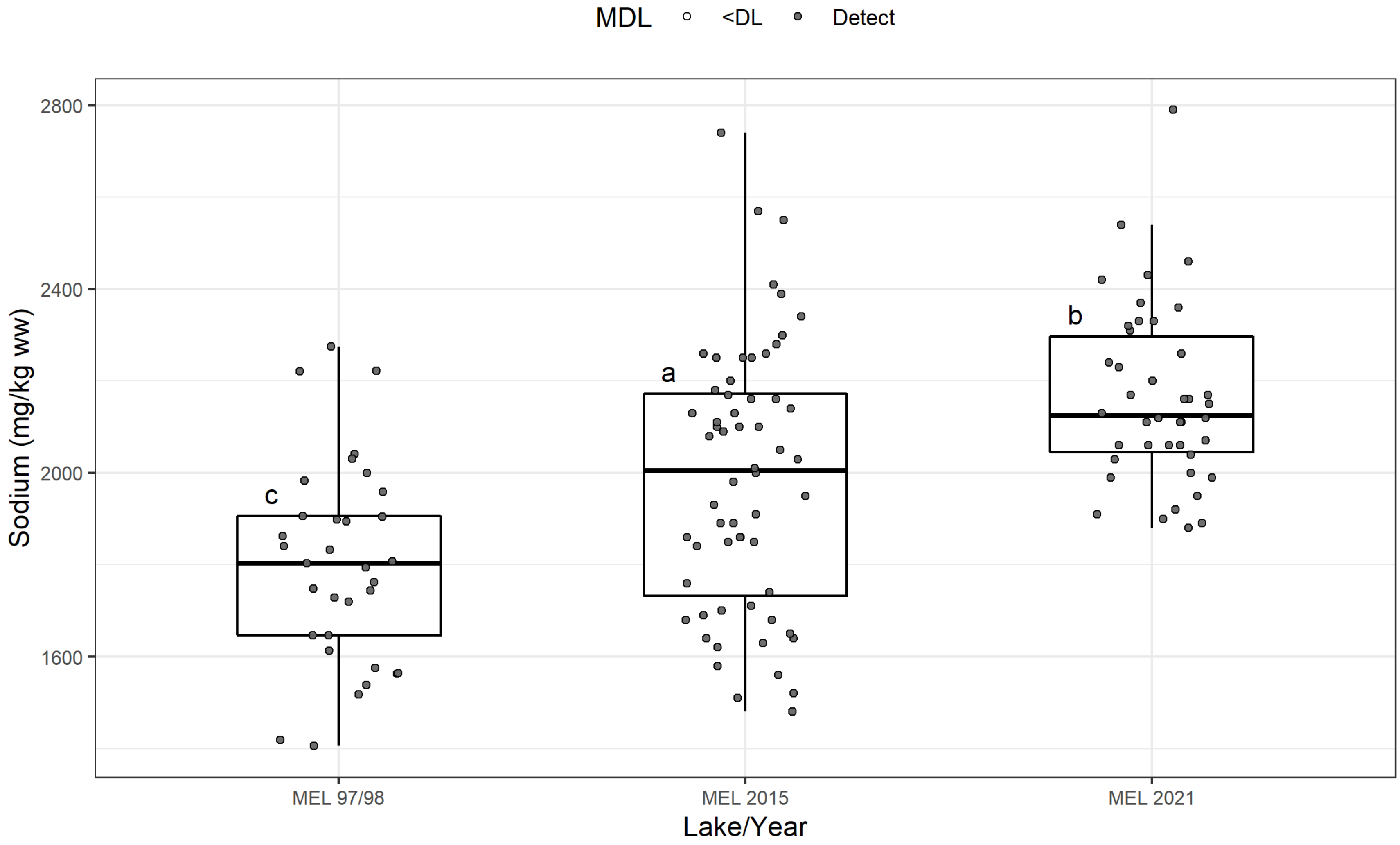


Figure 12-2. Sodium concentrations (mg/kg ww) in Lake Trout liver tissue collected from Meliadine Lake in 1997/98, 2015, and 2021.

Notes: Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (P≤0.1).

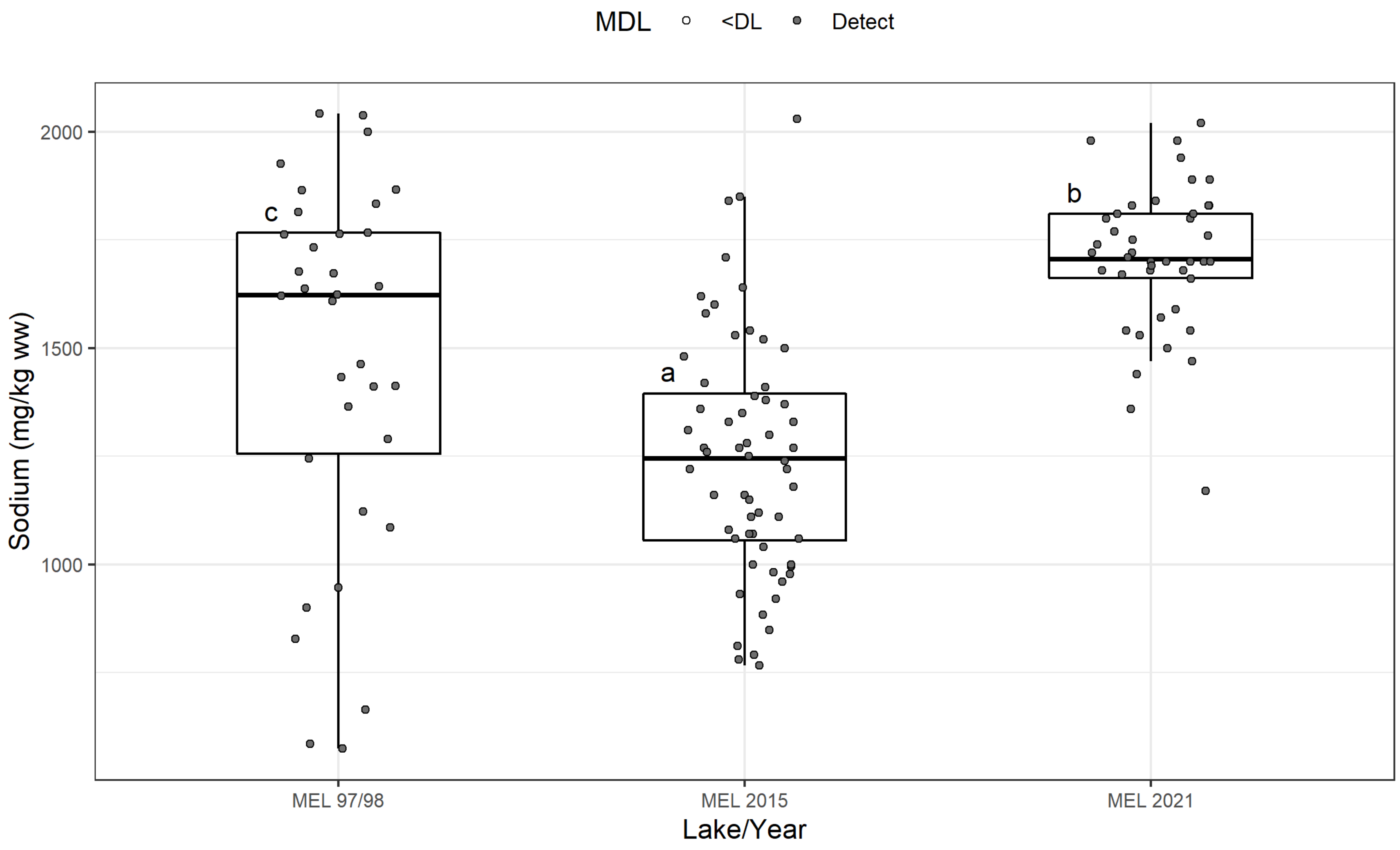


Figure 12-3. Sodium concentrations (mg/kg ww) in Lake Trout muscle tissue collected from Meliadine Lake in 1997/98, 2015, and 2021.

Notes: Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (P≤0.1).

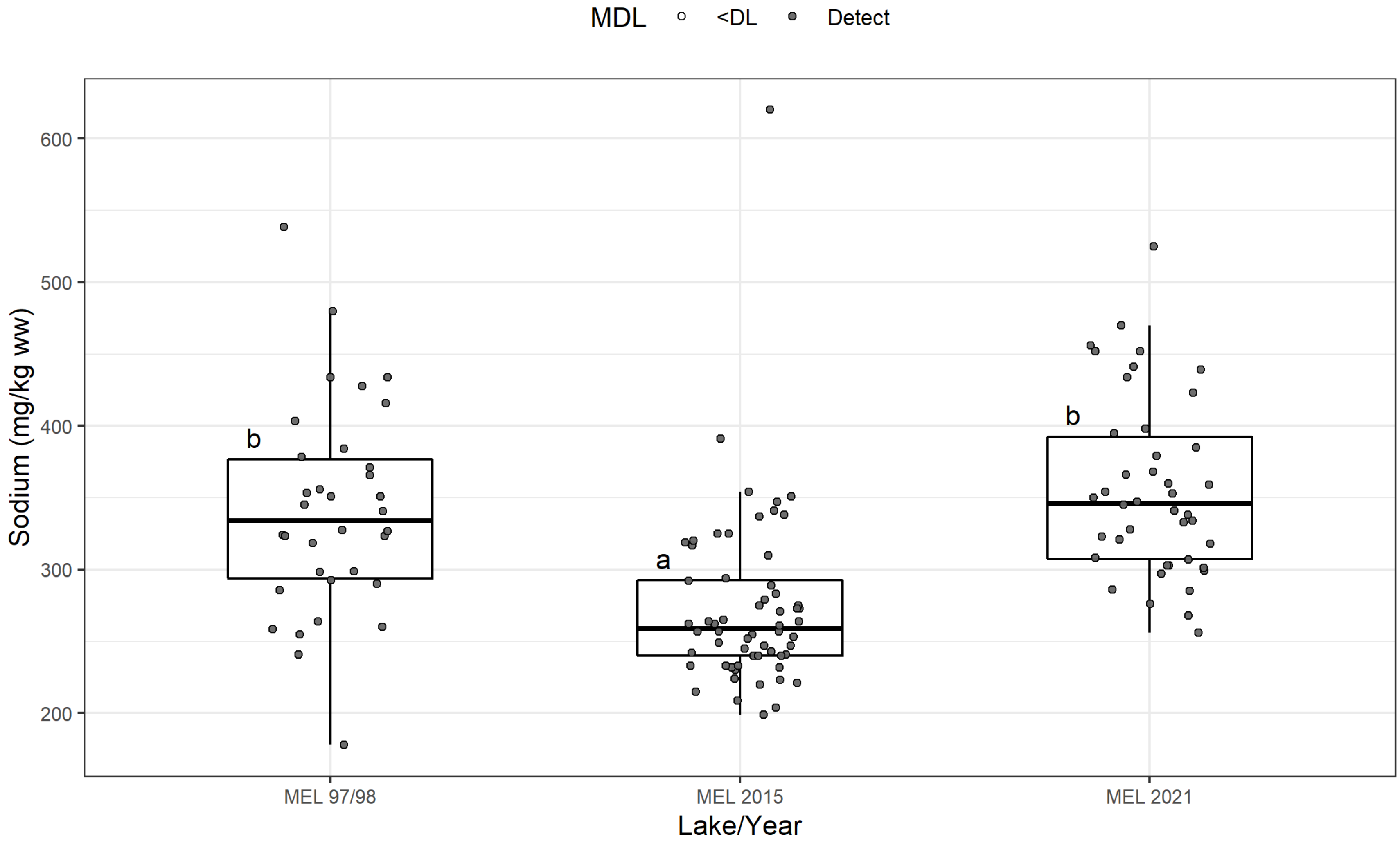


Figure 12-4. Molybdenum concentrations (mg/kg ww) in Lake Trout kidney tissue collected from Meliadine Lake in 1997/98, 2015, and 2021.

Notes: Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (P≤0.1).

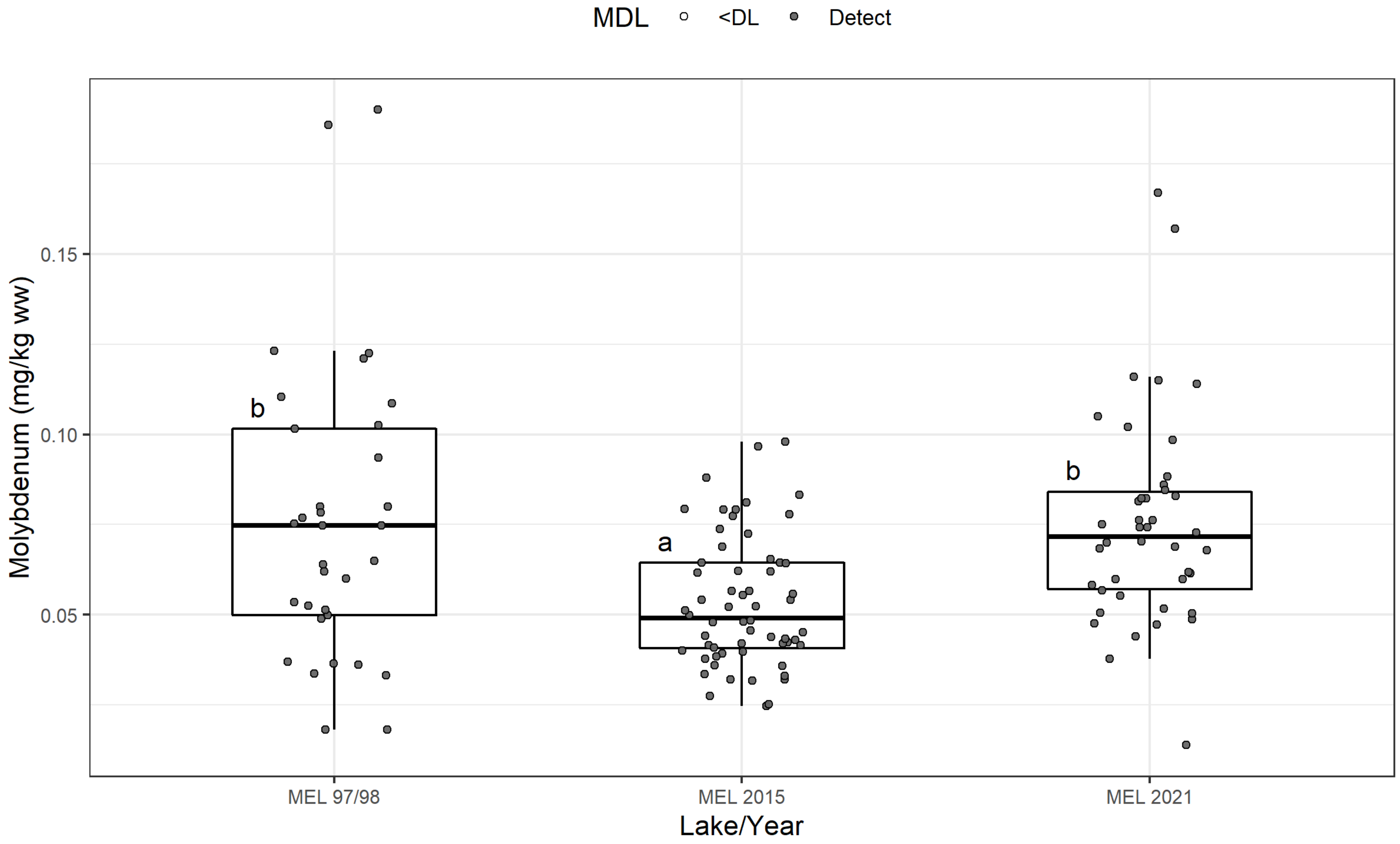


Figure 12-5. Strontium concentrations (mg/kg ww) in Lake Trout liver tissue collected from Meliadine Lake in 1997/98, 2015, and 2021.

Notes: Letters represent results from ANOVA analysis, different letters indicate significant differences among areas and years (P≤0.1).

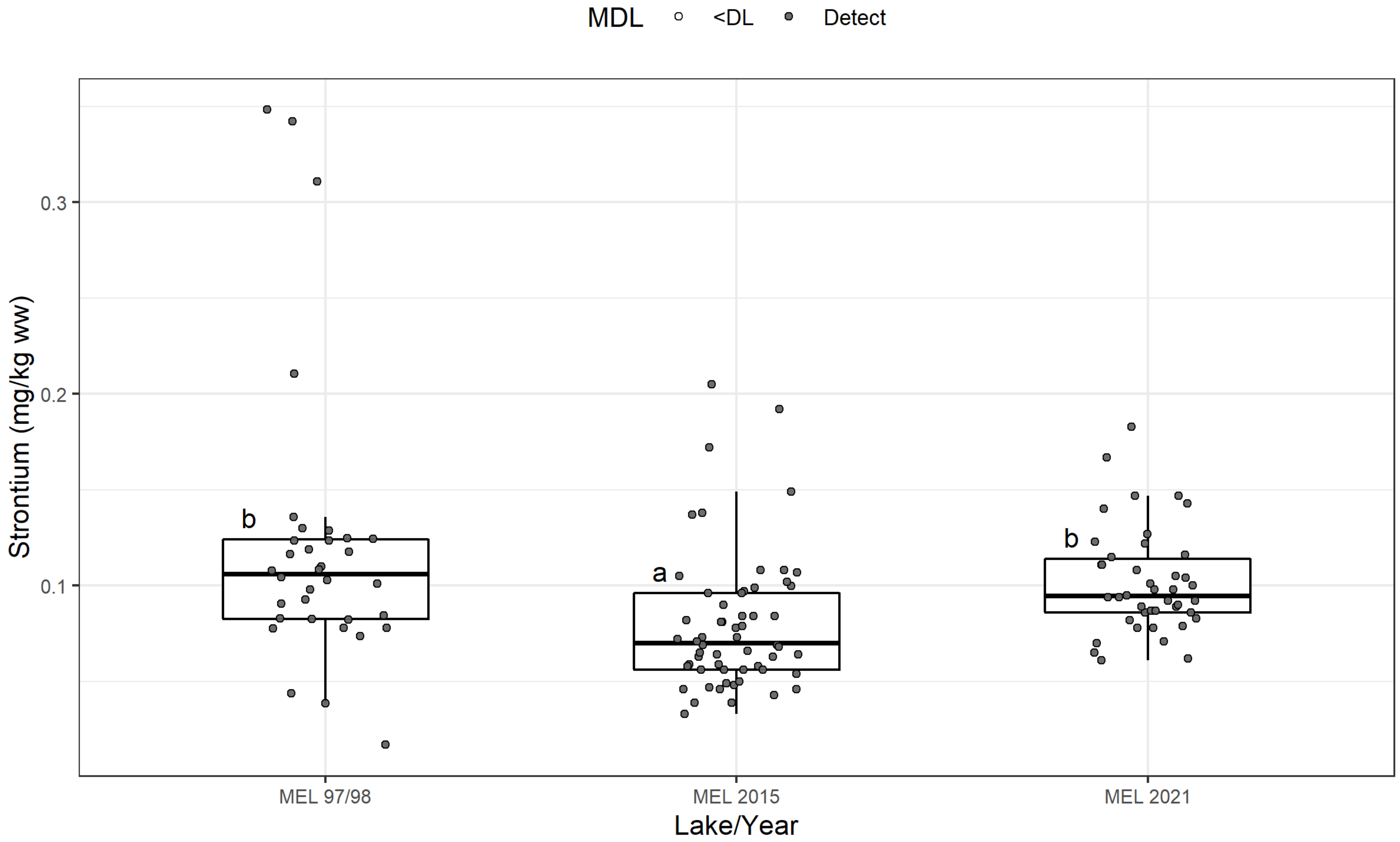
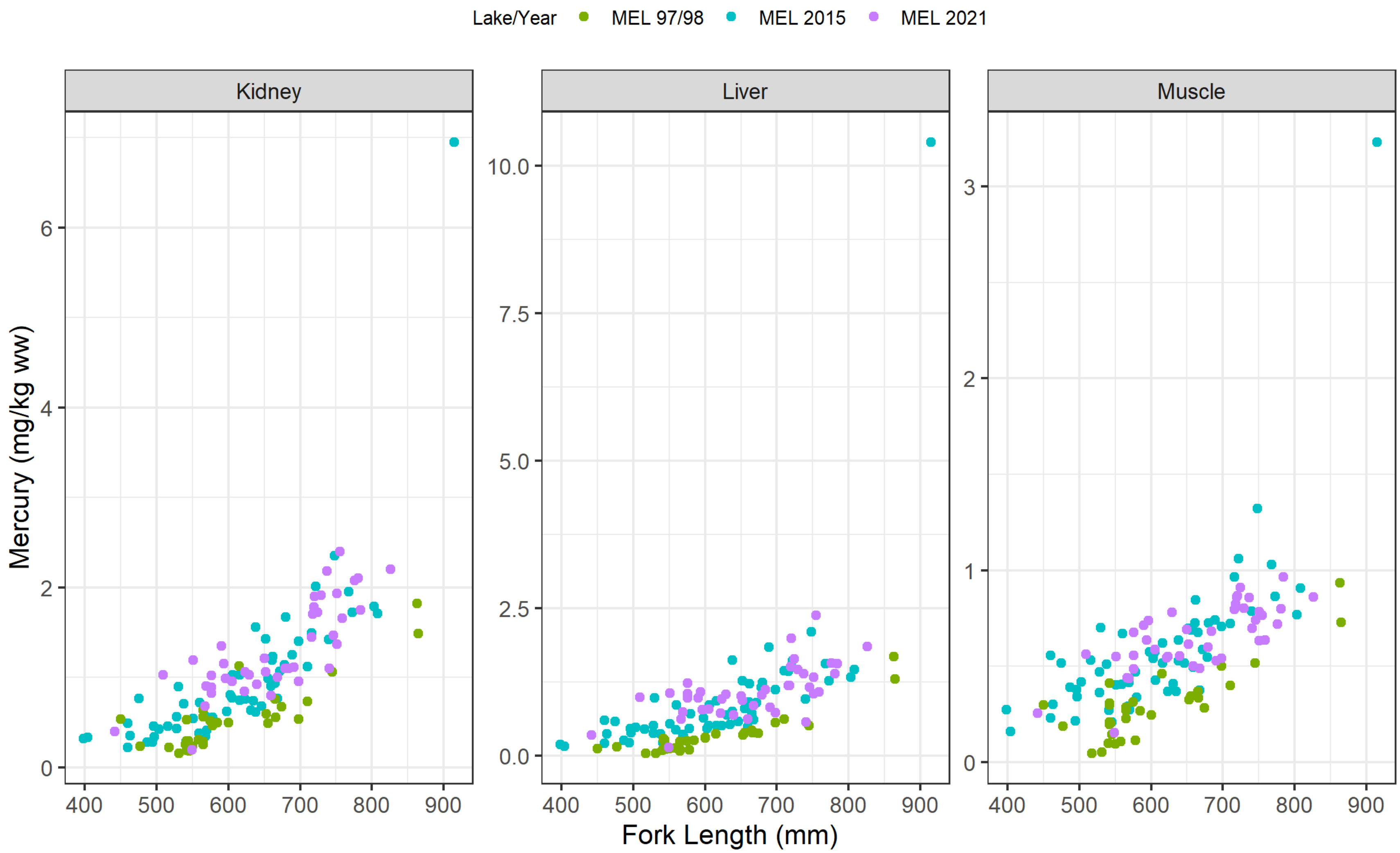


Figure 12-6. Relationships between mercury concentrations (mg/kg ww) and fork length for Lake Trout kidney, liver and muscle tissue collected from Meliadine Lake in 1997/98, 2015, and 2021.



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13 RESPONSE FRAMEWORK AND LOW ACTION LEVEL ASSESSMENT

13.1 Response Framework

The Response Framework links monitoring results with appropriate management actions to implement changes before effects occur[25]. The Response Framework for Meliadine was developed based on *Draft Guidelines for Adaptive Management – a Response Framework for Aquatic Effects Monitoring* (WLWB 2010) and experience gained at Meadowbank.

Action Levels (i.e., Low, Moderate, and High) are used within the Response Framework to determine if follow-up action is required to manage and reverse any detected changes in the aquatic environment. Low Action Levels were developed in the AEMP Design Plan for water quality, benthic invertebrates, fish health, and fish tissue chemistry to provide an early warning of potential adverse effects to aquatic life, changes in water quality that may affect human health or changes in the useability of the fishery. The Low Action Level assessment integrates various results/analyses to determine if a change has occurred that warrants further investigation. The assessment criteria include comparisons to baseline and/or reference data (e.g., normal range assessment), water quality guidelines (i.e., AEMP Benchmarks and Action Levels), or statistical comparisons. The assessment criteria are deliberately conservative so that Low Action Level exceedances are addressed before impacts occur to aquatic life, drinking water quality, or the useability of the fishery. If a Low Action Level is reached, then Medium and High Action Levels will be developed to further support adaptive management.

The managed response is dependent on what changed in the environment (e.g., a higher concentration of X parameter or change in biological assessment endpoint). Furthermore, the specific management action that would be appropriate in each case depends on the underlying cause. For example, if a metal becomes elevated in the aquatic receiving environment, the identification of options for further assessment and/or mitigation would be different if the source of the metal is effluent versus dust.

The release of treated effluent and release of air emissions (acidifying emissions, dust, and associated metals) were the two pathways identified in the FEIS that could result in changes to the aquatic environment in Meliadine Lake. For Meliadine Lake, discharge of effluent is the most likely pathway for

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[25] Terminology for *effect* and *change* is taken from the AEMP Design Plan (Golder 2016). *Effects* are defined as *changes* that are linked to activities at the mine. For example, a particular water quality parameter may increase from one year to the next due to inherent natural temporal variability or a regional trend that caused changes in water quality over a wide area. In this respect, the increase constitutes a *change*, but not an *effect* that is plausibly linked to activities at the mine.

changes in water quality and effects to aquatic life. Because effluent contains metals and nutrients, two impact hypotheses were developed: toxicological impairment and nutrient enrichment. An overview of each hypothesis is provided below followed by a summary of the findings from the 2021 AEMP in the context of the Action Level Assessment for toxicological impairment and nutrient enrichment.

13.2 Low Action Level Assessment – Toxicological Impairment

Mining activities have the potential to increase concentrations of parameters that could exert toxic effects on primary producers (algae), aquatic invertebrates, and fish and impact the quality of drinking water for human consumption. Toxicological impairment is evaluated using information from sublethal toxicity testing on effluent from MEL-14, comparing water quality to the AEMP Benchmarks, and biological monitoring data from the phytoplankton, benthic invertebrate, and fish population studies. Results from the individual sections are summarized below and compiled in **Table 13-1**.

Effluent Quality

The criterion for end-of-pipe toxicity is a persistent sublethal toxic effect observed in the same test organism in three consecutive monthly samples collected from MEL-14. Sublethal effects are defined as an effluent concentration less than the highest test concentration that causes a 25% effect to growth or reproduction relative to the control treatment. *Lemna* showed lower frond yield but not biomass in the August and September 2021 tests; however, no effects to frond yield or biomass were observed in the July, August, and September tests in 2020 at TDS concentrations ranging from 1,480 mg/L to 1,850 mg/L. Notwithstanding the inconsistency observed in frond yield and biomass endpoints in 2020 and 2021, there is no evidence to suggest a persistent effect to frond yield or biomass when concentrations of TDS are below 2,000 mg/L in effluent discharged to Meliadine Lake.

The Low Action Level was not exceeded for end-of-pipe toxicity in 2021.

Water Quality – Meliadine Lake

The Low Action Level for potential toxicological impacts to aquatic life and human health in 2021 has three conditions that must be met for an exceedance: 1) concentrations for at least one parameter must exceed the AEMP Action Level meant to protect aquatic life and/or human health, 2) concentrations must have increased relative to baseline/reference conditions (i.e., the normal range assessment, and 3) there is a clear trend showing concentrations in the NF area diverge from the reference areas (temporal plots). A brief overview of each condition is provided below.

- AEMP Action Level Screening – Copper and zinc exceeded their respective AEMP Action Levels (aquatic life) in a few samples at the exposure and reference areas (**Section 4.5.2**). The exceedances were natural and concentrations were representative of historical data. There were no mining-related exceedances of the AEMP Action Levels in 2021 indicating potential effects to aquatic life are negligible and water quality is safe for human consumption.

- Temporal Assessment – The annual mean concentration of TDS and constituent ions as well as some nutrients and metals exceeded the upper limit of the normal range in 2021 (**Section 4.5.3**). Some of these parameters have periodically exceeded the normal range since the baseline period and will likely continue to exceed the normal range in the future.
- Divergent Trends? – The pattern of the change for some parameters in the NF area points to effluent as the primary source, whereas other parameters appear to be increasing naturally due to wider regional changes in water quality. For example, the unusually high amounts of precipitation in 2019 contributed to lake-wide changes for chloride and possibly arsenic.

In summary, water quality has changed in the east basin of Meliadine Lake, particularly for TDS and some major ions. However, the observed change in water quality aligns with predictions in the FEIS (minor increase) and concentrations remain well below guidelines meant to protect drinking water quality and aquatic life. **The Low Action Level for toxicological impairment was not exceeded for drinking water quality or aquatic life.**

Water Quality – Peninsula Lakes

The purpose of the Low Action Level Assessment is to determine if management actions are needed to address unexpected changes in water quality at Lake D7, Lake A8, and Lake B7 caused by non-point source discharges (e.g., dust deposition). The Low Action Level Assessment for the Peninsula Lakes study follows the approach for Meliadine Lake described above, and two conditions must be met:
1) concentrations for at least one parameter must exceed the AEMP Action Level to protect aquatic life and/or human health, and 2) water quality has changed over time relative to baseline conditions (normal range assessment).

Water quality has changed relative to baseline conditions at Lake D7, Lake A8, and Lake B7, but the magnitude of the change is less than AEMP Action Levels meant to protect aquatic life and human health. The change in water quality at all three lakes is consistent with a *minor* change as predicted in the FEIS (Agnico Eagle, 2014). Therefore, **the Low Action Level was not triggered in 2021.**

Phytoplankton

The primary concern for effects to phytoplankton is related to increased productivity associated with nutrient inputs. However, metals present in the effluent can also cause elicit changes in aquatic primary producers such as decreased photosynthesis and structural changes in the community to favour taxa that are more tolerant of metals (Vendrell-Puigmitja et al. 2020). Multivariate analysis of the 2021 phytoplankton data confirms findings from previous surveys that showed the phytoplankton community in the NF area is different than the reference areas (i.e., outside the 99th percentile of reference; **Figure 6-7**). However, temporal comparisons of the phytoplankton results show the structure (composition of major taxa) and function (total phytoplankton biomass) of the phytoplankton community have remained consistent over the past six years of monitoring.

There is no evidence of decreased biomass, lower taxa richness, or altered community composition that are consistent with toxicological impairment.

Benthic Invertebrates

Effluent discharged to Meliadine Lake contains metals that have the potential to cause effects to aquatic invertebrates. The conceptual model of effects caused by exposure to metals would likely manifest as lower species richness, particularly for sensitive taxa, lower density, and less diversity relative to the reference areas. Results from the 2021 survey indicated taxa richness, abundance, and indices of diversity (e.g., Simpson's Evenness) were similar among the exposure and reference areas.

The Low Action Level for toxicological impairment was not exceeded for effects to the benthic invertebrate community.

Fish Health

Toxicological effects to fish are evaluated in the Low Action Level Assessment using condition (how heavy they are at a given length or how fat they are) and relative liver size as the key assessment endpoints (Golder, 2016). Relative gonad size, which was also included in the AEMP Design Plan, was not carried forward for the Low Action Level assessment because of challenges in assessing effects to reproduction for Threespine Stickleback (multiple spawners; **Section 9.5.7**) or Lake Trout (low sample sizes for spawning females; **Section 11.5.7**).

Fish condition and relative liver size provide a thorough understanding of the potential effects to fish from direct exposure to metals in effluent or via their diet. The conceptual model of effects to fish from chemical toxicity is an increase in liver weight with a decrease in condition (Environment Canada, 2012). For Threespine Stickleback, fish condition and relative liver size for males and females from the NF area were similar to the range observed at the two reference areas in Meliadine Lake. Together, these results provide strong evidence suggesting effluent is not likely to cause toxicological effects to small-bodied fish residing in the east basin near the diffuser.

Lake Trout captured in 2021 had significantly larger livers compared to fish from the baseline period and both sexes had higher condition in 2021 compared to 2015. Increased relative liver size may suggest elevated exposure to metals (detoxification) or an increase in energy storage associated with greater availability and/or quality of food. Because Lake Trout condition was also higher in 2021 compared to 2015, toxicological impairment is not the suspected cause of the observed increase in relative liver size

Adverse effects to small- and large-bodied fish from exposure to contaminants were not predicted in the FEIS (Agnico Eagle, 2014) because water quality was expected to meet aquatic life guidelines beyond the mixing zone, 100 m from the diffuser.

There is no evidence of decreased biomass, lower taxa richness, or altered community composition that are consistent with toxicological impairment.

Fish Useability

Impacts to the useability of fishery were evaluated by looking at metals concentrations in edible muscle (fillets). Mercury concentrations are naturally-elevated in older, larger Lake Trout, but compared to the baseline period, no change in concentration was reported. **There is no evidence that effluent discharge is causing a change in tissue chemistry that would negatively impact the useability of the fishery for traditional and recreational purposes.**

Table 13-1. 2021 AEMP Action Level Assessment – Toxicological Impairment

Component	Assessment	Assessment Criteria	Low Action Level Exceeded?	Notes	Reference
Meliadine Lake					
Water Quality	End of Pipe Toxicity	Confirmed sublethal toxic effects on test organisms other than fish in end-of-pipe samples AND No sublethal toxic effects on fish in end-of-pipe samples	No	Minor reductions in *Lemna minor* frond growth but not biomass. Inconclusive results on the effects of effluent on *L. minor*	Table 3-4
				No sublethal effects to Fathead Minnow.	
	Aquatic Life	Near-field mean above the normal range of baseline/reference conditions AND Near-field mean exceeds the AEMP Action Level (75% of the AEMP Benchmark) AND Divergent trends compared to the reference areas	No	Copper and zinc naturally exceed guidelines for protection of aquatic life in some sample from the NF, MF, and reference areas. No other parameters were detected above AEMP Action Levels.	Figure 4-5 Figure 4-6 Appendix C1 Table C1-2 to C1-5
	Drinking Water Quality	Drinking water parameters in exposure area above 75% of Health Canada's human health drinking water quality guideline (maximum acceptable concentration)	No	No exceedances of AEMP Action Levels for health-based drinking water quality guidelines in samples collected from Meliadine Lake in 2021.	Appendix C1 Tables C1-2 to C1-5
Phytoplankton[a]	Aquatic Life	Phytoplankton community metrics at the Near-field area beyond the range of baseline/reference conditions AND Change in direction and magnitude that are indicative of toxicological impairment	No	Phytoplankton richness at the NF area has remained relatively stable over time. Annual variability in taxa richness and community composition at the NF is also evident at the MF and reference areas.	Figure 6-3 Figure 6-6
Benthic Invertebrates	Aquatic Life	Statistically significant[b] decrease in Near-field total density, richness, or dominant taxa compared to reference area AND Change in direction and magnitude indicative of toxicological impairment	No	No significant differences were reported for taxa richness or total density among the exposure and reference areas in 2021. Total density was higher throughout Meliadine Lake in 2021 compared to previous years.	Table 8-3 Figure 8-1 Figure 8-5 Figure 8-10

Table 13-1. 2021 AEMP Action Level Assessment – Toxicological Impairment

Component	Assessment	Assessment Criteria	Low Action Level Exceeded?	Notes	Reference
Meliadine Lake					
Fish Health	Aquatic Life	Statistically significant differences in fish health endpoints[c] between Near-field and Reference AND Change in direction and magnitude indicative of impairment of fish health	No	Threespine Stickleback No evidence of adverse effects consistent with toxicological impairment (e.g., low survival, poor condition, changes in relative liver size)	Table 9-7
				Lake Trout No evidence of adverse effects consistent with toxicological impairment (e.g., poor condition, changes in relative liver size)	Table 11-10
Fish Usability	Human Consumption	Statistically significant[d] difference in metal concentrations relative to baseline conditions	No	Mercury concentrations in Lake Trout muscle tissue were similar in 2021 compared to 2015. Some large and old Lake Trout have naturally high levels of mercury.	Table 12-3 Figure 12-6
Meliadine Lake					
Water Quality	Aquatic Life	Near-field mean above the normal range of baseline/reference conditions AND Near-field mean exceeds the AEMP Action Level (75% of the AEMP Benchmark)	No		Table 5-2 (Lake D7) Table 5-3 (Lake A8) Table 5-4 (Lake B7)

Notes

[a] Assessment criteria were not proposed in the original AEMP Design Plan (Golder, 2016).

[b] The Normal Range assessment was replaced with statistical comparisons for determining differences between exposure and reference areas.

[c] Health endpoints for fish are condition and relative liver size. Relative gonad size was not included as an endpoint for the Action Level Assessment for Threespine Stickleback or Lake Trout (see **Section 9.4.3** and **Section 11.5.7** for details).

[d] Statistical tests (ANOVA and ANCOVA) were used to test for differences in fish tissue chemistry over time rather than a comparison to the normal range of baseline data as stated in the AEMP Design Plan (Golder, 2016).

13.3 Low Action Level Assessment – Nutrient Enrichment

Discharge of treated effluent containing nutrients to Meliadine Lake has the potential to cause an increase in primary productivity, which under certain conditions, can lead to changes in the overall health of freshwater aquatic communities. Nutrient enrichment is evaluated using data from the water quality monitoring program, the phytoplankton study, the benthic invertebrate community assessment, and the fish population studies. Results from the individual sections of the report are summarized below and compiled in **Table 13-2**.

Water Quality

Total phosphorus and chlorophyll-a are the two parameters used to determine if activities at the mine are causing nutrient enrichment in Meliadine Lake. The AEMP Benchmark for total phosphorus is 0.01 mg/L, corresponding to the upper limit of oligotrophic status in the CCME guidance document for managing freshwater systems (CCME, 2004). The phosphorus guideline is not associated with adverse effects to aquatic life. The AEMP Benchmark for chlorophyll-a is 4.5 µg/L based on an evaluation of chlorophyll-a and trophic status by DDMI (2013). Their literature review concluded that 4.5 µg/L represents a reasonable and conservative upper boundary for oligotrophic status for northern lakes.

Total phosphorus (0.0073 mg/L) and chlorophyll-a (2.8 µg/L) were below their respective AEMP Action Levels in 2021. Chlorophyll-a concentrations increased at both the NF and MF areas in 2021 compared to 2020. The annual mean increased at the NF area from 2.0 µg/L in 2020 to 2.8 µg/L in 2021, which corresponds to a 40% increase. A similar magnitude of change was evident at the MF area, as concentrations increased from 0.89 µg/L in 2020 to 1.2 µg/L in 2021 (34% increase). The chlorophyll-a data on their own indicate the east basin may be becoming more productive, but it’s important to weigh conclusions from the chlorophyll-a data against results from the phytoplankton community assessment.

The annual mean concentrations of phosphorus and chlorophyll-a were below their respective AEMP Action Levels; therefore, the Low Action Level for nutrient enrichment was not exceeded in 2021.

Phytoplankton

Phytoplankton indices such as community structure and biomass provide a direct estimate of whether effluent discharged to Meliadine Lake is contributing to changes in primary productivity. Therefore, phytoplankton community data are given a higher weighting than chlorophyll-a and phosphorus results when determining if effluent is contributing to nutrient enrichment in Meliadine Lake.

Annual phytoplankton community monitoring since 2015 has consistently shown that the east basin of Meliadine Lake is a more productive area compare to the MF and reference areas. Previous AEMP reports have highlighted the uncertainty about whether the increase in productivity between baseline (2013) and construction (2015) is related to sewage discharge during the exploration and early construction phases or if the east basin is naturally more productive (Golder, 2019; Azimuth, 2020). Notwithstanding this point of uncertainty, biomass results (**Section 6.6.4**), nutrient-productivity relationships (**Section 6.6.5**), and the trophic status index (TSI) assessment (**Section 6.6.6**) demonstrate that effluent is not resulting in wide-spread and divergent changes in productivity in the east basin compared to the MF and reference areas. **Overall, the phytoplankton community in the east basin is functionally intact and supports healthy fish and benthic invertebrate communities.**

Benthic Invertebrates

Discharge of effluent containing nutrients can alter the structure of benthic invertebrate communities by creating conditions that are more favourable for nutrient tolerant species. The conceptual model of effects for mild nutrient enrichment is higher benthic invertebrate density and richness relative to baseline and/or reference conditions. More pronounced nutrient enrichment would likely result in the loss of sensitive taxa, with an overall increase in the total abundance of more tolerant taxa (Environment Canada, 2012).

There were no statistically significant differences in benthic invertebrate richness or density among the NF, MF, and reference areas in 2021 (**Section 8.6.2**). Compared to previous years, benthic invertebrate density was higher at all study areas in 2021 primarily because of higher numbers of midge larvae (chironomids; **Figure 8-1**). Higher density throughout Meliadine Lake implies that the change is natural and not indicative of nutrient enrichment.

The benthic invertebrate community results in 2021 did not trigger the Low Action Level criteria for nutrient enrichment.

Fish

As outlined above for the evaluation of toxicological effects, there were no differences in fish condition or relative liver size for Threespine Stickleback at the NF area in 2021 compared to the reference areas. These results suggest effluent discharged to Meliadine Lake is not increasing the availability or quality of food for Threespine Stickleback in a way that is causing a measurable and significant change in energy storage. **The Low Action Level for nutrient enrichment was not exceeded for Threespine Stickleback.**

Lake Trout in 2021 had greater condition and relative liver size compared to baseline results from 2015. These results show that Lake Trout are storing more energy compared to baseline conditions in Meliadine Lake, but it’s unclear if the change is related to nutrient enrichment caused by mining activities or natural changes. The Lake Trout study for the Cycle 2 EEM (Azimuth, in prep) included two regional reference lakes in 2021 to characterize the health of Lake Trout in Meliadine Lake within a regional context.

Table 13-2. 2021 AEMP Action Level Assessment – Nutrient Enrichment

Component	Assessment	Assessment Criteria	Low Action Level Exceeded?	Notes	Reference
Water Quality	Productivity	Concentrations of Phosphorus and Chlorophyll-a in the Near-field area above the normal range, supported by temporal trends AND Phosphorus and Chlorophyll-a exceed their respective AEMP Action Levels	No	Annual mean phosphorus concentration in the NF area did not exceed the AEMP Action Level of 0.0075 mg/L.	Figure 4-8
				Chlorophyll-a concentrations trended higher in 2021 at NF and MF areas; concentrations were below the AEMP Action Level	Figure 6-2
Phytoplankton[a]	Productivity	Phytoplankton biomass at the Near-field area beyond the range of baseline/reference conditions AND Change in direction and magnitude indicative of nutrient enrichment	No	Biomass in 2021 at NF and MF was within the range of previous years. Trophic status index indicated the lake is within oligotrophic classification.	Table 6-7 Figure 6-11
Benthic Community	Productivity	Statistically significant[b] increase in total density or richness between Near-field and Reference Areas AND Change in direction and magnitude indicative of nutrient enrichment	No	No statistically significant differences total density or richness among exposure and reference areas. Higher density reported at all study areas in 2021 compared to previous years (natural variability).	Table 8-2 and Table 8-3; Figure 8-10
Fish Health	Productivity	Statistically significant differences in fish health endpoints[c] between Near-field and Reference AND Change in direction and magnitude indicative of impairment of fish health	No	Threespine Stickleback There were no significant differences in energy storage (condition and relative liver size endpoints) between MEL-01 and the reference areas.	Table 9-7
			Cycle 2 EEM	Lake Trout Increased condition and relative liver size between 2021 and baseline. Differences between Meliadine Lake and regional reference lakes are not evident.	Table 11-10

Notes

[a] Assessment criteria were not proposed in the original AEMP Design Plan (Golder, 2016).

[b] The Normal Range assessment was replaced with statistical comparisons for determining differences between exposure and reference areas.

[c] Health endpoints for fish are condition and relative liver size. Relative gonad size was not included as an endpoint for the Action Level Assessment for Threespine Stickleback or Lake Trout (see **Section 9.4.3** and **Section 11.5.7** for details).

13.4 Scope of the 2022 AEMP

The 2022 AEMP will be carried out according to the AEMP Design Plan. The scope of the 2022 AEMP will focus on monitoring changes in water quality (limnology and chemistry) and phytoplankton community in Meliadine Lake and water quality in the Peninsula Lakes (Lake D7, Lake A8, and Lake B7). Routine effluent chemistry monitoring and sublethal toxicity testing will be completed as per the Water Licence and MDMER. No plume delineation studies are planned for 2022.

Table 13-3. Scope of the 2022 AEMP for Meliadine Lake and the Peninsula Lakes.

Area	Winter (April)	July	August	September
MEL-01	Water Quality	Water Quality	Water Quality Phytoplankton	Water Quality
MEL-02	Water Quality	Water Quality	Water Quality Phytoplankton	Water Quality
MEL-03	-	Water Quality	Water Quality Phytoplankton	Water Quality
MEL-04	-	Water Quality	Water Quality Phytoplankton	-
MEL-05	-	Water Quality	Water Quality Phytoplankton	-
Peninsula Lakes (Lake A8, B7, D7)	-	Water Quality	Water Quality	-

The Cycle 2 EEM is due to the Minister of Environment on or before June 21, 2022. Findings from the Threespine Stickleback and Lake Trout health assessments for the Cycle 2 EEM may be incorporated into the next update of the AEMP Design Plan prior to biological monitoring studies in 2024.

13.5 References

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APPENDICES

APPENDIX A

QUALITY ASSURANCE / QUALITY CONTROL

APPENDIX A – TABLE OF CONTENTS

A.1 INTRODUCTION 1
A.2 WATER CHEMISTRY 1
  A.2.1 QA/QC Methods 1
    A.2.1.1 Field 1
    A.2.1.2 Laboratory 5
  A.2.2 Results and Discussion 6
    A.2.2.1 Field Results 6
    A.2.2.2 Laboratory Results 9
  A.2.3 QA/QC Summary 10
A.3 SEDIMENT CHEMISTRY 23
  A.3.1 QA/QC Methods 23
    A.3.1.1 Field 23
    A.3.1.2 Laboratory 23
  A.3.2 Results and Discussion 23
    A.3.2.1 Field Results 23
    A.3.2.2 Laboratory Results 23
  A.3.3 QA/QC Summary 24
A.4 PHYTOPLANKTON 28
  A.4.1 QA/QC Methods 28
    A.4.1.1 Field 28
    A.4.1.2 Laboratory 29
  A.4.2 Results and Discussion 29
  A.4.3 QA/QC Summary 30

APPENDIX A – TABLES

Table A-1. Laboratory QA/QC summary for water sediment and phytoplankton, Meliadine AEMP, 2021. 13
Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2021. 15
Table A-3. Field QA/QC summary for water quality, Meliadine AEMP, 2021. 18
Table A-4. Water chemistry field duplicate RPDs greater than QA/QC DQO's for Meliadine AEMP, 2021. 22
Table A-5. Field duplicate results for the sediment grabs collected in 2021. 27
Table A-6. Field QA/QC data for phytoplankton, Meliadine AEMP, August 2021. 32
Table A-7. Laboratory QA/QC data for phytoplankton, Meliadine AEMP, August 2021. 33
Table A-8. Field QA/QC summary for chlorophyll-a (µg/L), Meliadine AEMP, 2021 34

A.1 INTRODUCTION

The objective of quality assurance and quality control (QA/QC) is to assure that the chemical and biological data collected are representative of the material or populations being sampled, are of known quality, have sufficient laboratory precision to be highly repeatable, are properly documented, and are scientifically defensible. Data quality was assured throughout the collection and analysis of samples using specified standardized procedures, by the employment of laboratories that have been certified for all applicable methods, and by staffing the program with experienced technicians.

A brief description of Quality Assurance (QA) and Quality Control (QC) practices are provided here.

- *Quality Assurance* (QA) are the practices employed (e.g., use of experienced field staff, use of SOPs, use of field data sheets, and use of certified laboratories) to collect scientifically defensible samples meeting pre-defined data quality objectives (DQOs).
- *Quality Control* (QC) are measures taken to verify that the specific DQOs are met.

There were three major components to the 2021 Meliadine AEMP program: water quality, sediment quality, and phytoplankton. The field and laboratory QA/QC methods and results & discussion for each of these media is reported herein.

A.2 WATER CHEMISTRY

A.2.1 QA/QC Methods

An overview of the QA/QC methods in 2021 for the water chemistry component of the AEMP is provided below; refer to the *2016 AEMP Design Plan* (Golder, 2016) for a complete description.

Field duplicates, laboratory duplicates, and blank samples were analyzed as part of the QA/QC program in each of the four sampling events in 2021.

A.2.1.1 Field

Field Data and Sample Collection

Briefly, the standard QA procedures for the water chemistry program include thoroughly flushing the flexible tubing and pump to prevent cross-contamination between areas and thoroughly rinsing the sample containers with site water prior to sample collection. Field collected limnology data focused primarily on measurements using a multiprobe meter. The meter was calibrated before field measures according to manufacturer instructions. Agnico Eagle Environment department maintains a calibration log for each field instrument used to collect field measurements. QA methods used to prevent cross-contamination between locations and from the equipment itself included wearing nitrile gloves and rinsing the sample equipment with surface water prior to collecting samples.

Careful documentation and handling of all samples and data is a key component of QA/QC in a field program. Field data were recorded on customized field data sheets. Sample bottles were labeled appropriately with the sample ID, date and project identification and sample containers were stored according to laboratory handling instructions. Field data sheets were scanned after each field program. Information that was recorded in the field (e.g., field measurements, station information, etc.) was transcribed into an EQUIS database administered by Agnico Eagle.

Sample Shipping and Handling

Shipments of samples to the analytical laboratories were accompanied by chain-of-custody (CoC) forms detailing sample identification, reporting requirements, and sample handling information. CoC forms not only inform the laboratory of sample details, they also help ensure that sample handling instructions are followed and that all samples are accounted for.

The Meliadine Environment Department plans water sampling events to minimize the amount of time that samples are in transit between Site, Val d’Or, and the various laboratories in Vancouver, Alberta, Winnipeg and Colorado. The remote location of the mine will always present challenges with some analytes meeting recommended hold-times, but the effect of slightly exceeding hold-times on the quality of the results is considered negligible. Correspondence with the lab regarding hold-time exceedance hasn’t led to establishing definitive benchmarks for data quality. ALS recommends “professional judgement” when interpreting chemistry data for parameters that exceeded hold-times for analysis.

Recommended hold-times are provided by the laboratory for analytes and water quality parameters. The times vary from a low of 0.25 days for pH to six months for metals. Hold-times for water samples are regularly exceeded for turbidity, pH, nitrate, nitrite, total dissolved solids, total suspended solids and dissolved orthophosphate (as P). Occasionally, hold-times are exceeded for cyanides (free and total). Samples are generally shipped very soon after collection and the distances and logistics make it impossible to meet short hold-times. However, it is highly unlikely that results are affected for those parameters or analytes where hold-times were not met in 2021.

Sample Blanks

Field QC procedures as part of the AEMP included collecting and analyzing three different types of *blank* samples, travel blanks, field blanks and equipment blanks. Blank sample collection, particularly equipment blank samples, requires careful planning, attention to detail, focuses on the importance of cleanliness and generally provides a good opportunity to refine sample collection skills.

Blank samples are collected once per sample event, and are submitted *blind* to the laboratory, to ensure they are treated the same as field collected samples during analysis. Results from the field, equipment and travel blanks are examined for detectable concentrations of any of the parameters measured; no parameter in blanks should exceed laboratory method detection limits (MDLs). If an analyte is detected in a blank, the results for the batch of samples submitted with the blank are compared with the measured concentration in the blank; results that are less than 5-times the detected analyte concentration in the equipment blank are flagged to examine the potential for cross-contamination to affect the results[1]. This threshold does not apply to pH measurements, as DLs are not available for the pH scale.

Travel blanks (TB) – One set of travel blanks was provided by the analytical laboratory for the purpose of testing for contamination associated with travel (i.e., hold time, heat/cold, moisture, desiccation, leaching, etc.). Travel blanks consist of de-ionized (DI) water provided in sampling bottles by ALS and receive the same treatment as field samples during shipment, handling, storage, and laboratory analysis. The travel blanks were opened in the field for the amount of time it takes to collect a sample and then sealed. Travel blank results are treated the same as equipment blank results by the analytical laboratory. Travel blanks should (1) be included in sample container shipments, (2) come directly from the analytical laboratory and (3) be stored in a cool place (e.g., refrigerator).

Field blanks (aka Deionized Water Blanks [DI]) – To obtain a field blank, DI water provided by the analytical laboratory is transferred to a sample bottle in the field. Field blanks are handled and analyzed using the same techniques as water samples collected in the field. Field blanks are used to detect potential contamination during sample collection, handling, shipping and laboratory analysis. Field blank results are treated the same as equipment blank results by the analytical laboratory.

Equipment blanks (EB) – To obtain an equipment blank, DI water provided by the analytical laboratory is transferred to the same equipment used to collect field samples. The DI water is first run through the equipment and then transferred to a sample bottle. Equipment blanks are handled in the way as field samples and are used to detect potential contamination from sampling equipment. Results from equipment blanks are examined for detectable concentrations of any of the parameters measured; no parameter should exceed MDLs. If an analyte is detected in a blank, the results for the batch of samples submitted with the blank were compared with the measured concentration in the blank; results that were less than 10-times the detected analyte concentration in the equipment blank were flagged to examine the potential for cross-contamination to affect the results.

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[1] This approach is consistent with how ALS flags unreliable results for the laboratory method blanks.

Field Duplicates

Additional samples (i.e., field duplicates) are collected as a subset of the field sampling locations for water. Field duplicates were collected at the same time and using the same methodology as field samples with the intent of collecting the same media. Field duplicates are used to identify the precision of field sampling methods and laboratory analysis and within-station variability. Field duplicate are submitted *blind* to the laboratory and analysed using the same methods and equipment as original samples.

Results of the field duplicates are assessed by measuring the relative percent difference (RPD) as a percentage between original and duplicate measurements as measure of precision by the laboratory and the magnitude of variability between original and field duplicate samples, respectively. The variability in field duplicates may be attributed to sampling procedures but may also be attributed to natural conditions (i.e., spatial heterogeneity in the sampling media). The equation used to calculate the RPD is the following:

$$RPD = \frac{(A - B)}{(\frac{A + B}{2})} x\ 100$$

where: A = analytical result; B = duplicate result.

In 2021, the DQOs were revised for water chemistry field duplicates. The DQOs for field duplicates were adjusted to be 1.5X the laboratory RPDs (RPDs can be negative or positive). If no RPD was provided by the laboratory, the field duplicate DQO was set to a default of 40%. The adjustment above laboratory RPD levels is to reflect that field duplicates are inherently more variable in comparison to laboratory duplicates partly because field duplicate samples are collected from a large sample volume (i.e., the lake or stream) versus a small well-mixed sample volume (i.e., the single sample container in the laboratory). The Canadian Council of Ministers for the Environment (CCME) state that acceptance limits for field-based QC are broader than laboratory QC and are typically 1.5 to 2 times the laboratory QC limits (CCME 2016).

As stated, RPD values may be either positive or negative, and ideally should provide a mix of the two, clustered around zero. RPDs are not calculated when one of the samples (i.e., either A or B above) is below detection and the other is not. If an RPD value falls outside the field duplicate DQO it is flagged for review. When analyte concentrations are less than 10-times DL we expect a greater likelihood of not meeting the DQOs because laboratory precision is slightly further from the DLs and because smaller concentrations of analytes per volume tends to magnify variability between the original sample and the duplicate. These occasions are still flagged for assessment to reflect upon the implications for sampling protocol and data interpretation. However, given the higher potential to not meet DQOs for those reasons outlined above, they are not weighted as highly unless there is a relatively high percentage of

RPD values that did not meet DQOs or if the RPD values themselves are very high. Analyte concentrations that are greater than 10-times DL and do not meet the DQOs are given more weight in the QA/QC assessment.

A.2.1.2 Laboratory

Water samples collected during the 2021 Meliadine Lake study were analyzed by ALS Environmental Laboratory (ALS; Vancouver, Edmonton and Winnipeg locations). ALS is an analytical laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Performance evaluations are conducted under CALA's accreditation program for laboratory methods, protocols, and QC.

The first step in the QC program involves documenting any issues with the sample submission. This step applies to all sampling components (e.g., water chemistry and phytoplankton). ALS reports concerns surrounding sample submission as *sample integrity* issues in the Sample Receipt Confirmation (SRC) email after the samples are received. For ALS reports, the results are typically recorded in the sample integrity assessment for one of three reasons: (1) samples were damaged during transport, (2) the temperature inside the cooler was above 10°C when received by the laboratory, or (3) the recommend hold-time was exceeded prior to analysis. Sample integrity issues don't necessarily mean the data are unusable; rather, this information is meant to help the client make an informed decision on how to proceed with analysis and using the results.

There are four main components of the water chemistry laboratory QC program to assess analytical precision, bias, and completeness:

Laboratory Duplicate – The laboratory randomly chooses samples to re-run as duplicates. A new aliquot from the same sample is analyzed from the start in the same manner as the original aliquot taken from the bottle/jar. The difference between the two analyses is a measure of the variability associated with duplicate analyses of the same sample in the laboratory.

Results of the laboratory duplicates are assessed by measuring the RPD as a percentage between original and duplicate measurements which is referred to as a measure of precision by the laboratory. For full discussion of the RPD calculation, see **Section A.2.1.1**. Laboratory duplicate DQOs are parameter-specific and depend on the concentration in the sample. The RPD DQOs for lab duplicates are lower than for field duplicates given that the same aliquot is split.

Method Blank (MB) – An analyte-free matrix (e.g., de-ionized water) is subjected to the entire analytical process to demonstrate that the analytical system itself does not introduce contamination. Blanks are examined for detectable concentrations of any of the parameters measured; no parameter in blanks should exceed laboratory method detection limits (MDLs). If an analyte is detected in a blank, the results for the batch of samples submitted with the blank are compared with the measured concentration in the blank. Results that are less than 10-times the detected analyte concentration in the blank are flagged to examine the potential for cross-contamination to affect the results.

Matrix Spike (MS) / Matrix Duplicate (MD) – A known amount of a compound chemically similar to the target analyte is added to samples to ascertain any matrix effects on recoveries and to determine the accuracy and precision of the method in this matrix.

Laboratory Control Sample (LCS) – An LCS is a well-characterized sample of known analytes and concentration. A reference material (i.e., certified reference material) containing certified amounts of target analytes, may be used as an LCS. Percent recovery of the target analytes in the LCS is compared to established control limits and assists in determining whether the methodology is in control and whether the laboratory is capable of making accurate and precise measurements at the required reporting limit.

Certified Reference Material (CRM) – These are parameters (e.g., metals, conductivity, etc.) with a known concentration against which the lab must achieve a precision of within ±10% of the CRM.

The lowest available detection limits (DL) were specified for all the chemical analyses for the Meliadine AEMP water quality program. A shift in DLs for any given water quality parameter was reviewed, and the laboratory asked to explain the change in DLs. Changes in DLs by the laboratory could limit the ability to compare results across samples. Any changes in DLs that resulted in the DL being close to the result (i.e., less half the result) for any given parameter was flagged for further scrutiny.

Dissolved concentrations of nutrients and metals were compared to their corresponding total concentrations. If the dissolved concentration exceeded the corresponding total concentration, the parameter was re-analyzed by ALS. If the dissolved concentration after re-analysis was still 20% greater than the corresponding total concentration and both concentrations were greater than 10-times the DL the dissolved concentration was flagged.

A.2.2 Results and Discussion

Results of the QA/QC analysis are discussed below, along with a discussion on the implications of the QA/QC assessment of the sample results from 2021.

A.2.2.1 Field Results

Table A-1 summarizes sample integrity observations (e.g., broken sample containers, mislabeled containers), cooler temperature upon delivery to the lab, and parameters that exceeded the recommended hold-times for analysis.

Sample Shipping and Handling

The target temperature for samples arriving at ALS is between 5°C and 10°C. The range of temperatures reported in 2021 was between 16.3°C in March to a high of 24.8°C in July. These temperature ranges reflect the seasonal ambient temperatures. The effect on preserved samples is considered negligible. No sample integrity observations were identified for any water chemistry samples collected across the four sampling events in March and July to September.

The sample shipping and handling QA/QC for water samples in 2021 was acceptable, with only minor sample integrity issues identified by ALS. The logistics, distances, and general challenges of collecting and shipping samples from a remote mine in Nunavut meant that hold times were exceeded for several parameters/analytes but the impact on results is considered negligible.

Field Duplicates

The target frequency of field duplicate sample collection is approximately 10% of the total number of samples collected. For this program there were 73 original samples collected over four events (i.e., one event in February, July, August and September) and eight duplicate samples collected. In 2021, two field duplicate were collected in each sampling month. In July, three duplicates were collected, however, due to a labeling error the location where DUP-MEL-JUL-02 was collected could not be determined. The field duplicate assessment is provided in **Table A-3**.

As mentioned in **Section A.2.1.1**, the DQOs for field duplicates were 1.5X the laboratory RPD for each analyte unless no RPD was available, in which case, a default 40% was used. The laboratory RPDs for water chemistry for most analytes is 20% and, as such, in 2021 the DQOs for field duplicate water samples were generally less than ±30%.

Table A-4 summarizes analytes from each sampling event for which the field duplicate RPDs did not meet the DQOs. The shaded cells indicate one or more RPDs when concentrations were >10-times DL. The RPDs for total phosphorus, dissolved phosphorus and dissolved zinc did not meet DQOs in three to four sampling events. Parameters where DQO exceedances were associated with concentrations 10-times the MDL included: TDS, chloride, total phosphorus, copper (total and dissolved), iron, and manganese.

The 2021 field duplicate results were very good approximately 6% of the calculated RPDs not meeting DQOs. Only a few field duplicate RPDs did not meet DQOs in 2021, suggesting that sample collection and sample handling occurred at a high standard. Furthermore, very few RPDs did not meet DQOs when analyte concentrations were > 10-times DL, and for at least some of those instances the differences in analytes concentrations may be related to natural heterogeneity.

QC Blanks

Travel Blanks

Travel blanks were not submitted during the four sampling periods in March, and July to September.

De-ionized Water Blanks

The goal of these blanks is to test the quality of the de-ionized (DI) water batch and variability in laboratory analytical methods. DI blanks with the full suite of analyses were submitted for all sampling events. DI blanks were submitted for dissolved metals but not filtered in the field. Results of the blanks collected for the AEMP are reported in **Table A-2**.

In a March 15th DI blank, hardness (as CaCO3), total ammonia (as N), total organic carbon, calcium, strontium, antimony, and zinc were found at levels above detection limits. A number of parameters (nitrogen, antimony, sulfur, tin) were detected in a March 12th DI blank, but not in the equipment blank for the same event suggesting a potential laboratory error. Six parameters occurred at concentrations >10-times the MDL during this event, results which were much higher than the March 15th DI blank which found no analytes with concentrations higher than 10-times the MDL.

In July, nitrate, nitrate and nitrite (as N), ammonia, and DOC were detected at concentrations close to the detection limits.

In August, conductivity, silica, calcium, magnesium, rubidium, strontium, tungsten, zinc, and sodium were detected at concentrations close to the detection limits. Sodium occurred at a concentration >10-times the MDL during this event.

In September a number of nutrient parameters occurred at concentrations greater than detection limits along with total zinc and dissolved arsenic. Nitrate and nitrite (as N), nitrate, and total nitrogen occurred at concentrations >10-times the MDL, however a second DI blank taken the same day showed these nutrient concentrations to be below detection.

Equipment Blanks

Equipment blanks represent one of the best opportunities to assess not only the water sampling equipment but the skills of the sample teams. Collecting these samples requires careful planning and closely following the sample collection methods as outlined in the *AEMP Design Plan* (Golder, 2016; Golder 2018).

Several analytes were detected in each of the equipment blanks submitted in 2021 – results are provided in **Table A-2**. In general, results were acceptable for the 2021 sampling events:

In March, analytes detected 10-times above the MDLs were strontium and manganese. There were a number of analytes detected in the equipment blanks at concentrations close to the detection limits. These results are considered unlikely to impact the interpretation of water quality data from that month.

In July, there were a number of analytes for which the concentrations were close to the detection limits. Barium, calcium, iron, and strontium were present in concentrations greater than 10-times the MDL.

In August, conductivity, TSS, turbidity, chloride, sodium, strontium were detected at concentrations greater than 10-times the MDL in the equipment blank.

Most of these analytes were just above the detection limit and are considered very unlikely to impact the interpretation of water quality data from that month. All analytes that are detected at concentrations greater than 10-times the DL are flagged for closer scrutiny in the interpretation of the February, August and September water quality results. The implications of possible cross-contamination on interpreting the water quality data from the same event is considered inconsequential for each sampling event.

A.2.2.2 Laboratory Results

ALS provides a thorough account of their QC assessment in each COA that is issued[2]. These results are provided in **Table A-1**. The various components of the QC assessment are provided to help make informed decisions when interpreting the data. The QC program is comprised of four main elements:

- **Laboratory Duplicates** – The laboratory DQO for most parameters is an RPD of less than 20%. All of the laboratory duplicates met the DQOs for water chemistry in 2021 with the exception of total zinc in August at Atulik Lake (AL-01, 19 Aug 2021).
- **Method blanks (MB)** – The MB is a blank matrix sample that is taken through the entire analytical procedure to test variability in the analytical method and report any bias in the analysis. MB results are equal to the limit of reporting (or MDL as termed here). MB qualifiers are either:
    - "B" – Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
    - "MB-LOR" – Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank levels.

  For most sample analysis there were no flags or very few flags (e.g., one or two analytes in one sample may have been flagged for B) in the method blank results. These results indicate that the laboratory may have increased MDLs for several samples. However, the limited number of cases

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[2] The COA may include data qualifiers that relate to the sample "batch". The sample batch may include samples that are from other projects and the qualifiers included in the COA may relate to those and not the AEMP samples. In general, this does not impact the assessment of laboratory QA; however, in some instances, data qualifiers in the COA related to sample heterogeneity may not relate to AEMP samples. The Microsoft Excel® report that accompanies the COA includes tabs with detailed assessments of laboratory QA that are project specific and can be reviewed in conjunction with the COAs.

with DQO flags for MB samples were reviewed; the results do not affect the interpretation of the 2021 water quality data.

- **Matrix Spike (MS)** – MS recovery is periodically flagged in the QC assessment due to high concentrations of the analyte in the sample. These instances are rare, and are typically associated with parameters such as major cations (e.g., magnesium) or certain metals with detected results above the MDL (i.e., strontium), with the exception of silica (reactive as SiO_2) flagged in samples from the August and September sampling event. The limited number of cases with DQO flags for MS samples were reviewed; the results do not affect the interpretation of the 2021 water quality data.
- **Laboratory Control Samples (LCS) / Certified Reference Material (CRM) / Internal Reference Material (IRM)** – reference material analysis met the ALS DQOs for all samples analyzed as part of the 2021.

A.2.3 QA/QC Summary

Overall, the field and laboratory QA/QC water chemistry results in 2021 were very good:

Sample Integrity –Sample temperatures received at the laboratory were variable depending on season and reflect the challenges with shipping from a remote mine site. Likewise hold time exceedances for parameters and analytes with short hold times are unavoidable but are not considered likely to impact data analysis and interpretation.

Field Duplicates – The 2021 field duplicate results were very good with approximately 6% of the calculated RPDs not meeting DQOs.

Blanks – There were several analytes detected in the DI and EB samples submitted in 2021. The magnitude of the detected concentrations in the various blanks was typically less than 10-times the DL. In a few instances, the measured concentration in the QA blanks was greater than 10-times the DL. Detected concentrations of various parameters in the blanks merely indicates the *potential* for cross-contamination. Close examination of the water quality data from 2021 indicated concentrations were consistent with previously-reported results, and potential for cross-contamination to bias the interpretation of the 2021 water quality data is considered unlikely.

The detection of certain parameters in both the DI and EB in 2021 suggests there may have been underlying issues with the quality of the DI water at the lab in 2021. This quality and suitability of the DI water at ALS in Winnipeg is being discussed with the laboratory manager.

Laboratory QC Assessment –the laboratory QC assessment completed by ALS indicated the 2021 water quality data were typically within the established DQOs. In the few instances where a DQO was exceeded, the laboratory concluded the results were reliable and fit for use in the water quality assessment.

WATER CHEMISTRY QA/QC TABLES

Table A-1. Laboratory QA/QC summary for water sediment and phytoplankton, Meliadine AEMP, 2021.

Event	Lab ID	Parameters Measured	Date Sampled	Date Received	Sample Integrity Observations	Temperature (°C)	Hold-time Exceedances	Data Qualifiers[1]			Laboratory QC Summary									
											Detection Limits		Laboratory Duplicates		Method Blanks		Matrix Spike		LCS / CRM	
								Sample ID	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier
March	L2569015	All parameters	Mar 12 and 15	22-Mar	None.	16.3	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-PO4.	None.	-	-	None.	-	None.	-	None.	-	Ca, Mg, Na, Sr,	MS-B	None.	-
July	L2618088	All parameters	Jul 15	26-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-PO4.	None.	-	-	None.	-	None.	-	Total Alkalinity (as HCO3), Th	B	None.	-	None.	-
	L2618097	All parameters	Jul 18	26-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	None.	-	None.	-	None.	-
	L2618100	All parameters	Jul 18	23-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	None.	-	Ca, Mg, Na, Sr,	MS-B	None.	-
	L2618105	All parameters	Jul 19	27-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	Total Alkalinity (as HCO3), Th	B	None.	-	None.	-
	L2618108	All parameters	Jul 20	23-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	Total Alkalinity (as HCO3), Th	B	None.	-	None.	-
	L2618113	All parameters	Jul 18, 19, 20	23-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	Total Alkalinity (as HCO3), Th	B	None.	-	None.	-
	L2618115	All parameters	Jul 20	23-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	Total Alkalinity (as HCO3)	B	None.	-	None.	-
	L2618120	All parameters	Jul 20	23-Jul	None.	24.8	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	None.	-	Ca, Mg, Na, Sr,	MS-B	None.	-
August	L2625810	All parameters	Aug 6, 7	12-Aug	None.	6.4	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	None.	-	SiO2, Ca, Mg, Na, Sr,	MS-B	None.	-
	L2629445	All parameters	Aug 10, 14-16	23-Aug	None.	18.4	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-PO4, ammonia, DKN, TKN.	None.	-	-	None.	-	None.	-	None.	-	SiO2, Ca, Mg, Na, Sr,	MS-B	None.	-
	L2633552	All parameters	Aug 25	31-Aug	None.	19.7	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	None.	-	SiO2.	MS-B	None.	-
	L2633560	All parameters	Aug 25	31-Aug	None.	21.1	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	None.	-	None.	-	None.	-
	L2633576	All parameters	Aug 25	31-Aug	None.	21	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-$PO_{4.}$	None.	-	-	None.	-	None.	-	None.	-	None.	-	None.	-
	L2633582	All parameters	Aug 19	31-Aug	None.	21	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-PO4, ammonia, DKN, TKN, Hg.	None.	-	-	None.	-	Total Zn	DUP-H	None.	-	Ca, Mg, Na, Sr,	MS-B	None.	-
	C801782	Chlorophyll a	Aug 6, 7, 10, 14-16	20-Aug	MEL-02-01-PC, 02-04-PC - Samples not received		pH, Organic/Inorganic carbon, Hg.	MEL-05-05, MEL-01-09	Full triplicate not available since not received or filtering errors	-	None.	-	None.	-	None.	-	None.	-	None.	-
	L2629453	Sediment Chemistry	Aug 7, 10, 14, 15	18-Aug	None.	18.4	None.	None.	-	-	None.	-	None.	-	None.	-	None.	-	None.	-

Table A-1. Laboratory QA/QC summary for water sediment and phytoplankton, Meliadine AEMP, 2021.

Event	Lab ID	Parameters Measured	Date Sampled	Date Received	Sample Integrity Observations	Temperature (°C)	Hold-time Exceedances	Data Qualifiers[1]			Laboratory QC Summary									
											Detection Limits		Laboratory Duplicates		Method Blanks		Matrix Spike		LCS / CRM	
								Sample ID	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier
September	L2637721	All parameters	Sep 7	10-Sep	None.	18.3	pH, Diss O-PO_4, ammonia.	None.	-	-	None.	-	None.	-	None.	-	SiO2.	MS-B	None.	-
	L2637724	All parameters	Sep 2	10-Sep	None.	18.3	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-PO_4.	None.	-	-	None.	-	None.	-	None.	-	None.	-	None.	-
	L2637731	All parameters	Sep 2	10-Sep	None.	18.3	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-PO4, ammonia, DKN, TKN.	None.	-	-	None.	-	None.	-	None.	-	Ca, Mg, Na, Sr,	MS-B	None.	-
	L2637887	All parameters	Sep 5	10-Sep	None.	18.3	Nitrate, Nitrite, Turbidity, TDS, TSS, pH, Diss O-PO4, ammonia, DKN, TKN, alkalinity, Total CN, WAD CN, Total Hg, Diss Hg.	None.	-	-	None.	-	None.	-	None.	-	None.	-	None.	-

Notes:

[1] Data qualifiers referring to Method Blanks, Matrix Spikes, and LCS/CRM are not flagged here. Separate columns are used for these qualifiers.

Conventionals = analytes that are not preserved

Diss O-PO_4 = dissolved orthophosphate

LCS / CRM = laboratory control sample / certified reference material

TDS = total dissolved solids

TDP = total dissolved phosphorus

TSS = total suspended solids

Data and Laboratory QC qualifiers:

B = Method Blank exceeds ALS DQO.

CNP = Cyanide test sample appears to have been preserved, but pH was <10 at time of testing. Results may be biased low, particularly for Free CN species.

DLA = Detection Limit adjusted for required dilution.

DLB = Detection Limit Raised: Analyte detected at comparable level in method blank.

DLCI = Detection Limit Raised: Chromatographic interference due to co-elution.

DLDS = Detection Limit Raised: Dilution required due to high dissolved solids / electrical conductivity.

DLHM = Detection Limit Adjusted: Sample has high moisture content.

DLQ = Detection Limit raised due to co-eluting interference. GCMS qualifier ion ratio did not meet acceptance criteria.

DTC = Dissolved concentration exceeds total. Results were confirmed by re-analysis.

DTMF = Dissolved concentration exceeds total for field-filtered samples. Metallic contaminants may have been introduced to dissolved sample during field filtration.

PSAL = Limited sample was available for Particle Size Analysis

Data and Laboratory QC qualifiers (continued):

DUP-H = Duplicate results outside ALS DQO, due to sample heterogeneity.

HTD = Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.

HTP = Sample preparation or preservation hold time was exceeded.

MB-LOR = Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

MES = Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).

MS-B = Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

RRV = Reported result verified by repeat analysis.

RRR = Refer to report remarks for issues regarding analysis.

n/a = laboratory QC program not included as part of the analyses.

Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2021.

Month		March				July			August			September		
Collected at Blank (Travel, DI, or EB)		Detection Limits	Equip. Blank	DI Blank	DI Blank	Detection Limits	DI Blank	Equip. Blank	Detection Limits	DI Blank	Equip. Blank	Detection Limits	DI Blank	DI Blank
ALS Sample ID			L2569015-16	L2569015-17	L2569015-18		L2618113-4	L2618113-5		L2629445-21	L2629445-22		L2637887-7	L2637887-8
Physical Tests														
Conductivity	umhos/cm	1.0	<1.0	**1.1**	<1.0	1.0	<1.0	<1.0	1.0	**1**	14	1.0	**2.8**	<1.0
Alkalinity, Total (as CaCO3)	mg/L	1.0	<1.0	**1**	<1.0	1.0	<1.0	**1.3**	1.0	<1.0	**1.1**	1.0	<1.0	<1.0
Bicarbonate (HCO3)	mg/L	1.2	<1.2	**1.2**	<1.2	1.2	<1.2	**1.6**	1.2	<1.2	**1.3**	1.2	<1.2	<1.2
Carbonate (CO3)	mg/L	0.60	<0.60	<0.60	<0.60	0.60	<0.60	<0.60	0.60	<0.60	<0.60	0.60	<0.60	<0.60
Hardness (as CaCO3)	mg/L		<0.20	<0.20	**0.24**	0.20	<0.20	<0.20	0.20	<0.20	**0.23**	0.20	<0.20	<0.20
pH	pH units	0.1	5.8	5.7	5.97	0.1	5.31	5.58	0.1	5.47	5.77	0.1	4.99	5.27
Total Dissolved Solids	mg/L	4.0	<4.0	<4.0	<4.0	4.0	<4.0	<4.0	4.0	<4.0	**6.4**	4.0	<4.0	<4.0
Total Suspended Solids	mg/L	1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	1.0	<1.0	11	1.0	<1.0	<1.0
Turbidity	NTU	0.10	**0.16**	<0.10	<0.10	0.10	<0.10	**0.16**	0.10	<0.10	1.6	0.10	<0.10	<0.10
Anions and Nutrients														
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	<0.050	<0.050
Ammonia, Total (as N)	mg/L	0.0050	**0.0369**	**0.0402**	**0.0109**	0.0050	**0.0114**	**0.0105**	0.050	<0.050	<0.050	0.050	<0.050	<0.050
Bromide (Br)	mg/L	-	-	-	-	0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.10	<0.10	<0.10
Chloride (Cl)	mg/L	0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.10	<0.10	3.2	0.10	<0.10	<0.10
Fluoride (F)	mg/L	0.020	<0.020	<0.020	<0.020	0.020	<0.020	<0.020	0.020	<0.020	<0.020	0.020	<0.020	<0.020
Hydroxide (OH)	mg/L	0.34	<0.34	<0.34	<0.34	0.34	<0.34	<0.34	0.34	<0.34	<0.34	0.34	<0.34	<0.34
Nitrate and Nitrite as N	mg/L	0.0051	<0.0051	<0.0051	<0.0051	0.0051	**0.0053**	<0.0051	0.0051	<0.0051	<0.0051	0.0051	0.13	<0.0051
Nitrate (as N)	mg/L	0.0050	<0.0050	<0.0050	<0.0050	0.0050	**0.0053**	<0.0050	0.0050	<0.0050	<0.0050	0.0050	0.13	<0.0050
Nitrite (as N)	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
Total Nitrogen	mg/L	0.050	<0.050	<0.050	<0.050	0.050	<0.050	<0.050	0.050	<0.050	<0.050	0.0051	**0.128**	<0.0051
Dissolved Kjeldahl Nitrogen	mg/L	0.050	<0.050	**0.064**	<0.050	0.050	<0.050	<0.050	0.050	<0.050	<0.050	0.050	<0.050	<0.050
Total Dissolved Nitrogen	mg/L	0.050	<0.050	**0.064**	<0.050	0.050	<0.050	<0.050	0.050	<0.050	<0.050	0.050	**0.128**	<0.050
Orthophosphate-Diss (as P)	mg/L	0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	**0.0019**	0.0010	<0.0010	<0.0010
Phosphorus (P)-Total Diss	mg/L	0.0010	**0.0018**	<0.0010	<0.0010	0.0010	<0.0010	**0.0014**	0.0010	<0.0010	<0.0010	0.0010	**0.0013**	**0.0017**
Phosphorus (P)-Total	mg/L	0.0010	**0.0016**	<0.0010	<0.0010	0.0010	<0.0010	**0.0014**	0.0010	<0.0010	**0.0031**	0.0010	<0.0010	<0.0010
Silica, Reactive (as SiO2)	mg/L	0.010	<0.010	<0.010	<0.010	0.010	<0.010	**0.017**	0.010	**0.035**	**0.042**	0.010	**0.017**	<0.010
Sulfate (SO4)	mg/L	0.30	<0.30	<0.30	<0.30	**0.3**	<0.30	<0.30	0.30	<0.30	**0.51**	0.30	<0.30	<0.30
Cyanides														
Cyanide, Weak Acid Diss	mg/L	-	-	-	-	0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010
Cyanide, Total	mg/L	-	-	-	-	0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010
Cyanide, Free	mg/L	-	-	-	-	0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010
Organic Carbon														
Dissolved Organic Carbon	mg/L	0.50	<0.50	<0.50	<0.50	0.50	**0.88**	**0.54**	0.50	<0.50	<0.50	0.50	<0.50	<0.50
Total Organic Carbon	mg/L	0.50	<0.50	<0.50	**0.5**	0.50	<0.50	<0.50	0.50	<0.50	<0.50	0.50	<0.50	<0.50
Total Metals (Water)														
Mercury (Hg)-Total	ug/L	0.00050	<0.00050	**0.00094**	<0.00050	0.00050	<0.00050	<0.00050	0.00050	<0.00050	<0.00050	0.00050	<0.00050	<0.00050
Total Metals														
Aluminum (Al)-Total	mg/L	0.0010	**0.0024**	**0.0022**	<0.0010	0.0010	<0.0010	**0.007**	0.0030	<0.0010	**0.0142**	0.0010	<0.0010	<0.0010
Antimony (Sb)-Total	mg/L	0.00002	<0.000020	**0.000153**	<0.000020	0.00002	<0.000020	<0.000020	0.00003	<0.000020	<0.000030	0.00002	<0.000020	<0.000020
Arsenic (As)-Total	mg/L	0.00002	**0.000044**	**0.00004**	<0.000020	0.00002	<0.000020	**0.000183**	0.00005	<0.000020	**0.000077**	0.00002	<0.000020	<0.000020
Barium (Ba)-Total	mg/L	0.00002	**0.000064**	**0.000074**	<0.000020	0.00002	<0.000020	**0.000223**	0.00010	<0.000020	**0.0002**	0.00002	<0.000020	<0.000020
Beryllium (Be)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Bismuth (Bi)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00005	<0.0000050	<0.000050	0.00001	<0.0000050	<0.0000050
Boron (B)-Total	mg/L	0.0050	<0.0050	<0.0050	<0.0050	0.0050	<0.0050	<0.0050	0.010	<0.0050	<0.010	0.0050	<0.0050	<0.0050

Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2021.

Month		March				July			August			September		
Collected at Blank (Travel, DI, or EB)		**Detection Limits**	Equip. Blank	DI Blank	DI Blank	**Detection Limits**	DI Blank	Equip. Blank	**Detection Limits**	DI Blank	Equip. Blank	**Detection Limits**	DI Blank	DI Blank
ALS Sample ID			L2569015-16	L2569015-17	L2569015-18		L2618113-4	L2618113-5		L2629445-21	L2629445-22		L2637887-7	L2637887-8
Cadmium (Cd)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Calcium (Ca)-Total	mg/L	0.010	**0.061**	**0.062**	**0.095**	0.010	<0.010	0.10	0.020	**0.034**	**0.048**	0.010	<0.010	<0.010
Cesium (Cs)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Chromium (Cr)-Total	mg/L	0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	0.00050	<0.00010	<0.00050	0.00010	<0.00010	<0.00010
Cobalt (Co)-Total	mg/L	0.00001	**0.0000133**	**0.0000319**	<0.0000050	0.00001	<0.0000050	**0.0000106**	0.00005	<0.0000050	<0.000050	0.00001	<0.0000050	<0.0000050
Copper (Cu)-Total	mg/L	0.00005	**0.000311**	<0.000050	<0.000050	0.00005	<0.000050	**0.000224**	0.00050	<0.000050	<0.00050	0.00005	<0.000050	<0.000050
Gallium (Ga)-Total	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	0.00005	<0.000050	<0.000050
Iron (Fe)-Total	mg/L	0.0010	**0.0042**	**0.0029**	<0.0010	0.0010	<0.0010	0.019	0.010	<0.0010	**0.02**	0.0010	<0.0010	<0.0010
Lanthanum (La)-Total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	**0.000016**	0.00005	<0.000010	<0.000050	0.00001	<0.000010	<0.000010
Lead (Pb)-Total	mg/L	0.00001	**0.000024**	**0.000024**	<0.000010	0.00001	<0.000010	**0.000054**	0.00005	<0.000010	<0.000050	0.00001	<0.000010	<0.000010
Lithium (Li)-Total	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
Magnesium (Mg)-Total	mg/L	0.0040	**0.0074**	**0.0227**	<0.0040	0.0040	<0.0040	**0.0105**	0.010	**0.0245**	**0.048**	0.0040	<0.0040	<0.0040
Manganese (Mn)-Total	mg/L	0.00005	0.00054	**0.000156**	<0.000050	0.00005	<0.000050	**0.000386**	0.00020	<0.000050	**0.00026**	0.00005	<0.000050	<0.000050
Molybdenum (Mo)-Total	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	0.00005	<0.000050	<0.000050
Niobium (Nb)-Total	mg/L	0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	0.00020	<0.00010	<0.00020	0.00010	<0.00010	<0.00010
Nickel (Ni)-Total	mg/L	0.00005	**0.000067**	<0.000050	<0.000050	0.00005	<0.000050	**0.000071**	0.00010	<0.000050	<0.00010	0.00005	<0.000050	<0.000050
Phosphorus (P)-Total	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	<0.050
Potassium (K)-Total	mg/L	0.020	<0.020	<0.020	<0.020	0.020	<0.020	**0.034**	0.030	<0.020	<0.030	0.020	<0.020	<0.020
Rhenium (Re)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Rubidium (Rb)-Total	mg/L	0.00001	**0.0000075**	**0.0000143**	<0.0000050	0.00001	<0.0000050	**0.0000381**	0.00002	**0.0000109**	**0.000047**	0.00001	<0.0000050	<0.0000050
Selenium (Se)-Total	mg/L	0.00004	<0.000040	<0.000040	<0.000040	0.00004	<0.000040	<0.000040	0.00020	<0.000040	<0.00020	0.00004	<0.000040	<0.000040
Silicon (Si)-Total	mg/L	0.050	<0.050	<0.050	<0.050	0.050	<0.050	<0.050	0.10	<0.050	<0.10	0.050	<0.050	<0.050
Silver (Ag)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Sodium (Na)-Total	mg/L	0.020	**0.03**	1.6	<0.020	0.020	<0.020	**0.103**	0.020	0.20	0.49	0.020	<0.020	<0.020
Strontium (Sr)-Total	mg/L	0.00002	0.00024	0.00045	**0.0001**	0.00002	<0.000020	0.00039	0.00020	**0.000175**	**0.00045**	0.00002	<0.000020	<0.000020
Sulfur (S)-Total	mg/L	0.50	<0.50	**1.04**	<0.50	0.50	<0.50	<0.50	0.50	<0.50	<0.50	0.50	<0.50	<0.50
Tantalum (Ta)-Total	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
Tellurium (Te)-Total	mg/L	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	0.00005	<0.000020	<0.000050	0.00002	<0.000020	<0.000020
Thallium (Tl)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Thorium (Th)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	**0.0000054**	0.00001	<0.0000050	<0.0000050
Tin (Sn)-Total	mg/L	0.00002	<0.000020	0.00089	<0.000020	0.00002	<0.000020	**0.000032**	0.00020	<0.000020	<0.00020	0.00002	<0.000020	<0.000020
Titanium (Ti)-Total	mg/L	0.00005	**0.00008**	**0.00008**	<0.000050	0.00005	<0.000050	**0.000434**	0.0010	<0.000050	<0.0010	0.00005	<0.000050	<0.000050
Tungsten (W)-Total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	**0.000021**	0.00001	**0.000058**	**0.000028**	0.00001	<0.000010	<0.000010
Uranium (U)-Total	mg/L	0.00000	<0.0000010	<0.0000010	<0.0000010	0.00000	<0.0000010	<0.0000010	0.00000	<0.0000010	<0.0000020	0.00000	<0.0000010	<0.0000010
Vanadium (V)-Total	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	0.00020	<0.000050	<0.00020	0.00005	<0.000050	<0.000050
Yttrium (Y)-Total	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Zinc (Zn)-Total	mg/L	0.00050	**0.00304**	0.0053	<0.00050	0.00050	<0.00050	**0.00389**	0.0030	**0.00097**	<0.0030	0.00050	**0.00246**	<0.00050
Zirconium (Zr)-Total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	0.00005	<0.000010	<0.000050	0.00001	<0.000010	<0.000010
Dissolved Metals														
Aluminum (Al)-Dissolved	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
Antimony (Sb)-Dissolved	mg/L	0.00002	<0.000020	0.00024	**0.000094**	0.00002	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	0.00002	<0.000020	<0.000020
Arsenic (As)-Dissolved	mg/L	0.00002	**0.000026**	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	0.00002	<0.000020	**0.000025**
Barium (Ba)-Dissolved	mg/L	0.00002	**0.000046**	<0.000020	<0.000020	0.00002	<0.000020	**0.000031**	0.00002	<0.000020	**0.000049**	0.00002	<0.000020	<0.000020
Beryllium (Be)-Dissolved	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Bismuth (Bi)-Dissolved	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Boron (B)-Dissolved	mg/L	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
Cadmium (Cd)-Dissolved	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Calcium (Ca)-Dissolved	mg/L	0.010	**0.069**	<0.010	**0.096**	0.010	<0.010	**0.033**	0.010	**0.014**	**0.036**	0.010	<0.010	<0.010
Cesium (Cs)-Dissolved	mg/L	0.00001	<0.0000050	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050	0.00001	<0.0000050	<0.0000050
Chromium (Cr)-Dissolved	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

Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2021.

Month		March				July			August			September		
Collected at Blank (Travel, DI, or EB)		Detection Limits	Equip. Blank	DI Blank	DI Blank	Detection Limits	DI Blank	Equip. Blank	Detection Limits	DI Blank	Equip. Blank	Detection Limits	DI Blank	DI Blank
ALS Sample ID			L2569015-16	L2569015-17	L2569015-18		L2618113-4	L2618113-5		L2629445-21	L2629445-22		L2637887-7	L2637887-8
Cobalt (Co)-Dissolved	mg/L	0.00001	**0.0000172**	**0.0000067**	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*
Copper (Cu)-Dissolved	mg/L	0.00005	**0.000234**	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	**0.000065**	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*
Gallium (Ga)-Dissolved	mg/L	0.00005	*<0.000050*	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*
Iron (Fe)-Dissolved	mg/L	0.0010	**0.0011**	*<0.0010*	*<0.0010*	0.0010	*<0.0010*	*<0.0010*	0.0010	*<0.0010*	*<0.0010*	0.0010	*<0.0010*	*<0.0010*
Lanthanum (La)-Dissolved	mg/L	0.00001	*<0.000010*	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*
Lead (Pb)-Dissolved	mg/L	0.00001	*<0.000010*	**0.000017**	*<0.000010*	0.00001	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*
Lithium (Li)-Dissolved	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*
Magnesium (Mg)-Dissolved	mg/L	0.0040	**0.0058**	*<0.0040*	*<0.0040*	0.0040	*<0.0040*	*<0.0040*	0.0040	**0.0042**	**0.0329**	0.0040	*<0.0040*	*<0.0040*
Manganese (Mn)-Dissolved	mg/L	0.00005	**0.000452**	**0.000057**	*<0.000050*	0.00005	*<0.000050*	**0.000064**	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*
Mercury (Hg)-Dissolved	ug/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*
Molybdenum (Mo)-Dissolved	mg/L	0.00005	*<0.000050*	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*
Nickel (Ni)-Dissolved	mg/L	0.00005	**0.000052**	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*
Niobium (Nb)-Dissolved	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*
Phosphorus (P)-Dissolved	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*	*<0.050*
Potassium (K)-Dissolved	mg/L	0.020	*<0.020*	*<0.020*	*<0.020*	0.020	*<0.020*	*<0.020*	0.020	*<0.020*	*<0.020*	0.020	*<0.020*	*<0.020*
Rhenium (Re)-Dissolved	mg/L	0.00001	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*
Rubidium (Rb)-Dissolved	mg/L	0.00001	**0.0000068**	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	**0.0000079**	0.00001	*<0.0000050*	**0.0000101**	0.00001	*<0.0000050*	*<0.0000050*
Selenium (Se)-Dissolved	mg/L	0.00004	*<0.000040*	*<0.000040*	*<0.000040*	0.00004	*<0.000040*	*<0.000040*	0.00004	*<0.000040*	*<0.000040*	0.00004	*<0.000040*	*<0.000040*
Silicon (Si)-Dissolved	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*	*<0.050*
Silver (Ag)-Dissolved	mg/L	0.00001	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*
Sodium (Na)-Dissolved	mg/L	0.020	**0.032**	*<0.020*	*<0.020*	0.020	*<0.020*	**0.08**	0.020	**0.197**	0.33	0.020	*<0.020*	*<0.020*
Strontium (Sr)-Dissolved	mg/L	0.00002	0.00022	**0.000106**	**0.000108**	0.00002	*<0.000020*	**0.000126**	0.00002	**0.00003**	0.00033	0.00002	*<0.000020*	*<0.000020*
Sulfur (S)-Dissolved	mg/L	0.50	*<0.50*	*<0.50*	*<0.50*	0.50	*<0.50*	*<0.50*	0.50	*<0.50*	*<0.50*	0.50	*<0.50*	*<0.50*
Tantalum (Ta)-Dissolved	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*
Tellurium (Te)-Dissolved	mg/L	0.00002	*<0.000020*	*<0.000020*	*<0.000020*	0.00002	*<0.000020*	*<0.000020*	0.00002	*<0.000020*	*<0.000020*	0.00002	*<0.000020*	*<0.000020*
Thallium (Tl)-Dissolved	mg/L	0.00001	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*
Thorium (Th)-Dissolved	mg/L	0.00001	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*
Tin (Sn)-Dissolved	mg/L	0.00002	*<0.000020*	0.0015	*<0.000020*	0.00002	*<0.000020*	*<0.000020*	0.00002	*<0.000020*	*<0.000020*	0.00002	*<0.000020*	*<0.000020*
Titanium (Ti)-Dissolved	mg/L	0.00005	*<0.000050*	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*
Tungsten (W)-Dissolved	mg/L	0.00001	*<0.000010*	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	**0.000019**	0.00001	**0.000062**	**0.000029**	0.00001	*<0.000010*	*<0.000010*
Uranium (U)-Dissolved	mg/L	0.00000	*<0.0000010*	*<0.0000010*	*<0.0000010*	0.00000	*<0.0000010*	*<0.0000010*	0.00000	*<0.0000010*	*<0.0000010*	0.00000	*<0.0000010*	*<0.0000010*
Vanadium (V)-Dissolved	mg/L	0.00005	*<0.000050*	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*	0.00005	*<0.000050*	*<0.000050*
Yttrium (Y)-Dissolved	mg/L	0.00001	*<0.0000050*	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*	0.00001	*<0.0000050*	*<0.0000050*
Zinc (Zn)-Dissolved	mg/L	0.00050	**0.0032**	**0.00165**	**0.0032**	0.00050	*<0.00050*	**0.00232**	0.00050	*<0.00050*	**0.0009**	0.00050	*<0.00050*	*<0.00050*
Zirconium (Zr)-Dissolved	mg/L	0.00001	*<0.000010*	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*	0.00001	*<0.000010*	*<0.000010*

Notes

Bolded Travel, DI, or Equipment Blank concentration exceeds laboratory DLs but < 10x DL.

Shaded Travel, DI, or Equipment Blank concentration is > 10x DL.

Italicized numbers are below detection limits.

"-" analyte not measured

Table A-3. Field QA/QC summary for water quality, Meliadine AEMP, 2021.

Month	Units	Lab RPD Values (%)	Field RPD Values (%)	March							July									
Analyte				March MDLs	MEL-06-02	DUP-MAR-12	RPD (%)	MEL-02-08	DUP-MAR-15	RPD (%)	July MDLs	MEL-01-09	DUP-MEL-JUL-01	RPD (%)	-	DUP-MEL-JUL-02	RPD (%)	D7-01	DUP-MEL-JUL-03	RPD (%)
Date Sampled					12-Mar-21	12-Mar-21		15-Mar-21	15-Mar-21			18-Jul-21	18-Jul-21		-	19-Jul-21		20-Jul-21	20-Jul-21	
ALS Sample ID					L2569015-13	L2569015-14		L2569015-11	L2569015-15			L2618100-5	L2618113-1		-	L2618113-2		L2618120-1	L2618113-3	
Physical Tests (Water)																				
Conductivity	uS/cm	10	15	2.0	139	140	-0.7	137	140	-2	1.0	108	96	11	-	88		140	123	13
Hardness (as CaCO3)	-		40	0.20	40	39	3.1	39	39	1.0	0.20	27	26	3.7	-	24		42	41	3.9
pH	pH		40	0.10	7.4	7.4	-0.1	7.4	7.4	0.14	0.10	7.54	7.35	2.6	-	7.4		7.7	7.8	-0.39
Total Suspended Solids	mg/L		40	1.0	*<1.0*	*<1.0*		*<1.0*	*<1.0*		1.0	*<1.0*	1.3		-	*<1.0*		1.5	1.4	6.9
Total Dissolved Solids	mg/L		40	4.0	77	65	17	58	78	-29	13	57	54	5.4	-	49		69	66	4.4
Turbidity	NTU	15	23	0.10	0.17	0.19	-11	0.18	0.17	5.7	0.10	0.72	0.69	4.3	-	0.48		0.93	0.79	16
Anions and Nutrients (Water)																				
Alkalinity, Total (as CaCO3)	mg/L	20	30	1.0	23	23	0	25	25	2.8	1.0	21	17	23	-	17		43	43	-0.47
Ammonia, Total (as N)	mg/L	20	30	0.0050	0.061	0.053	14	0.037	0.029	24	0.0050	0.0093	0.0098	-5.2	-	0.0092		0.027	0.018	**42**
Bicarbonate (HCO3)	mg/L	20	30	1.2	28	28	0	31			1.2	25	20	23	-	20		52	52	-0.38
Bromide (Br)	mg/L	20	30	-	-	-		-	-		0.10	*<0.10*	*<0.10*		-	*<0.10*		*<0.10*	*<0.10*	
Carbonate (CO3)	mg/L	20	30	0.60	*<0.60*	*<0.60*		*<0.60*			0.60	*<0.60*	*<0.60*		-	*<0.60*		*<0.60*	*<0.60*	
Chloride (Cl)	mg/L	20	30	0.10	23	23	0	21	21	-3	0.10	14	14	3.6	-	12		14	9.9	36.0
Fluoride (F)	mg/L	20	30	0.020	0.033	0.032	3.1	0.034	0.035	-3	0.020	0.023	0.021	9.1	-	0.024		0.035	0.035	0
Hydroxide (OH)	mg/L	20	30	0.34	*<0.34*	*<0.34*		*<0.34*			0.34	*<0.34*	*<0.34*		-	*<0.34*		*<0.34*	*<0.34*	
Nitrate (as N)	mg/L	20	30	0.0050	0.024	0.023	3.4	0.026	0.029	-11	0.0050	*<0.0050*	*<0.0050*		-	0.012		0.016	0.0073	**77**
Nitrite (as N)	mg/L	20	30	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	mg/L	20	30	0.050	0.30	0.27	12	0.27	0.25	5.8	0.050	0.18	0.20	-12	-	0.21		0.36	0.34	6.0
Total Nitrogen	mg/L	20	30	0.050	0.32	0.29	11	0.29	0.28	4.2	0.050	0.18	0.20	-12	-	0.23		0.38	0.35	8.3
Dissolved Kjeldahl Nitrogen	mg/L	20	30	0.050	0.26	0.27	-3	0.30	0.28	5.2	0.050	0.16	0.17	-3.6	-	0.18		0.28	0.26	4.1
Total Dissolved Nitrogen	mg/L	20	30	0.050	0.29	0.29	-2	0.32	0.31	3.8	0.050	0.16	0.17	-3.6	-	0.19		0.29	0.27	7.1
Orthophosphate-Dissolved (as P)	mg/L	20	30	0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.0010	*<0.0010*	*<0.0010*		-	*<0.0010*		0.0013	0.0014	-7.4
Phosphorus (P)-Dissolved	mg/L	20	30	0.0010	0.0058	0.0067	-14	0.0022	0.0035	**-46**	0.0030	0.0029	0.0032	-9.8	-	0.0030		0.0057	0.0050	13
Phosphorus (P)-Total	mg/L	20	30	0.0010	0.012	0.0057	68.2	0.010	0.0051	**65**	0.0030	0.0073	0.0067	8.6	-	0.0057		0.010	0.011	-11
Silica, Reactive (as SiO2)	mg/L	20	30	0.010	0.32	0.32	-0.9	0.43			0.010	0.41	0.39	5.0	-	0.27		0.21	0.20	4.0
TDS (Calculated)	mg/L	20	30		71	70	1.1	68			0	50	46	9.0	-	43		70	63	11
Sulfate (SO4)	mg/L	20	30	0.30	7.7	7.7	0	7.3	7.8	-6	0.30	5.0	4.8	3.3	-	4.4		3.8	3.5	7.4
Cyanides (Water)																				
Cyanide, Weak Acid Diss	mg/L	20	30	-	-	-		-	-		0.0010	0.0017	*<0.0010*		-	*<0.0010*		*<0.0010*	*<0.0010*	
Cyanide, Total	mg/L	20	30	-	-	-		-	-		0.0010	0.0015	*<0.0010*		-	*<0.0010*		*<0.0010*	*<0.0010*	
Cyanide, Free	mg/L	20	30	-	-	-		-	-		0.0010	0.0018	*<0.0010*		-	*<0.0010*		*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (Water)																				
Dissolved Organic Carbon	mg/L	20	30	0.50	3.7	3.8	-0.5	3.9	4.0	-3	0.50	3.0	3.4	-12	-	3.6		3.8	4.2	-9.0
Total Organic Carbon	mg/L	20	30	0.50	4.0	3.8	4.9	3.8	3.6	4.6	0.50	3.5	3.2	8.8	-	3.3		4.1	3.9	3.0
Total Metals (Water)																				
Mercury (Hg)-Total	ug/L	20	30	0.00050	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*		0.00050	*<0.00050*	0.00057		-	0.00051		0.00065	0.00056	15
Total Metals (Undigested) (Water)																				
Aluminum (Al)-Total	mg/L	20	30	0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.0010	0.0071	0.0072	-1.4	-	0.0047		0.015	0.013	18
Antimony (Sb)-Total	mg/L	20	30	0.000020	0.000021	0.00012	**-141**	0.000020	0.000021	-5	0.000020	*<0.000020*	*<0.000020*		-	*<0.000020*		*<0.000020*	*<0.000020*	
Arsenic (As)-Total	mg/L	20	30	0.000020	0.00054	0.00053	3.2	0.00050	0.00051	-2	0.000020	0.00052	0.00049	5.9	-	0.00072		0.0013	0.0012	8.7
Barium (Ba)-Total	mg/L	20	30	0.000020	0.011	0.011	0	0.014	0.014	2.1	0.000020	0.0086	0.0086	-0.35	-	0.0088		0.016	0.015	1.3
Beryllium (Be)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		-	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Bismuth (Bi)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		-	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Boron (B)-Total	mg/L	20	30	0.0050	0.0096	0.0097	-1	0.0089	0.0091	-2	0.0050	0.0062	0.0070	-12	-	0.0058		0.013	0.013	-3.9
Cadmium (Cd)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		-	*<0.0000050*		0.000006	0.000007	-3.1
Calcium (Ca)-Total	mg/L	20	30	0.010	12	12	0.84	12	12	0	0.010	7.8	8.4	-7.4	-	7.9		13	12	1.6
Chromium (Cr)-Total	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		-	*<0.00010*		0.00011	0.00016	**-37**
Cobalt (Co)-Total	mg/L	20	30	0.000005	0.000023	0.000024	-5	0.000022	0.000024	-6	0.000005	0.000039	0.000040	-4.6	-	0.000020		0.000050	0.000050	-1.0
Copper (Cu)-Total	mg/L	20	30	0.000050	0.0015	0.0013	17	0.0011	0.0011	1.8	0.000050	0.00088	0.00089	-1.5	-	0.0014		0.00080	0.00081	-1.5
Gallium (Ga)-Total	mg/L	20	30	0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.000050	*<0.000050*	*<0.000050*		-	*<0.000050*		*<0.000050*	*<0.000050*	
Iron (Fe)-Total	mg/L	20	30	0.0010	0.0038	0.0035	8.2	0.011	0.0092	15	0.0010	0.044	0.043	2.1	-	0.025		0.10	0.10	0
Lanthanum (La)-Total	mg/L	20	30	0.000010	0.000015	0.000014	6.9	0.000022	0.000024	-9	0.000010	0.000036	0.000039	-8.0	-	0.000032		0.000047	0.000047	0
Lead (Pb)-Total	mg/L	20	30	0.000010	0.000011	*<0.000010*		*<0.000010*	*<0.000010*		0.000010	0.000016	0.000019	-17	-	0.000035		0.000072	0.000057	23
Lithium (Li)-Total	mg/L	20	30	0.00050	0.0020	0.0020	-1.0	0.0018	0.0018	0	0.00050	0.0011	0.0012	-5.1	-	0.0010		0.0014	0.0013	10
Magnesium (Mg)-Total	mg/L	20	30	0.0040	2.3	2.2	1.3	2.2	2.2	0.46	0.0040	1.5	1.6	-2.6	-	1.4		2.8	2.5	7.9
Manganese (Mn)-Total	mg/L	20	30	0.000050	0.0015	0.0015	1.3	0.0042	0.0042	-0.7	0.000050	0.016	0.016	-1.9	-	0.0051		0.0094	0.0091	3.0
Molybdenum (Mo)-Total	mg/L	20	30	0.000050	0.00014	0.00014	-1	0.00011	0.00011	-2	0.000050	0.000084	0.00016	**-63**	-	0.000077		0.00042	0.00039	7.6
Niobium (Nb)-Total	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		-	*<0.00010*		*<0.00010*	*<0.00010*	
Nickel (Ni)-Total	mg/L	20	30	0.000050	0.00091	0.00089	1.9	0.00089	0.00089	0.11	0.000050	0.00080	0.00078	2.4	-	0.00073		0.00064	0.00062	3.5
Phosphorus (P)-Total	mg/L	20	30	0.050	*<0.050*	*<0.050*		*<0.050*	*<0.050*		0.050	*<0.050*	*<0.050*		-	*<0.050*		*<0.050*	*<0.050*	
Potassium (K)-Total	mg/L	20	30	0.020	1.5	1.5	2.0	1.5	1.5	0	0.020	1.1	1.1	-4.5	-	1.0		1.4	1.3	8.3
Rhenium (Re)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		-	*<0.0000050*		*<0.0000050*	*<0.0000050*	

Table A-3. Field QA/QC summary for water quality, Meliadine AEMP, 2021.

Month	Units	Lab RPD Values (%)	Field RPD Values (%)	March							July									
Analyte				**March MDLs**	MEL-06-02	DUP-MAR-12	**RPD (%)**	MEL-02-08	DUP-MAR-15	**RPD (%)**	**July MDLs**	MEL-01-09	DUP-MEL-JUL-01	**RPD (%)**	-	DUP-MEL-JUL-02	**RPD (%)**	D7-01	DUP-MEL-JUL-03	**RPD (%)**
Date Sampled					12-Mar-21	12-Mar-21		15-Mar-21	15-Mar-21			18-Jul-21	18-Jul-21		-	19-Jul-21		20-Jul-21	20-Jul-21	
ALS Sample ID					L2569015-13	L2569015-14		L2569015-11	L2569015-15			L2618100-5	L2618113-1		-	L2618113-2		L2618120-1	L2618113-3	
Selenium (Se)-Total	mg/L	20	30	0.000040	0.000059	0.000055	7.0	0.000067	0.000065	3.0	0.000040	0.000055	0.000042	27	-	<0.000040		<0.000040	<0.000040	
Silicon (Si)-Total	mg/L	20	30	0.050	0.14	0.14	-2	0.17	0.18	-5	0.050	0.23	0.22	4.0	-	0.15		0.12	0.12	2.6
Silver (Ag)-Total	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	<0.0000050	
Sodium (Na)-Total	mg/L	20	30	0.020	10	10	0	9.5	9.4	0.74	0.020	6.9	6.8	0.87	-	6.0		9.7	7.5	26
Strontium (Sr)-Total	mg/L	20	30	0.000020	0.086	0.086	0.23	0.079	0.079	0.63	0.000020	0.052	0.055	-5.4	-	0.047		0.073	0.067	9.4
Sulfur (S)-Total	mg/L	20	30	0.50	2.9	3.0	-3	2.8	2.9	-5	0.50	1.8	1.7	5.2	-	1.6		1.4	1.2	12
Tantalum (Ta)-Total	mg/L	20	30	0.00010	<0.00010	<0.00010		<0.00010	<0.00010		0.00010	<0.00010	<0.00010		-	<0.00010		<0.00010	<0.00010	
Thallium (Tl)-Total	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	<0.0000050	
Tin (Sn)-Total	mg/L	20	30	0.000020	<0.000020	<0.000020		<0.000020	<0.000020		0.000020	<0.000020	<0.000020		-	<0.000020		0.000026	<0.000020	
Titanium (Ti)-Total	mg/L	20	30	0.000050	<0.000050	<0.000050		<0.000050	<0.000050		0.000050	0.00035	0.00037	-4.2	-	0.00016		0.00091	0.00087	4.5
Uranium (U)-Total	mg/L	20	30	0.000001	0.000022	0.000023	-2	0.000018	0.000018	0	0.000001	0.000018	0.000018	2.8	-	0.000015		0.000065	0.000064	2.2
Vanadium (V)-Total	mg/L	20	30	0.000050	<0.000050	<0.000050		<0.000050	<0.000050		0.000050	0.000058	0.000056	3.5	-	<0.000050		0.00015	0.00015	6.0
Zinc (Zn)-Total	mg/L	20	30	0.00050	0.0012	<0.00050		<0.00050	<0.00050		0.00050	<0.00050	0.0018		-	0.0041		0.0031	0.00095	**106**
Dissolved Metals (Water)																				
Aluminum (Al)-Dissolved	mg/L	20	30	0.0010	<0.0010	<0.0010		<0.0010	<0.0010		0.0010	0.0019	0.0016	17	-	0.0014		0.0031	0.0025	21
Antimony (Sb)-Dissolved	mg/L	20	30	0.000020	0.000024	0.000093	**-118**	0.000020	0.000080	**-120**	0.000020	<0.000020	<0.000020		-	<0.000020		<0.000020	<0.000020	
Arsenic (As)-Dissolved	mg/L	20	30	0.000020	0.00053	0.00053	-0.4	0.00049	0.00048	0.21	0.000020	0.00048	0.00047	1.9	-	0.00060		0.0010	0.00095	6.6
Barium (Ba)-Dissolved	mg/L	20	30	0.000020	0.012	0.012	0.86	0.014	0.014	-2	0.000020	0.0089	0.0083	6.3	-	0.0084		0.015	0.014	4.1
Beryllium (Be)-Dissolved	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	<0.0000050	
Bismuth (Bi)-Dissolved	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	<0.0000050	
Boron (B)-Dissolved	mg/L	20	30	0.0050	0.0099	0.0096	3.1	0.0086	0.0089	-3	0.0050	0.0071	0.0070	1.4	-	0.0057		0.014	0.013	6.7
Cadmium (Cd)-Dissolved	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	0.000005	
Calcium (Ca)-Dissolved	mg/L	20	30	0.010	12	12	4.2	12	12	0.84	0.010	8.3	8.0	4.1	-	7.5		12	12	0.81
Chromium (Cr)-Dissolved	mg/L	20	30	0.00010	<0.00010	<0.00010		<0.00010	<0.00010		0.00010	<0.00010	<0.00010		-	<0.00010		<0.00010	<0.00010	
Cobalt (Co)-Dissolved	mg/L	20	30	0.000005	0.000019	0.000019	1.6	0.000018	0.000017	7.4	0.000005	0.000015	0.000015	0.66	-	0.000009		0.000018	0.000015	15
Copper (Cu)-Dissolved	mg/L	20	30	0.000050	0.0016	0.0012	23	0.0011	0.0011	1.8	0.000050	0.00092	0.0012	-29	-	0.00099		0.00071	0.00076	-7.3
Gallium (Ga)-Dissolved	mg/L	20	30	0.000050	<0.000050	<0.000050		<0.000050	<0.000050		0.000050	<0.000050	<0.000050		-	<0.000050		<0.000050	<0.000050	
Iron (Fe)-Dissolved	mg/L	20	30	0.0010	0.0024	0.0019	23	0.0050	0.0040	22	0.0010	0.011	0.010	7.4	-	0.0076		0.034	0.030	11
Lanthanum (La)-Dissolved	mg/L	20	30	0.000010	0.000015	0.000014	6.9	0.000018	0.000019	-5	0.000010	0.000012	0.000010	18	-	0.000013		0.000013	0.000014	-7.4
Lead (Pb)-Dissolved	mg/L	20	30	0.000010	<0.000010	<0.000010		<0.000010	<0.000010		0.000010	<0.000010	<0.000010		-	<0.000010		0.000030	0.000021	**35**
Lithium (Li)-Dissolved	mg/L	20	30	0.00050	0.0020	0.0020	0.99	0.0018	0.0018	-1	0.00050	0.0013	0.0011	12	-	0.00098		0.0015	0.0013	15
Magnesium (Mg)-Dissolved	mg/L	20	30	0.0040	2.3	2.3	1.7	2.2	2.2	0.90	0.0040	1.6	1.5	3.9	-	1.4		2.7	2.4	12
Manganese (Mn)-Dissolved	mg/L	20	30	0.000050	0.00058	0.00055	6.4	0.00060	0.00056	7.1	0.000050	0.0025	0.0024	4.1	-	0.00071		0.00084	0.00062	30.5
Mercury (Hg)-Dissolved	ug/L	20	30	0.00050	<0.00050	<0.00050		<0.00050	<0.00050		0.00050	<0.00050	<0.00050		-	<0.00050		<0.00050	<0.00050	
Molybdenum (Mo)-Dissolved	mg/L	20	30	0.000050	0.00017	0.00014	22	0.00011	0.00011	0.89	0.000050	0.000088	0.00013	**-36**	-	0.000075		0.00044	0.00039	12
Nickel (Ni)-Dissolved	mg/L	20	30	0.000050	0.00090	0.00088	2.8	0.00092	0.00088	4.4	0.000050	0.00075	0.00080	-6.7	-	0.00068		0.00058	0.00058	-0.86
Niobium (Nb)-Dissolved	mg/L	20	30	0.00010	<0.00010	<0.00010		<0.00010	<0.00010		0.00010	<0.00010	<0.00010		-	<0.00010		<0.00010	<0.00010	
Phosphorus (P)-Dissolved	mg/L	20	30	0.050	<0.050	<0.050		<0.050	<0.050		0.050	<0.050	<0.050		-	<0.050		<0.050	<0.050	
Potassium (K)-Dissolved	mg/L	20	30	0.020	1.5	1.5	2.7	1.5	1.5	2.0	0.020	1.2	1.1	7.9	-	1.1		1.4	1.2	13
Rhenium (Re)-Dissolved	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	<0.0000050	
Selenium (Se)-Dissolved	mg/L	20	30	0.000040	0.000050	0.000058	-15	0.000059	0.000059	0	0.000040	<0.000040	<0.000040		-	<0.000040		0.000054	0.000040	30
Silicon (Si)-Dissolved	mg/L	20	30	0.050	0.14	0.13	0.74	0.17	0.18	-2	0.050	0.22	0.21	4.7	-	0.16		0.10	0.11	-6.6
Silver (Ag)-Dissolved	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	<0.0000050	
Sodium (Na)-Dissolved	mg/L	20	30	0.020	10	10	2.0	9.6	9.5	1.7	0.020	7.3	6.8	7.8	-	6.3		9.7	7.5	26
Strontium (Sr)-Dissolved	mg/L	20	30	0.000020	0.088	0.086	2.8	0.080	0.079	1.3	0.000020	0.053	0.054	-1.9	-	0.046		0.072	0.068	6.9
Sulfur (S)-Dissolved	mg/L	20	30	0.50	3.0	3.0	-1	2.8	2.9	-1	0.50	2.2	1.7	23	-	1.7		1.5	1.3	15
Tantalum (Ta)-Dissolved	mg/L	20	30	0.00010	<0.00010	<0.00010		<0.00010	<0.00010		0.00010	<0.00010	<0.00010		-	<0.00010		<0.00010	<0.00010	
Thallium (Tl)-Dissolved	mg/L	20	30	0.000005	<0.0000050	<0.0000050		<0.0000050	<0.0000050		0.000005	<0.0000050	<0.0000050		-	<0.0000050		<0.0000050	<0.0000050	
Tin (Sn)-Dissolved	mg/L	20	30	0.000020	<0.000020	<0.000020		<0.000020	<0.000020		0.000020	<0.000020	<0.000020		-	<0.000020		<0.000020	<0.000020	
Titanium (Ti)-Dissolved	mg/L	20	30	0.000050	<0.000050	<0.000050		<0.000050	<0.000050		0.000050	0.000058	<0.000050		-	<0.000050		0.000059	0.000060	-1.7
Uranium (U)-Dissolved	mg/L	20	30	0.000001	0.000024	0.000023	1.7	0.000017	0.000018	-6	0.000001	0.000015	0.000013	14	-	0.000015		0.000063	0.000063	0
Vanadium (V)-Dissolved	mg/L	20	30	0.000050	<0.000050	<0.000050		<0.000050	<0.000050		0.000050	<0.000050	<0.000050		-	<0.000050		0.000080	0.000078	2.5
Zinc (Zn)-Dissolved	mg/L	20	30	0.00050	0.0041	0.00094	**125**	0.00094	0.0012	-22	0.00050	0.0026	0.0013	**67**	-	0.0011		0.0020	0.00055	**114**

Table A-3. Field QA/QC summary for water quality, Meliadine AEMP, 2021.

Month				August							September						
Analyte	**Units**	**Lab RPD Values (%)**	**Field RPD Values (%)**	**August MDLs**	MEL-01-10	DUP-MEL-AUG-01	**RPD (%)**	MEL-02-03	DUP-MEL-AUG-02	**RPD (%)**	**Sep. MDLs**	MEL-01-07	DUP-MEL-SEP-02	**RPD (%)**	MEL-03-01	DUP-MEL-SEP-01	**RPD (%)**
Date Sampled					14-Aug-21	14-Aug-21		15-Aug-21	15-Aug-21			02-Sep-21	02-Sep-21		05-Sep-21	05-Sep-21	
ALS Sample ID					L2629445-6	L2629445-17		L2629445-8	L2629445-18			L2637731-3	L2637731-6		L2637887-1	L2637887-6	
Physical Tests (Water)																	
Conductivity	uS/cm	10	15	1.0	101	102	-0.99	89	89	-0.22	1.0	105	105	0	80	80	0.13
Hardness (as CaCO3)	-		40	0.20	27	28	-2.9	25	24	2.9	0.20	27	27	-2	23	23	-3
pH	pH		40	0.10	7.4	7.3	0.55	7.4	7.3	0.27	0.10	7.4	7.4	0	7.4	7.4	-0.1
Total Suspended Solids	mg/L		40	1.0	*<1.0*	*<1.0*		*<1.0*	*<1.0*		1.0	*<1.0*	*<1.0*		*<1.0*	*<1.0*	
Total Dissolved Solids	mg/L		40	4.0	53	56	-5.5	49	41	18	13	51	25	68.4	44	55	-22
Turbidity	NTU	15	23	0.10	0.49	0.46	6.3	0.29	0.28	3.5	0.10	0.54	0.41	**27**	0.13	0.17	**-27**
Anions and Nutrients (Water)																	
Alkalinity, Total (as CaCO3)	mg/L	20	30	1.0	17	17	0.60	17	17	2.4	1.0	17	17	4.1	17	17	-1
Ammonia, Total (as N)	mg/L	20	30	0.050	*<0.050*	*<0.050*		*<0.050*	*<0.050*		0.050	0.095	*<0.050*		*<0.050*	*<0.050*	
Bicarbonate (HCO3)	mg/L	20	30	1.2	21	20	0.49	21	20	2.4	1.2	21	20	3.9	21	21	-0.9
Bromide (Br)	mg/L	20	30	0.10	*<0.10*	*<0.10*		*<0.10*	*<0.10*		0.10	*<0.10*	*<0.10*		*<0.10*	*<0.10*	
Carbonate (CO3)	mg/L	20	30	0.60	*<0.60*	*<0.60*		*<0.60*	*<0.60*		0.60	*<0.60*	*<0.60*		*<0.60*	*<0.60*	
Chloride (Cl)	mg/L	20	30	0.10	15	15	5.4	12	12	3.3	0.10	16	16	1.3	10	10	-1.0
Fluoride (F)	mg/L	20	30	0.020	0.025	0.025	0	0.026	0.026	0	0.020	0.027	0.026	3.8	0.025	0.026	-4
Hydroxide (OH)	mg/L	20	30	0.34	*<0.34*	*<0.34*		*<0.34*	*<0.34*		0.34	*<0.34*	*<0.34*		*<0.34*	*<0.34*	
Nitrate (as N)	mg/L	20	30	0.0050	*<0.0050*	*<0.0050*		*<0.0050*	*<0.0050*		0.0050	0.017	0.016	6.0	*<0.0050*	*<0.0050*	
Nitrite (as N)	mg/L	20	30	0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Total Kjeldahl Nitrogen	mg/L	20	30	0.050	0.22	0.21	5.5	0.22	0.21	4.2	0.050	0.27	0.21	23	0.14	0.14	-6
Total Nitrogen	mg/L	20	30	0.050	0.22	0.21	5.5	0.22	0.21	4.2	0.0051	0.017	0.016	6.0	*<0.0051*	0.23	
Dissolved Kjeldahl Nitrogen	mg/L	20	30	0.050	0.29	0.21	**31**	0.19	0.16	16	0.050	0.26	0.26	-2	0.13	0.23	**-58**
Total Dissolved Nitrogen	mg/L	20	30	0.050	0.29	0.21	**31**	0.19	0.16	16	0.050	0.27	0.28	-2	0.13	0.23	**-58**
Orthophosphate-Dissolved (as P)	mg/L	20	30	0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Phosphorus (P)-Dissolved	mg/L	20	30	0.0010	0.0018	0.0029	**-47**	0.0020	0.0020	0	0.0010	0.0029	0.0031	-7	0.0040	0.0026	**42**
Phosphorus (P)-Total	mg/L	20	30	0.0010	0.0059	0.0055	7.0	0.0044	0.0031	**35**	0.0030	0.0063	0.0059	6.6	0.0029	0.0036	-22
Silica, Reactive (as SiO2)	mg/L	20	30	0.010	0.34	0.34	-2.4	0.23	0.24	-2.1	0.010	0.31	0.32	-5	0.18	0.19	-5
TDS (Calculated)	mg/L	20	30	0	49	48	0.41	43	42	2.3	0	50	50	0.60	38	39	-1
Sulfate (SO4)	mg/L	20	30	0.30	5.4	5.5	-1.5	4.5	4.5	-0.44	0.30	5.9	5.8	1.5	3.8	3.8	-0.5
Cyanides (Water)																	
Cyanide, Weak Acid Diss	mg/L	20	30	0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Cyanide, Total	mg/L	20	30	0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Cyanide, Free	mg/L	20	30	0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*		0.0010	*<0.0010*	*<0.0010*		*<0.0010*	*<0.0010*	
Organic / Inorganic Carbon (Water)																	
Dissolved Organic Carbon	mg/L	20	30	0.50	3.3	3.6	-9.0	2.9	2.8	3.6	0.50	3.7	3.7	0.54	2.6	2.8	-8
Total Organic Carbon	mg/L	20	30	0.50	3.2	3.3	-1.6	2.9	3.1	-6.3	0.50	3.3	3.6	-7	2.5	2.6	-3
Total Metals (Water)																	
Mercury (Hg)-Total	ug/L	20	30	0.00050	0.00050	*<0.00050*		*<0.00050*	*<0.00050*		0.00050	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Total Metals (Undigested) (Water)																	
Aluminum (Al)-Total	mg/L	20	30	0.0010	0.0037	0.0042	-13	0.0019	0.0019	0	0.0010	0.0052	0.0055	-6	0.0022	0.0028	-24
Antimony (Sb)-Total	mg/L	20	30	0.000020	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		0.000020	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Arsenic (As)-Total	mg/L	20	30	0.000020	0.00048	0.00046	4.0	0.00053	0.00052	2.3	0.000020	0.00047	0.00045	5.2	0.00030	0.00032	-5
Barium (Ba)-Total	mg/L	20	30	0.000020	0.0082	0.0082	0.73	0.0080	0.0078	2.7	0.000020	0.0081	0.0081	0	0.0078	0.0082	-5
Beryllium (Be)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Bismuth (Bi)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Boron (B)-Total	mg/L	20	30	0.0050	0.0068	0.0070	-2.9	0.0054	0.0053	1.9	0.0050	0.0072	0.0072	0	*<0.0050*	*<0.0050*	
Cadmium (Cd)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium (Ca)-Total	mg/L	20	30	0.010	8.2	8.3	-1.3	7.6	7.6	-0.13	0.010	8.3	8.3	-0.5	7.1	7.2	-1
Chromium (Cr)-Total	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Cobalt (Co)-Total	mg/L	20	30	0.000005	0.000027	0.000029	-6.4	0.000016	0.000018	-14	0.000005	0.000027	0.000029	-6	0.000010	0.000011	-11
Copper (Cu)-Total	mg/L	20	30	0.000050	0.00087	0.0014	-47.7	0.0010	0.00076	30	0.000050	0.00084	0.00087	-4	0.00067	0.00069	-3
Gallium (Ga)-Total	mg/L	20	30	0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Iron (Fe)-Total	mg/L	20	30	0.0010	0.020	0.020	3.0	0.011	0.012	-12	0.0010	0.019	0.021	-10	0.0078	0.0096	-21
Lanthanum (La)-Total	mg/L	20	30	0.000010	0.000029	0.000028	3.5	0.000023	0.000023	0	0.000010	0.000036	0.000037	-3	0.000016	0.000019	-17
Lead (Pb)-Total	mg/L	20	30	0.000010	*<0.000010*	*<0.000010*		0.000011	0.000014	-24	0.000010	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Lithium (Li)-Total	mg/L	20	30	0.00050	0.0012	0.0012	-0.81	0.00097	0.00096	1.0	0.00050	0.0012	0.0012	0	0.00084	0.00085	-1
Magnesium (Mg)-Total	mg/L	20	30	0.0040	1.6	1.6	1.9	1.4	1.3	2.2	0.0040	1.6	1.6	0	1.2	1.2	-4
Manganese (Mn)-Total	mg/L	20	30	0.000050	0.0068	0.0066	3.0	0.0036	0.0037	-4.4	0.000050	0.0054	0.0058	-7	0.0020	0.0021	-9
Molybdenum (Mo)-Total	mg/L	20	30	0.000050	0.000096	0.00010	-6.1	0.000088	0.000082	7.1	0.000050	0.00011	0.00011	-2	0.000075	0.000085	-13
Niobium (Nb)-Total	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Nickel (Ni)-Total	mg/L	20	30	0.000050	0.00069	0.00066	3.3	0.00054	0.00052	2.7	0.000050	0.00069	0.00070	-3	0.00046	0.00042	8.5
Phosphorus (P)-Total	mg/L	20	30	0.050	*<0.050*	*<0.050*		*<0.050*	*<0.050*		0.050	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium (K)-Total	mg/L	20	30	0.020	1.1	1.1	0	1.0	1.0	0	0.020	1.1	1.1	0	0.96	0.99	-4
Rhenium (Re)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	

Table A-3. Field QA/QC summary for water quality, Meliadine AEMP, 2021.

Month	Units	Lab RPD Values (%)	Field RPD Values (%)	August							September						
Analyte				**August MDLs**	MEL-01-10	DUP-MEL-AUG-01	**RPD (%)**	MEL-02-03	DUP-MEL-AUG-02	**RPD (%)**	**Sep. MDLs**	MEL-01-07	DUP-MEL-SEP-02	**RPD (%)**	MEL-03-01	DUP-MEL-SEP-01	**RPD (%)**
Date Sampled					14-Aug-21	14-Aug-21		15-Aug-21	15-Aug-21			02-Sep-21	02-Sep-21		05-Sep-21	05-Sep-21	
ALS Sample ID					L2629445-6	L2629445-17		L2629445-8	L2629445-18			L2637731-3	L2637731-6		L2637887-1	L2637887-6	
Selenium (Se)-Total	mg/L	20	30	0.000040	*<0.000040*	*<0.000040*		*<0.000040*	*<0.000040*		0.000040	0.000051	0.000043	17	*<0.000040*	*<0.000040*	
Silicon (Si)-Total	mg/L	20	30	0.050	0.18	0.19	-4.3	0.11	0.12	-7.0	0.050	0.13	0.14	-3	0.096	0.10	-5
Silver (Ag)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Sodium (Na)-Total	mg/L	20	30	0.020	7.1	7.1	-0.42	5.8	5.8	0	0.020	7.5	7.5	-1	5.0	5.2	-4
Strontium (Sr)-Total	mg/L	20	30	0.000020	0.055	0.055	-0.54	0.046	0.046	1.1	0.000020	0.055	0.057	-3	0.040	0.040	0
Sulfur (S)-Total	mg/L	20	30	0.50	1.9	2.0	-3.1	1.5	1.5	-5.3	0.50	1.9	2.1	-8	1.3	1.3	-0.8
Tantalum (Ta)-Total	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Thallium (Tl)-Total	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Tin (Sn)-Total	mg/L	20	30	0.000020	*<0.000020*	*<0.000020*		0.000030	*<0.000020*		0.000020	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Titanium (Ti)-Total	mg/L	20	30	0.000050	0.00017	0.00017	-2.4	*<0.000050*	0.000059		0.000050	0.00018	0.00018	2.8	0.000051	0.00013	**-87**
Uranium (U)-Total	mg/L	20	30	0.000001	0.000020	0.000019	4.6	0.000017	0.000017	4.7	0.000001	0.000022	0.000021	4.2	0.000015	0.000015	-0.7
Vanadium (V)-Total	mg/L	20	30	0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Zinc (Zn)-Total	mg/L	20	30	0.00050	0.00068	0.00087	-25	0.00084	*<0.00050*		0.00050	0.00055	*<0.00050*		0.0029	0.0031	-6
Dissolved Metals (Water)																	
Aluminum (Al)-Dissolved	mg/L	20	30	0.0010	0.0015	0.0013	14	0.0012	0.0010	18	0.0010	0.0023	0.0027	-16	0.0015	0.0018	-18
Antimony (Sb)-Dissolved	mg/L	20	30	0.000020	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*		0.000020	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Arsenic (As)-Dissolved	mg/L	20	30	0.000020	0.00047	0.00044	7.0	0.00048	0.00049	-3.1	0.000020	0.00040	0.00043	-7	0.00029	0.00029	0
Barium (Ba)-Dissolved	mg/L	20	30	0.000020	0.0079	0.0083	-5.2	0.0077	0.0078	-1.5	0.000020	0.0077	0.0079	-3	0.0078	0.0077	0.65
Beryllium (Be)-Dissolved	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Bismuth (Bi)-Dissolved	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Boron (B)-Dissolved	mg/L	20	30	0.0050	0.0068	0.0073	-7.1	0.0055	0.0054	1.8	0.0050	0.0071	0.0072	-1	*<0.0050*	*<0.0050*	
Cadmium (Cd)-Dissolved	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Calcium (Ca)-Dissolved	mg/L	20	30	0.010	8.3	8.6	-3.0	7.8	7.6	2.9	0.010	8.1	8.3	-2	7.1	7.3	-3
Chromium (Cr)-Dissolved	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Cobalt (Co)-Dissolved	mg/L	20	30	0.000005	0.000012	0.000013	-10	0.000009	0.000011	-26	0.000005	0.000012	0.000014	-18	0.000008	0.000007	8.0
Copper (Cu)-Dissolved	mg/L	20	30	0.000050	0.0039	0.0012	106.7	0.00080	0.00081	-1.2	0.000050	0.00087	0.00081	7.1	0.00066	0.00065	1.4
Gallium (Ga)-Dissolved	mg/L	20	30	0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Iron (Fe)-Dissolved	mg/L	20	30	0.0010	0.0051	0.0052	-1.9	0.0037	0.0039	-5.3	0.0010	0.010	0.0063	47.3	0.0029	0.0033	-13
Lanthanum (La)-Dissolved	mg/L	20	30	0.000010	0.000012	0.000012	0	0.000016	0.000014	13	0.000010	0.000017	0.000017	0	*<0.000010*	*<0.000010*	
Lead (Pb)-Dissolved	mg/L	20	30	0.000010	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*		0.000010	*<0.000010*	*<0.000010*		*<0.000010*	*<0.000010*	
Lithium (Li)-Dissolved	mg/L	20	30	0.00050	0.0012	0.0013	-6.5	0.00098	0.00096	2.1	0.00050	0.0011	0.0012	-4	0.00081	0.00084	-4
Magnesium (Mg)-Dissolved	mg/L	20	30	0.0040	1.5	1.5	-1.3	1.3	1.3	3.1	0.0040	1.5	1.6	-2	1.2	1.2	-2
Manganese (Mn)-Dissolved	mg/L	20	30	0.000050	0.00047	0.00053	-11	0.00043	0.00044	-2.3	0.000050	0.00040	0.00036	11	0.00030	0.00035	-14
Mercury (Hg)-Dissolved	ug/L	20	30	0.00050	*<0.00050*	*<0.00050*		0.00051	*<0.00050*		0.00050	*<0.00050*	*<0.00050*		*<0.00050*	*<0.00050*	
Molybdenum (Mo)-Dissolved	mg/L	20	30	0.000050	0.00010	0.00010	0	0.000086	0.000087	-1.2	0.000050	0.00011	0.00011	2.8	0.000075	0.000079	-5
Nickel (Ni)-Dissolved	mg/L	20	30	0.000050	0.00064	0.00063	2.8	0.00053	0.00051	4.6	0.000050	0.00068	0.00067	1.0	0.00041	0.00044	-7
Niobium (Nb)-Dissolved	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Phosphorus (P)-Dissolved	mg/L	20	30	0.050	*<0.050*	*<0.050*		*<0.050*	*<0.050*		0.050	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Potassium (K)-Dissolved	mg/L	20	30	0.020	1.1	1.1	-0.94	1.00	0.99	1.1	0.020	1.1	1.1	-2	0.94	0.94	-0.1
Rhenium (Re)-Dissolved	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Selenium (Se)-Dissolved	mg/L	20	30	0.000040	*<0.000040*	*<0.000040*		*<0.000040*	0.000044		0.000040	*<0.000040*	*<0.000040*		*<0.000040*	*<0.000040*	
Silicon (Si)-Dissolved	mg/L	20	30	0.050	0.16	0.16	0	0.12	0.12	3.3	0.050	0.14	0.14	2.2	0.093	0.091	2.2
Silver (Ag)-Dissolved	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Sodium (Na)-Dissolved	mg/L	20	30	0.020	6.8	7.1	-4.2	5.8	5.7	1.9	0.020	7.3	7.6	-3	5.0	5.1	-2
Strontium (Sr)-Dissolved	mg/L	20	30	0.000020	0.055	0.057	-3.5	0.047	0.047	0	0.000020	0.056	0.058	-4	0.040	0.040	-0.5
Sulfur (S)-Dissolved	mg/L	20	30	0.50	1.9	2.1	-9.1	1.8	1.6	8.8	0.50	2.0	1.9	2.6	1.4	1.4	2.2
Tantalum (Ta)-Dissolved	mg/L	20	30	0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*		0.00010	*<0.00010*	*<0.00010*		*<0.00010*	*<0.00010*	
Thallium (Tl)-Dissolved	mg/L	20	30	0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*		0.000005	*<0.0000050*	*<0.0000050*		*<0.0000050*	*<0.0000050*	
Tin (Sn)-Dissolved	mg/L	20	30	0.000020	0.000042	0.000032	27	0.000023	*<0.000020*		0.000020	*<0.000020*	*<0.000020*		*<0.000020*	*<0.000020*	
Titanium (Ti)-Dissolved	mg/L	20	30	0.000050	0.000050	*<0.000050*		*<0.000050*	*<0.000050*		0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Uranium (U)-Dissolved	mg/L	20	30	0.000001	0.000018	0.000020	-12	0.000017	0.000016	9.1	0.000001	0.000020	0.000021	-2	0.000014	0.000013	3.0
Vanadium (V)-Dissolved	mg/L	20	30	0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*		0.000050	*<0.000050*	*<0.000050*		*<0.000050*	*<0.000050*	
Zinc (Zn)-Dissolved	mg/L	20	30	0.00050	0.0016	*<0.00050*		0.00057	*<0.00050*		0.00050	*<0.00050*	0.0014		0.0011	0.0015	**-33**

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs are only calculated when both samples are above detection.

The data quality objective (DQO) for field duplicates is an RPD of 1.5 x the laboratory RPD or 40% in the absence of a lab RPD.

Bolded RPDs	**RPD values exceeded but < 10 x MDL.**
Shaded RPDs	RPD values exceeded and > 10 x MDL.

Italicized numbers are below detection limits.

"-" = No measurement

Table A-4. Water chemistry field duplicate RPDs greater than QA/QC DQO's for Meliadine AEMP, 2021.

Parameter	March	July	August	September
Total Dissolved Solids				I
Turbidity				I
Ammonia, Total (as N)		I		
Chloride (Cl)		I		
Nitrite (as N)		I		
Dissolved Kjeldahl Nitrogen			I	I
Total Dissolved Nitrogen			I	I
Phosphorus (P)-Total Dissolved	I		I	I
Phosphorus (P)-Total	II		I	
Total metals				
Antimony (Sb)-Total	I			
Chromium (Cr)-Total		I		
Copper (Cu)-Total			I	
Molybdenum (Mo)-Total		I		
Titanium (Ti)-Total				I
Zinc (Zn)-Total		I		
Dissolved metals				
Antimony (Sb)-Dissolved	II			
Copper (Cu)-Dissolved			I	
Iron (Fe)-Dissolved				I
Lead (Pb)-Dissolved		I		
Manganese (Mn)-Dissolved		I		
Molybdenum (Mo)-Dissolved		I		
Zinc (Zn)-Dissolved	I	II		I

Notes:

Shading indicates that the DQO was exceeded and the concentrations were >10X MDL.

A.3 SEDIMENT CHEMISTRY

A.3.1 QA/QC Methods

An overview of the QA/QC methods in 2021 for the sediment component of the AEMP is provided below; refer to the 2016 AEMP Design Plan (Golder 2016) for a complete description.

A.3.1.1 Field

Field QA consisted of taking care between sampling areas by rinsing and cleaning the sampling gear for sediment grabs (Petite Ponar grab, stainless steel compositing bowls and spoons) using site water and phosphate-free cleaning detergent, to avoid the possibility of cross-contamination. Field QC measures included collection and analysis of field duplicates.

A.3.1.2 Laboratory

Laboratory duplicates were analyzed for sediment chemistry parameters similar to water chemistry parameters.

A.3.2 Results and Discussion

A.3.2.1 Field Results

Field Duplicates

Two grab sample field duplicates were collected in 2021 for general chemistry (moisture, pH, particle size, TOC and metals). The field duplicates for grab samples are provided in **Table A-5**. The DQOs for sediment samples are similar to those outlined for water chemistry (Section A.2.1). Generally, the RPD limits were 1.5 times the laboratory RPDs unless no RPD was provided in which case a default ±40% was applied. For grab samples, RPDs are also calculated on particle size and moisture content where default DQOs of 40% and 30% DQO were applied, respectively.

All field DQOs were met for the samples that were analyzed in 2021. Overall, field duplicate results indicate good field collection methods and a high degree of replicability in sampling.

A.3.2.2 Laboratory Results

Laboratory QC for sediment samples included laboratory control samples, method blanks, matrix spikes, and reference material. No qualifiers were identified for the laboratory QC results indicating a high degree of precision for the laboratory analysis and that laboratory processing and analytical methods were consistent between sub-samples.

A.3.3 QA/QC Summary

Overall, the field and laboratory QA/QC water chemistry results in 2021 were very good:

Sample Integrity –Sample temperatures received at the laboratory were variable depending on season and reflect the challenges with shipping from a remote mine site. Likewise hold time exceedances for parameters and analytes with short hold times are unavoidable but are not considered likely to impact data analysis and interpretation.

Field Duplicates – The 2021 field duplicate results were very good all of the calculated RPDs meeting DQOs.

Laboratory QC Assessment –the laboratory QC assessment completed by ALS indicated the 2021 sediment quality data were within the established DQOs.

SEDIMENT CHEMISTRY QA/QC TABLES

Table A-5. Field duplicate results for the sediment grabs collected in 2021.

Analyte	Units	DLs	Lab RPD (%)	Field RPD (%)[1]	DUP-01			DUP-02		
					MEL-03-04	DUP-01[2]	RPD (%)	MEL-01-07	DUP-02[2]	RPD (%)
Date Sampled					10-Aug-21			14-Aug-21		
ALS Sample ID					L2629453-14	L2629453-21		L2629453-3	L2629453-22	
Physical Tests (Soil)										
pH (1:2 soil:water)	*pH*	*0.1*	5	8	6.74	6.39	5	5.77	5.98	-3.6
Particle Size (Soil)										
Cobbles (>3in.)	*%*	*1*	5	8	*<1.0*	*<1.0*		*<1.0*	*<1.0*	
Gravel (4.75mm - 3in.)	*%*	*1*	5	8	*<1.0*	*<1.0*		*<1.0*	*<1.0*	
Medium Sand (0.425mm - 2.0m	*%*	*1*	5	8	2	*<1.0*		*<1.0*	*<1.0*	
Fines (<0.075mm)	*%*	*1*		40	68	67	0	92.6	93.7	-1.2
Coarse Sand (2.0mm - 4.75mm)	*%*	*1*	5	8	*<1.0*	*<1.0*		*<1.0*	*<1.0*	
Fine Sand (0.075mm - 0.425mm	*%*	*1*		40	31	32	-5	6.6	6.0	9.5
Organic / Inorganic Carbon (Soil)										
Total Organic Carbon	*%*	*0.05*	20	30	5.06	5.29	-4	5.18	4.71	9.5
Metals (Soil)										
Aluminum (Al)	*mg/kg*	*50*	40	60	6900	8130	-16	13300	13600	-2
Antimony (Sb)	*mg/kg*	*0.1*	30	45	*<0.10*	0		0.14	0.14	0
Arsenic (As)	*mg/kg*	*0.1*	30	45	5	5	-3	58.60	37.50	44
Barium (Ba)	*mg/kg*	*0.5*	40	60	73	82	-11	138.00	136.00	1
Beryllium (Be)	*mg/kg*	*0.1*	30	45	0	0	-6	0.29	0.33	-13
Bismuth (Bi)	*mg/kg*	*0.2*	30	45	*<0.20*	*<0.20*		0.320	0.310	3
Boron (B)	*mg/kg*	*5*	30	45	*<5.0*	5		6	6	5
Cadmium (Cd)	*mg/kg*	*0.02*	30	45	0.16	0.183	-13	0.46	0.51	-10
Calcium (Ca)	*mg/kg*	*50*	30	45	4310	4780	-10	4580.0	4460.0	3
Chromium (Cr)	*mg/kg*	*0.5*	30	45	24	26	-9	48.2	50.3	-4
Cobalt (Co)	*mg/kg*	*0.1*	30	45	6	6	-6	16	15	5
Copper (Cu)	*mg/kg*	*0.5*	30	45	48	52	-8	78.3	85.3	-9
Iron (Fe)	*mg/kg*	*50*	30	45	11500	12400	-8	38300.0	33200.0	14
Lead (Pb)	*mg/kg*	*0.5*	40	60	4	4	-6	12	12	2
Lithium (Li)	*mg/kg*	*2*	30	45	11	11	-6	15	15	-4
Magnesium (Mg)	*mg/kg*	*20*	30	45	4060	4460	-9	7190	7410	-3
Manganese (Mn)	*mg/kg*	*1*	30	45	157	169	-7	921	693	28
Mercury (Hg)	*mg/kg*	*0.05*	40	60	*<0.050*	*<0.050*		*<0.050*	*<0.050*	
Molybdenum (Mo)	*mg/kg*	*0.1*	40	60	2	2	-6	5	4	14
Nickel (Ni)	*mg/kg*	*0.5*	30	45	27	28	-5	71	70	2
Phosphorus (P)	*mg/kg*	*50*	30	45	592	644	-8	1020	1070	-5
Potassium (K)	*mg/kg*	*100*	40	60	1310	1430	-9	2180	2240	-3
Selenium (Se)	*mg/kg*	*0.2*	30	45	0.46	0.48	-4	1.1	1.2	-6
Silver (Ag)	*mg/kg*	*0.1*	40	60	*<0.10*	*<0.10*		0.2	0.2	-16
Sodium (Na)	*mg/kg*	*50*	40	60	215	252	-16	330	339	-3
Strontium (Sr)	*mg/kg*	*0.5*	40	60	20	23	-15	29.1	28.4	2
Sulfur (S)	*mg/kg*	*1000*	30	45	1200	1300	-8	1300.0	1100.0	17
Thallium (Tl)	*mg/kg*	*0.05*	30	45	0.15	0.16	-6	0.3	0.4	-14
Tin (Sn)	*mg/kg*	*2*	40	60	*<2.0*	*<2.0*		*<2.0*	*<2.0*	
Titanium (Ti)	*mg/kg*	*1*	40	60	549	620	-12	692	702	-1
Tungsten (W)	*mg/kg*	*0.5*	30	45	1	*<0.50*		*<0.50*	*<0.50*	
Uranium (U)	*mg/kg*	*0.05*	30	45	2	2	-5	3.8	4.1	-8
Vanadium (V)	*mg/kg*	*0.2*	30	45	28	30	-9	56.5	58.3	-3
Zinc (Zn)	*mg/kg*	*2*	30	45	46	50	-7	88.1	92.3	-5
Zirconium (Zr)	*mg/kg*	*1*	30	45	1	1	-10	1.6	1.7	-6

Notes:

[1] The DQO for field duplicates is an RPD 1.5x the laboratory RPD or 40% in the absence of a lab RPD.

[2] Field Dup grab samples are homogenization duplicates - the original and duplicate samples were split from the same homogenized bowl of sediment.

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs are only calculated when both samples are above detection.

Bold RPDs	**RPD values exceeded but < 10 x MDL.**
Shaded RPDs	RPD values exceeded and > 10 x MDL.

Italicized numbers are below detection limits.

A.4 PHYTOPLANKTON

A.4.1 QA/QC Methods

An overview of the QA/QC methods in 2021 for the phytoplankton component of the AEMP is provided below; refer to the 2016 AEMP Design Plan (Golder 2016) for a complete description.

A.4.1.1 Field

In 2021, water samples for phytoplankton and chlorophyll-a were collected during the August sampling event. Standard procedures were used to collect water samples at a target depth for analysis of each parameter (Golder, 2018). Sampling gear was thoroughly rinsed between sampling areas to ensure that there was no inadvertent introduction (i.e., cross-contamination) from one area to another. For Chlorophyll-a collection, water samples were typically filtered within 6 hours of collection. **Table A-1** summarizes sample integrity observations (e.g., broken sample containers, mislabeled containers) and cooler temperature upon delivery to the lab.

Field Duplicates

Quality control procedures implemented during field operations during the August 2021 sampling event in Meliadine Lake included the collection of duplicate phytoplankton samples and triplicate chlorophyll-a samples, all using the same methods and collected at the same time as respective field samples.

Phytoplankton - Two field duplicate phytoplankton samples were collected during the August sampling event and submitted *blind* to the laboratory for analysis in order to assess sampling variability and sample homogeneity. RPDs were calculated for field and laboratory duplicates by comparing the original sample and the duplicate result for total density and total biomass. RPD values were also calculated for the major taxa groups, but these results are not relied on for QC purposes because of the tendency for small differences in abundance/biomass between the original and the duplicate to cause large differences in the RPD. Thus, we evaluate the quality of these data based on total density and total biomass both for field and laboratory duplicates. For field duplicates, an RPD of 50% for total density and biomass concentrations is considered acceptable.

Chlorophyll-a – Triplicate samples of chlorophyll-a were collected in 2021 to act as duplicates for the associated sampling locations. An RPD of 50% is considered acceptable.

Field Blank

Chlorophyll-a – A set of field blanks consisting of DI water filtered through regular sampling equipment was included in samples delivered to the laboratory. For these blanks to pass DQOs, chlorophyll-a concentrations below detection (<0.04 µg/L) were required.

A.4.1.2 Laboratory

Water samples collected in 2021 for chlorophyll-a were submitted to the University of Alberta Biogeochemical Analytical Service Laboratory (BASL). Samples collected for taxonomic analysis of phytoplankton were submitted to Plankton-R-Us Inc., a reputable taxonomic laboratory. Overall, the reliability of the analytical results is considered high.

As stated in **Section A.2.1.1**, the first step in the QC program involves documenting any issues with the sample submission. This step applies to all sampling components. Plankton-R-Us reports sample integrity concerns via email.

Phytoplankton - As a measure of laboratory QA/QC on the enumeration method replicate counts were performed on 10% of the samples. Replicate samples were randomly chosen and processed at different times from the original analysis to reduce bias (Golder 2018). The laboratory replicate is a new aliquot (10 mL) from the sample jar and is counted from the start in the same manner as the original aliquot (10 mL) taken from the jar. Laboratory QC results were reviewed in order to determine any Phytoplankton laboratory DQOs did not change in 2021. An RPD of 25% for total density and biomass concentrations is considered acceptable for laboratory replicates.

Chlorophyll-a - Data were checked for errors or omissions as was done in 2018 (Golder). Inconsistent results were clarified with the analytical laboratory and any errors were flagged.

A.4.2 Results and Discussion

As described in **Section A.2**, extensive quality assurance (QA) measures were used to minimize deviations from the program's data quality objectives (DQOs). This section presents the results of both the QA and QC testing conducted for the phytoplankton portion of the AEMP program to verify data quality relative to the DQOs. The QA/QC results present below for the 2021 AEMP program are summarized in **Section 3** of the main report.

Sample Shipping and Handling

All water for chlorophyll-a and phytoplankton samples arrived thawed and at room temperature, despite being shipped in coolers full of ice packs. Keeping the water samples frozen, particularly during summer months is a recurring challenge for this program given the logistics of shipping samples from Nunavut to the respective laboratories in a timely fashion.

There was a mislabeling error on the COC, however, after investigation it was determined that the correct samples were submitted with no impact on test results and interpretation (see “sample integrity observations”, **Table A-1**).

Finally, samples for MEL-05-05, and MEL-01-09 were each missing one of the triplicate samples due to collection error or because of technical issues during filtering.

Field and Laboratory Duplicates and Blanks

Results of the RPD analysis for phytoplankton field duplicates and laboratory duplicates, as well as chlorophyll-a field duplicates are presented in **Table A-6**, **Table A-7** and **Table A-8** respectively. These results are discussed below:

Phytoplankton Duplicates - All of the field and laboratory duplicate RPDs for total biomass and density met the DQOs indicating very good replicability in sample collection. See **Table A-6** and, **Table A-7** for the complete field duplicate results, including RPDs calculated for major taxa groups.

Chlorophyll-a Duplicates– All of the field duplicate RPDs for chlorophyll-a concentrations met the DQOs (RPD < 50%) indicating very good replicability in sample collection. See **Table A-8** for the complete field duplicate results.

Chlorophyll-a Blanks– All chlorophyll-a blanks registered concentrations less than detection limits (<0.04 µg/L) meeting the lab DQOs.

A.4.3 QA/QC Summary

The field and laboratory QA/QC for phytoplankton and chlorophyll-a in 2021 met the DQOs. This indicates very good replicability and sample handling in the field and in the laboratory:

Sample Integrity –Samples reached temperatures above freezing when they were received at the laboratory which reflects the challenges of shipping from a remote mine site. Full triplicate samples were not available for two sampling stations, though this represents a small proportion of total samples. All of these sample handling flags are considered to have a negligible impact on data analysis and interpretation.

Duplicates – The 2021 field and laboratory duplicate results were very good with no exceedances of DQO thresholds.

Blanks – All chlorophyll-a laboratory blanks results were below the reported detection limit.

PHYTOPLANKTON QA/QC TABLES

Table A-6. Field QA/QC data for phytoplankton, Meliadine AEMP, August 2021.

Field QA	Date	Sample	Phytoplankton Biomass (mg/m^3)						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL-01-10	14-Aug-21	Sample	0.5	51	269	84	13	53	470
		DUP-1	2.3	33	243	62	14	84	439
		RPD (%)	**-127**	44	10	30	-12	-46	7
MEL-02-03	15-Aug-21	Sample	1	19	93	31	9	15	168
		DUP-2	5	37	132	55	11	26	267
		RPD (%)	**-157**	**-66**	-34	**-56**	-24	**-52**	-45

Field QA	Date	Sample	Phytoplankton Density (cells/L)						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL-01-10	14-Aug-21	Sample	1000	1029912	2460328	880712	20568	7000	4399520
		DUP-1	101576	537816	2209088	662640	35936	13200	3560256
		RPD (%)	**-196**	**63**	10.8	28	**-54**	**-61**	21
MEL-02-03	15-Aug-21	Sample	7384	397720	1230064	212768	46904	3200	1898040
		DUP-2	57672	555768	1351592	273640	69656	3000	2311328
		RPD (%)	**-155**	-33	-9	-25	-39.0	6.5	-20

Notes:
RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
Bolded RPD values exceed 50%.
RPDs have not been calculated for cases where one or both of the samples is "0".

Table A-7. Laboratory QA/QC data for phytoplankton, Meliadine AEMP, August 2021.

Area-Replicate	**Date**	**Sample**	**Phytoplankton Biomass (mg/m^3)**						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL -01-08	14-Aug-21	Sample	0	13.6	209.6	53.0	17.5	60.2	354.3
		Lab dup	1	19.1	208.6	43.1	22.8	62.1	356.4
		RPD (%)	**-80**	**-34**	0	21	**-26**	-3	-1
MEL-03-04	7-Aug-21	Sample	0	6.9	87.8	11.4	12.8	23.5	142.4
		Lab dup	0	10.8	86.5	15.6	10.3	18.0	141.1
		RPD (%)		**-44**	1	**-31**	22	**27**	1
MEL-04-05	6-Aug-21	Sample	0	6.7	86.4	15.3	9.8	19.8	138.2
		Lab dup	0	8.3	100.3	15.6	9.9	24.8	159.0
		RPD (%)	**NA**	-22	-15	-2	-1	-22	-14

Area-Replicate	**Date**	**Date**	**Phytoplankton Density (cells/L)**						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL -01-08	14-Aug-21	Sample	600	234288	1814168	382400	15584	9000	2456040.00
		Lab dup	1400	312312	1857272	304576	39336	8600	2523496.00
		RPD (%)	**-80**	**-29**	-2	23	**-86**	5	-3
MEL-03-04	7-Aug-21	Sample	0	31536	971840	119744	130912	2600	1256632
		Lab dup	0	65856	1029112	158064	102376	2000	1357408
		RPD (%)		**-70**	-5.7	**-28**	24	**26**	-8
MEL-04-05	6-Aug-21	Sample	200	267608	993592	127728	33536	2400	1425064
		Lab dup	0	281376	1086984	85224	19768	2400	1475752
		RPD (%)		-5	-9.0	**40**	**52**	0	-3

Notes:
RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.
Bolded RPD values exceed 25%.
RPDs have not been calculated for cases where one or both of the samples is "0".

Table A-8. Field QA/QC summary for chlorophyll-a (µg/L), Meliadine AEMP, 2021.

Chlorophyll-a (µg/L)						
Replicate	Sample = MEL-01-10 Duplicate = AUG-DUP-01			Sample = MEL-02-03 Duplicate = AUG-DUP-02		
	Sample	Duplicate	**RPD**	Sample	Duplicate	**RPD**
1	3.05	2.86	6.4	1.11	1.19	-7.0
2	2.66	3.03	-13.0	1.04	1.1	-5.6
3	3.06	2.74	11.0	1.11	1.18	-6.1

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

RPDs are calculated when both samples are above detection.

The data quality objective (DQO) for field duplicates is an RPD of 50%.

Bolded RPD values exceed 50%.

APPENDIX B

EFFLUENT QUALITY, 2021

Appendix B1

Effluent Quality – Supporting Data

APPENDIX B1 – TABLES

Table B1-1. Daily discharge (m^3) from the Effluent Water Treatment Plant in 2021. 1
Table B1-2. MEL-14 chemistry results from 2021. 2
Table B1-3. Sublethal toxicity test results on water discharged to Meliadine Lake Since 2018. 5
Table B1-4. Plume delineation survey results for casts taken on 29 August 2021 in the east basin of Meliadine Lake. 6

Table B1-1. Daily discharge (m^3) from the Effluent Water Treatment Plant in 2021.

July		**August**		**September**		**October**	
Day	EWTP Discharge	Day	EWTP Discharge	Day	EWTP Discharge	Day	EWTP Discharge
1	0	1	10,808	1	17,192	1	5,537
2	0	2	11,880	2	16,989	2	3,286
3	0	3	11,324	3	6,988	3	3,981
4	0	4	11,838	4	7,088	4	4,456
5	0	5	5,649	5	7,103	5	4,689
6	0	6	8,943	6	7,384	6	4,671
7	0	7	2,755	7	8,293	7	4,268
8	0	8	0	8	6,755	8	4,316
9	0	9	0	9	8,286	9	5,400
10	0	10	12,474	10	8,281	10	5,352
11	0	11	14,728	11	1,512	11	1,648
12	0	12	14,813	12	5,599	12	5,321
13	2,600	13	10,456	13	8,273	13	9,771
14	6,632	14	14,260	14	8,275	14	11,083
15	7,408	15	14,773	15	6,150	15	13,429
16	3,433	16	14,820	16	8,264	16	11,871
17	7,706	17	10,037	17	11,748	17	0
18	8,106	18	15,684	18	11,679	18	0
19	8,163	19	17,236	19	9,977	19	0
20	8,158	20	17,240	20	5,019	20	0
21	8,247	21	8,966	21	6,029	21	0
22	8,289	22	17,151	22	6,075	22	0
23	5,569	23	17,114	23	5,997	23	0
24	8,326	24	17,180	24	5,543	24	0
25	5,639	25	16,990	25	3,147	25	0
26	5,056	26	17,153	26	1,734	26	0
27	8,268	27	16,549	27	5,542	27	0
28	8,269	28	16,709	28	5,205	28	0
29	8,289	29	17,241	29	5,539	29	0
30	7,886	30	15,470	30	5,548	30	0
31	7,396	31	17,159			31	0
Total	**133,439**	**Total**	**397,398**	**Total**	**221,210**	**Total**	**99,079**

Table B1-2. MEL-14 chemistry results from 2021.

		Limits (Grab Samples)		July			August						September					October		
Parameter	**Units**	**WL**	**MDMER**	**7/14/2021**	**7/18/2021**	**7/25/2021**	**8/1/2021**	**8/6/2021**	**8/10/2021**	**8/16/2021**	**8/22/2021**	**8/29/2021**	**9/5/2021**	**9/12/2021**	**9/19/2021**	**9/20/2021**	**9/27/2021**	**10/3/2021**	**10/5/2021**	**10/11/2021**
Field Measurements																				
DO (%)	%	-	-	-	106	70.8	79.9	-	-	96.1	85.3	87.3	84	111	102	88	109.3	80.1	-	97.2
DO (mg/L)	mg/L	-	-	-	11.29	7.28	-	-	-	10.73	9.47	8.89	8.43	13.46	12.56	11.2	18.41	9.7	-	12.17
pH (field)	pH units	6 | 9.5	6 | 9.5	6.96	7.39	6.83	7.32	7.17	6.96	7.35	7.15	7.01	7.34	7.47	7.43	7.51	7.52	7.52	7.4	6.76
Sp. Conductivity (field)	uS/cm	-	-	1730	1913	1960	2049.5	2185	2233	2082	2488	2766	2807	2922	3365	3246	2754	3682	3175	3601
Temperature	C	-	-	14.6	12.5	13.8	13.2	10.8	10.3	10.2	10.4	14.3	14.4	7.1	6	4.7	4.2	6.5	4.7	5.3
Turbidity (field)	NTU	-	-	-	-	0.6	1.01	1.98	0.92	0.72	0.87	0.52	1.05	90	-	2.32	0.54	0.532	-	0.92
Conventional Parameters																				
Conductivity (lab)	uS/cm	-	-	1700	1700	2000	2100	2200	2200	2300	2400	2700	2600	2800	3200	3000	3300	3600	3300	3200
Hardness (D)	mg/L	-	-	360	360	433	446	462	485	480	520	593	605	647	703	682	802	751	765	728
Hardness (T)	mg/L	-	-	349	375	412	447	474	485	500	530	568	582	590	717	694	733	786	716	760
pH (lab)	pH units	-	-	7.42	7.36	7.58	7.73	7.73	7.67	7.67	7.56	7.57	7.63	7.71	7.64	7.69	7.76	7.7	7.65	7.5
Total Dissolved Solids	mg/L	3,500	-	990	995	1180	1230	1250	1480	1380	1520	1730	1670	1540	1820	2020	2110	2260	2020	2140
TDS (Calculated)	mg/L	-	-	890	900	1000	1100	1200	1200	1200	1400	1600	1500	1600	1800	1800	1900	2000	2000	1900
Total Suspended Solids	mg/L	30	30	3	4	2	4	3	4	5	5	3	3	3	2	4	3	3	2	3
Turbidity (lab)	NTU	-	-	0.4	0.2	0.3	0.4	0.5	0.4	0.2	*< 0.1*	0.4	0.5	0.2	0.5	1.2	0.4	0.6	0.7	0.7
Major Ions																				
Alkalinity, Bicarbonate	mg/L	-	-	45	42	48	67	68	67	70	68	67	70	73	72	74	82	81	79	64
Alkalinity, Carbonate	mg/L	-	-	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*
Alkalinity, Total	mg/L	-	-	45	42	48	67	68	68	71	68	67	70	73	72	75	83	81	80	64
Calcium (D)	mg/L	-	-	98.9	98.4	122	123	127	137	130	143	165	168	180	194	184	223	201	209	198
Calcium (T)	mg/L	-	-	94.7	105	114	126	130	136	133	148	156	159	164	197	190	199	215	194	207
Chloride	mg/L	-	-	390	400	450	480	530	530	530	590	670	630	640	770	780	810	920	840	840
Fluoride	mg/L	-	-	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*
Magnesium (D)	mg/L	-	-	27.6	27.9	30.9	33.4	35	34.7	38	39.3	43.9	45.3	47.9	53.2	53.9	59.9	60.5	58.9	56.7
Magnesium (T)	mg/L	-	-	27.3	27.1	31.2	32.2	36.6	35.1	40.5	39.1	43.4	45.3	44	54.7	53.3	57.3	60.3	56.1	58.8
Potassium (D)	mg/L	-	-	14	14	16	16.7	18	18.2	18.8	19.9	22.5	23	24.8	26.1	26.3	29.5	27.6	26.8	25.6
Potassium (T)	mg/L	-	-	13.6	13.7	15.9	16.1	18.1	18.6	19.2	20.2	21.8	21.9	22.8	26.9	26.2	27.3	28.4	25.6	27.5
Reactive Silica (SiO2)	mg/L	-	-	0.11	0.17	5.2	0.44	0.68	0.57	0.52	0.26	0.35	0.11	0.05	0.39	0.27	0.36	0.23	0.37	0.7
Sodium (D)	mg/L	-	-	173	170	196	207	221	226	238	253	289	284	300	326	327	365	362	361	354
Sodium (T)	mg/L	-	-	173	169	197	210	227	231	254	248	272	281	283	344	332	352	373	355	359
Sulphate	mg/L	-	-	130	140	140	150	170	180	190	210	260	260	250	270	300	270	280	300	310
Nutrients																				
Ammonia (as N)	mg/L	18	-	0.49	0.079	0.28	0.3	-	0.58	0.62	0.49	0.82	0.12	0.099	1.3	0.83	1.2	2	1.9	2.7
Nitrate (as N)	mg/L	-	-	5.39	5.79	6.15	6.31	7.66	7.51	8.86	11.1	14.5	15.4	15.4	19.8	18.1	19.4	24.8	23.8	26.1
Nitrate + Nitrite (as N)	mg/L	-	-	5.62	5.95	6.3	6.47	7.88	7.73	9.07	11.4	14.9	15.6	15.5	20.1	18.4	19.8	25.2	24.3	26.5
Nitrite (as N)	mg/L	-	-	0.235	0.168	0.152	0.162	0.22	0.216	0.209	0.252	0.395	0.156	0.112	0.358	0.294	0.309	0.442	0.469	0.352
Orthophosphate (PO4-P)	mg/L	-	-	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	0.021	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	0.01	*< 0.01*
Total Kjeldahl Nitrogen	mg/L	-	-	0.91	*< 0.2*	0.72	0.51	1.4	1.1	1.9	2	1.2	*< 0.5*	2.2	2	1.5	1.3	2.1	1.6	2.5
Total Phosphorus	mg/L	4	-	*< 0.02*	*< 0.02*	0.023	*< 0.02*	0.046	0.037	0.033	*< 0.02*	0.032	0.032	0.031	0.031	0.047	*< 0.02*	0.025	*< 0.02*	0.079
Unionized Ammonia (calc)	mg/L	-	-	0.0012	0.00043	0.00047	0.0045	-	0.001	0.0026	0.0013	0.0022	0.00068	0.00043	0.0047	0.00325	0.0046	-	-	-
Organic/Inorganic Carbon																				
Dissolved Organic Carbon	mg/L	-	-	5.6	5.4	6	7.7	7.3	7.3	7.6	7.3	7.6	7.9	8.1	8.7	8.2	9.5	9.6	9.3	7.9
Total Organic Carbon	mg/L	-	-	6.1	5.9	6.3	8.5	8.4	8.1	8.3	7.6	7.9	8.5	9.2	9.3	8.9	11	11	10	8.2

Table B1-2. MEL-14 chemistry results from 2021.

		Limits (Grab Samples)		July			August						September					October		
Parameter	**Units**	**WL**	**MDMER**	**7/14/2021**	**7/18/2021**	**7/25/2021**	**8/1/2021**	**8/6/2021**	**8/10/2021**	**8/16/2021**	**8/22/2021**	**8/29/2021**	**9/5/2021**	**9/12/2021**	**9/19/2021**	**9/20/2021**	**9/27/2021**	**10/3/2021**	**10/5/2021**	**10/11/2021**
Total Metals																				
Aluminum (T)	mg/L	3	-	0.337	0.326	0.205	0.384	0.404	0.41	0.431	0.42	0.44	0.394	0.377	0.437	0.446	0.438	0.375	0.351	0.423
Antimony (T)	mg/L	-	-	0.00076	0.00073	0.00076	0.00079	9.00E-04	0.00086	0.00088	9.00E-04	*< 0.001*	0.00091	*< 0.001*	0.001	*< 0.001*	0.00097	0.00091	*< 0.001*	9.00E-04
Arsenic (T)	mg/L	0.6	1	0.00417	0.00726	0.00797	0.00946	0.00599	0.00483	0.00433	0.00387	0.0038	0.00382	0.0037	0.00277	0.0031	0.0038	0.00366	0.00369	0.00226
Barium (T)	mg/L	-	-	0.0457	0.0476	0.0532	0.0552	0.0608	0.0627	0.0619	0.0683	0.0726	0.069	0.0711	0.0777	0.0788	0.0808	0.0863	0.0796	0.0854
Beryllium (T)	mg/L	-	-	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0002*	*< 0.0001*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0001*	*< 0.0001*	*< 0.0002*	*< 0.0001*
Bismuth (T)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.001*
Boron (T)	mg/L	-	-	0.203	0.204	0.234	0.258	0.245	0.253	0.335	0.322	0.31	0.351	0.33	0.38	0.38	0.38	0.379	0.38	0.403
Cadmium (T)	mg/L	-	-	2.50E-05	2.40E-05	1.90E-05	1.80E-05	2.70E-05	2.10E-05	2.10E-05	2.10E-05	3.00E-05	2.20E-05	2.10E-05	2.80E-05	*< 0.00002*	1.90E-05	2.70E-05	3.30E-05	3.60E-05
Chromium (T)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.001*
Cobalt (T)	mg/L	-	-	0.00118	0.00113	0.00118	0.00124	0.00152	0.00133	0.00129	0.00125	0.00139	0.00116	0.00111	0.00157	0.0014	0.00152	0.00169	0.00159	0.00187
Copper (T)	mg/L	0.4	0.6	0.00214	0.0019	0.00185	0.00259	0.00224	0.00198	0.00199	0.00173	0.0018	0.00199	0.0019	0.002	0.0019	0.00194	0.00201	0.002	0.00161
Iron (T)	mg/L	-	-	0.033	0.026	0.033	0.029	0.053	0.021	0.018	0.03	*< 0.02*	0.023	*< 0.02*	0.03	0.06	0.038	0.031	0.024	0.017
Lead (T)	mg/L	0.4	0.4	0.00024	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0004*	*< 0.0002*	*< 0.0004*	*< 0.0004*	*< 0.0004*	0.00024	*< 0.0002*	*< 0.0004*	*< 0.0002*
Lithium (T)	mg/L	-	-	0.0345	0.0326	0.041	0.0436	0.0388	0.0436	0.0504	0.0443	0.0407	0.0438	0.0377	0.0422	0.0425	0.043	0.0398	0.0414	0.0505
Manganese (T)	mg/L	-	-	0.126	0.13	0.128	0.147	0.137	0.117	0.109	0.122	0.149	0.0785	0.0583	0.194	0.162	0.2	0.286	0.279	0.379
Mercury (T)	mg/L	-	-	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*	*< 0.00001*
Molybdenum (T)	mg/L	-	-	0.0043	0.0045	0.0046	0.0048	0.0051	0.0051	0.0048	0.0046	0.0043	0.0047	0.0048	0.0052	0.0052	0.0058	0.0053	0.0047	0.005
Nickel (T)	mg/L	1	1	0.004	0.0036	0.0036	0.004	0.0052	0.0047	0.0054	0.0055	0.0065	0.0052	0.0054	0.0078	0.0065	0.0066	0.0083	0.008	0.0088
Selenium (T)	mg/L	-	-	0.00091	0.00088	0.00085	0.00083	0.00105	0.00106	0.00098	0.00092	0.00099	0.00093	0.00091	0.001	0.00093	0.00097	0.00107	0.00099	0.00094
Silicon (T)	mg/L	-	-	*< 0.1*	0.13	0.19	0.25	0.33	0.29	0.28	0.2	*< 0.2*	*< 0.1*	*< 0.2*	0.23	0.22	0.22	0.14	0.2	0.38
Silver (T)	mg/L	-	-	*< 0.00002*	*< 0.00002*	*< 0.00002*	*< 0.00002*	*< 0.00002*	*< 0.00002*	*< 0.00002*	*< 0.00002*	*< 0.00004*	*< 0.00002*	*< 0.00004*	*< 0.00004*	*< 0.00004*	*< 0.00002*	*< 0.00002*	*< 0.00004*	*< 0.00002*
Strontium (T)	mg/L	-	-	1.36	1.51	1.6	1.68	1.78	2	1.86	2.13	2.01	2	2.07	2.43	2.4	2.59	2.64	2.46	2.87
Sulfur (T)	mg/L	-	-	45.1	45.7	50.5	53.9	62	63.7	69.2	70.2	76.7	82.1	85.5	102	100	106	112	104	106
Thallium (T)	mg/L	-	-	0.000023	0.000024	0.00002	0.000023	0.000027	0.000025	0.000024	0.000025	0.000031	0.00003	0.00003	0.00003	*< 0.00002*	0.000027	0.00004	0.000036	0.000037
Tin (T)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.005*
Titanium (T)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.005*
Uranium (T)	mg/L	-	-	0.00016	0.00011	1.00E-04	0.00075	0.00067	0.00069	0.00114	0.00088	0.0011	0.00146	0.00161	0.00178	0.00139	0.00285	0.00333	0.00287	0.00118
Vanadium (T)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.005*
Zinc (T)	mg/L	0.8	1	*< 0.005*	*< 0.005*	0.0094	*< 0.005*	0.007	*< 0.005*	0.0118	0.0051	*< 0.01*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.005*	0.0107	*< 0.01*	0.0089
Zirconium (T)	mg/L	-	-	0.0001	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0002*	*< 0.0001*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0001*	*< 0.0001*	*< 0.0002*	*< 0.0001*
Dissolved Metals																				
Aluminum (D)	mg/L	-	-	0.0676	0.055	0.0731	0.167	0.12	0.111	0.103	0.112	0.112	0.131	0.101	0.075	0.083	0.105	0.126	0.113	0.0484
Antimony (D)	mg/L	-	-	0.00078	0.00076	0.00075	8.00E-04	0.00083	0.00084	0.00088	0.00084	0.00098	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	0.0011	0.00091	*< 0.001*	*< 0.001*
Arsenic (D)	mg/L	-	-	0.00322	0.00678	0.0078	0.00905	0.00438	0.00348	0.00279	0.00261	0.00277	0.00289	0.00267	0.00189	0.00196	0.00277	0.00257	0.00278	0.00152
Barium (D)	mg/L	-	-	0.047	0.0472	0.0535	0.0562	0.06	0.0621	0.0604	0.0655	0.074	0.073	0.0762	0.0783	0.0773	0.0893	0.084	0.0844	0.0784
Beryllium (D)	mg/L	-	-	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0001*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0002*	*< 0.0001*	*< 0.0002*	*< 0.0002*
Bismuth (D)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.001*	*< 0.002*	*< 0.002*
Boron (D)	mg/L	-	-	0.208	0.21	0.22	0.262	0.242	0.244	0.263	0.295	0.331	0.35	0.35	0.41	0.42	0.42	0.414	0.39	0.37
Cadmium (D)	mg/L	-	-	2.60E-05	2.50E-05	2.50E-05	1.80E-05	2.50E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	*< 0.00002*	2.60E-05	2.50E-05	*< 0.00002*	*< 0.00002*	2.70E-05	3.40E-05	3.60E-05
Chromium (D)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.002*	*< 0.001*	*< 0.002*	*< 0.002*
Cobalt (D)	mg/L	-	-	0.00118	0.0011	0.00117	0.00123	0.00143	0.00132	0.00127	0.00124	0.00139	0.00116	0.00121	0.00139	0.00132	0.00162	0.00159	0.00161	0.0018
Copper (D)	mg/L	-	-	0.00204	0.0018	0.00194	0.00205	0.00204	0.00191	0.00188	0.00174	0.00168	0.00171	0.00196	0.00171	0.00158	0.00191	0.0019	0.00163	0.00162
Iron (D)	mg/L	-	-	0.01	0.0147	0.0291	0.0126	0.0079	0.0083	0.0056	0.0062	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	0.012	0.032	*< 0.01*	0.015

Table B1-2. MEL-14 chemistry results from 2021.

		Limits (Grab Samples)		July			August						September					October		
Parameter	**Units**	**WL**	**MDMER**	**7/14/2021**	**7/18/2021**	**7/25/2021**	**8/1/2021**	**8/6/2021**	**8/10/2021**	**8/16/2021**	**8/22/2021**	**8/29/2021**	**9/5/2021**	**9/12/2021**	**9/19/2021**	**9/20/2021**	**9/27/2021**	**10/3/2021**	**10/5/2021**	**10/11/2021**
Lead (D)	mg/L	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0004	0.00049	< 0.0004	< 0.0004	< 0.0004	< 0.0002	< 0.0004	< 0.0004
Lithium (D)	mg/L	-	-	0.0353	0.0362	0.0372	0.0468	0.0371	0.0405	0.0338	0.0415	0.0419	0.0418	0.0414	0.0446	0.0439	0.048	0.0423	0.0451	0.042
Manganese (D)	mg/L	-	-	0.125	0.129	0.13	0.142	0.127	0.113	0.106	0.117	0.155	0.0808	0.0618	0.179	0.154	0.215	0.262	0.287	0.363
Mercury (D)	mg/L	-	-	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Molybdenum (D)	mg/L	-	-	0.0046	0.0043	0.0047	0.0047	0.0049	0.0049	0.0046	0.0046	0.005	0.0049	0.0051	0.005	0.0051	0.0063	0.0048	0.0049	0.0045
Nickel (D)	mg/L	-	-	0.0039	0.0035	0.0039	0.0038	0.0051	0.0047	0.0052	0.0055	0.0065	0.0054	0.0057	0.0072	0.006	0.0069	0.008	0.0081	0.0093
Selenium (D)	mg/L	-	-	0.00089	0.00079	0.00084	0.00078	0.00102	0.001	0.00097	0.00089	0.00113	0.00103	0.00103	0.00098	0.00091	0.00102	0.001	0.00099	0.00096
Silicon (D)	mg/L	-	-	< 0.1	0.11	0.18	0.24	0.29	0.26	0.26	0.17	0.17	< 0.2	< 0.2	0.21	< 0.2	0.22	0.15	< 0.2	0.36
Silver (D)	mg/L	-	-	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00002	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00002	< 0.00004	< 0.00004
Strontium (D)	mg/L	-	-	1.43	1.39	1.7	1.77	1.8	1.93	1.77	1.99	2.26	2.1	2.21	2.36	2.37	2.9	2.46	2.67	2.4
Sulfur (D)	mg/L	-	-	47.3	45.2	51.3	54.9	61.6	60.6	63.6	70.3	79.1	83.7	92	102	99.9	119	110	105	102
Thallium (D)	mg/L	-	-	2.70E-05	2.40E-05	2.40E-05	2.40E-05	2.40E-05	2.50E-05	2.40E-05	2.10E-05	3.60E-05	3.10E-05	3.00E-05	3.00E-05	< 0.00002	2.90E-05	3.90E-05	3.80E-05	3.80E-05
Tin (D)	mg/L	-	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01
Titanium (D)	mg/L	-	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01
Uranium (D)	mg/L	-	-	1.00E-04	< 0.0001	< 0.0001	0.00076	0.00058	0.00063	0.00099	0.00078	0.00109	0.00139	0.00159	0.00161	0.00123	0.0028	0.00307	0.00284	0.00099
Vanadium (D)	mg/L	-	-	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< 0.01
Zinc (D)	mg/L	-	-	< 0.005	< 0.005	0.017	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.01	0.0255	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	0.011
Zirconium (D)	mg/L	-	-	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0001	< 0.0002	< 0.0002
Cyanides																				
Cyanide (free)	mg/L	-	-	0.0027	0.0018	0.0025	0.0029	0.0056	0.0031	0.0038	0.004	< 0.001	0.0016	< 0.001	0.0014	0.0014	0.0053	0.0037	0.0034	0.0048
Cyanide (Total)	mg/L	1	2	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Cyanide (WAD)	mg/L	-	-	0.0012	< 0.001	0.001	< 0.001	0.001	< 0.001	0.0014	0.0016	0.0013	0.0012	0.0015	0.002	0.0015	0.0012	0.0012	0.0017	0.0015
Radium																				
Radium-226	Bq/l	-	1.11	0.005	< 0.005	0.009	0.01	0.01	0.008	0.011	0.015	0.011	0.014	0.009	0.021	0.018	0.01	0.02	< 0.005	0.014
Hydrocarbons																				
F1 (C6-C10)	mg/L	-	-	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
F1 (C6-C10)-BTEX	mg/L	-	-	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
F2 (C10-C16)	mg/L	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
F3 (C16-C34)	mg/L	-	-	< 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
F4 (C34-C50)	mg/L	-	-	< 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
Volatile Organics																				
Benzene	mg/L	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Ethylbenzene	mg/L	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
m,p-Xylenes	mg/L	-	-	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
o-Xylene	mg/L	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Toluene	mg/L	-	-	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Xylenes	mg/L	-	-	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004

Table B1-3. Sublethal toxicity test results on water discharged to Meliadine Lake Since 2018.

				Species	**Fathead Minnow**		***Lemna minor***		***Hyalella azteca***		***Daphnia magna***			***Ceriodaphnia dubia***		***P. subcapitata***
				Test Type	Sublethal		Sublethal		Sublethal		Sublethal			Sublethal		Sublethal
				Test Duration	7-d		7-d		14-d		21-d			14-d		72 h
				Endpoint	Survival	Growth	Dry weight	Frond Number	Survival	Growth	Survival	Growth	Reproduction	Survival	Reproduction	Growth
Year	Date	Sample name	Chloride (mg/L)	Measured TDS (mg/L)	LC50	IC25	IC25	IC25	LC50	IC25	LC50	IC25	IC25	LC50	IC25	IC25
2018	7-Aug-18	MEL-14	530 [e]	1140 [e]	>100	>100	>97.0	72.3 (36.4-86.5)	-	-	-	-	-	>100	>100	>90.9
	13-Aug-18	MEL-14	590	1,260	>100	>100	42.0 (26.5-63.2)	38.2 (26.6-52.1)	-	-	-	-	-	see note [a]		>90.9
	3-Sep-18	MEL-14	660	1,360	>100	>100	>97.0	>97.0	-	-	-	-	-	>100	90.1 (23.3-96.3)	>90.9
2019	9-Jul-19	MEL-14	500	1,190	-	-	>97.0	>97.0	-	-	-	-	-	-	-	-
	13-Aug-19	MEL-14	410	1,130	-	-	>97.0	>97.0	-	-	-	-	-	-	-	-
	24-Sep-19	MEL-12[b]	1,100	2,490	>100	>100	>97.0	26.3	-	-	-	-	-	>100	24.3	60.8
	1-Oct-19	MEL-14 & -12[b]	530	860	>100	>100	>97.0	>97.0	-	-	-	-	-	>100	58.8	88.2
2020	15-Jun-20	MEL-14	1,300	3,100	-	-	>97.0	67.2 (58.9-76.4)	-	-	-	-	-	-	-	-
	19-Jul-20	MEL-14	530	1,430	>100	>100	>97	>97	>100	>100	>100	>100	>100	-	-	-
	23-Aug-20	MEL-14 [d]	700	1,850	13.5 (8.9-20.5)	8.7 (2.2-21.9)	>97	>97	>100	>100	>100	>100	37.6 (4.9-N/A)	-	-	-
	13-Sep-20	MEL-14 [d]	900	1,780	43.2 (30.1-62)	24.2 (13.7-36.4)	>97	>97	>100	>100	90.3 (30.0->100)	>100	93.8 (4.6-N/A)	-	-	-
2021 [f]	16-Aug-21	MEL-14	530	1,380	>100	3.1 (2.5, 3.8)	>97 (72.8, N/A)	60.7 (34.5-80.7)	>100	>100	>100	>100	49.5 (8.6-100)	-	-	-
		MEL-14 (UV)			>100	>100	-	-	-	-	-	-	-	-	-	-
	20-Sep-21	MEL-14	780	2,020	86.8 (41.7-N/A)	1.56 (<1.56-2.3)	>97	44.0 (28.9-60.9)	>100	>100	see note [g]			-	-	-
		MEL-14 (UV)			>100	>100	-	-	-	-	-		-	-	-	-

Notes

Test results presented here correspond to the discharge period in 2018 through 2021.

Numbers with gray font indicate test results that were excluded from the assessment of end-of-pipe effluent quality.

IC/ECxx concentrations in parentheses are the 95% confidence intervals. N/A indicates confidence limits are not available.

[a] The *C. dubia* test in August 2018 failed laboratory control criteria. Results from this test were invalid.

[b] The toxicity tests on September 24, 2019 were conducted on water taken with water from MEL-12 prior to treatment at EWTP. These data are excluded from the assessment of end-of-pipe effluent quality.

[c] Sublethal tests on *C. dubia, P. subcapitata*, and Fathead Minnow on October 1st, 2019 were conducted on water taken with water from MEL-12 prior to treatment at EWTP.

[d] Reduced growth and survival in the August and September Fathead Minnow tests was attributed to pathogens caused by the test conditions, not the chemistry of the effluent. These data are not considered representative of effects to fish.

[e] Effluent chemistry data were taken on August 5, 2018 for this round of testing.

[f] Fathead Minnow toxicity tests were conducted with UV treated water from MEL-14 and untreated water.

[g] The *D. magna* test in September 2021 failed laboratory control criteria. Results from this test were invalid.

Table B1-4. Plume delineation survey results for casts taken on 29 August 2021 in the east basin of Meliadine Lake.

		UTM (Zone 15, NAD83)		Coordinates (Decimal Degrees)		Cast Duration	Temperature (°C)			Depth (m)			Specific Conductivity (µS/cm)				Plume Delineation [a]	
Cast ID	Time	Northing	Easting	Latitude	Longitude	Seconds	Min	Max	Average	Min	Max	Average	Min	Max	Average	% Diff [b]	Depth of Max Sp. Cond	% Effluent
133009	9:30:00 AM	6989145	542800	63.0293837	-92.1541555	59.6	10.8	10.9	10.9	0.2	10.3	5.2	117	191	126	64%	8.7	4.15
133246	9:32:00 AM	6989147	542801	63.0294071	-92.154146	46.8	10.7	10.9	10.9	0.2	11.3	5.7	117	119	118	2%	10.8	1.56
133359	9:33:00 AM	6989149	542792	63.029421	-92.1543085	49.6	10.7	10.9	10.9	0.2	10.6	5.3	117	119	117	2%	10.2	1.55
133627	9:36:00 AM	6989150	542797	63.0294304	-92.1542116	43.8	10.8	10.9	10.9	0.2	9.8	5.0	118	201	137	71%	8.7	4.53
134046	9:40:00 AM	6989149	542795	63.0294263	-92.154249	49	10.8	10.9	10.9	0.2	9.4	4.7	117	120	118	3%	9.4	1.60
134353	9:43:00 AM	6989148	542798	63.0294146	-92.1541941	49.4	10.7	10.9	10.8	0.2	10.6	5.3	117	157	120	34%	9.6	2.92
134526	9:45:00 AM	6989145	542795	63.0293909	-92.1542665	46.4	10.7	10.9	10.8	0.2	11.5	5.8	117	119	117	2%	11.5	1.56
134652	9:46:00 AM	6989147	542793	63.0294084	-92.1543004	50	10.7	10.9	10.8	0.2	11.7	6.0	117	119	118	2%	11.7	1.57
134805	9:48:00 AM	6989151	542780	63.0294403	-92.1545457	50.4	10.7	10.9	10.8	0.2	12.0	6.1	117	119	118	2%	12	1.57
134921	9:49:00 AM	6989154	542766	63.0294675	-92.1548338	54.6	10.7	10.9	10.8	0.2	11.1	5.7	117	119	118	2%	11.1	1.57
135323	9:53:00 AM	6989047	542767	63.0285081	-92.1548311	53.4	10.7	10.9	10.8	0.2	11.3	5.8	117	118	117	1%	11.2	1.55
135602	9:56:00 AM	6989192	542766	63.0298097	-92.1548129	12.6	10.9	10.9	10.9	0.2	0.7	0.4	118	118	118	0%	0.5	1.53
135635	9:56:00 AM	6989196	542777	63.0298487	-92.1546075	42.4	10.7	10.9	10.8	0.2	11.1	5.7	117	119	118	2%	0.2	1.58
135758	9:57:00 AM	6989191	542755	63.0298034	-92.1550456	43	10.8	10.9	10.8	0.2	10.8	5.5	116	118	117	1%	10.8	1.53
135904	9:59:00 AM	6989185	542736	63.0297485	-92.1554101	41.6	10.7	10.9	10.8	0.2	11.4	5.8	116	119	117	2%	11.4	1.56
140025	10:00:00 AM	6989184	542720	63.0297421	-92.1557395	41.2	10.6	10.9	10.8	0.2	9.7	4.9	116	119	117	3%	9.3	1.56
140145	10:01:00 AM	6989168	542707	63.0296	-92.1559941	39.2	10.6	10.9	10.8	0.2	9.5	4.9	115	119	117	4%	9.5	1.57
140335	10:03:00 AM	6989148	542690	63.0294234	-92.1563229	38.8	10.6	10.9	10.7	0.2	9.4	4.7	116	119	118	3%	9.4	1.58
140534	10:05:00 AM	6989126	542668	63.0292343	-92.1567777	34.6	10.6	10.9	10.8	0.2	8.5	4.3	116	119	117	3%	8.5	1.57
140738	10:07:00 AM	6989116	542624	63.0291465	-92.1576406	28.4	10.6	10.6	10.6	0.2	6.2	3.2	119	119	119	0%	1.1	1.58
140948	10:09:00 AM	6989090	542553	63.0289252	-92.1590459	31.8	10.5	10.6	10.6	0.2	6.8	3.5	118	125	119	5%	6.8	1.77
141117	10:11:00 AM	6989067	542497	63.0287199	-92.1601726	30.6	10.5	10.5	10.5	0.2	6.7	3.4	118	118	118	0%	6.3	1.55
141309	10:13:00 AM	6989061	542451	63.0286739	-92.161077	11.6	10.5	10.6	10.5	0.2	1.9	1.1	119	119	119	0%	0.8	1.57
141400	10:14:00 AM	6989076	542438	63.0288089	-92.1613244	12	10.6	10.6	10.6	0.2	1.7	0.9	119	119	119	0%	0.8	1.58
141505	10:15:00 AM	6989113	542420	63.02914	-92.1616738	14.8	10.6	10.7	10.6	0.2	2.0	1.1	119	119	119	0%	0.2	1.58
141620	10:16:00 AM	6989155	542405	63.0295242	-92.161968	12.2	10.7	10.7	10.7	0.2	1.6	0.9	118	119	118	0%	1.1	1.55
141833	10:18:00 AM	6989193	542441	63.0298552	-92.1612397	26.8	10.7	10.7	10.7	0.2	6.4	3.2	119	119	119	0%	1.1	1.57
142035	10:20:00 AM	6989250	542469	63.0303634	-92.1606739	32	10.7	10.8	10.7	0.2	7.0	3.5	118	119	118	1%	4.4	1.56
142211	10:22:00 AM	6989292	542494	63.0307451	-92.1601777	27.4	10.7	10.9	10.8	0.2	6.4	3.2	116	118	117	2%	6.4	1.55
142353	10:23:00 AM	6989341	542527	63.0311771	-92.1595002	22.4	10.9	10.9	10.9	0.2	5.1	2.6	111	111	111	0%	2.9	1.30
142504	10:25:00 AM	6989377	542532	63.0314959	-92.1593959	13.6	11.0	11.0	11.0	0.2	1.9	1.1	112	112	112	0%	1.4	1.32
142557	10:25:00 AM	6989371	542554	63.0314431	-92.1589657	14.8	11.0	11.0	11.0	0.2	1.8	0.9	113	113	113	1%	1.8	1.36
142720	10:27:00 AM	6989373	542605	63.0314548	-92.157954	15.4	10.9	11.0	11.0	0.2	1.9	1.1	118	119	118	1%	1.1	1.55
142843	10:28:00 AM	6989360	542648	63.0313314	-92.1571057	14.2	11.0	11.0	11.0	0.2	1.9	1.1	119	119	119	0%	1.9	1.57
143003	10:30:00 AM	6989376	542699	63.0314694	-92.1560961	24.8	10.9	11.0	10.9	0.2	5.2	2.7	109	119	113	9%	0.2	1.57
143129	10:31:00 AM	6989384	542729	63.0315413	-92.1554904	27.4	11.0	11.0	11.0	0.2	5.9	3.1	116	119	118	2%	1.4	1.58
143243	10:32:00 AM	6989380	542755	63.0315026	-92.154993	12.6	11.0	11.0	11.0	0.2	1.5	0.9	113	114	113	1%	1.4	1.40
143346	10:33:00 AM	6989372	542781	63.0314296	-92.1544667	14.4	11.0	11.0	11.0	0.2	1.6	0.9	110	110	110	1%	0.2	1.26
143436	10:34:00 AM	6989365	542816	63.0313604	-92.1537909	12.2	11.0	11.0	11.0	0.2	1.7	0.9	111	111	111	0%	0.5	1.29
143533	10:35:00 AM	6989350	542839	63.031223	-92.1533326	9.4	11.0	11.0	11.0	0.2	1.3	0.7	110	110	110	1%	1.1	1.26
143648	10:36:00 AM	6989319	542871	63.0309404	-92.1527073	31.4	11.0	11.0	11.0	0.2	4.9	2.6	109	111	110	2%	4.7	1.30
143802	10:38:00 AM	6989301	542903	63.0307716	-92.1520924	16	11.0	11.1	11.0	0.2	2.7	1.4	107	110	108	3%	2.7	1.26
143927	10:39:00 AM	6989277	542936	63.0305558	-92.1514339	12.8	11.0	11.1	11.1	0.2	2.1	1.1	106	108	107	2%	2.1	1.19

Table B1-4. Plume delineation survey results for casts taken on 29 August 2021 in the east basin of Meliadine Lake.

		UTM (Zone 15, NAD83)		Coordinates (Decimal Degrees)		Cast Duration	Temperature (°C)			Depth (m)			Specific Conductivity (µS/cm)				Plume Delineation [a]	
Cast ID	Time	Northing	Easting	Latitude	Longitude	Seconds	Min	Max	Average	Min	Max	Average	Min	Max	Average	% Diff [b]	Depth of Max Sp. Cond	% Effluent
144026	10:40:00 AM	6989259	542967	63.0303935	-92.1508222	24.4	10.9	11.1	11.0	0.2	5.3	2.7	106	119	110	12%	5	1.58
144200	10:42:00 AM	6989241	543001	63.0302239	-92.1501645	12.6	11.1	11.1	11.1	0.2	1.5	0.8	109	109	109	0%	1.1	1.20
144300	10:43:00 AM	6989225	543015	63.030077	-92.1498874	10.4	11.1	11.1	11.1	0.2	1.4	0.8	108	109	109	0%	0.8	1.20
144428	10:44:00 AM	6989182	542994	63.0296991	-92.1503114	11.8	11.0	11.0	11.0	0.2	1.7	0.9	115	115	115	0%	1.4	1.43
144511	10:45:00 AM	6989163	542984	63.0295222	-92.1505278	16	11.0	11.0	11.0	0.2	2.6	1.4	121	121	121	0%	2.3	1.64
144620	10:46:00 AM	6989138	542967	63.0293043	-92.1508692	29	10.8	10.9	10.9	0.2	6.9	3.5	121	123	121	2%	6.6	1.71
144815	10:48:00 AM	6989110	542922	63.029054	-92.1517517	36	10.7	10.8	10.8	0.2	9.0	4.6	118	120	119	2%	1.1	1.62
145008	10:50:00 AM	6989100	542906	63.0289698	-92.1520714	44	10.8	10.8	10.8	0.2	10.9	5.5	126	144	138	14%	6.3	2.48
145138	10:51:00 AM	6989073	542880	63.0287279	-92.15259	41.8	10.6	10.9	10.8	0.2	11.3	5.7	119	124	122	4%	2	1.76
145325	10:53:00 AM	6989063	542823	63.0286499	-92.1537284	41	10.6	10.9	10.8	0.2	11.0	5.5	117	120	119	3%	4.1	1.61
145502	10:55:00 AM	6989053	542790	63.0285651	-92.1543753	41	10.8	10.9	10.9	0.2	9.6	4.9	117	121	118	4%	8.4	1.63
145730	10:57:00 AM	6989024	542702	63.0283092	-92.1561215	36.4	10.6	10.8	10.7	0.2	7.9	4.0	119	121	120	1%	0.8	1.65
145913	10:59:00 AM	6989059	542706	63.028624	-92.1560335	33.2	10.6	10.8	10.7	0.2	8.3	4.3	119	121	120	2%	1.1	1.63
150051	11:00:00 AM	6989093	542743	63.02893	-92.1552916	34	10.6	10.9	10.8	0.2	10.4	5.3	116	121	118	4%	10.4	1.63
150247	11:02:00 AM	6989135	542777	63.0292984	-92.1546169	44.4	10.6	10.9	10.8	0.2	11.9	6.0	116	119	118	2%	8.7	1.58
150430	11:04:00 AM	6989148	542802	63.0294135	-92.1541204	44.8	10.6	10.9	10.8	0.2	11.2	5.7	117	175	134	49%	4.7	3.59
150715	11:07:00 AM	6989136	542801	63.029306	-92.1541335	44.6	10.6	10.9	10.8	0.2	11.4	5.8	117	183	133	56%	5	3.87
150851	11:08:00 AM	6989128	542830	63.0292277	-92.1535786	43.2	10.6	10.8	10.7	0.2	10.6	5.4	127	160	141	27%	0.5	3.06
151008	11:10:00 AM	6989130	542850	63.0292471	-92.1531731	40	10.7	10.8	10.8	0.2	10.8	5.5	142	154	148	8%	2.6	2.83
151121	11:11:00 AM	6989116	542847	63.0291201	-92.1532478	44	10.7	10.8	10.8	0.2	10.1	5.2	118	140	127	19%	9.6	2.32
151256	11:12:00 AM	6989097	542830	63.0289502	-92.153575	39.2	10.6	10.9	10.8	0.2	10.8	5.5	117	124	120	6%	6.3	1.77
151421	11:14:00 AM	6989080	542806	63.0288018	-92.1540609	41.6	10.6	10.9	10.8	0.2	11.5	5.8	116	120	118	4%	8.1	1.62
151735	11:17:00 AM	6989162	542825	63.029539	-92.1536598	44	10.7	10.9	10.8	0.2	9.3	4.7	118	119	118	1%	0.2	1.57
151907	11:19:00 AM	6989190	542834	63.0297864	-92.1534759	40.2	10.6	10.9	10.8	0.2	10.1	5.0	118	120	119	2%	0.8	1.62
152049	11:20:00 AM	6989216	542840	63.0300198	-92.1533446	33.4	10.8	10.9	10.9	0.2	8.0	4.1	119	123	122	4%	3.2	1.71
152253	11:22:00 AM	6989237	542843	63.0302078	-92.1532824	32.4	10.9	11.0	10.9	0.2	7.7	4.0	120	125	122	4%	7.7	1.77
152437	11:24:00 AM	6989262	542865	63.0304242	-92.1528393	31.8	10.9	11.0	10.9	0.2	7.6	3.8	120	122	121	2%	0.2	1.68
152618	11:26:00 AM	6989291	542815	63.0306941	-92.1538276	31.2	10.9	11.0	11.0	0.2	7.1	3.7	119	127	121	7%	7.1	1.87
152729	11:27:00 AM	6989303	542783	63.0308099	-92.1544513	31	10.9	11.0	11.0	0.2	7.1	3.7	118	121	120	3%	3.2	1.66
152940	11:29:00 AM	6989448	542727	63.032112	-92.155521	29.8	10.8	10.9	10.9	0.2	5.7	2.9	98	98	98	1%	0.2	0.83
153121	11:31:00 AM	6989579	542770	63.0332856	-92.1546354	27.6	11.0	11.2	11.1	0.2	4.9	2.6	100	101	101	1%	1.7	0.93
153559	11:35:00 AM	6989681	542545	63.0342294	-92.1590583	26.6	11.0	11.0	11.0	0.2	4.8	2.4	98	98	98	0%	2.9	0.83
153938	11:39:00 AM	6989896	542071	63.0362159	-92.1683758	36	11.0	11.1	11.1	0.2	8.5	4.3	98	101	98	3%	8.5	0.91
154423	11:44:00 AM	6989749	541657	63.0349402	-92.1766006	39	10.9	11.1	11.1	0.2	9.3	4.7	98	103	102	5%	0.5	0.98
154635	11:46:00 AM	6989660	541799	63.034125	-92.1738008	31.4	11.1	11.1	11.1	0.2	6.1	3.1	105	106	105	1%	5.3	1.09
154819	11:48:00 AM	6989614	541898	63.0337023	-92.1718551	48.8	10.1	11.1	10.9	0.2	10.1	5.0	104	116	106	11%	10.1	1.45
155040	11:50:00 AM	6989622	541989	63.033761	-92.1700593	25.6	11.1	11.2	11.1	0.2	2.9	1.5	110	111	110	1%	0.2	1.28
155227	11:52:00 AM	6989538	541994	63.0330038	-92.1699944	38.2	10.8	11.1	11.0	0.2	7.8	4.0	104	109	107	5%	5.3	1.21
155415	11:54:00 AM	6989438	541996	63.0321135	-92.1699761	24.2	11.0	11.1	11.1	0.2	4.7	2.4	106	107	106	0%	0.2	1.12
155658	11:56:00 AM	6989329	542331	63.0310962	-92.1633794	28.6	10.8	11.0	11.0	0.2	6.0	3.1	110	112	111	2%	0.2	1.32
160258	12:02:00 PM	6989092	542912	63.028901	-92.1519604	37.6	10.8	11.0	10.9	0.2	10.2	5.2	128	142	136	11%	5.7	2.40
160417	12:04:00 PM	6989087	542942	63.0288476	-92.1513721	38.8	10.7	10.9	10.8	0.2	8.4	4.3	120	131	126	9%	3.8	2.01
160534	12:05:00 PM	6989082	542972	63.0287975	-92.1507822	38	10.7	11.0	10.9	0.2	8.2	4.1	119	128	122	8%	6.3	1.89

Table B1-4. Plume delineation survey results for casts taken on 29 August 2021 in the east basin of Meliadine Lake.

		UTM (Zone 15, NAD83)		Coordinates (Decimal Degrees)		Cast Duration	Temperature (°C)			Depth (m)			Specific Conductivity (µS/cm)				Plume Delineation [a]	
Cast ID	Time	Northing	Easting	Latitude	Longitude	Seconds	Min	Max	Average	Min	Max	Average	Min	Max	Average	% Diff [b]	Depth of Max Sp. Cond	% Effluent
160654	12:06:00 PM	6989070	542998	63.0286916	-92.1502602	42.4	10.7	11.0	10.9	0.2	8.2	4.1	118	124	121	5%	0.2	1.73
160814	12:08:00 PM	6989062	543030	63.0286145	-92.1496328	34	10.7	11.0	10.9	0.2	8.0	4.1	118	132	123	12%	8	2.05
160931	12:09:00 PM	6989050	543057	63.0285012	-92.1491024	37.8	10.7	11.0	10.9	0.2	8.2	4.1	119	127	124	7%	0.2	1.84
161130	12:11:00 PM	6989031	543111	63.028328	-92.1480522	35.2	10.9	11.0	10.9	0.2	9.1	4.6	126	127	127	1%	5.3	1.88
161300	12:13:00 PM	6989007	543138	63.0281042	-92.1475248	38	10.9	11.0	10.9	0.2	10.0	5.0	126	128	127	2%	5	1.89
161448	12:14:00 PM	6988975	543202	63.0278174	-92.1462581	50.2	10.8	11.0	10.9	0.2	10.4	5.2	126	128	127	2%	4.1	1.88
161756	12:17:00 PM	6988864	543355	63.0267985	-92.1432675	43.6	10.8	10.9	10.9	0.2	9.9	5.0	124	125	124	1%	9.3	1.78
161956	12:19:00 PM	6988741	543378	63.025693	-92.1428522	43.8	10.8	10.9	10.9	0.2	9.7	4.9	126	128	127	2%	9.7	1.90
162232	12:22:00 PM	6988626	543295	63.0246674	-92.1445147	54.2	10.8	11.0	10.9	0.2	11.7	6.0	120	124	122	4%	10.8	1.76
162955	12:29:00 PM	6988321	543302	63.0219284	-92.1444665	65.2	10.7	11.0	10.9	0.2	11.0	5.5	121	123	123	2%	8.4	1.73
163425	12:34:00 PM	6988901	543124	63.0271582	-92.1478181	40.4	10.8	11.0	10.9	0.2	10.5	5.3	122	132	125	9%	10.5	2.05
163553	12:35:00 PM	6988932	543105	63.0274351	-92.1481849	44.4	10.7	11.0	10.9	0.2	11.0	5.5	122	129	124	6%	9	1.94
163708	12:37:00 PM	6988969	543084	63.0277761	-92.148595	41.8	10.7	11.0	10.9	0.2	10.6	5.3	120	128	122	7%	8.7	1.90
163827	12:38:00 PM	6989011	543062	63.0281538	-92.149024	52	10.7	11.1	10.9	0.2	9.7	4.9	118	125	123	6%	2.9	1.79
164000	12:40:00 PM	6989039	543007	63.0284146	-92.1500875	43.2	10.7	11.0	10.9	0.2	9.3	4.7	119	122	121	3%	7.8	1.69
164142	12:41:00 PM	6989108	543011	63.0290332	-92.1499981	34.2	10.7	11.1	10.9	0.2	6.6	3.4	119	126	123	6%	0.2	1.82
164307	12:43:00 PM	6989136	542992	63.0292787	-92.1503669	24.6	10.9	11.1	11.0	0.2	6.0	3.1	121	126	124	4%	0.8	1.81

Notes

[a] Refer to Section 3.4 for details on how % effluent was calculated.

[b] % Diff = the percent difference between the minimum and maximum conductivity reading for each cast. Shade cells represent cast where the difference was > 10%.

Appendix B2

Effluent Quality – Supplemental Figures

APPENDIX B2 – FIGURES

Figure B2-1. TSS – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 1
Figure B2-2. TDS (measured) – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 2
Figure B2-3. Chloride – Effluent concentrations (mg/L) and loadings to Meliadine Lake.......................... 3
Figure B2-4. Sodium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 4
Figure B2-5. Calcium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 5
Figure B2-6. Magnesium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 6
Figure B2-7. Potassium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 7
Figure B2-8. Sulphate – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 8
Figure B2-9. Alkalinity (Total) – Effluent concentrations (mg/L) and loadings to Meliadine Lake............ 9
Figure B2-10. Reactive Silica – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 10
Figure B2-11. Nitrate (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 11
Figure B2-12. Nitrite (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 12
Figure B2-13. Nitrate + Nitrite (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 13
Figure B2-14. TKN – Effluent concentrations (mg/L) and loadings to Meliadine Lake............................. 14
Figure B2-15. Ammonia (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 15
Figure B2-16. Total Phosphorus – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 16
Figure B2-17. Orthophosphate – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 17
Figure B2-18. Total Organic Carbon – Effluent concentrations (mg/L) and loadings to Meliadine Lake. .. 18
Figure B2-19. Arsenic – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 19
Figure B2-20. Barium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 20
Figure B2-21. Beryllium – Effluent concentrations (mg/L) and loadings to Meliadine Lake..................... 21
Figure B2-22. Bismuth – Effluent concentrations (mg/L) and loadings to Meliadine Lake....................... 22
Figure B2-23. Boron– Effluent concentrations (mg/L) and loadings to Meliadine Lake. 23
Figure B2-24. Cadmium – Effluent concentrations (mg/L) and loadings to Meliadine Lake..................... 24
Figure B2-25. Chromium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 25
Figure B2-26. Cobalt – Effluent concentrations (mg/L) and loadings to Meliadine Lake.......................... 26
Figure B2-27. Copper – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 27
Figure B2-28. Iron– Effluent concentrations (mg/L) and loadings to Meliadine Lake. 28
Figure B2-29. Lead – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 29

Figure B2-30. Lithium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 30
Figure B2-31. Manganese – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 31
Figure B2-32. Mercury – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 32
Figure B2-33. Molybdenum – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 33
Figure B2-34. Nickel – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 34
Figure B2-35. Selenium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 35
Figure B2-36. Silicon – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 36
Figure B2-37. Silver – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 37
Figure B2-38. Strontium– Effluent concentrations (mg/L) and loadings to Meliadine Lake. 38
Figure B2-39. Thallium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 39
Figure B2-40. Tin – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 40
Figure B2-41. Titanium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 41
Figure B2-42. Uranium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 42
Figure B2-43. Vanadium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 43
Figure B2-44. Zinc– Effluent concentrations (mg/L) and loadings to Meliadine Lake. 44
Figure B2-45. Zirconium – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 45
Figure B2-46. Cyanide (Free) – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 46
Figure B2-47. Cyanide (Total) – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 47
Figure B2-48. Radium-226 – Effluent concentrations (mg/L) and loadings to Meliadine Lake. 48

Figure B2-1. TSS – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

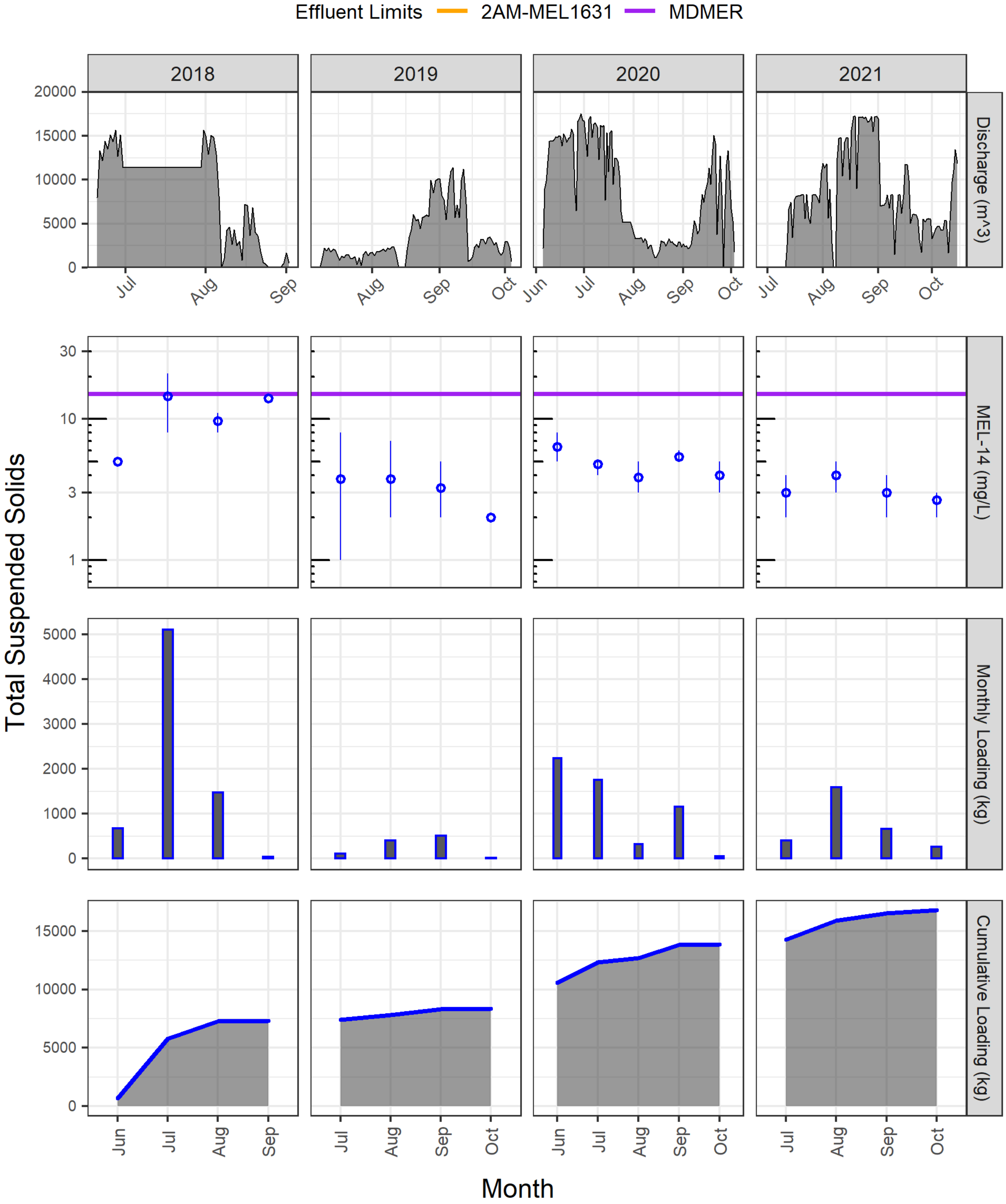


Figure B2-2. TDS (measured) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

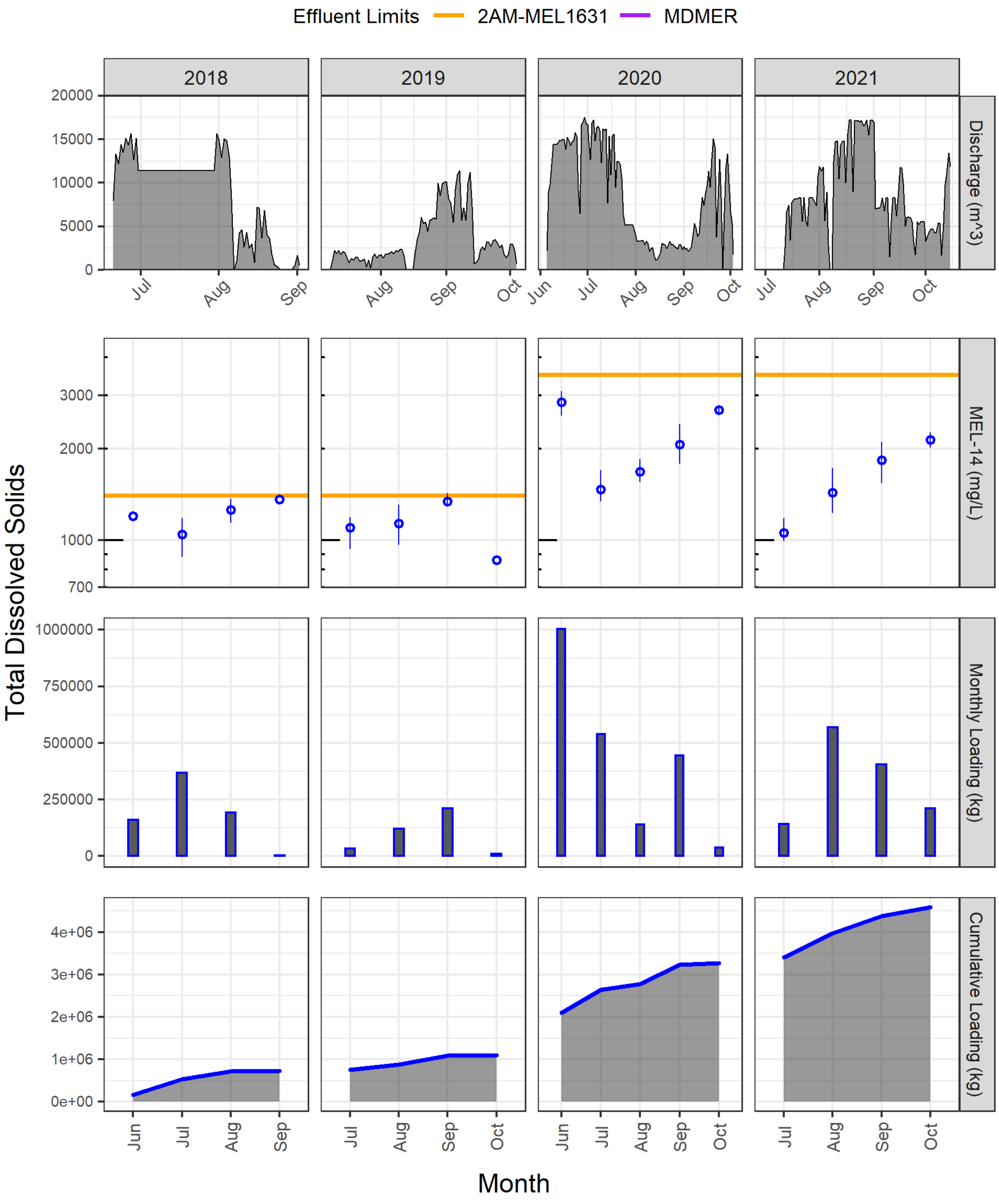


Figure B2-3. Chloride – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

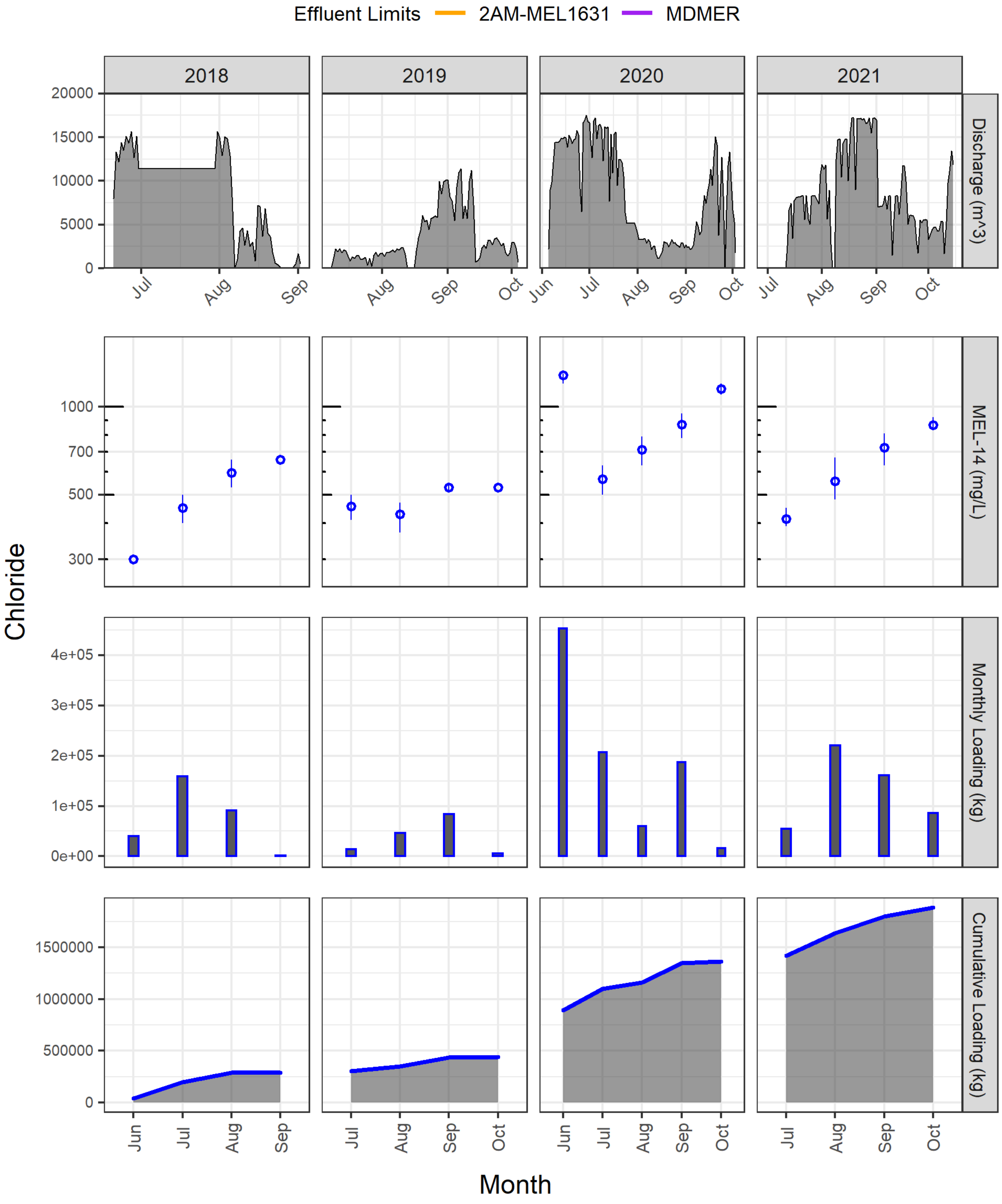


Figure B2-4. Sodium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

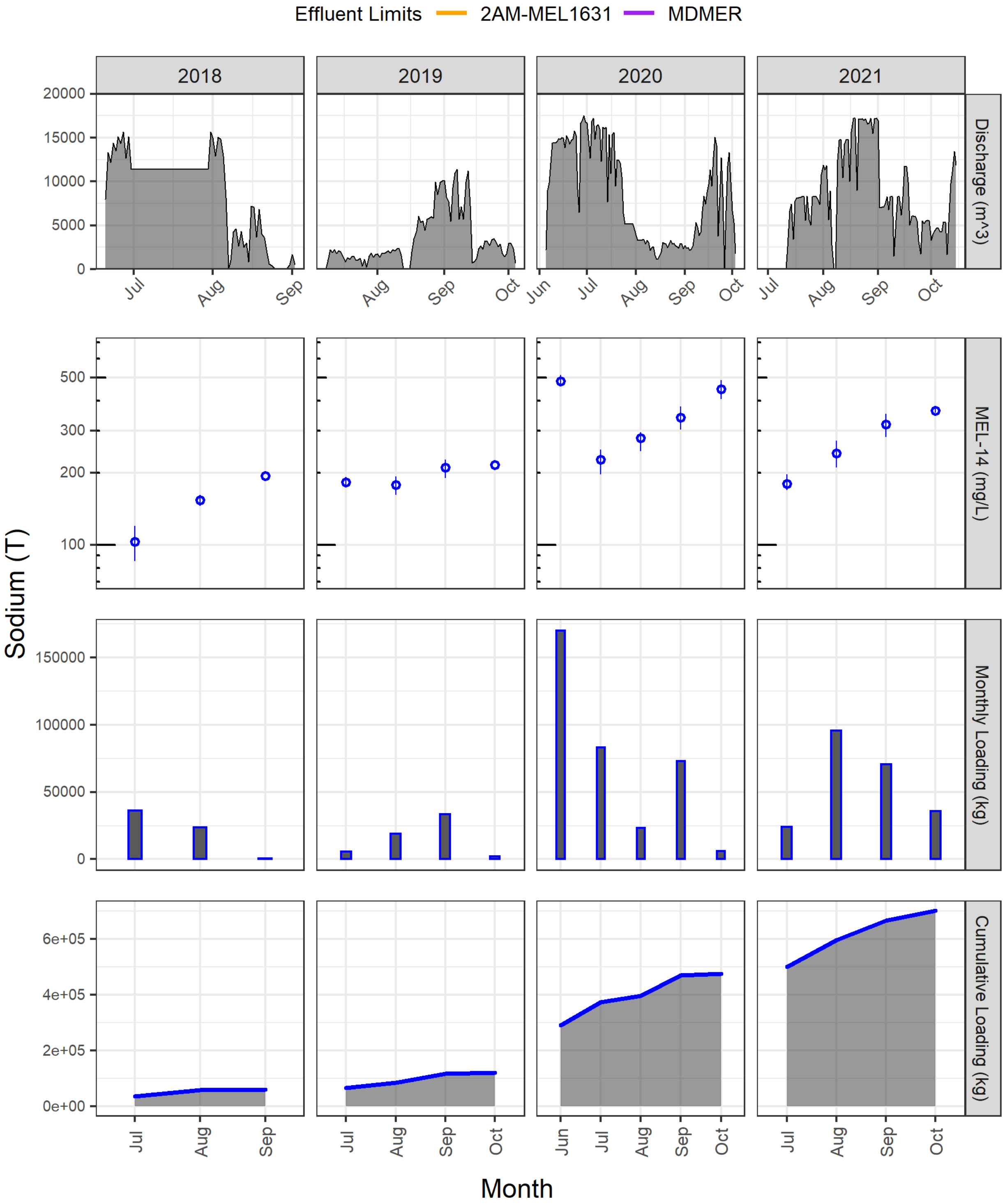


Figure B2-5. Calcium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

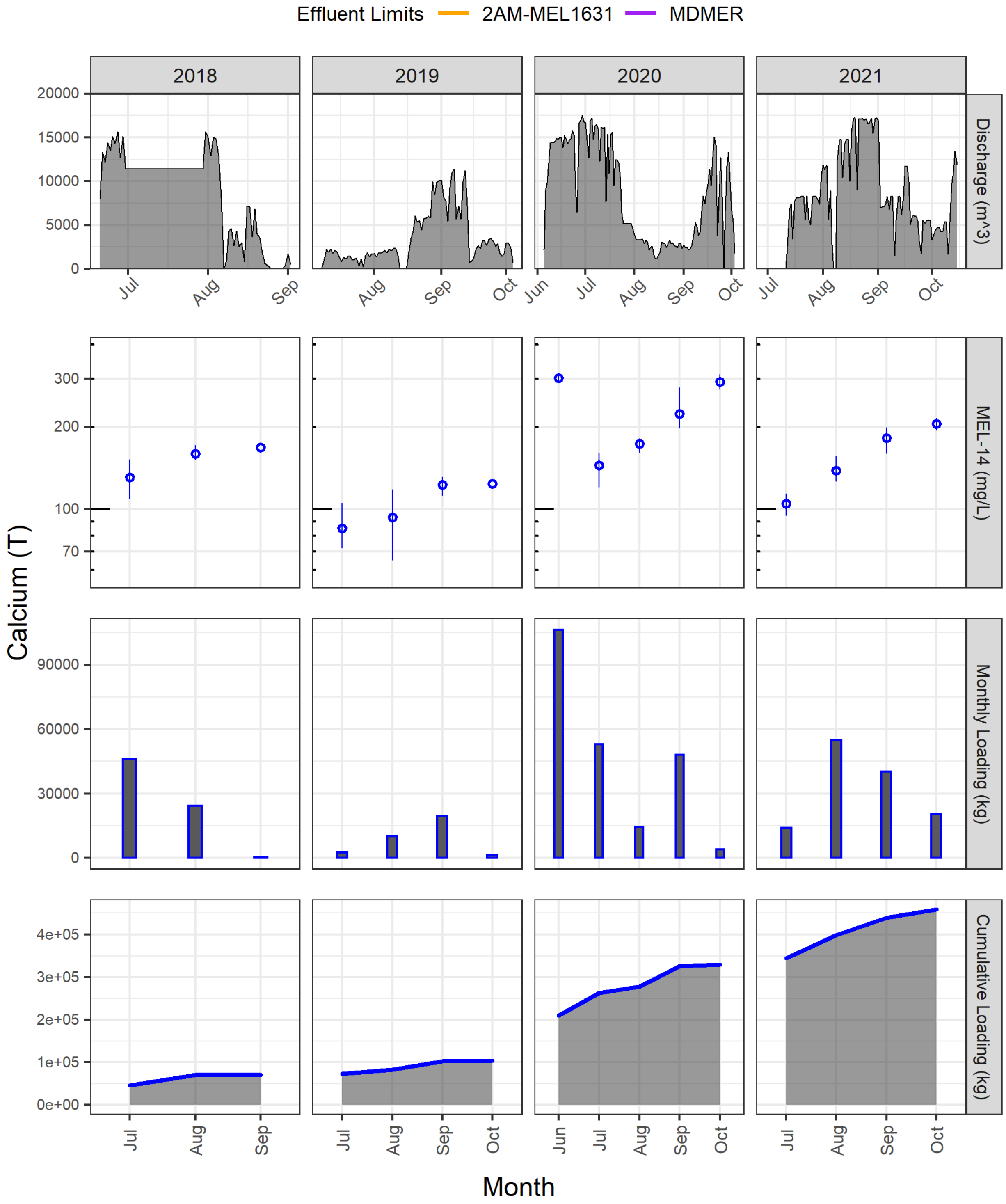


Figure B2-6. Magnesium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

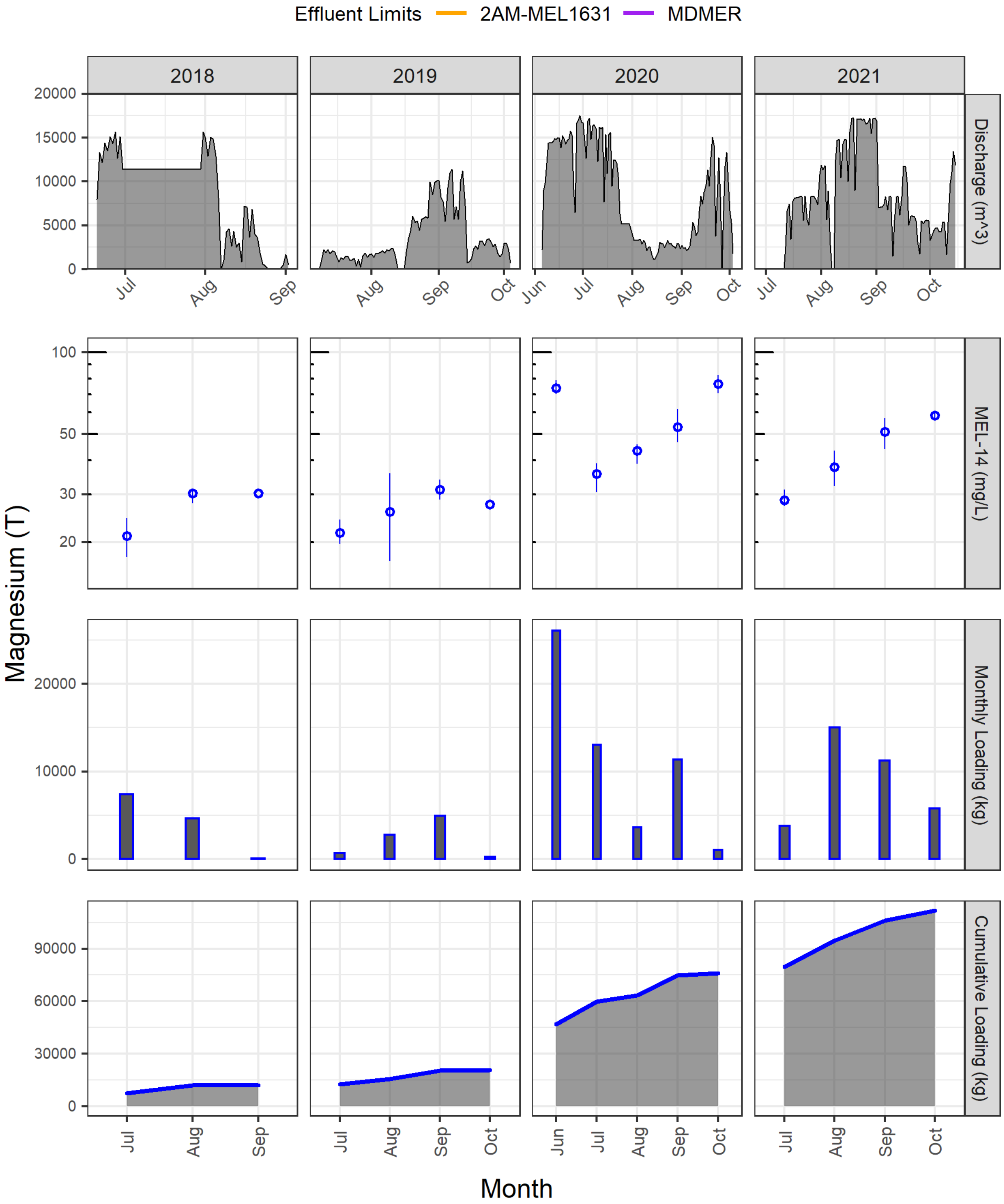


Figure B2-7. Potassium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

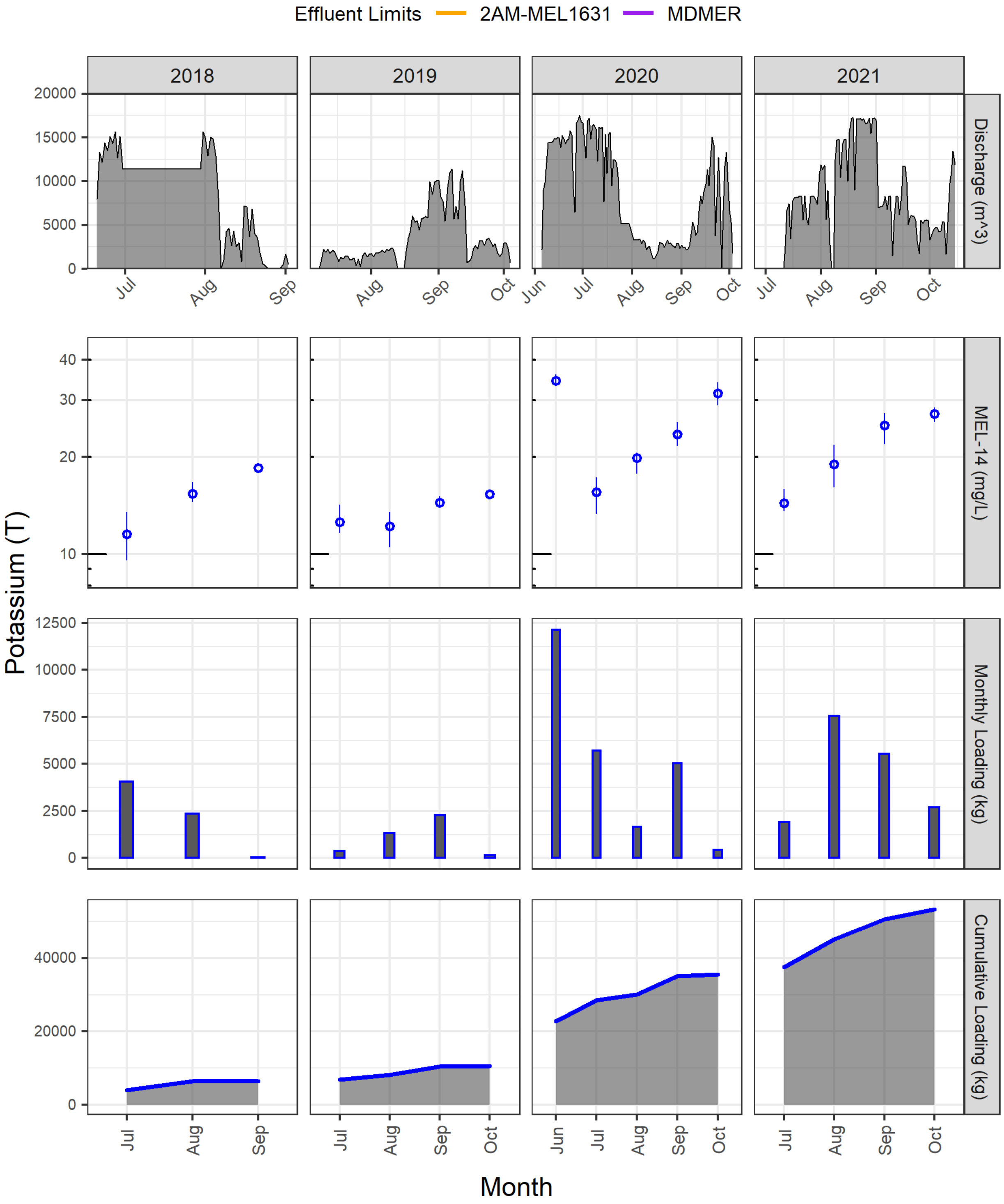


Figure B2-8. Sulphate – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

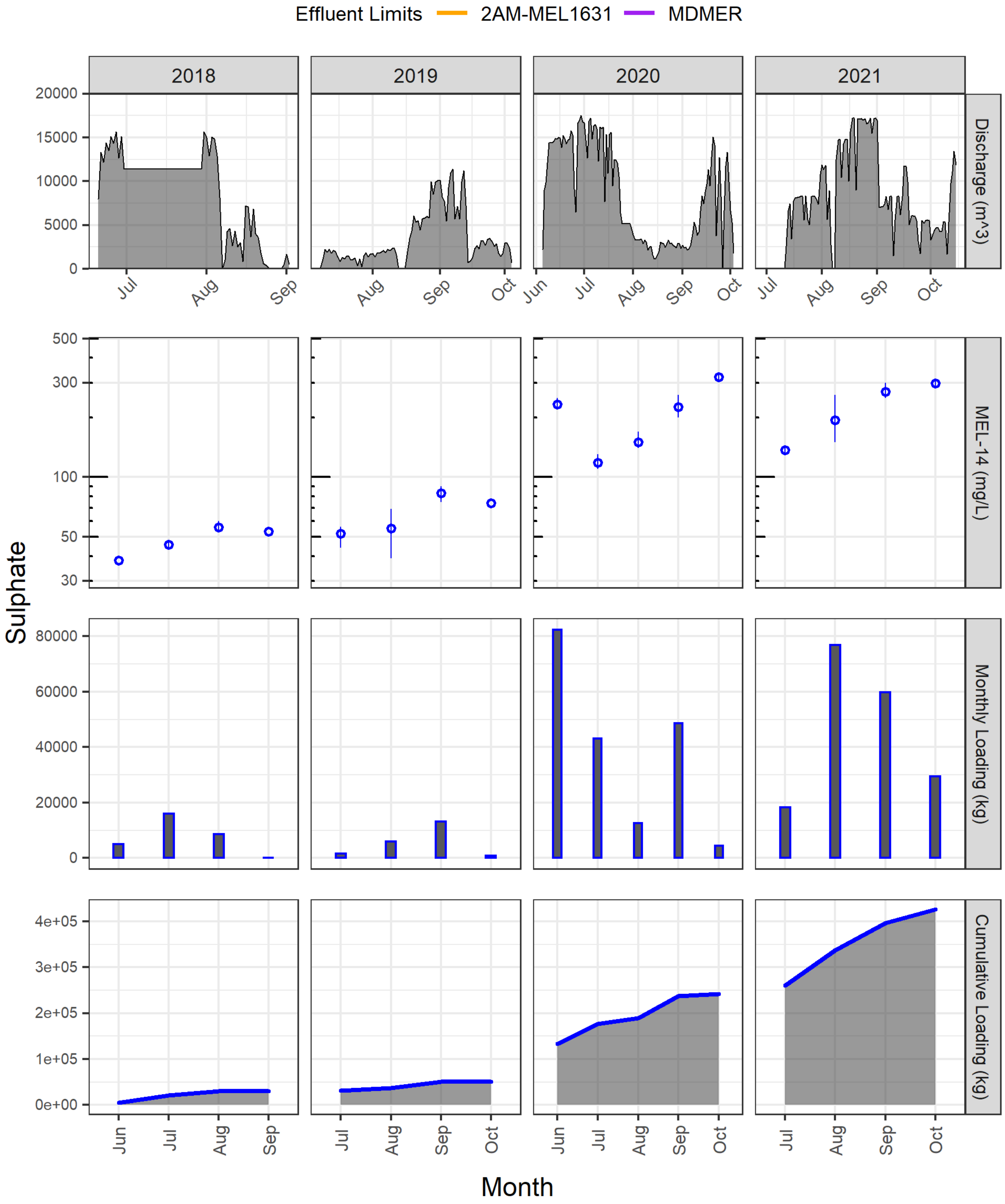


Figure B2-9. Alkalinity (Total) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

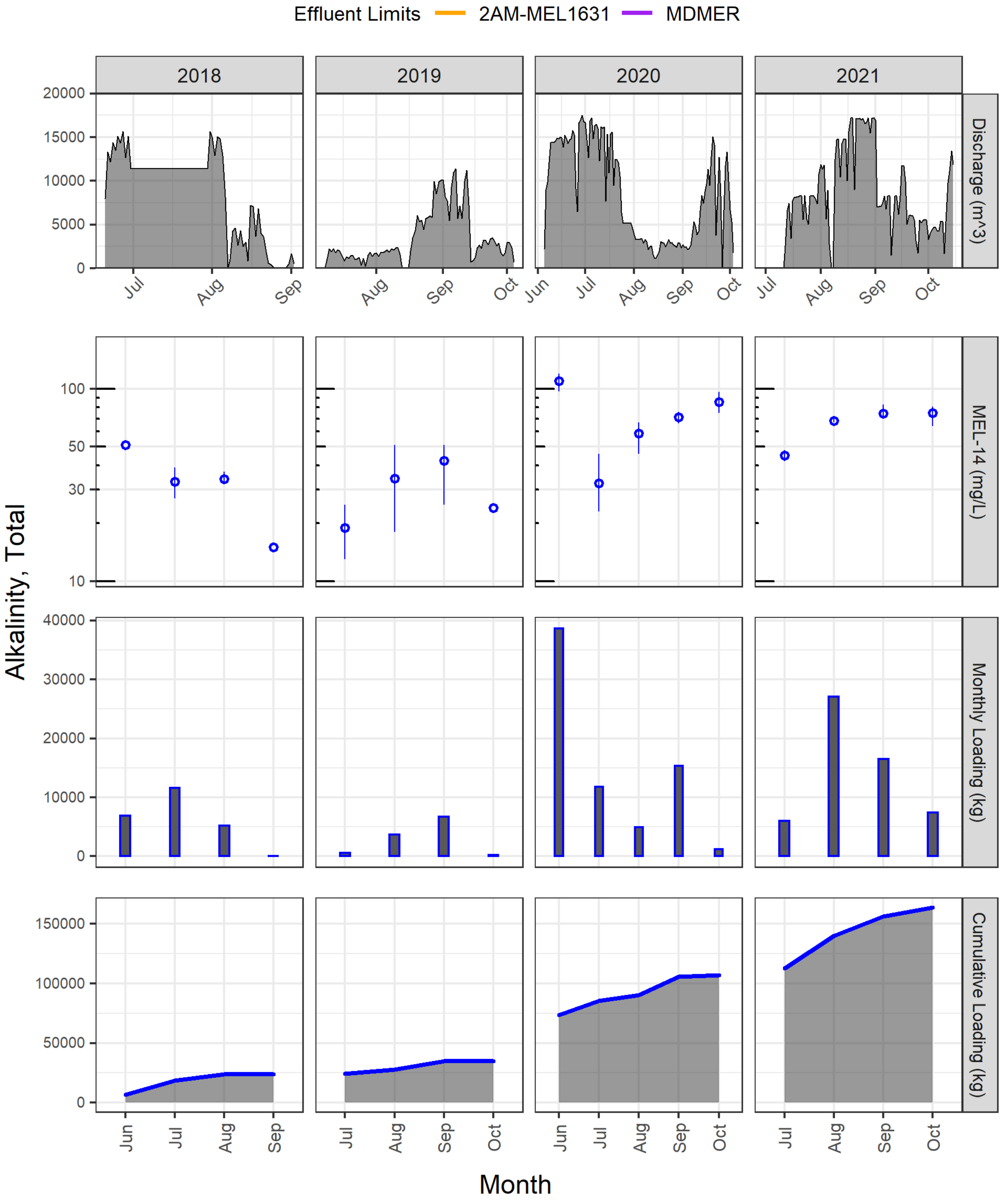


Figure B2-10. Reactive Silica – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

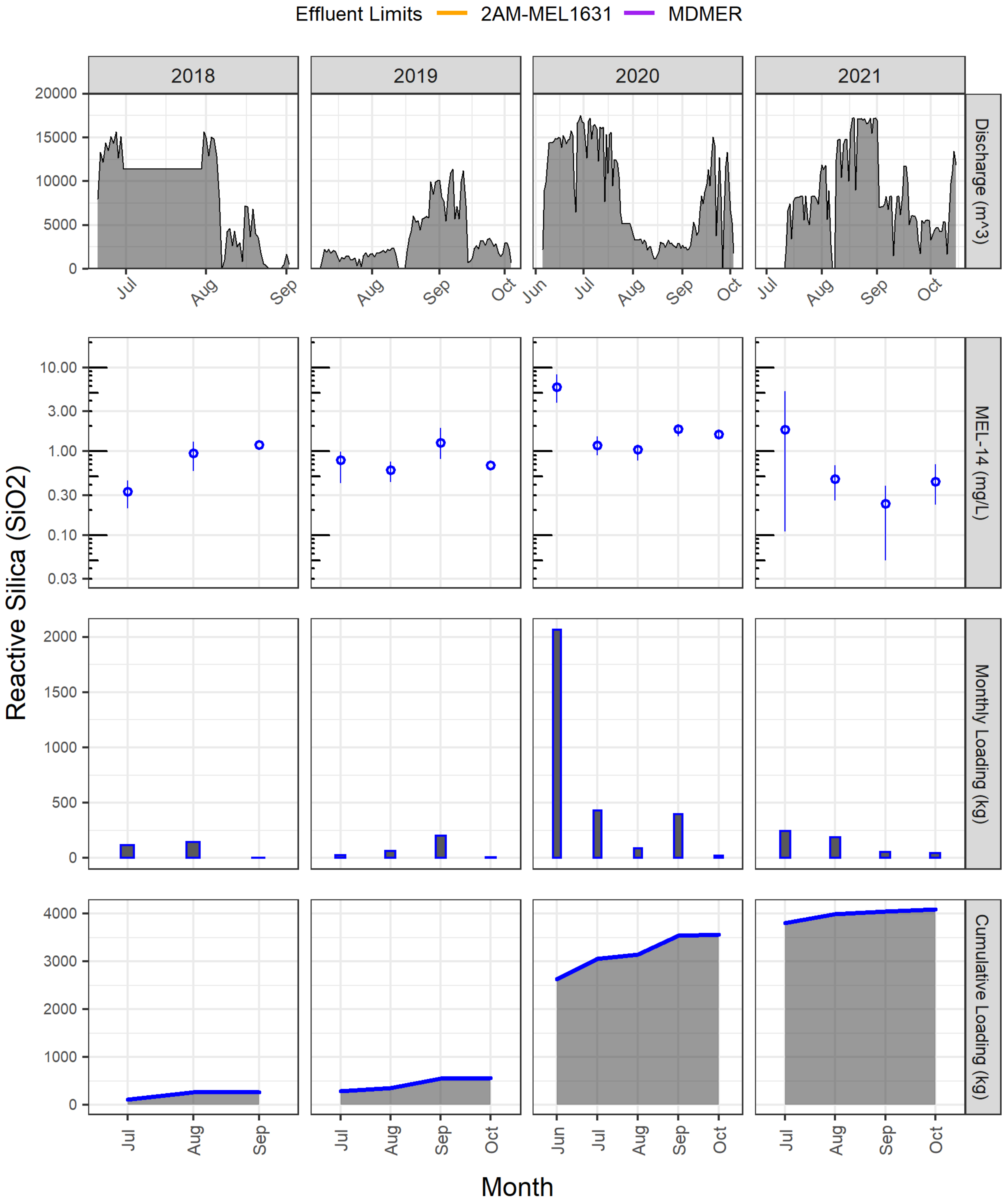


Figure B2-11. Nitrate (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

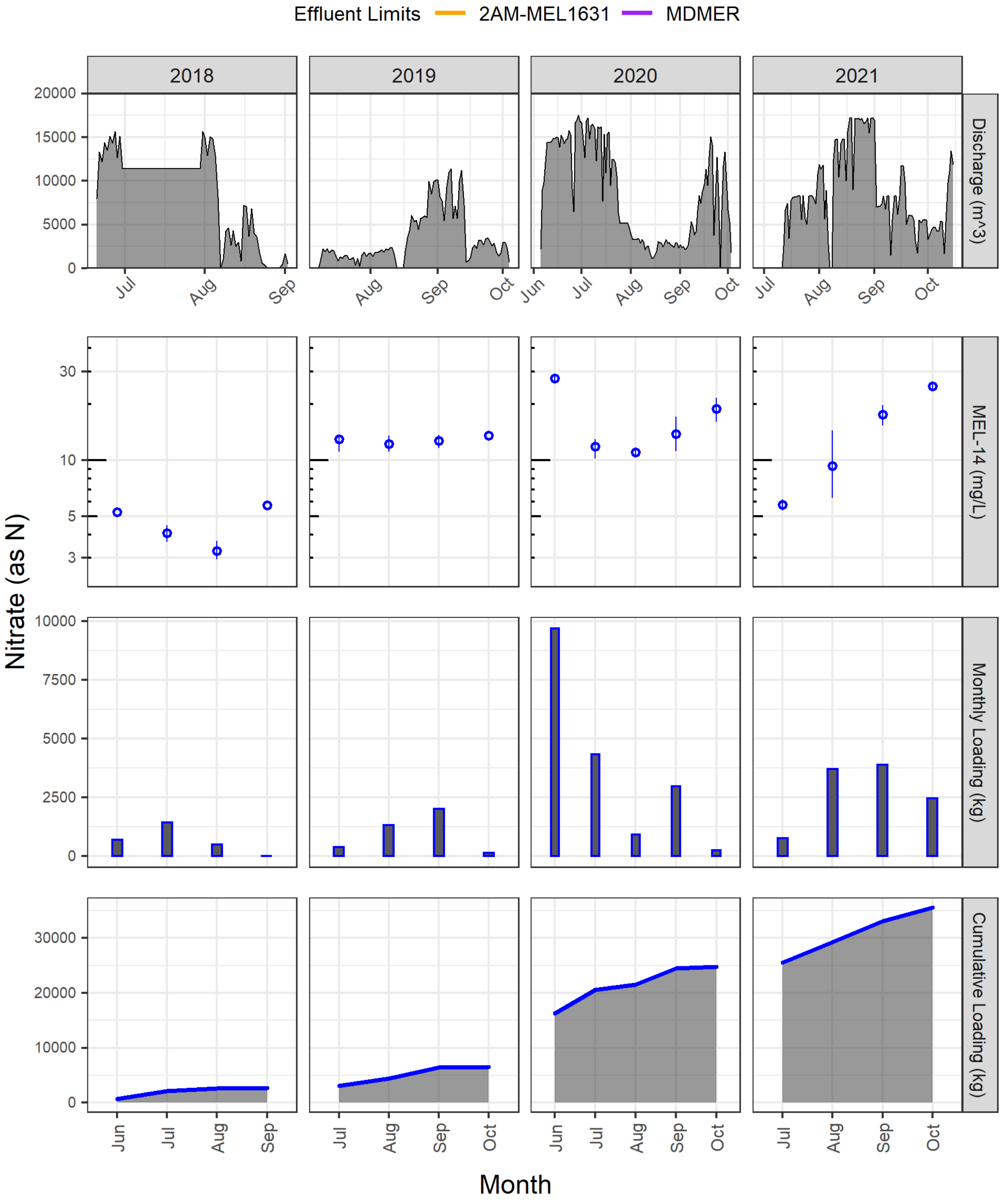


Figure B2-12. Nitrite (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

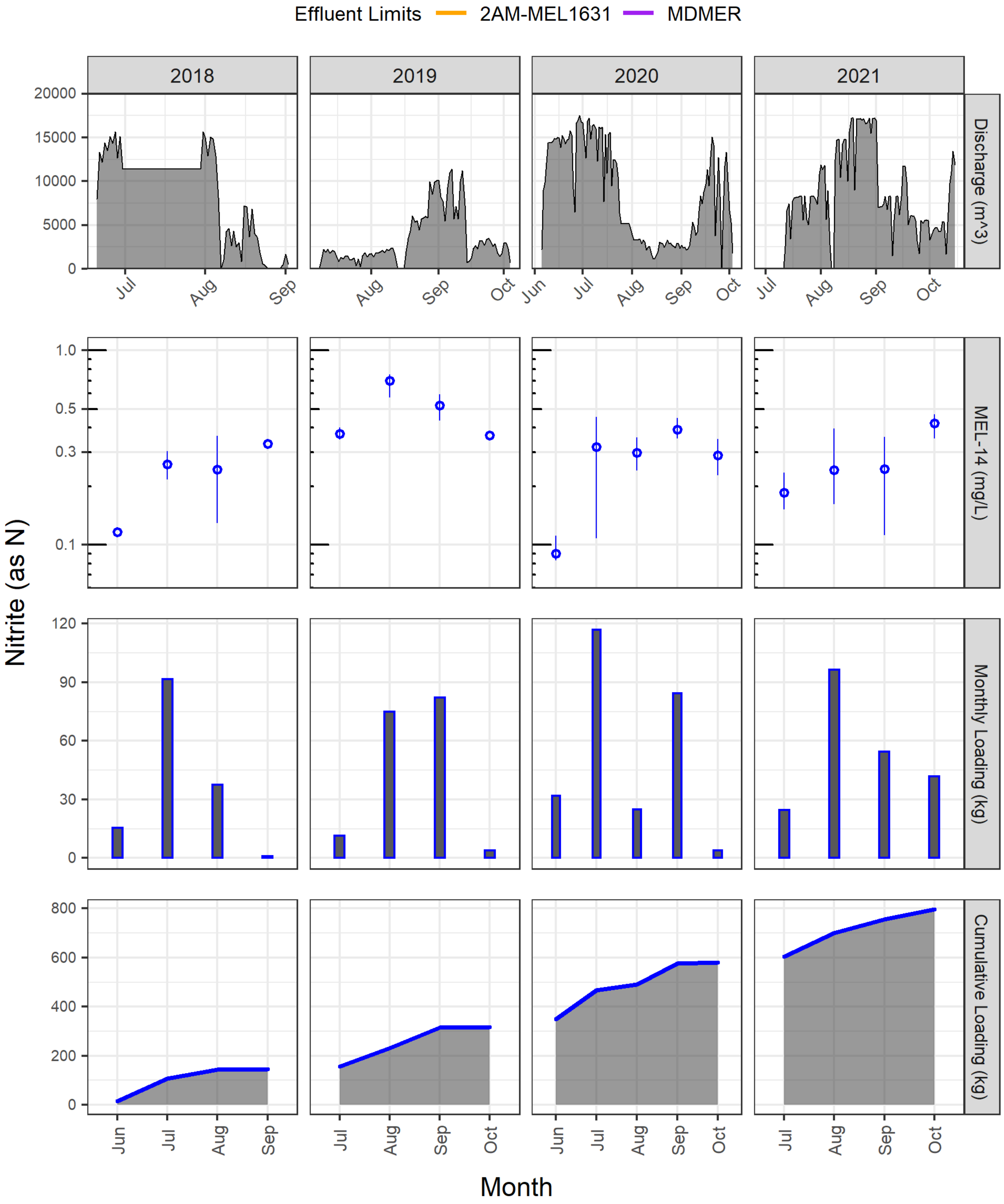


Figure B2-13. Nitrate + Nitrite (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

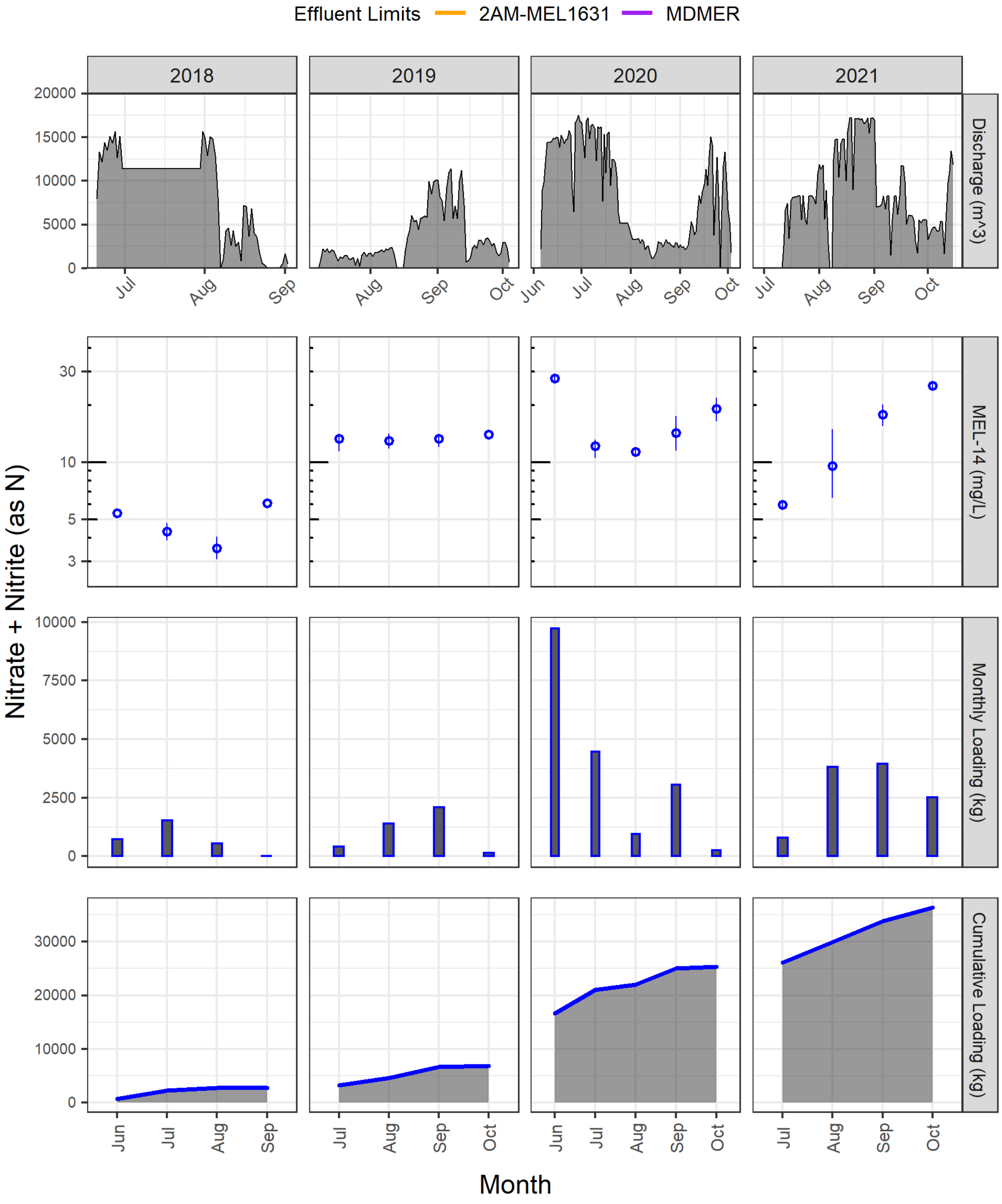


Figure B2-14. TKN – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

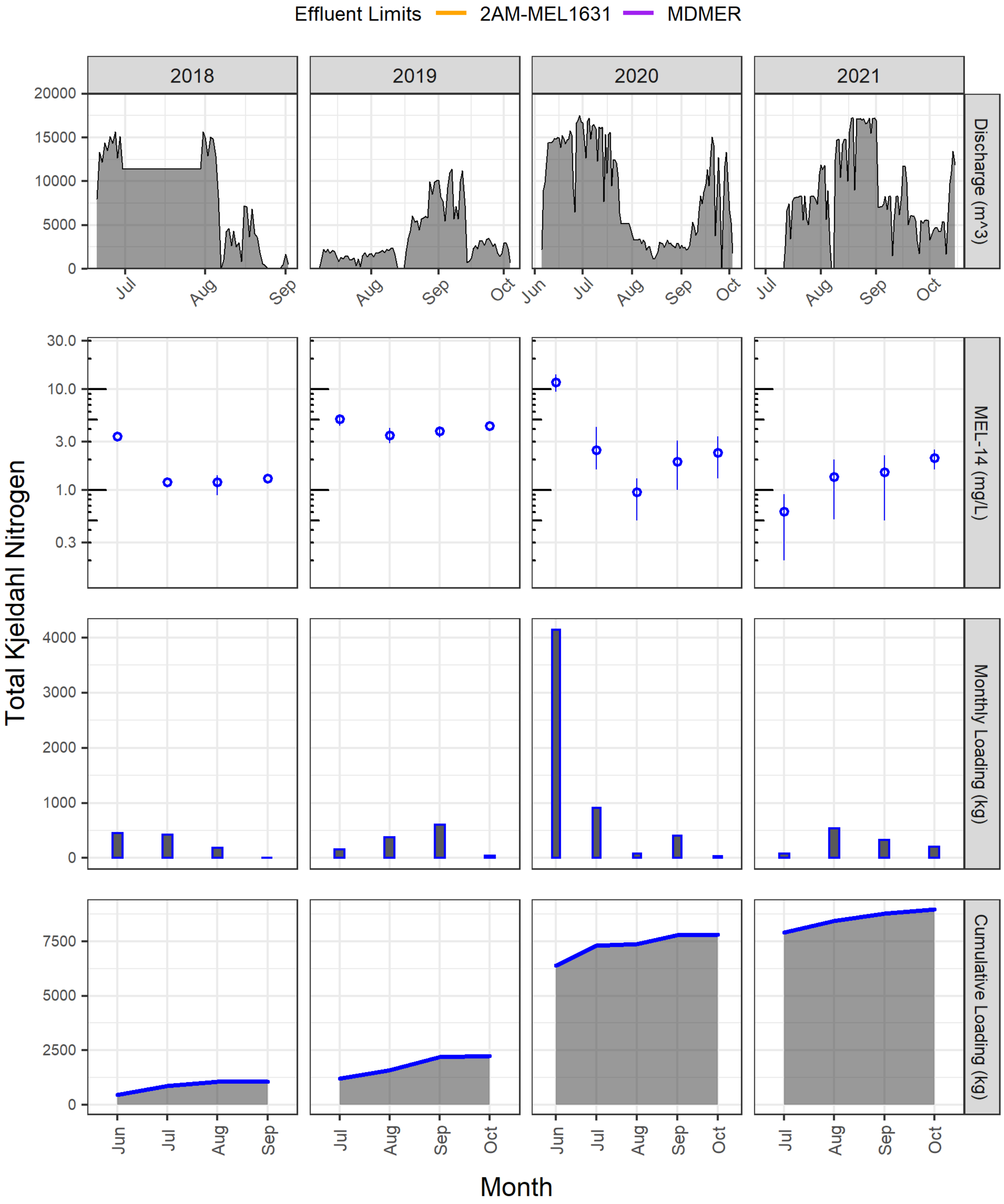


Figure B2-15. Ammonia (as N) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

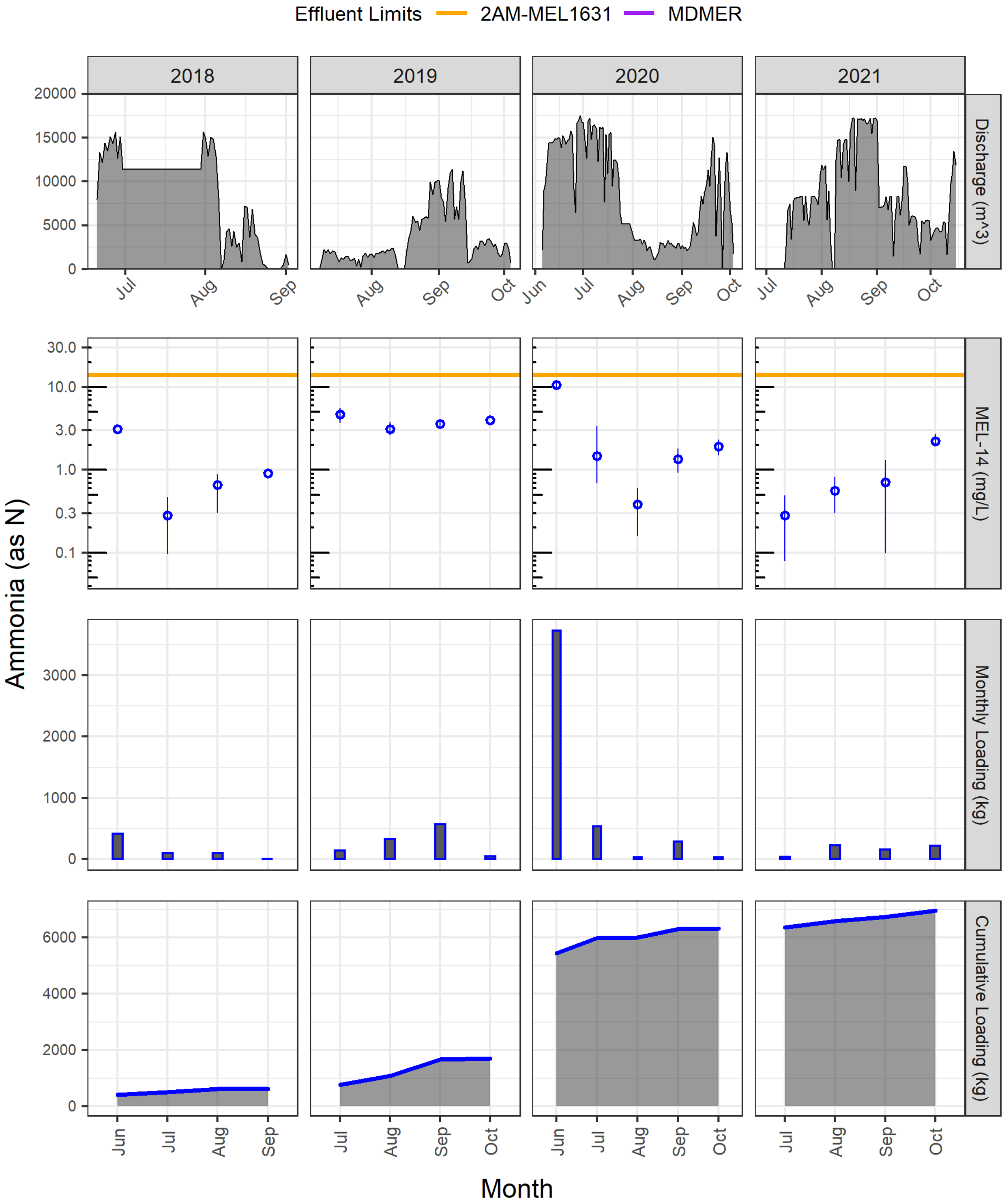


Figure B2-16. Total Phosphorus – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

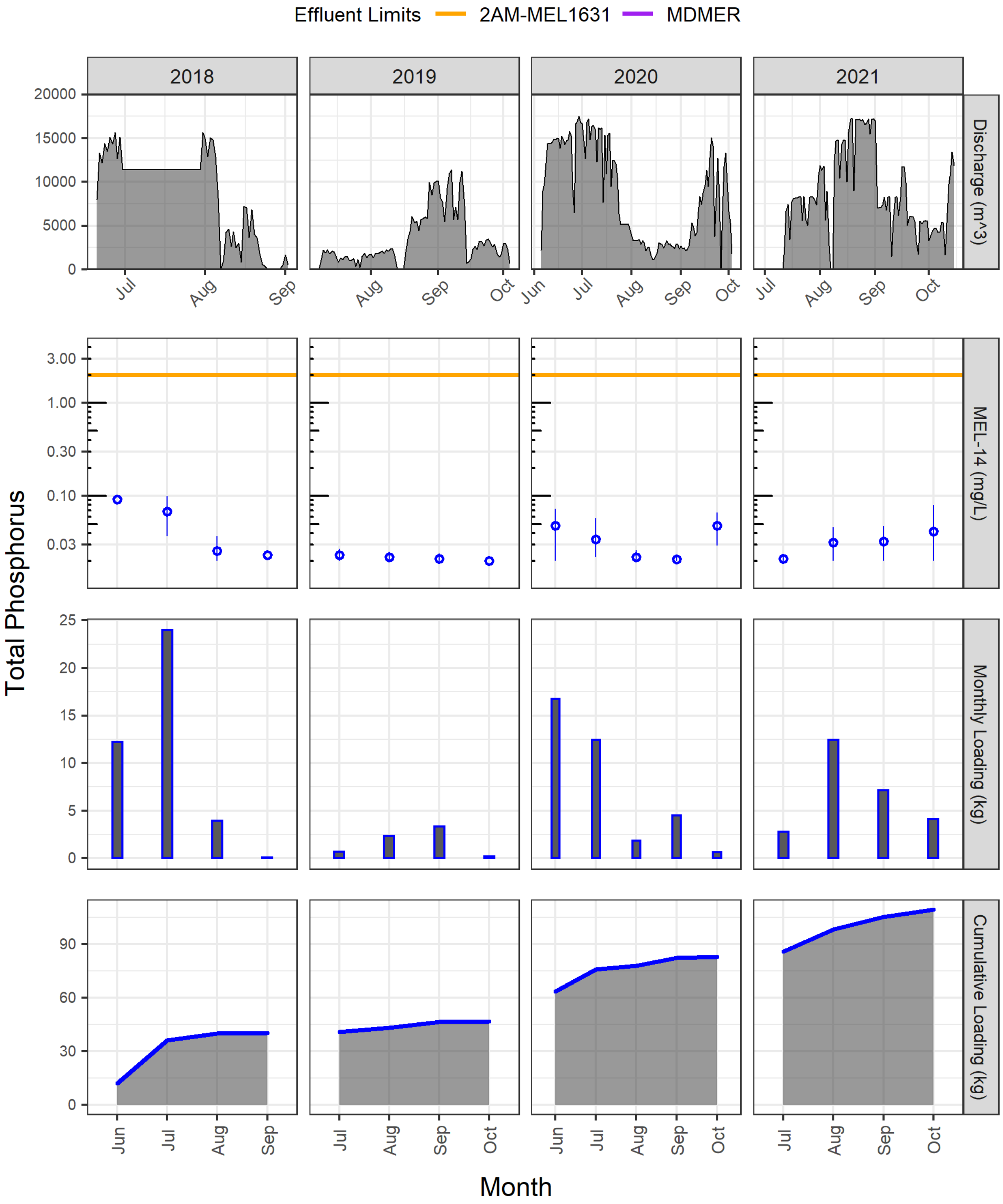


Figure B2-17. Orthophosphate – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

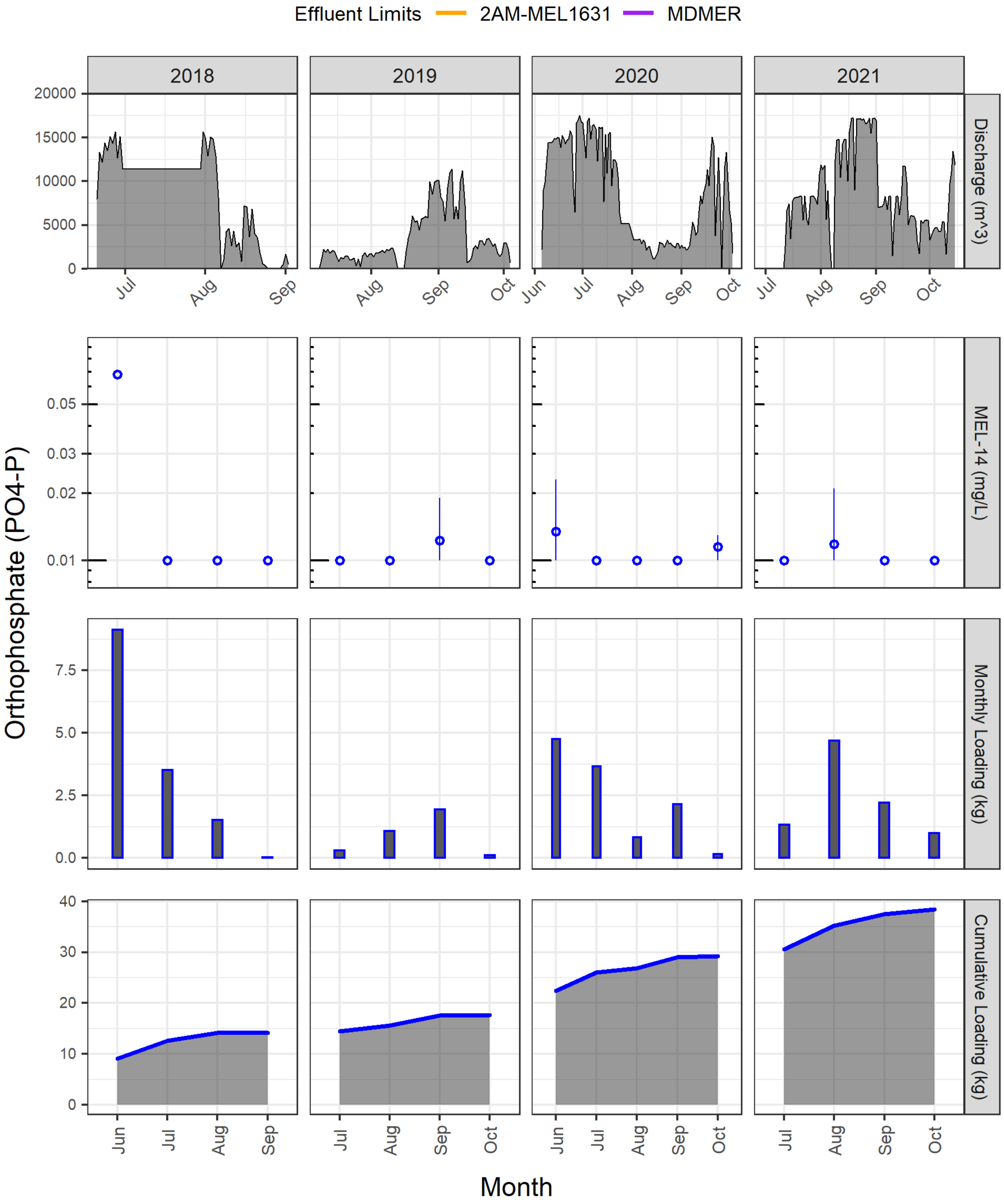


Figure B2-18. Total Organic Carbon – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

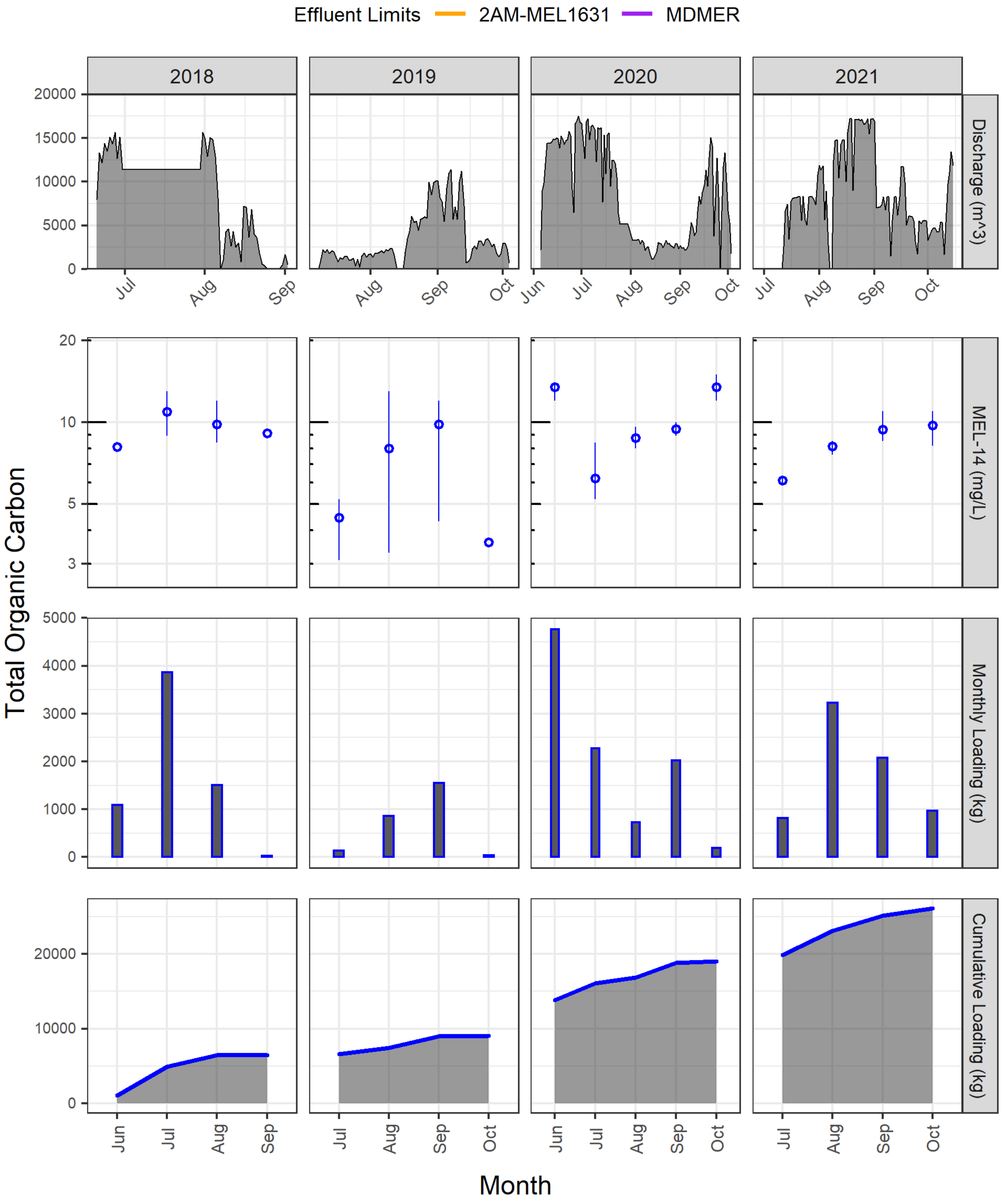


Figure B2-19. Arsenic – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

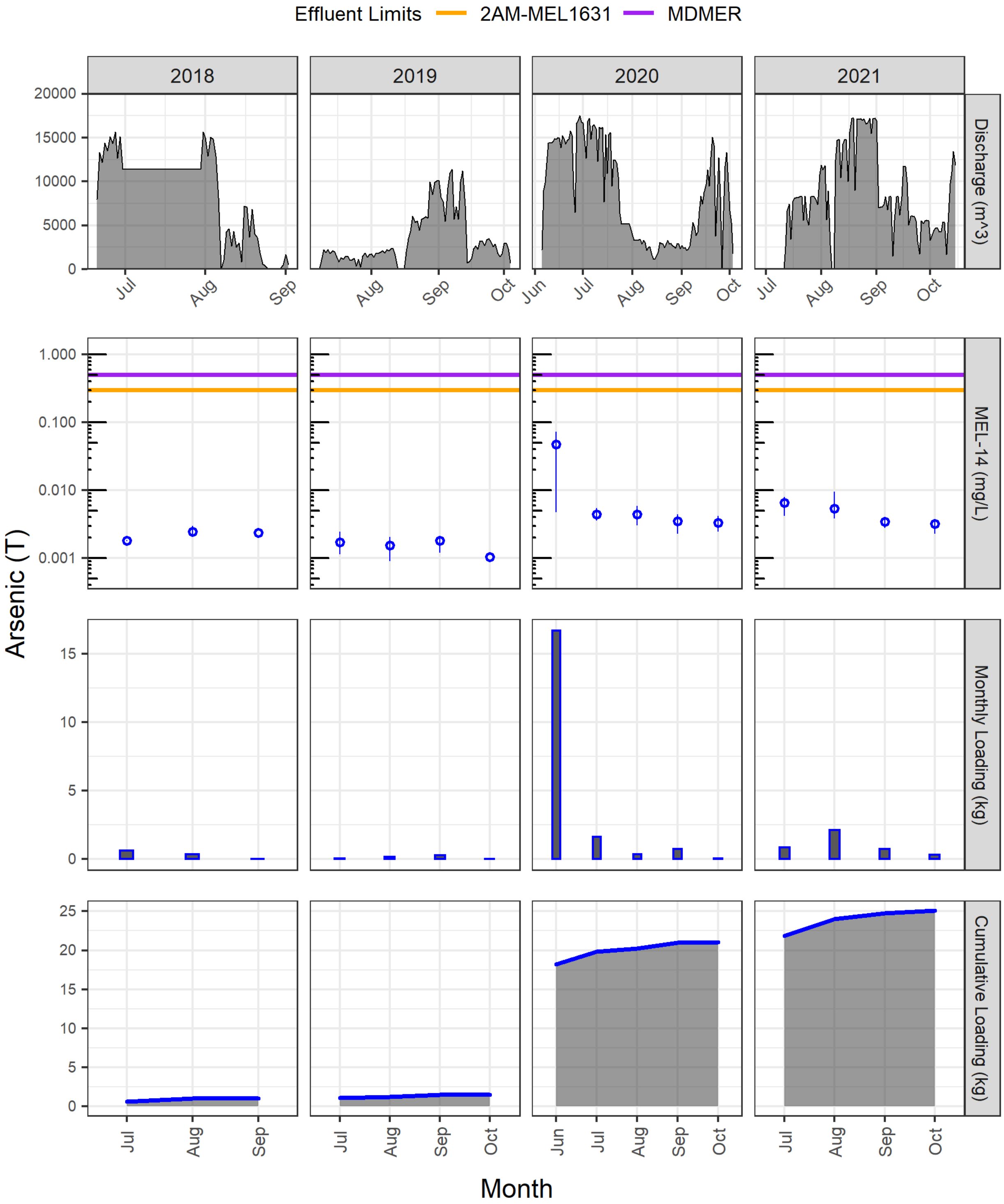


Figure B2-20. Barium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

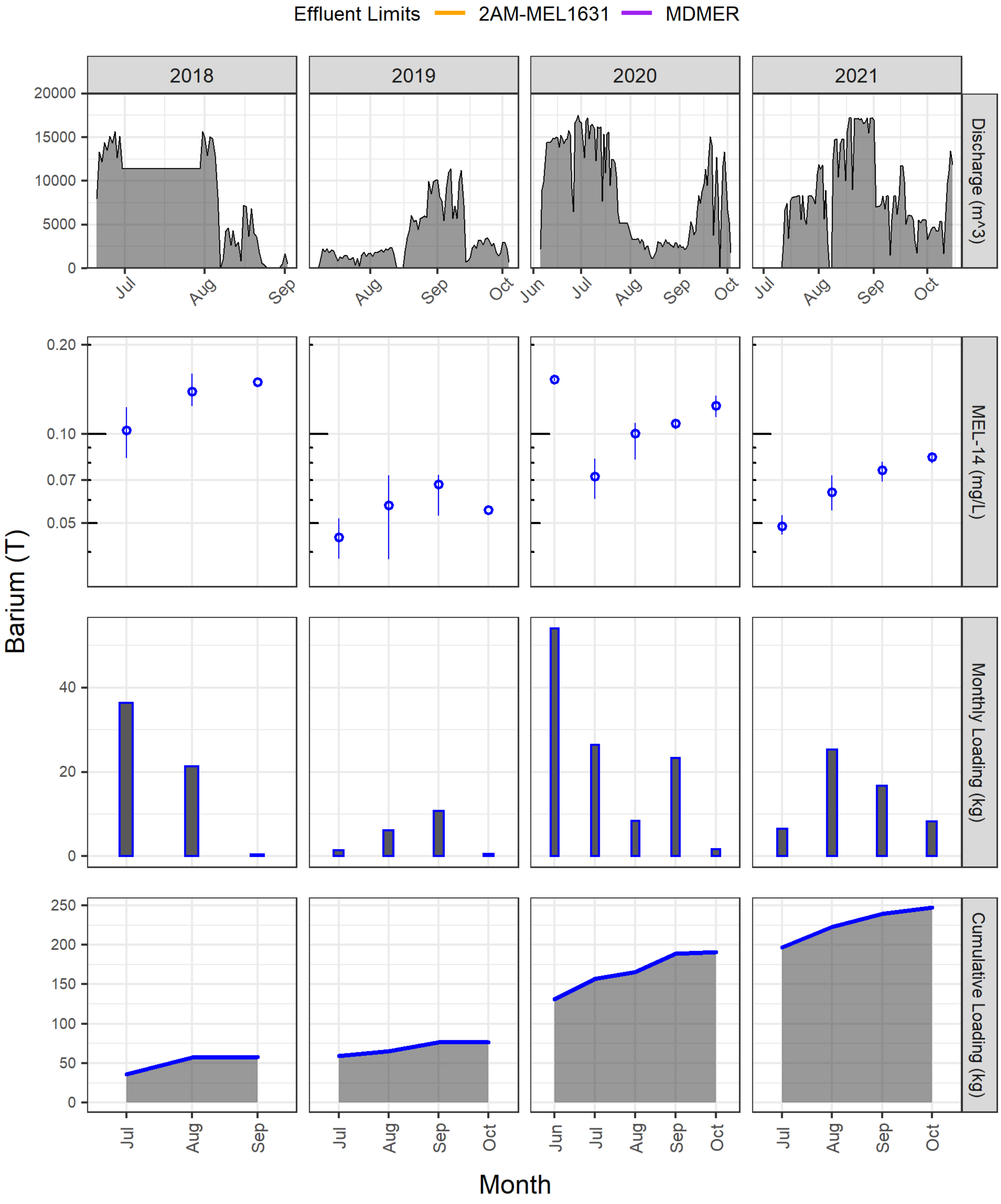


Figure B2-21. Beryllium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

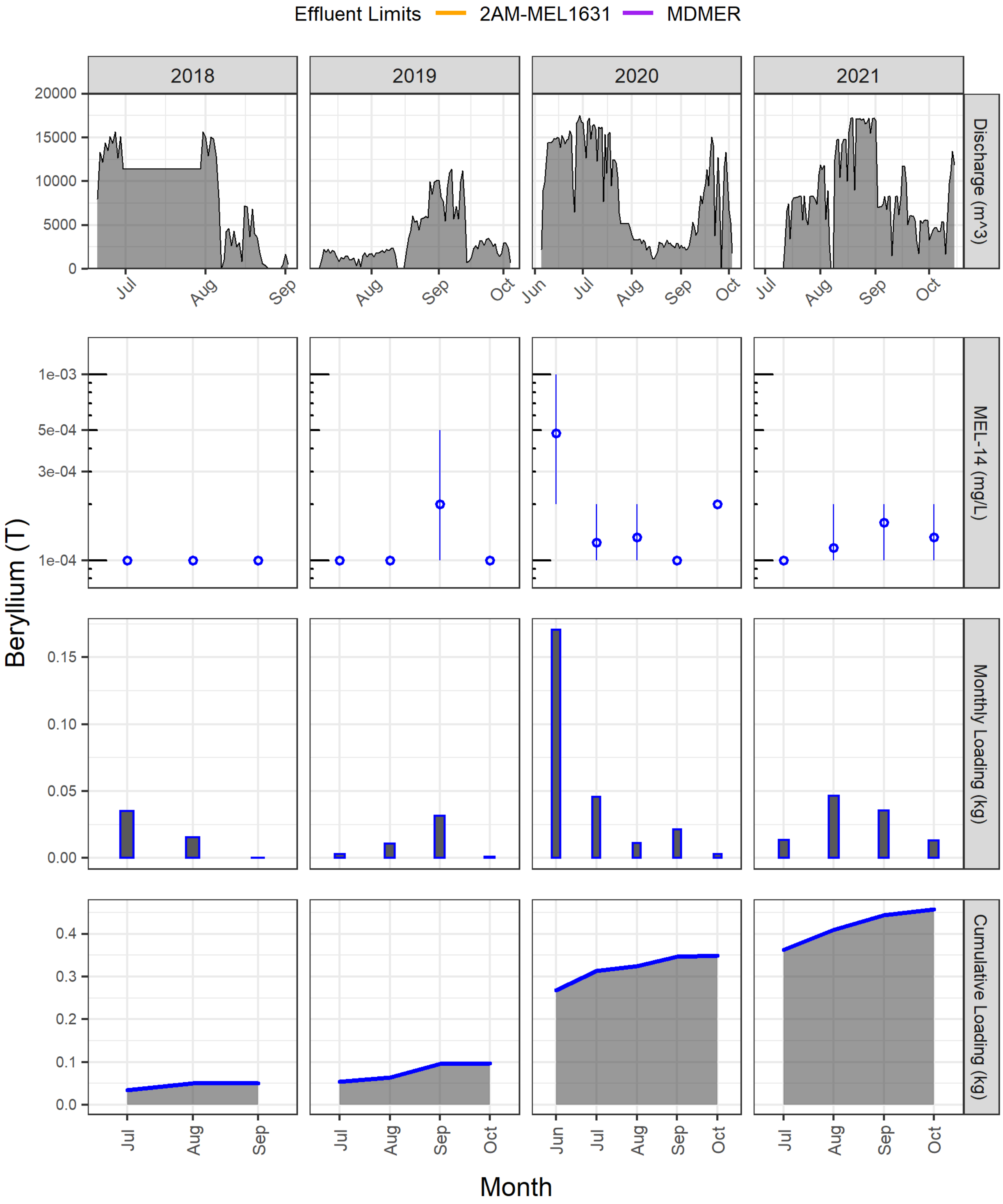


Figure B2-22. Bismuth – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

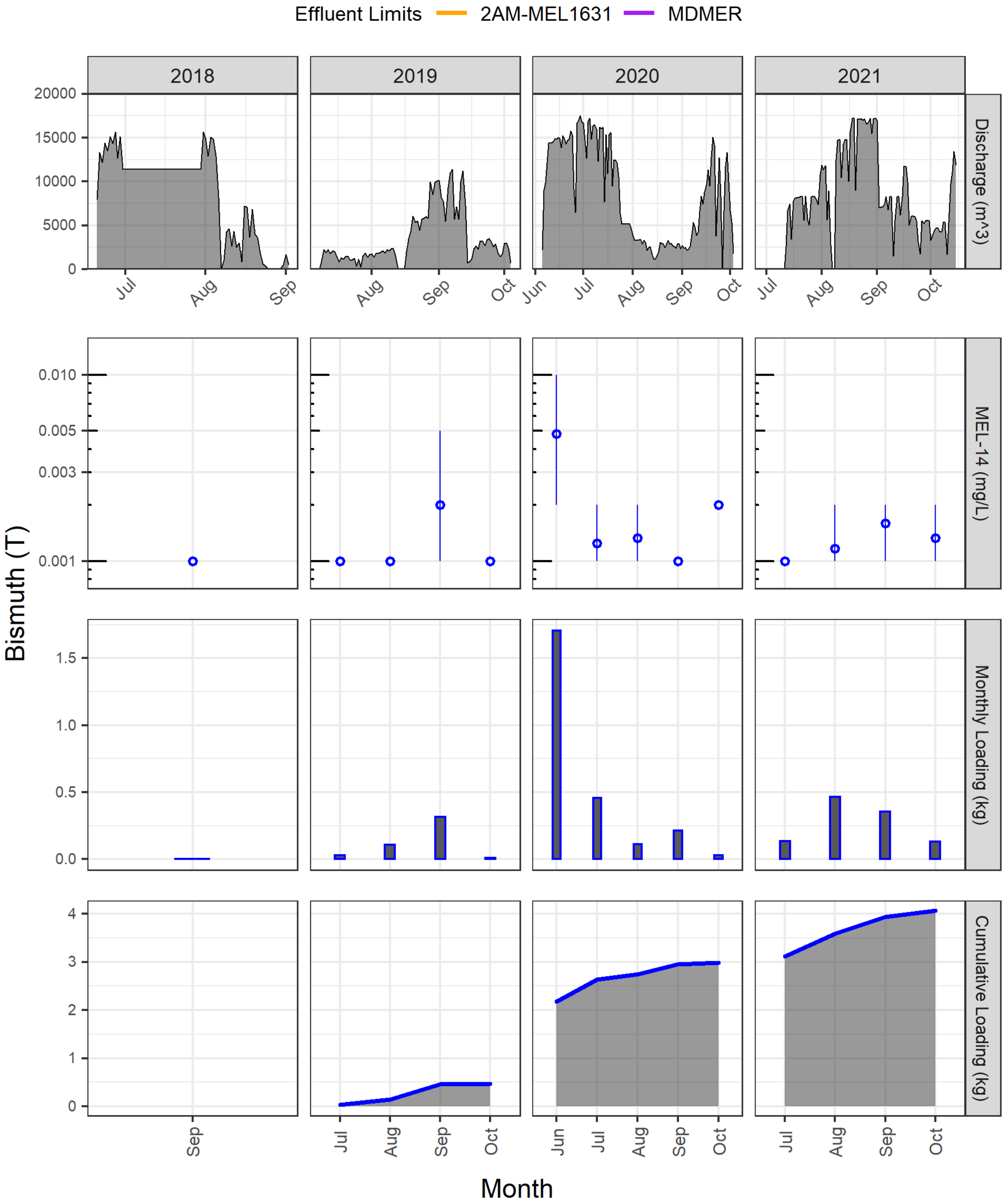


Figure B2-23. Boron– Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

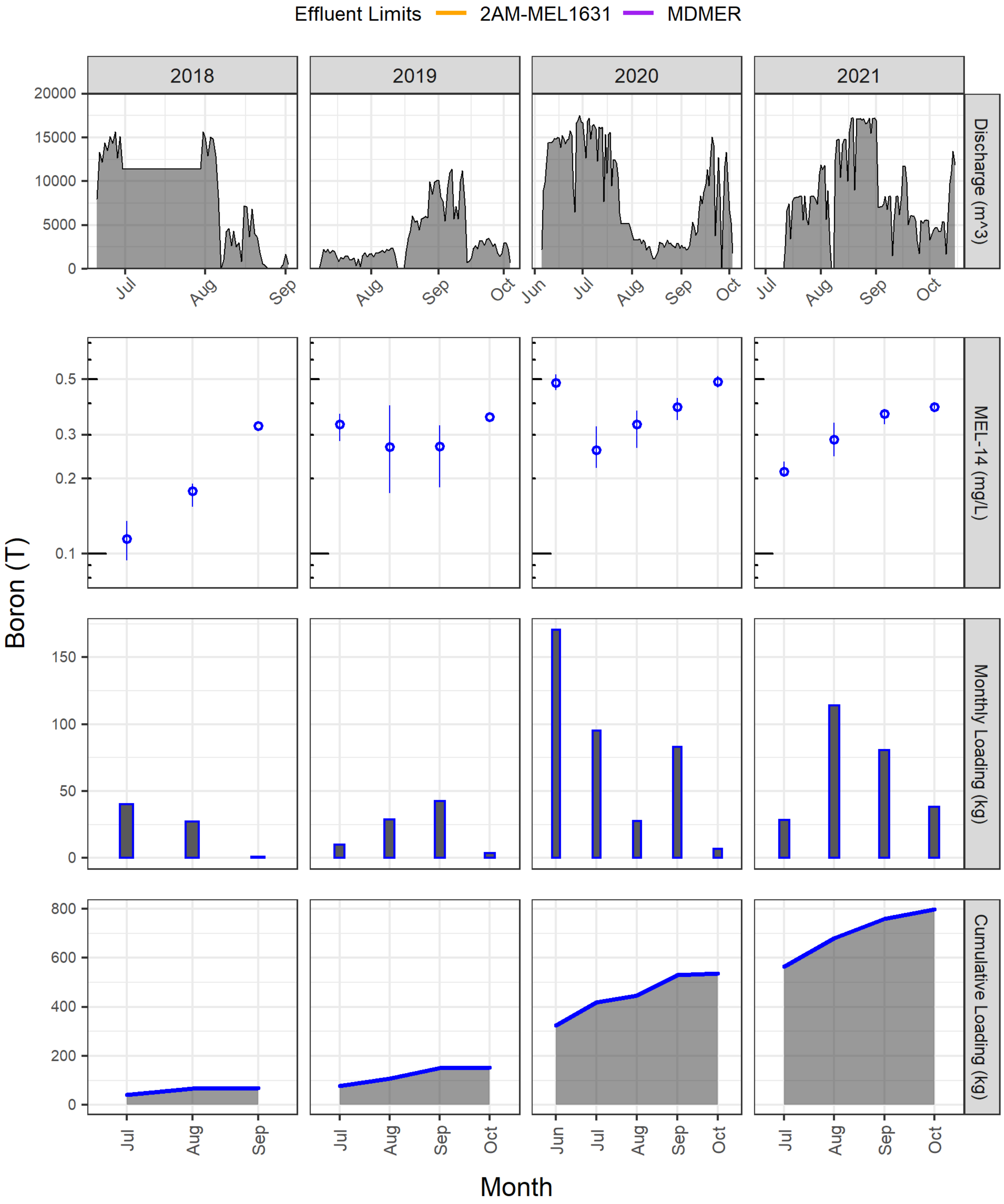


Figure B2-24. Cadmium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

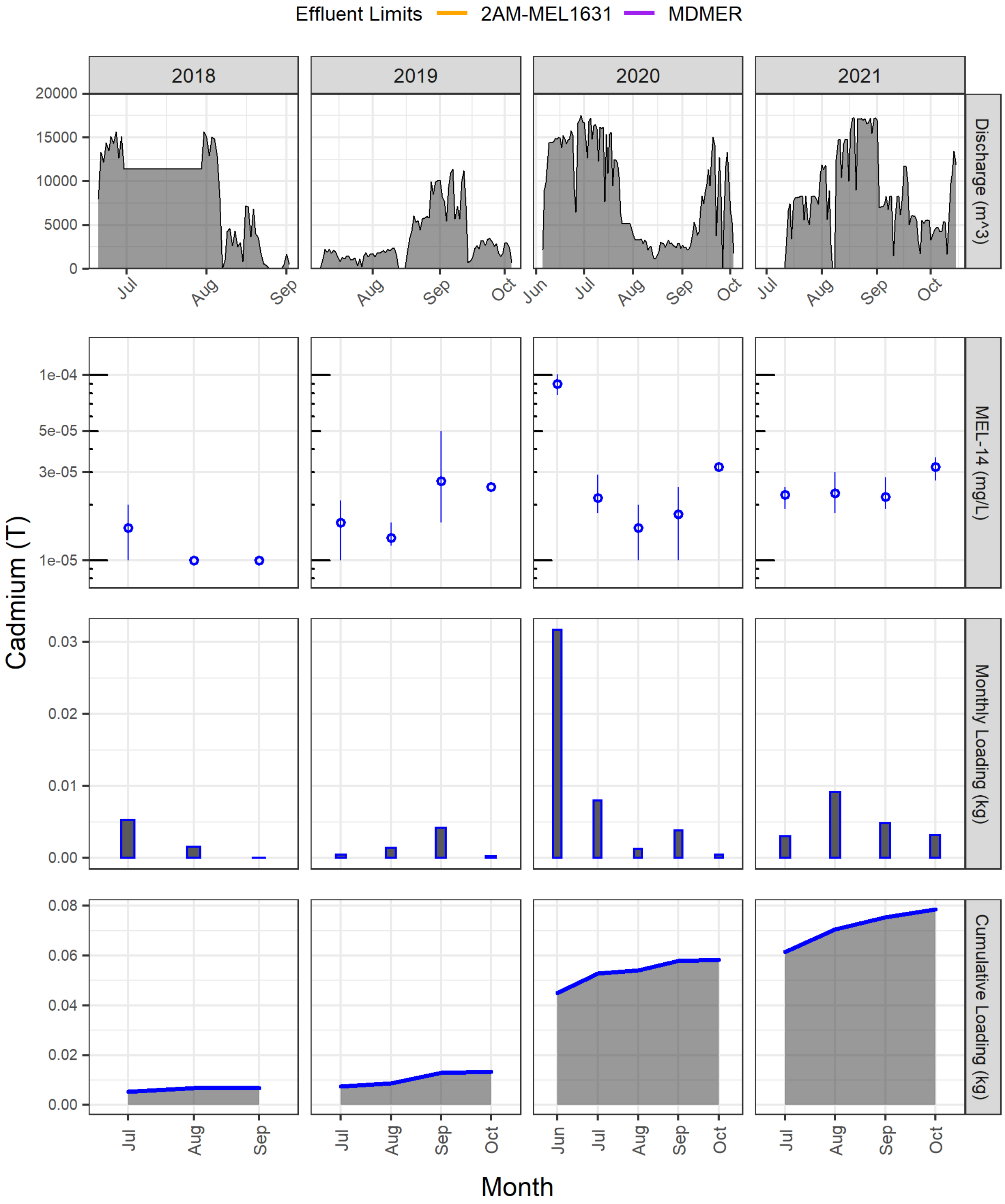


Figure B2-25. Chromium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

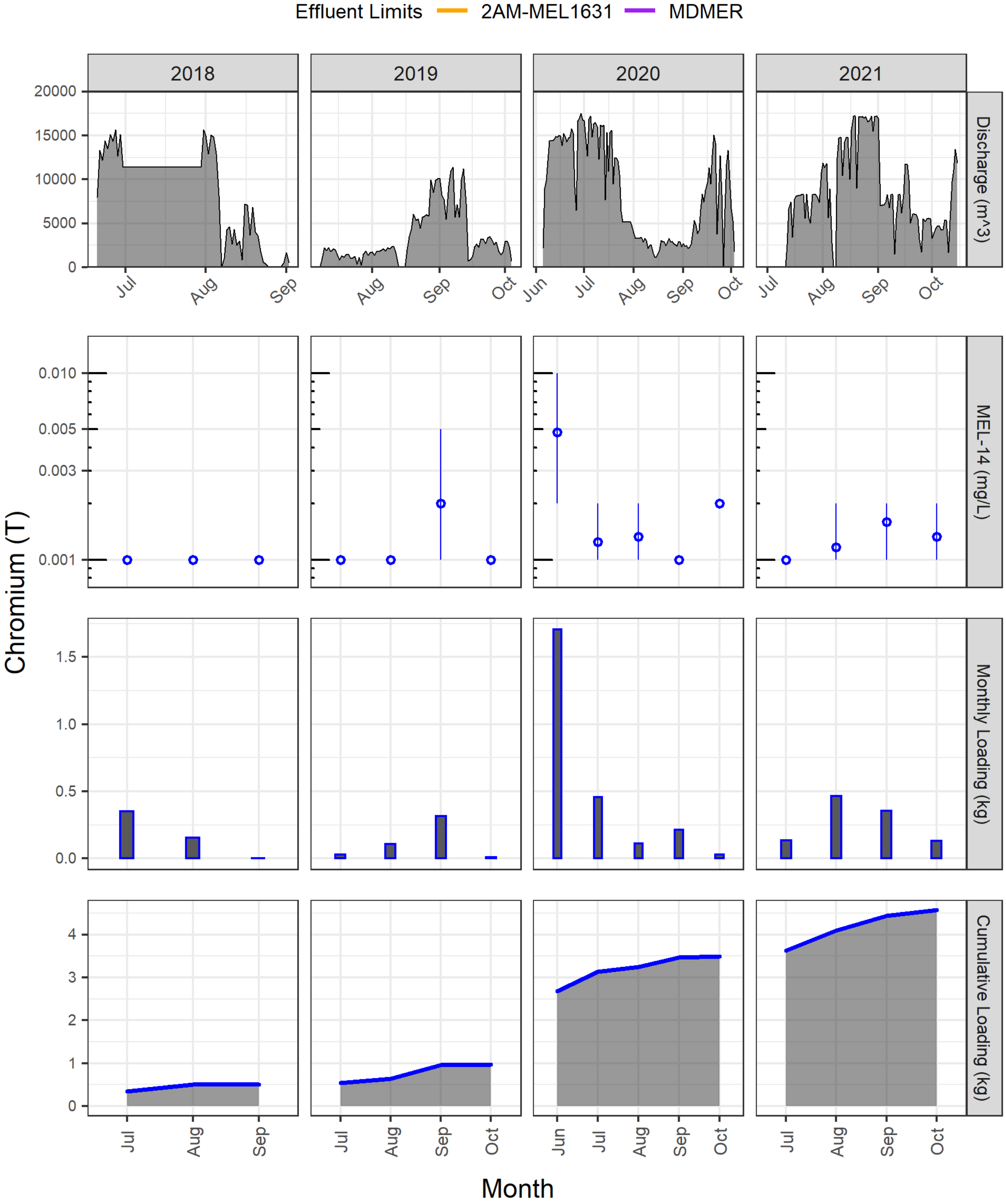


Figure B2-26. Cobalt – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

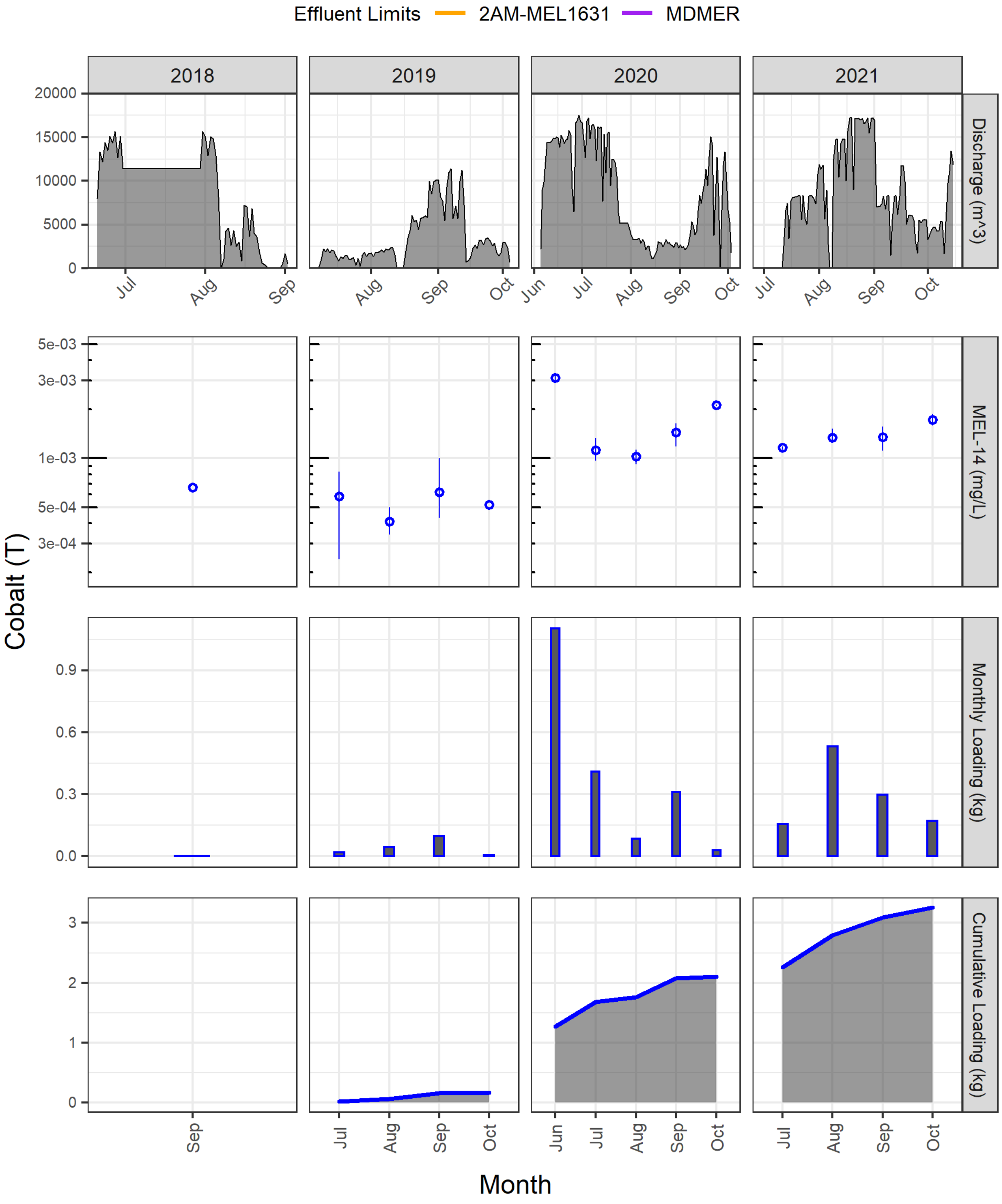


Figure B2-27. Copper – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

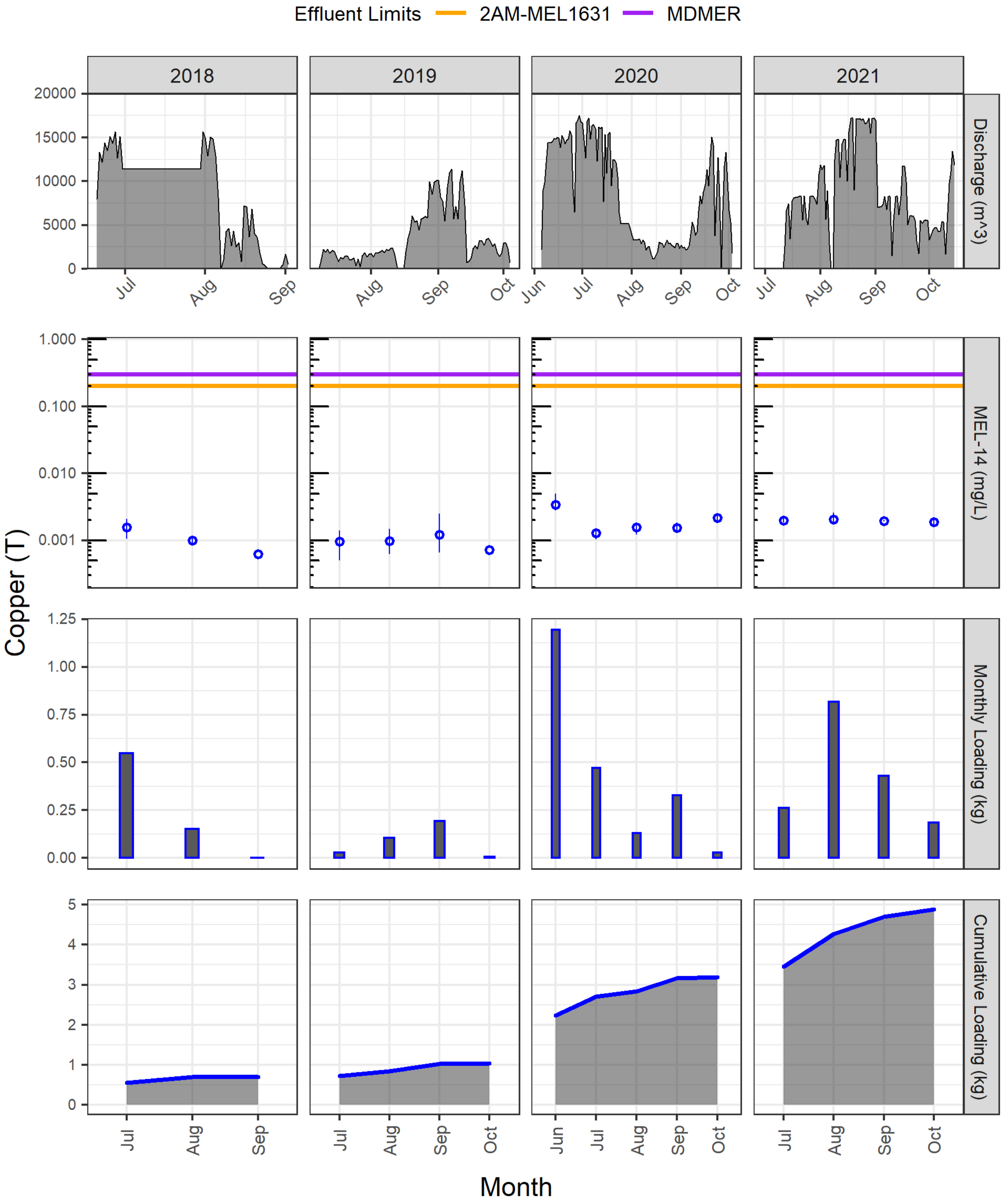


Figure B2-28. Iron– Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

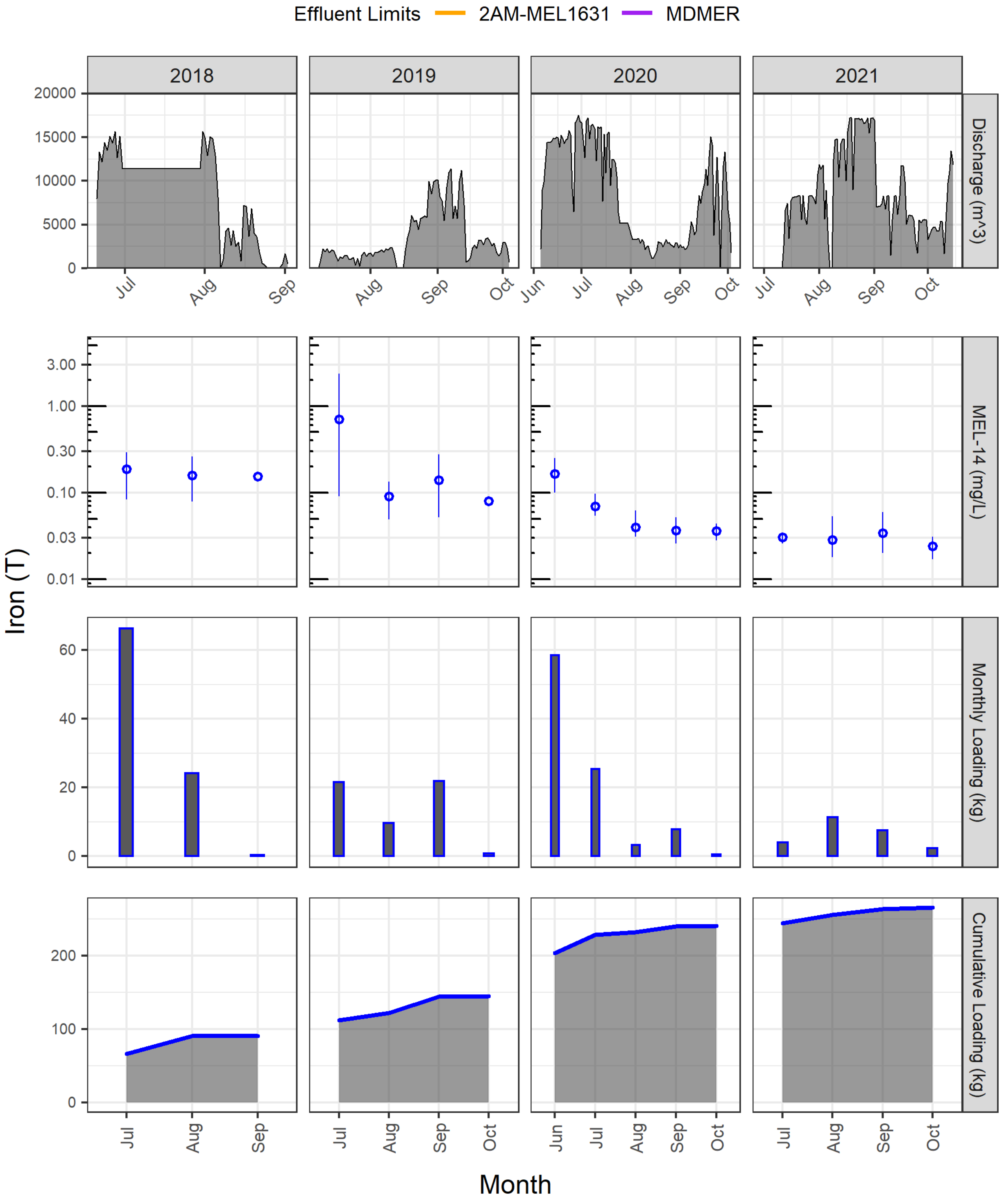


Figure B2-29. Lead – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

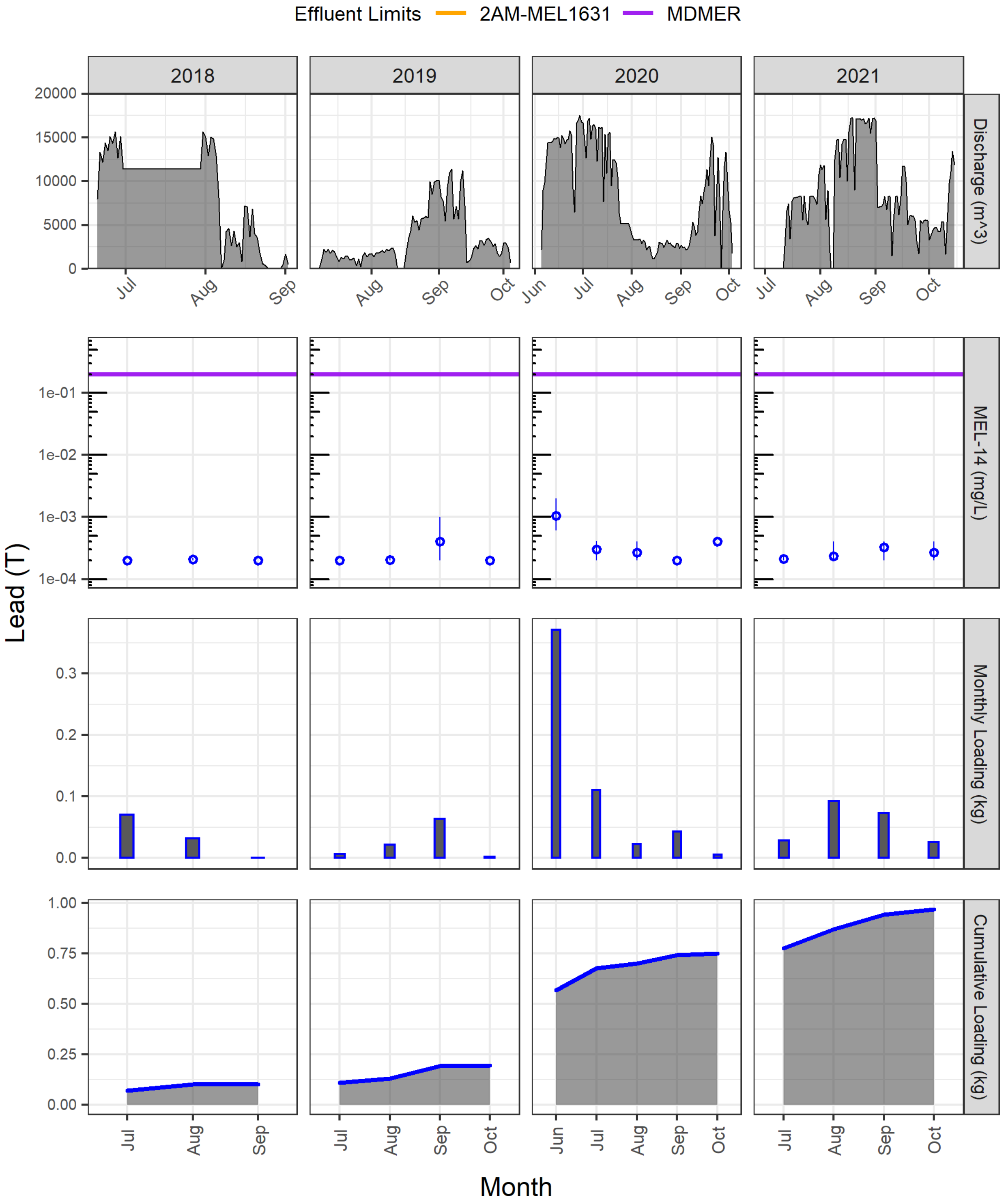


Figure B2-30. Lithium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

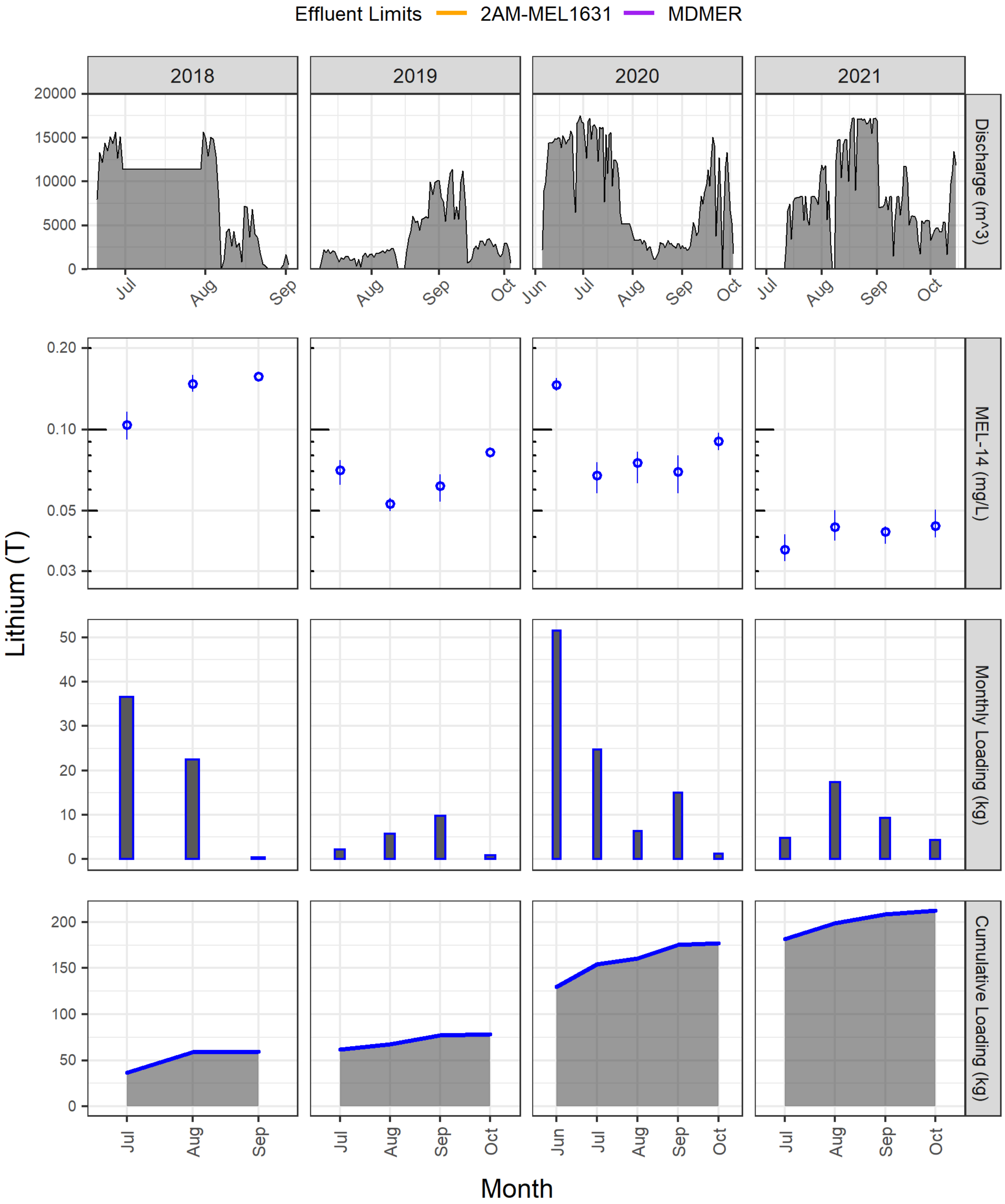


Figure B2-31. Manganese – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

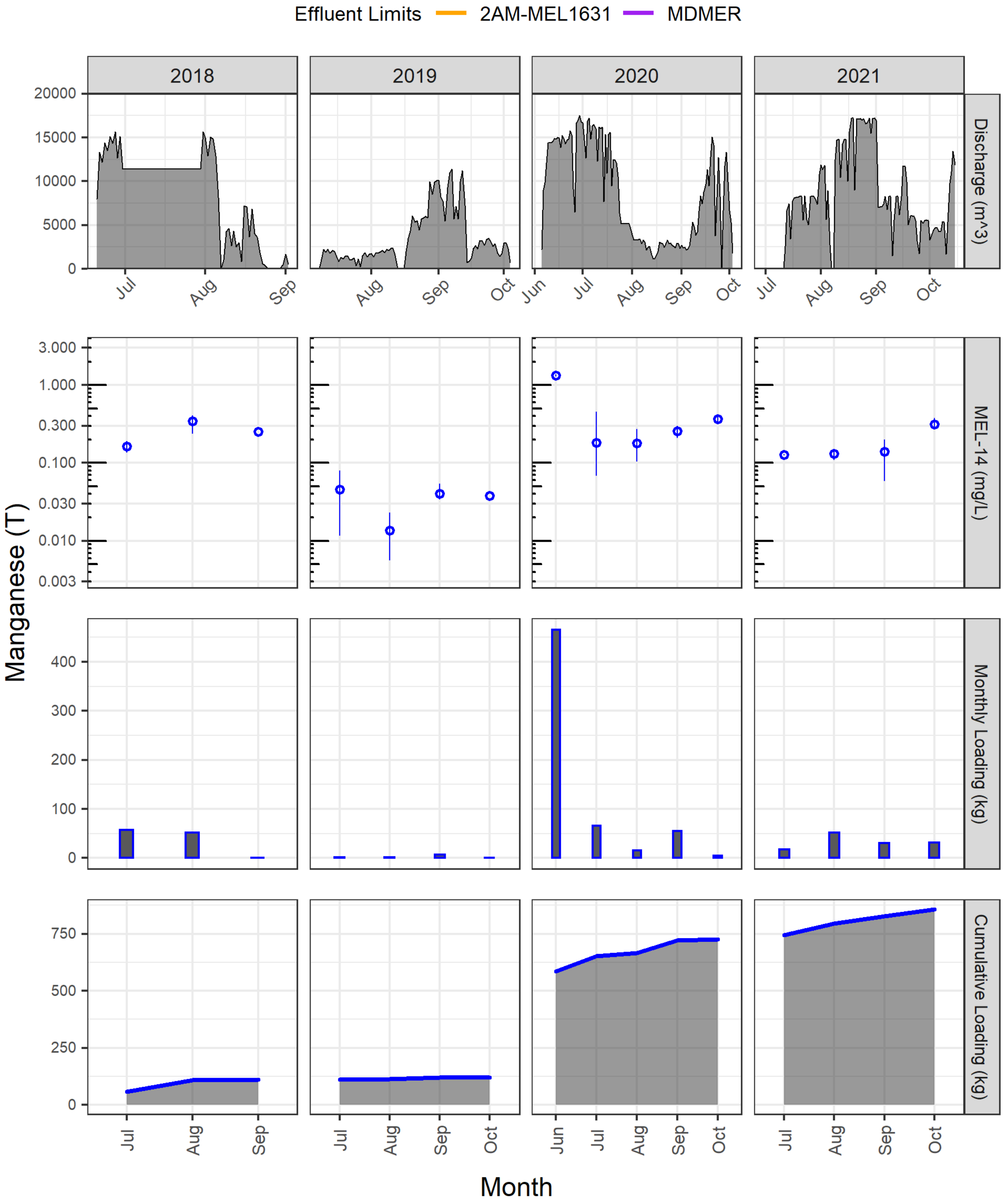


Figure B2-32. Mercury – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

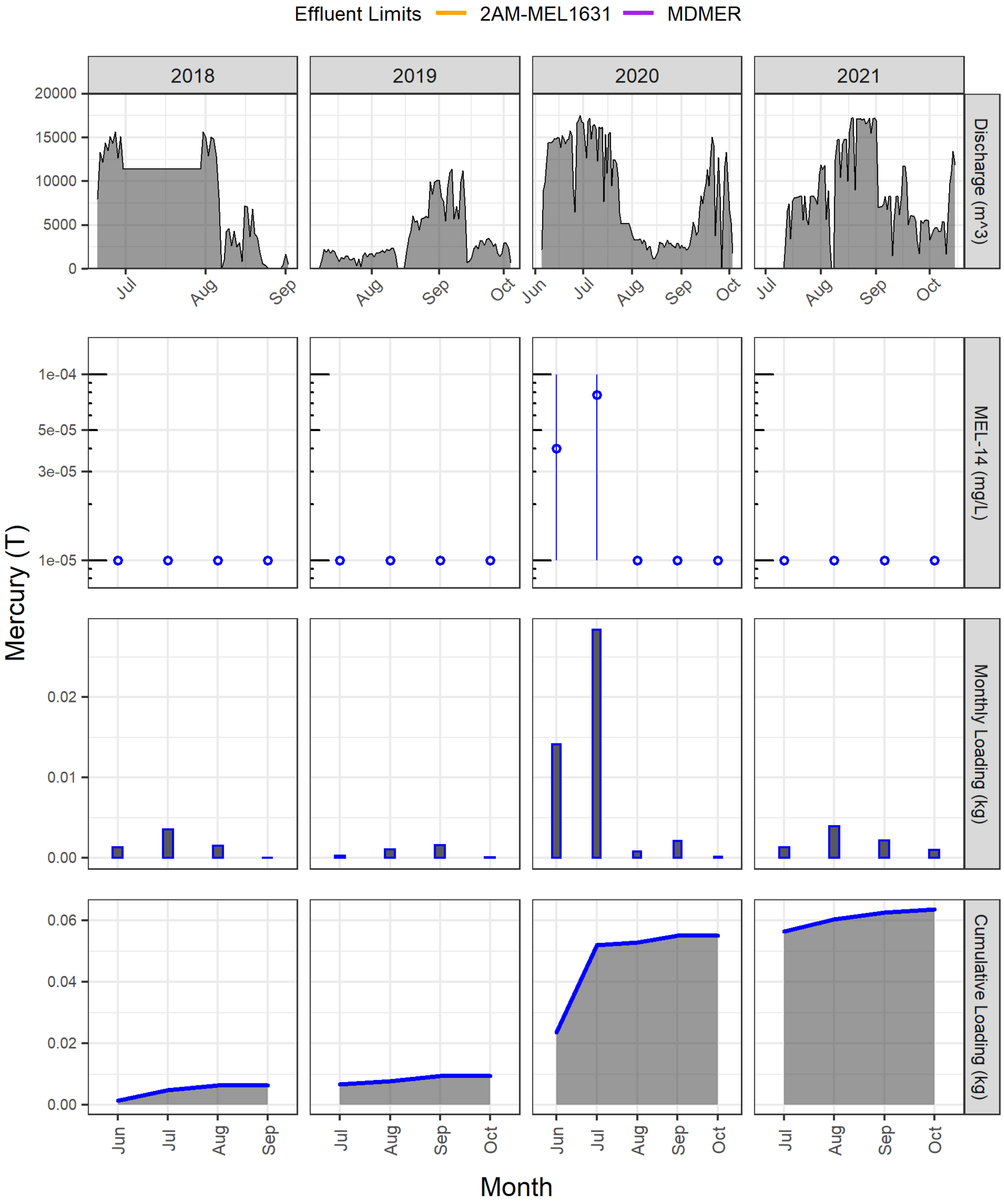


Figure B2-33. Molybdenum – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

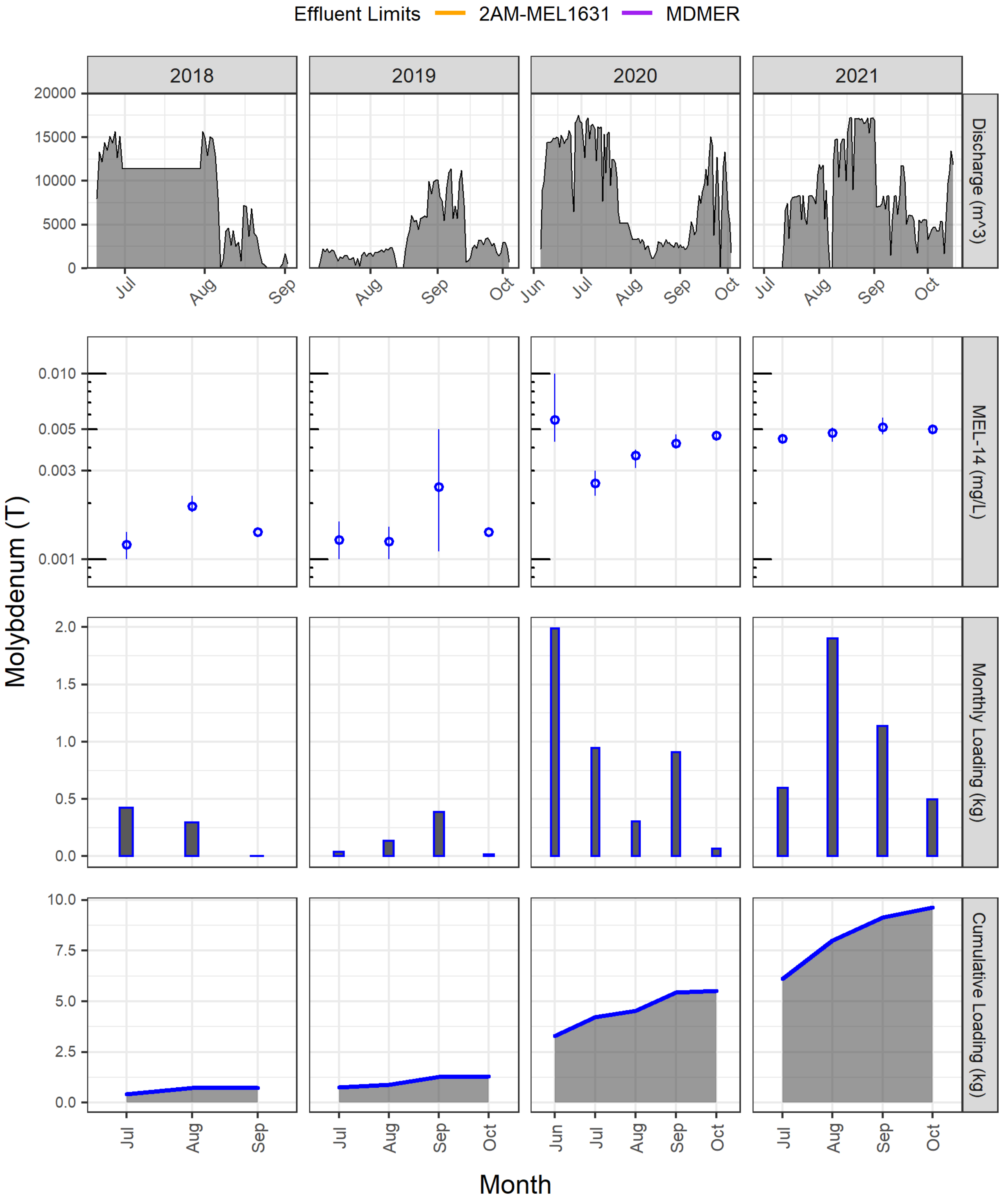


Figure B2-34. Nickel – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

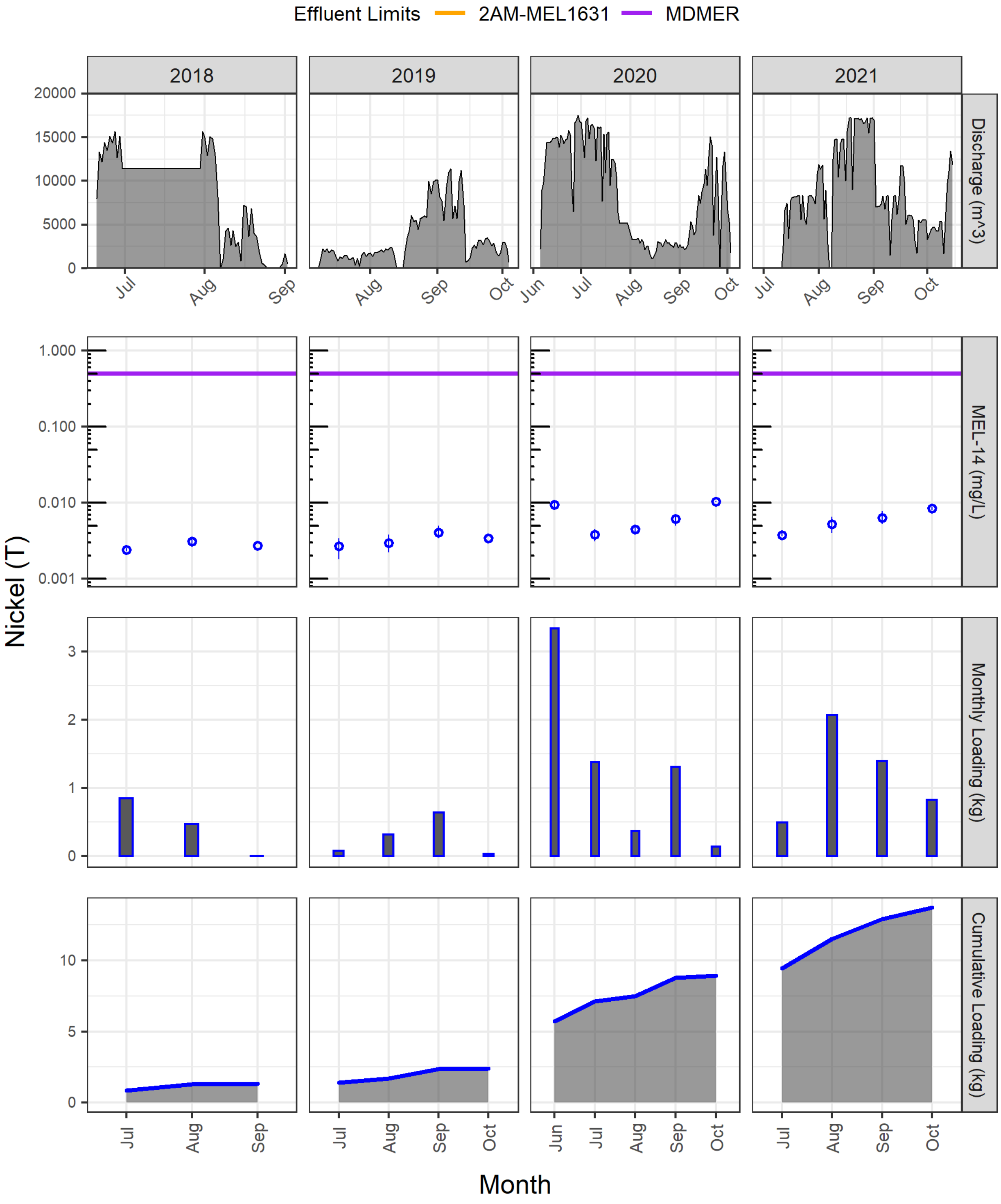


Figure B2-35. Selenium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

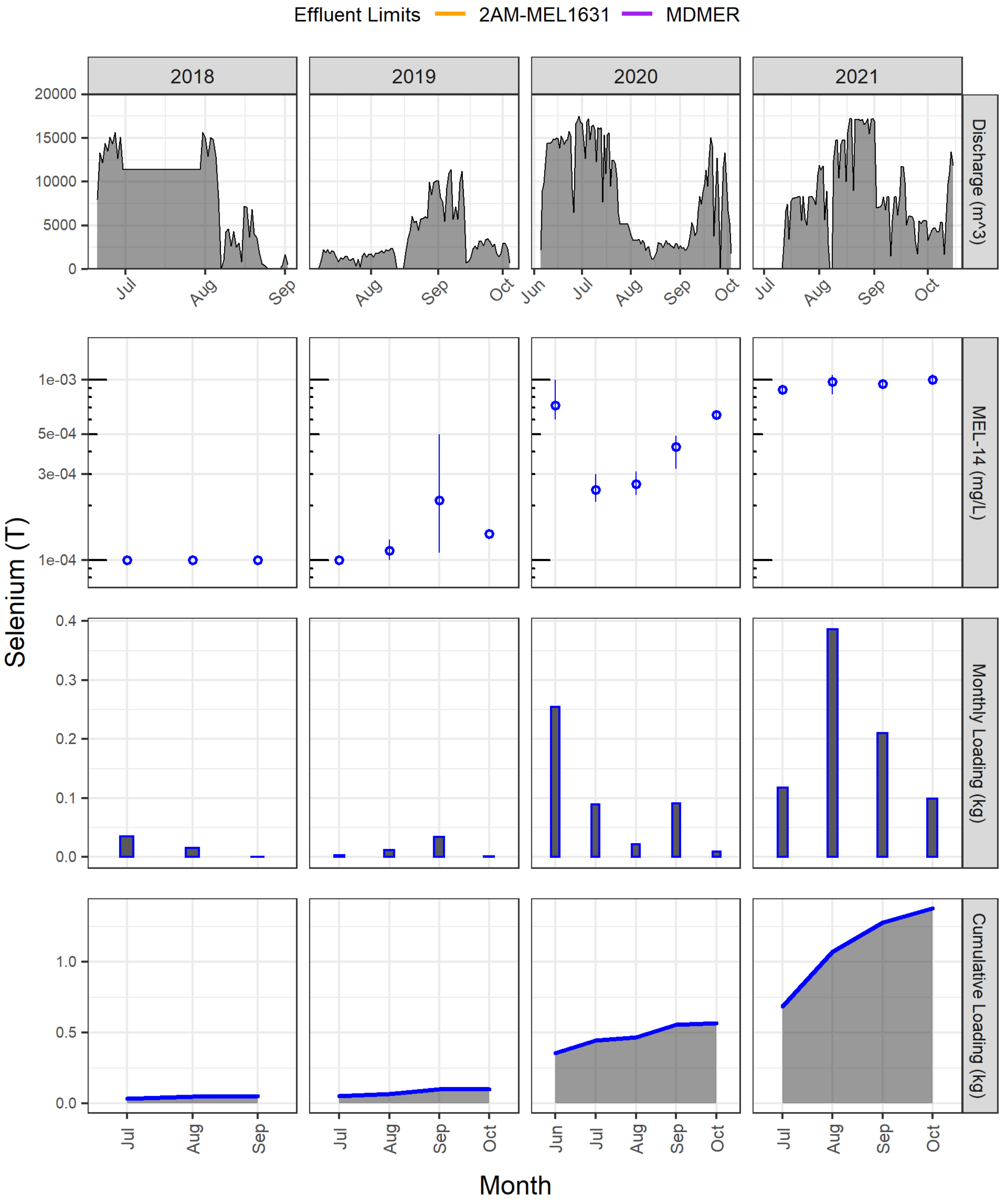


Figure B2-36. Silicon – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

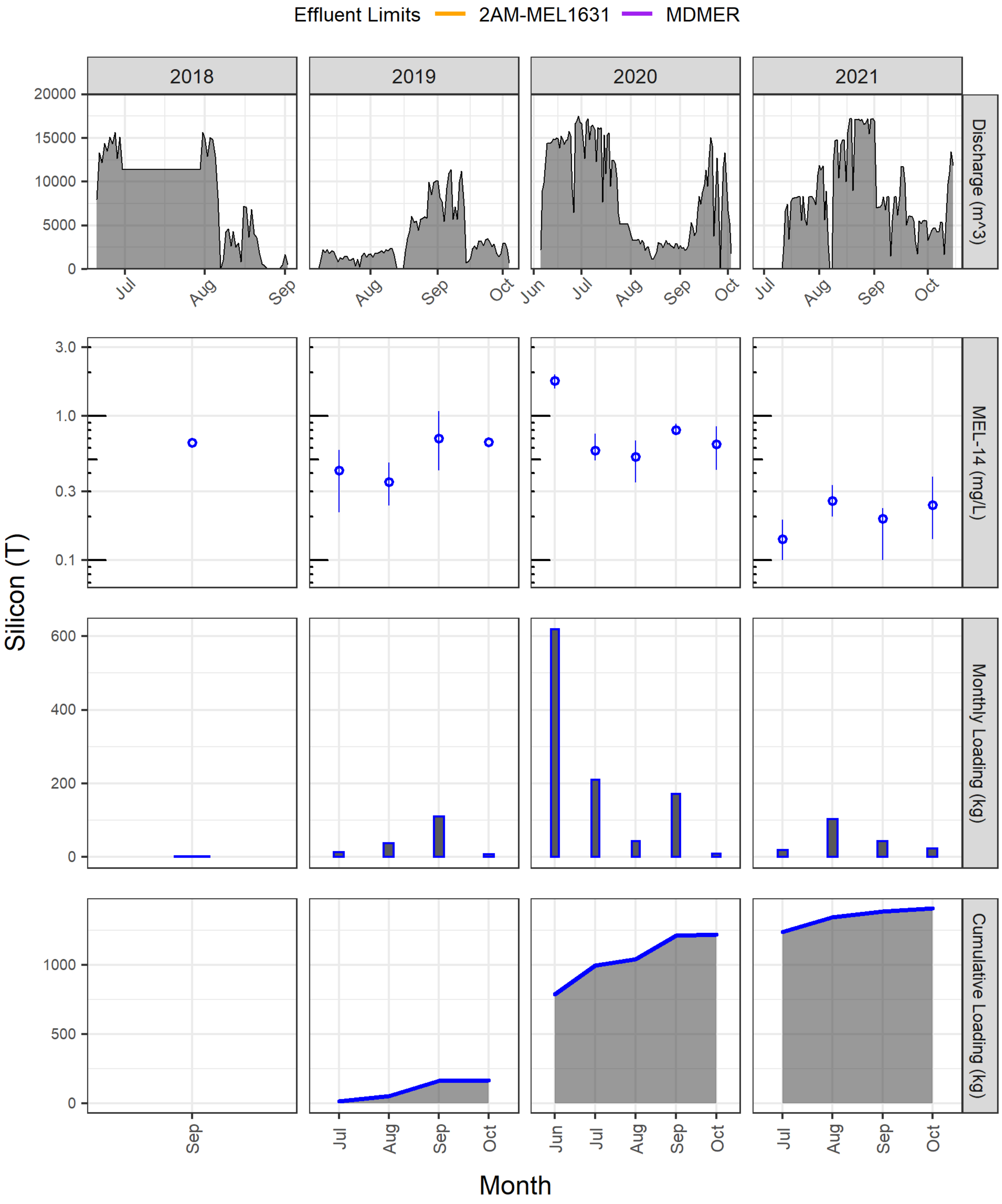


Figure B2-37. Silver – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

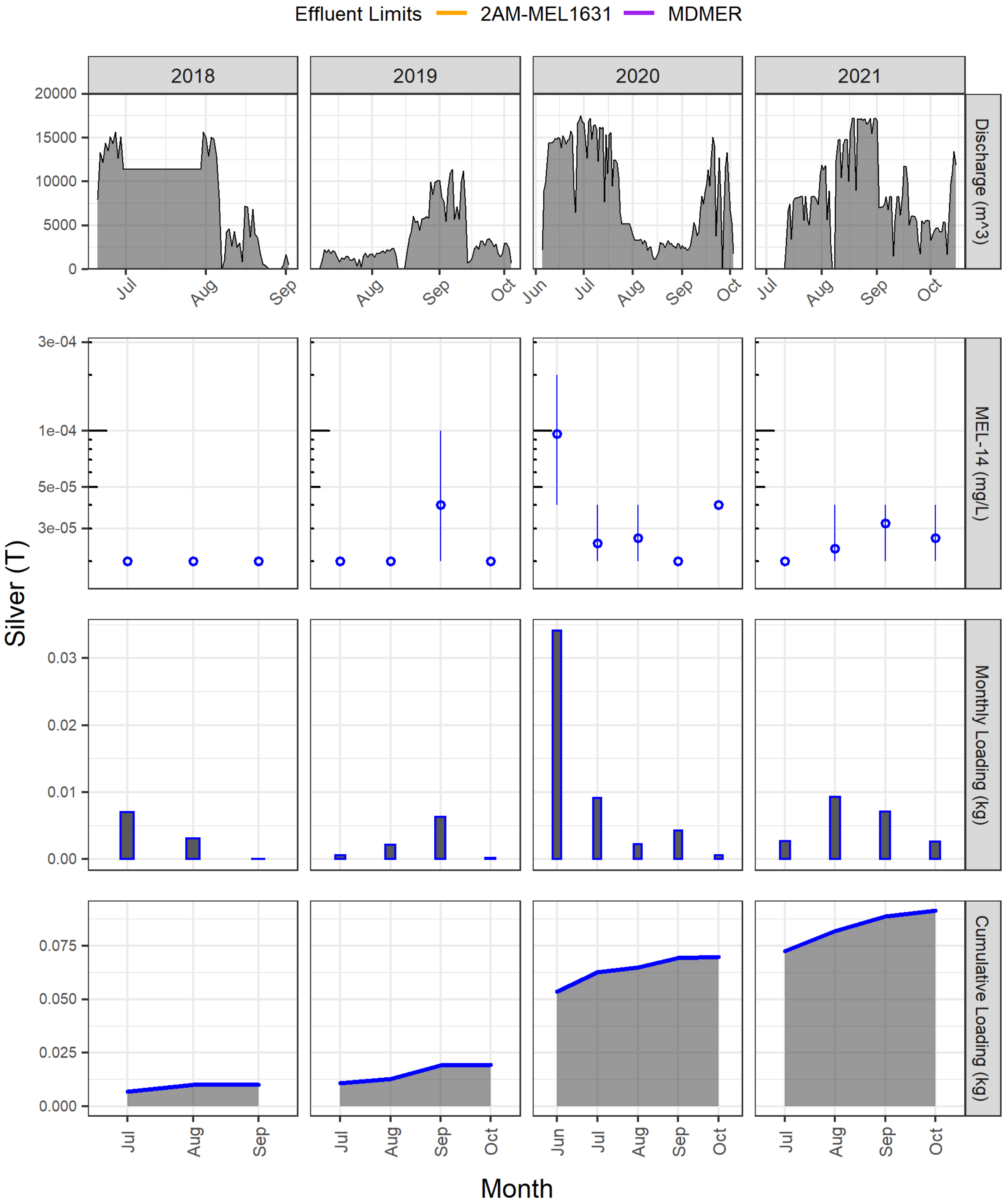


Figure B2-38. Strontium– Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

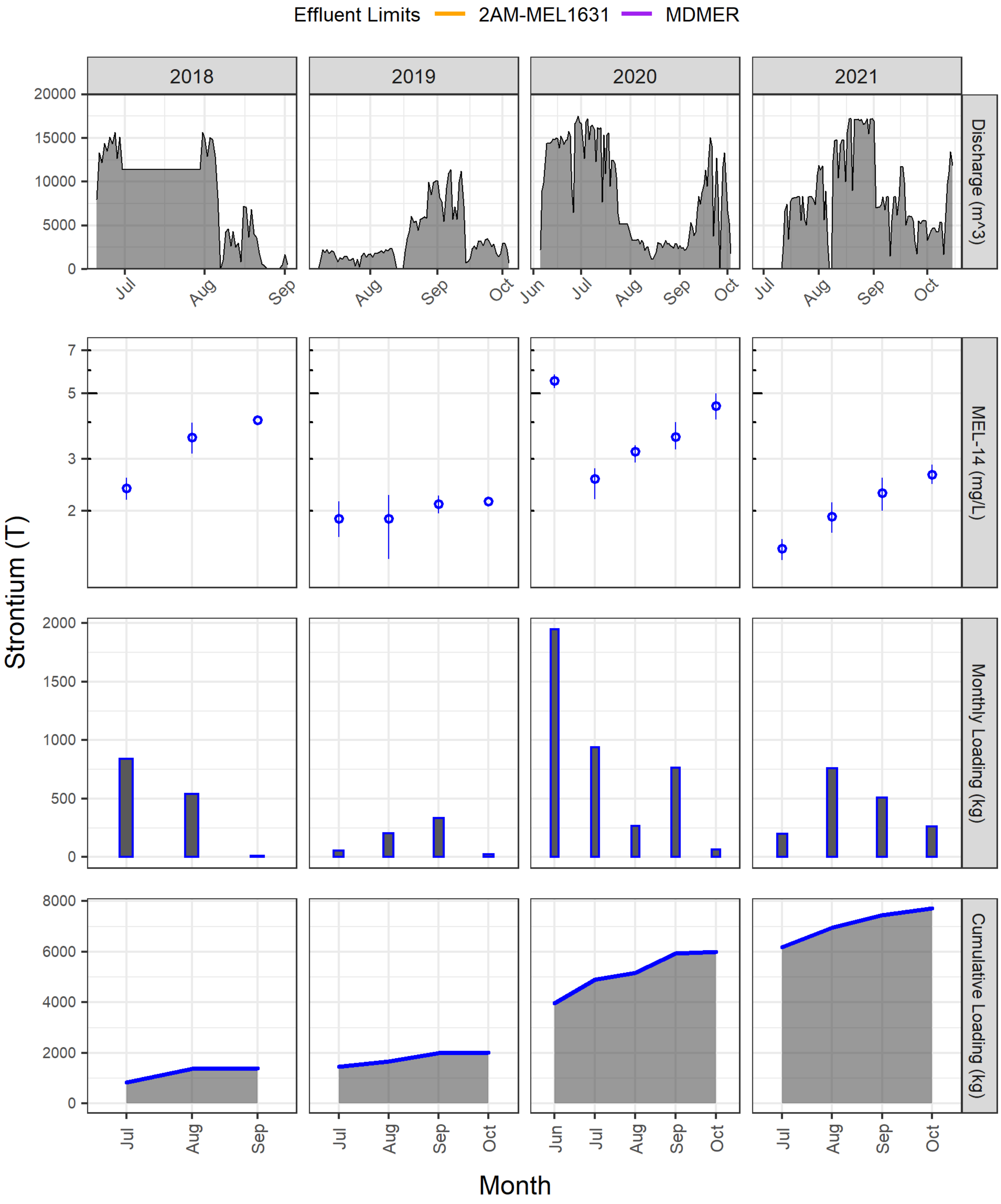


Figure B2-39. Thallium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

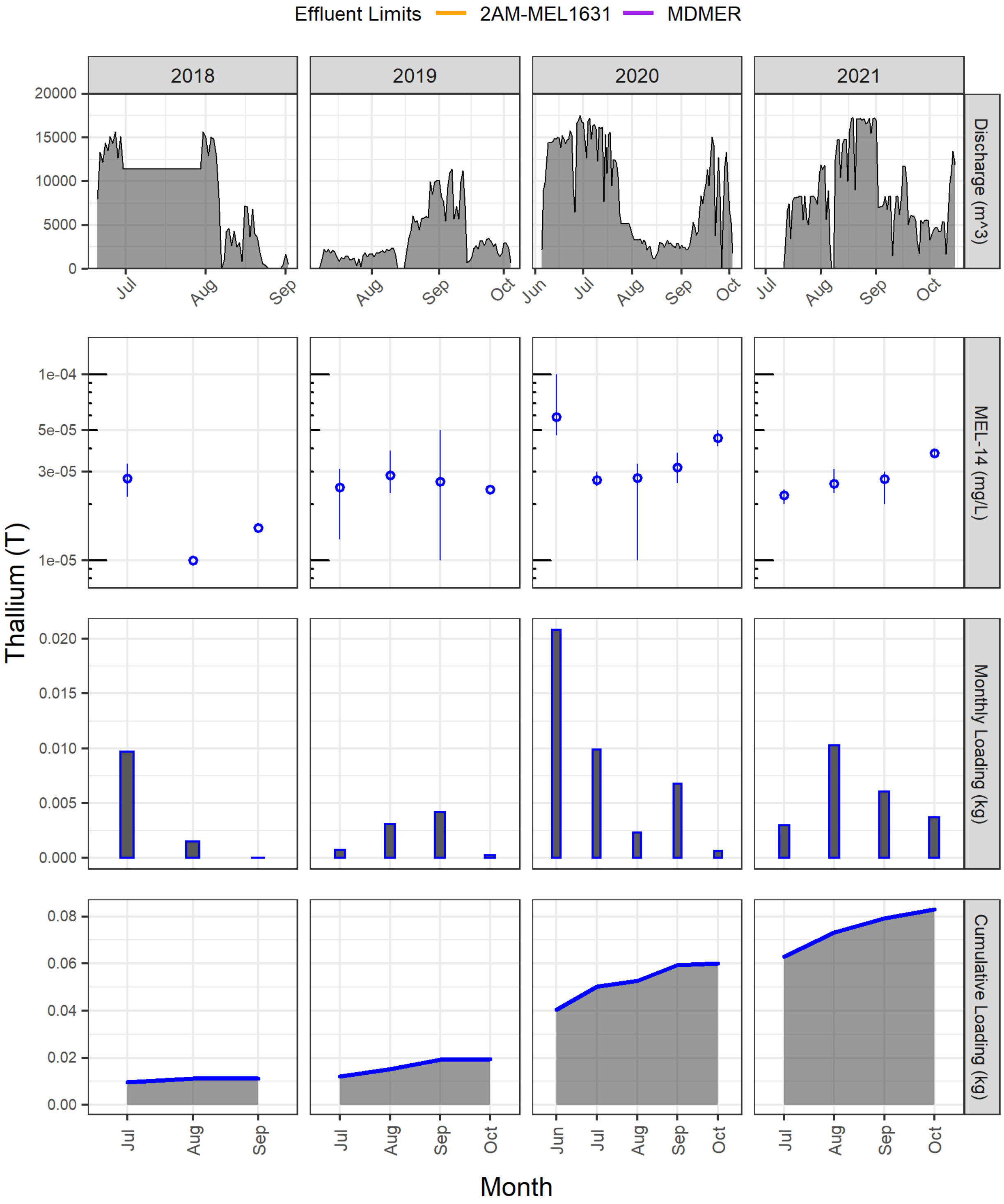


Figure B2-40. Tin – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

Figure B2-41. Titanium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

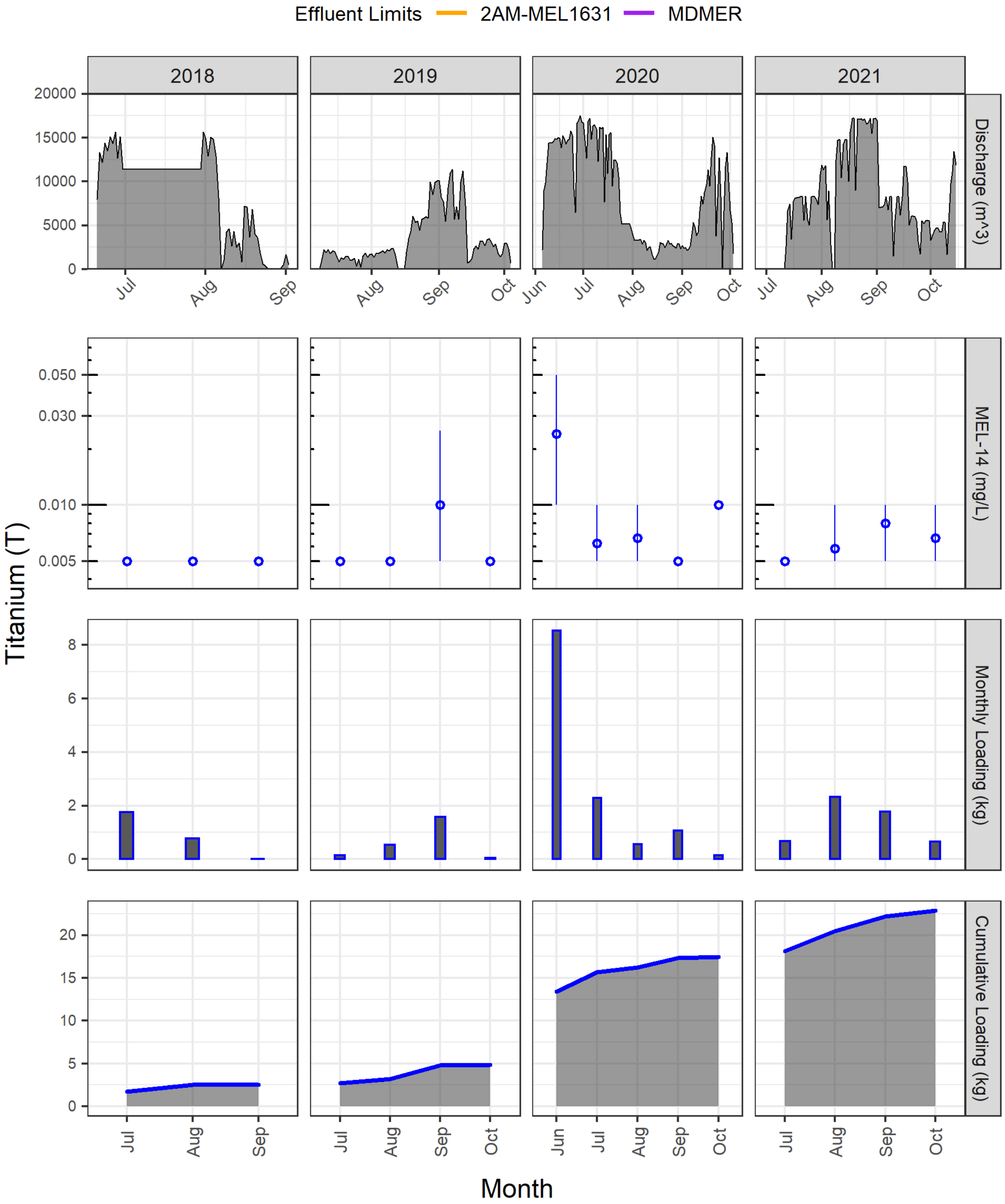


Figure B2-42. Uranium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

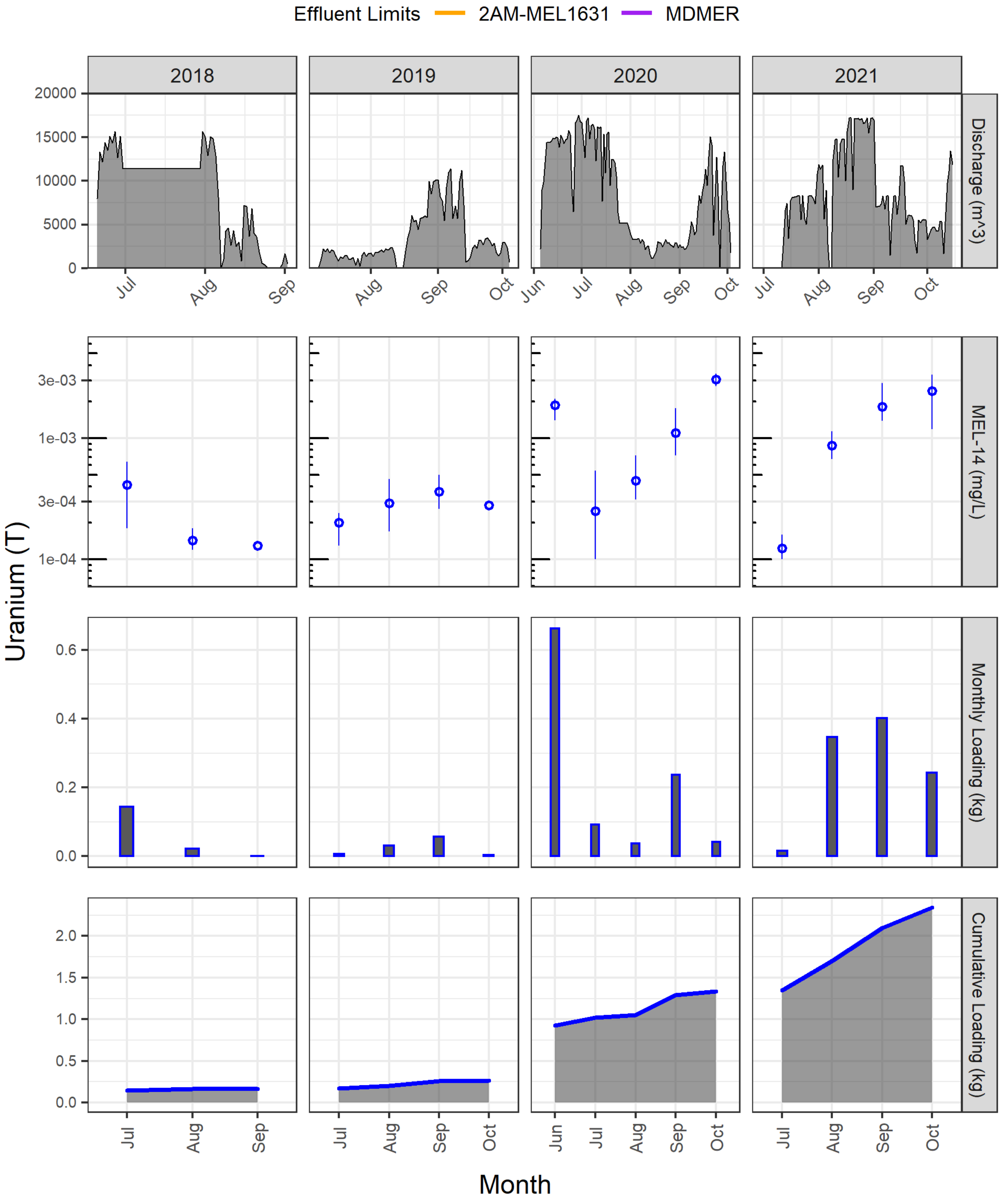


Figure B2-43. Vanadium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

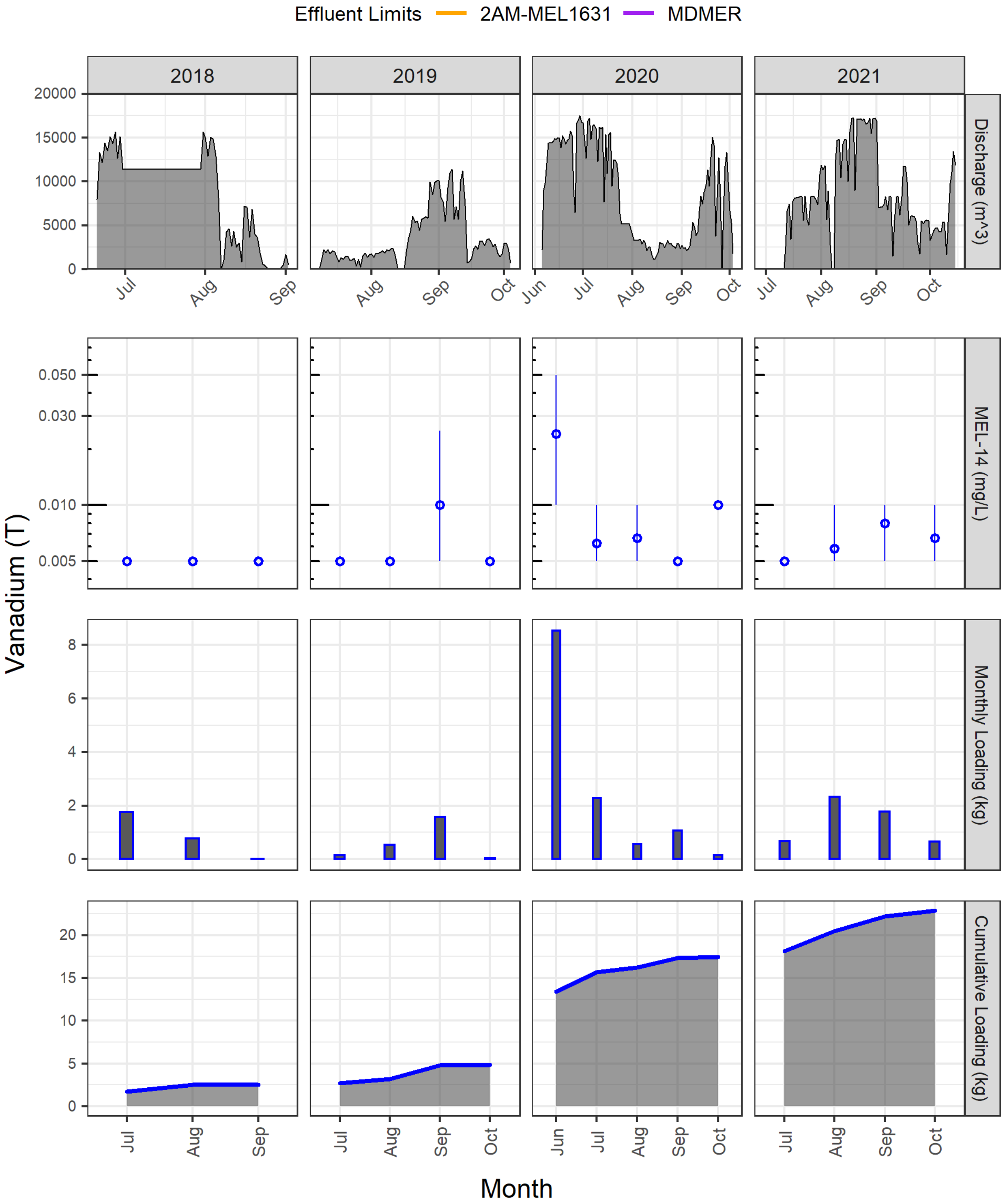


Figure B2-44. Zinc– Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

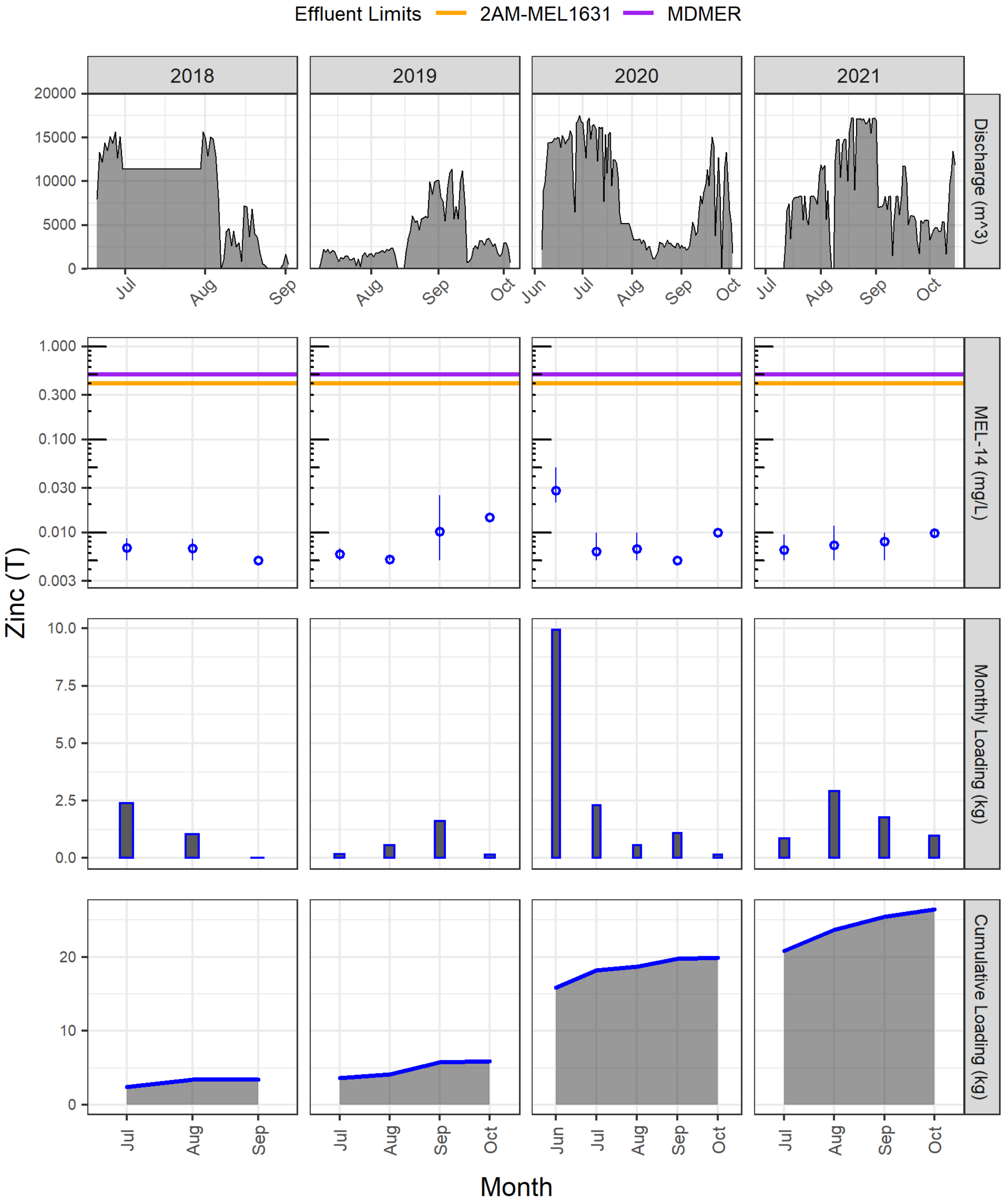


Figure B2-45. Zirconium – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

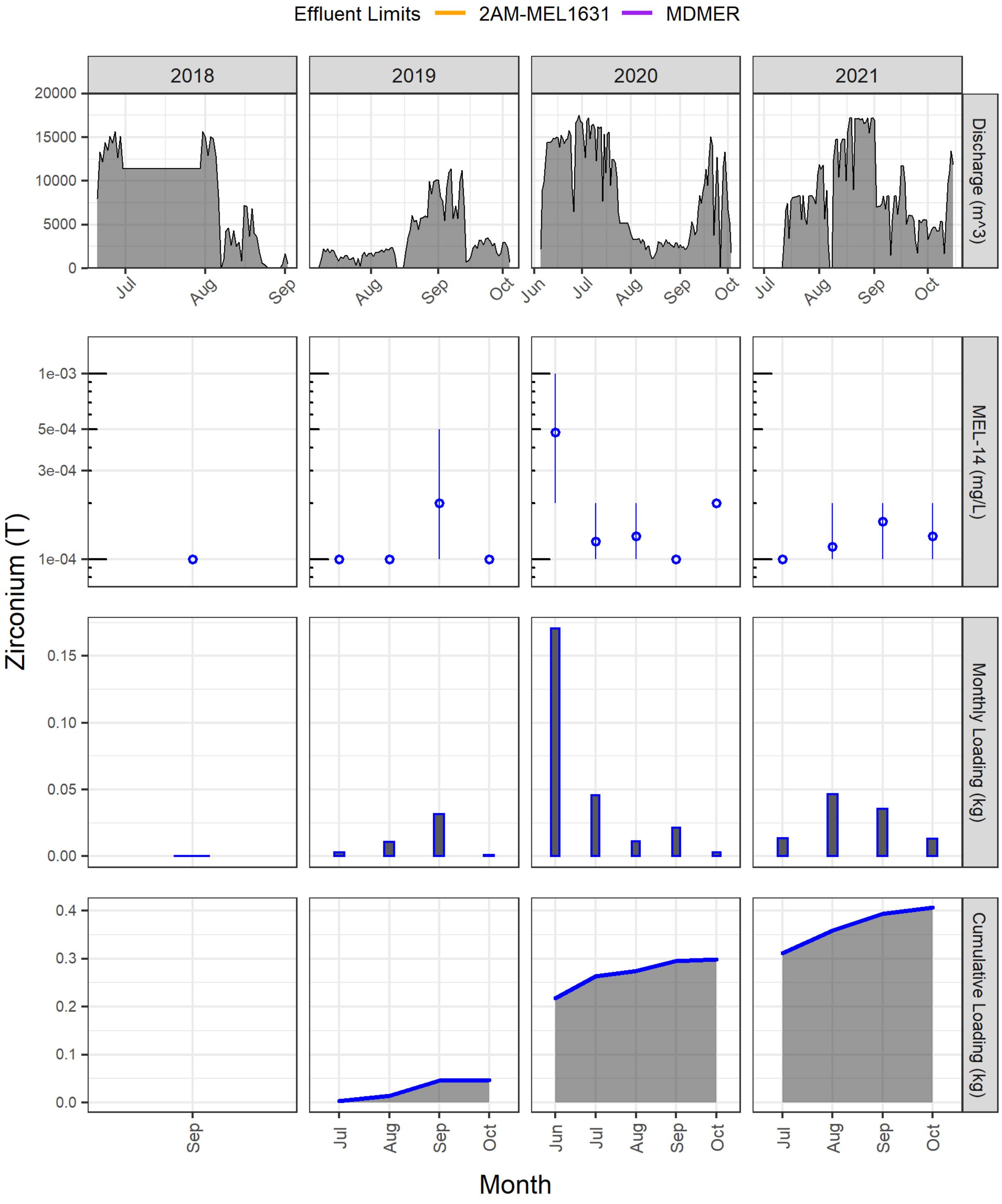


Figure B2-46. Cyanide (Free) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m³) /1,000.

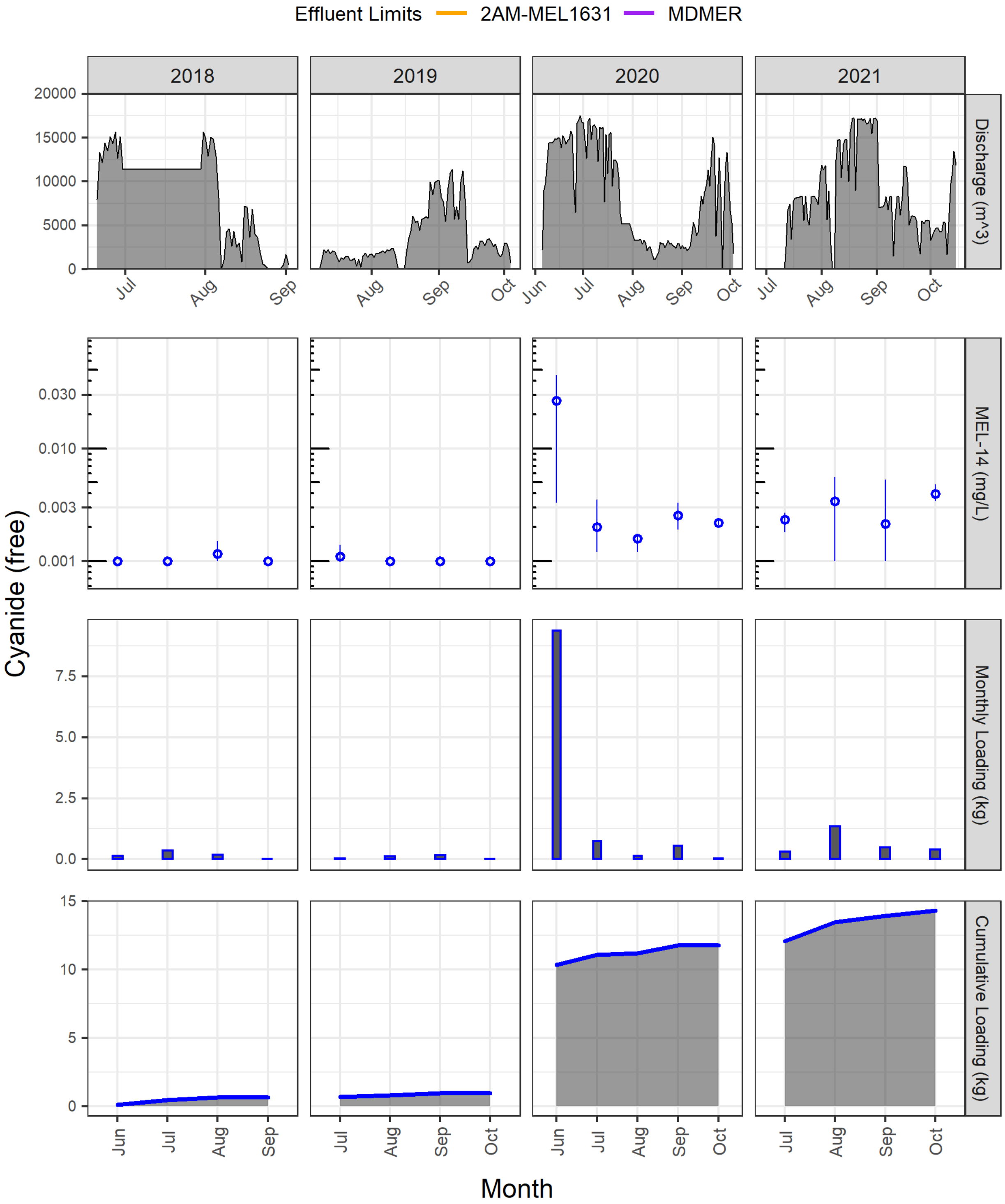


Figure B2-47. Cyanide (Total) – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.

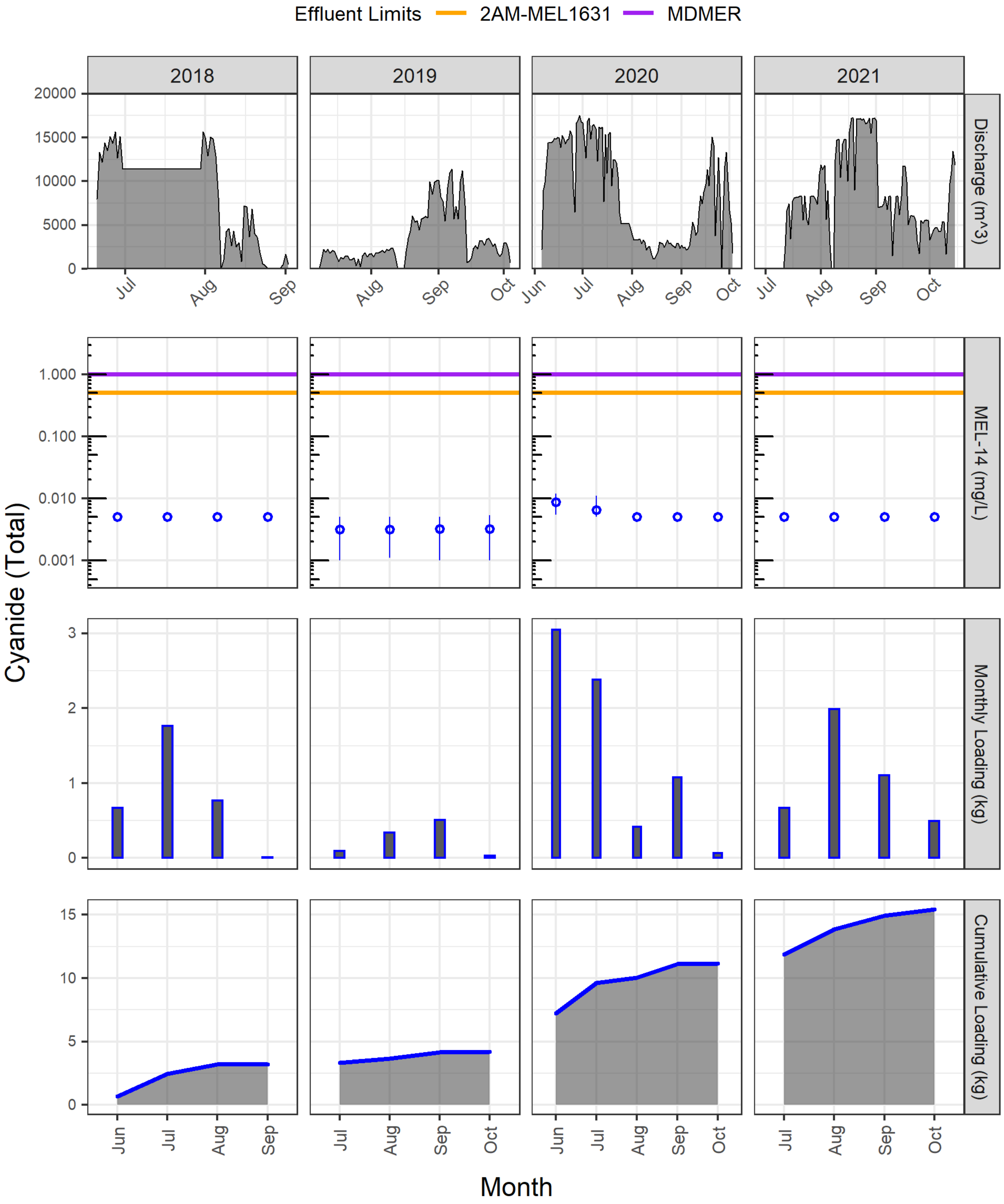
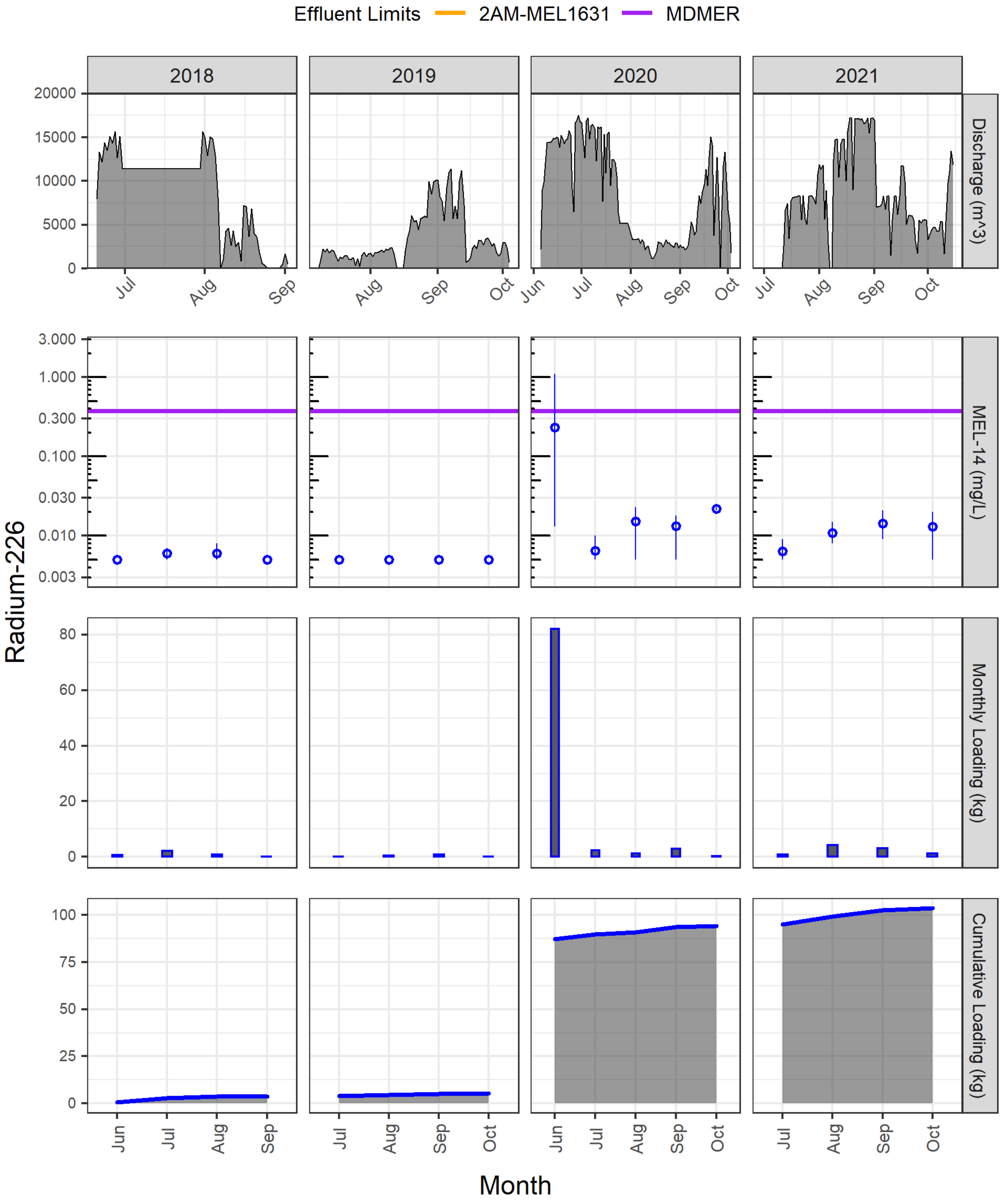


Figure B2-48. Radium-226 – Effluent concentrations (mg/L) and loadings to Meliadine Lake.

Notes: The blue dot represents the monthly mean concentration; the blue vertical line represents the range of concentrations measured in each month. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.



APPENDIX C

MELIADINE LAKE WATER QUALITY – SUPPORTING INFORMATION

Appendix C1

Meliadine Lake Water Quality – Data and Summary Statistics

APPENDIX C1 – FIGURES

Figure C1-1. Copper BLM guideline for sample MEL-01-06 collected in March 2021. iii

APPENDIX C1 – TABLES

Table C1-1. Detection limits and screening values for the Meliadine Lake water quality program. 1
Table C1-2. MEL-01 summary statistics for the 2021 winter water sampling event. 6
Table C1-3. MEL-02 summary statistics for the 2021 winter water sampling event. 9
Table C1-4. MEL-01 summary statistics for the 2021 open water sampling events. 12
Table C1-5. MEL-02 summary statistics for the 2021 open water sampling events. 15
Table C1-6. Pooled reference areas summary statistics for the 2021 open water sampling events...... 18
Table C1-7. MEL-03 summary statistics for the 2021 open water sampling events. 21
Table C1-8. MEL-04 summary statistics for the August 2021 sampling event. 24
Table C1-9. MEL-05 summary statistics for the August 2021 sampling event. 27

Federal Environmental Quality Guideline for Copper

The Benchmark for dissolved copper is based on the Environment and Climate Change Canada (ECCC) FWAL guideline published in 2021. The new FWAL for copper applies to dissolved rather than total (unfiltered) copper for three reasons:

1. Bioavailability and toxicity of copper to aquatic life is related to concentration of the copper ion (Cu^{2+}) in water.
2. Concentrations of total copper in Canadian surface waters can be affected by non-bioavailable mineral forms; and
3. Toxicity data used for deriving the guideline are based on exposures to dissolved copper.

Copper toxicity is dependent on the concentration of the free copper ion and site-specific water quality parameters such as temperature, pH, dissolved organic carbon, hardness, alkalinity, chloride, and major cations (e.g., calcium, magnesium, etc.) that are known to modify the bioavailability and toxicity of copper to aquatic organisms. The new FWAL guideline for copper uses the biotic ligand model (BLM) that accounts for site-specific water quality to calculate the FWAL guideline on a sample-by-sample basis. A detailed overview of the BLM is provided in *Federal environmental quality guidelines – Copper* (ECCC, 2021). Briefly, the copper FWAL for each sample is determined from the normalized species sensitivity distribution (SSD) of chronic toxicity results for a diverse range of aquatic species including primary producers (5 species), aquatic invertebrates (17 species), and fish (11 species). The 5th percentile of the SSD is equal to the FWAL guidelines for copper. To illustrate the FWAL guideline derivation process, the SSD and corresponding FWAL guideline is shown in **Figure C1-1** for the water sample collected at MEL-01-06 in March 2021. The two most sensitive species used to derive the FWAL guideline of 2.1 µg/L are an air-breathing snail (*Lymnea stagnalis*) and Rainbow mussel (*Villosa iris*), neither of which are found in northern Canada. Including non-endemic species in derivation of the BLM guideline provides an added level of assurance that copper concentrations in Meliadine Lake do not pose risks to aquatic life.

Figure C1-1. Copper BLM guideline for sample MEL-01-06 collected in March 2021.

Note: The copper BLM guideline is indicated by the blue dashed line (log-normal 5% = 2.11 µg/L).

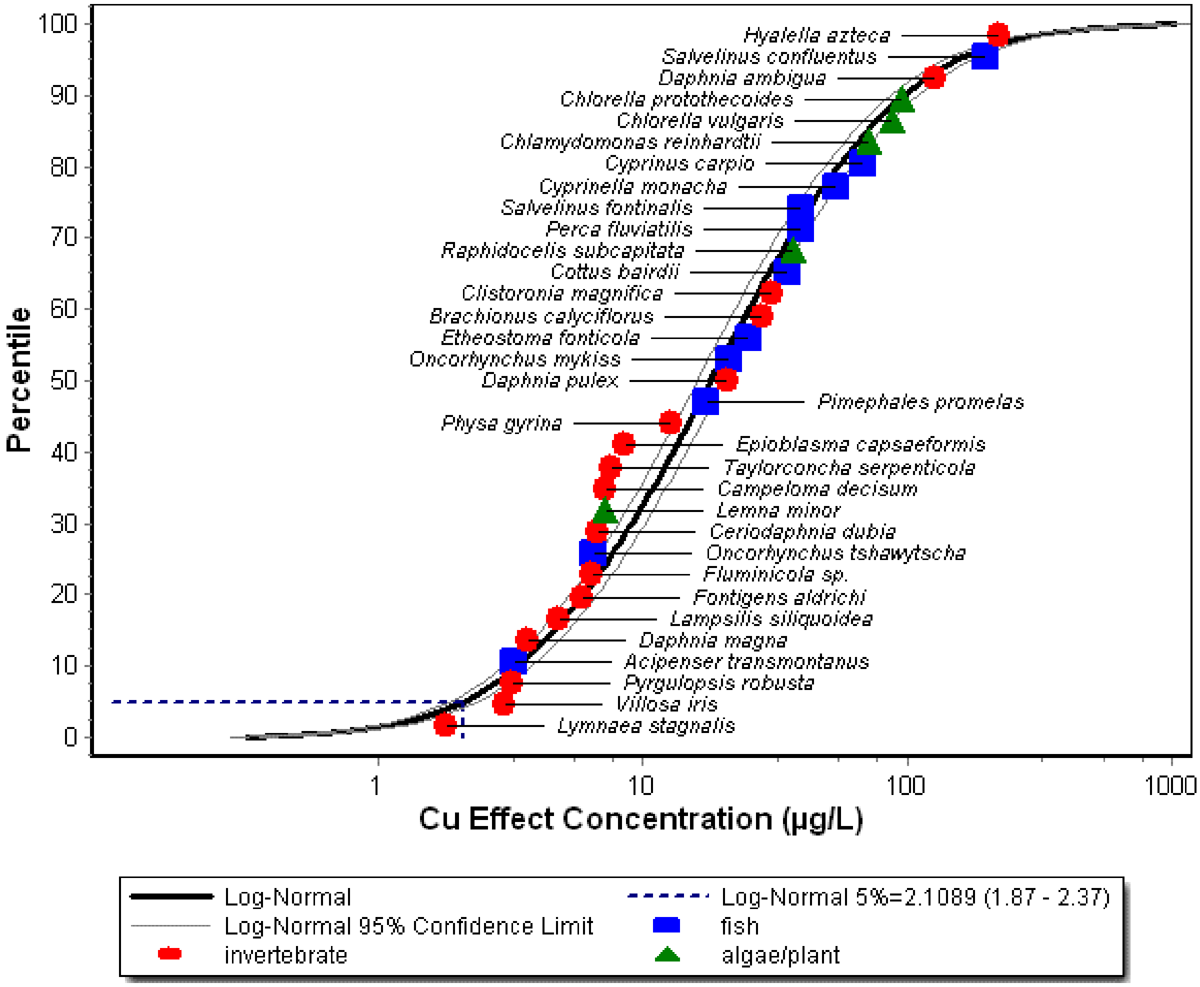


Table C1-1. Detection limits and screening values for the Meliadine Lake water quality program.

Parameter	Units	DL	Normal Range	FEIS[a]	FWAL[b]	HH DW[c]	SSWQO[d]	AEMP Action Level[e]	AEMP Benchmark[f]
Field Measurements									
DO (%)	%	-	-	-	-	-	-	-	-
DO (mg/L)	mg/L	-	-	-	-	-	-	6.5	6.5
pH (field)	units	-	7.1 | 7.95	-	6.5 | 9	-	-	6.5 | 9.0	6.5 | 9.0
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-
Temperature	C	-	-	-	-	-	-	-	-
Turbidity (field)	NTU	-	-	-	-	-	-	-	-
Conventional Parameters									
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-
pH (lab)	units	0.1	-	-	6.5 | 9	-	-	6.5 | 9.0	6.5 | 9.0
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500
TDS (Calculated)	mg/L	1	39.6	68	500	-	1000	375	500
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-
Major Ions									
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-
Bromide	mg/L	0.1	-	-	-	-	-	-	-
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-

Table C1-1. Detection limits and screening values for the Meliadine Lake water quality program.

Parameter	Units	DL	Normal Range	FEIS[a]	FWAL[b]	HH DW[c]	SSWQO[d]	AEMP Action Level[e]	AEMP Benchmark[f]
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-
Nutrients									
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	18.1	-	-	13.6	18.1
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-
Organic/Inorganic Carbon									
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-
Total Metals									
Aluminum	ug/L	1	5.32	9.1	100	-	-	75	100
Antimony	ug/L	0.02	0.02	0.51	-	6	-	4.5	6
Arsenic	ug/L	0.02	0.275	3.8	5	10	25	18.8	25
Barium	ug/L	0.02	8.05	77	-	1000	-	750	1000
Beryllium	ug/L	0.005	0.005	-	-	-	-	-	-
Bismuth	ug/L	0.005	0.005	-	-	-	-	-	-
Boron	ug/L	5	6.52	23	1500	5000	-	1120	1500
Cadmium	ug/L	0.005 | 0.01	0.005	0.05	0.0427 | 0.0665	5	-	0.032 | 0.0499	0.0427 | 0.0665
Cesium	ug/L	0.005	-	-	-	-	-	-	-

Table C1-1. Detection limits and screening values for the Meliadine Lake water quality program.

Parameter	Units	DL	Normal Range	FEIS[a]	FWAL[b]	HH DW[c]	SSWQO[d]	AEMP Action Level[e]	AEMP Benchmark[f]
Chromium	ug/L	0.1	0.103	1.1	5	50	-	3.75	5
Cobalt	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78
Copper	ug/L	0.05	0.86	2	-	2000	-	1500	2000
Gallium	ug/L	0.05	-	-	-	-	-	-	-
Iron	ug/L	1	15	42	300	-	1060	795	1060
Lanthanum	ug/L	0.01 | 0.02	-	-	-	-	-	-	-
Lead	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5
Lithium	ug/L	0.5	0.72	-	-	-	-	-	-
Manganese	ug/L	0.05	3.06	5.5	-	120	-	90	120
Mercury	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026
Molybdenum	ug/L	0.05	0.107	5.2	73	-	-	54.8	73
Nickel	ug/L	0.05	0.441	2.7	25	-	-	18.8	25
Niobium	ug/L	0.1	-	-	-	-	-	-	-
Phosphorus	ug/L	50	-	-	-	-	-	-	-
Rhenium	ug/L	0.005 | 0.01	-	-	-	-	-	-	-
Rubidium	ug/L	0.005	-	-	-	-	-	-	-
Selenium	ug/L	0.04	0.049	0.16	1	50	-	0.75	1
Silicon	ug/L	50	-	-	-	-	-	-	-
Silver	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25
Strontium	ug/L	0.02	36.1	-	2500	7000	-	1880	2500
Sulfur	ug/L	500	-	-	-	-	-	-	-
Tantalum	ug/L	0.1	-	-	-	-	-	-	-
Tellurium	ug/L	0.02	-	-	-	-	-	-	-
Thallium	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8
Thorium	ug/L	0.005	-	-	-	-	-	-	-
Tin	ug/L	0.02	0.0384	-	-	-	-	-	-
Titanium	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-
Tungsten	ug/L	0.01	-	-	-	-	-	-	-
Uranium	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15
Vanadium	ug/L	0.05	0.05	-	-	-	-	-	-
Yttrium	ug/L	0.005 | 0.01	-	-	-	-	-	-	-

Table C1-1. Detection limits and screening values for the Meliadine Lake water quality program.

Parameter	Units	DL	Normal Range	FEIS[a]	FWAL[b]	HH DW[c]	SSWQO[d]	AEMP Action Level[e]	AEMP Benchmark[f]
Zinc	ug/L	0.5	1.7	6.7	-	-	-	-	-
Zirconium	ug/L	0.01	-	-	-	-	-	-	-
Dissolved Metals									
Aluminum	ug/L	1	-	-	-	-	-	-	-
Antimony	ug/L	0.02	-	-	-	-	-	-	-
Arsenic	ug/L	0.02	-	-	-	-	-	-	-
Barium	ug/L	0.02	-	-	-	-	-	-	-
Beryllium	ug/L	0.005	-	-	-	-	-	-	-
Bismuth	ug/L	0.005	-	-	-	-	-	-	-
Boron	ug/L	5	-	-	-	-	-	-	-
Cadmium	ug/L	0.005	-	-	-	-	-	-	-
Cesium	ug/L	0.005	-	-	-	-	-	-	-
Chromium	ug/L	0.1	-	-	-	-	-	-	-
Cobalt	ug/L	0.005	-	-	-	-	-	-	-
Copper	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83
Gallium	ug/L	0.05	-	-	-	-	-	-	-
Iron	ug/L	1	-	-	-	-	-	-	-
Lanthanum	ug/L	0.01	-	-	-	-	-	-	-
Lead	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36
Lithium	ug/L	0.5	-	-	-	-	-	-	-
Manganese	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330
Mercury	ug/L	0.5	-	-	-	-	-	-	-
Molybdenum	ug/L	0.05	-	-	-	-	-	-	-
Nickel	ug/L	0.05	-	-	-	-	-	-	-
Niobium	ug/L	0.1	-	-	-	-	-	-	-
Phosphorus	ug/L	50	-	-	-	-	-	-	-
Rhenium	ug/L	0.005	-	-	-	-	-	-	-
Rubidium	ug/L	0.005	-	-	-	-	-	-	-
Selenium	ug/L	0.04	-	-	-	-	-	-	-
Silicon	ug/L	50	-	-	-	-	-	-	-

Table C1-1. Detection limits and screening values for the Meliadine Lake water quality program.

Parameter	Units	DL	Normal Range	FEIS[a]	FWAL[b]	HH DW[c]	SSWQO[d]	AEMP Action Level[e]	AEMP Benchmark[f]
Silver	ug/L	0.005 | 0.01	-	-	-	-	-	-	-
Strontium	ug/L	0.02	-	-	2500	-	-	1880	2500
Sulfur	ug/L	500	-	-	-	-	-	-	-
Tantalum	ug/L	0.1	-	-	-	-	-	-	-
Tellurium	ug/L	0.02	-	-	-	-	-	-	-
Thallium	ug/L	0.005	-	-	-	-	-	-	-
Thorium	ug/L	0.005	-	-	-	-	-	-	-
Tin	ug/L	0.02	-	-	-	-	-	-	-
Titanium	ug/L	0.05	-	-	-	-	-	-	-
Tungsten	ug/L	0.01	-	-	-	-	-	-	-
Uranium	ug/L	0.001	-	-	-	-	-	-	-
Vanadium	ug/L	0.05	-	-	-	-	-	-	-
Yttrium	ug/L	0.005 | 0.01	-	-	-	-	-	-	-
Zinc	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4
Zirconium	ug/L	0.01	-	-	-	-	-	-	-
Other									
Cyanide (free)	mg/L	0.001	-	0.00035	-	-	-	-	-
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The freshwater aquatic life guidelines (FWAL) for cadmium (T), copper (D), lead (D), manganese (D), and zinc (D) are variable depending on modifying factors such as pH, hardness, and DOC. Values shown represent the range of FWAL guidelines calculated for MEL-01 open-water samples in 2021.

[c] Health Canada drinking water guidelines (maximum acceptable concentrations)

[d Site-specific water quality objectives for fluoride, arsenic, and iron.

[e] The AEMP Action Level is 75% of the AEMP Benchmark.

[f] The AEMP Benchmark is the lowest of the FWAL or HH DW guidelines.

Table C1-2. MEL-01 summary statistics for the 2021 winter water sampling event.

Parameter	Units	DL (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-01 (Near-field Exposure Area) Winter Sampling Event (March)										
					N	N<DL	% <MDL	Mean	Median	SD	SE	Min	Max	%> FEIS	% > Act Lvl
Field Measurements															
Temperature	C	-	-	-	6	0	0	2.05	2.05	0.0497	0.0203	2	2.13	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	6	0	0	149	148	1.24	0.507	148	151	-	-
pH (field)	pH units	-	-	6.5 | 9.0	6	0	0	7.09	7.07	0.0985	0.0402	6.97	7.21	-	0
DO (mg/L)	mg/L	-	-	6.5	6	0	0	14.7	14.4	0.969	0.395	13.6	16.3	-	0
DO (%)	%	-	-	-	6	0	0	106	104	7.33	2.99	97.4	118	-	-
Conventional Parameters															
Conductivity (lab)	uS/cm	1	-	-	6	0	0	152	152	3.39	1.38	148	156	-	-
Hardness	mg/L	0.2 | 1	-	-	6	0	0	42.2	42.6	1.02	0.418	40.5	43.1	-	-
pH (lab)	pH units	0.1	-	6.5 | 9.0	6	0	0	7.48	7.46	0.0828	0.0338	7.38	7.63	-	0
Total Dissolved Solids	mg/L	13	68	375	6	0	0	79	78	5.44	2.22	72	87	100	0
Total Dissolved Solids (Calculated)	mg/L	1	68	375	6	0	0	75.9	75.8	2.11	0.859	72.8	78.5	100	0
Total Suspended Solids	mg/L	1	3.1	-	6	5	83	-	1	-	-	1	1	0	0
Turbidity (lab)	NTU	0.1	-	-	6	0	0	0.203	0.22	0.048	0.0196	0.13	0.25	-	-
Major Ions															
Alkalinity, Bicarbonate	mg/L	1.2	-	-	6	0	0	30.9	31	0.768	0.313	29.5	31.6	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	6	6	100	-	-	-	-	-	0.6	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	6	6	100	-	-	-	-	-	0.34	0	0
Alkalinity, Total	mg/L	1	-	-	6	0	0	25.3	25.4	0.618	0.252	24.2	25.9	-	-
Bromide	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium (D)	mg/L	0.01	-	-	6	0	0	12.8	13	0.32	0.131	12.3	13.1	-	-
Calcium (T)	mg/L	0.01	-	-	6	0	0	13	13	0.294	0.12	12.5	13.3	-	-
Chloride	mg/L	0.1	14	90	6	0	0	24.3	24.5	0.777	0.317	23.1	25.1	100	0
Fluoride	mg/L	0.02	0.0084	2.1	6	0	0	0.0347	0.0345	0.00121	0.000494	0.033	0.036	100	0
Magnesium (D)	mg/L	0.004	-	-	6	0	0	2.46	2.48	0.0652	0.0266	2.37	2.54	-	-
Magnesium (T)	mg/L	0.004	-	-	6	0	0	2.46	2.46	0.0556	0.0227	2.37	2.52	-	-
Potassium (D)	mg/L	0.02	-	-	6	0	0	1.6	1.6	0.0459	0.0187	1.53	1.65	-	-
Potassium (T)	mg/L	0.02	-	-	6	0	0	1.6	1.6	0.0351	0.0143	1.54	1.63	-	-
Reactive Silica (SiO2)	mg/L	0.01	-	-	6	0	0	0.344	0.329	0.0474	0.0194	0.313	0.439	-	-
Sodium (D)	mg/L	0.02	-	-	6	0	0	11.1	11.1	0.578	0.236	10.5	12.1	-	-
Sodium (T)	mg/L	0.02	5.3	-	6	0	0	11.2	11	0.562	0.229	10.6	12.2	100	-
Sulphate	mg/L	0.3	38	-	6	0	0	8.27	8.34	0.244	0.0996	7.88	8.52	0	-
Nutrients															
Ammonia (as N)	mg/L	0.005 | 0.05	0.54	13.6	6	0	0	0.0562	0.0528	0.0114	0.00465	0.045	0.0728	0	0
Nitrate (as N)	mg/L	0.005	0.25	2.17	6	0	0	0.0226	0.0207	0.00419	0.00171	0.0196	0.0307	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	6	0	0	0.0226	0.0207	0.00419	0.00171	0.0196	0.0307	-	-
Nitrite (as N)	mg/L	0.001	0.051	0.045	6	6	100	-	-	-	-	-	0.001	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	6	0	0	0.386	0.359	0.109	0.0447	0.31	0.602	-	-
Orthophosphate (PO4-P)	mg/L	0.001	-	-	6	6	100	-	-	-	-	-	0.001	0	0
Total Diss Phosphorus	mg/L	0.001 | 0.003	-	-	6	0	0	0.00655	0.0069	0.0013	0.000533	0.0042	0.008	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	6	0	0	0.296	0.292	0.0247	0.0101	0.273	0.339	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	6	0	0	0.364	0.337	0.106	0.0431	0.29	0.572	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	6	0	0	0.273	0.27	0.0208	0.00848	0.254	0.309	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.0049	-	6	0	0	0.0103	0.0102	0.00226	0.000922	0.0068	0.0138	100	-

Table C1-2. MEL-01 summary statistics for the 2021 winter water sampling event.

Parameter	Units	DL (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-01 (Near-field Exposure Area) Winter Sampling Event (March)										
					N	N<DL	% <MDL	Mean	Median	SD	SE	Min	Max	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon															
Dissolved Organic Carbon	mg/L	0.5	-	-	6	0	0	4.44	4.31	0.352	0.144	4.18	5.1	-	-
Total Organic Carbon	mg/L	0.5	-	-	6	0	0	4.2	4.2	0.0751	0.0307	4.08	4.29	-	-
Total Metals															
Aluminum	ug/L	1	9.1	75	6	0	0	1.88	1.5	0.985	0.402	1	3.4	0	0
Antimony	ug/L	0.02	0.51	4.5	6	0	0	0.0557	0.064	0.0266	0.0108	0.023	0.081	0	0
Arsenic	ug/L	0.02	3.8	18.8	6	0	0	0.574	0.578	0.0296	0.0121	0.521	0.613	0	0
Barium	ug/L	0.02	77	750	6	0	0	13.3	13.4	0.501	0.204	12.7	14.1	0	0
Beryllium	ug/L	0.005	-	-	6	6	100	-	-	-	-	-	0.005	0	0
Boron	ug/L	5	23	1120	6	0	0	9.92	10	0.527	0.215	9	10.4	0	0
Cadmium	ug/L	0.005 | 0.01	0.05	0.032 | 0.0499	6	6	100	-	-	-	-	-	0.005	0	0
Chromium	ug/L	0.1	1.1	3.75	6	6	100	-	-	-	-	-	0.1	0	0
Cobalt	ug/L	0.005	-	0.585	6	0	0	0.0357	0.0346	0.009	0.00368	0.0265	0.0476	-	0
Copper	ug/L	0.05	2	1500	6	0	0	1.92	1.98	0.46	0.188	1.1	2.46	50	0
Iron	ug/L	1	42	795	6	0	0	7.53	7.4	2.56	1.04	4.1	10.8	0	0
Lead	ug/L	0.01	0.15	3.75	6	1	17	0.0398	0.018	0.0427	0.0174	0.01	0.117	0	0
Lithium	ug/L	0.5	-	-	6	0	0	2.23	2.22	0.0714	0.0291	2.12	2.32	-	-
Manganese	ug/L	0.05	5.5	90	6	0	0	3.03	2.68	0.978	0.399	2.21	4.9	0	0
Mercury	ug/L	0.5	0.02	0.0195	6	2	33	0.000575	0.00055	8.64E-05	3.53E-05	5.00E-04	0.00072	0	0
Molybdenum	ug/L	0.05	5.2	54.8	6	0	0	0.146	0.149	0.00946	0.00386	0.129	0.155	0	0
Nickel	ug/L	0.05	2.7	18.8	6	0	0	0.98	0.97	0.0198	0.0081	0.963	1.01	0	0
Selenium	ug/L	0.04	0.16	0.75	6	0	0	0.0665	0.0675	0.00274	0.00112	0.061	0.068	0	0
Silver	ug/L	0.005 | 0.01	0.1	0.188	6	6	100	-	-	-	-	-	0.01	0	0
Strontium	ug/L	0.02	-	1880	6	0	0	93.7	94.1	2.21	0.903	90.1	96.4	-	0
Thallium	ug/L	0.005	0.1	0.6	6	6	100	-	-	-	-	-	0.005	0	0
Tin	ug/L	0.02	-	-	6	4	67	-	0.02	-	-	0.02	1.19	-	-
Titanium	ug/L	0.05 | 0.35	-	-	6	2	33	0.0698	0.0525	0.0306	0.0125	0.05	0.123	-	-
Uranium	ug/L	0.001	1.5	11.2	6	0	0	0.0215	0.02	0.00312	0.00127	0.0189	0.0259	0	0
Vanadium	ug/L	0.05	-	-	6	6	100	-	-	-	-	-	0.05	0	0
Zinc	ug/L	0.5	6.7	-	6	0	0	3.74	1.28	4.35	1.78	0.89	11.5	17	-
Dissolved Metals															
Aluminum	ug/L	1	-	-	6	2	33	1.63	1.15	1.13	0.462	1	3.9	-	-
Antimony	ug/L	0.02	-	-	6	0	0	0.0742	0.0755	0.0441	0.018	0.026	0.136	-	-
Arsenic	ug/L	0.02	-	-	6	0	0	0.571	0.567	0.0419	0.0171	0.516	0.645	-	-
Barium	ug/L	0.02	-	-	6	0	0	13.4	13.4	0.402	0.164	12.8	14	-	-
Beryllium	ug/L	0.005	-	-	6	6	100	-	-	-	-	-	0.005	0	0
Boron	ug/L	5	-	-	6	0	0	10.2	10.3	0.565	0.231	9.1	10.6	-	-
Cadmium	ug/L	0.005	-	-	6	6	100	-	-	-	-	-	0.005	0	0
Chromium	ug/L	0.1	-	-	6	6	100	-	-	-	-	-	0.1	0	0
Cobalt	ug/L	0.005	-	-	6	0	0	0.0343	0.0302	0.0148	0.00603	0.0199	0.0571	-	-
Copper	ug/L	0.05	-	0.223 | 2.87	6	0	0	1.92	2.02	0.46	0.188	1.12	2.46	-	67
Iron	ug/L	1	-	-	6	0	0	4.63	3.6	2.85	1.16	3.1	10.4	-	-
Lead	ug/L	0.01	-	3.39 | 4.77	6	3	50	-	0.0135	-	-	0.01	0.067	-	0
Lithium	ug/L	0.5	-	-	6	0	0	2.16	2.17	0.0747	0.0305	2.07	2.25	-	-
Manganese	ug/L	0.05	-	158 | 248	6	0	0	1.23	1.01	0.783	0.32	0.44	2.73	-	0
Mercury	ug/L	0.5	-	-	6	5	83	-	5.00E-04	-	-	5.00E-04	0.00053	0	0

Table C1-2. MEL-01 summary statistics for the 2021 winter water sampling event.

Parameter	Units	DL (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-01 (Near-field Exposure Area) Winter Sampling Event (March)										
					N	N<DL	% <MDL	Mean	Median	SD	SE	Min	Max	%> FEIS	% > Act Lvl
Molybdenum	ug/L	0.05	-	-	6	0	0	0.146	0.148	0.00931	0.0038	0.13	0.155	-	-
Nickel	ug/L	0.05	-	-	6	0	0	0.984	0.992	0.0344	0.014	0.925	1.02	-	-
Selenium	ug/L	0.04	-	-	6	0	0	0.0627	0.0635	0.00339	0.00138	0.057	0.067	-	-
Silver	ug/L	0.005 | 0.01	-	-	6	6	100	-	-	-	-	-	0.01	-	-
Strontium	ug/L	0.02	-	1880	6	0	0	93.3	94.2	2.46	1.01	89.8	96.3	-	0
Thallium	ug/L	0.005	-	-	6	6	100	-	-	-	-	-	0.005	0	0
Tin	ug/L	0.02	-	-	6	3	50	-	0.264	-	-	0.02	1.29	-	-
Titanium	ug/L	0.05	-	-	6	5	83	-	0.05	-	-	0.05	0.155	-	-
Uranium	ug/L	0.001	-	-	6	0	0	0.0237	0.0235	0.00162	0.000662	0.0218	0.0262	-	-
Vanadium	ug/L	0.05	-	-	6	6	100	-	-	-	-	-	0.05	0	0
Zinc	ug/L	0.5	-	4.47 | 9.3	6	0	0	3.73	3.3	2.42	0.989	1.59	7.99	-	0
Other															
Cyanide (free)	mg/L	0.001	0.00035	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/L	0.001	0.009	0.00375	6	6	100	-	-	-	-	-	0.005	0	0
Cyanide (WAD)	mg/L	0.001	-	-	6	6	100	-	-	-	-	-	0.001	0	0
Radium-226	Bq/l	0.003 | 0.0086	-	-	6	6	100	-	-	-	-	-	0.0069	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Table C1-3. MEL-02 summary statistics for the 2021 winter water sampling event.

Parameter	Units	DL (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-02 (Mid-field Exposure Area) Winter Sampling Event (March)										
					N	N<DL	% <MDL	Mean	Median	SD	SE	Min	Max	%> FEIS	% > Act Lvl
Field Measurements															
Temperature	C	-	-	-	5	0	0	1.88	1.95	0.117	0.0523	1.71	1.97	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	5	0	0	117	114	7.07	3.16	112	129	-	-
pH (field)	pH units	-	-	6.5 | 9.0	5	0	0	6.96	7	0.208	0.0929	6.62	7.13	-	0
DO (mg/L)	mg/L	-	-	6.5	4	0	0	14.2	14.1	0.899	0.45	13.2	15.3	-	0
DO (%)	%	-	-	-	5	0	0	103	103	5.94	2.66	95.8	112	-	-
Conventional Parameters															
Conductivity (lab)	uS/cm	1	-	-	5	0	0	126	124	7.06	3.16	119	137	-	-
Hardness	mg/L	0.2 | 1	-	-	5	0	0	36.4	36.9	2.05	0.915	33.7	39.2	-	-
pH (lab)	pH units	0.1	-	6.5 | 9.0	5	0	0	7.5	7.51	0.0716	0.032	7.4	7.6	-	0
Total Dissolved Solids	mg/L	13	68	375	5	0	0	63.2	65	8.04	3.6	53	74	20	0
Total Dissolved Solids (Calculated)	mg/L	1	68	375	5	0	0	62.4	62.5	3.77	1.69	58.4	68.4	20	0
Total Suspended Solids	mg/L	1	3.1	-	5	5	100	-	-	-	-	-	1	0	0
Turbidity (lab)	NTU	0.1	-	-	5	1	20	0.144	0.15	0.0336	0.015	0.1	0.18	-	-
Major Ions															
Alkalinity, Bicarbonate	mg/L	1.2	-	-	5	0	0	31.4	31.1	1.54	0.687	29.4	33.1	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	5	5	100	-	-	-	-	-	0.6	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	5	5	100	-	-	-	-	-	0.34	0	0
Alkalinity, Total	mg/L	1	-	-	5	0	0	25.8	25.5	1.25	0.558	24.1	27.1	-	-
Bromide	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium (D)	mg/L	0.01	-	-	5	0	0	11.3	11.5	0.606	0.271	10.4	12	-	-
Calcium (T)	mg/L	0.01	-	-	5	0	0	11.4	11.7	0.541	0.242	10.6	11.9	-	-
Chloride	mg/L	0.1	14	90	5	0	0	17.3	16.7	1.8	0.805	16.3	20.5	100	0
Fluoride	mg/L	0.02	0.0084	2.1	5	0	0	0.0364	0.037	0.0023	0.00103	0.034	0.039	100	0
Magnesium (D)	mg/L	0.004	-	-	5	0	0	1.99	1.98	0.136	0.0607	1.87	2.22	-	-
Magnesium (T)	mg/L	0.004	-	-	5	0	0	1.98	2	0.126	0.0563	1.84	2.17	-	-
Potassium (D)	mg/L	0.02	-	-	5	0	0	1.47	1.51	0.0731	0.0327	1.35	1.52	-	-
Potassium (T)	mg/L	0.02	-	-	5	0	0	1.47	1.48	0.0794	0.0355	1.35	1.54	-	-
Reactive Silica (SiO2)	mg/L	0.01	-	-	5	0	0	0.375	0.369	0.0302	0.0135	0.351	0.427	-	-
Sodium (D)	mg/L	0.02	-	-	5	0	0	8.3	8.12	0.747	0.334	7.78	9.61	-	-
Sodium (T)	mg/L	0.02	5.3	-	5	0	0	8.32	8.23	0.665	0.298	7.81	9.45	100	-
Sulphate	mg/L	0.3	38	-	5	0	0	6.59	6.53	0.442	0.197	6.21	7.33	0	-
Nutrients															
Ammonia (as N)	mg/L	0.005 | 0.05	0.54	13.6	5	0	0	0.0563	0.0551	0.0233	0.0104	0.0369	0.0942	0	0
Nitrate (as N)	mg/L	0.005	0.25	2.17	5	1	20	0.0102	0.0062	0.00869	0.00389	0.005	0.0255	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	5	1	20	0.0102	0.0062	0.00868	0.00388	0.0051	0.0255	-	-
Nitrite (as N)	mg/L	0.001	0.051	0.045	5	5	100	-	-	-	-	-	0.001	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	5	0	0	0.28	0.282	0.0249	0.0111	0.246	0.312	-	-
Orthophosphate (PO4-P)	mg/L	0.001	-	-	5	5	100	-	-	-	-	-	0.001	0	0
Total Diss Phosphorus	mg/L	0.001 | 0.003	-	-	5	0	0	0.00554	0.0055	0.000518	0.000232	0.0049	0.0063	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	5	0	0	0.281	0.275	0.0287	0.0128	0.246	0.323	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	-	-	5	0	0	0.271	0.267	0.0209	0.00936	0.246	0.303	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	5	0	0	0.271	0.267	0.0234	0.0105	0.239	0.297	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.0049	-	5	0	0	0.00706	0.0065	0.00207	0.000927	0.005	0.01	100	-

Table C1-3. MEL-02 summary statistics for the 2021 winter water sampling event.

Parameter	Units	DL (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-02 (Mid-field Exposure Area) Winter Sampling Event (March)										
					N	N<DL	% <MDL	Mean	Median	SD	SE	Min	Max	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon															
Dissolved Organic Carbon	mg/L	0.5	-	-	5	0	0	3.73	3.61	0.353	0.158	3.43	4.26	-	-
Total Organic Carbon	mg/L	0.5	-	-	5	0	0	3.62	3.58	0.123	0.055	3.47	3.8	-	-
Total Metals															
Aluminum	ug/L	1	9.1	75	5	4	80	-	1	-	-	1	1.4	0	0
Antimony	ug/L	0.02	0.51	4.5	5	2	40	0.0314	0.02	0.0249	0.0112	0.02	0.076	0	0
Arsenic	ug/L	0.02	3.8	18.8	5	0	0	0.46	0.446	0.0259	0.0116	0.441	0.503	0	0
Barium	ug/L	0.02	77	750	5	0	0	13.2	13.3	0.803	0.359	12	14.2	0	0
Beryllium	ug/L	0.005	-	-	5	5	100	-	-	-	-	-	0.005	0	0
Boron	ug/L	5	23	1120	5	0	0	7.52	7.2	0.779	0.348	7	8.9	0	0
Cadmium	ug/L	0.005 | 0.01	0.05	0.032 | 0.0499	5	5	100	-	-	-	-	-	0.005	0	0
Chromium	ug/L	0.1	1.1	3.75	5	5	100	-	-	-	-	-	0.1	0	0
Cobalt	ug/L	0.005	-	0.585	5	0	0	0.0179	0.0193	0.0038	0.0017	0.0134	0.0221	-	0
Copper	ug/L	0.05	2	1500	5	0	0	1.69	1.65	0.358	0.16	1.14	2.06	20	0
Iron	ug/L	1	42	795	5	0	0	4.52	2.8	3.56	1.59	2.2	10.7	0	0
Lead	ug/L	0.01	0.15	3.75	5	4	80	-	0.01	-	-	0.01	0.016	0	0
Lithium	ug/L	0.5	-	-	5	0	0	1.51	1.45	0.172	0.077	1.39	1.81	-	-
Manganese	ug/L	0.05	5.5	90	5	0	0	1.72	1.09	1.39	0.623	1.03	4.21	0	0
Mercury	ug/L	0.5	0.02	0.0195	5	5	100	-	-	-	-	-	5.00E-04	0	0
Molybdenum	ug/L	0.05	5.2	54.8	5	0	0	0.121	0.123	0.0135	0.00605	0.106	0.139	0	0
Nickel	ug/L	0.05	2.7	18.8	5	0	0	0.748	0.726	0.0825	0.0369	0.687	0.892	0	0
Selenium	ug/L	0.04	0.16	0.75	5	0	0	0.0676	0.066	0.00546	0.00244	0.063	0.077	0	0
Silver	ug/L	0.005 | 0.01	0.1	0.188	5	5	100	-	-	-	-	-	0.005	0	0
Strontium	ug/L	0.02	-	1880	5	0	0	68.5	67.2	6.31	2.82	64.1	79.4	-	0
Thallium	ug/L	0.005	0.1	0.6	5	5	100	-	-	-	-	-	0.005	0	0
Tin	ug/L	0.02	-	-	5	5	100	-	-	-	-	-	0.02	0	0
Titanium	ug/L	0.05 | 0.35	-	-	5	4	80	-	0.05	-	-	0.05	0.087	-	-
Uranium	ug/L	0.001	1.5	11.2	5	0	0	0.0177	0.0182	0.00185	0.000825	0.0149	0.0196	0	0
Vanadium	ug/L	0.05	-	-	5	5	100	-	-	-	-	-	0.05	0	0
Zinc	ug/L	0.5	6.7	-	5	2	40	0.938	0.57	0.604	0.27	0.5	1.85	0	-
Dissolved Metals															
Aluminum	ug/L	1	-	-	5	5	100	-	-	-	-	-	1	0	0
Antimony	ug/L	0.02	-	-	5	0	0	0.0314	0.02	0.0249	0.0112	0.02	0.076	-	-
Arsenic	ug/L	0.02	-	-	5	0	0	0.454	0.452	0.0184	0.00823	0.437	0.485	-	-
Barium	ug/L	0.02	-	-	5	0	0	13.1	13.3	0.746	0.334	12	13.9	-	-
Beryllium	ug/L	0.005	-	-	5	5	100	-	-	-	-	-	0.005	0	0
Boron	ug/L	5	-	-	5	0	0	7.42	7.3	0.879	0.393	6.2	8.6	-	-
Cadmium	ug/L	0.005	-	-	5	5	100	-	-	-	-	-	0.005	0	0
Chromium	ug/L	0.1	-	-	5	5	100	-	-	-	-	-	0.1	0	0
Cobalt	ug/L	0.005	-	-	5	0	0	0.0154	0.0138	0.00336	0.0015	0.012	0.0198	-	-
Copper	ug/L	0.05	-	0.223 | 2.87	5	0	0	1.68	1.65	0.361	0.161	1.11	2.02	-	100
Iron	ug/L	1	-	-	5	0	0	2.6	1.9	1.45	0.649	1.4	5	-	-
Lead	ug/L	0.01	-	3.39 | 4.77	5	5	100	-	-	-	-	-	0.01	0	0
Lithium	ug/L	0.5	-	-	5	0	0	1.47	1.41	0.204	0.0914	1.29	1.82	-	-
Manganese	ug/L	0.05	-	158 | 248	5	0	0	0.554	0.591	0.0893	0.0399	0.431	0.654	-	0
Mercury	ug/L	0.5	-	-	5	5	100	-	-	-	-	-	5.00E-04	0	0
Molybdenum	ug/L	0.05	-	-	5	0	0	0.12	0.119	0.00754	0.00337	0.113	0.133	-	-

Table C1-3. MEL-02 summary statistics for the 2021 winter water sampling event.

Parameter	Units	DL (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-02 (Mid-field Exposure Area) Winter Sampling Event (March)										
					N	N<DL	% <MDL	Mean	Median	SD	SE	Min	Max	%> FEIS	% > Act Lvl
Nickel	ug/L	0.05	-	-	5	0	0	0.751	0.71	0.0957	0.0428	0.694	0.921	-	-
Selenium	ug/L	0.04	-	-	5	0	0	0.0628	0.062	0.00432	0.00193	0.059	0.07	-	-
Silver	ug/L	0.005 | 0.01	-	-	5	5	100	-	-	-	-	-	0.005	0	0
Strontium	ug/L	0.02	-	1880	5	0	0	67.5	65.5	6.99	3.13	63.1	79.8	-	0
Thallium	ug/L	0.005	-	-	5	5	100	-	-	-	-	-	0.005	0	0
Tin	ug/L	0.02	-	-	5	5	100	-	-	-	-	-	0.02	0	0
Titanium	ug/L	0.05	-	-	5	5	100	-	-	-	-	-	0.05	0	0
Uranium	ug/L	0.001	-	-	5	0	0	0.0178	0.0179	0.000677	0.000303	0.0171	0.0187	-	-
Vanadium	ug/L	0.05	-	-	5	5	100	-	-	-	-	-	0.05	0	0
Zinc	ug/L	0.5	-	4.47 | 9.3	5	0	0	1.4	1.24	0.469	0.21	0.94	1.99	-	0
Other															
Cyanide (free)	mg/L	0.001	0.00035	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/L	0.001	0.009	0.00375	5	5	100	-	-	-	-	-	0.005	0	0
Cyanide (WAD)	mg/L	0.001	-	-	5	5	100	-	-	-	-	-	0.001	0	0
Radium-226	Bq/l	0.003 | 0.0086	-	-	5	5	100	-	-	-	-	-	0.0056	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Table C1-4. MEL-01 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-01 Near-Field Area Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Field Measurements																	
Temperature	C	-	-	-	-	18	0	0	10.3	10.5	0.511	0.12	9.5	10.9	-	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	-	18	0	0	102	98.4	8.83	2.08	90.9	116	-	-	-
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	18	0	0	7.49	7.49	0.0761	0.0179	7.35	7.66	0	-	0
DO (mg/L)	mg/L	-	-	-	6.5	18	0	0	11.2	11.2	0.119	0.0282	10.9	11.3	-	-	0
DO (%)	%	-	-	-	-	18	0	0	100	101	2.68	0.632	96.3	104	-	-	-
Conventional Parameters																	
Conductivity (lab)	uS/cm	1	77.5	-	-	18	0	0	107	104	8.29	1.95	98	123	100	-	-
Hardness	mg/L	0.2 | 1	23.4	-	-	18	0	0	28.1	27.1	2.14	0.504	26.2	35.1	100	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	18	0	0	7.39	7.36	0.0525	0.0124	7.34	7.54	-	-	0
Total Dissolved Solids	mg/L	13	54	68	375	18	0	0	56.9	54.5	7.95	1.87	47	77	50	11	0
Total Dissolved Solids (Calculated)	mg/L	1	39.6	68	375	18	0	0	51.8	49.8	4.67	1.1	47.5	63.4	100	0	0
Total Suspended Solids	mg/L	1	1	3.1	-	18	14	78	-	1	-	-	1	1.9	22	0	-
Turbidity (lab)	NTU	0.1	-	-	-	18	0	0	0.622	0.545	0.227	0.0536	0.39	1.12	-	-	-
Major Ions																	
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	18	0	0	21.4	21	1.45	0.342	19.9	25.4	6	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	18	18	100	-	-	-	-	-	0.6	0	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	18	18	100	-	-	-	-	-	0.34	0	0	0
Alkalinity, Total	mg/L	1	20.5	-	-	18	0	0	17.5	17.2	1.18	0.279	16.3	20.8	6	-	-
Bromide	mg/L	0.1	-	-	-	18	18	100	-	-	-	-	-	0.1	0	0	0
Calcium (D)	mg/L	0.01	-	-	-	18	0	0	8.56	8.3	0.603	0.142	7.88	10.5	-	-	-
Calcium (T)	mg/L	0.01	7.33	-	-	18	0	0	8.4	8.22	0.594	0.14	7.78	10.3	100	-	-
Chloride	mg/L	0.1	9.56	14	90	18	0	0	16.2	15.8	1.97	0.464	14.1	20	100	100	0
Fluoride	mg/L	0.02	0.028	0.0084	2.1	18	0	0	0.0251	0.026	0.00188	0.000442	0.022	0.028	0	100	0
Magnesium (D)	mg/L	0.004	-	-	-	18	0	0	1.63	1.56	0.164	0.0386	1.5	2.17	-	-	-
Magnesium (T)	mg/L	0.004	1.18	-	-	18	0	0	1.63	1.58	0.159	0.0376	1.5	2.19	100	-	-
Potassium (D)	mg/L	0.02	-	-	-	18	0	0	1.14	1.13	0.0791	0.0186	1.04	1.39	-	-	-
Potassium (T)	mg/L	0.02	0.954	-	-	18	0	0	1.12	1.09	0.0794	0.0187	1.06	1.4	100	-	-
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	18	0	0	0.357	0.343	0.0444	0.0105	0.305	0.422	100	-	-
Sodium (D)	mg/L	0.02	-	-	-	18	0	0	7.77	7.32	1.15	0.272	6.8	11.6	-	-	-
Sodium (T)	mg/L	0.02	4.85	5.3	-	18	0	0	7.7	7.16	1.17	0.276	6.9	11.6	100	100	-
Sulphate	mg/L	0.3	3.87	38	-	18	0	0	5.8	5.55	0.764	0.18	4.98	7.3	100	0	-
Nutrients																	
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	13.6	18	8	44	0.0474	0.05	0.0302	0.00711	0.0093	0.123	72	0	0
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.17	18	7	39	0.0263	0.0064	0.031	0.0073	0.005	0.0897	39	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	18	7	39	0.0267	0.0064	0.0316	0.00746	0.0051	0.0917	-	-	-
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.045	18	14	78	-	0.001	-	-	0.001	0.0021	22	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	18	0	0	0.182	0.197	0.103	0.0242	0.0173	0.385	-	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	18	15	83	-	0.001	-	-	0.001	0.0012	11	-	-
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	18	0	0	0.00317	0.0029	0.00115	0.00027	0.0018	0.0061	28	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	18	0	0	0.247	0.241	0.0664	0.0156	0.162	0.362	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	18	0	0	0.244	0.24	0.0511	0.012	0.179	0.378	44	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	18	0	0	0.222	0.222	0.0486	0.0115	0.158	0.302	-	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	17	0	0	0.00731	0.0075	0.00127	0.000309	0.005	0.0099	82	100	-

Table C1-4. MEL-01 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-01 Near-Field Area Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon																	
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	18	0	0	3.47	3.46	0.207	0.0487	2.96	3.74	100	-	-
Total Organic Carbon	mg/L	0.5	3	-	-	18	0	0	3.4	3.37	0.118	0.0277	3.2	3.59	100	-	-
Total Metals																	
Aluminum	ug/L	1	5.32	9.1	75	18	0	0	8.37	6.25	8.09	1.91	3.5	38.5	61	11	0
Antimony	ug/L	0.02	0.02	0.51	4.5	18	16	89	-	0.02	-	-	0.02	0.031	11	0	0
Arsenic	ug/L	0.02	0.275	3.8	18.8	18	0	0	0.524	0.499	0.107	0.0253	0.442	0.935	100	0	0
Barium	ug/L	0.02	8.05	77	750	18	0	0	8.44	8.3	0.435	0.102	7.66	9.47	94	0	0
Beryllium	ug/L	0.005	0.005	-	-	18	18	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	6.52	23	1120	18	0	0	7.46	6.95	1.4	0.33	6.2	12.1	83	0	0
Cadmium	ug/L	0.005 | 0.01	0.005	0.05	0.032 | 0.0499	18	18	100	-	-	-	-	-	0.01	6	0	0
Chromium	ug/L	0.1	0.103	1.1	3.75	18	17	94	-	0.1	-	-	0.1	0.15	6	0	0
Cobalt	ug/L	0.005	0.016	-	0.585	18	0	0	0.0361	0.0326	0.014	0.0033	0.0248	0.0863	100	-	0
Copper	ug/L	0.05	0.86	2	1500	18	0	0	1.07	0.895	0.357	0.0842	0.796	2.16	67	6	0
Iron	ug/L	1	15	42	795	18	0	0	31.4	20.5	23.2	5.48	14.5	112	94	33	0
Lead	ug/L	0.01	0.0222	0.15	3.75	18	7	39	0.0218	0.013	0.0347	0.00818	0.01	0.16	11	6	0
Lithium	ug/L	0.5	0.72	-	-	18	0	0	1.28	1.23	0.154	0.0363	1.14	1.82	100	-	-
Manganese	ug/L	0.05	3.06	5.5	90	18	0	0	9.46	6.6	4.96	1.17	5.07	16.5	100	83	0
Mercury	ug/L	0.5	8.00E-04	0.02	0.0195	18	11	61	-	5.00E-04	-	-	5.00E-04	0.00468	0	0	0
Molybdenum	ug/L	0.05	0.107	5.2	54.8	18	0	0	0.437	0.104	1.4	0.329	0.084	6.03	39	6	0
Nickel	ug/L	0.05	0.441	2.7	18.8	18	0	0	0.733	0.702	0.0755	0.0178	0.626	0.92	100	0	0
Selenium	ug/L	0.04	0.049	0.16	0.75	18	12	67	-	0.04	-	-	0.04	0.059	17	0	0
Silver	ug/L	0.005 | 0.01	0.005	0.1	0.188	18	18	100	-	-	-	-	-	0.01	6	0	0
Strontium	ug/L	0.02	36.1	-	1880	18	0	0	58.5	55.1	7.41	1.75	52.2	82.8	100	-	0
Thallium	ug/L	0.005	0.005	0.1	0.6	18	18	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	0.0384	-	-	18	12	67	-	0.02	-	-	0.02	0.034	0	-	-
Titanium	ug/L	0.05 | 0.35	0.17	-	-	18	1	6	0.335	0.216	0.409	0.0964	0.115	1.94	78	-	-
Uranium	ug/L	0.001	0.0164	1.5	11.2	18	0	0	0.0215	0.0202	0.00541	0.00127	0.0151	0.0384	89	0	0
Vanadium	ug/L	0.05	0.05	-	-	18	12	67	-	0.05	-	-	0.05	0.171	33	-	-
Zinc	ug/L	0.5	1.7	6.7	-	18	2	11	1.55	1.05	1.18	0.278	0.5	4.15	33	0	-
Dissolved Metals																	
Aluminum	ug/L	1	-	-	-	18	0	0	2.51	2.05	1.48	0.349	1.1	7.1	-	-	-
Antimony	ug/L	0.02	-	-	-	18	17	94	-	0.02	-	-	0.02	0.028	-	-	-
Arsenic	ug/L	0.02	-	-	-	18	0	0	0.457	0.466	0.0293	0.0069	0.402	0.5	-	-	-
Barium	ug/L	0.02	-	-	-	18	0	0	8.17	8.11	0.336	0.0792	7.66	8.85	-	-	-
Beryllium	ug/L	0.005	-	-	-	18	18	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	-	-	-	18	0	0	7.63	7.05	1.37	0.323	6.4	12.1	-	-	-
Cadmium	ug/L	0.005	-	-	-	18	18	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	-	-	-	18	18	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	-	-	-	18	0	0	0.0164	0.0156	0.00431	0.00101	0.0118	0.0299	-	-	-
Copper	ug/L	0.05	-	-	0.223 | 2.87	17	0	0	0.854	0.803	0.151	0.0367	0.728	1.38	-	-	0
Iron	ug/L	1	-	-	-	18	0	0	7.64	5.75	3.07	0.723	4.9	12.9	-	-	-
Lead	ug/L	0.01	0.0125	-	3.39 | 4.77	18	17	94	-	0.01	-	-	0.01	0.011	0	-	0
Lithium	ug/L	0.5	-	-	-	18	0	0	1.3	1.27	0.147	0.0348	1.12	1.79	-	-	-
Manganese	ug/L	0.05	1.2	-	158 | 248	18	0	0	1.2	0.648	1.02	0.241	0.293	2.94	33	-	0
Mercury	ug/L	0.5	-	-	-	18	16	89	-	5.00E-04	-	-	5.00E-04	0.00071	0	0	0
Molybdenum	ug/L	0.05	-	-	-	18	0	0	0.44	0.106	1.39	0.328	0.088	6.02	-	-	-

Table C1-4. MEL-01 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-01 Near-Field Area Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Nickel	ug/L	0.05	-	-	-	18	0	0	0.692	0.683	0.0579	0.0136	0.605	0.8	-	-	-
Selenium	ug/L	0.04	-	-	-	18	12	67	-	0.04	-	-	0.04	0.063	-	-	-
Silver	ug/L	0.005 | 0.01	-	-	-	18	18	100	-	-	-	-	-	0.01	-	-	-
Strontium	ug/L	0.02	-	-	1880	18	0	0	58.7	55.6	8.01	1.89	52.5	85.4	-	-	0
Thallium	ug/L	0.005	-	-	-	18	18	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	-	-	-	18	15	83	-	0.02	-	-	0.02	0.042	-	-	-
Titanium	ug/L	0.05	-	-	-	18	14	78	-	0.05	-	-	0.05	0.069	-	-	-
Uranium	ug/L	0.001	-	-	-	18	0	0	0.0199	0.0182	0.00543	0.00128	0.015	0.0375	-	-	-
Vanadium	ug/L	0.05	-	-	-	18	18	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.9	-	4.47 | 9.3	18	7	39	1.54	0.865	2.39	0.562	0.5	10.8	11	-	6
Other																	
Cyanide (free)	mg/L	0.001	-	0.00035	-	18	15	83	-	0.001	-	-	0.001	0.0018	-	100	-
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.00375	18	16	89	-	0.001	-	-	0.001	0.0015	11	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	18	16	89	-	0.001	-	-	0.001	0.0017	-	-	-
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	18	18	100	-	-	-	-	-	0.0086	-	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Table C1-5. MEL-02 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-02 (Mid-field Area) Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Field Measurements																	
Temperature	C	-	-	-	-	16	0	0	10.7	10.7	0.715	0.179	9.63	11.7	-	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	-	16	0	0	87.5	88.4	3.05	0.763	82.8	91.1	-	-	-
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	16	0	0	7.35	7.36	0.202	0.0504	6.79	7.66	-	-	0
DO (mg/L)	mg/L	-	-	-	6.5	16	0	0	11.3	11.2	0.261	0.0653	10.8	11.8	-	-	0
DO (%)	%	-	-	-	-	16	0	0	103	103	1.58	0.394	99.6	106	-	-	-
Conventional Parameters																	
Conductivity (lab)	uS/cm	1	77.5	-	-	15	0	0	88.9	88.5	1.01	0.261	87.6	90.9	100	-	-
Hardness	mg/L	0.2 | 1	23.4	-	-	15	0	0	24.5	24.4	0.394	0.102	24	25.4	100	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	15	0	0	7.36	7.36	0.017	0.00439	7.34	7.39	-	-	0
Total Dissolved Solids	mg/L	13	54	68	375	15	0	0	52.3	50	7.95	2.05	42	71	27	7	0
Total Dissolved Solids (Calculated)	mg/L	1	39.6	68	375	15	0	0	42.8	42.6	0.746	0.193	42	44.4	100	0	0
Total Suspended Solids	mg/L	1	1	3.1	-	15	13	87	-	1	-	-	1	1.4	13	0	-
Turbidity (lab)	NTU	0.1	-	-	-	15	0	0	0.389	0.35	0.147	0.038	0.23	0.73	-	-	-
Major Ions																	
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	15	0	0	20.8	20.6	1.08	0.279	20	24.4	0	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	15	15	100	-	-	-	-	-	0.6	0	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	15	15	100	-	-	-	-	-	0.34	0	0	0
Alkalinity, Total	mg/L	1	20.5	-	-	15	0	0	17	16.9	0.884	0.228	16.4	20	0	-	-
Bromide	mg/L	0.1	-	-	-	15	15	100	-	-	-	-	-	0.1	0	0	0
Calcium (D)	mg/L	0.01	-	-	-	15	0	0	7.63	7.67	0.16	0.0412	7.39	7.96	-	-	-
Calcium (T)	mg/L	0.01	7.33	-	-	15	0	0	7.54	7.55	0.107	0.0277	7.37	7.77	100	-	-
Chloride	mg/L	0.1	9.56	14	90	15	0	0	12.2	12.2	0.318	0.082	11.7	13	100	0	0
Fluoride	mg/L	0.02	0.028	0.0084	2.1	15	0	0	0.0251	0.026	0.00144	0.000371	0.023	0.027	0	100	0
Magnesium (D)	mg/L	0.004	-	-	-	15	0	0	1.33	1.33	0.0304	0.00786	1.26	1.37	-	-	-
Magnesium (T)	mg/L	0.004	1.18	-	-	15	0	0	1.36	1.35	0.0492	0.0127	1.28	1.44	100	-	-
Potassium (D)	mg/L	0.02	-	-	-	15	0	0	1.01	1.01	0.0183	0.00472	0.99	1.05	-	-	-
Potassium (T)	mg/L	0.02	0.954	-	-	15	0	0	1.02	1.01	0.0348	0.00899	0.979	1.09	100	-	-
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	15	0	0	0.244	0.234	0.0214	0.00552	0.217	0.275	20	-	-
Sodium (D)	mg/L	0.02	-	-	-	15	0	0	5.94	5.98	0.161	0.0416	5.64	6.19	-	-	-
Sodium (T)	mg/L	0.02	4.85	5.3	-	15	0	0	5.96	5.94	0.208	0.0537	5.75	6.39	100	100	-
Sulphate	mg/L	0.3	3.87	38	-	15	0	0	4.48	4.47	0.0942	0.0243	4.34	4.67	100	0	-
Nutrients																	
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	13.6	15	7	47	0.0471	0.05	0.025	0.00646	0.0093	0.09	80	0	0
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.17	15	12	80	-	0.005	-	-	0.005	0.0463	13	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	15	12	80	-	0.0051	-	-	0.0051	0.0463	-	-	-
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.045	15	15	100	-	-	-	-	-	0.001	0	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	15	0	0	0.228	0.232	0.0359	0.00928	0.141	0.276	-	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	15	13	87	-	0.001	-	-	0.001	0.0012	13	-	-
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	15	0	0	0.00258	0.0022	0.00083	0.000214	0.0016	0.0044	27	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	15	0	0	0.202	0.206	0.0336	0.00866	0.122	0.244	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	15	0	0	0.222	0.219	0.0334	0.00863	0.141	0.276	20	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	15	0	0	0.196	0.199	0.0306	0.0079	0.122	0.244	-	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	14*	0	0	0.00529	0.00555	0.000805	0.000215	0.0034	0.0062	21	71	-

Table C1-5. MEL-02 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-02 (Mid-field Area) Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon																	
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	15	0	0	3.02	3.03	0.184	0.0475	2.71	3.36	93	-	-
Total Organic Carbon	mg/L	0.5	3	-	-	15	0	0	2.92	2.9	0.17	0.0438	2.68	3.41	20	-	-
Total Metals																	
Aluminum	ug/L	1	5.32	9.1	75	15	0	0	3.24	3	1.25	0.324	1.9	6.2	13	0	0
Antimony	ug/L	0.02	0.02	0.51	4.5	15	15	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	0.275	3.8	18.8	15	0	0	0.56	0.518	0.0872	0.0225	0.432	0.726	100	0	0
Barium	ug/L	0.02	8.05	77	750	15	0	0	8.15	8.01	0.424	0.11	7.42	8.81	40	0	0
Beryllium	ug/L	0.005	0.005	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	6.52	23	1120	15	0	0	5.48	5.5	0.132	0.0341	5.2	5.7	0	0	0
Cadmium	ug/L	0.005 | 0.01	0.005	0.05	0.032 | 0.0499	15	15	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	0.103	1.1	3.75	15	15	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	0.016	-	0.585	15	0	0	0.0183	0.0181	0.00297	0.000768	0.0137	0.0235	73	-	0
Copper	ug/L	0.05	0.86	2	1500	15	0	0	0.907	0.849	0.18	0.0466	0.732	1.44	47	0	0
Iron	ug/L	1	15	42	795	15	0	0	15.7	12.9	4.99	1.29	10.5	22.8	40	0	0
Lead	ug/L	0.01	0.0222	0.15	3.75	15	2	13	0.0195	0.019	0.00882	0.00228	0.01	0.032	47	0	0
Lithium	ug/L	0.5	0.72	-	-	15	0	0	0.949	0.95	0.0363	0.00938	0.9	1	100	-	-
Manganese	ug/L	0.05	3.06	5.5	90	15	0	0	3.91	3.57	0.705	0.182	2.96	5.02	93	0	0
Mercury	ug/L	0.5	8.00E-04	0.02	0.0195	15	13	87	-	5.00E-04	-	-	5.00E-04	0.00075	0	0	0
Molybdenum	ug/L	0.05	0.107	5.2	54.8	15	0	0	0.0847	0.087	0.00632	0.00163	0.073	0.092	0	0	0
Nickel	ug/L	0.05	0.441	2.7	18.8	15	0	0	0.582	0.536	0.0728	0.0188	0.509	0.699	100	0	0
Selenium	ug/L	0.04	0.049	0.16	0.75	15	12	80	-	0.04	-	-	0.04	0.051	7	0	0
Silver	ug/L	0.005 | 0.01	0.005	0.1	0.188	15	15	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	36.1	-	1880	15	0	0	46.2	46.4	1.15	0.297	44.4	48.6	100	-	0
Thallium	ug/L	0.005	0.005	0.1	0.6	15	15	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	0.0384	-	-	15	14	93	-	0.02	-	-	0.02	0.03	0	-	-
Titanium	ug/L	0.05 | 0.35	0.17	-	-	15	2	13	0.115	0.094	0.0778	0.0201	0.05	0.35	13	-	-
Uranium	ug/L	0.001	0.0164	1.5	11.2	15	0	0	0.0159	0.016	0.000968	0.00025	0.0137	0.0173	33	0	0
Vanadium	ug/L	0.05	0.05	-	-	15	15	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.7	6.7	-	15	4	27	1.41	1.23	1.25	0.323	0.5	5.35	27	0	-
Dissolved Metals																	
Aluminum	ug/L	1	-	-	-	15	1	7	1.53	1.3	0.819	0.211	1	4.4	-	-	-
Antimony	ug/L	0.02	-	-	-	15	15	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	-	-	-	15	0	0	0.52	0.479	0.0661	0.0171	0.458	0.629	-	-	-
Barium	ug/L	0.02	-	-	-	15	0	0	7.91	7.82	0.244	0.0629	7.61	8.39	-	-	-
Beryllium	ug/L	0.005	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	-	-	-	15	0	0	5.51	5.5	0.106	0.0274	5.4	5.8	-	-	-
Cadmium	ug/L	0.005	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	-	-	-	15	15	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	-	-	-	15	0	0	0.01	0.0089	0.00211	0.000546	0.0078	0.0141	-	-	-
Copper	ug/L	0.05	-	-	0.223 | 2.87	15	0	0	0.83	0.799	0.0996	0.0257	0.695	1	-	-	7
Iron	ug/L	1	-	-	-	15	0	0	5.39	4.3	1.8	0.465	3.7	8.1	-	-	-
Lead	ug/L	0.01	0.0125	-	3.39 | 4.77	15	12	80	-	0.01	-	-	0.01	0.026	7	-	0
Lithium	ug/L	0.5	-	-	-	15	0	0	0.941	0.94	0.032	0.00827	0.9	1	-	-	-
Manganese	ug/L	0.05	1.2	-	158 | 248	15	0	0	0.527	0.448	0.172	0.0444	0.36	0.823	0	-	0
Mercury	ug/L	0.5	-	-	-	15	13	87	-	5.00E-04	-	-	5.00E-04	0.00083	0	0	0
Molybdenum	ug/L	0.05	-	-	-	15	0	0	0.0853	0.086	0.00511	0.00132	0.075	0.093	-	-	-

Table C1-5. MEL-02 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-02 (Mid-field Area) Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Nickel	ug/L	0.05	-	-	-	15	0	0	0.57	0.53	0.0734	0.0189	0.494	0.711	-	-	-
Selenium	ug/L	0.04	-	-	-	15	9	60	-	0.04	-	-	0.04	0.058	-	-	-
Silver	ug/L	0.005 | 0.01	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	-	-	1880	15	0	0	46.1	46.1	0.976	0.252	44.8	47.9	-	-	0
Thallium	ug/L	0.005	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	-	-	-	15	13	87	-	0.02	-	-	0.02	0.024	-	-	-
Titanium	ug/L	0.05	-	-	-	15	15	100	-	-	-	-	-	0.05	0	0	0
Uranium	ug/L	0.001	-	-	-	15	0	0	0.0151	0.0148	0.000952	0.000246	0.0139	0.0172	-	-	-
Vanadium	ug/L	0.05	-	-	-	15	15	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.9	-	4.47 | 9.3	15	3	20	1.03	0.85	0.891	0.23	0.5	4.08	7	-	0
Other																	
Cyanide (free)	mg/L	0.001	-	0.00035	-	15	15	100	-	-	-	-	-	0.001	0	0	0
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.00375	15	15	100	-	-	-	-	-	0.001	0	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	15	15	100	-	-	-	-	-	0.001	0	0	0
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Table C1-6. Pooled reference areas summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Pooled Reference Areas Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Field Measurements																	
Temperature	C	-	-	-	-	30	0	0	9.57	10	1.33	0.242	5.21	10.7	-	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	-	30	0	0	76.9	75.2	9.03	1.65	72.2	124	-	-	-
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	30	0	0	7.46	7.48	0.196	0.0358	6.98	7.84	-	-	0
DO (mg/L)	mg/L	-	-	-	6.5	29	0	0	11.6	11.3	0.593	0.11	11.1	12.8	-	-	0
DO (%)	%	-	-	-	-	30	0	0	102	101	3.34	0.611	99	110	-	-	-
Conventional Parameters																	
Conductivity (lab)	uS/cm	1	77.5	-	-	25	0	0	77.9	78.1	2.07	0.413	72.6	80.7	76	-	-
Hardness	mg/L	0.2 | 1	23.4	-	-	25	0	0	22.8	23.4	1.14	0.227	20.6	24.1	52	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	25	0	0	7.39	7.37	0.0524	0.0105	7.3	7.51	-	-	0
Total Dissolved Solids	mg/L	13	54	68	375	25	0	0	49	46	7.87	1.57	38	61	32	0	0
Total Dissolved Solids (Calculated)	mg/L	1	39.6	68	375	25	0	0	38	38	1.53	0.306	35.2	40.4	20	0	0
Total Suspended Solids	mg/L	1	1	3.1	-	25	24	96	-	1	-	-	1	1.1	4	0	-
Turbidity (lab)	NTU	0.1	-	-	-	25	0	0	0.282	0.19	0.196	0.0391	0.13	0.79	-	-	-
Major Ions																	
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	25	0	0	21.8	20.9	1.85	0.371	20.1	25.7	8	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	25	25	100	-	-	-	-	-	0.6	0	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	25	25	100	-	-	-	-	-	0.34	0	0	0
Alkalinity, Total	mg/L	1	20.5	-	-	25	0	0	17.9	17.1	1.52	0.305	16.5	21.1	8	-	-
Bromide	mg/L	0.1	-	-	-	25	25	100	-	-	-	-	-	0.1	0	0	0
Calcium (D)	mg/L	0.01	-	-	-	25	0	0	7.2	7.34	0.381	0.0761	6.43	7.66	-	-	-
Calcium (T)	mg/L	0.01	7.33	-	-	25	0	0	7.1	7.12	0.262	0.0524	6.51	7.52	16	-	-
Chloride	mg/L	0.1	9.56	14	90	25	0	0	9.39	9.37	0.422	0.0844	8.42	10.1	40	0	0
Fluoride	mg/L	0.02	0.028	0.0084	2.1	25	0	0	0.0256	0.026	0.00119	0.000238	0.023	0.027	0	100	0
Magnesium (D)	mg/L	0.004	-	-	-	25	0	0	1.18	1.17	0.0559	0.0112	1.08	1.27	-	-	-
Magnesium (T)	mg/L	0.004	1.18	-	-	25	0	0	1.16	1.17	0.0295	0.00589	1.1	1.21	24	-	-
Potassium (D)	mg/L	0.02	-	-	-	25	0	0	0.939	0.943	0.0211	0.00423	0.892	0.979	-	-	-
Potassium (T)	mg/L	0.02	0.954	-	-	25	0	0	0.937	0.927	0.0284	0.00569	0.904	1	32	-	-
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	25	0	0	0.218	0.225	0.0187	0.00374	0.179	0.256	0	-	-
Sodium (D)	mg/L	0.02	-	-	-	25	0	0	4.82	4.84	0.134	0.0268	4.56	5.12	-	-	-
Sodium (T)	mg/L	0.02	4.85	5.3	-	25	0	0	4.74	4.65	0.176	0.0351	4.51	5.12	28	0	-
Sulphate	mg/L	0.3	3.87	38	-	25	0	0	3.68	3.7	0.128	0.0256	3.34	3.87	4	0	-
Nutrients																	
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	13.6	25	19	76	-	0.05	-	-	0.005	0.098	80	0	0
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.17	25	22	88	-	0.005	-	-	0.005	0.0309	4	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	25	22	88	-	0.0051	-	-	0.0051	0.0309	-	-	-
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.045	25	25	100	-	-	-	-	-	0.001	0	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	25	3	12	0.151	0.168	0.0658	0.0132	0.0051	0.269	-	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	25	24	96	-	0.001	-	-	0.001	0.0011	4	-	-
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	25	0	0	0.00229	0.002	0.000802	0.00016	0.0012	0.0041	12	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	25	0	0	0.141	0.127	0.039	0.0078	0.088	0.234	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	25	1	4	0.157	0.152	0.0417	0.00834	0.05	0.269	4	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	25	0	0	0.139	0.127	0.0367	0.00733	0.088	0.234	-	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	25	0	0	0.00391	0.0032	0.00157	0.000314	0.002	0.0074	16	28	-

Table C1-6. Pooled reference areas summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Pooled Reference Areas Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon																	
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	25	0	0	2.57	2.56	0.216	0.0431	2.29	3.03	24	-	-
Total Organic Carbon	mg/L	0.5	3	-	-	25	0	0	2.5	2.43	0.184	0.0369	2.27	2.89	0	-	-
Total Metals																	
Aluminum	ug/L	1	5.32	9.1	75	25	0	0	2.5	2.2	0.889	0.178	1.3	5.3	0	0	0
Antimony	ug/L	0.02	0.02	0.51	4.5	25	25	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	0.275	3.8	18.8	25	0	0	0.336	0.322	0.0405	0.0081	0.257	0.447	96	0	0
Barium	ug/L	0.02	8.05	77	750	25	0	0	7.9	7.96	0.263	0.0525	7.26	8.26	28	0	0
Beryllium	ug/L	0.005	0.005	-	-	25	25	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	6.52	23	1120	25	25	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005 | 0.01	0.005	0.05	0.032 | 0.0499	25	25	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	0.103	1.1	3.75	25	25	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	0.016	-	0.585	25	0	0	0.0117	0.0119	0.0016	0.000319	0.0089	0.0161	4	-	0
Copper	ug/L	0.05	0.86	2	1500	25	0	0	1.04	0.837	0.641	0.128	0.649	3.42	44	12	0
Iron	ug/L	1	15	42	795	25	0	0	10.3	9.9	2	0.4	7.4	16.1	4	0	0
Lead	ug/L	0.01	0.0222	0.15	3.75	25	8	32	0.0174	0.013	0.0107	0.00215	0.01	0.058	20	0	0
Lithium	ug/L	0.5	0.72	-	-	25	0	0	0.746	0.74	0.052	0.0104	0.66	0.88	72	-	-
Manganese	ug/L	0.05	3.06	5.5	90	25	0	0	2.6	2.68	0.365	0.073	1.94	3.39	4	0	0
Mercury	ug/L	0.5	0.0008	0.02	0.0195	25	22	88	-	0.0005	-	-	0.0005	0.00071	0	0	0
Molybdenum	ug/L	0.05	0.107	5.2	54.8	25	0	0	0.0783	0.077	0.00792	0.00158	0.067	0.098	0	0	0
Nickel	ug/L	0.05	0.441	2.7	18.8	25	0	0	0.42	0.426	0.0228	0.00457	0.373	0.457	12	0	0
Selenium	ug/L	0.04	0.049	0.16	0.75	25	20	80	-	0.04	-	-	0.04	0.069	8	0	0
Silver	ug/L	0.005 | 0.01	0.005	0.1	0.188	25	25	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	36.1	-	1880	25	0	0	36.9	36.5	1.62	0.323	33.9	40.2	60	-	0
Thallium	ug/L	0.005	0.005	0.1	0.6	25	24	96	-	0.005	-	-	0.005	0.0088	4	0	0
Tin	ug/L	0.02	0.0384	-	-	25	24	96	-	0.02	-	-	0.02	0.022	0	-	-
Titanium	ug/L	0.05 | 0.35	0.17	-	-	25	8	32	0.0834	0.069	0.0453	0.00907	0.05	0.211	8	-	-
Uranium	ug/L	0.001	0.0164	1.5	11.2	25	0	0	0.0152	0.0151	0.00142	0.000284	0.0128	0.0185	16	0	0
Vanadium	ug/L	0.05	0.05	-	-	25	25	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.7	6.7	-	25	8	32	1.22	0.7	1.02	0.204	0.5	4.05	24	0	-
Dissolved Metals																	
Aluminum	ug/L	1	-	-	-	25	6	24	1.5	1.3	0.581	0.116	1	3	-	-	-
Antimony	ug/L	0.02	-	-	-	25	25	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	-	-	-	25	0	0	0.317	0.312	0.0219	0.00438	0.283	0.364	-	-	-
Barium	ug/L	0.02	-	-	-	25	0	0	7.74	7.84	0.367	0.0735	6.97	8.23	-	-	-
Beryllium	ug/L	0.005	-	-	-	25	25	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	-	-	-	25	25	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005	-	-	-	25	25	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	-	-	-	25	25	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	-	-	-	25	5	20	0.0059	0.0058	0.000805	0.000161	0.005	0.0078	-	-	-
Copper	ug/L	0.05	-	-	0.223 | 2.87	25	0	0	0.789	0.731	0.14	0.028	0.619	1.14	-	-	0
Iron	ug/L	1	-	-	-	25	0	0	3.46	3.3	0.807	0.161	2.3	5.3	-	-	-
Lead	ug/L	0.01	0.0125	-	3.39 | 4.77	25	20	80	-	0.01	-	-	0.01	0.013	4	-	0
Lithium	ug/L	0.5	-	-	-	25	0	0	0.738	0.73	0.0485	0.0097	0.65	0.85	-	-	-
Manganese	ug/L	0.05	1.2	-	158 | 248	25	0	0	0.534	0.398	0.334	0.0667	0.275	1.32	4	-	0
Mercury	ug/L	0.5	-	-	-	25	24	96	-	0.0005	-	-	0.0005	0.00055	0	0	0
Molybdenum	ug/L	0.05	-	-	-	25	0	0	0.0772	0.076	0.0053	0.00106	0.066	0.092	-	-	-

Table C1-6. Pooled reference areas summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Pooled Reference Areas Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Nickel	ug/L	0.05	-	-	-	25	0	0	0.416	0.422	0.0285	0.00571	0.368	0.463	-	-	-
Selenium	ug/L	0.04	-	-	-	25	22	88	-	0.04	-	-	0.04	0.056	-	-	-
Silver	ug/L	0.005 | 0.01	-	-	-	25	25	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	-	-	1880	25	0	0	37.3	37.6	1.45	0.29	34.7	40.2	-	-	0
Thallium	ug/L	0.005	-	-	-	25	25	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	-	-	-	25	20	80	-	0.02	-	-	0.02	0.033	-	-	-
Titanium	ug/L	0.05	-	-	-	25	25	100	-	-	-	-	-	0.05	0	0	0
Uranium	ug/L	0.001	-	-	-	25	0	0	0.0146	0.0146	0.00178	0.000356	0.0113	0.0185	-	-	-
Vanadium	ug/L	0.05	-	-	-	25	25	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.9	-	4.47 | 9.3	25	9	36	1.38	0.59	2.53	0.505	0.5	13.2	12	-	4
Other																	
Cyanide (free)	mg/L	0.001	-	0.00035	-	25	25	100	-	-	-	-	-	0.001	0	0	0
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.00375	25	25	100	-	-	-	-	-	0.001	0	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	25	25	100	-	-	-	-	-	0.001	0	0	0
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	5	5	100	-	-	-	-	-	0.0077	-	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Table C1-7. MEL-03 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-03 (Reference Area 1) Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Field Measurements																	
Temperature	C	-	-	-	-	20	0	0	9.26	10	1.53	0.343	5.21	10.7	-	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	-	20	0	0	77.7	75	11	2.47	72.2	124	-	-	-
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	20	0	0	7.43	7.4	0.232	0.052	6.98	7.84	-	-	0
DO (mg/L)	mg/L	-	-	-	6.5	19	0	0	11.8	11.4	0.642	0.147	11.1	12.8	-	-	0
DO (%)	%	-	-	-	-	20	0	0	104	102	3.31	0.74	100	110	-	-	-
Conventional Parameters																	
Conductivity (lab)	uS/cm	1	77.5	-	-	15	0	0	77.2	77.6	2.28	0.587	72.6	79.9	60	-	-
Hardness	mg/L	0.2 | 1	23.4	-	-	15	0	0	22.3	22.3	1.15	0.297	20.6	24.1	27	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	15	0	0	7.38	7.36	0.0612	0.0158	7.3	7.51	-	-	0
Total Dissolved Solids	mg/L	13	54	68	375	15	0	0	47.9	44	8.18	2.11	38	61	27	0	0
Total Dissolved Solids (Calculated)	mg/L	1	39.6	68	375	15	0	0	37.2	37.5	1.17	0.302	35.2	38.6	0	0	0
Total Suspended Solids	mg/L	1	1	3.1	-	15	14	93	-	1	-	-	1	1.1	7	0	-
Turbidity (lab)	NTU	0.1	-	-	-	15	0	0	0.338	0.19	0.238	0.0616	0.13	0.79	-	-	-
Major Ions																	
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	15	0	0	20.7	20.6	0.392	0.101	20.1	21.7	0	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	15	15	100	-	-	-	-	-	0.6	0	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	15	15	100	-	-	-	-	-	0.34	0	0	0
Alkalinity, Total	mg/L	1	20.5	-	-	15	0	0	17	16.9	0.323	0.0834	16.5	17.8	0	-	-
Bromide	mg/L	0.1	-	-	-	15	15	100	-	-	-	-	-	0.1	0	0	0
Calcium (D)	mg/L	0.01	-	-	-	15	0	0	7.01	7.01	0.361	0.0932	6.43	7.57	-	-	-
Calcium (T)	mg/L	0.01	7.33	-	-	15	0	0	6.98	7.1	0.235	0.0608	6.51	7.24	0	-	-
Chloride	mg/L	0.1	9.56	14	90	15	0	0	9.33	9.35	0.523	0.135	8.42	10.1	33	0	0
Fluoride	mg/L	0.02	0.028	0.0084	2.1	15	0	0	0.0253	0.026	0.00135	0.000347	0.023	0.027	0	100	0
Magnesium (D)	mg/L	0.004	-	-	-	15	0	0	1.16	1.16	0.0621	0.016	1.08	1.27	-	-	-
Magnesium (T)	mg/L	0.004	1.18	-	-	15	0	0	1.15	1.17	0.0296	0.00765	1.1	1.19	7	-	-
Potassium (D)	mg/L	0.02	-	-	-	15	0	0	0.933	0.94	0.0227	0.00587	0.892	0.979	-	-	-
Potassium (T)	mg/L	0.02	0.954	-	-	15	0	0	0.942	0.927	0.0305	0.00787	0.907	1	40	-	-
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	15	0	0	0.211	0.215	0.0216	0.00557	0.179	0.256	0	-	-
Sodium (D)	mg/L	0.02	-	-	-	15	0	0	4.82	4.84	0.165	0.0425	4.56	5.12	-	-	-
Sodium (T)	mg/L	0.02	4.85	5.3	-	15	0	0	4.75	4.65	0.202	0.0521	4.51	5.12	33	0	-
Sulphate	mg/L	0.3	3.87	38	-	15	0	0	3.67	3.75	0.167	0.0431	3.34	3.87	7	0	-
Nutrients																	
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	13.6	15	10	67	-	0.05	-	-	0.005	0.084	67	0	0
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.17	15	12	80	-	0.005	-	-	0.005	0.0309	7	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	15	12	80	-	0.0051	-	-	0.0051	0.0309	-	-	-
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.045	15	15	100	-	-	-	-	-	0.001	0	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	15	3	20	0.126	0.14	0.069	0.0178	0.0051	0.234	-	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	15	14	93	-	0.001	-	-	0.001	0.0011	7	-	-
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	15	0	0	0.00251	0.002	0.000923	0.000238	0.0015	0.0041	20	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	15	0	0	0.14	0.122	0.0458	0.0118	0.088	0.234	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	15	1	7	0.138	0.14	0.0291	0.00751	0.05	0.17	0	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	15	0	0	0.137	0.122	0.0423	0.0109	0.088	0.234	-	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	15	0	0	0.00397	0.0032	0.00135	0.000349	0.0028	0.0063	13	33	-

Table C1-7. MEL-03 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-03 (Reference Area 1) Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon																	
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	15	0	0	2.63	2.66	0.231	0.0598	2.3	3.03	40	-	-
Total Organic Carbon	mg/L	0.5	3	-	-	15	0	0	2.59	2.6	0.193	0.0499	2.27	2.89	0	-	-
Total Metals																	
Aluminum	ug/L	1	5.32	9.1	75	15	0	0	2.91	2.7	0.922	0.238	1.9	5.3	0	0	0
Antimony	ug/L	0.02	0.02	0.51	4.5	15	15	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	0.275	3.8	18.8	15	0	0	0.341	0.322	0.0508	0.0131	0.257	0.447	93	0	0
Barium	ug/L	0.02	8.05	77	750	15	0	0	7.81	7.94	0.282	0.0728	7.26	8.22	7	0	0
Beryllium	ug/L	0.005	0.005	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	6.52	23	1120	15	15	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005 | 0.01	0.005	0.05	0.032 | 0.0499	15	15	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	0.103	1.1	3.75	15	15	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	0.016	-	0.585	15	0	0	0.0116	0.0115	0.00192	0.000497	0.0089	0.0161	7	-	0
Copper	ug/L	0.05	0.86	2	1500	15	0	0	1.13	0.883	0.751	0.194	0.649	3.42	53	13	0
Iron	ug/L	1	15	42	795	15	0	0	11	11.4	2.33	0.601	7.4	16.1	7	0	0
Lead	ug/L	0.01	0.0222	0.15	3.75	15	3	20	0.0209	0.02	0.0123	0.00317	0.01	0.058	27	0	0
Lithium	ug/L	0.5	0.72	-	-	15	0	0	0.742	0.73	0.0661	0.0171	0.66	0.88	53	-	-
Manganese	ug/L	0.05	3.06	5.5	90	15	0	0	2.51	2.55	0.444	0.115	1.94	3.39	7	0	0
Mercury	ug/L	0.5	0.0008	0.02	0.0195	15	12	80	-	0.0005	-	-	0.0005	0.00071	0	0	0
Molybdenum	ug/L	0.05	0.107	5.2	54.8	15	0	0	0.0798	0.079	0.00928	0.00239	0.067	0.098	0	0	0
Nickel	ug/L	0.05	0.441	2.7	18.8	15	0	0	0.428	0.43	0.0182	0.0047	0.387	0.457	13	0	0
Selenium	ug/L	0.04	0.049	0.16	0.75	15	11	73	-	0.04	-	-	0.04	0.069	13	0	0
Silver	ug/L	0.005 | 0.01	0.005	0.1	0.188	15	15	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	36.1	-	1880	15	0	0	37.1	36.5	1.82	0.471	33.9	40.2	60	-	0
Thallium	ug/L	0.005	0.005	0.1	0.6	15	15	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	0.0384	-	-	15	14	93	-	0.02	-	-	0.02	0.022	0	-	-
Titanium	ug/L	0.05 | 0.35	0.17	-	-	15	3	20	0.0892	0.086	0.044	0.0114	0.05	0.211	7	-	-
Uranium	ug/L	0.001	0.0164	1.5	11.2	15	0	0	0.0152	0.0148	0.00162	0.000419	0.0128	0.0185	20	0	0
Vanadium	ug/L	0.05	0.05	-	-	15	15	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.7	6.7	-	15	0	0	1.68	1.35	1.11	0.286	0.59	4.05	40	0	-
Dissolved Metals																	
Aluminum	ug/L	1	-	-	-	15	1	7	1.69	1.5	0.63	0.163	1	3	-	-	-
Antimony	ug/L	0.02	-	-	-	15	15	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	-	-	-	15	0	0	0.318	0.312	0.0259	0.00669	0.283	0.364	-	-	-
Barium	ug/L	0.02	-	-	-	15	0	0	7.55	7.58	0.344	0.0888	6.97	8.01	-	-	-
Beryllium	ug/L	0.005	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	-	-	-	15	15	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	-	-	-	15	15	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	-	-	-	15	2	13	0.00614	0.0062	0.000917	0.000237	0.005	0.0078	-	-	-
Copper	ug/L	0.05	-	-	0.223 | 2.87	15	0	0	0.771	0.731	0.128	0.033	0.619	1.05	-	-	0
Iron	ug/L	1	-	-	-	15	0	0	3.93	3.9	0.69	0.178	2.8	5.3	-	-	-
Lead	ug/L	0.01	0.0125	-	3.39 | 4.77	15	11	73	-	0.01	-	-	0.01	0.012	0	-	0
Lithium	ug/L	0.5	-	-	-	15	0	0	0.727	0.72	0.0591	0.0153	0.65	0.85	-	-	-
Manganese	ug/L	0.05	1.2	-	158 | 248	15	0	0	0.63	0.403	0.407	0.105	0.275	1.32	7	-	0
Mercury	ug/L	0.5	-	-	-	15	14	93	-	0.0005	-	-	0.0005	0.00055	0	0	0
Molybdenum	ug/L	0.05	-	-	-	15	0	0	0.0765	0.075	0.00615	0.00159	0.066	0.092	-	-	-

Table C1-7. MEL-03 summary statistics for the 2021 open water sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-03 (Reference Area 1) Open Water Sampling Events (July, August, September)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Nickel	ug/L	0.05	-	-	-	15	0	0	0.422	0.425	0.0289	0.00746	0.368	0.463	-	-	-
Selenium	ug/L	0.04	-	-	-	15	13	87	-	0.04	-	-	0.04	0.056	-	-	-
Silver	ug/L	0.005 | 0.01	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	-	-	1880	15	0	0	37.3	37.5	1.78	0.46	34.7	40.2	-	-	0
Thallium	ug/L	0.005	-	-	-	15	15	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	-	-	-	15	13	87	-	0.02	-	-	0.02	0.026	-	-	-
Titanium	ug/L	0.05	-	-	-	15	15	100	-	-	-	-	-	0.05	0	0	0
Uranium	ug/L	0.001	-	-	-	15	0	0	0.0147	0.0138	0.00209	0.000541	0.0121	0.0185	-	-	-
Vanadium	ug/L	0.05	-	-	-	15	15	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.9	-	4.47 | 9.3	15	4	27	1.73	0.59	3.24	0.837	0.5	13.2	20	-	7
Other																	
Cyanide (free)	mg/L	0.001	-	0.00035	-	15	15	100	-	-	-	-	-	0.001	0	0	0
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.00375	15	15	100	-	-	-	-	-	0.001	0	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	15	15	100	-	-	-	-	-	0.001	0	0	0
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	5	5	100	-	-	-	-	-	0.0077	-	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Table C1-8. MEL-04 summary statistics for the August 2021 sampling event.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-04 Reference Area 2 Open Water Sampling Event (August)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Field Measurements																	
Temperature	C	-	-	-	-	5	0	0	10	9.96	0.103	0.0459	9.95	10.2	-	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	-	5	0	0	74.1	74.1	0.0447	0.02	74	74.1	-	-	-
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	5	0	0	7.56	7.57	0.0619	0.0277	7.45	7.6	0	-	0
DO (mg/L)	mg/L	-	-	-	6.5	5	0	0	11.2	11.2	0.0152	0.00678	11.2	11.3	-	-	0
DO (%)	%	-	-	-	-	5	0	0	99.6	99.4	0.349	0.156	99.4	100	-	-	-
Conventional Parameters																	
Conductivity (lab)	uS/cm	1	77.5	-	-	5	0	0	78	78	0.187	0.0837	77.7	78.2	100	-	-
Hardness	mg/L	0.2 | 1	23.4	-	-	5	0	0	23.6	23.5	0.432	0.193	23	24.1	80	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	5	0	0	7.37	7.37	0.0192	0.0086	7.34	7.39	-	-	0
Total Dissolved Solids	mg/L	13	54	68	375	5	0	0	57.6	58	2.07	0.927	54	59	80	0	0
Total Dissolved Solids (Calculated)	mg/L	1	39.6	68	375	5	0	0	38.1	38	0.573	0.256	37.6	39	0	0	0
Total Suspended Solids	mg/L	1	1	3.1	-	5	5	100	-	-	-	-	-	1	0	0	0
Turbidity (lab)	NTU	0.1	-	-	-	5	0	0	0.182	0.17	0.0277	0.0124	0.16	0.23	-	-	-
Major Ions																	
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	5	0	0	21.7	21	1.66	0.743	20.4	24.5	0	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	5	5	100	-	-	-	-	-	0.6	0	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	5	5	100	-	-	-	-	-	0.34	0	0	0
Alkalinity, Total	mg/L	1	20.5	-	-	5	0	0	17.8	17.2	1.37	0.613	16.7	20.1	0	-	-
Bromide	mg/L	0.1	-	-	-	5	5	100	-	-	-	-	-	0.1	0	0	0
Calcium (D)	mg/L	0.01	-	-	-	5	0	0	7.41	7.37	0.148	0.066	7.22	7.59	-	-	-
Calcium (T)	mg/L	0.01	7.33	-	-	5	0	0	7.13	7.12	0.0464	0.0207	7.09	7.21	0	-	-
Chloride	mg/L	0.1	9.56	14	90	5	0	0	9.31	9.25	0.0853	0.0381	9.24	9.42	0	0	0
Fluoride	mg/L	0.02	0.028	0.0084	2.1	5	0	0	0.0254	0.025	0.000548	0.000245	0.025	0.026	0	100	0
Magnesium (D)	mg/L	0.004	-	-	-	5	0	0	1.23	1.24	0.0152	0.00678	1.21	1.25	-	-	-
Magnesium (T)	mg/L	0.004	1.18	-	-	5	0	0	1.17	1.17	0.011	0.0049	1.15	1.18	0	-	-
Potassium (D)	mg/L	0.02	-	-	-	5	0	0	0.941	0.937	0.0195	0.0087	0.915	0.961	-	-	-
Potassium (T)	mg/L	0.02	0.954	-	-	5	0	0	0.906	0.906	0.0023	0.00103	0.904	0.91	0	-	-
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	5	0	0	0.23	0.229	0.00268	0.0012	0.228	0.234	0	-	-
Sodium (D)	mg/L	0.02	-	-	-	5	0	0	4.78	4.76	0.0896	0.0401	4.67	4.88	-	-	-
Sodium (T)	mg/L	0.02	4.85	5.3	-	5	0	0	4.6	4.59	0.027	0.0121	4.57	4.64	0	0	-
Sulphate	mg/L	0.3	3.87	38	-	5	0	0	3.69	3.69	0.0207	0.00927	3.67	3.72	0	0	-
Nutrients																	
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	13.6	5	5	100	-	-	-	-	-	0.05	0	0	0
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.17	5	5	100	-	-	-	-	-	0.005	0	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	5	5	100	-	-	-	-	-	0.0051	0	0	0
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.045	5	5	100	-	-	-	-	-	0.001	0	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	5	0	0	0.178	0.18	0.0382	0.0171	0.118	0.22	-	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	5	5	100	-	-	-	-	-	0.001	0	0	0
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	5	0	0	0.00218	0.0022	0.000466	0.000208	0.0015	0.0028	0	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	5	0	0	0.14	0.124	0.0371	0.0166	0.117	0.205	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	5	0	0	0.178	0.18	0.0382	0.0171	0.118	0.22	0	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	5	0	0	0.14	0.124	0.0371	0.0166	0.117	0.205	-	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	5	0	0	0.00488	0.0035	0.00227	0.00101	0.0029	0.0074	40	40	-

Table C1-8. MEL-04 summary statistics for the August 2021 sampling event.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-04 Reference Area 2 Open Water Sampling Event (August)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon																	
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	5	0	0	2.51	2.5	0.182	0.0815	2.29	2.69	0	-	-
Total Organic Carbon	mg/L	0.5	3	-	-	5	0	0	2.34	2.35	0.0387	0.0173	2.29	2.38	0	-	-
Total Metals																	
Aluminum	ug/L	1	5.32	9.1	75	5	0	0	2.08	2.1	0.0837	0.0374	2	2.2	0	0	0
Antimony	ug/L	0.02	0.02	0.51	4.5	5	5	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	0.275	3.8	18.8	5	0	0	0.316	0.319	0.00581	0.0026	0.307	0.321	100	0	0
Barium	ug/L	0.02	8.05	77	750	5	0	0	8.16	8.16	0.0694	0.031	8.08	8.26	100	0	0
Beryllium	ug/L	0.005	0.005	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	6.52	23	1120	5	5	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005 | 0.01	0.005	0.05	0.032 | 0.0499	5	5	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	0.103	1.1	3.75	5	5	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	0.016	-	0.585	5	0	0	0.0122	0.0122	0.000482	0.000215	0.0115	0.0128	0	-	0
Copper	ug/L	0.05	0.86	2	1500	5	0	0	1.03	0.757	0.616	0.276	0.696	2.13	20	20	0
Iron	ug/L	1	15	42	795	5	0	0	9.82	9.9	0.13	0.0583	9.6	9.9	0	0	0
Lead	ug/L	0.01	0.0222	0.15	3.75	5	0	0	0.0142	0.012	0.00606	0.00271	0.011	0.025	20	0	0
Lithium	ug/L	0.5	0.72	-	-	5	0	0	0.746	0.74	0.0152	0.00678	0.73	0.77	100	-	-
Manganese	ug/L	0.05	3.06	5.5	90	5	0	0	2.84	2.86	0.0327	0.0146	2.79	2.87	0	0	0
Mercury	ug/L	0.5	0.0008	0.02	0.0195	5	5	100	-	-	-	-	-	0.0005	0	0	0
Molybdenum	ug/L	0.05	0.107	5.2	54.8	5	0	0	0.0732	0.074	0.00335	0.0015	0.07	0.078	0	0	0
Nickel	ug/L	0.05	0.441	2.7	18.8	5	0	0	0.431	0.429	0.00667	0.00298	0.425	0.442	20	0	0
Selenium	ug/L	0.04	0.049	0.16	0.75	5	5	100	-	-	-	-	-	0.04	0	0	0
Silver	ug/L	0.005 | 0.01	0.005	0.1	0.188	5	5	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	36.1	-	1880	5	0	0	35.6	35.6	0.416	0.186	35.1	36.2	20	-	0
Thallium	ug/L	0.005	0.005	0.1	0.6	5	4	80	-	0.005	-	-	0.005	0.0088	20	0	0
Tin	ug/L	0.02	0.0384	-	-	5	5	100	-	-	-	-	-	0.02	0	0	0
Titanium	ug/L	0.05 | 0.35	0.17	-	-	5	0	0	0.0996	0.077	0.0609	0.0272	0.064	0.208	20	-	-
Uranium	ug/L	0.001	0.0164	1.5	11.2	5	0	0	0.0153	0.0149	0.00154	0.00069	0.0135	0.0175	20	0	0
Vanadium	ug/L	0.05	0.05	-	-	5	5	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.7	6.7	-	5	3	60	-	0.5	-	-	0.5	0.76	0	0	-
Dissolved Metals																	
Aluminum	ug/L	1	-	-	-	5	0	0	1.44	1.3	0.434	0.194	1.1	2.2	-	-	-
Antimony	ug/L	0.02	-	-	-	5	5	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	-	-	-	5	0	0	0.303	0.3	0.00768	0.00344	0.294	0.312	-	-	-
Barium	ug/L	0.02	-	-	-	5	0	0	8.16	8.21	0.0841	0.0376	8.05	8.23	-	-	-
Beryllium	ug/L	0.005	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	-	-	-	5	5	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	-	-	-	5	5	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	-	-	-	5	0	0	0.00582	0.0057	0.000217	9.70E-05	0.0056	0.0061	-	-	-
Copper	ug/L	0.05	-	-	0.223 | 2.87	5	0	0	0.932	0.878	0.156	0.0699	0.791	1.14	-	-	0
Iron	ug/L	1	-	-	-	5	0	0	2.56	2.6	0.207	0.0927	2.3	2.8	-	-	-
Lead	ug/L	0.01	0.0125	-	3.39 | 4.77	5	4	80	-	0.01	-	-	0.01	0.013	20	-	0
Lithium	ug/L	0.5	-	-	-	5	0	0	0.74	0.74	0.0158	0.00707	0.72	0.76	-	-	-
Manganese	ug/L	0.05	1.2	-	158 | 248	5	0	0	0.38	0.371	0.0266	0.0119	0.354	0.422	0	-	0
Mercury	ug/L	0.5	-	-	-	5	5	100	-	-	-	-	-	0.0005	0	0	0
Molybdenum	ug/L	0.05	-	-	-	5	0	0	0.0766	0.075	0.00378	0.00169	0.073	0.082	-	-	-

Table C1-8. MEL-04 summary statistics for the August 2021 sampling event.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-04 Reference Area 2 Open Water Sampling Event (August)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Nickel	ug/L	0.05	-	-	-	5	0	0	0.429	0.433	0.0139	0.00623	0.405	0.442	-	-	-
Selenium	ug/L	0.04	-	-	-	5	5	100	-	-	-	-	-	0.04	0	0	0
Silver	ug/L	0.005 | 0.01	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	-	-	1880	5	0	0	36.8	36.9	0.885	0.396	35.8	37.8	-	-	0
Thallium	ug/L	0.005	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	-	-	-	5	2	40	0.024	0.022	0.00543	0.00243	0.02	0.033	-	-	-
Titanium	ug/L	0.05	-	-	-	5	5	100	-	-	-	-	-	0.05	0	0	0
Uranium	ug/L	0.001	-	-	-	5	0	0	0.0138	0.0146	0.00152	0.000678	0.0113	0.0149	-	-	-
Vanadium	ug/L	0.05	-	-	-	5	5	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.9	-	4.47 | 9.3	5	0	0	1.24	1.26	0.162	0.0726	1.07	1.43	0	-	0
Other																	
Cyanide (free)	mg/L	0.001	-	0.00035	-	5	5	100	-	-	-	-	-	0.001	0	0	0
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.00375	5	5	100	-	-	-	-	-	0.001	0	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	5	5	100	-	-	-	-	-	0.001	0	0	0
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Table C1-9. MEL-05 summary statistics for the August 2021 sampling event.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-05 Reference Area 3 Open Water Sampling Event (August)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Field Measurements																	
Temperature	C	-	-	-	-	5	0	0	10.4	10.4	0.0812	0.0363	10.3	10.5	-	-	-
Sp. Conductivity (field)	uS/cm	-	-	-	-	5	0	0	76.5	76.5	0.217	0.097	76.2	76.8	-	-	-
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	5	0	0	7.49	7.48	0.0383	0.0171	7.47	7.56	0	-	0
DO (mg/L)	mg/L	-	-	-	6.5	5	0	0	11.1	11.1	0.00548	0.00245	11.1	11.1	-	-	0
DO (%)	%	-	-	-	-	5	0	0	99.2	99.3	0.164	0.0735	99	99.4	-	-	-
Conventional Parameters																	
Conductivity (lab)	uS/cm	1	77.5	-	-	5	0	0	80	79.8	0.517	0.231	79.4	80.7	100	-	-
Hardness	mg/L	0.2 | 1	23.4	-	-	5	0	0	23.8	23.8	0.13	0.0583	23.6	23.9	100	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	5	0	0	7.43	7.43	0.0148	0.00663	7.41	7.45	-	-	0
Total Dissolved Solids	mg/L	13	54	68	375	5	0	0	44	44	2	0.894	42	46	0	0	0
Total Dissolved Solids (Calculated)	mg/L	1	39.6	68	375	5	0	0	40.2	40.3	0.182	0.0812	40	40.4	100	0	0
Total Suspended Solids	mg/L	1	1	3.1	-	5	5	100	-	-	-	-	-	1	0	0	0
Turbidity (lab)	NTU	0.1	-	-	-	5	0	0	0.216	0.22	0.0167	0.00748	0.2	0.24	-	-	-
Major Ions																	
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	5	0	0	25	25	0.524	0.235	24.4	25.7	40	-	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	5	5	100	-	-	-	-	-	0.6	0	0	0
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	5	5	100	-	-	-	-	-	0.34	0	0	0
Alkalinity, Total	mg/L	1	20.5	-	-	5	0	0	20.5	20.5	0.43	0.192	20	21.1	40	-	-
Bromide	mg/L	0.1	-	-	-	5	5	100	-	-	-	-	-	0.1	0	0	0
Calcium (D)	mg/L	0.01	-	-	-	5	0	0	7.59	7.59	0.0513	0.0229	7.54	7.66	-	-	-
Calcium (T)	mg/L	0.01	7.33	-	-	5	0	0	7.43	7.49	0.163	0.0729	7.14	7.52	80	-	-
Chloride	mg/L	0.1	9.56	14	90	5	0	0	9.64	9.64	0.0487	0.0218	9.58	9.69	100	0	0
Fluoride	mg/L	0.02	0.028	0.0084	2.1	5	0	0	0.0266	0.027	0.000548	0.000245	0.026	0.027	0	100	0
Magnesium (D)	mg/L	0.004	-	-	-	5	0	0	1.16	1.16	0.0114	0.0051	1.15	1.18	-	-	-
Magnesium (T)	mg/L	0.004	1.18	-	-	5	0	0	1.2	1.2	0.00837	0.00374	1.19	1.21	100	-	-
Potassium (D)	mg/L	0.02	-	-	-	5	0	0	0.955	0.956	0.00778	0.00348	0.945	0.966	-	-	-
Potassium (T)	mg/L	0.02	0.954	-	-	5	0	0	0.953	0.954	0.00354	0.00158	0.948	0.957	40	-	-
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	5	0	0	0.227	0.227	0.00179	8.00E-04	0.225	0.229	0	-	-
Sodium (D)	mg/L	0.02	-	-	-	5	0	0	4.84	4.86	0.0467	0.0209	4.77	4.89	-	-	-
Sodium (T)	mg/L	0.02	4.85	5.3	-	5	0	0	4.84	4.84	0.0611	0.0273	4.77	4.91	40	0	-
Sulphate	mg/L	0.3	3.87	38	-	5	0	0	3.7	3.69	0.0152	0.00678	3.68	3.72	0	0	-
Nutrients																	
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	13.6	5	4	80	-	0.05	-	-	0.05	0.098	100	0	0
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.17	5	5	100	-	-	-	-	-	0.005	0	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	5	5	100	-	-	-	-	-	0.0051	0	0	0
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.045	5	5	100	-	-	-	-	-	0.001	0	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	5	0	0	0.195	0.179	0.0477	0.0213	0.141	0.269	-	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	5	5	100	-	-	-	-	-	0.001	0	0	0
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	5	0	0	0.00176	0.0018	0.000336	0.00015	0.0012	0.0021	0	-	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	5	0	0	0.143	0.149	0.0199	0.0089	0.116	0.167	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	5	0	0	0.195	0.179	0.0477	0.0213	0.141	0.269	20	-	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	5	0	0	0.143	0.149	0.0199	0.0089	0.116	0.167	-	-	-
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	5	0	0	0.00274	0.0028	0.000573	0.000256	0.002	0.0035	0	0	-

Table C1-9. MEL-05 summary statistics for the August 2021 sampling event.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-05 Reference Area 3 Open Water Sampling Event (August)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Organic/Inorganic Carbon																	
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	5	0	0	2.43	2.41	0.111	0.0497	2.29	2.57	0	-	-
Total Organic Carbon	mg/L	0.5	3	-	-	5	0	0	2.42	2.41	0.0557	0.0249	2.37	2.51	0	-	-
Total Metals																	
Aluminum	ug/L	1	5.32	9.1	75	5	0	0	1.68	1.7	0.249	0.111	1.3	1.9	0	0	0
Antimony	ug/L	0.02	0.02	0.51	4.5	5	5	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	0.275	3.8	18.8	5	0	0	0.343	0.345	0.0118	0.0053	0.328	0.356	100	0	0
Barium	ug/L	0.02	8.05	77	750	5	0	0	7.9	7.81	0.144	0.0646	7.8	8.13	20	0	0
Beryllium	ug/L	0.005	0.005	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	6.52	23	1120	5	5	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005 | 0.01	0.005	0.05	0.032 | 0.0499	5	5	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	0.103	1.1	3.75	5	5	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	0.016	-	0.585	5	0	0	0.0116	0.011	0.00134	6.00E-04	0.0103	0.0137	0	-	0
Copper	ug/L	0.05	0.86	2	1500	5	0	0	0.792	0.732	0.0967	0.0432	0.715	0.904	40	0	0
Iron	ug/L	1	15	42	795	5	0	0	8.82	8.7	0.295	0.132	8.6	9.3	0	0	0
Lead	ug/L	0.01	0.0222	0.15	3.75	5	5	100	-	-	-	-	-	0.01	0	0	0
Lithium	ug/L	0.5	0.72	-	-	5	0	0	0.76	0.76	0.0187	0.00837	0.73	0.78	100	-	-
Manganese	ug/L	0.05	3.06	5.5	90	5	0	0	2.64	2.66	0.0492	0.022	2.58	2.69	0	0	0
Mercury	ug/L	0.5	0.0008	0.02	0.0195	5	5	100	-	-	-	-	-	0.0005	0	0	0
Molybdenum	ug/L	0.05	0.107	5.2	54.8	5	0	0	0.0788	0.077	0.00482	0.00215	0.075	0.087	0	0	0
Nickel	ug/L	0.05	0.441	2.7	18.8	5	0	0	0.386	0.389	0.0122	0.00544	0.373	0.403	0	0	0
Selenium	ug/L	0.04	0.049	0.16	0.75	5	4	80	-	0.04	-	-	0.04	0.04	0	0	0
Silver	ug/L	0.005 | 0.01	0.005	0.1	0.188	5	5	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	36.1	-	1880	5	0	0	37.8	37.6	0.667	0.298	37.1	38.6	100	-	0
Thallium	ug/L	0.005	0.005	0.1	0.6	5	5	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	0.0384	-	-	5	5	100	-	-	-	-	-	0.02	0	0	0
Titanium	ug/L	0.05 | 0.35	0.17	-	-	5	5	100	-	-	-	-	-	0.05	0	0	0
Uranium	ug/L	0.001	0.0164	1.5	11.2	5	0	0	0.0153	0.0152	0.000683	0.000306	0.0145	0.0164	0	0	0
Vanadium	ug/L	0.05	0.05	-	-	5	5	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.7	6.7	-	5	5	100	-	-	-	-	-	0.5	0	0	0
Dissolved Metals																	
Aluminum	ug/L	1	-	-	-	5	5	100	-	-	-	-	-	1	0	0	0
Antimony	ug/L	0.02	-	-	-	5	5	100	-	-	-	-	-	0.02	0	0	0
Arsenic	ug/L	0.02	-	-	-	5	0	0	0.328	0.328	0.0085	0.0038	0.316	0.34	-	-	-
Barium	ug/L	0.02	-	-	-	5	0	0	7.86	7.86	0.146	0.0652	7.66	8.06	-	-	-
Beryllium	ug/L	0.005	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Boron	ug/L	5	-	-	-	5	5	100	-	-	-	-	-	5	0	0	0
Cadmium	ug/L	0.005	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Chromium	ug/L	0.1	-	-	-	5	5	100	-	-	-	-	-	0.1	0	0	0
Cobalt	ug/L	0.005	-	-	-	5	3	60	-	0.005	-	-	0.005	0.006	-	-	-
Copper	ug/L	0.05	-	-	0.223 | 2.87	5	0	0	0.703	0.706	0.0171	0.00767	0.684	0.726	-	-	0
Iron	ug/L	1	-	-	-	5	0	0	2.96	3	0.167	0.0748	2.8	3.2	-	-	-
Lead	ug/L	0.01	0.0125	-	3.39 | 4.77	5	5	100	-	-	-	-	-	0.01	0	0	0
Lithium	ug/L	0.5	-	-	-	5	0	0	0.768	0.77	0.00837	0.00374	0.76	0.78	-	-	-
Manganese	ug/L	0.05	1.2	-	158 | 248	5	0	0	0.403	0.398	0.0131	0.00585	0.389	0.417	0	-	0
Mercury	ug/L	0.5	-	-	-	5	5	100	-	-	-	-	-	0.0005	0	0	0
Molybdenum	ug/L	0.05	-	-	-	5	0	0	0.0796	0.08	0.00358	0.0016	0.076	0.084	-	-	-

Table C1-9. MEL-05 summary statistics for the August 2021 sampling event.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	MEL-05 Reference Area 3 Open Water Sampling Event (August)											
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	%> FEIS	% > Act Lvl
Nickel	ug/L	0.05	-	-	-	5	0	0	0.386	0.38	0.0162	0.00723	0.37	0.409	-	-	-
Selenium	ug/L	0.04	-	-	-	5	4	80	-	0.04	-	-	0.04	0.054	-	-	-
Silver	ug/L	0.005 | 0.01	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Strontium	ug/L	0.02	-	-	1880	5	0	0	37.7	37.8	0.572	0.256	36.7	38.2	-	-	0
Thallium	ug/L	0.005	-	-	-	5	5	100	-	-	-	-	-	0.005	0	0	0
Tin	ug/L	0.02	-	-	-	5	5	100	-	-	-	-	-	0.02	0	0	0
Titanium	ug/L	0.05	-	-	-	5	5	100	-	-	-	-	-	0.05	0	0	0
Uranium	ug/L	0.001	-	-	-	5	0	0	0.015	0.0148	0.000568	0.000254	0.0146	0.016	-	-	-
Vanadium	ug/L	0.05	-	-	-	5	5	100	-	-	-	-	-	0.05	0	0	0
Zinc	ug/L	0.5	1.9	-	4.47 | 9.3	5	5	100	-	-	-	-	-	0.5	0	0	0
Other																	
Cyanide (free)	mg/L	0.001	-	0.00035	-	5	5	100	-	-	-	-	-	0.001	0	0	0
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.00375	5	5	100	-	-	-	-	-	0.001	0	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	5	5	100	-	-	-	-	-	0.001	0	0	0
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Appendix C2
Meliadine Lake Water Quality – Supplemental Figures

APPENDIX C2 – FIGURES

Figure C2-1. Specific conductivity (µS/cm) 1
Figure C2-3. Lab-measured conductivity (µS/cm) 2
Figure C2-2. Field pH 3
Figure C2-4. Hardness (mg/L) 5
Figure C2-5. Lab measured pH 4
Figure C2-6. Total dissolved solids (mg/L) 6
Figure C2-7. Calculated total dissolved solids (mg/L) 7
Figure C2-8. Total suspended solids (mg/L) 8
Figure C2-9. Lab measured turbidity (NTU) 9
Figure C2-10. Bicarbonate alkalinity (mg/L) 10
Figure C2-11. Total alkalinity (mg/L) 11
Figure C2-12. Total calcium (mg/L) 12
Figure C2-13. Total magnesium (mg/L) 13
Figure C2-14. Total potassium (mg/L) 14
Figure C2-15. Total sodium (mg/L) 15
Figure C2-16. Chloride (mg/L) 16
Figure C2-17. Fluoride (mg/L) 17
Figure C2-18. Ammonia (as nitrogen) (mg/L) 18
Figure C2-19. Nitrate (as N) (mg/L) 19
Figure C2-20. Nitrate and nitrite (as N) (mg/L) 20
Figure C2-21. Total Kjeldahl nitrogen (TKN; mg/L) 21
Figure C2-22. Sulphate (mg/L) 22
Figure C2-23. Total phosphorus (mg/) 23
Figure C2-24. Dissolved organic carbon (mg/L) 24
Figure C2-25. Total organic carbon (mg/L) 25
Figure C2-26. Total aluminum (µg/L) 26
Figure C2-27. Total antimony (µg/L) 27
Figure C2-28. Total arsenic (µg/L) 28
Figure C2-29. Total barium (µg/L) 29

Figure C2-30. Total beryllium (µg/L)........ 30
Figure C2-31. Total bismuth (µg/L)........ 31
Figure C2-32. Total boron (µg/L)........ 32
Figure C2-33. Total cadmium (µg/L)........ 33
Figure C2-34. Total chromium (µg/L)........ 34
Figure C2-35. Total cobalt (µg/L)........ 35
Figure C2-36. Total copper (µg/L)........ 36
Figure C2-37. Total iron (µg/L)........ 37
Figure C2-38. Total lead (µg/L)........ 38
Figure C2-39. Total lithium (µg/L)........ 39
Figure C2-40. Total manganese (µg/L)........ 40
Figure C2-41. Total mercury (µg/L)........ 41
Figure C2-42. Total molybdenum (µg/L)........ 42
Figure C2-43. Total nickel (µg/L)........ 43
Figure C2-44. Total selenium (µg/L)........ 44
Figure C2-45. Total silver (µg/L)........ 45
Figure C2-46. Total strontium (µg/L)........ 46
Figure C2-47. Total thallium (µg/L)........ 47
Figure C2-48. Total tin (µg/L)........ 48
Figure C2-49. Total titanium (µg/L)........ 49
Figure C2-50. Total uranium (µg/L)........ 50
Figure C2-51. Total vanadium (µg/L)........ 51
Figure C2-52. Total zinc (µg/L)........ 52
Figure C2-53. Dissolved copper (µg/L)........ 53
Figure C2-54. Dissolved lead (µg/L)........ 54
Figure C2-55. Dissolved manganese (µg/L)........ 55
Figure C2-56. Dissolved zinc (µg/L)........ 56

Figure C2-1. Specific conductivity (µS/cm)

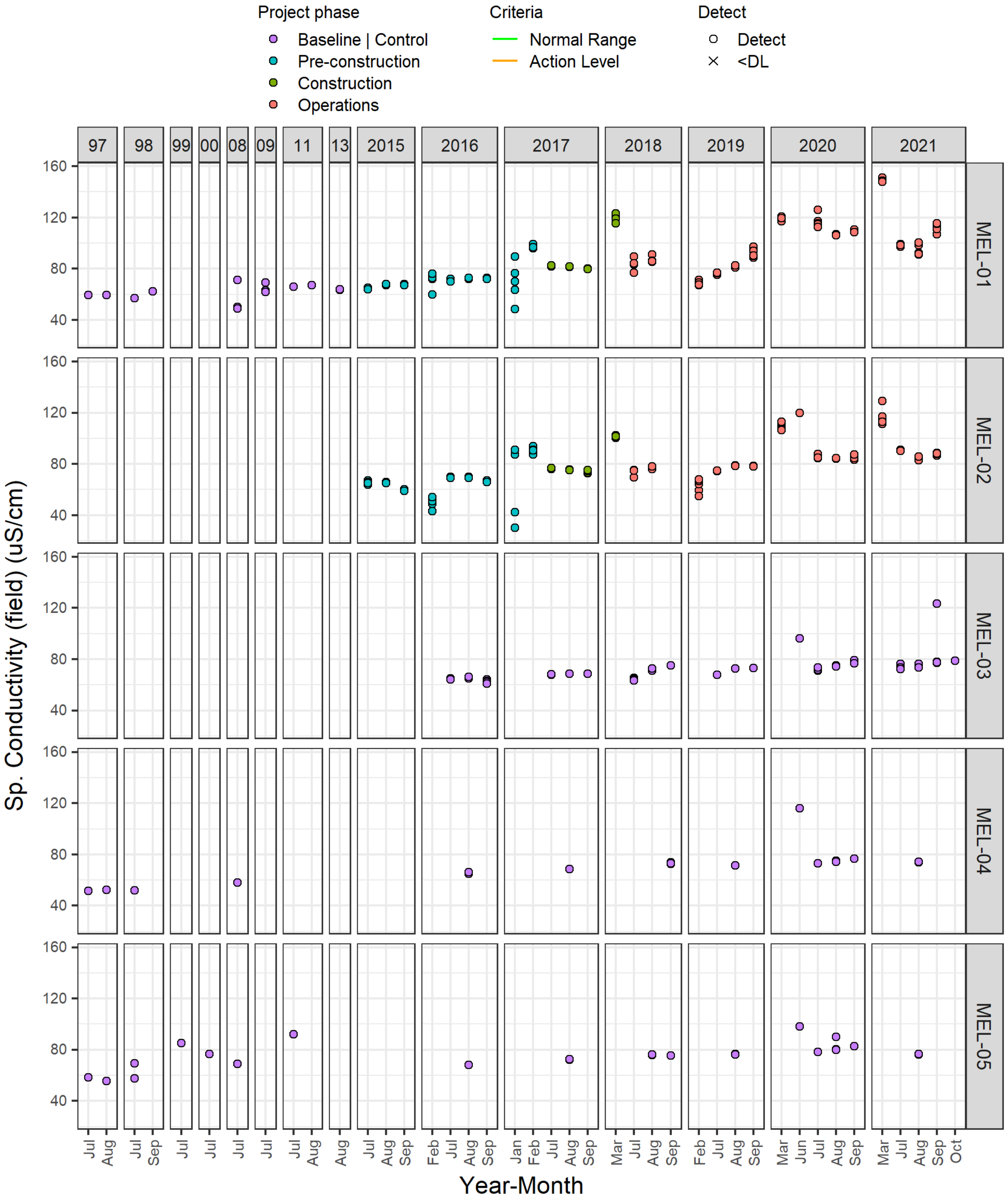


Figure C2-2. Lab-measured conductivity (µS/cm)

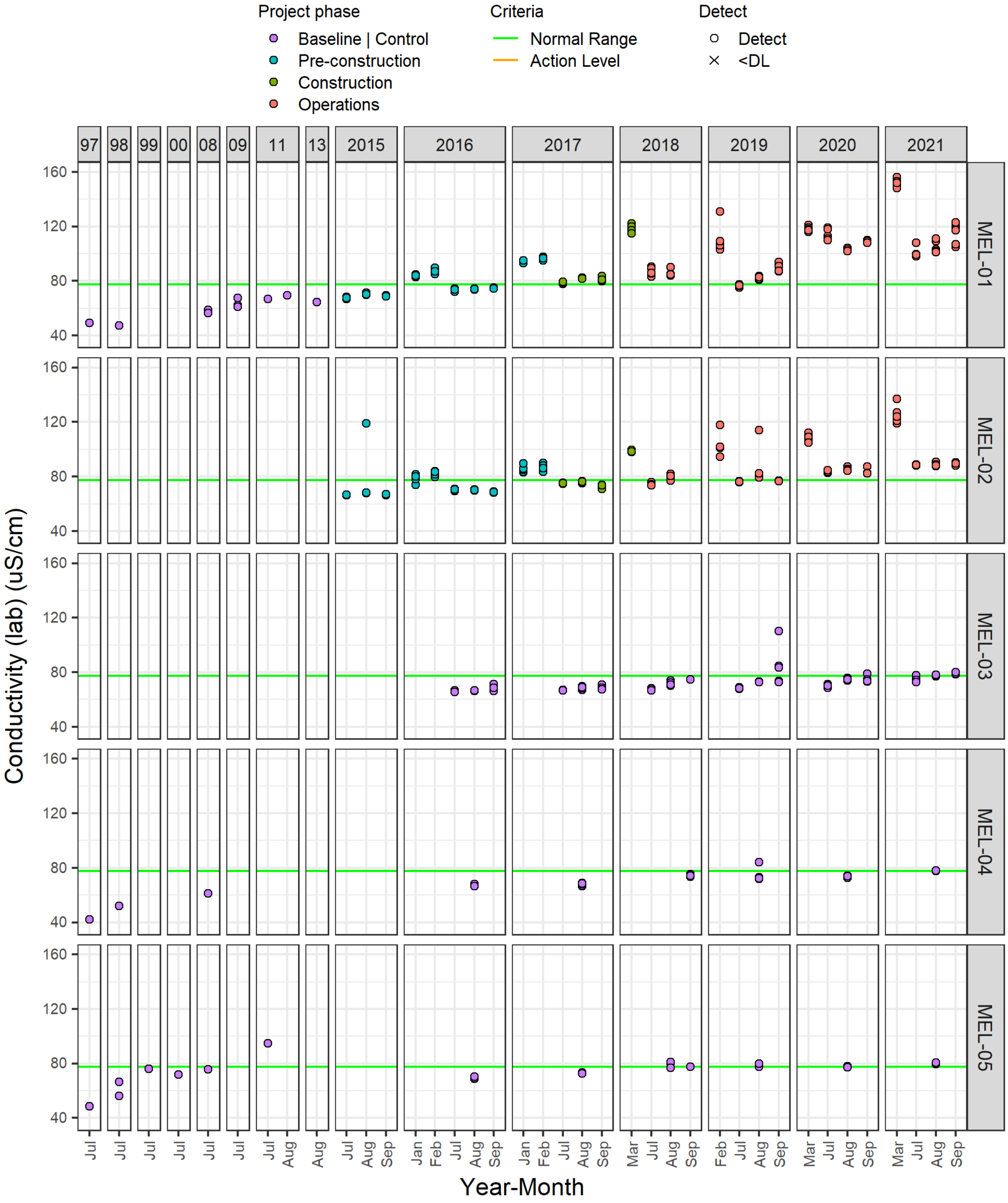


Figure C2-3. Field pH

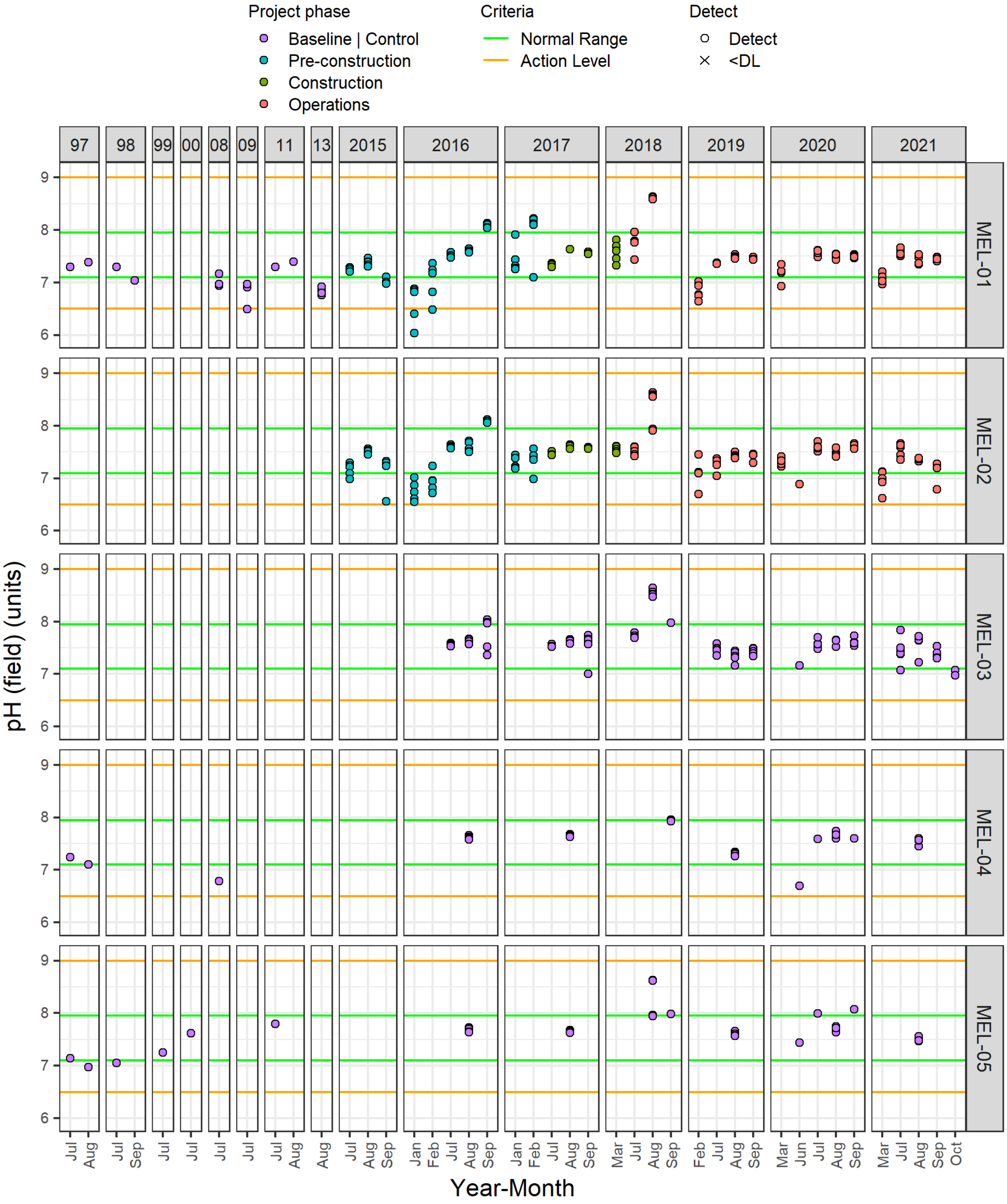


Figure C2-4. Lab measured pH

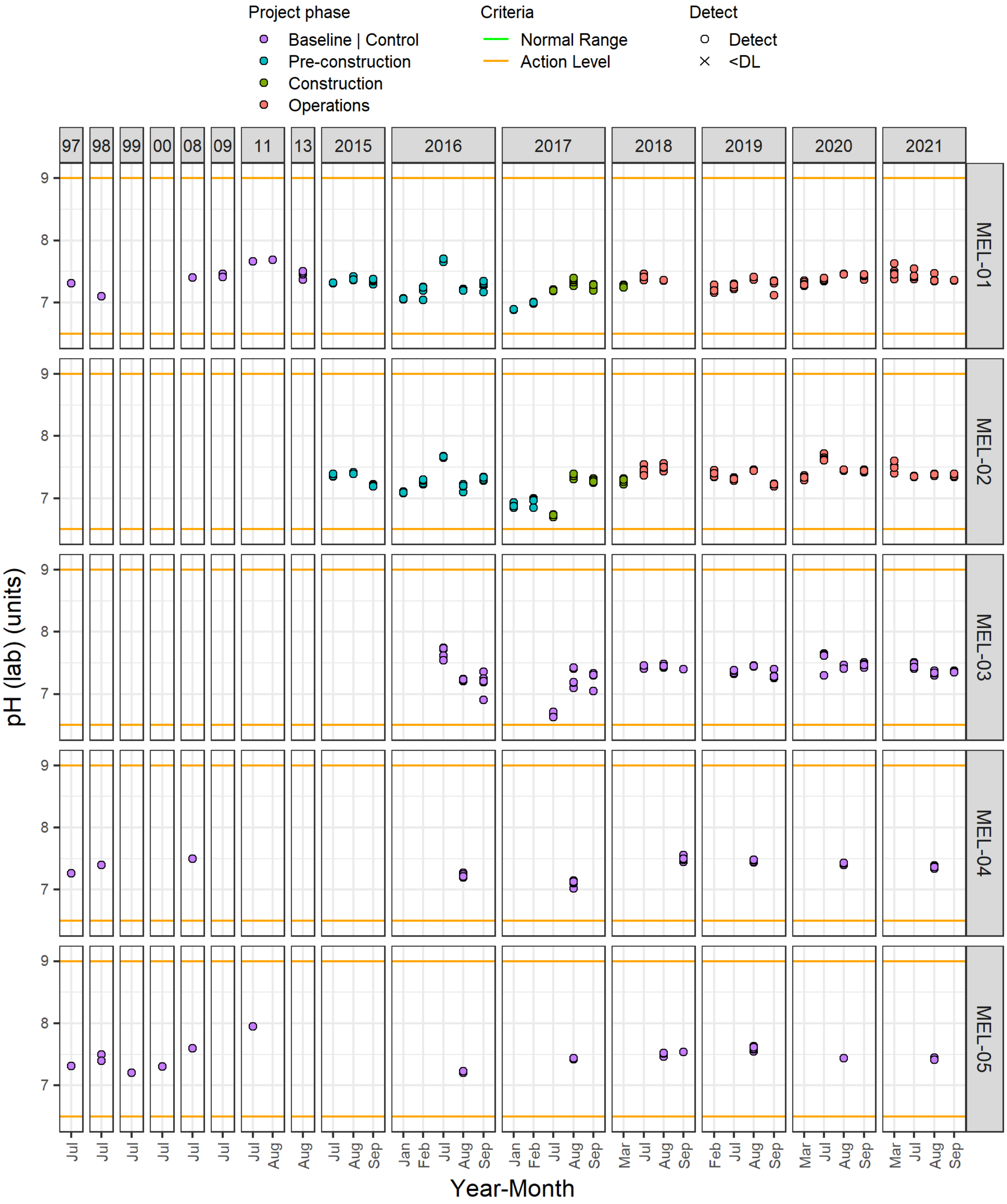


Figure C2-5. Hardness (mg/L)

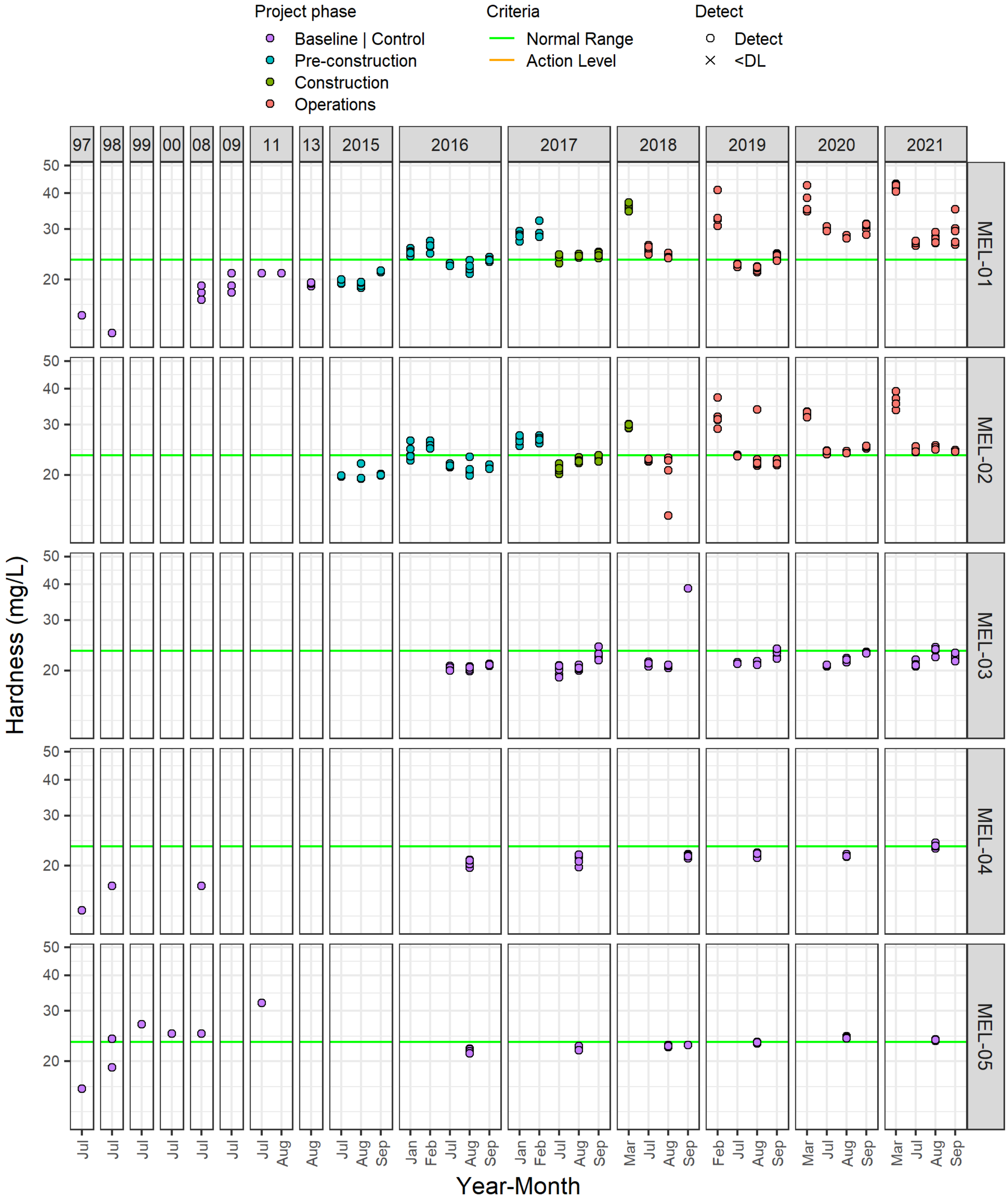


Figure C2-6. Total dissolved solids (measured; mg/L)

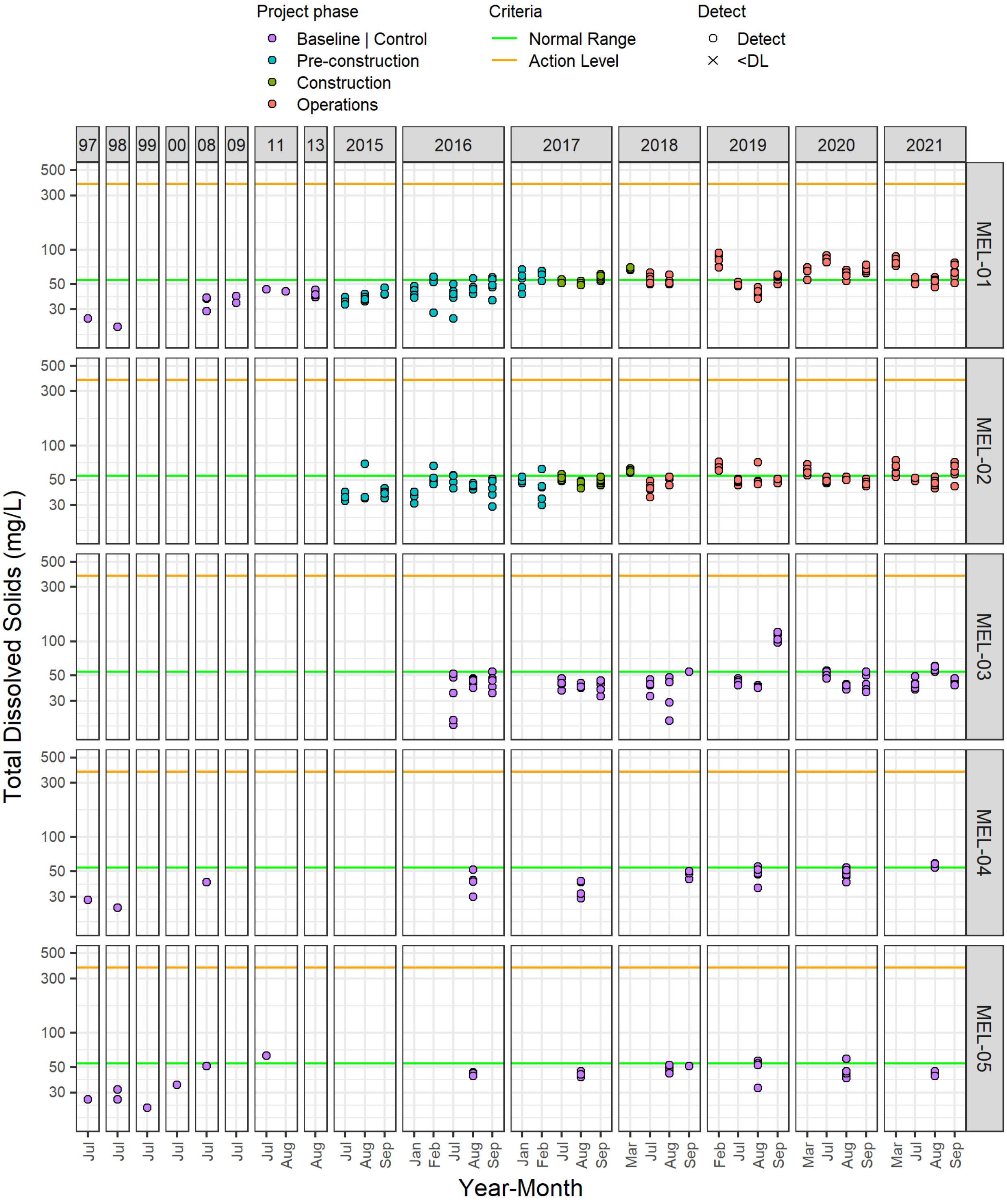


Figure C2-7. Total dissolved solids (calculated; mg/L)

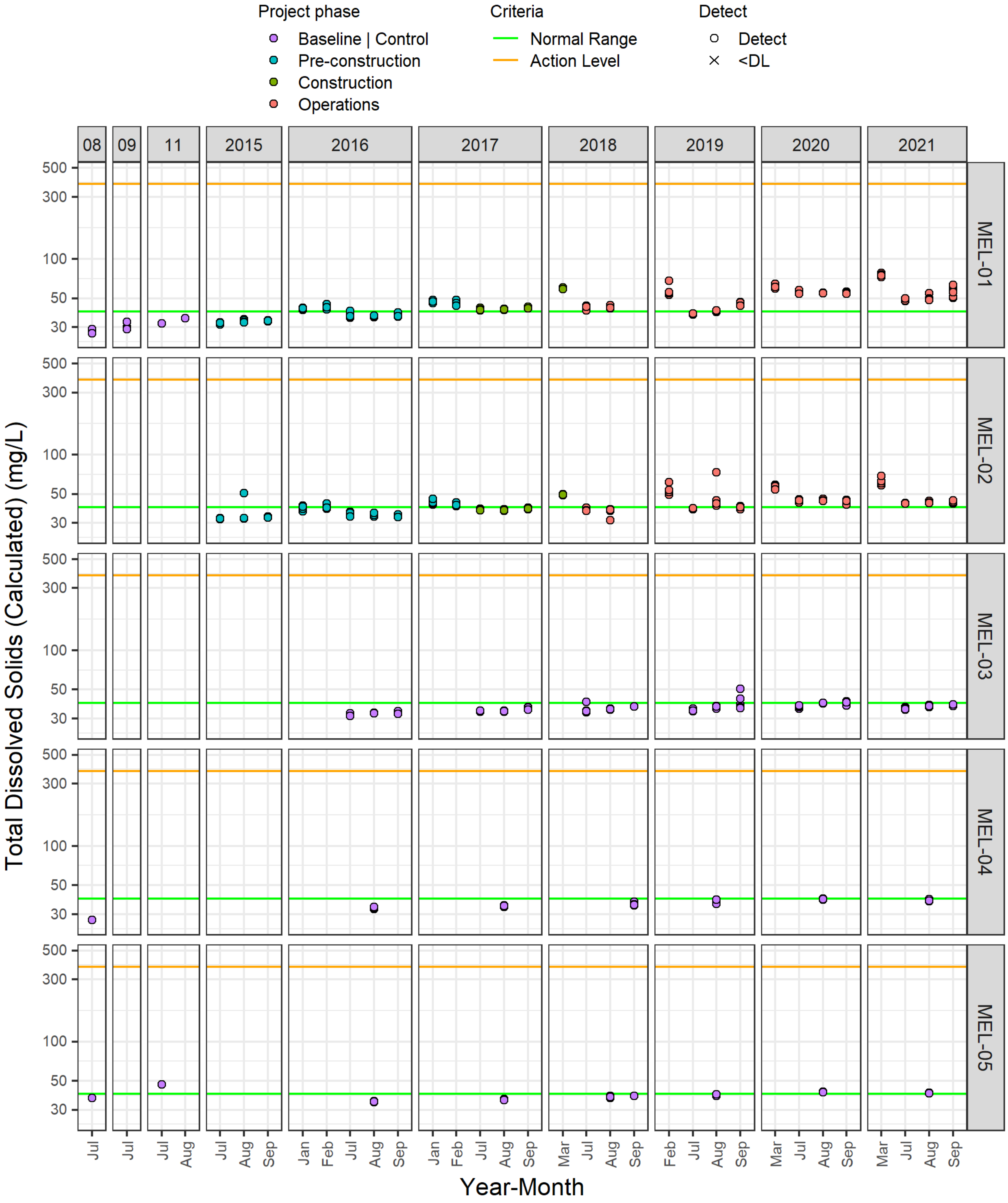


Figure C2-8. Total suspended solids (mg/L)

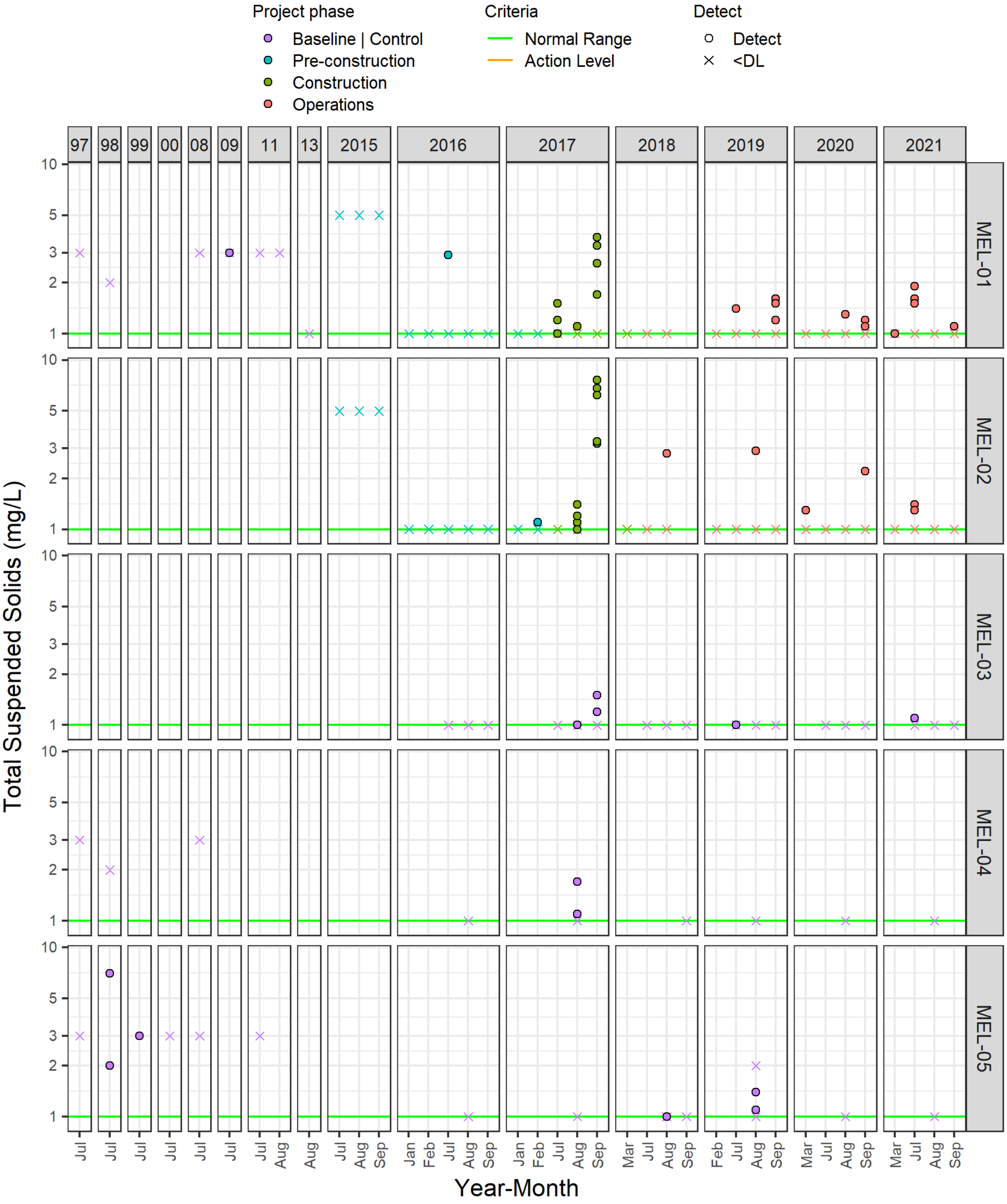


Figure C2-9. Lab measured turbidity (NTU)

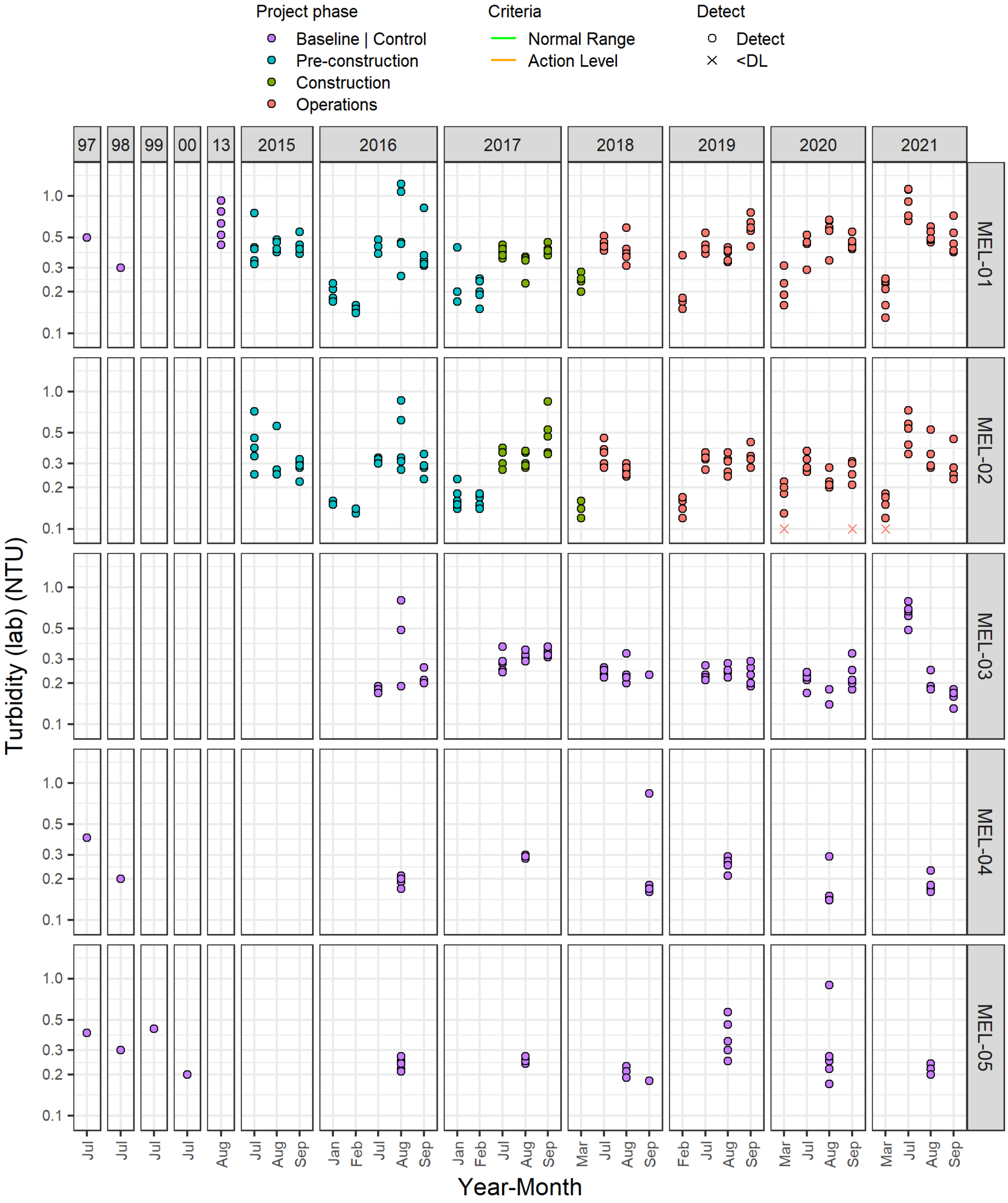


Figure C2-10. Bicarbonate alkalinity (mg/L)

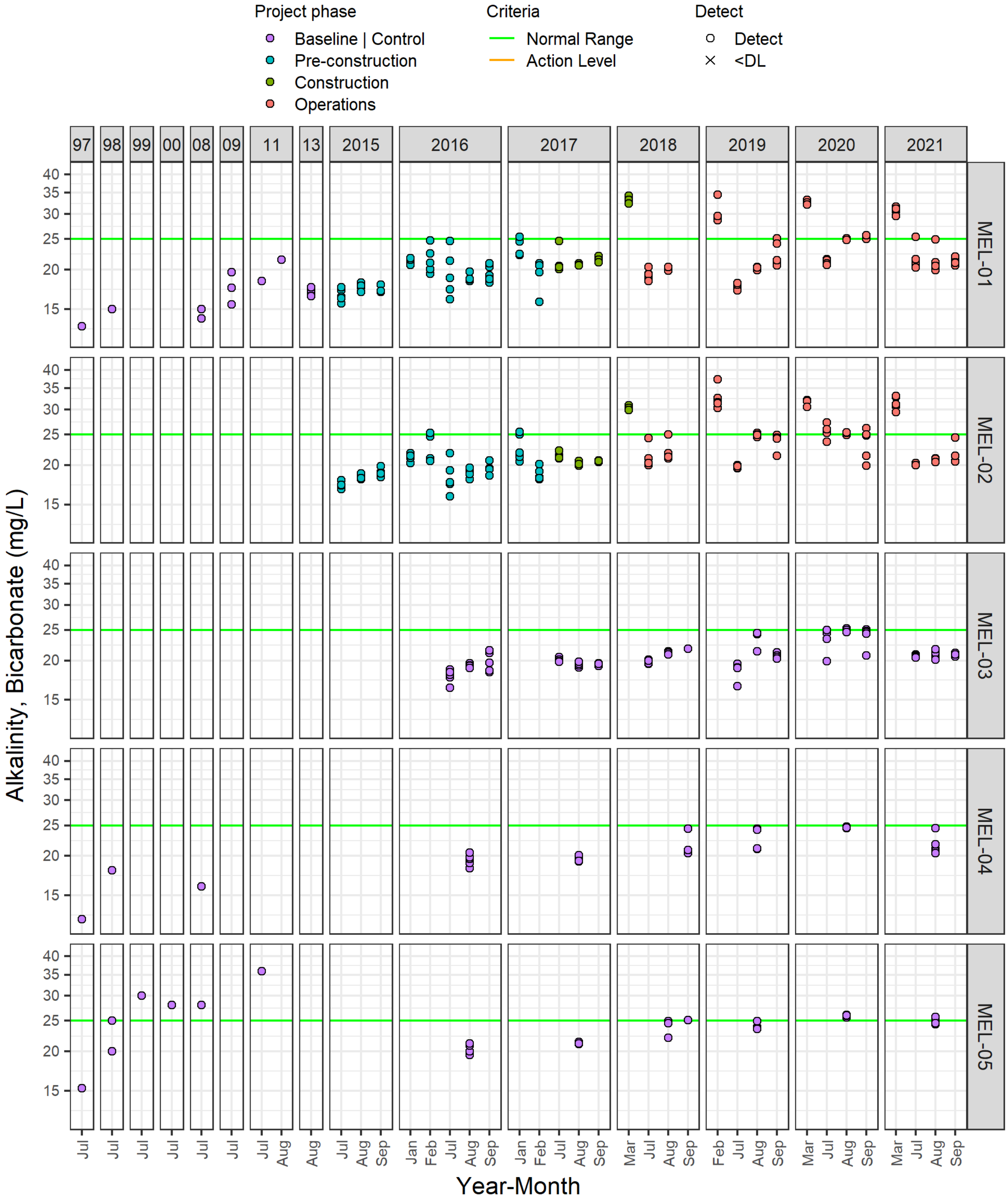


Figure C2-11. Total alkalinity (mg/L)

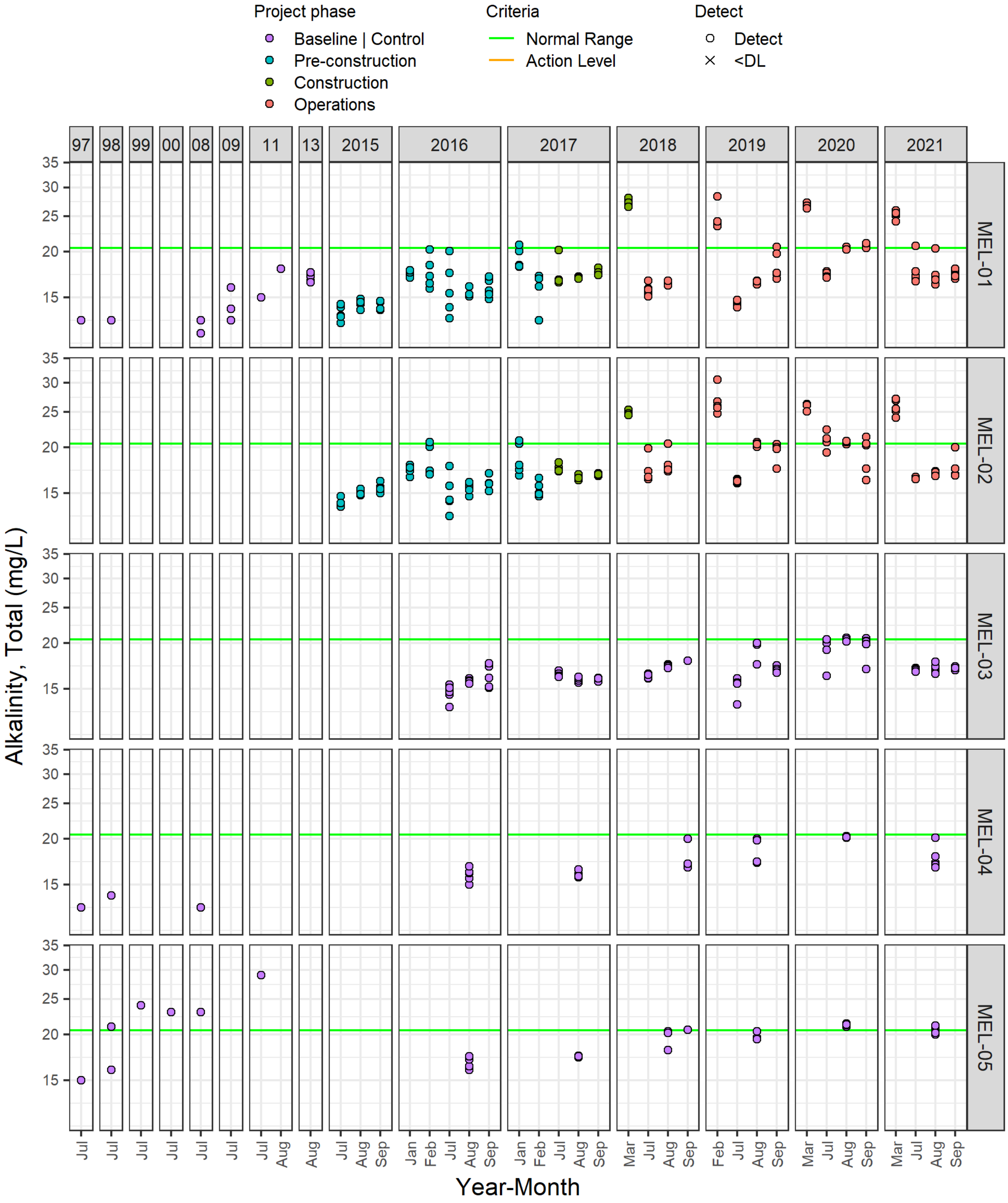


Figure C2-12. Total calcium (mg/L)

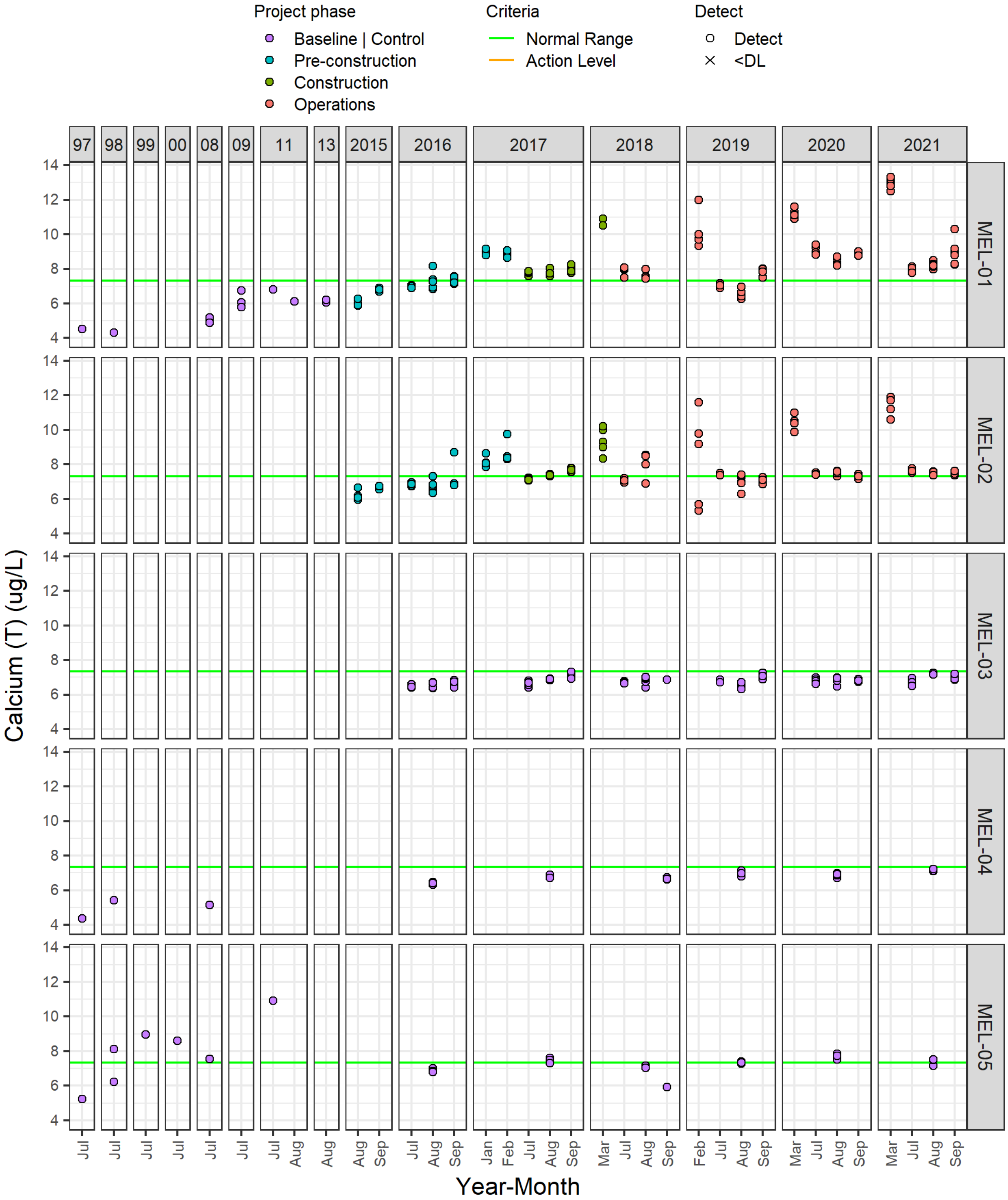


Figure C2-13. Total magnesium (mg/L)

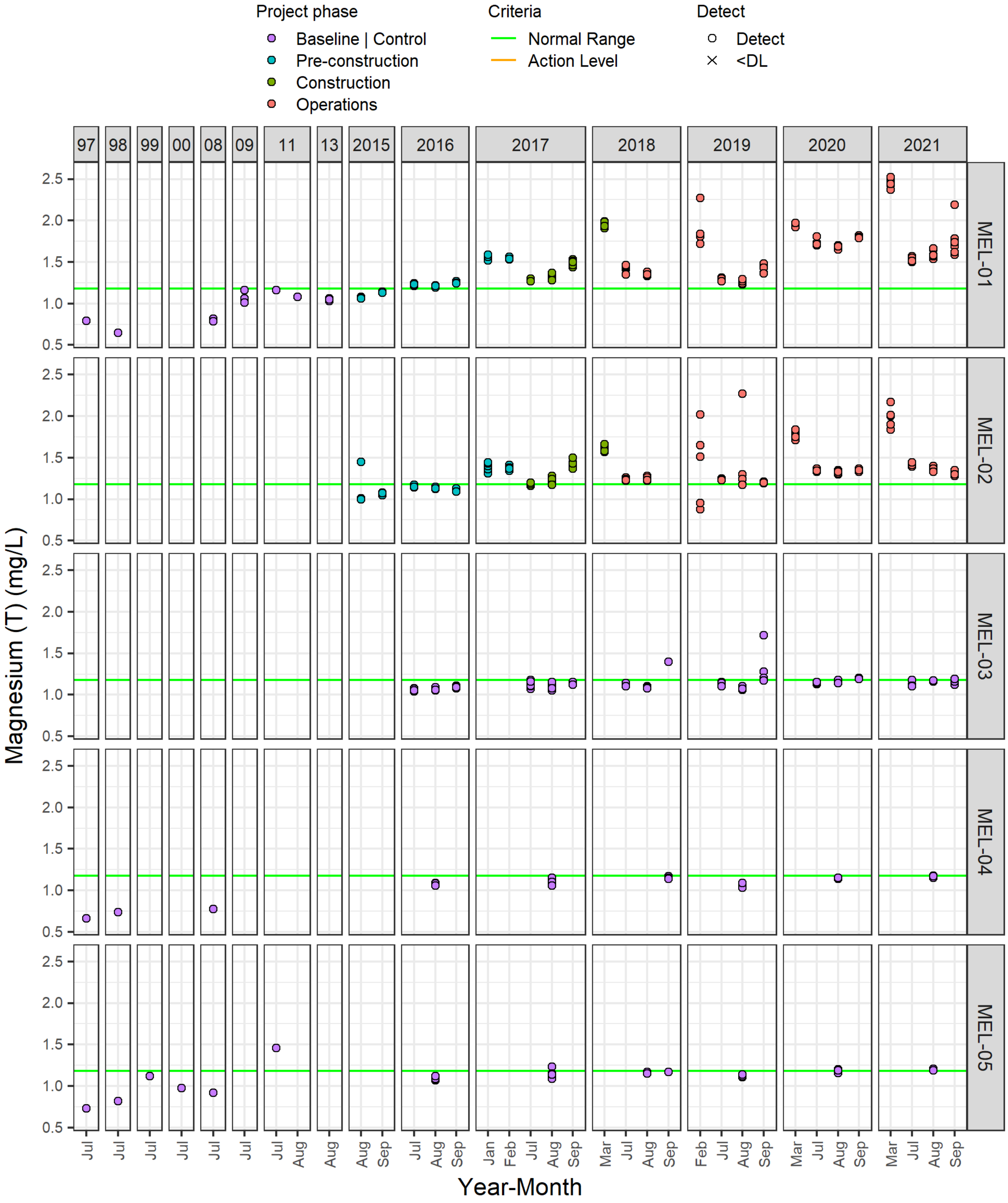


Figure C2-14. Total potassium (mg/L)

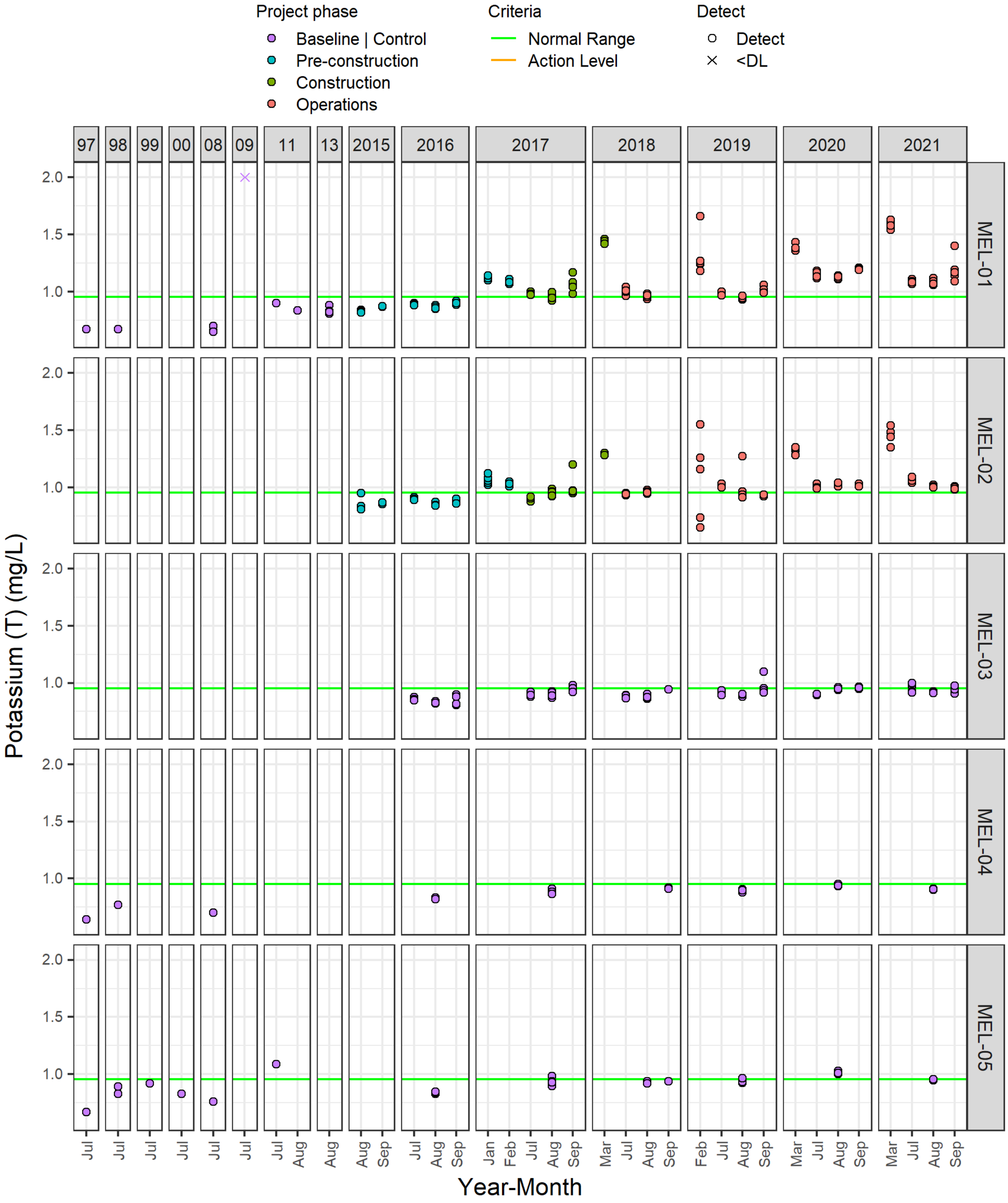


Figure C2-15. Total sodium (mg/L)

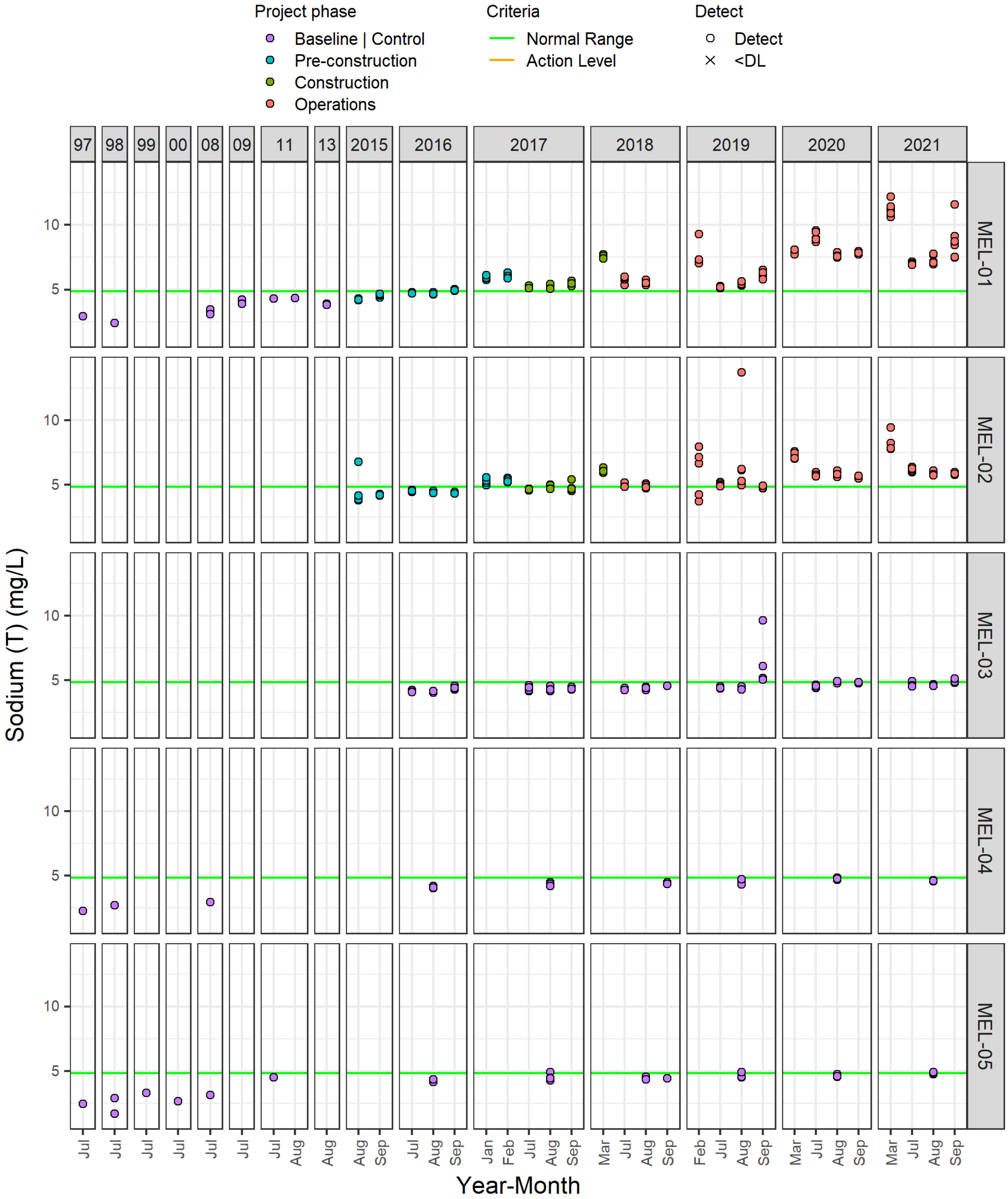


Figure C2-16. Chloride (mg/L)

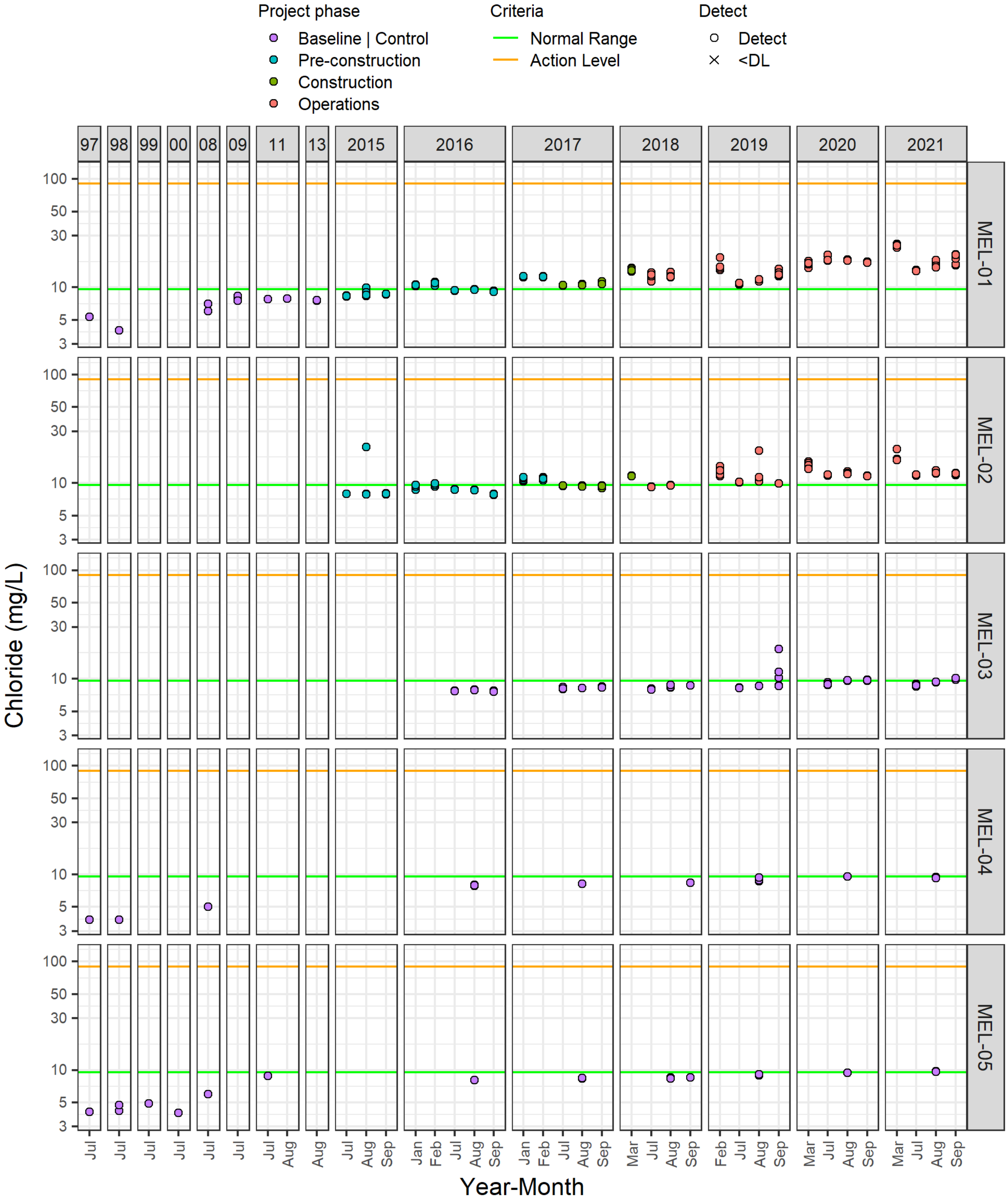


Figure C2-17. Fluoride (mg/L)

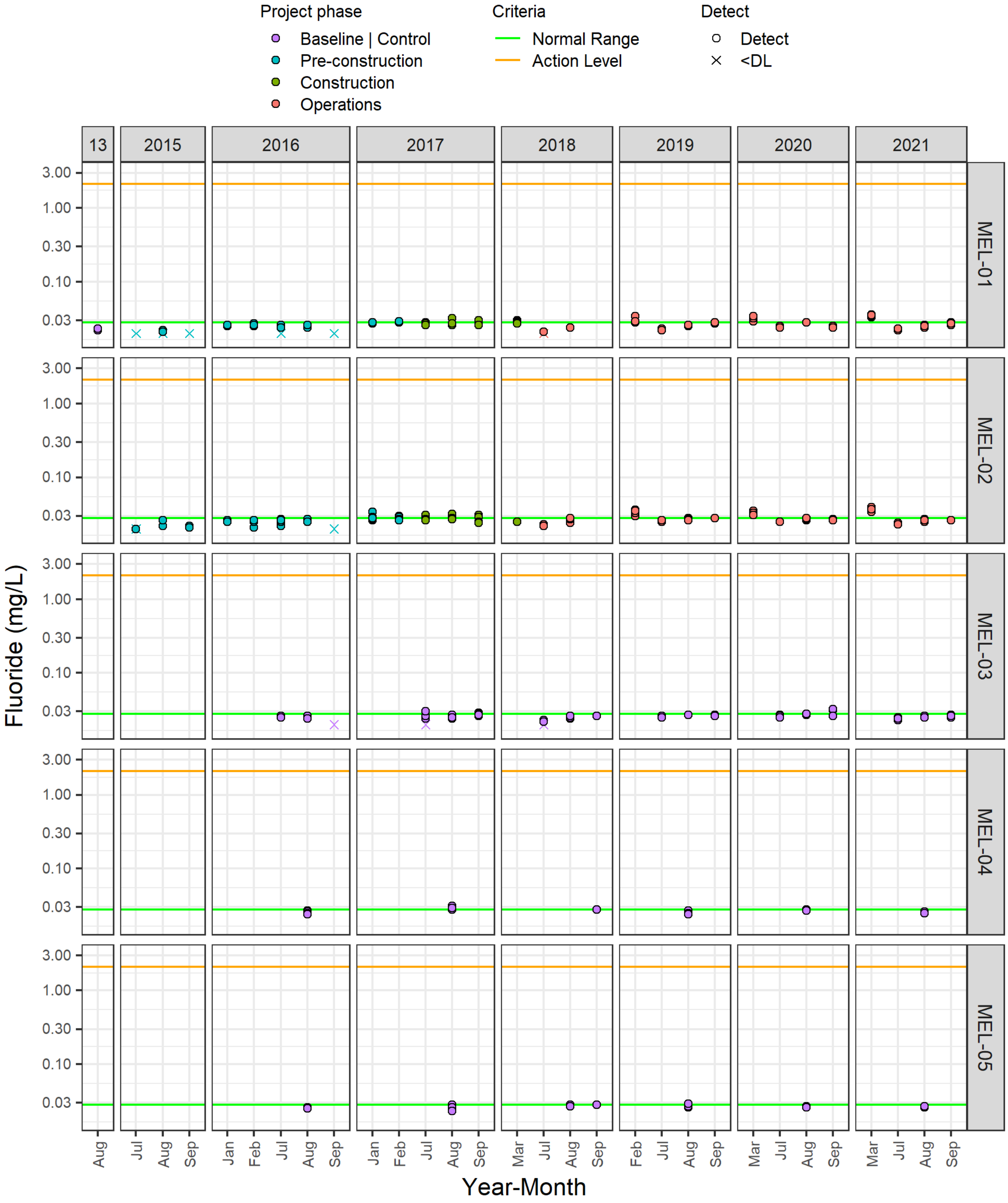


Figure C2-18. Ammonia (as nitrogen) (mg/L)

Notes: Ammonia data from August and September 2021 should be interpreted with caution because of higher detection limits reported by the laboratory.

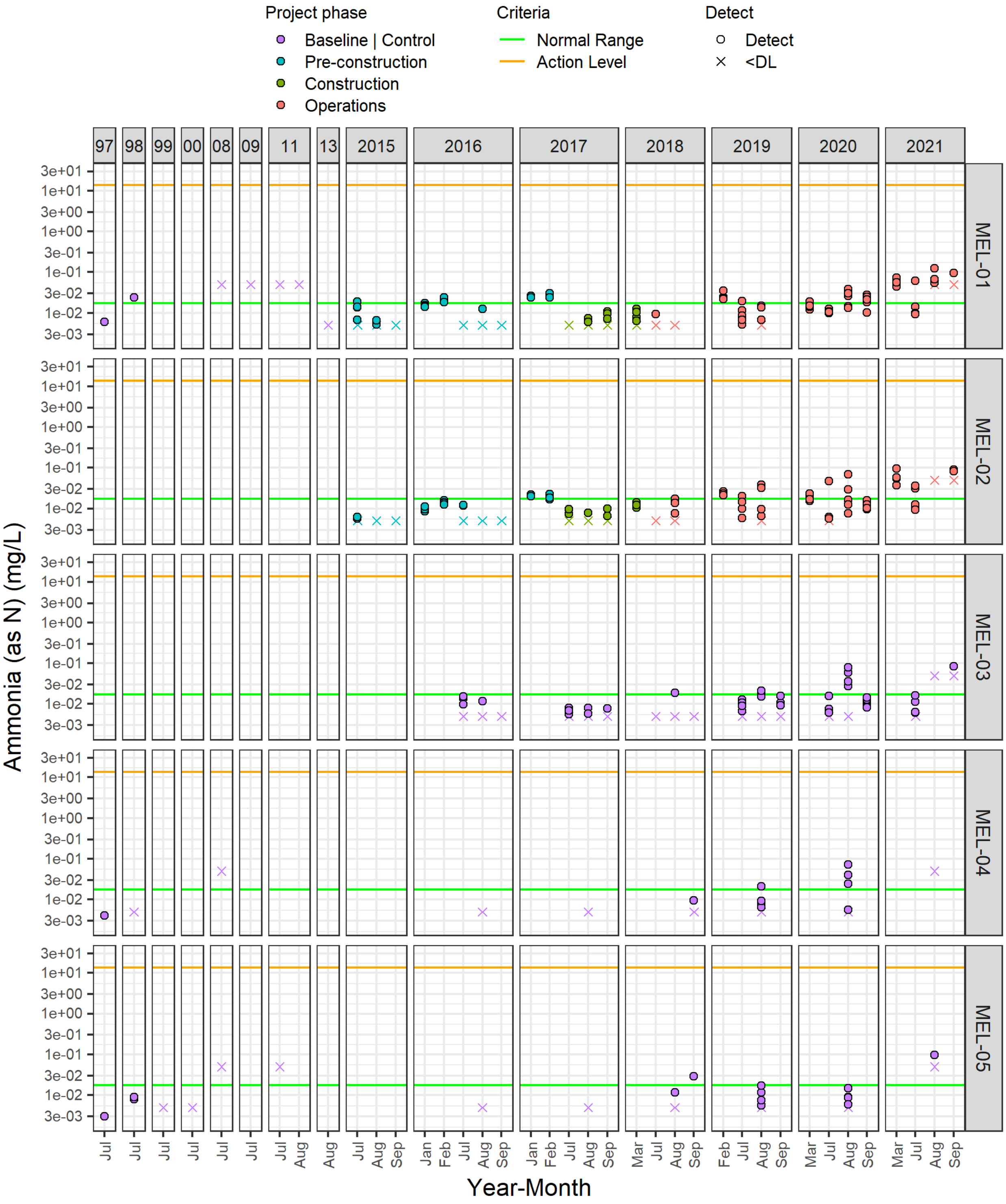


Figure C2-19. Nitrate (as N) (mg/L)

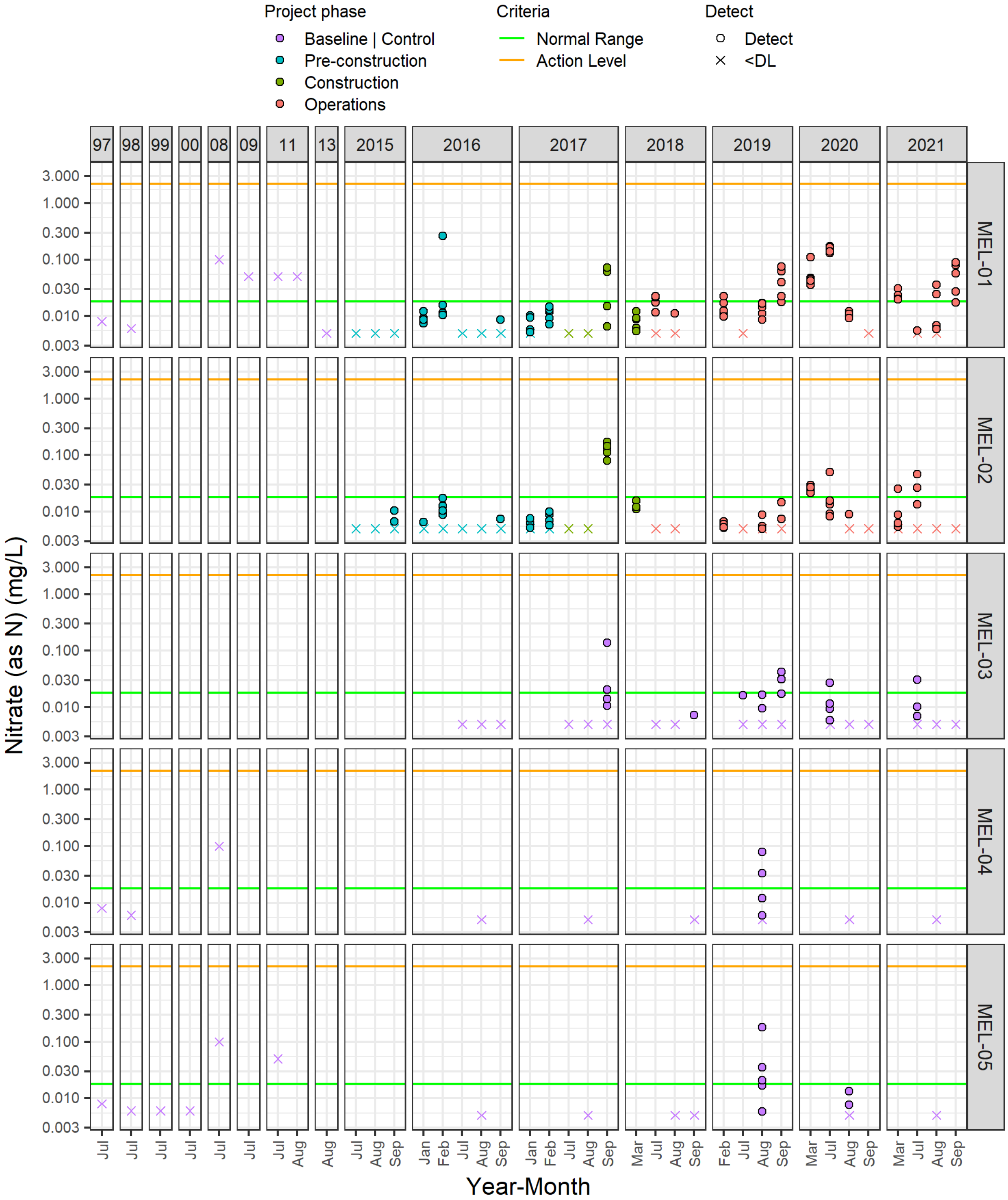


Figure C2-20. Nitrate and nitrite (as N) (mg/L)

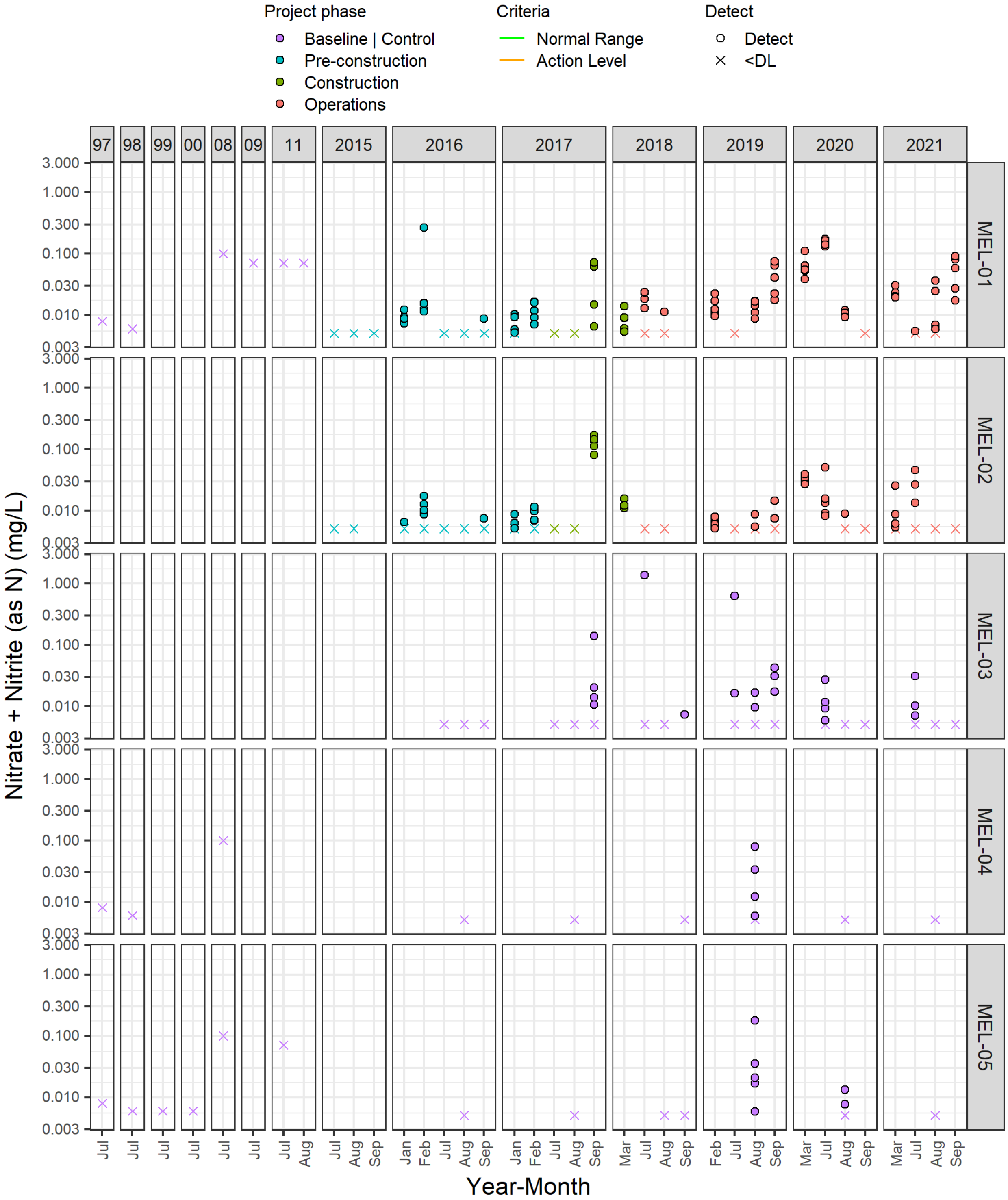


Figure C2-21. Total Kjeldahl nitrogen (TKN; mg/L)

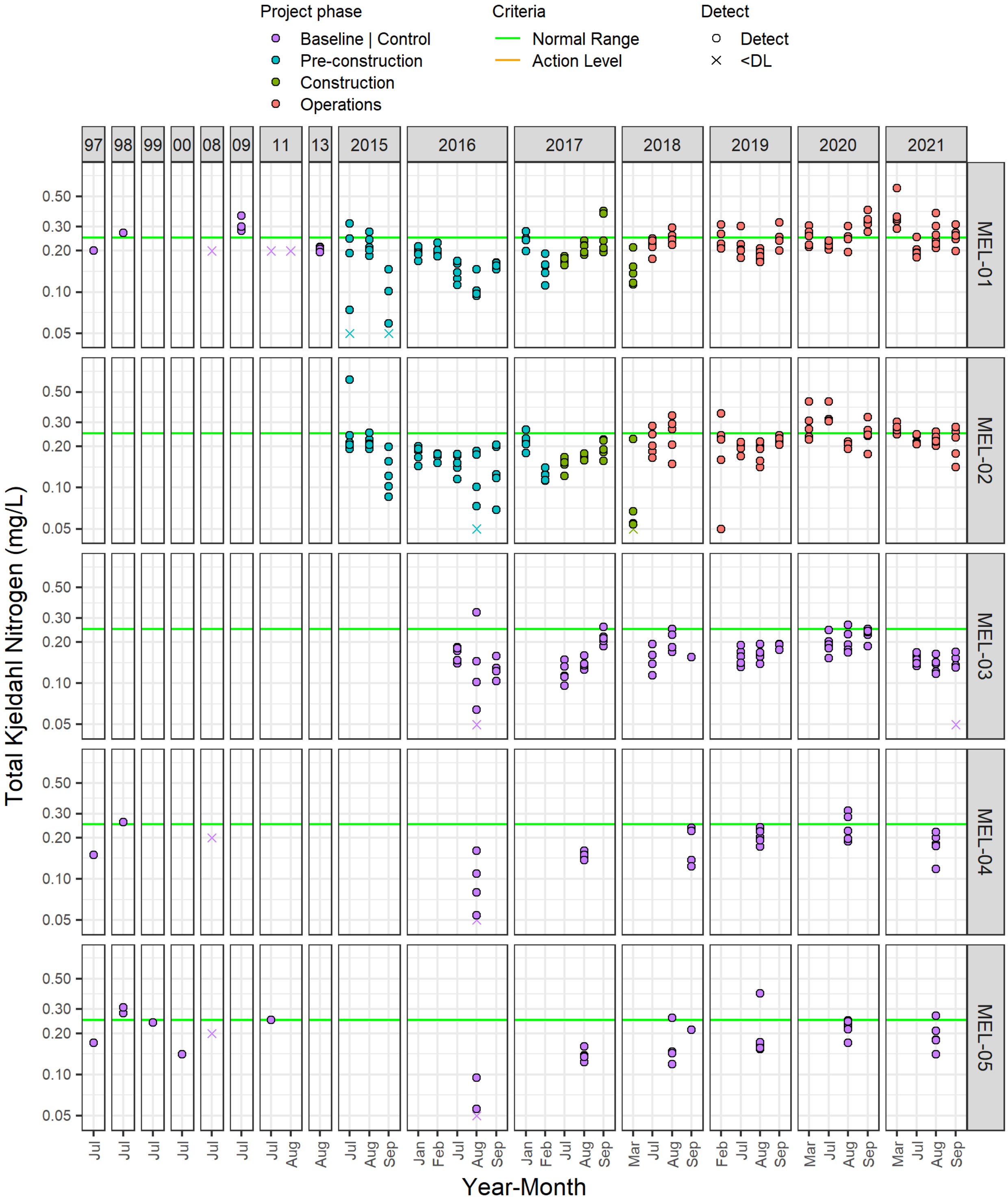


Figure C2-22. Sulphate (mg/L)

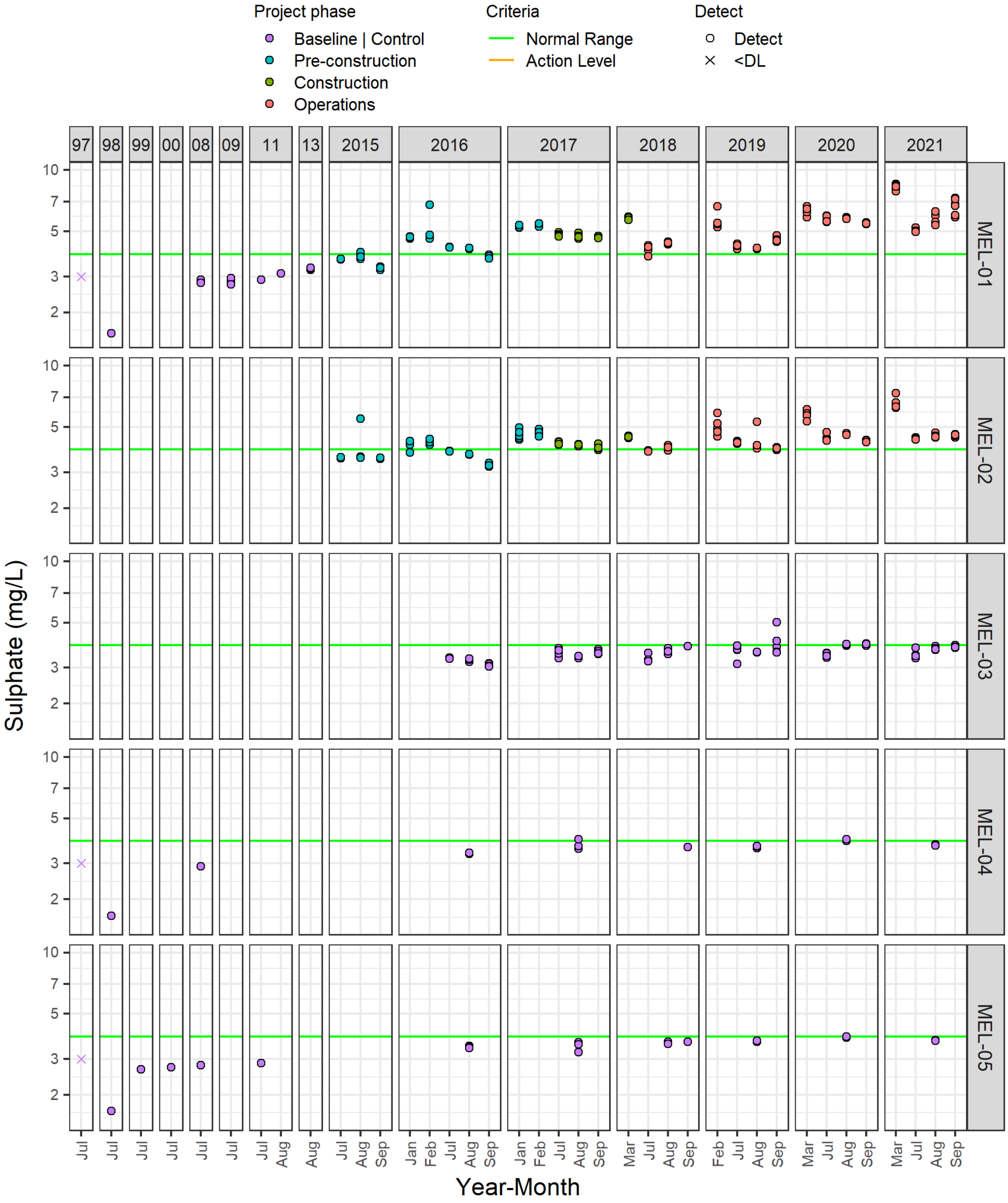


Figure C2-23. Total phosphorus (mg/L)

Notes: The AEMP Benchmark for total phosphorus of 0.01 mg/L is questionable given that baseline concentrations of total phosphorus exceeded this value on occasion. The Action Level (0.0075 mg/L) is not shown.

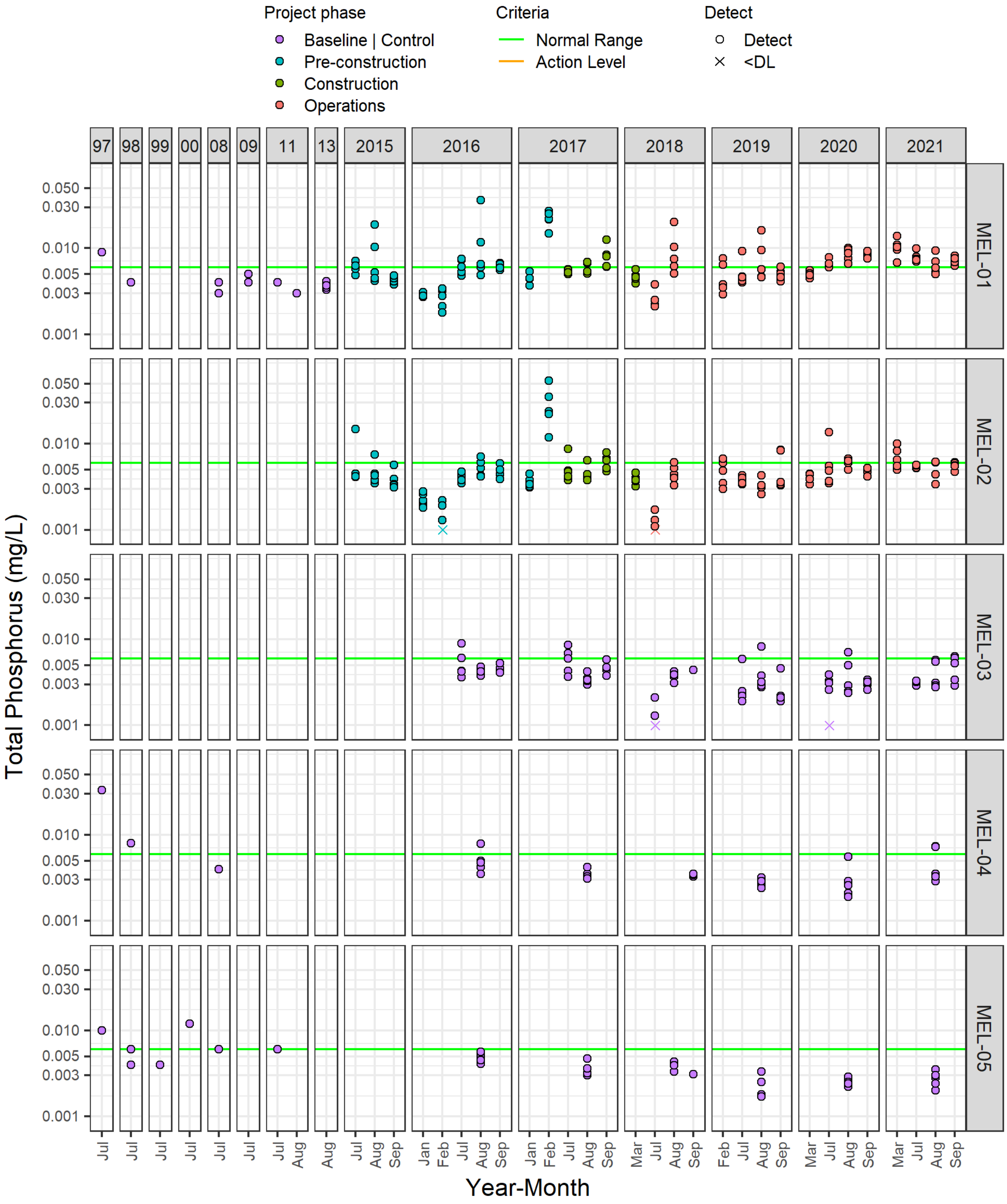


Figure C2-24. Dissolved organic carbon (mg/L)

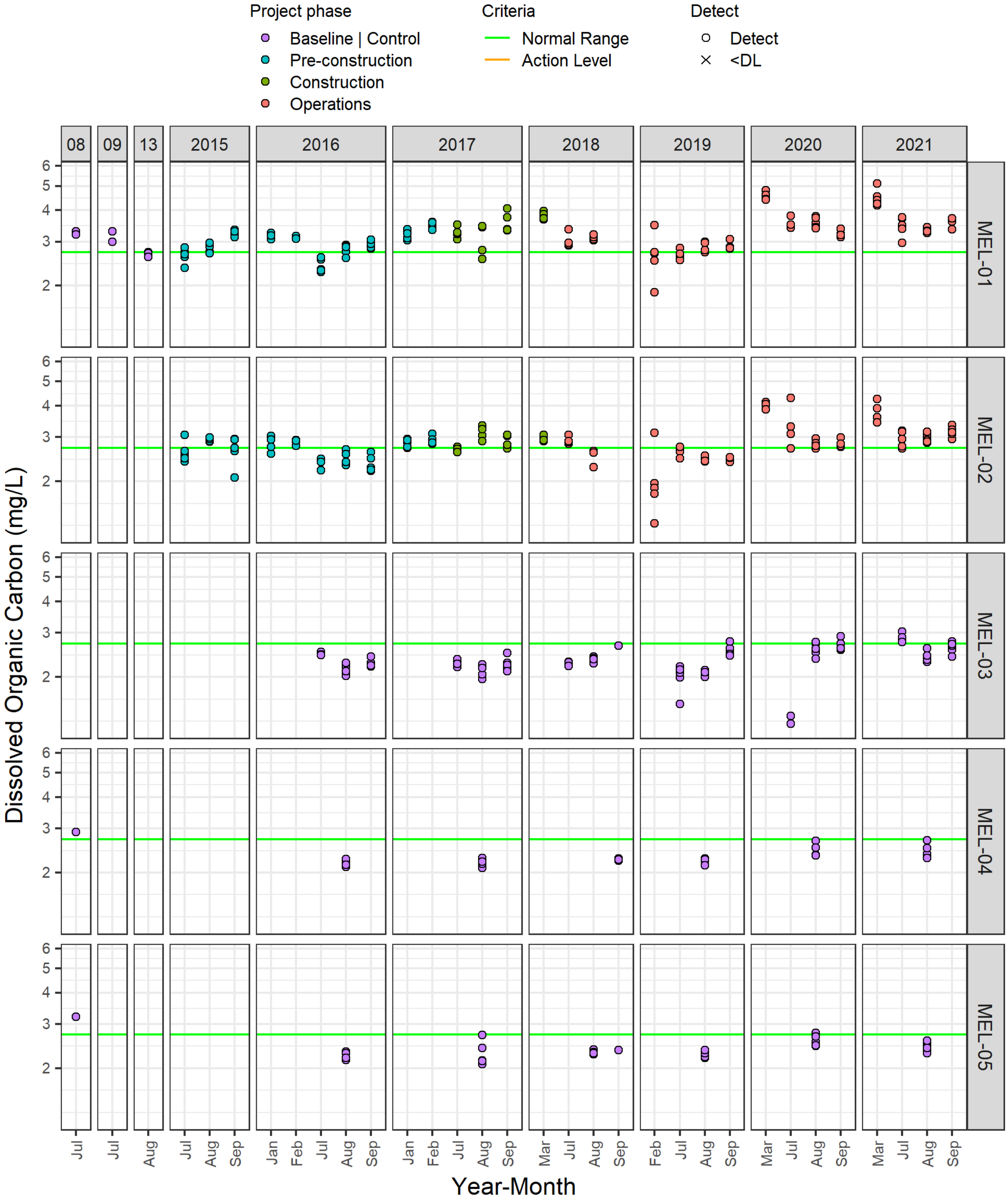


Figure C2-25. Total organic carbon (mg/L)

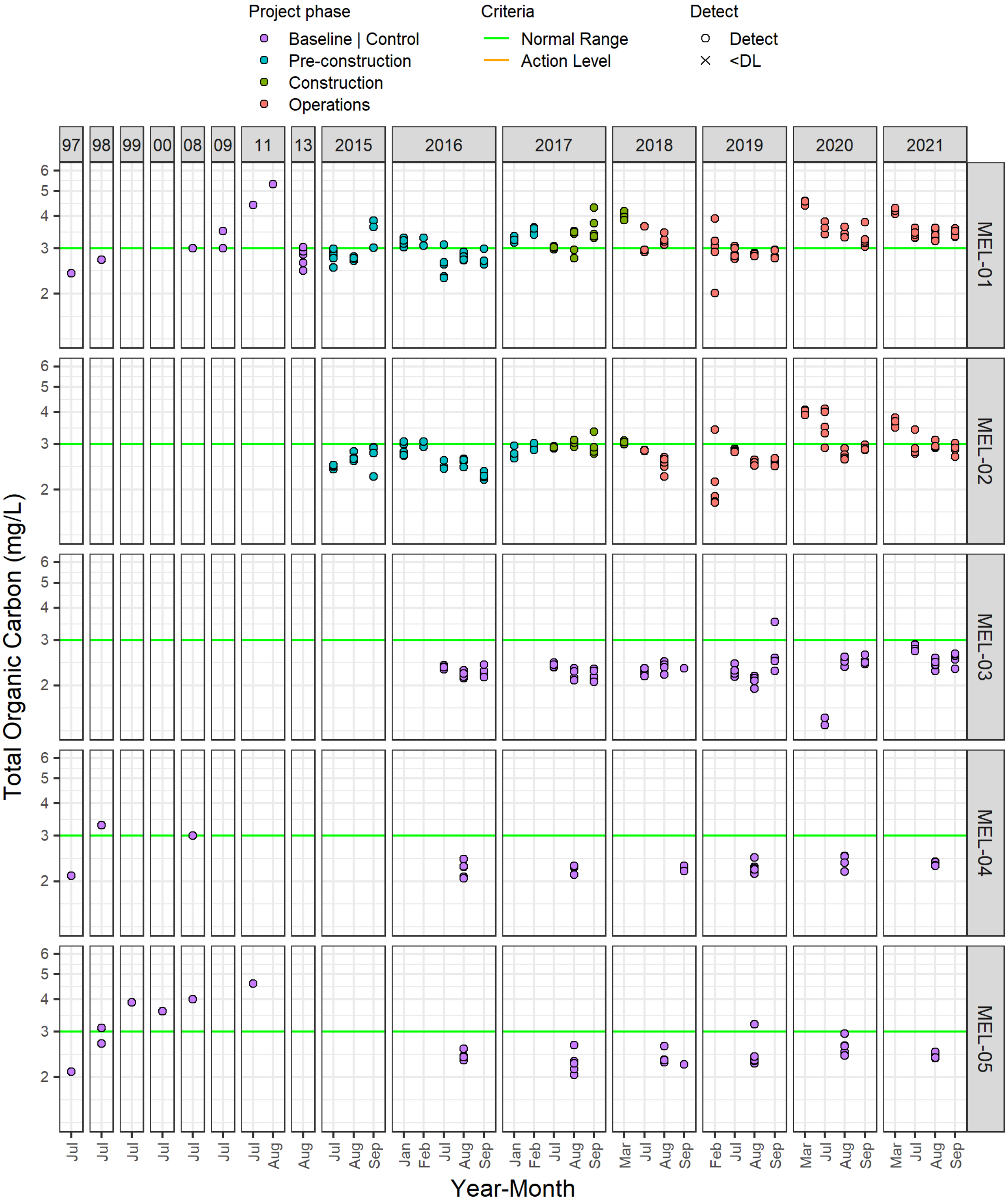


Figure C2-26. Total aluminum (µg/L)

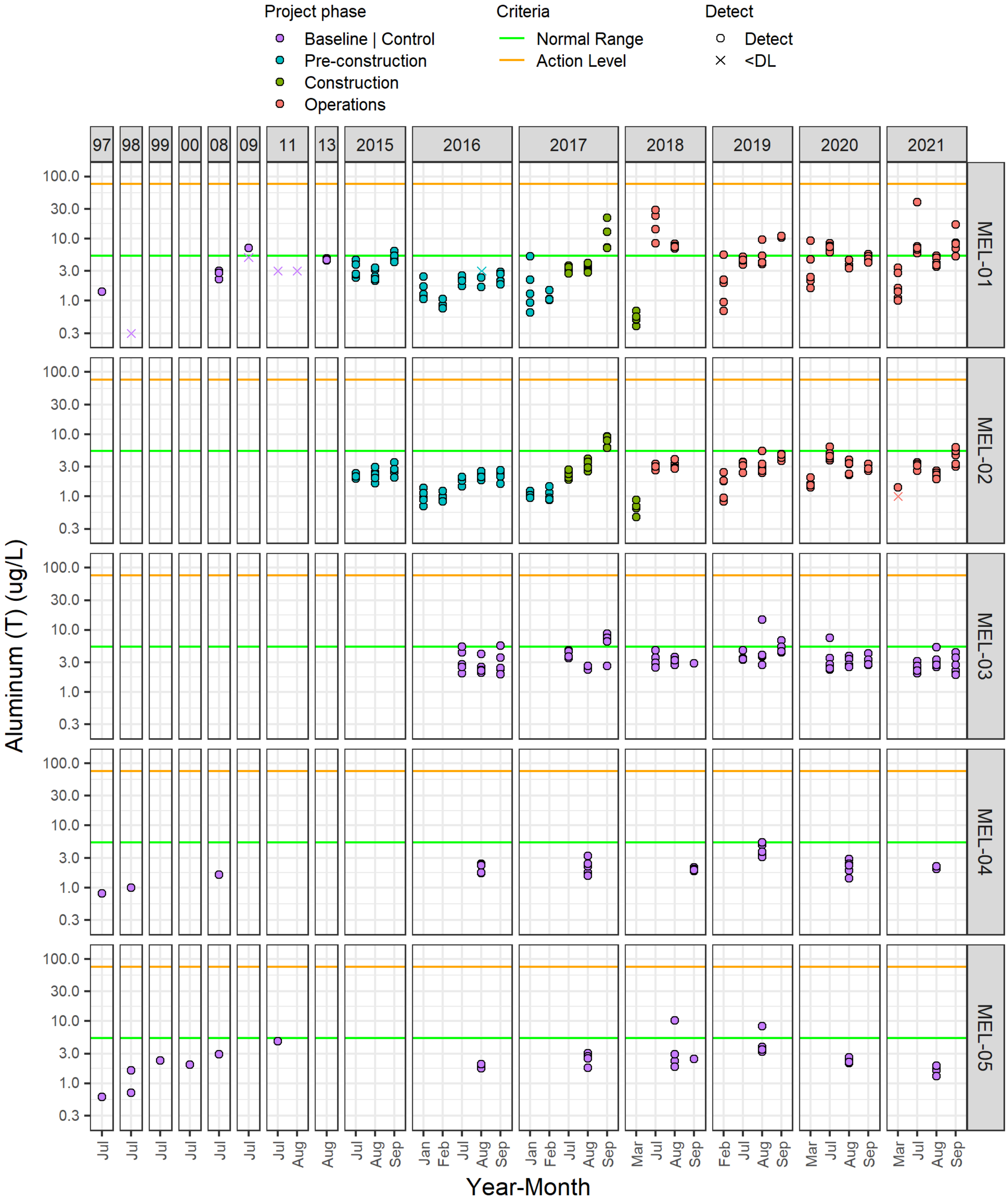


Figure C2-27. Total antimony (µg/L)

Notes: The normal range for antimony is equal to the current detection limit.

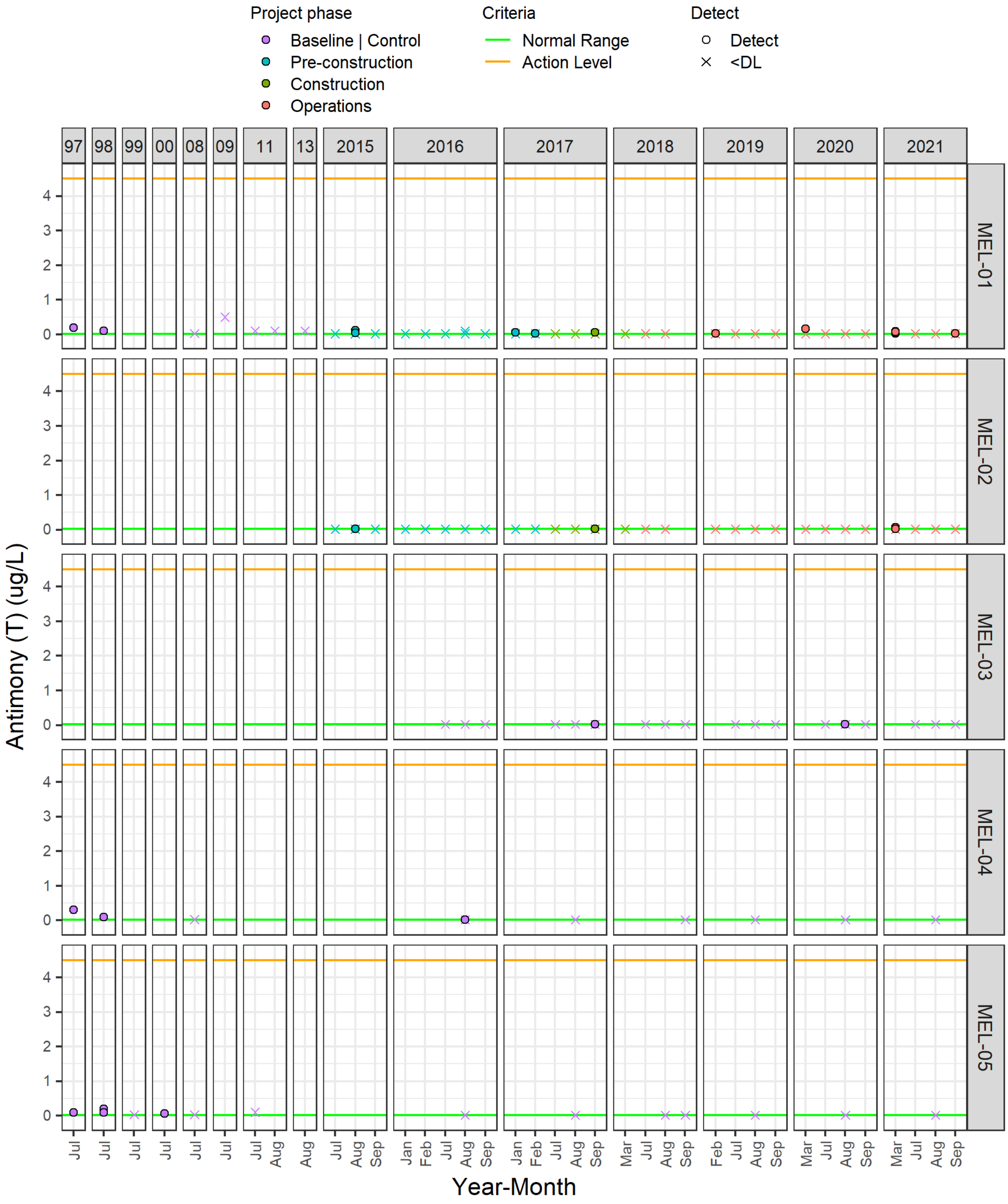


Figure C2-28. Total arsenic (µg/L)

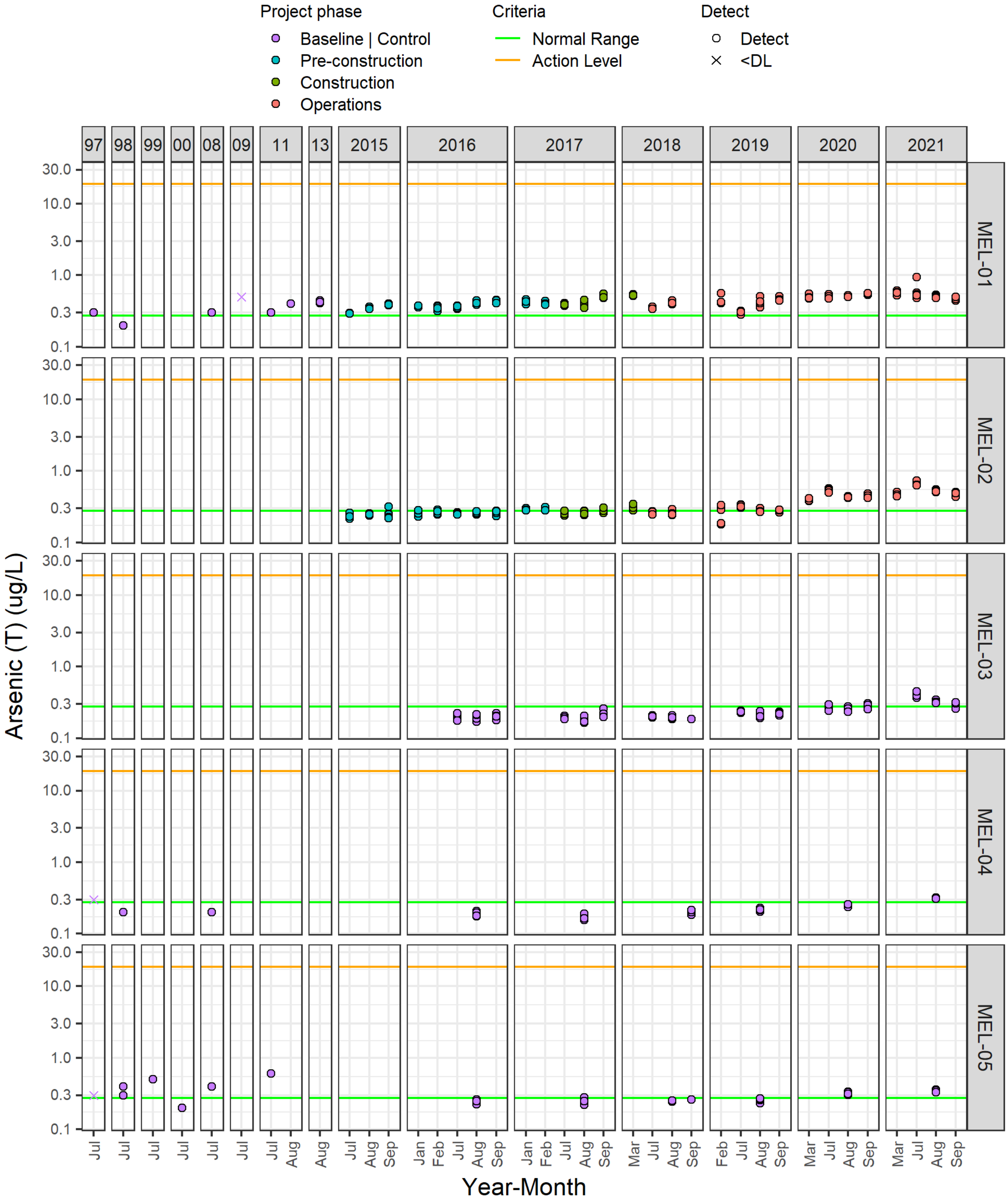


Figure C2-29. Total barium (µg/L)

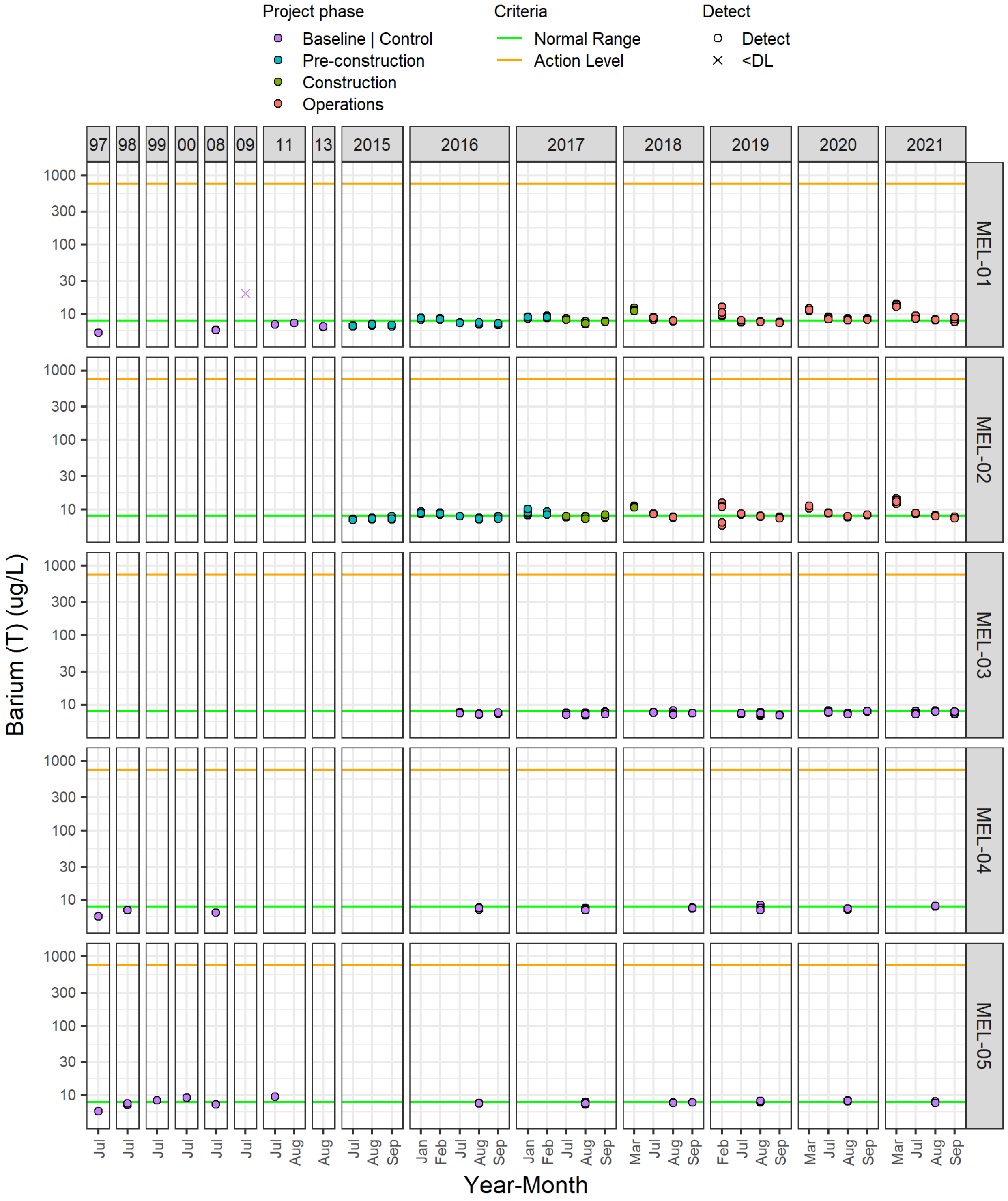


Figure C2-30. Total beryllium (µg/L)

Notes: The normal range for beryllium is equal to the current detection limit.

Figure C2-31. Total bismuth (µg/L)

Notes: The normal range for bismuth is equal to the current detection limit.

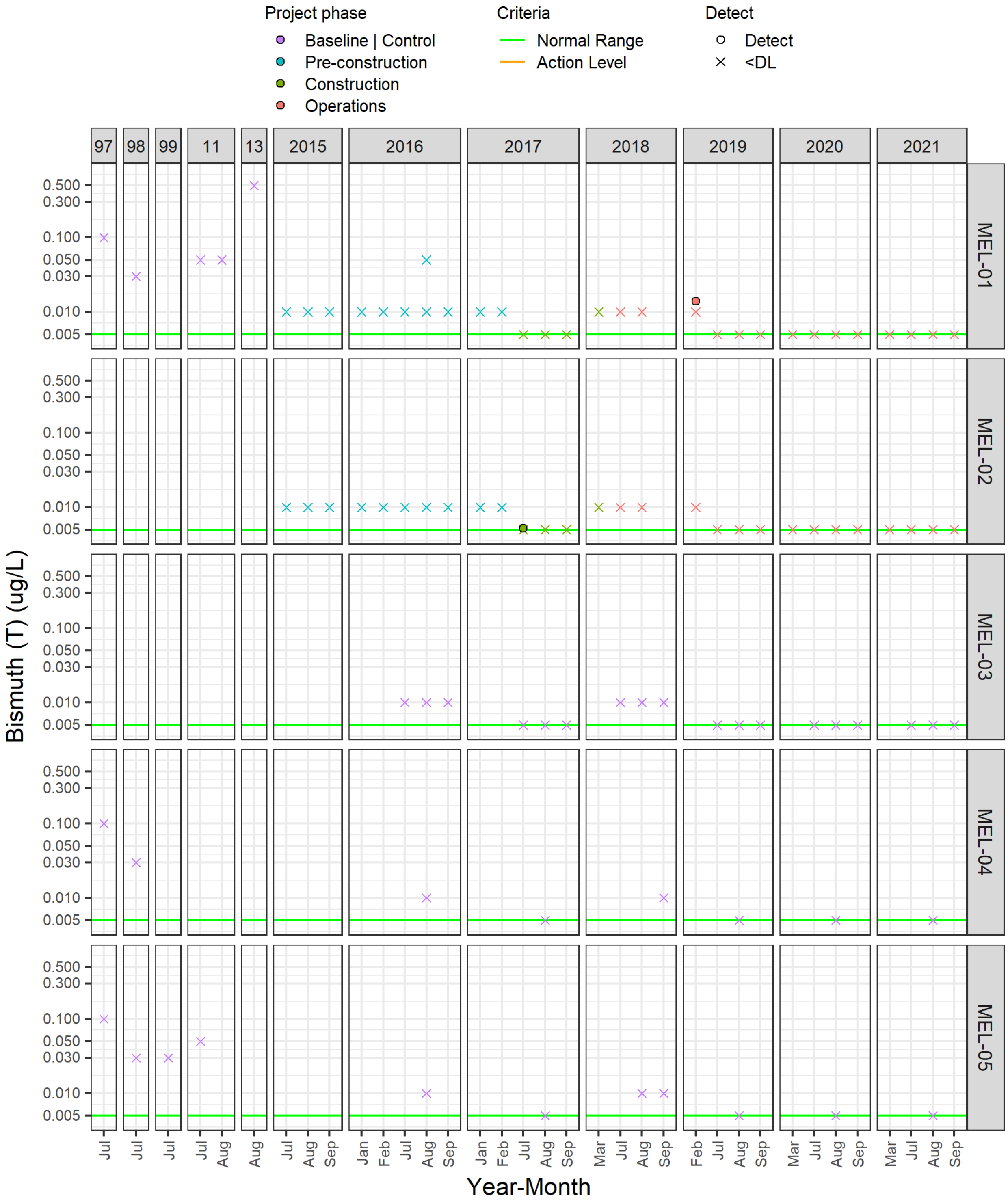


Figure C2-32. Total boron (µg/L)

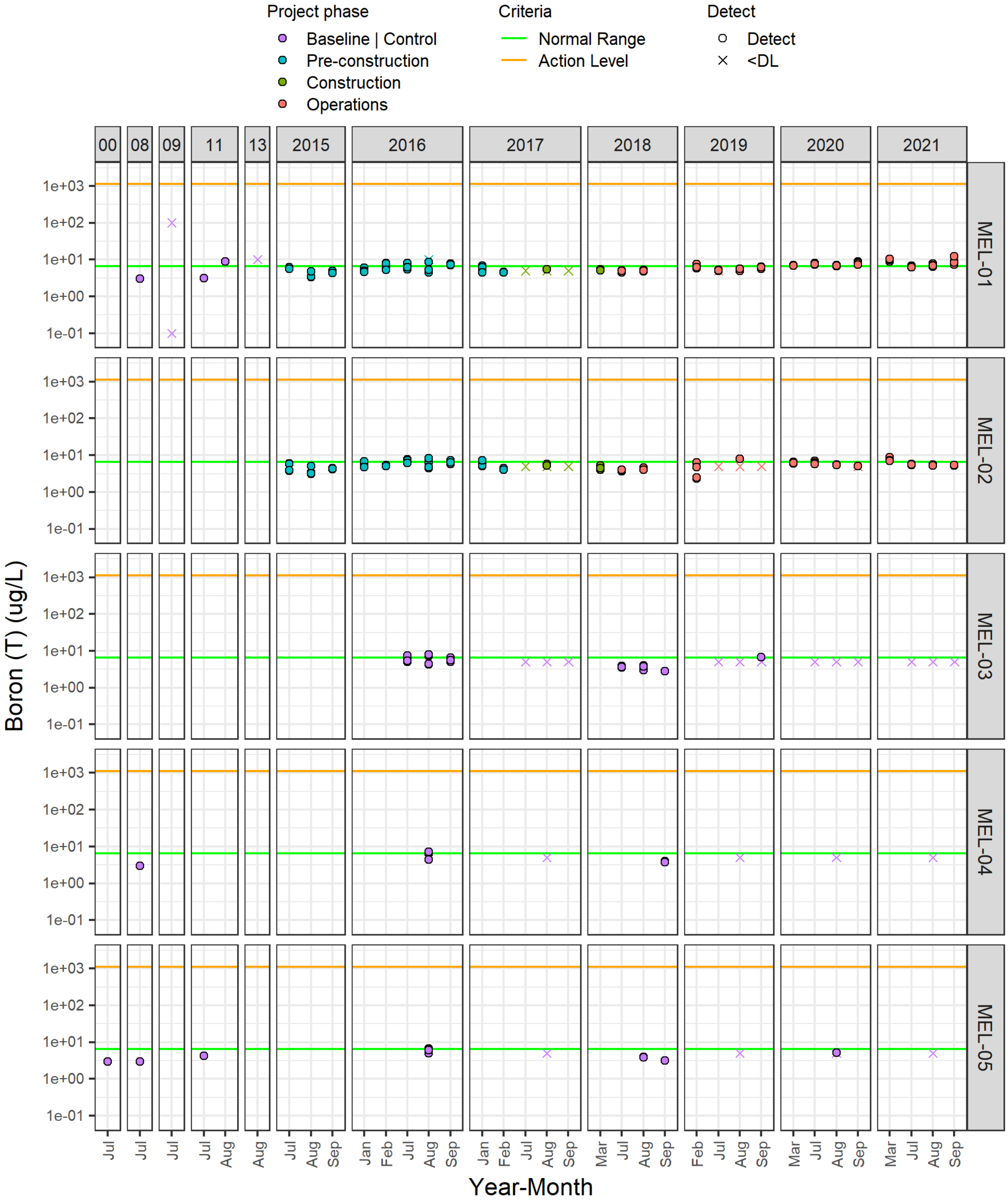


Figure C2-33. Total cadmium (µg/L)

Notes: The normal range for cadmium is equal to the current detection limit. The two lines for the Action Level represent the range in site-specific guidelines for protection of aquatic life for MEL-01 samples in 2021.

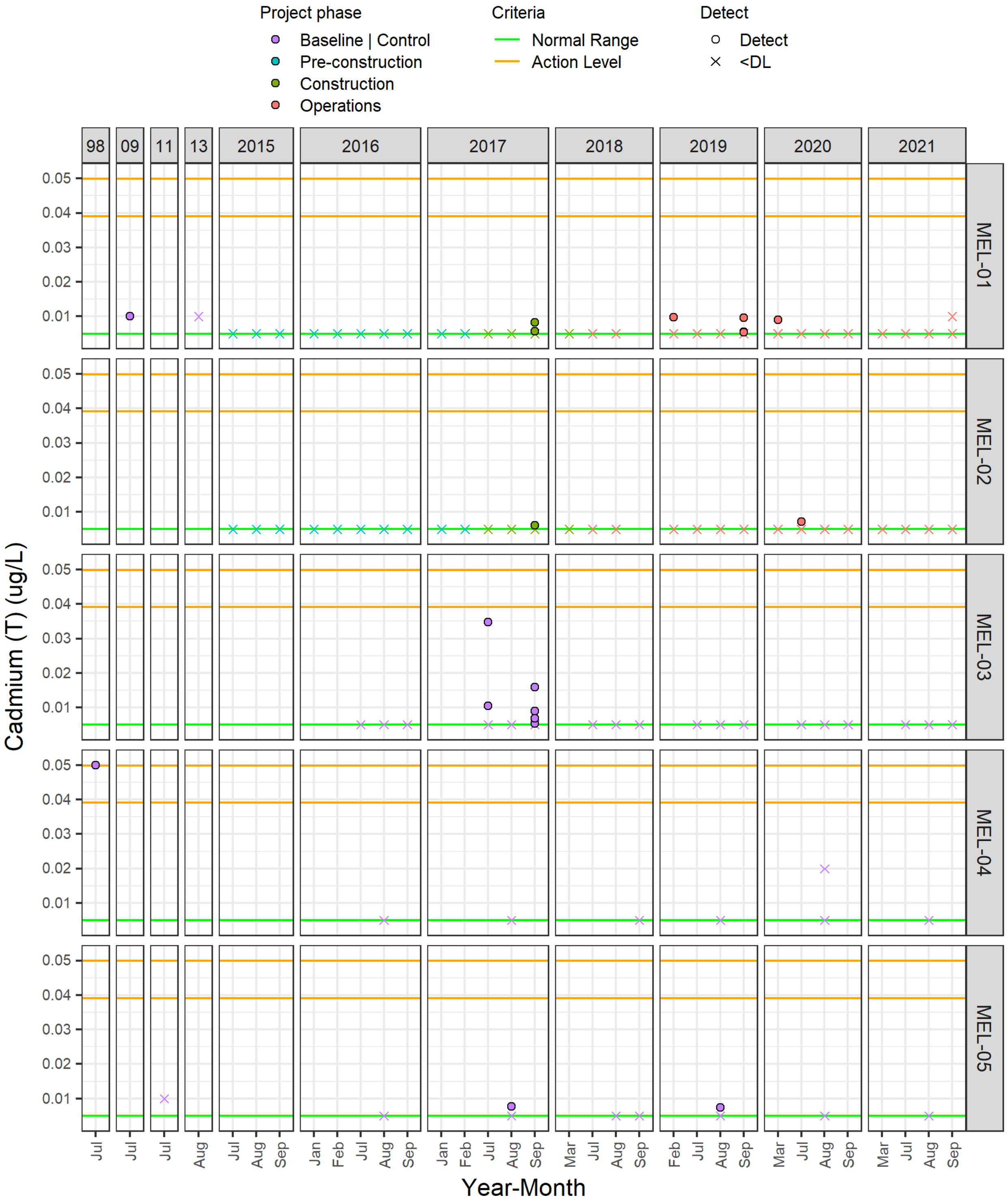


Figure C2-34. Total chromium (µg/L)

Notes: The normal range for chromium is equal to the current detection limit.

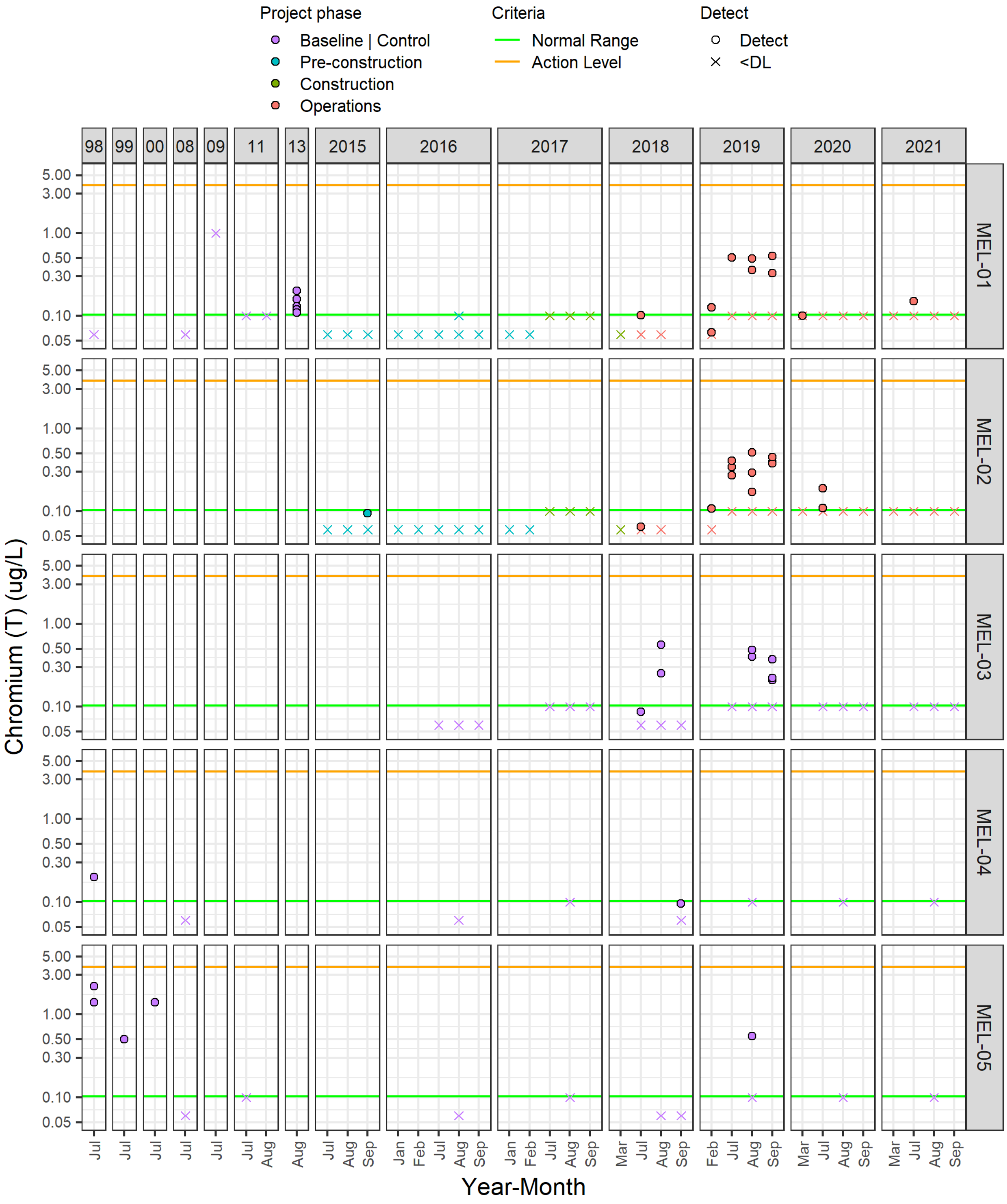


Figure C2-35. Total cobalt (µg/L)

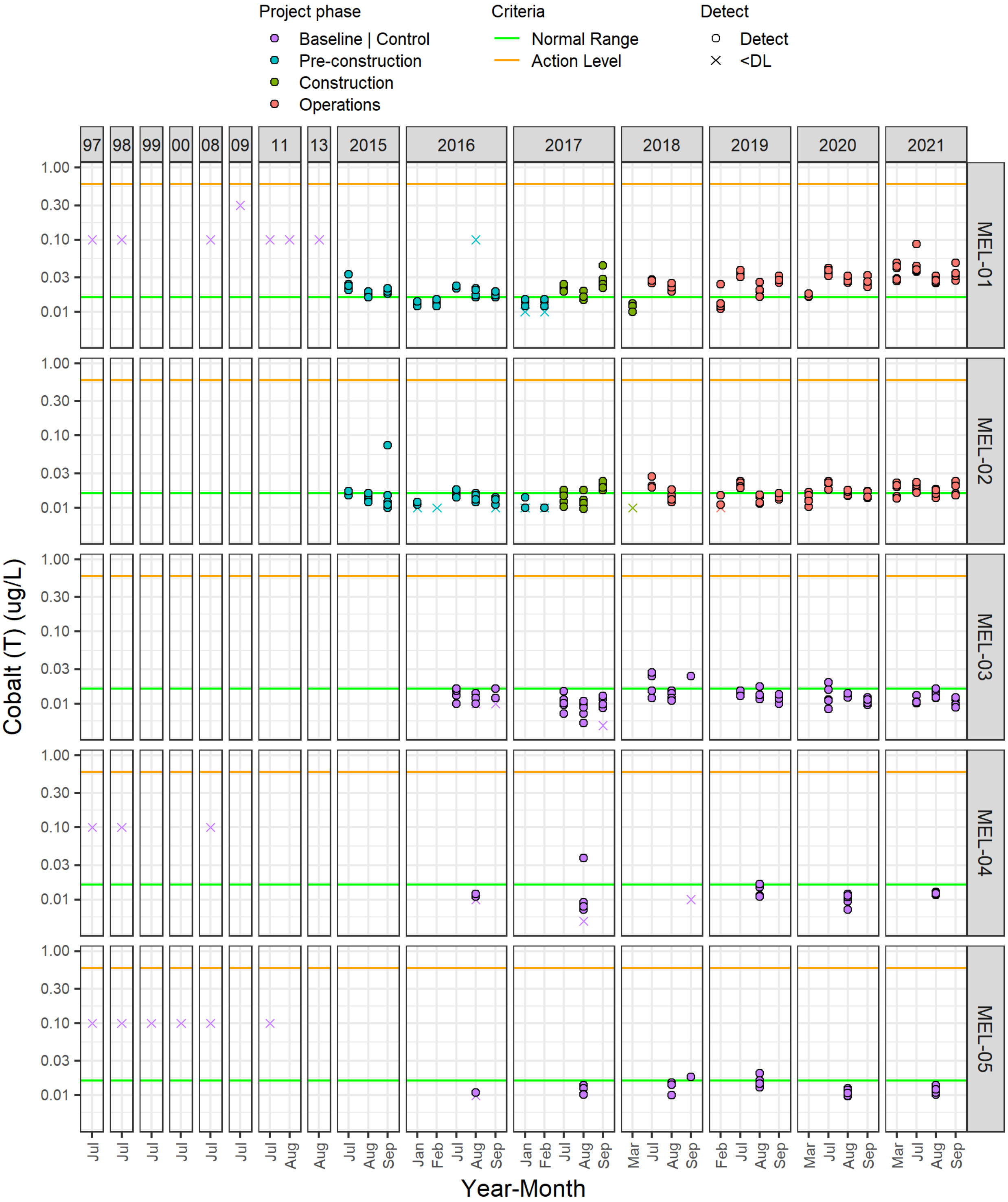


Figure C2-36. Total copper (µg/L)

Notes: The AEMP Benchmark for total copper is equal to 2 µg/L (CCME, 1987). As of 2021, the AEMP Action Level assessment for copper is based on the dissolved concentration. The new FEQG for dissolved copper is based on the biotic ligand model (ECCC, 2021). Refer to **Appendix C1** for information on the copper BLM.

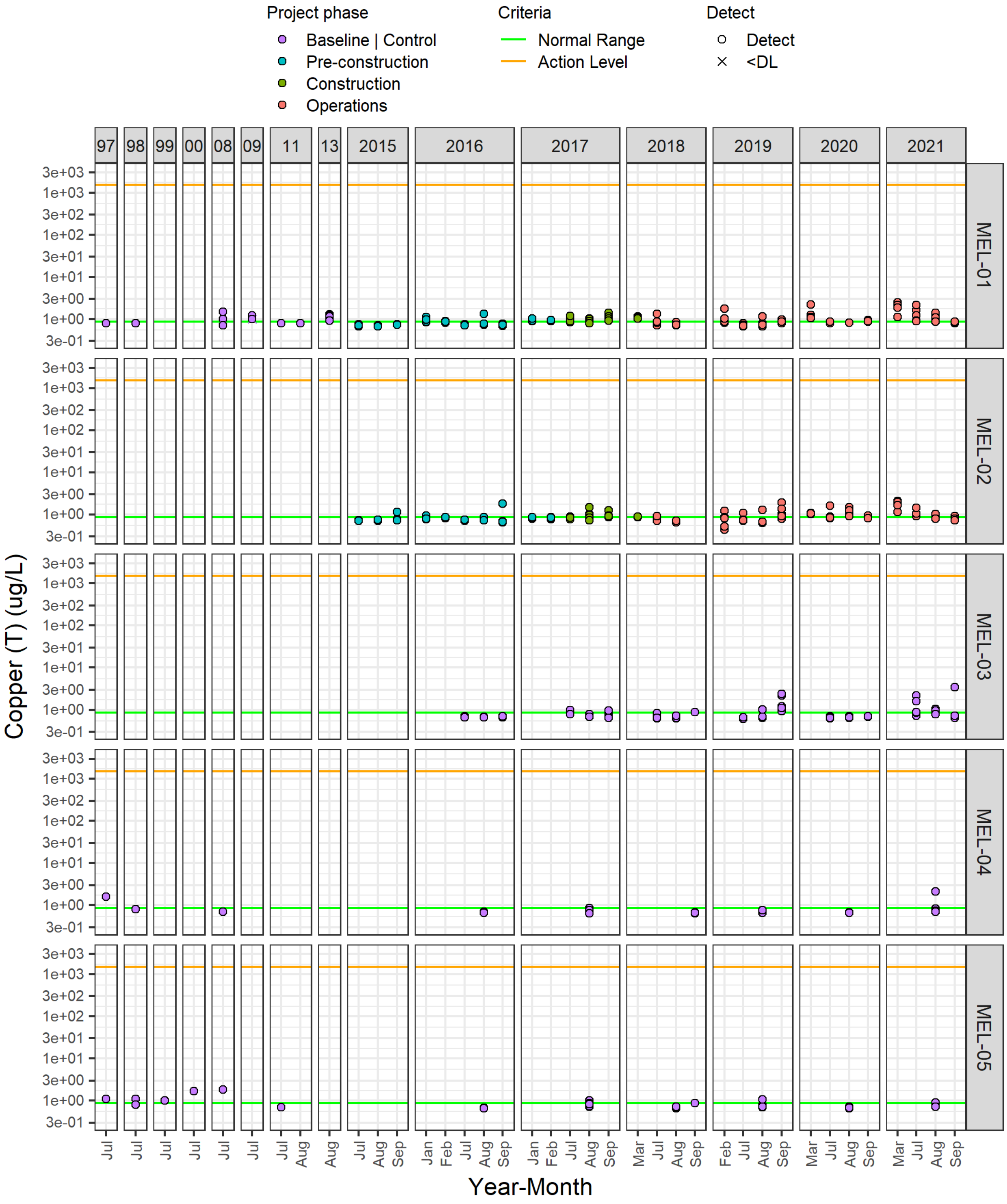


Figure C2-37. Total iron (µg/L)

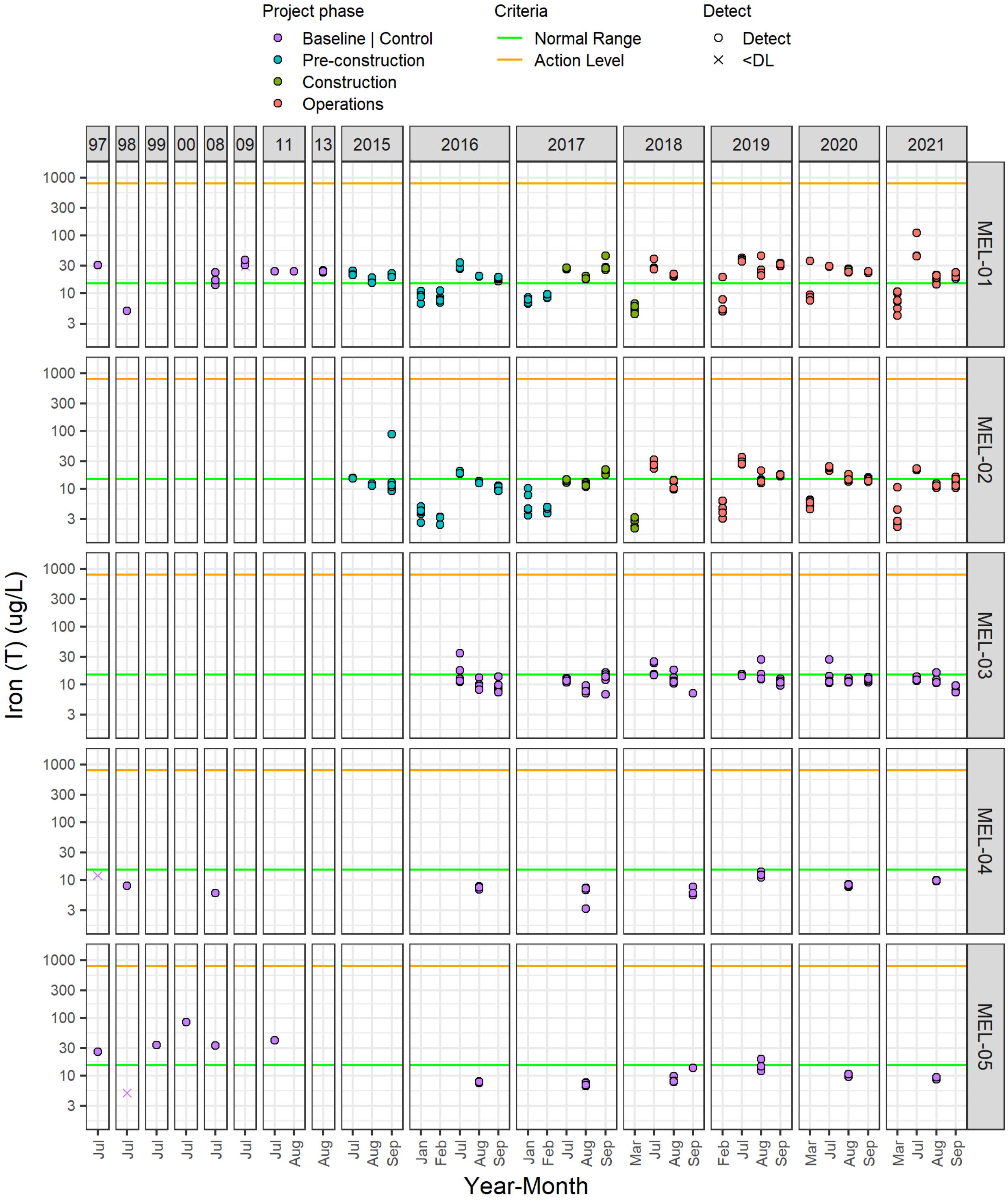


Figure C2-38. Total lead (µg/L)

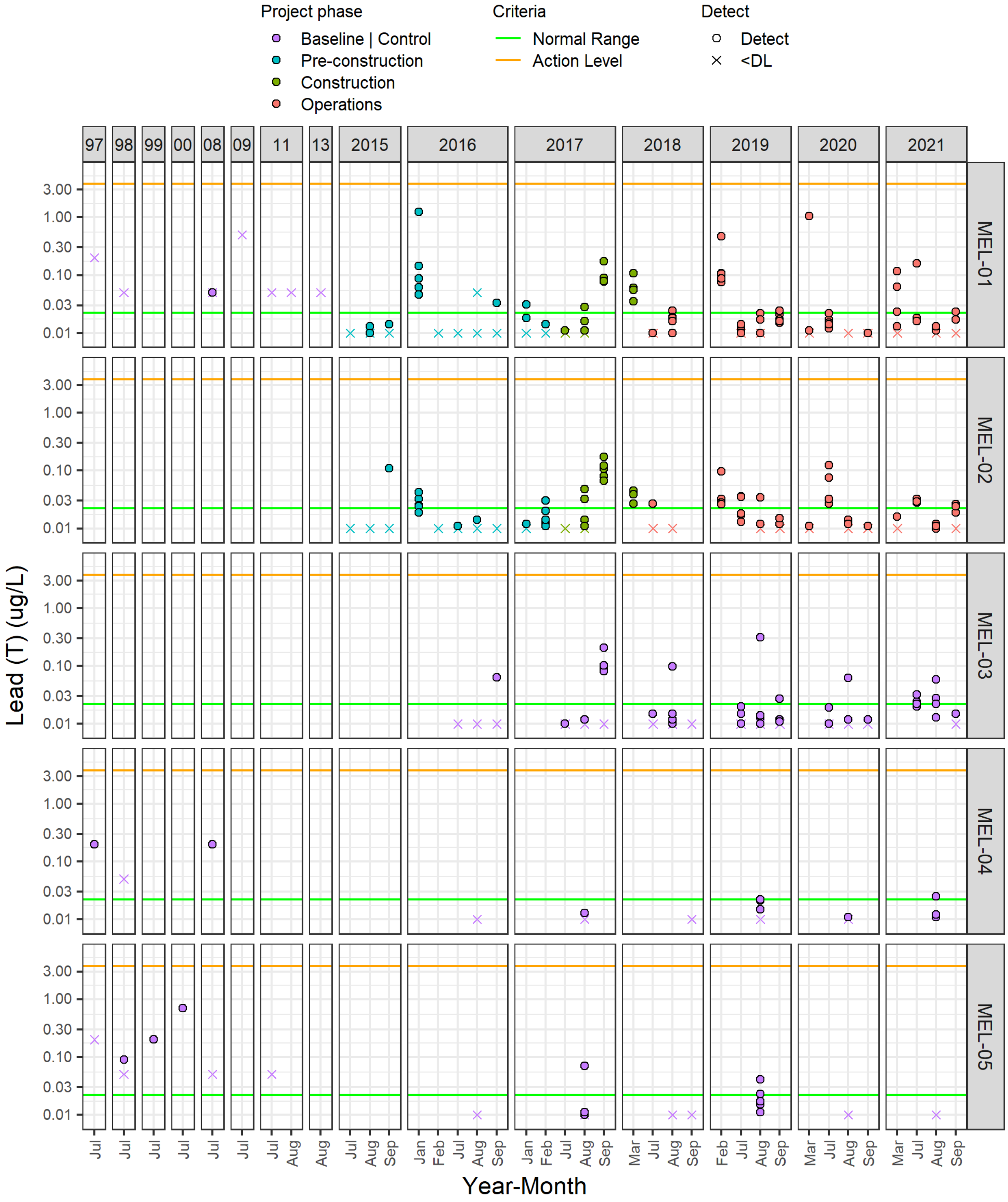


Figure C2-39. Total lithium (µg/L)

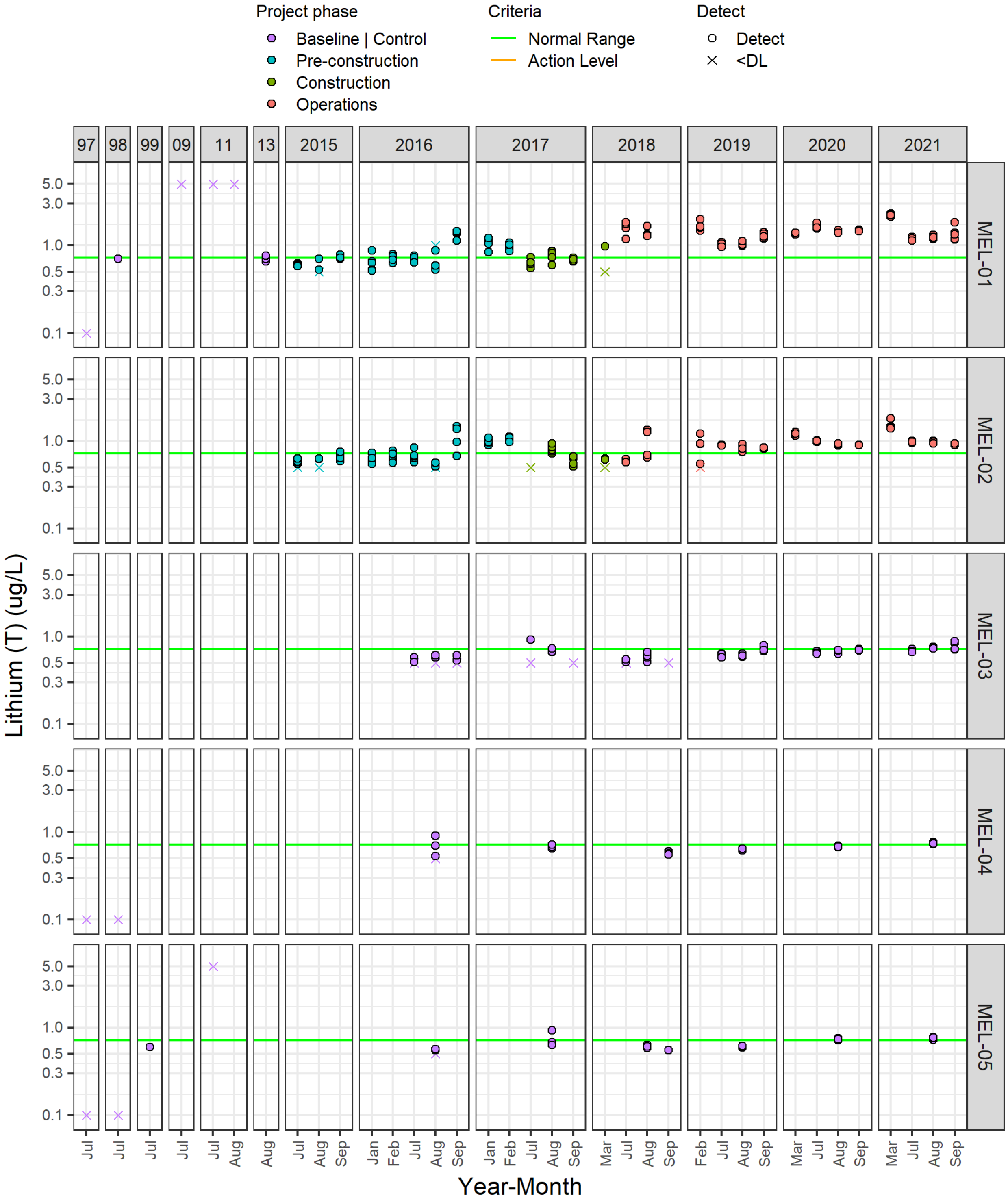


Figure C2-40. Total manganese (µg/L)

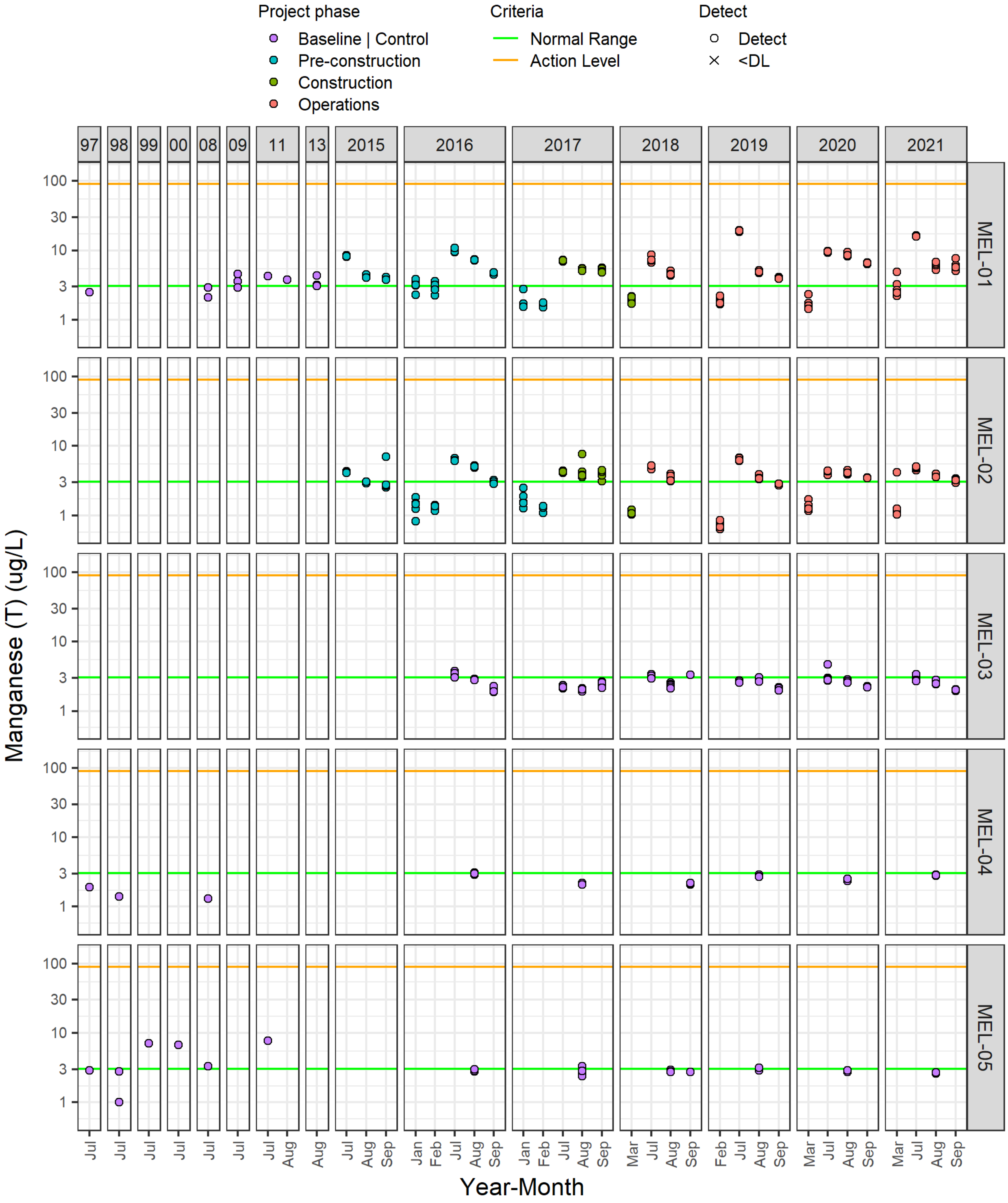


Figure C2-41. Total mercury (µg/L)

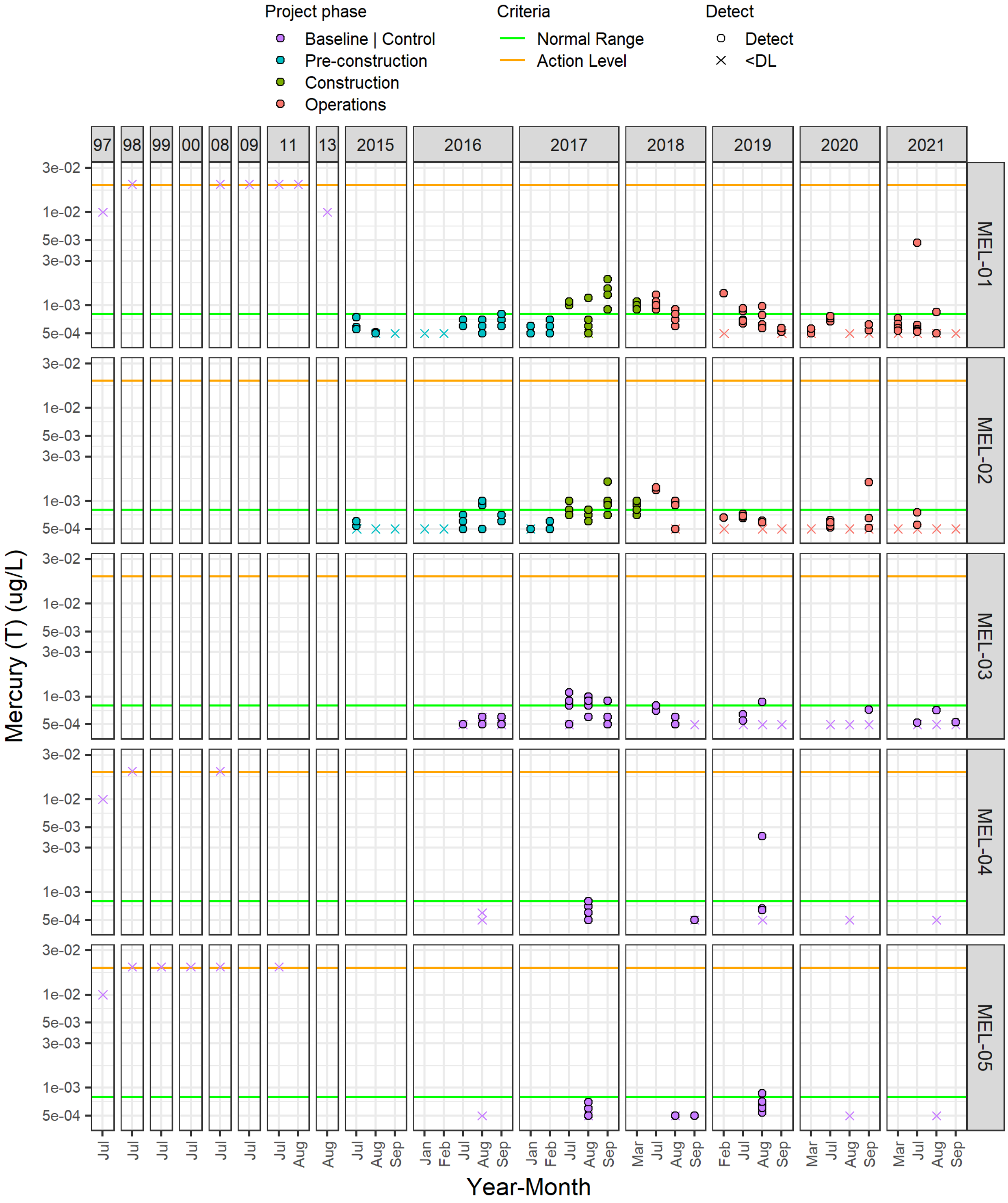


Figure C2-42. Total molybdenum (µg/L)

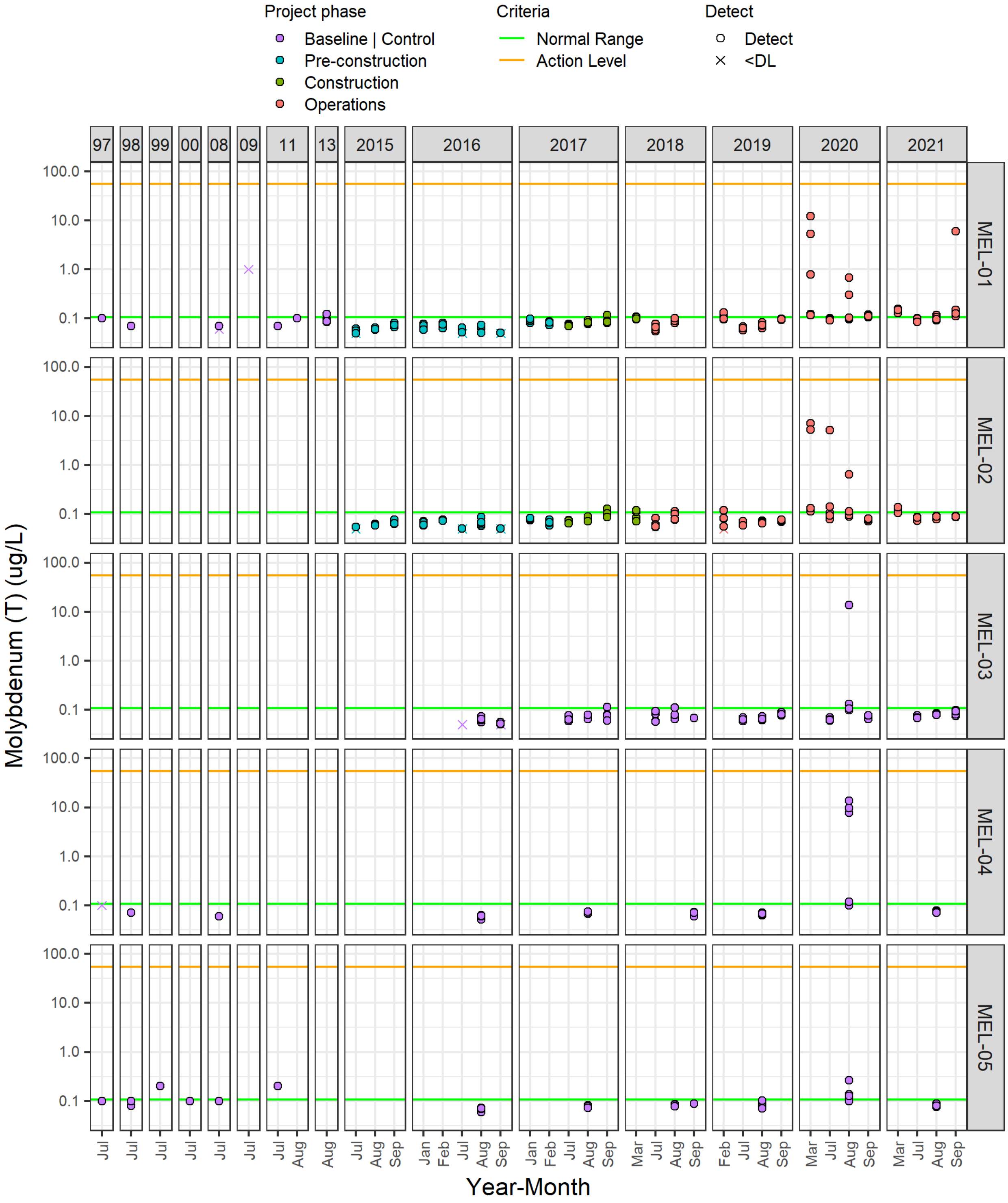


Figure C2-43. Total nickel (µg/L)

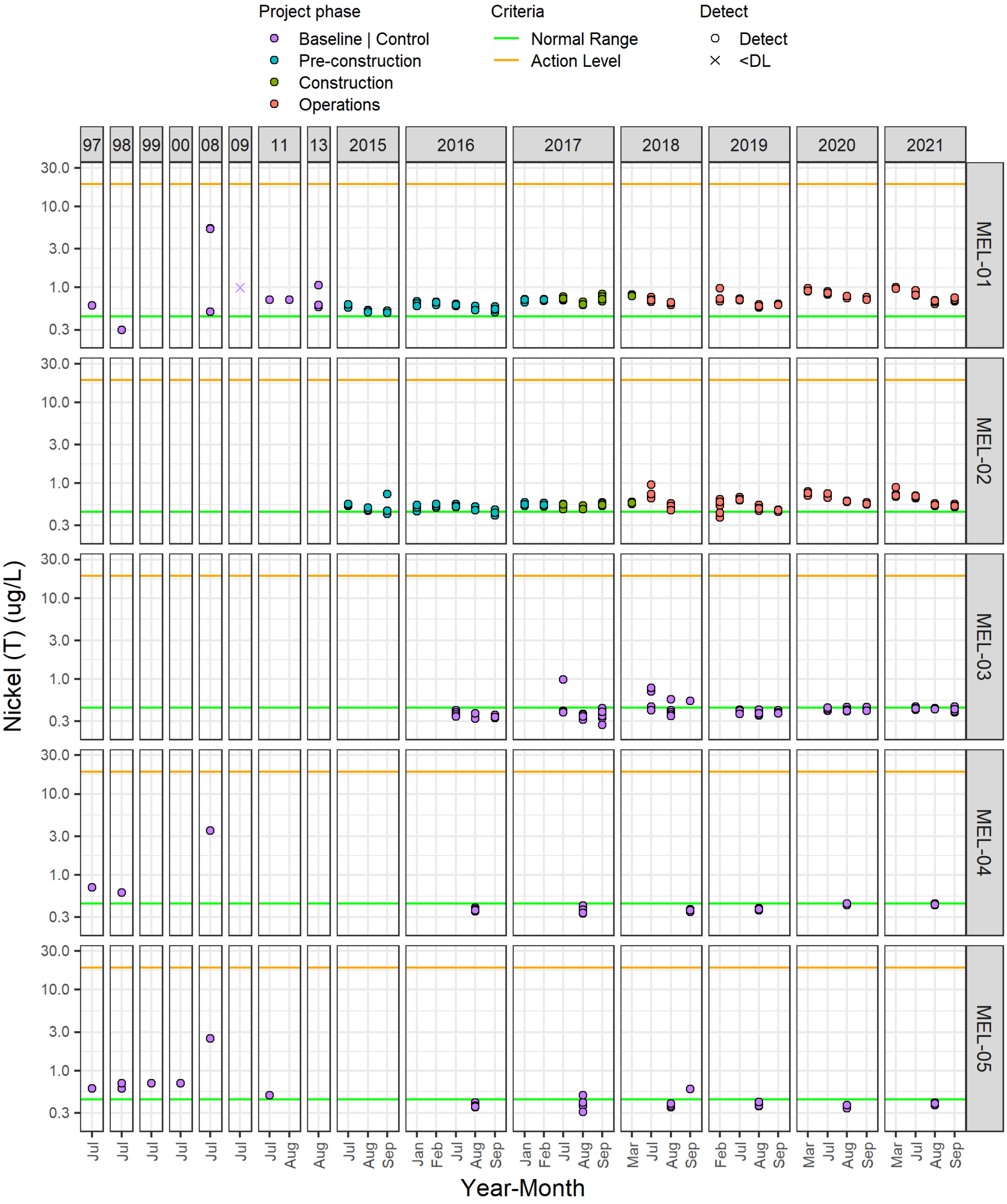


Figure C2-44. Total selenium (µg/L)

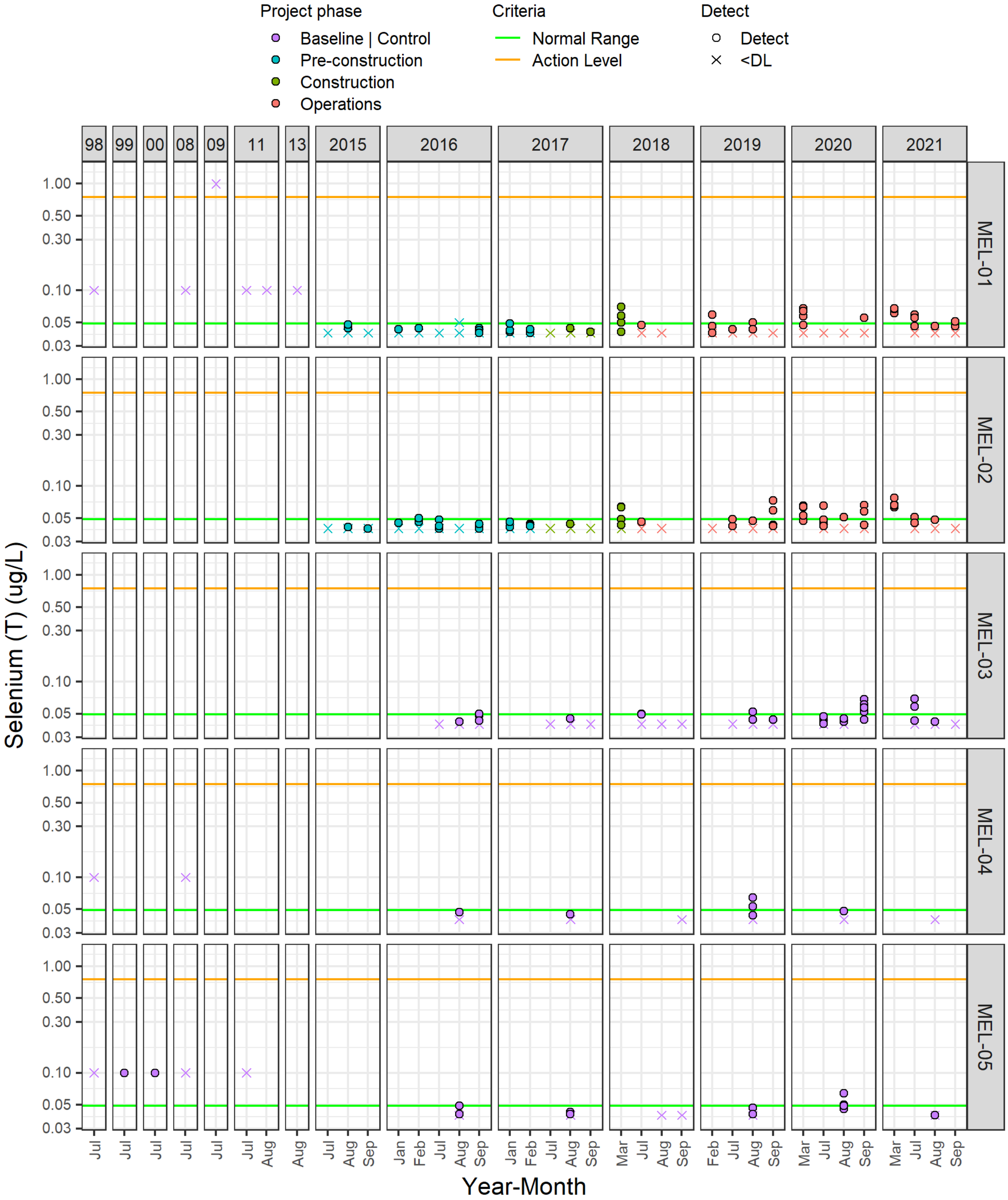


Figure C2-45. Total silver (µg/L)

Notes: The normal range for silver is equal to the current detection limit.

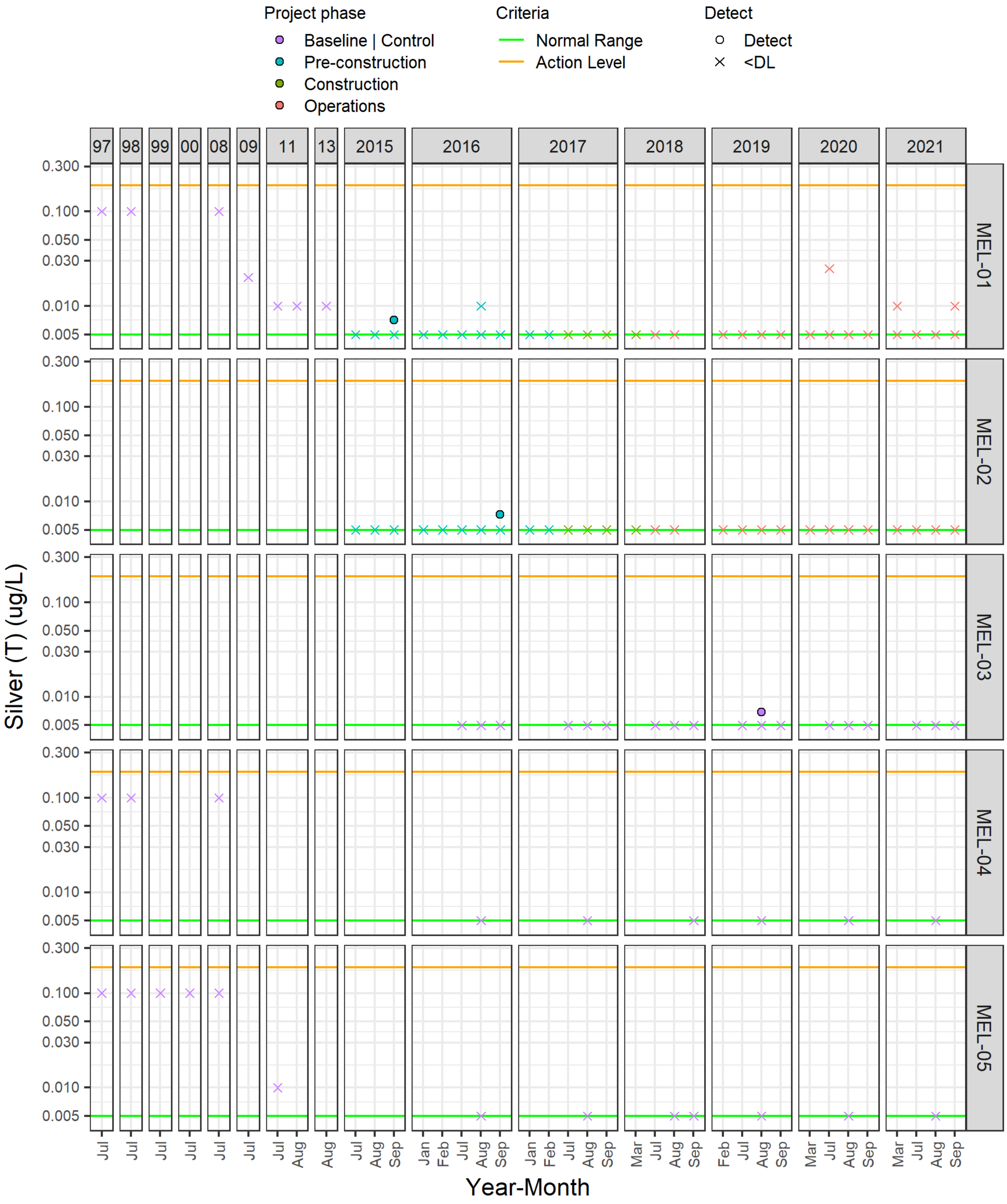


Figure C2-46. Total strontium (µg/L)

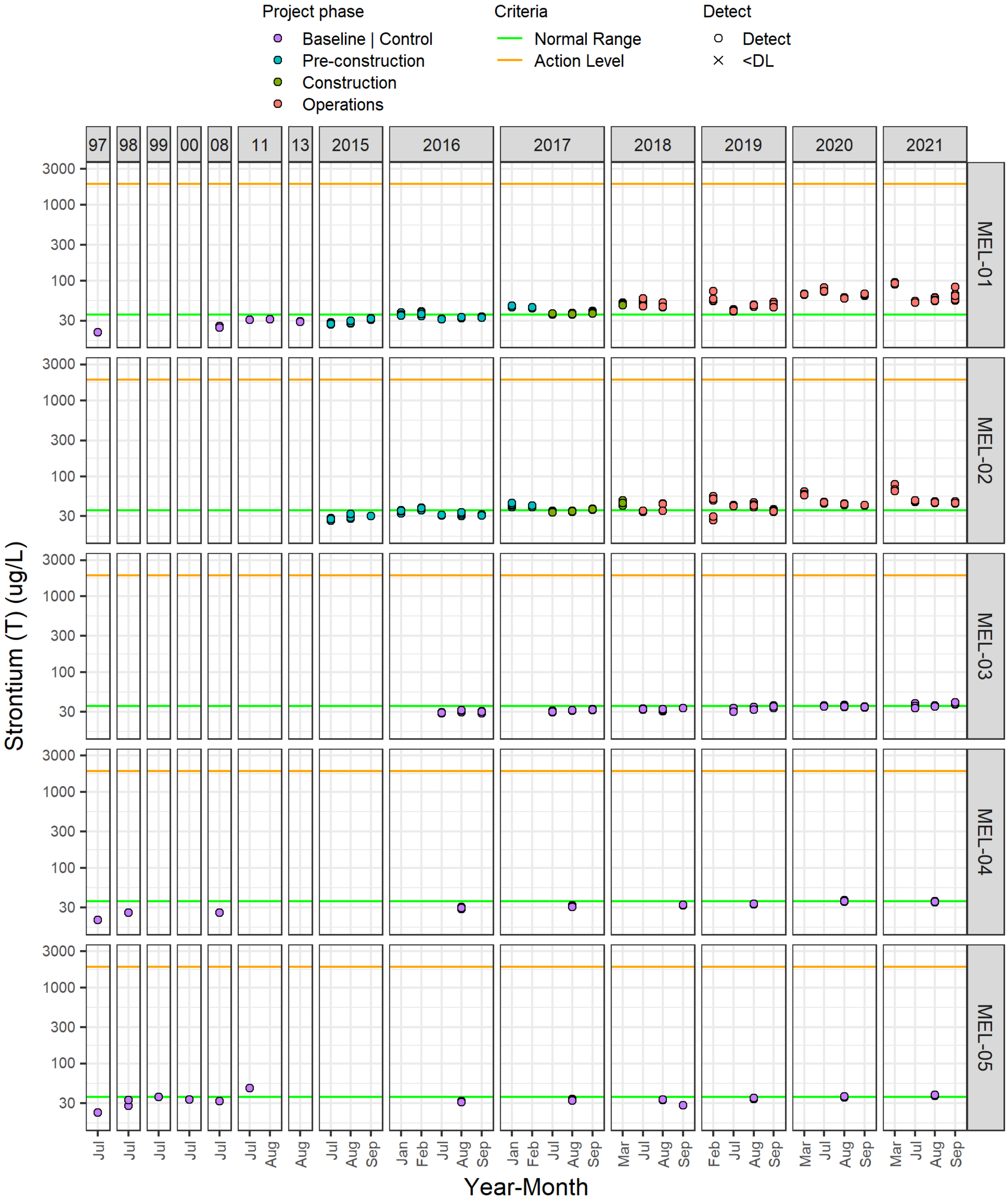


Figure C2-47. Total thallium (µg/L)

Notes: The normal range for thallium is equal to the current detection limit.

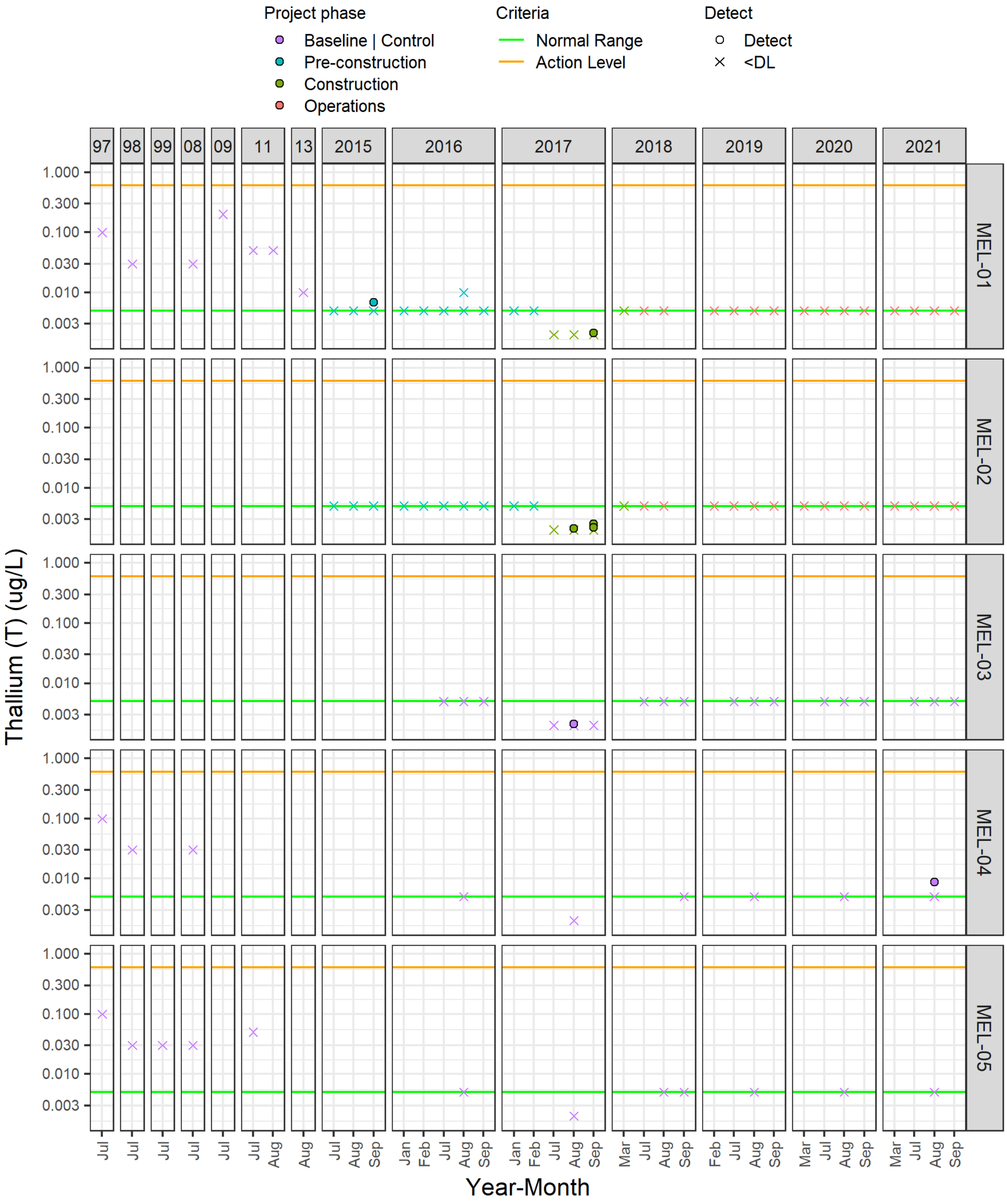


Figure C2-48. Total tin (µg/L)

Notes: The normal range for tin is equal to the current detection limit.

Figure C2-49. Total titanium (µg/L)

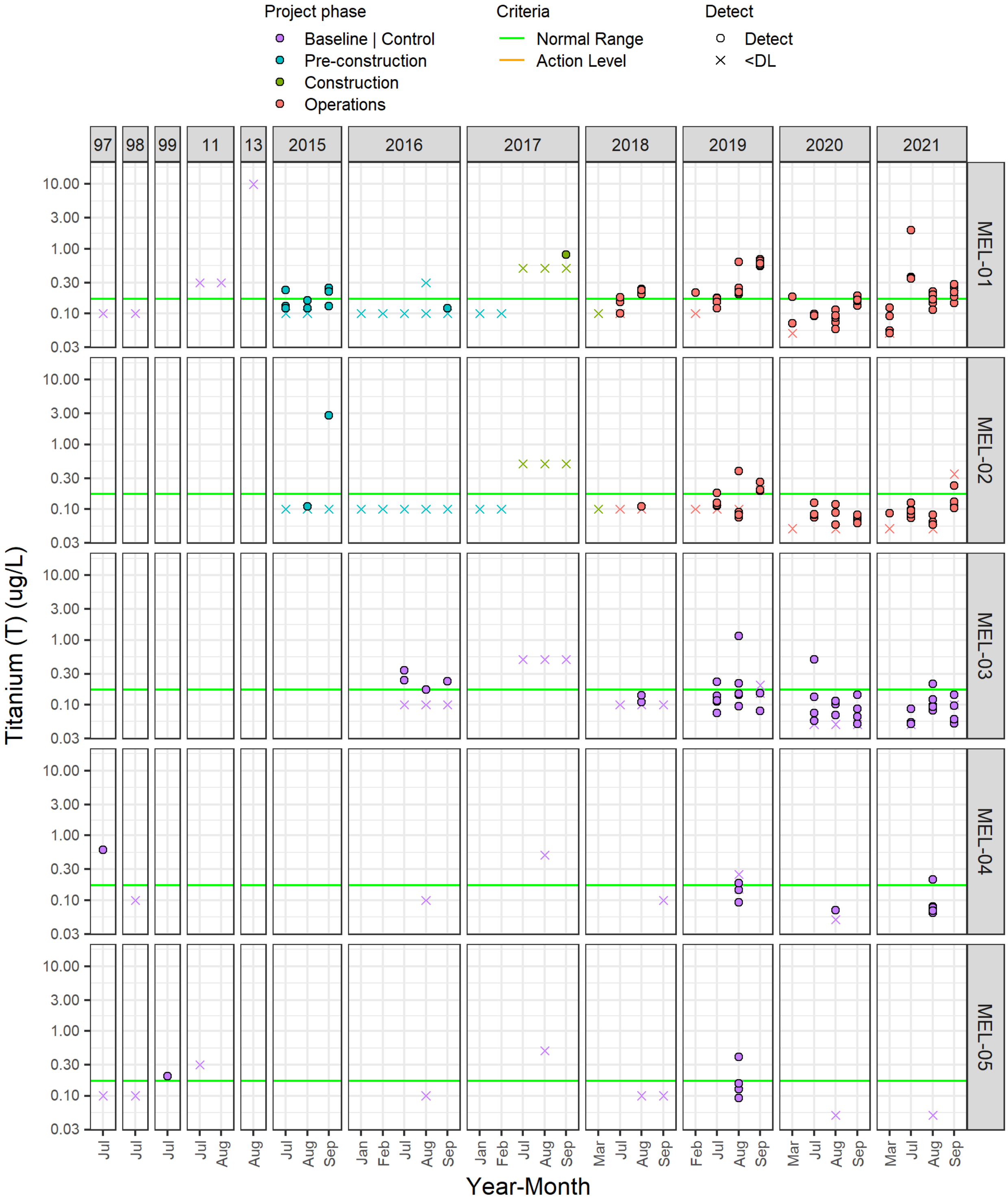


Figure C2-50. Total uranium (µg/L)

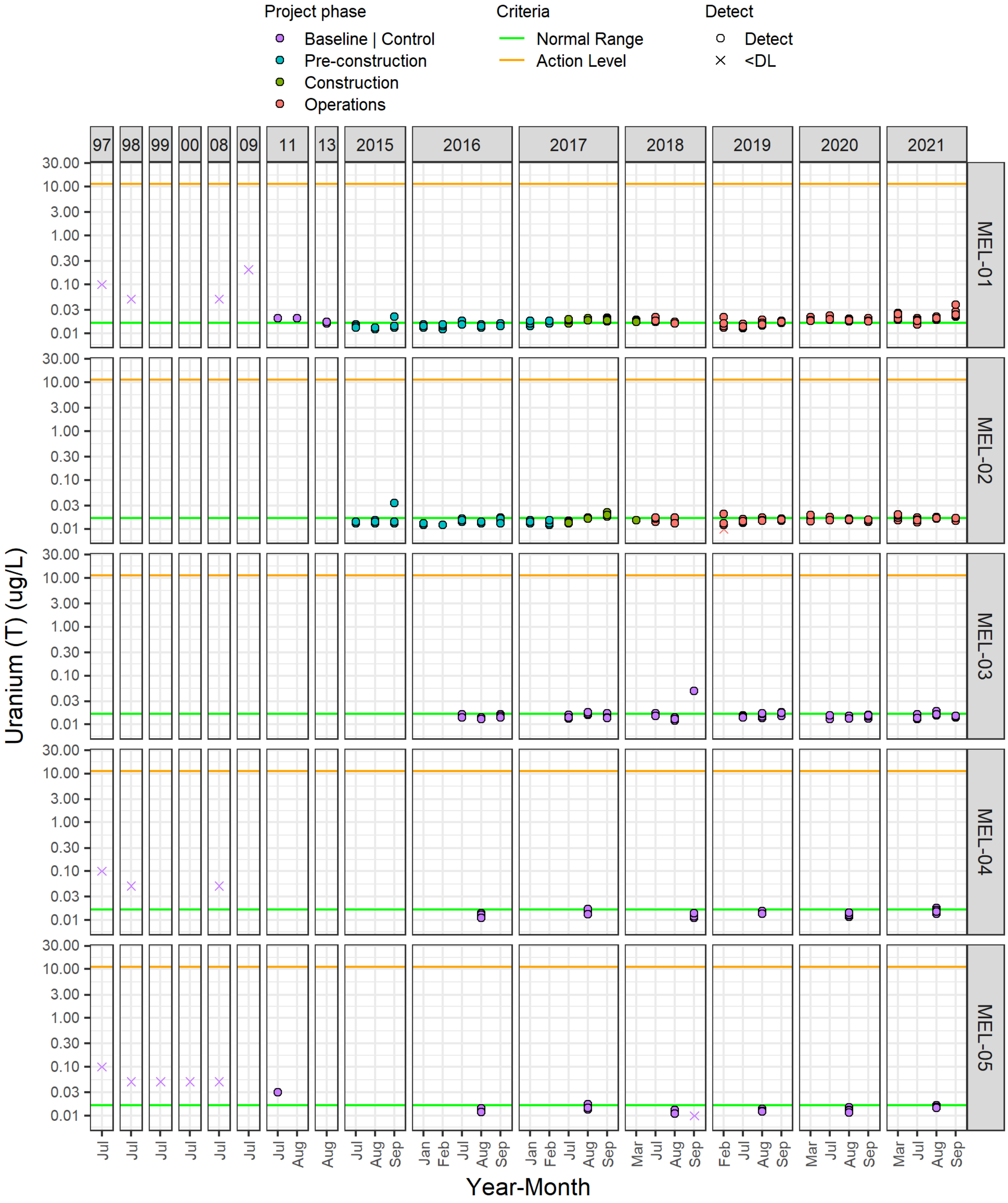


Figure C2-51. Total vanadium (µg/L)

Notes: The normal range for vanadium is equal to the current detection limit.

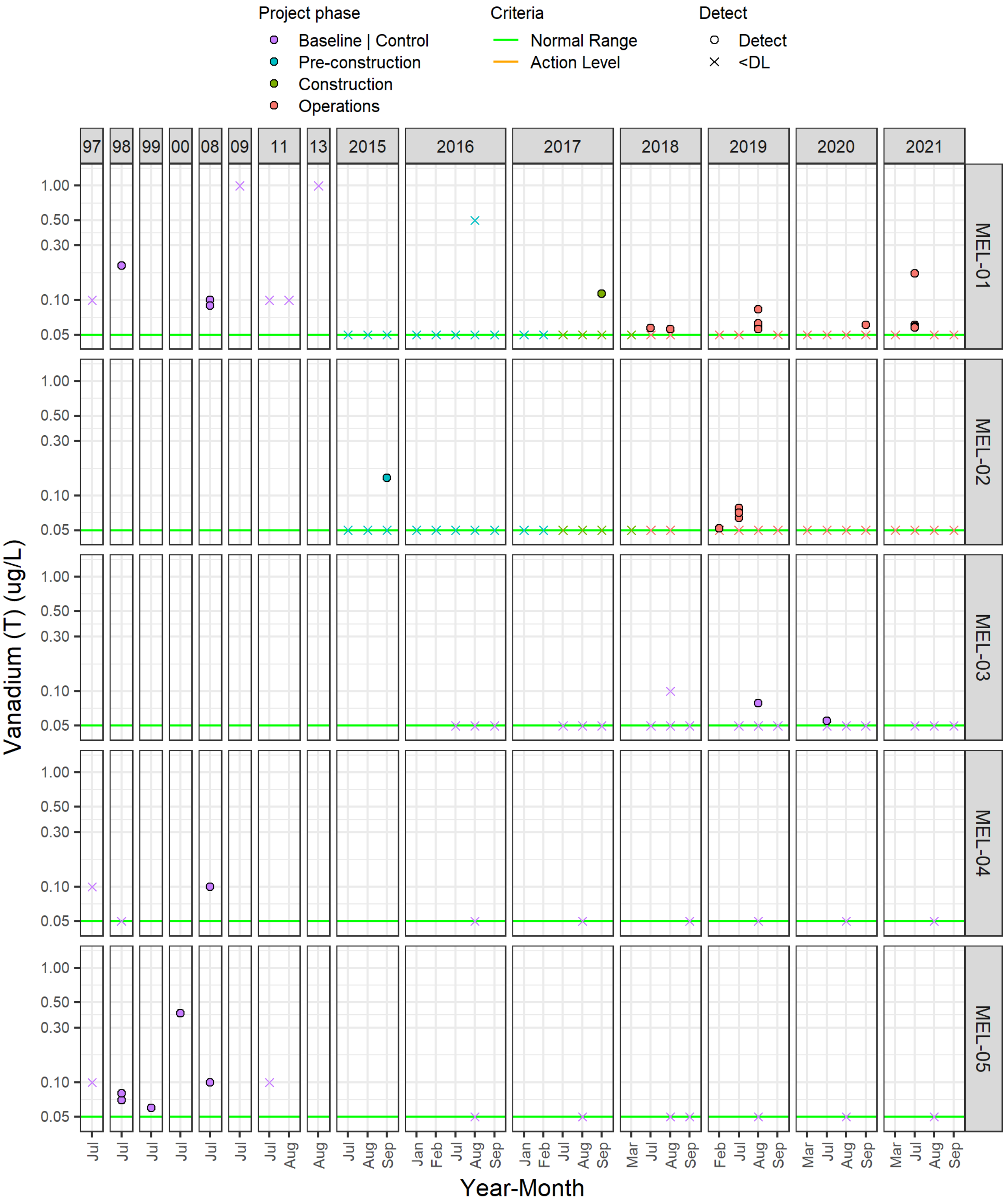


Figure C2-52. **Total zinc (µg/L)**

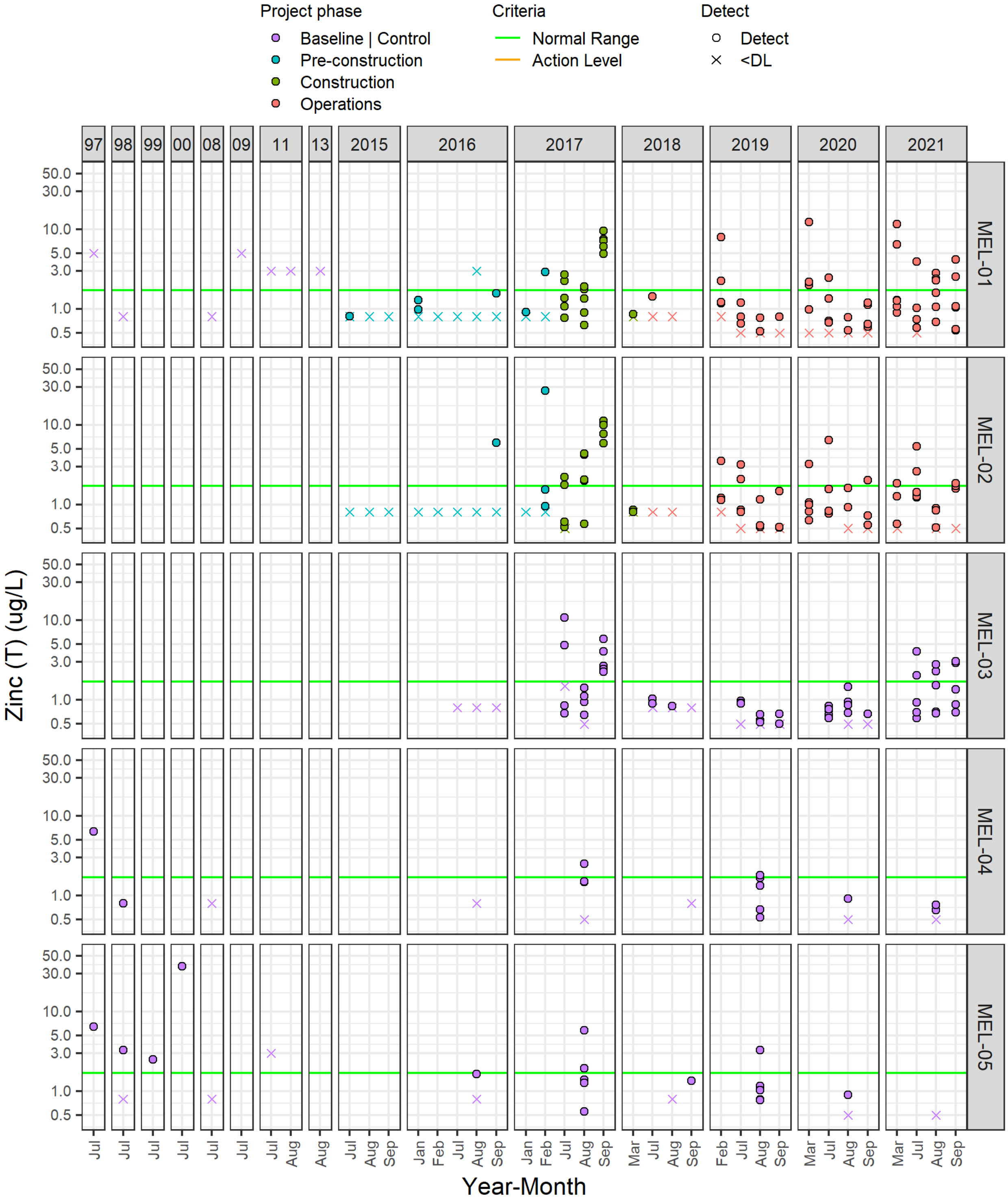


Figure C2-53. Dissolved copper (µg/L)

Notes: The AEMP Benchmark for dissolved copper is based on the copper BLM (ECCC, 2021). The two lines for the Action Level represent the range in site-specific guidelines for protection of aquatic life for open water samples at MEL-01 in 2021.

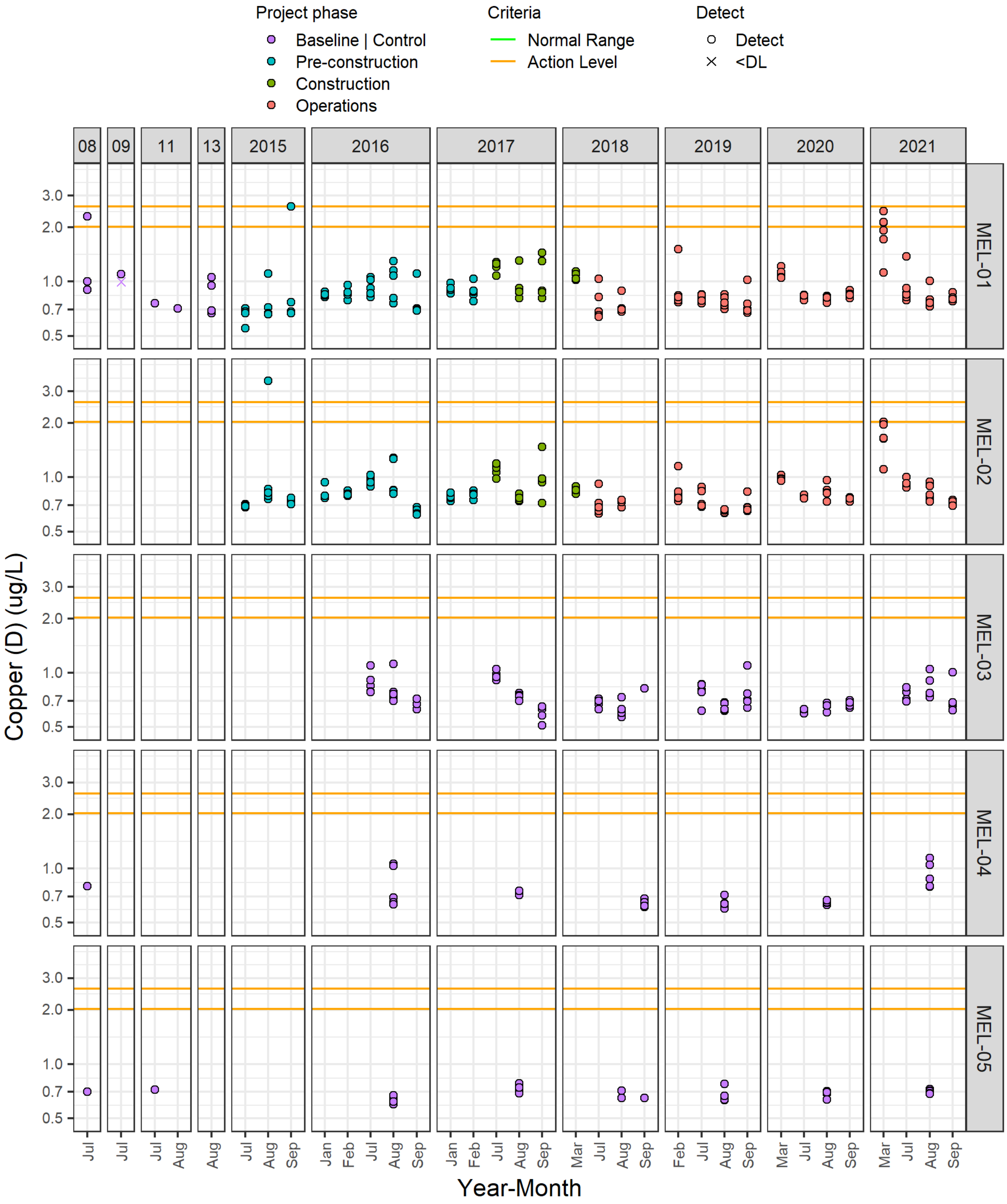


Figure C2-54. Dissolved lead (µg/L)

Notes: The two lines for the Action Level represent the range in site-specific guidelines for protection of aquatic life for open water samples at MEL-01 in 2021.

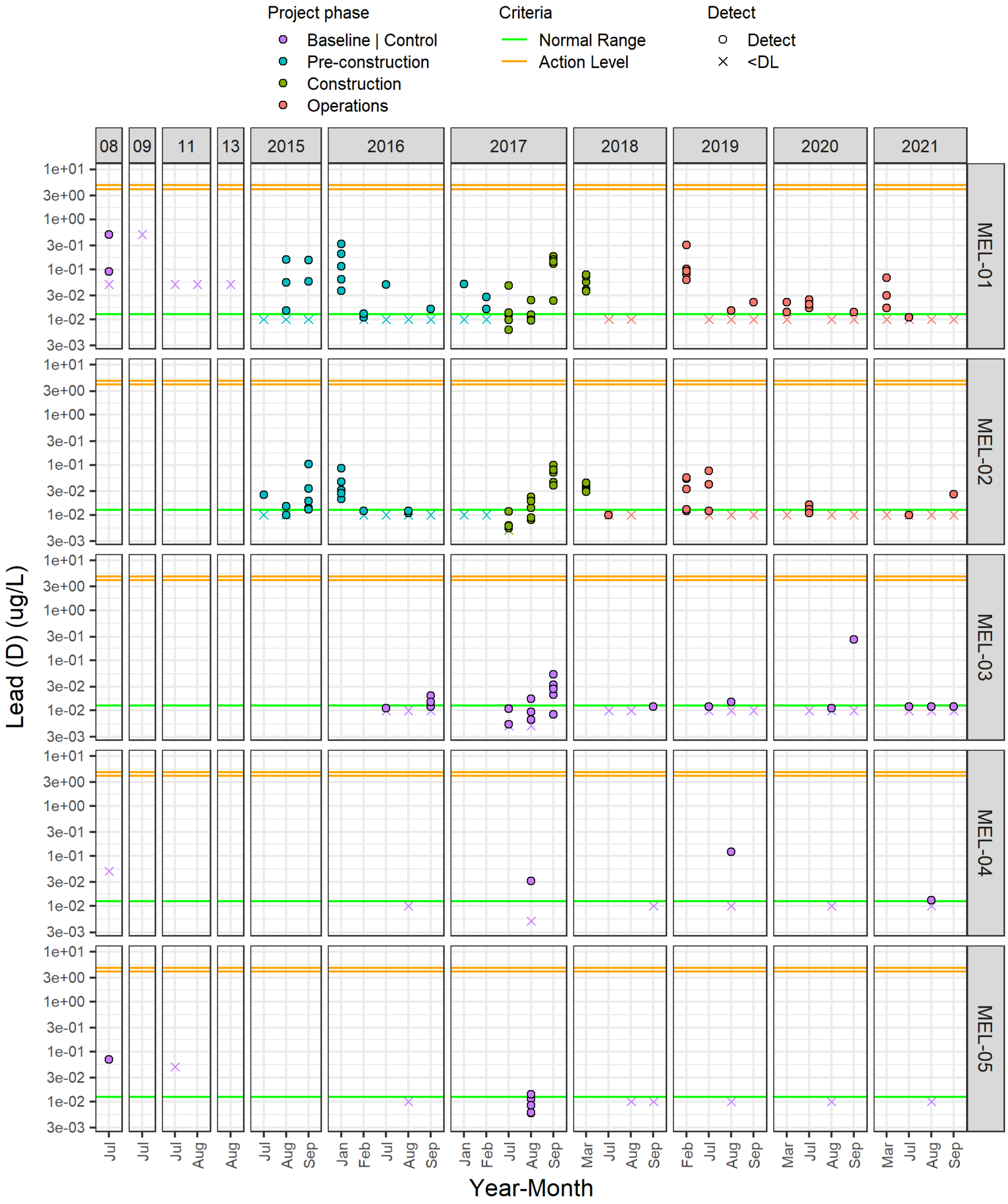


Figure C2-55. Dissolved manganese (µg/L)

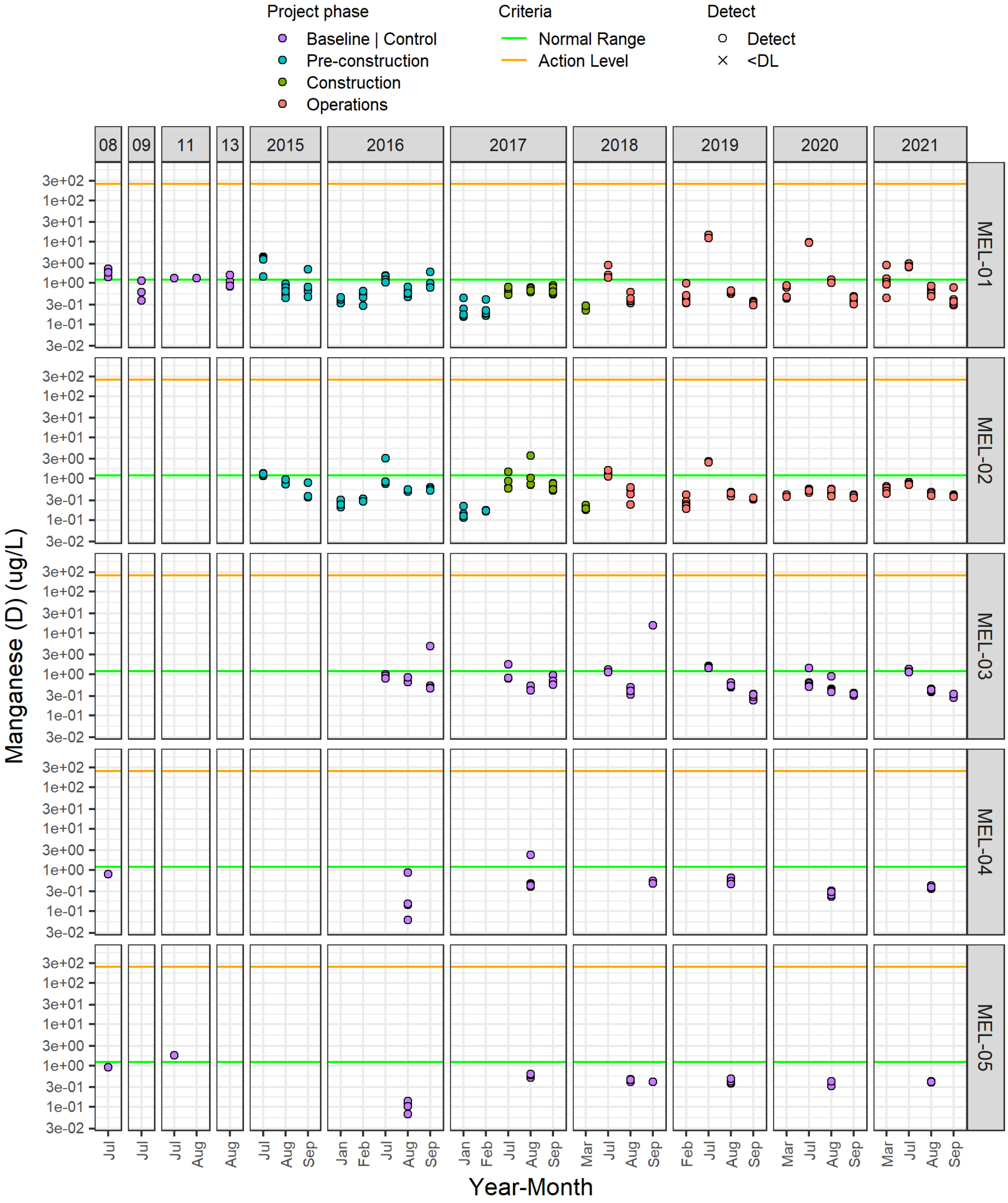
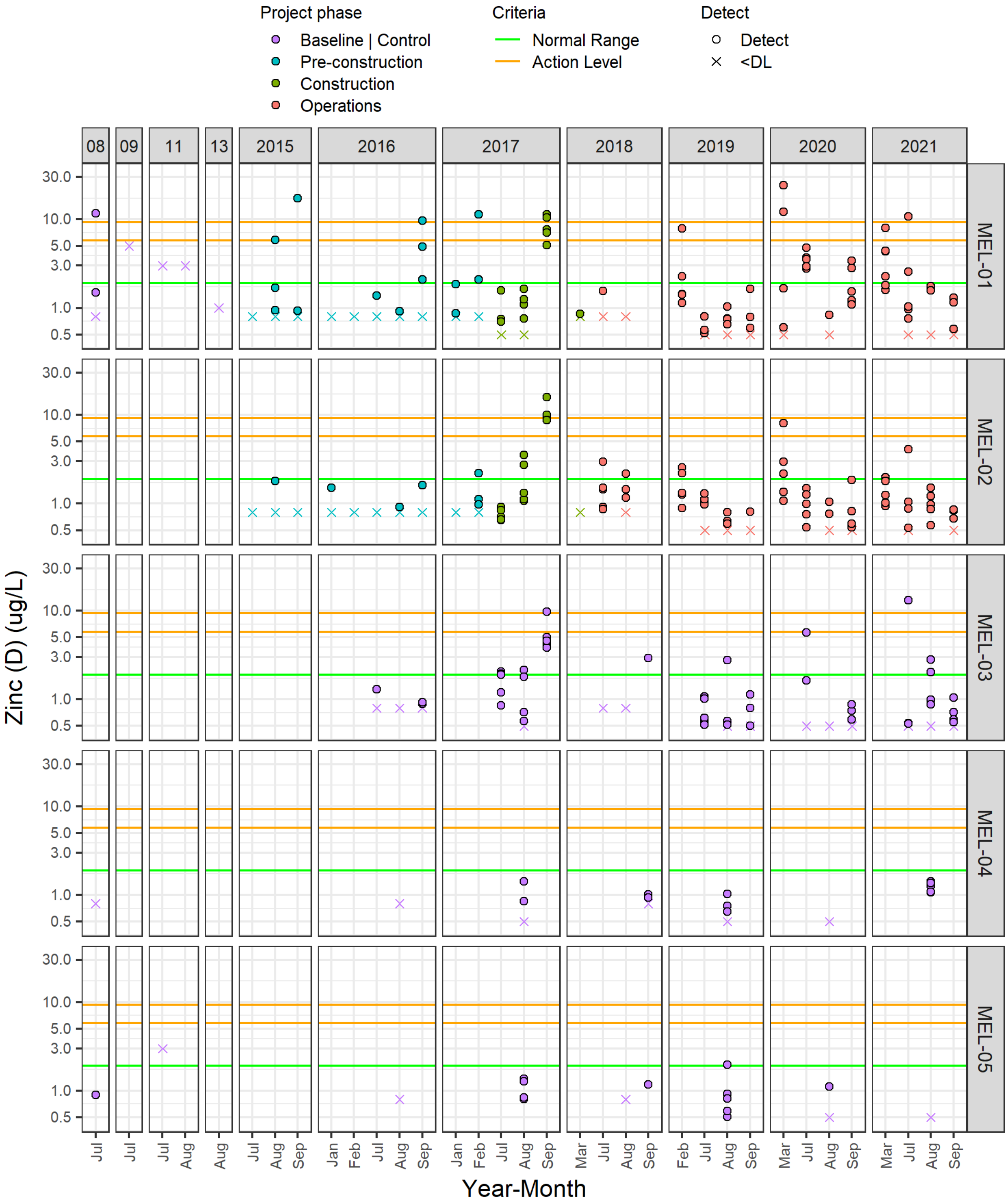


Figure C2-56. Dissolved zinc (µg/L)

Notes: The CCME guideline for dissolved zinc is hardness-dependent. The two lines for the Action Level represent the range in site-specific guidelines for protection of aquatic life for open water samples at MEL-01 in 2021.



Appendix C3

Meliadine Lake 2021 Surface Water Chemistry Results

Appendix C3
2021 Meliadine Lake Water Quality Results

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQ	Action Level (min | max)	Benchmark (min | max)	March										
										MEL-01						MEL-02				
										MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-01-10	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08
										3/12/2021	3/12/2021	3/12/2021	3/12/2021	3/12/2021	3/12/2021	3/15/2021	3/15/2021	3/15/2021	3/15/2021	3/15/2021
Field Measurements																				
Temperature	C	-	-	-	-	-	-	-	-	2.13	2	2.08	2.05	2	2.06	1.71	1.95	1.97	1.96	1.8
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-	147.7	148.8	148.4	147.7	151	148.1	114.2	117.1	111.5	113.1	129.1
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	6.97	7.03	7.2	7.21	7.11	7.03	7	7.12	7.13	6.93	6.62
DO (mg/L)	mg/L	-	-	-	6.5	-	-	6.5	6.5	14.51	14.07	14.35	15.18	16.31	13.55	14.04	14.16	-	13.15	15.34
DO (%)	%	-	-	-	-	-	-	-	-	105	101.1	103.4	109.8	118.2	97.4	102.8	103.7	100.2	95.8	112
Conventional Parameters																				
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-	149	148	156	156	153	152	127	119	121	124	137
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-	42.5	41.3	43.1	42.9	42.6	40.5	37	33.7	35.4	36.9	39.2
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.63	7.38	7.5	7.46	7.47	7.45	7.52	7.49	7.6	7.51	7.4
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500	87	80	83	72	76	76	74	65	66	53	58
Total Dissolved Solids (Calc)	mg/L	1	39.6	68	500	-	1000	375	500	75.2	72.8	77.8	78.5	76.4	74.7	62.7	58.4	60.2	62.5	68.4
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-	0.23	0.24	0.21	0.25	0.16	0.13	0.15	0.12	0.17	<0.1	0.18
Major Ions																				
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-	30.6	29.5	31.5	31.6	31	31.1	33.1	29.4	31.1	32.8	30.7
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-	25.1	24.2	25.8	25.9	25.4	25.5	27.1	24.1	25.5	26.9	25.2
Bromide	mg/L	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	12.9	12.6	13.1	13.1	13	12.3	11.5	10.4	11	11.5	12
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-	12.9	12.5	13.1	13.2	13.3	12.8	11.7	10.6	11.2	11.8	11.9
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120	23.7	23.1	25.1	25	24.6	24.3	16.7	16.3	16.3	16.7	20.5
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8	0.034	0.033	0.036	0.036	0.034	0.035	0.039	0.034	0.037	0.038	0.034
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	2.49	2.39	2.54	2.49	2.47	2.37	1.99	1.87	1.91	1.98	2.22
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-	2.43	2.37	2.49	2.5	2.52	2.44	2.01	1.84	1.9	2	2.17
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	1.6	1.56	1.65	1.64	1.6	1.53	1.52	1.35	1.45	1.51	1.52
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-	1.58	1.54	1.61	1.63	1.63	1.58	1.54	1.35	1.44	1.54	1.48
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-	0.333	0.439	0.313	0.332	0.318	0.326	0.369	0.351	0.357	0.371	0.427
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	11.2	10.6	11.3	12.1	11	10.5	8.12	7.78	7.87	8.14	9.61
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-	10.9	10.6	11.2	12.2	11.4	10.9	8.23	7.81	7.85	8.25	9.45
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-	8.09	7.88	8.52	8.46	8.39	8.28	6.58	6.21	6.3	6.53	7.33
Nutrients																				
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	0.141	-	-	0.105	0.141	0.0496	0.067	0.0468	0.045	0.0728	0.056	0.0374	0.0551	0.0581	0.0942	0.0369
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9	0.0212	0.0307	0.0203	0.0233	0.0203	0.0196	0.0054	0.0087	0.0062	<0.005	0.0255
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	0.0212	0.0307	0.0203	0.0233	0.0203	0.0196	0.0054	0.0087	0.0062	<0.0051	0.0255
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.352	0.602	0.31	0.366	0.375	0.31	0.268	0.312	0.282	0.246	0.292
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-	0.008	0.0068	0.0061	0.007	0.0042	0.0072	0.0053	0.0055	0.0063	0.0057	0.0049
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.302	0.339	0.275	0.301	0.283	0.273	0.268	0.275	0.246	0.291	0.323
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-	0.331	0.572	0.29	0.343	0.355	0.29	0.263	0.303	0.276	0.246	0.267
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.28	0.309	0.255	0.278	0.263	0.254	0.262	0.267	0.239	0.291	0.297
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-	0.0099	0.011	0.0097	0.0138	0.0104	0.0068	0.0065	0.0055	0.0083	0.005	0.01
Organic/Inorganic Carbon																				
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-	4.53	4.38	4.18	5.1	4.18	4.25	4.26	3.43	3.44	3.61	3.9
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-	4.16	4.08	4.26	4.22	4.19	4.29	3.58	3.47	3.67	3.58	3.8
Total Metals																				
Aluminum (T)	ug/L	1	5.32	9.1	100	-	-	75	100	1.1	1.6	1	3.4	1.4	2.8	<1	<1	1.4	<1	<1
Antimony (T)	ug/L	0.02	0.02	0.51	-	6	-	4.5	6	0.025	0.076	0.023	0.052	0.081	0.077	<0.02	<0.02	0.021	0.076	0.02
Arsenic (T)	ug/L	0.02	0.275	3.8	5	10	25	18.8	25	0.578	0.521	0.578	0.613	0.578	0.574	0.464	0.441	0.444	0.446	0.503
Barium (T)	ug/L	0.02	8.05	77	-	1000	-	750	1000	13.3	12.9	13.4	14.1	13.6	12.7	13.5	12	13	13.3	14.2
Beryllium (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (T)	ug/L	5	6.52	23	1500	5000	-	1120	1500	9.7	9	10.1	10.4	9.9	10.4	7.3	7.2	7	7.2	8.9
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.05	0.043 | 0.067	5	-	0.032 | 0.050	0.043 | 0.067	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0104	0.0101	0.0106	0.011	0.0106	0.0102	0.0114	0.0101	0.0109	0.0118	0.0101
Chromium (T)	ug/L	0.1	0.103	1.1	5	50	-	3.75	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (T)	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78	0.0476	0.0265	0.0288	0.0405	0.028	0.0427	0.0144	0.0134	0.0203	0.0193	0.0221
Copper (T)	ug/L	0.05	0.86	2	-	2000	-	1500	2000	1.1	2.46	1.88	2.08	2.17	1.84	1.95	1.63	1.65	2.06	1.14
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (T)	ug/L	1	15	42	300	-	1060	795	1060	5.5	10	4.1	10.8	7.3	7.5	2.2	2.8	4.4	2.5	10.7
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.016	0.02	0.015	0.023	0.015	0.019	0.011	0.012	0.02	0.011	0.022
Lead (T)	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5	<0.01	0.117	0.013	0.063	0.013	0.023	<0.01	<0.01	0.016	<0.01	<0.01
Lithium (T)	ug/L	0.5	0.72	-	-	-	-	-	-	2.19	2.12	2.32	2.29	2.22	2.23	1.46	1.42	1.39	1.45	1.81
Manganese (T)	ug/L	0.05	3.06	5.5	-	120	-	90	120	3.24	4.9	2.21	2.67	2.68	2.47	1.04	1.25	1.03	1.09	4.21
Mercury (T)	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026	0.00053	0.00063	0.00057	0.00072	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (T)	ug/L	0.05	0.107	5.2	73	-	-	54.8	73	0.14	0.129	0.149	0.155	0.151	0.149	0.123	0.106	0.139	0.127	0.109
Nickel (T)	ug/L	0.05	0.441	2.7	25	-	-	18.8	25	1.01	0.972	0.968	0.967	1	0.963	0.726	0.687	0.703	0.732	0.892
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	2.17	2.1	2.22	2.2	2.22	2.17	2.24	1.95	2.11	2.24	2.07
Selenium (T)	ug/L	0.04	0.049	0.16	1	50	-	0.75	1	0.068	0.061	0.068	0.067	0.067	0.068	0.077	0.065	0.066	0.063	0.067
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	147	184	134	162	140	173	158	144	150	153	173
Silver (T)	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (T)	ug/L	0.02	36.1	-	2500	7000	-	1880	2500	93.4	90.1	95	94.7	96.4	92.5	67.2	64.1	64.2	67.6	79.4
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	3170	2990	3220	4180	3120	3150	2530	2370	2430	2480	2790
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (T)	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (T)	ug/L	0.02	0.0384	-	-	-	-	-	-	<0.02	<0.02	<0.02	1.19	<0.02	0.071	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (T)	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-	<0.05	0.055	<0.05	0.123	0.05	0.091	<0.05	<0.05	0.087	<0.05	<0.05
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (T)	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15	0.0189	0.0206	0.019	0.0259	0.0195	0.0249	0.017	0.0189	0.0196	0.0149	0.0182
Vanadium (T)	ug/L	0.05	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	0.0076	<0.005	0.0138	0.0058	<0.005	<0.005	<0.005	0.0059	<0.005	0.0068
Zinc (T)	ug/L	0.5	1.7	6.7	-	-	-	-	-	1.29	0.89	1.07	6.41	1.27	11.5	1.27	<0.5	1.85	0.57	<0.5
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Metals																				
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	1.6	<1	1.2	3.9	<1	1.1	<1	<1	<1	<1	<1
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	0.028	0.136	0.026	0.059	0.104	0.092	0.021	0.02	0.02	0.076	0.02
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	0.566	0.516	0.568	0.645	0.556	0.573	0.453	0.437	0.452	0.444	0.485
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	13.6	13.4	13.5	14	13.2	12.8	13.3	12	12.8	13.6	13.9
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (D)	ug/L	5	-	-	-	-	-	-	-	10.4	9.1	10.2	10.6	10.6	10	7.8	7.3	6.2	7.2	8.6
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0109	0.0109	0.011	0.0114	0.0109	0.0109	0.0114	0.0101	0.0112	0.0119	0.0097
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0571	0.0199	0.0217	0.0468	0.0275	0.0329	0.0138	0.0133	0.012	0.0198	0.0181
Copper (D)	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83	1.12	2.46	1.93	2.12	2.14	1.72	1.96	1.64	1.65	2.02	1.11
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (D)	ug/L	1	-	-	-	-	-	-	-	3.9	4	3.1	10.4	3.3	3.1	1.8	2.9	1.9	1.4	5
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	0.016	0.014	0.016	0.022	0.014	0.015	0.013	0.013	0.013	0.011	0.018
Lead (D)	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36	0.03	<0.01	0.017	0.067	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	2.23	2.07	2.18	2.25	2.16	2.08	1.4	1.41	1.29	1.41	1.82
Manganese (D)	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330	0.973	0.44	1.27	2.73	1.04	0.935	0.591	0.495	0.431	0.654	0.598
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	0.00053	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.151	0.13	0.155	0.154	0.146	0.143	0.119	0.117	0.12	0.133	0.113
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	1.01	0.968	0.998	1.02	0.986	0.925	0.71	0.694	0.71	0.718	0.921
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	2.18	2.12	2.25	2.24	2.2	2.09	2.22	1.96	2.1	2.21	2.12
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	0.064	0.057	0.064	0.067	0.061	0.063	0.07	0.062	0.063	0.06	0.059
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	143	178	133	167	135	135	153	144	146	152	172
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (D)	ug/L	0.02	-	-	2500	-	-	1880	2500	94.6	90.9	96.3	94.3	94.1	89.8	65.7	63.1	63.3	65.5	79.8
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	3640	3100	3210	4340	3130	3340	2510	2380	2450	2500	2820
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	1.29	<0.02	<0.02	1.21	<0.02	0.507	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	0.155	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0262	0.0247	0.0224	0.023	0.024	0.0218	0.0187	0.0171	0.0179	0.018	0.0171
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0074	<0.005	0.008	0.0074	<0.005	0.0073	0.0103	0.0051	0.0076	<0.005	0.0107
Zinc (D)	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4	2.27	1.59	4.39	7.99	1.81	4.33	1.99	1.24	1.02	1.79	0.94
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Other																				
Cyanide (free)	mg/L	0.001	-	0.0004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	103	102	99.6	102	99.8	95.5	98.2	97.8	98.8	99.1	100
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	<0.0068	<0.0064	<0.0069	<0.0036	<0.0051	<0.0051	<0.0052	<0.0046	<0.0056	<0.0041	<0.0037

Notes

DL = 2021 detection limits	FWAL = freshwater aquatic life guideline
HH DW = Health Canada drinking water quality guidel	SSWQO = site-specific water quality objective

FEIS = predicted concentrations at the edge of the mixing zone (Agnico Eagle, 2014).

2021 Meliadine Lake Water Quality Results

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQ	Action Level (min | max)	Benchmark (min | max)	July										
										MEL-01						MEL-02				
										MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-01-10	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08
										7/18/2021	7/18/2021	7/18/2021	7/18/2021	7/18/2021	7/18/2021	7/19/2021	7/19/2021	7/19/2021	7/17/2021	7/19/2021
Field Measurements																				
Temperature	C	-	-	-	-	-	-	-	-	10.54	10.48	10.58	10.48	10.48	10.5	11.46	11.55	11.45	11.22	11.72
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-	97.9	98.5	99	98	97	98.2	90.4	90.2	90.6	90.2	91.1
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.54	7.6	7.5	7.53	7.66	7.54	7.44	7.59	7.66	7.35	7.63
DO (mg/L)	mg/L	-	-	-	6.5	-	-	6.5	6.5	11.24	11.26	11.25	11.26	11.21	11.26	10.85	11.3	11.4	11.18	11.29
DO (%)	%	-	-	-	-	-	-	-	-	100.8	100.8	101	100.9	100.5	100.9	99.6	103.7	104.4	102	104.1
Conventional Parameters																				
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-	99.7	99.3	99.3	99.1	108	98	88.1	88.8	88.1	88.2	88.5
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-	27	26.6	26.2	26.8	27.2	27	24.2	25.1	24.7	24	24.1
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.4	7.38	7.41	7.43	7.54	7.43	7.36	7.34	7.34	7.35	7.35
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500	55	55	52	50	57	53	52	50	50	49	52
Total Dissolved Solids (Calc)	mg/L	1	39.6	68	500	-	1000	375	500	47.8	47.7	47.5	48.2	50	47.6	42	42.6	42.5	42.2	42
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-	<1	1.9	1.6	1.5	<1	<1	<1	<1	1.4	1.3	<1
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-	0.91	1.11	1.12	0.72	0.72	0.66	0.58	0.54	0.73	0.41	0.35
Major Ions																				
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-	21	20.9	20.3	21.6	25.4	20.7	20.1	20	20	20.3	20
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-	17.2	17.1	16.6	17.7	20.8	17	16.5	16.4	16.4	16.6	16.4
Bromide	mg/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	8.2	8.09	7.88	8.2	8.3	8.25	7.44	7.83	7.67	7.39	7.4
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-	8.05	8.14	8.03	8.05	7.78	8.05	7.54	7.77	7.58	7.61	7.61
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120	14.2	14.3	14.4	14.4	14.1	14.2	11.7	12	11.9	12	11.9
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8	0.022	0.023	0.023	0.023	0.023	0.023	0.024	0.023	0.023	0.023	0.023
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	1.59	1.55	1.57	1.54	1.58	1.56	1.36	1.35	1.35	1.34	1.37
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-	1.57	1.53	1.55	1.5	1.51	1.53	1.39	1.42	1.4	1.41	1.44
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	1.15	1.14	1.16	1.12	1.18	1.12	1.05	1.04	1.03	1	1.02
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-	1.11	1.09	1.09	1.07	1.08	1.08	1.04	1.08	1.05	1.06	1.09
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-	0.409	0.422	0.416	0.418	0.412	0.414	0.268	0.274	0.268	0.275	0.272
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	7.36	7.14	7.31	7.24	7.33	7.21	6.1	6.04	6.06	6.04	6.14
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-	7.16	6.93	7.03	6.94	6.9	7.1	6.08	6.18	5.99	6.39	6.27
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-	5	5.14	5.2	5.04	4.98	5.02	4.38	4.39	4.45	4.4	4.34
Nutrients																				
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	0.141	-	-	0.105	0.141	0.0095	0.0142	0.01	0.0098	0.0093	0.0619	0.011	0.0126	0.0315	0.0359	0.0093
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9	<0.005	0.0055	<0.005	<0.005	<0.005	<0.005	0.0134	0.0263	0.0463	<0.005	<0.005
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	<0.0051	0.0055	<0.0051	<0.0051	<0.0051	<0.0051	0.0134	0.0263	0.0463	<0.0051	<0.0051
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.201	0.21	0.193	0.192	0.179	0.252	0.225	0.266	0.261	0.246	0.208
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-	<0.001	0.001	<0.001	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-	0.0026	0.0046	0.0029	0.0032	0.0029	0.0028	0.0027	0.003	0.0029	0.0034	0.0032
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.209	0.167	0.166	0.17	0.162	0.254	0.244	0.225	0.232	0.227	0.206
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-	0.201	0.205	0.193	0.192	0.179	0.252	0.211	0.24	0.214	0.246	0.208
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.209	0.162	0.166	0.17	0.162	0.254	0.231	0.199	0.186	0.227	0.206
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-	0.0078	0.0099	0.0079	0.0075	0.0073	0.007	0.0053	0.0056	0.0052	0.0057	0.132
Organic/Inorganic Carbon																				
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-	3.71	3.49	3.74	3.37	2.96	3.49	2.76	3.19	2.71	3.16	2.95
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-	3.32	3.29	3.31	3.38	3.45	3.59	2.81	3.41	2.76	2.8	2.89
Total Metals																				
Aluminum (T)	ug/L	1	5.32	9.1	100	-	-	75	100	5.8	5.8	38.5	6.7	7.1	7.5	3.3	2.6	3.5	2.6	3.1
Antimony (T)	ug/L	0.02	0.02	0.51	-	6	-	4.5	6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (T)	ug/L	0.02	0.275	3.8	5	10	25	18.8	25	0.571	0.483	0.935	0.538	0.523	0.518	0.665	0.726	0.694	0.641	0.624
Barium (T)	ug/L	0.02	8.05	77	-	1000	-	750	1000	8.91	8.84	9.47	8.55	8.6	8.72	8.81	8.59	8.68	8.49	8.8
Beryllium (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (T)	ug/L	5	6.52	23	1500	5000	-	1120	1500	6.8	6.7	6.6	6.6	6.2	6.5	5.6	5.7	5.4	5.6	5.6
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.05	0.043 | 0.067	5	-	0.032 | 0.050	0.043 | 0.067	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0104	0.0076	0.0155	0.0082	0.0101	0.0082	0.0086	0.0087	0.0082	0.0087	0.009
Chromium (T)	ug/L	0.1	0.103	1.1	5	50	-	3.75	5	<0.1	<0.1	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (T)	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78	0.036	0.0383	0.0863	0.0375	0.0386	0.0431	0.0181	0.0163	0.0214	0.0206	0.0224
Copper (T)	ug/L	0.05	0.86	2	-	2000	-	1500	2000	1.61	1.21	2.16	0.91	0.879	0.878	1.03	0.907	0.93	1.06	1.44
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (T)	ug/L	1	15	42	300	-	1060	795	1060	44	45.1	112	45	44	44.7	22.8	21.6	21.1	22.6	22.7
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.038	0.039	0.126	0.045	0.036	0.041	0.03	0.028	0.026	0.027	0.031
Lead (T)	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5	0.018	0.016	0.16	0.018	0.016	0.017	0.029	0.029	0.028	0.032	0.029
Lithium (T)	ug/L	0.5	0.72	-	-	-	-	-	-	1.22	1.24	1.25	1.2	1.14	1.2	0.95	1	0.95	0.99	0.98
Manganese (T)	ug/L	0.05	3.06	5.5	-	120	-	90	120	16.1	16.4	16.5	16.1	15.9	16.3	4.86	4.79	4.48	4.9	5.02
Mercury (T)	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026	0.00061	0.00055	0.00052	0.00053	<5e-04	0.00468	0.00055	<5e-04	0.00075	<5e-04	<5e-04
Molybdenum (T)	ug/L	0.05	0.107	5.2	73	-	-	54.8	73	0.095	0.085	0.091	0.099	0.084	0.101	0.075	0.077	0.086	0.073	0.084
Nickel (T)	ug/L	0.05	0.441	2.7	25	-	-	18.8	25	0.808	0.797	0.92	0.788	0.802	0.833	0.651	0.668	0.699	0.689	0.69
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.42	1.37	1.43	1.37	1.35	1.42	1.41	1.43	1.4	1.39	1.45
Selenium (T)	ug/L	0.04	0.049	0.16	1	50	-	0.75	1	<0.04	<0.04	0.059	0.046	0.055	<0.04	0.051	<0.04	<0.04	0.045	<0.04
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	213	236	257	212	231	202	135	148	136	149	148
Silver (T)	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (T)	ug/L	0.02	36.1	-	2500	7000	-	1880	2500	54.5	53.4	54	54.4	52.2	53.6	46.4	47.4	46.6	46.9	48.6
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	1720	1970	1700	1980	1790	1810	1530	1740	1680	1490	1700
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (T)	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	0.0061	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (T)	ug/L	0.02	0.0384	-	-	-	-	-	-	0.032	<0.02	0.034	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (T)	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-	0.357	0.346	1.94	0.347	0.35	0.368	0.099	0.124	0.073	0.083	0.094
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (T)	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15	0.0167	0.0151	0.0204	0.019	0.0181	0.0159	0.0163	0.0169	0.0137	0.0155	0.0151
Vanadium (T)	ug/L	0.05	0.05	-	-	-	-	-	-	0.059	0.061	0.171	0.059	0.058	0.061	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0097	0.0126	0.0279	0.011	0.015	0.0087	0.0102	0.0084	0.0078	0.0081	0.0068
Zinc (T)	ug/L	0.5	1.7	6.7	-	-	-	-	-	1.02	<0.5	3.89	0.58	<0.5	0.74	1.23	1.27	5.35	1.42	2.59
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Metals																				
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	1.2	1.7	2.9	2.2	1.9	1.1	1.4	4.4	1.2	<1	1.4
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	0.472	0.485	0.469	0.488	0.482	0.417	0.604	0.629	0.587	0.608	0.601
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	8.36	8.45	8.61	8.33	8.85	8.5	8.15	8.18	8.39	8.27	8.02
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (D)	ug/L	5	-	-	-	-	-	-	-	6.8	6.8	6.4	6.9	7.1	6.8	5.5	5.6	5.4	5.6	5.5
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0071	0.0088	0.0065	0.0082	0.0103	0.0067	0.0074	0.0071	0.0077	0.0085	0.0072
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0165	0.0135	0.016	0.0143	0.0151	0.014	0.0084	0.0079	0.0133	0.0089	0.013
Copper (D)	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83	0.82	1.38	0.861	0.85	0.919	0.792	0.925	0.879	0.916	1.00	0.925
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (D)	ug/L	1	-	-	-	-	-	-	-	11.8	11	11.7	12.9	11.2	10.2	7.7	7.9	7.7	7.7	8.1
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	0.014	0.012	0.015	0.015	0.012	0.011	0.013	0.013	0.015	0.015	0.014
Lead (D)	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36	<0.01	<0.01	<0.01	0.011	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	1.28	1.24	1.2	1.27	1.28	1.27	0.95	0.98	0.93	0.93	0.94
Manganese (D)	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330	2.56	2.45	2.52	2.54	2.51	2.94	0.713	0.823	0.777	0.743	0.715
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	0.00071	<5e-04	0.00083	<5e-04	<5e-04	<5e-04
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.107	0.104	0.116	0.09	0.088	0.098	0.08	0.081	0.082	0.091	0.087
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.796	0.735	0.8	0.761	0.747	0.707	0.655	0.655	0.64	0.711	0.67
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	1.42	1.38	1.44	1.38	1.41	1.39	1.39	1.41	1.37	1.39	1.37
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	0.042	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.046
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	221	200	209	215	218	220	136	156	146	136	132
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (D)	ug/L	0.02	-	-	2500	-	-	1880	2500	53	53	53.4	53.4	52.7	52.5	46.1	45.4	47.1	45.2	45.4
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	1970	1700	1990	2040	2200	2060	1510	1590	1510	1560	1540
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	0.029	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	0.056	0.069	0.058	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0152	0.015	0.0156	0.0161	0.0154	0.0162	0.0139	0.0144	0.0148	0.0155	0.0149
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	0.0073	0.0091	0.0065	0.0052	0.0057	0.0055	<0.005	0.0068	<0.005
Zinc (D)	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4	0.76	0.97	10.8	1.03	2.58	<0.5	<0.5	4.08	1.04	0.88	0.53
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Other																				
Cyanide (free)	mg/L	0.001	-	0.0004	-	-	-	-	-	<0.001	0.0014	<0.001	<0.001	0.0018	0.0013	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005	<0.001	0.0011	<0.001	<0.001	0.0015	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	<0.001	0.0011	<0.001	<0.001	0.0017	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	-	-	-	-	97.3	-	-	-	-	-	-
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	<0.0078	<0.0056	<0.0042	<0.0068	<0.0061	<0.0054	-	-	-	-	-

Notes

DL = 2021 detection limits

FWAL = freshwater aquatic life guideline

HH DW = Health Canada drinking water quality guidel

SSWQO = site-specific water quality objective

FEIS = predicted concentrations at the edge of the mixing zone (Agnico Eagle, 2014).

2021 Meliadine Lake Water Quality Results

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQ	Action Level (min | max)	Benchmark (min | max)	Jul					August					
										MEL-03					MEL-01					
										MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-01-10
										7/15/2021	7/15/2021	7/15/2021	7/15/2021	7/15/2021	8/14/2021	8/14/2021	8/14/2021	8/14/2021	8/14/2021	8/14/2021
Field Measurements																				
Temperature	C	-	-	-	-	-	-	-	-	9.02	9.03	8.85	8.95	9.29	9.8	9.6	9.7	9.7	9.8	9.5
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-	73.7	73.5	76.3	73.5	72.4	98.3	90.9	100.3	92.4	91.9	91.3
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.45	7.38	7.39	7.5	7.84	7.52	7.51	7.47	7.35	7.53	7.37
DO (mg/L)	mg/L	-	-	-	6.5	-	-	6.5	6.5	12.5	12.54	12.74	12.44	12.44	11.13	10.99	10.94	10.98	10.96	11.28
DO (%)	%	-	-	-	-	-	-	-	-	108.3	108.6	109.8	107.5	107.1	98	96.4	96.3	96.5	97.2	98.8
Conventional Parameters																				
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-	74.2	74.6	77.6	74.3	72.6	109	102	111	103	102	101
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-	20.6	21	21.8	21	20.8	28.2	26.8	29.3	27.5	27.7	26.9
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.51	7.49	7.41	7.41	7.43	7.47	7.35	7.36	7.36	7.34	7.35
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500	43	38	39	49	42	53	57	52	54	47	53
Total Dissolved Solids (Calc)	mg/L	1	39.6	68	500	-	1000	375	500	35.6	35.2	36.8	35.9	35.3	54.4	49.2	54.4	49.7	49.4	48.5
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-	<1	1.1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-	0.62	0.67	0.79	0.69	0.49	0.6	0.46	0.48	0.48	0.55	0.49
Major Ions																				
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-	20.6	20.9	20.7	20.6	20.4	24.9	21	21.1	21.1	19.9	20.5
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-	16.9	17.1	17	16.9	16.7	20.4	17.2	17.3	17.3	16.3	16.8
Bromide	mg/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	6.43	6.61	6.8	6.61	6.54	8.71	8.26	8.95	8.49	8.52	8.31
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-	6.66	6.78	6.95	6.71	6.51	8.49	7.98	8.3	8.15	8.23	8.2
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120	8.8	8.42	8.97	8.89	8.68	17	15.7	17.8	15.6	15.8	15.3
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8	0.024	0.023	0.023	0.025	0.024	0.026	0.026	0.026	0.024	0.026	0.025
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	1.11	1.09	1.16	1.1	1.08	1.58	1.5	1.7	1.54	1.55	1.51
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-	1.12	1.12	1.18	1.11	1.1	1.65	1.54	1.66	1.59	1.57	1.58
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	0.918	0.903	0.947	0.916	0.914	1.11	1.04	1.14	1.06	1.06	1.06
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-	0.972	0.979	1	0.927	0.918	1.12	1.06	1.09	1.07	1.07	1.07
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-	0.228	0.23	0.256	0.226	0.215	0.346	0.345	0.34	0.345	0.341	0.336
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	4.66	4.57	4.84	4.73	4.61	7.62	6.8	8.03	7.06	7.03	6.82
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-	4.61	4.65	4.91	4.61	4.51	7.69	6.97	7.74	7.15	7.1	7.07
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-	3.45	3.34	3.77	3.47	3.43	5.96	5.53	6.24	5.54	5.56	5.38
Nutrients																				
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	0.141	-	-	0.105	0.141	<0.005	0.0062	0.0064	0.0114	0.0164	<0.05	0.054	0.067	0.123	<0.05	<0.05
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9	0.0102	0.007	0.0309	<0.005	<0.005	0.0245	<0.005	0.0361	0.0069	0.0059	<0.005
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	0.0102	0.007	0.0309	<0.0051	<0.0051	0.0245	<0.0051	0.0361	0.0069	0.0059	<0.0051
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.168	0.175	0.18	0.134	0.14	0.233	0.236	0.339	0.385	0.268	0.224
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0012	<0.001	<0.001	<0.001	<0.001
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-	0.0017	0.002	0.0017	0.0018	0.0019	0.003	0.0021	0.0027	0.002	0.0029	0.0018
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.171	0.207	0.201	0.119	0.149	0.209	0.302	0.194	0.245	0.207	0.291
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-	0.158	0.168	0.149	0.134	0.14	0.209	0.236	0.303	0.378	0.262	0.224
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.161	0.2	0.17	0.119	0.149	0.185	0.302	0.158	0.238	0.201	0.291
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-	0.0032	0.003	0.0029	0.0032	0.0033	0.0094	-	0.007	0.0052	0.005	0.0059
Organic/Inorganic Carbon																				
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-	2.84	3.03	2.88	2.88	2.76	3.39	3.41	3.43	3.31	3.25	3.3
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-	2.75	2.89	2.87	2.77	2.72	3.29	3.38	3.55	3.59	3.36	3.2
Total Metals																				
Aluminum (T)	ug/L	1	5.32	9.1	100	-	-	75	100	2.3	3.1	2.6	2	2.2	5.3	3.5	4	4.9	4	3.7
Antimony (T)	ug/L	0.02	0.02	0.51	-	6	-	4.5	6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (T)	ug/L	0.02	0.275	3.8	5	10	25	18.8	25	0.367	0.409	0.393	0.395	0.447	0.537	0.508	0.514	0.499	0.494	0.482
Barium (T)	ug/L	0.02	8.05	77	-	1000	-	750	1000	7.72	7.98	8.02	7.59	7.35	8.36	8.15	8.24	8.06	8.22	8.24
Beryllium (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (T)	ug/L	5	6.52	23	1500	5000	-	1120	1500	<5	<5	<5	<5	<5	7.2	6.5	7.8	7	6.9	6.8
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.05	0.043 | 0.067	5	-	0.032 | 0.050	0.043 | 0.067	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0098	0.0108	0.0087	0.0109	0.0135	0.0086	0.0074	0.0086	0.008	0.0074	0.007
Chromium (T)	ug/L	0.1	0.103	1.1	5	50	-	3.75	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (T)	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78	0.0101	0.0104	0.013	0.0107	0.0104	0.0315	0.0265	0.0278	0.0248	0.0259	0.0273
Copper (T)	ug/L	0.05	0.86	2	-	2000	-	1500	2000	0.712	2.16	1.58	0.848	0.883	1.3	1.41	0.911	0.983	1.07	0.873
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (T)	ug/L	1	15	42	300	-	1060	795	1060	11.7	13.7	12.2	11.9	12.2	20.7	17.3	14.5	18.5	18.8	20.4
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.017	0.018	0.019	0.019	0.017	0.028	0.024	0.025	0.025	0.029	0.029
Lead (T)	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5	0.021	0.032	0.02	0.024	0.022	0.013	<0.01	<0.01	0.011	0.013	<0.01
Lithium (T)	ug/L	0.5	0.72	-	-	-	-	-	-	0.68	0.68	0.72	0.68	0.66	1.31	1.18	1.32	1.22	1.24	1.23
Manganese (T)	ug/L	0.05	3.06	5.5	-	120	-	90	120	2.94	3	3.39	2.82	2.72	6.84	5.85	5.25	6.14	6.44	6.76
Mercury (T)	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026	<5e-04	0.00052	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	0.00084	<5e-04	<5e-04	5.00E-04
Molybdenum (T)	ug/L	0.05	0.107	5.2	73	-	-	54.8	73	0.075	0.067	0.077	0.069	0.068	0.105	0.091	0.116	0.102	0.105	0.096
Nickel (T)	ug/L	0.05	0.441	2.7	25	-	-	18.8	25	0.419	0.436	0.457	0.436	0.43	0.699	0.675	0.626	0.675	0.668	0.686
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.33	1.28	1.37	1.24	1.25	1.48	1.42	1.39	1.4	1.45	1.42
Selenium (T)	ug/L	0.04	0.049	0.16	1	50	-	0.75	1	0.058	<0.04	<0.04	0.069	0.043	<0.04	<0.04	<0.04	<0.04	0.046	<0.04
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	109	117	127	110	91	175	169	160	165	167	180
Silver (T)	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (T)	ug/L	0.02	36.1	-	2500	7000	-	1880	2500	36.5	36.4	38.9	35.8	33.9	60.2	54.5	59.5	55	56.2	54.9
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	1110	1010	1080	1160	970	2010	1700	2230	1810	1970	1910
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (T)	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (T)	ug/L	0.02	0.0384	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.027	<0.02	0.021	0.021	<0.02
Titanium (T)	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-	<0.05	0.086	0.053	<0.05	0.05	0.195	0.146	0.115	0.22	0.196	0.166
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (T)	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15	0.0136	0.0151	0.0128	0.0161	0.0134	0.0211	0.0192	0.0219	0.019	0.0194	0.02
Vanadium (T)	ug/L	0.05	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0055	<0.005	<0.005	0.0057	<0.005	<0.01	0.0073	0.0064	0.0062	0.0091	0.0081
Zinc (T)	ug/L	0.5	1.7	6.7	-	-	-	-	-	0.59	2.03	4.05	0.93	0.7	2.8	2.39	1.06	2.27	1.59	0.68
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.056	<0.01
Dissolved Metals																				
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	1.2	<1	1.1	1.4	3	1.8	1.3	2.9	1.4	1.6	1.5
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	0.331	0.338	0.348	0.364	0.361	0.446	0.406	0.477	0.463	0.429	0.474
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	7.13	7.25	7.45	7.06	6.97	8.28	7.8	8.14	7.7	8.05	7.92
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (D)	ug/L	5	-	-	-	-	-	-	-	<5	<5	<5	<5	<5	7.9	6.7	8.1	7	7	6.8
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0134	0.0113	0.0087	0.0126	0.0167	0.0083	0.0068	0.0079	0.0066	0.0063	0.0062
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0063	0.0068	0.0051	0.0066	0.0078	0.0201	0.0135	0.0178	0.012	0.0178	0.0119
Copper (D)	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83	0.697	0.715	0.784	0.692	0.832	0.748	1.01	0.793	0.728	0.763	3.88
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (D)	ug/L	1	-	-	-	-	-	-	-	4.7	4	3.8	4.9	5.3	5.3	5.2	6.2	5	4.9	5.1
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	0.011	0.01	0.01	<0.01	0.012	0.014	0.012	0.013	0.011	0.013	0.012
Lead (D)	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	0.65	0.68	0.7	0.67	0.67	1.38	1.2	1.42	1.24	1.25	1.2
Manganese (D)	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330	1.14	1.14	1.32	1.16	1.14	0.723	0.572	0.854	0.495	0.548	0.474
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	0.00055	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.071	0.073	0.075	0.092	0.079	0.104	0.102	0.129	0.102	0.101	0.104
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.448	0.426	0.449	0.45	0.463	0.643	0.605	0.679	0.622	0.614	0.644
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	1.25	1.24	1.31	1.27	1.25	1.44	1.39	1.48	1.42	1.4	1.41
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	<0.04	<0.04	0.044	<0.04	<0.04	<0.04	<0.04	0.045	<0.04	<0.04	<0.04
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	108	120	129	120	101	165	169	162	170	160	161
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (D)	ug/L	0.02	-	-	2500	-	-	1880	2500	35.3	34.7	37.1	35.7	35.1	61.2	55.6	62.1	54.6	56.6	55.4
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	1060	1120	1050	1010	1270	2220	2130	2380	1860	1950	1890
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.035	<0.02	<0.02	<0.02	0.042
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0135	0.0128	0.0121	0.0138	0.0126	0.0211	0.0175	0.0211	0.0171	0.0186	0.0177
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.0065	0.0057	0.0059	<0.005	0.0079
Zinc (D)	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4	<0.5	0.54	<0.5	0.53	13.2	<0.5	1.62	1.76	<0.5	<0.5	1.58
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Other																				
Cyanide (free)	mg/L	0.001	-	0.0004	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	-	-	-	-	-	91.1	95	98.3	98	99.6	97.9
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	-	-	-	-	-	<0.007	<0.0086	<0.0053	<0.0073	<0.0067	<0.0039

Notes

DL = 2021 detection limits

FWAL = freshwater aquatic life guideline

HH DW = Health Canada drinking water quality guidel

SSWQO = site-specific water quality objective

FEIS = predicted concentrations at the edge of the mixing zone (Agnico Eagle, 2014).

Appendix C3
2021 Meliadine Lake Water Quality Results

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQ(	Action Level (min | max)	Benchmark (min | max)	Aug										
										MEL-02					MEL-03					MEL-04
										MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-04-01
										8/15/2021	8/15/2021	8/15/2021	8/15/2021	8/15/2021	8/7/2021	8/7/2021	8/7/2021	8/7/2021	8/7/2021	8/6/2021
Field Measurements																				
Temperature	C	-	-	-	-	-	-	-	-	9.76	9.82	9.81	9.63	9.91	10.08	10.04	10.1	10.36	10.28	9.96
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-	82.8	83.4	83	82.9	85.8	73.5	73.5	73.5	73.6	73.3	74.1
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.32	7.37	7.36	7.37	7.38	7.69	7.66	7.64	7.65	7.72	7.45
DO (mg/L)	mg/L	-	-	-	6.5	-	-	6.5	6.5	11.64	11.68	11.67	11.59	11.78	11.35	11.36	11.36	11.4	11.42	11.24
DO (%)	%	-	-	-	-	-	-	-	-	104.6	105	105	103.8	106.2	100.7	100.7	100.7	101.9	101.9	99.5
Conventional Parameters																				
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-	87.6	88.8	88.2	87.9	90.9	78.1	77	77.6	77.2	78	77.7
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-	24.6	24.9	24.5	24.6	25.4	24.1	22.3	23.5	23.5	23.7	23.9
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.36	7.36	7.38	7.36	7.39	7.3	7.3	7.33	7.37	7.34	7.34
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500	45	49	47	42	53	60	54	56	61	60	59
Total Dissolved Solids (Calc)	mg/L	1	39.6	68	500	-	1000	375	500	42.5	43.1	42.6	42.8	44.3	37.9	36.8	37.7	38	37.5	38.1
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-	0.53	0.29	0.29	0.35	0.28	0.18	0.25	0.19	0.19	0.18	0.23
Major Ions																				
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-	20.6	20.9	20.4	20.7	21	20.3	20.5	21.1	21.7	20.1	21
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-	16.9	17.1	16.7	17	17.2	16.6	16.8	17.3	17.8	16.5	17.2
Bromide	mg/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	7.71	7.77	7.69	7.67	7.96	7.57	7.01	7.34	7.35	7.45	7.52
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-	7.58	7.55	7.37	7.44	7.55	7.23	7.19	7.24	7.17	7.16	7.09
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120	12.2	12.4	12.3	12.3	13	9.37	9.36	9.26	9.24	9.35	9.42
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8	0.026	0.026	0.026	0.027	0.025	0.026	0.026	0.026	0.026	0.025	0.026
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	1.31	1.33	1.29	1.32	1.35	1.27	1.16	1.24	1.24	1.24	1.25
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-	1.35	1.37	1.33	1.33	1.4	1.17	1.17	1.17	1.16	1.17	1.17
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	0.999	0.998	0.99	1	1.01	0.979	0.892	0.945	0.943	0.94	0.961
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-	1.01	1.01	0.998	0.997	1.02	0.927	0.913	0.915	0.916	0.91	0.906
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-	0.234	0.234	0.23	0.234	0.245	0.213	0.212	0.219	0.219	0.221	0.234
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	5.64	5.84	5.78	5.81	5.98	4.93	4.56	4.83	4.81	4.85	4.87
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-	5.75	5.81	5.75	5.75	6.11	4.68	4.62	4.61	4.58	4.57	4.58
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-	4.43	4.52	4.47	4.48	4.67	3.82	3.75	3.7	3.67	3.7	3.72
Nutrients																				
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	0.141	-	-	0.105	0.141	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.235	0.217	0.219	0.203	0.255	0.138	0.121	0.163	0.142	0.117	0.199
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-	0.0012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-	0.0022	0.002	0.002	0.0018	0.0021	0.0015	0.0017	0.0028	0.003	0.002	0.0028
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.205	0.191	0.21	0.172	0.21	0.1	0.122	0.088	0.104	0.096	0.205
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-	0.235	0.217	0.219	0.203	0.255	0.138	0.121	0.163	0.142	0.117	0.199
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.205	0.191	0.21	0.172	0.21	0.1	0.122	0.088	0.104	0.096	0.205
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-	0.0062	0.0044	0.0034	0.0061	0.0044	0.0031	0.0057	0.0029	0.0055	0.0028	0.0029
Organic/Inorganic Carbon																				
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-	2.92	2.85	2.88	3.03	3.16	2.33	2.3	2.34	2.43	2.6	2.37
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-	2.9	2.93	2.94	2.91	3.11	2.27	2.39	2.4	2.56	2.46	2.38
Total Metals																				
Aluminum (T)	ug/L	1	5.32	9.1	100	-	-	75	100	2.2	1.9	1.9	2.6	2.4	3	3.3	5.3	2.5	2.7	2
Antimony (T)	ug/L	0.02	0.02	0.51	-	6	-	4.5	6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (T)	ug/L	0.02	0.275	3.8	5	10	25	18.8	25	0.548	0.533	0.517	0.518	0.509	0.321	0.324	0.342	0.322	0.312	0.314
Barium (T)	ug/L	0.02	8.05	77	-	1000	-	750	1000	8.01	8.02	7.92	8.24	7.95	7.98	8.05	8.22	7.9	7.98	8.16
Beryllium (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (T)	ug/L	5	6.52	23	1500	5000	-	1120	1500	5.5	5.4	5.2	5.4	5.6	<5	<5	<5	<5	<5	<5
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.05	0.043 | 0.067	5	-	0.032 | 0.050	0.043 | 0.067	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0073	0.0077	0.008	0.0074	0.0068	0.0085	0.0087	0.009	0.008	0.0084	0.0091
Chromium (T)	ug/L	0.1	0.103	1.1	5	50	-	3.75	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (T)	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78	0.0137	0.0157	0.0177	0.0162	0.0181	0.0141	0.0133	0.0161	0.0119	0.0121	0.0115
Copper (T)	ug/L	0.05	0.86	2	-	2000	-	1500	2000	0.809	1.02	0.783	0.849	0.789	1.03	0.904	0.943	0.958	0.78	0.757
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (T)	ug/L	1	15	42	300	-	1060	795	1060	12.5	10.5	11.4	11.9	12	11.4	12.2	16.1	10.7	10.8	9.9
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.022	0.023	0.024	0.024	0.024	0.021	0.022	0.026	0.02	0.019	0.018
Lead (T)	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5	0.012	0.011	0.011	0.012	0.01	0.028	0.022	0.058	0.013	0.013	0.011
Lithium (T)	ug/L	0.5	0.72	-	-	-	-	-	-	0.97	0.97	0.94	0.95	1	0.75	0.73	0.76	0.74	0.73	0.74
Manganese (T)	ug/L	0.05	3.06	5.5	-	120	-	90	120	3.56	3.57	3.55	3.69	3.94	2.55	2.58	2.78	2.43	2.5	2.86
Mercury (T)	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	0.00071	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (T)	ug/L	0.05	0.107	5.2	73	-	-	54.8	73	0.079	0.088	0.09	0.091	0.08	0.084	0.079	0.08	0.078	0.079	0.078
Nickel (T)	ug/L	0.05	0.441	2.7	25	-	-	18.8	25	0.536	0.535	0.535	0.563	0.525	0.438	0.432	0.431	0.421	0.423	0.432
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.4	1.41	1.41	1.38	1.4	1.37	1.36	1.35	1.34	1.33	1.33
Selenium (T)	ug/L	0.04	0.049	0.16	1	50	-	0.75	1	<0.04	<0.04	<0.04	<0.04	0.048	<0.04	<0.04	<0.04	<0.04	0.042	<0.04
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	116	111	101	118	109	94	93	100	93	94	103
Silver (T)	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (T)	ug/L	0.02	36.1	-	2500	7000	-	1880	2500	45.1	46.2	45.3	46.1	46.9	36.5	35.9	36	35.8	35.5	35.6
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	1500	1460	1570	1520	1510	1370	1380	1400	1390	1380	1360
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (T)	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (T)	ug/L	0.02	0.0384	-	-	-	-	-	-	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.022	<0.02	<0.02
Titanium (T)	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-	0.063	<0.05	0.057	0.081	0.081	0.098	0.12	0.211	0.081	0.092	0.077
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (T)	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15	0.0162	0.0173	0.0165	0.016	0.017	0.0155	0.0177	0.0168	0.0185	0.0159	0.0162
Vanadium (T)	ug/L	0.05	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0074	0.0051	0.0074	0.0064	0.0057	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (T)	ug/L	0.5	1.7	6.7	-	-	-	-	-	<0.5	0.84	<0.5	0.51	0.9	2.3	1.53	2.79	0.71	0.68	0.66
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Metals																				
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	1.1	1.2	1.1	1.5	1.3	2.8	1.5	2.4	1.6	2.1	1.1
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	0.534	0.479	0.458	0.467	0.487	0.3	0.299	0.312	0.29	0.303	0.294
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	8.04	7.71	7.7	7.69	7.61	7.91	7.58	7.95	7.84	8.01	8.21
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (D)	ug/L	5	-	-	-	-	-	-	-	5.5	5.5	5.4	5.4	5.8	<5	<5	<5	<5	<5	<5
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0077	0.0076	0.0071	0.0066	0.0076	0.0083	0.0077	0.0086	0.0078	0.0081	0.0107
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0087	0.0086	0.0078	0.0103	0.0119	0.0066	0.006	0.0064	0.0057	0.0058	0.0057
Copper (D)	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83	0.775	0.799	0.733	0.946	0.894	1.05	0.735	0.908	0.731	0.77	0.791
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (D)	ug/L	1	-	-	-	-	-	-	-	4	3.7	3.8	4.1	4.1	4	3.5	4.3	3.7	4.2	2.4
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	0.014	0.016	0.013	0.012	0.013	0.01	0.01	<0.01	<0.01	0.011	<0.01
Lead (D)	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.012	<0.01	0.012	<0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	0.96	0.98	0.96	0.96	1	0.73	0.72	0.72	0.74	0.72	0.74
Manganese (D)	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330	0.468	0.431	0.386	0.448	0.478	0.403	0.371	0.44	0.399	0.419	0.364
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	<5e-04	0.00051	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.08	0.086	0.085	0.075	0.089	0.077	0.073	0.081	0.079	0.082	0.082
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.549	0.529	0.505	0.514	0.536	0.425	0.382	0.408	0.414	0.425	0.433
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	-
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	1.37	1.36	1.38	1.38	1.41	1.44	1.29	1.4	1.41	1.41	1.41
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	<0.04	<0.04	0.043	<0.04	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	113	122	106	119	119	92	92	96	93	96	100
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (D)	ug/L	0.02	-	-	2500	-	-	1880	2500	45.2	46.7	44.8	44.9	47.9	38.2	35.6	37.7	37	37.5	37.8
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	1470	1770	1540	1730	1560	1370	1390	1370	1350	1360	1330
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	0.023	<0.02	0.024	<0.02	0.026	<0.02	0.023	<0.02	<0.02	<0.02
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0163	0.0172	0.0149	0.0142	0.0167	0.0157	0.0185	0.0159	0.0182	0.0176	0.0148
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0056	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc (D)	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4	0.98	0.57	0.87	1.5	1.21	0.99	0.87	2.04	<0.5	2.81	1.26
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Other																				
Cyanide (free)	mg/L	0.001	-	0.0004	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes

DL = 2021 detection limits

FWAL = freshwater aquatic life guideline

HH DW = Health Canada drinking water quality guidel

SSWQO = site-specific water quality objective

FEIS = predicted concentrations at the edge of the mixing zone (Agnico Eagle, 2014).

Appendix C3
2021 Meliadine Lake Water Quality Results

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQ(	Action Level (min | max)	Benchmark (min | max)	August									September	
										MEL-04				MEL-05					MEL-01	
										MEL-04-02	MEL-04-03	MEL-04-04	MEL-04-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05	MEL-01-01	MEL-01-06
										8/6/2021	8/6/2021	8/6/2021	8/6/2021	8/10/2021	8/10/2021	8/10/2021	8/10/2021	8/10/2021	9/2/2021	9/2/2021
Field Measurements																				
Temperature	C	-	-	-	-	-	-	-	-	10.19	9.95	10.01	9.95	10.28	10.34	10.48	10.45	10.4	10.82	10.88
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-	74.1	74	74.1	74.1	76.8	76.5	76.2	76.4	76.5	115.5	114.3
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.6	7.56	7.6	7.57	7.47	7.56	7.47	7.48	7.48	7.48	7.41
DO (mg/L)	mg/L	-	-	-	6.5	-	-	6.5	6.5	11.26	11.23	11.22	11.23	11.1	11.09	11.09	11.09	11.1	11.26	11.15
DO (%)	%	-	-	-	-	-	-	-	-	100.2	99.4	99.4	99.4	99	99.1	99.4	99.3	99.3	103.7	102.9
Conventional Parameters																				
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-	78.1	78	78	78.2	80.3	79.7	79.4	79.8	80.7	119	122
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-	23.4	24.1	23.5	23	23.9	23.9	23.7	23.6	23.8	29.9	30.1
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.38	7.37	7.36	7.39	7.43	7.42	7.43	7.45	7.41	7.36	7.36
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500	59	54	58	58	42	46	44	46	42	58	77
Total Dissolved Solids (Calc)	mg/L	1	39.6	68	500	-	1000	375	500	37.6	37.6	38	39	40.4	40.3	40	40.4	40.1	57.4	59.5
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-	0.17	0.16	0.18	0.17	0.2	0.22	0.24	0.22	0.2	0.39	0.45
Major Ions																				
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-	20.7	20.4	21.8	24.5	25.3	25	24.4	25.7	24.6	21.5	22
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-	17	16.7	17.9	20.1	20.7	20.5	20	21.1	20.2	17.6	18
Bromide	mg/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	7.34	7.59	7.37	7.22	7.63	7.66	7.55	7.54	7.59	9.03	9.13
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-	7.12	7.12	7.21	7.11	7.14	7.49	7.52	7.48	7.52	8.99	9.15
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120	9.38	9.25	9.24	9.25	9.61	9.69	9.69	9.58	9.64	18.7	20
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8	0.025	0.026	0.025	0.025	0.027	0.027	0.026	0.026	0.027	0.027	0.028
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	1.23	1.24	1.24	1.21	1.18	1.16	1.17	1.15	1.16	1.8	1.78
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-	1.15	1.18	1.17	1.17	1.2	1.2	1.21	1.19	1.19	1.69	1.78
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	0.937	0.959	0.931	0.915	0.951	0.957	0.966	0.945	0.956	1.19	1.19
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-	0.904	0.91	0.905	0.907	0.948	0.954	0.957	0.951	0.955	1.14	1.19
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-	0.228	0.229	0.228	0.232	0.229	0.228	0.227	0.225	0.225	0.318	0.322
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	4.74	4.88	4.76	4.67	4.86	4.83	4.89	4.77	4.87	8.95	8.87
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-	4.57	4.64	4.59	4.6	4.78	4.77	4.84	4.88	4.91	8.43	9.12
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-	3.71	3.67	3.68	3.69	3.68	3.72	3.7	3.69	3.69	6.79	7.3
Nutrients																				
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	0.141	-	-	0.105	0.141	<0.05	<0.05	<0.05	<0.05	<0.05	0.098	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0801	0.0897
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.0812	0.0917
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	0.002
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.118	0.22	0.174	0.18	0.208	0.269	0.179	0.178	0.141	0.0812	0.0917
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-	0.0022	0.0023	0.0015	0.0021	0.0012	0.0021	0.0018	0.0018	0.0019	0.0025	0.0061
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.118	0.137	0.117	0.124	0.167	0.149	0.153	0.131	0.116	0.33	0.326
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-	0.118	0.22	0.174	0.18	0.208	0.269	0.179	0.178	0.141	0.199	0.244
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.118	0.137	0.117	0.124	0.167	0.149	0.153	0.131	0.116	0.249	0.234
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-	0.0074	0.0073	0.0033	0.0035	0.0035	0.002	0.0028	0.003	0.0024	0.0078	0.0082
Organic/Inorganic Carbon																				
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-	2.29	2.5	2.69	2.69	2.5	2.57	2.36	2.29	2.41	3.36	3.62
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-	2.37	2.31	2.29	2.35	2.43	2.41	2.51	2.37	2.38	3.57	3.42
Total Metals																				
Aluminum (T)	ug/L	1	5.32	9.1	100	-	-	75	100	2.1	2	2.2	2.1	1.9	1.7	1.6	1.3	1.9	6.9	8.2
Antimony (T)	ug/L	0.02	0.02	0.51	-	6	-	4.5	6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.021
Arsenic (T)	ug/L	0.02	0.275	3.8	5	10	25	18.8	25	0.321	0.319	0.307	0.32	0.351	0.356	0.333	0.345	0.328	0.47	0.481
Barium (T)	ug/L	0.02	8.05	77	-	1000	-	750	1000	8.08	8.11	8.18	8.26	7.95	8.13	7.81	7.8	7.8	8.12	8.15
Beryllium (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (T)	ug/L	5	6.52	23	1500	5000	-	1120	1500	<5	<5	<5	<5	<5	<5	<5	<5	<5	8.7	9
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.05	0.043 | 0.067	5	-	0.032 | 0.050	0.043 | 0.067	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.008	0.0084	0.0084	0.0087	0.0075	0.0075	0.0075	0.0079	0.0074	0.0094	0.01
Chromium (T)	ug/L	0.1	0.103	1.1	5	50	-	3.75	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (T)	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78	0.0124	0.012	0.0122	0.0128	0.0137	0.0103	0.0109	0.011	0.0121	0.0338	0.0313
Copper (T)	ug/L	0.05	0.86	2	-	2000	-	1500	2000	0.837	0.736	0.696	2.13	0.715	0.732	0.892	0.904	0.719	0.796	0.841
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (T)	ug/L	1	15	42	300	-	1060	795	1060	9.6	9.9	9.8	9.9	8.9	8.6	8.6	8.7	9.3	18.2	20.1
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.018	0.018	0.018	0.019	0.013	0.012	0.011	0.013	0.013	0.027	0.03
Lead (T)	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5	0.011	0.012	0.012	0.025	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium (T)	ug/L	0.5	0.72	-	-	-	-	-	-	0.75	0.73	0.74	0.77	0.73	0.76	0.78	0.76	0.77	1.38	1.4
Manganese (T)	ug/L	0.05	3.06	5.5	-	120	-	90	120	2.79	2.87	2.86	2.83	2.58	2.66	2.68	2.6	2.69	5.69	6.1
Mercury (T)	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (T)	ug/L	0.05	0.107	5.2	73	-	-	54.8	73	0.074	0.07	0.07	0.074	0.087	0.077	0.075	0.076	0.079	0.126	0.146
Nickel (T)	ug/L	0.05	0.441	2.7	25	-	-	18.8	25	0.425	0.442	0.427	0.429	0.391	0.373	0.376	0.403	0.389	0.677	0.727
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.32	1.34	1.33	1.32	1.31	1.32	1.33	1.3	1.3	1.48	1.49
Selenium (T)	ug/L	0.04	0.049	0.16	1	50	-	0.75	1	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.04	<0.04	0.046
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	102	101	102	103	107	104	103	104	107	148	144
Silver (T)	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (T)	ug/L	0.02	36.1	-	2500	7000	-	1880	2500	35.1	36.2	35.6	35.3	38.4	37.3	37.1	37.6	38.6	64.6	66.9
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	1390	1400	1360	1370	1230	1220	1150	1180	1300	2500	2380
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (T)	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8	<0.005	<0.005	<0.005	0.0088	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0061	0.0055
Tin (T)	ug/L	0.02	0.0384	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (T)	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-	0.064	0.069	0.208	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	0.145	<0.2
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (T)	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15	0.0146	0.0135	0.0149	0.0175	0.0152	0.0153	0.0164	0.0152	0.0145	0.0266	0.0281
Vanadium (T)	ug/L	0.05	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	0.0094	0.0094
Zinc (T)	ug/L	0.5	1.7	6.7	-	-	-	-	-	<0.5	<0.5	0.76	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.04	0.54
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Metals																				
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	1.3	1.3	2.2	1.3	<1	<1	<1	<1	<1	3.7	4.5
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	0.3	0.299	0.312	0.31	0.328	0.328	0.329	0.316	0.34	0.473	0.464
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	8.21	8.05	8.23	8.08	7.66	7.92	7.82	7.86	8.06	8.07	8.08
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (D)	ug/L	5	-	-	-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	8.7	9.3
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0088	0.0093	0.012	0.0102	0.0077	0.0078	0.0076	0.0077	0.0078	0.0093	0.0095
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0057	0.006	0.0061	0.0056	<0.005	0.0054	<0.005	0.006	<0.005	0.0189	0.02
Copper (D)	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83	0.799	0.878	1.05	1.14	0.726	0.712	0.706	0.689	0.684	0.803	0.789
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (D)	ug/L	1	-	-	-	-	-	-	-	2.6	2.3	2.8	2.7	3	3	2.8	2.8	3.2	5.4	5.1
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.015	0.014
Lead (D)	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36	<0.01	<0.01	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	0.72	0.76	0.73	0.75	0.78	0.76	0.77	0.76	0.77	1.37	1.4
Manganese (D)	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330	0.422	0.371	0.387	0.354	0.393	0.389	0.417	0.416	0.398	0.293	0.353
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	0.00051	<5e-04
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.079	0.074	0.073	0.075	0.084	0.08	0.082	0.076	0.076	0.138	0.141
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.43	0.442	0.433	0.405	0.37	0.374	0.38	0.395	0.409	0.667	0.694
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	1.39	1.42	1.38	1.35	1.3	1.31	1.31	1.29	1.3	1.53	1.5
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	0.054	<0.04	<0.04	<0.04	0.063	0.044
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	100	99	101	101	104	112	109	108	112	147	134
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (D)	ug/L	0.02	-	-	2500	-	-	1880	2500	36.9	37.6	36.1	35.8	37.8	37.8	36.7	38.2	37.9	64.2	66.5
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	1350	1490	1390	1350	1320	1250	1230	1350	1450	2290	2490
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	0.022	0.025	0.033	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0146	0.0113	0.0149	0.0135	0.0151	0.016	0.0146	0.0147	0.0148	0.0234	0.0247
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	0.0084	0.0065
Zinc (D)	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4	1.43	1.08	1.36	1.07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.58
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Other																				
Cyanide (free)	mg/L	0.001	-	0.0004	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	99	93.9
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0064	<0.0053

Notes

DL = 2021 detection limits

FWAL = freshwater aquatic life guideline

HH DW = Health Canada drinking water quality guidel

SSWQO = site-specific water quality objective

FEIS = predicted concentrations at the edge of the mixing zone (Agnico Eagle, 2014).

Appendix C3
2021 Meliadine Lake Water Quality Results

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQ	Action Level (min | max)	Benchmark (min | max)	September										
										MEL-01				MEL-02					MEL-03	
										MEL-01-07	MEL-01-08	MEL-01-09	MEL-01-10	MEL-02-01	MEL-02-02	MEL-02-03	MEL-02-04	MEL-02-05	MEL-03-01	MEL-03-02
										9/2/2021	9/2/2021	9/2/2021	9/2/2021	9/2/2021	9/2/2021	9/2/2021	9/2/2021	9/2/2021	9/5/2021	9/5/2021
Field Measurements																				
Temperature	C	-	-	-	-	-	-	-	-	10.88	10.88	10.81	10.86	10.73	10.7	10.73	10.74	10.75	9.98	10.04
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-	106.9	110.8	114.9	115.5	88.7	86.6	87.8	88.4	88.3	77.2	77.3
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.44	7.45	7.47	7.44	6.79	7.26	7.22	7.27	7.2	7.38	7.4
DO (mg/L)	mg/L	-	-	-	6.5	-	-	6.5	6.5	11.16	11.21	11.29	11.21	11.16	11.16	11.16	11.18	11.16	11.16	11.09
DO (%)	%	-	-	-	-	-	-	-	-	102.9	103.4	104	103.4	102.6	102.6	102.6	102.8	102.7	100.8	100.3
Conventional Parameters																				
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-	105	107	117	123	90.4	88.2	89.5	90.1	89.7	79.8	79.8
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-	26.5	27	29.5	35.1	24.2	24.4	24.4	24.4	24.1	22.5	23
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.35	7.35	7.36	7.36	7.34	7.34	7.35	7.36	7.39	7.36	7.36
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500	51	64	74	63	56	59	71	66	44	44	42
Total Dissolved Solids (Calc)	mg/L	1	39.6	68	500	-	1000	375	500	50.4	51.1	55.8	63.4	43.2	42.1	42.5	43.3	44.4	38.3	38.5
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-	<1	1.1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-	0.54	0.72	0.4	0.4	0.25	0.23	0.28	0.45	0.28	0.13	0.18
Major Ions																				
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-	21.1	20.6	20.6	21	20.6	20.6	20.5	21.4	24.4	21	20.6
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-	17.3	16.9	16.9	17.2	16.9	16.9	16.8	17.5	20	17.2	16.9
Bromide	mg/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	8.11	8.25	8.93	10.5	7.51	7.68	7.62	7.59	7.53	7.09	7.24
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-	8.27	8.3	8.81	10.3	7.43	7.59	7.37	7.46	7.62	7.1	7.1
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120	16	16.3	18.4	19.8	12.4	11.8	12.1	12.3	12.2	10	10.1
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8	0.027	0.026	0.027	0.027	0.026	0.026	0.026	0.026	0.026	0.025	0.027
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	1.52	1.55	1.75	2.17	1.33	1.26	1.3	1.33	1.29	1.17	1.19
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-	1.59	1.62	1.74	2.19	1.32	1.28	1.3	1.35	1.3	1.17	1.18
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	1.08	1.1	1.17	1.39	1.02	0.993	1.01	1.02	0.991	0.942	0.959
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-	1.09	1.09	1.17	1.4	1.01	0.989	0.979	1	0.985	0.956	0.966
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-	0.308	0.317	0.305	0.309	0.231	0.217	0.222	0.223	0.227	0.179	0.183
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	7.31	7.62	8.48	11.6	6.19	5.77	5.87	5.98	5.79	4.96	5.12
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-	7.46	7.5	8.71	11.6	5.94	5.76	5.77	5.97	5.87	5	5.09
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-	5.87	6	6.69	7.2	4.61	4.44	4.53	4.58	4.57	3.77	3.77
Nutrients																				
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	0.141	-	-	0.105	0.141	0.095	<0.05	<0.05	<0.05	0.084	0.09	<0.05	<0.05	0.082	<0.05	<0.05
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9	0.0173	0.0272	0.0565	0.0888	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	0.0173	0.0272	0.0579	0.0909	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06	<0.001	<0.001	0.0015	0.0021	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.0173	0.0272	0.0579	0.0909	0.177	0.255	0.141	0.232	0.276	<0.0051	<0.0051
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0011	<0.001	<0.001	0.0011
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-	0.0029	0.004	0.0054	0.0027	0.0037	0.0044	0.0017	0.002	0.0016	0.004	0.004
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.272	0.237	0.344	0.362	0.186	0.195	0.122	0.154	0.244	0.127	0.169
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-	0.266	0.311	0.27	0.259	0.177	0.255	0.141	0.232	0.276	0.135	0.152
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.255	0.209	0.286	0.271	0.186	0.195	0.122	0.154	0.244	0.127	0.169
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-	0.0063	0.0075	0.0069	0.0076	0.0061	0.0047	0.0059	0.0056	0.0055	0.0029	0.0063
Organic/Inorganic Carbon																				
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-	3.71	3.67	3.61	3.71	2.95	3.09	3.36	3.22	3.14	2.56	2.41
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-	3.32	3.32	3.33	3.5	2.92	2.68	2.86	3.03	2.9	2.52	2.6
Total Metals																				
Aluminum (T)	ug/L	1	5.32	9.1	100	-	-	75	100	5.2	8.6	8.3	16.7	4.6	3	5.4	6.2	3.3	2.2	1.9
Antimony (T)	ug/L	0.02	0.02	0.51	-	6	-	4.5	6	<0.02	<0.02	<0.02	0.031	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (T)	ug/L	0.02	0.275	3.8	5	10	25	18.8	25	0.47	0.442	0.464	0.499	0.496	0.432	0.507	0.502	0.486	0.304	0.299
Barium (T)	ug/L	0.02	8.05	77	-	1000	-	750	1000	8.09	7.66	8.41	9.05	7.77	7.85	7.86	7.86	7.42	7.83	7.94
Beryllium (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (T)	ug/L	5	6.52	23	1500	5000	-	1120	1500	7.2	7.4	8.3	12.1	5.5	5.3	5.5	5.4	5.5	<5	<5
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.05	0.043 | 0.067	5	-	0.032 | 0.050	0.043 | 0.067	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0079	0.0092	0.0097	0.0115	0.0086	0.0085	0.0081	0.0092	0.0071	0.0077	0.0083
Chromium (T)	ug/L	0.1	0.103	1.1	5	50	-	3.75	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (T)	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78	0.0273	0.0314	0.0343	0.0477	0.0207	0.0156	0.0235	0.0202	0.0149	0.0099	0.0115
Copper (T)	ug/L	0.05	0.86	2	-	2000	-	1500	2000	0.835	0.834	0.85	0.858	0.911	0.759	0.793	0.796	0.732	0.669	0.672
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (T)	ug/L	1	15	42	300	-	1060	795	1060	19.1	21	19.4	23	12.9	10.5	16.2	14.8	11.5	7.8	7.9
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.036	0.033	0.031	0.036	0.026	0.023	0.028	0.027	0.022	0.016	0.015
Lead (T)	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5	<0.01	0.023	<0.01	0.017	0.019	<0.01	0.026	0.024	<0.01	<0.01	<0.01
Lithium (T)	ug/L	0.5	0.72	-	-	-	-	-	-	1.16	1.18	1.34	1.82	0.9	0.9	0.9	0.9	0.94	0.84	0.85
Manganese (T)	ug/L	0.05	3.06	5.5	-	120	-	90	120	5.39	5.07	5.71	7.65	3.41	2.96	3.3	3.3	3.25	1.95	2.04
Mercury (T)	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (T)	ug/L	0.05	0.107	5.2	73	-	-	54.8	73	0.112	0.151	0.125	6.03	0.092	0.087	0.09	0.09	0.089	0.075	0.094
Nickel (T)	ug/L	0.05	0.441	2.7	25	-	-	18.8	25	0.685	0.686	0.705	0.745	0.554	0.509	0.529	0.532	0.521	0.456	0.425
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.46	1.43	1.53	1.66	1.42	1.41	1.38	1.37	1.42	1.33	1.34
Selenium (T)	ug/L	0.04	0.049	0.16	1	50	-	0.75	1	0.051	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	133	178	147	175	109	91	99	114	103	96	92
Silver (T)	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (T)	ug/L	0.02	36.1	-	2500	7000	-	1880	2500	55.2	56.8	63.7	82.8	46.7	45	44.4	47.3	44.8	39.9	39.2
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	1920	2000	2360	3060	1680	1470	1440	1540	1580	1250	1290
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (T)	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0052	0.0072	<0.005	0.0053	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (T)	ug/L	0.02	0.0384	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (T)	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-	0.181	0.255	0.213	0.283	0.11	0.13	0.229	<0.35	0.104	0.051	0.059
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.018	<0.01	<0.01	<0.01	<0.01
Uranium (T)	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15	0.0218	0.0228	0.0242	0.0384	0.0152	0.0158	0.0158	0.0146	0.0166	0.0146	0.014
Vanadium (T)	ug/L	0.05	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0093	0.008	0.0089	0.0108	0.0072	<0.005	0.0081	<0.005	0.0064	<0.005	<0.005
Zinc (T)	ug/L	0.5	1.7	6.7	-	-	-	-	-	0.55	4.15	1.08	2.53	1.58	<0.5	1.7	1.83	<0.5	2.92	0.88
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Metals																				
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	2.3	2.9	3.1	7.1	1.8	1.4	1.6	1.3	1.3	1.5	1.3
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	0.028	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	0.402	0.432	0.443	0.5	0.462	0.459	0.476	0.467	0.475	0.291	0.316
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	7.66	7.78	7.95	8.47	7.79	7.74	7.82	7.86	7.72	7.75	7.87
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron (D)	ug/L	5	-	-	-	-	-	-	-	7.1	7.4	8.4	12.1	5.6	5.5	5.4	5.5	5.5	<5	<5
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0081	0.0076	0.0082	0.0125	0.0087	0.0078	0.0086	0.0075	0.008	0.0084	0.008
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0118	0.014	0.0173	0.0299	0.0085	0.0083	0.0141	0.0099	0.0106	0.0078	<0.005
Copper (D)	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83	0.874	0.779	0.816	0.8	0.733	0.743	0.748	0.734	0.695	0.659	1.01
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron (D)	ug/L	1	-	-	-	-	-	-	-	10.2	6.1	5.3	4.9	4.7	4.2	4.3	4.3	4.5	2.9	3.3
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	0.017	0.018	0.016	0.014	0.014	0.013	0.012	0.014	0.014	<0.01	<0.01
Lead (D)	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36	<0.01	<0.01	<0.01	<0.01	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	1.12	1.17	1.35	1.79	0.92	0.9	0.9	0.9	0.91	0.81	0.83
Manganese (D)	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330	0.404	0.319	0.359	0.77	0.415	0.369	0.4	0.372	0.36	0.302	0.31
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04	<5e-04
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.109	0.142	0.131	6.02	0.093	0.086	0.092	0.083	0.089	0.075	0.066
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.679	0.678	0.686	0.705	0.52	0.494	0.53	0.526	0.509	0.408	0.461
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	1.45	1.46	1.5	1.63	1.4	1.36	1.4	1.42	1.35	1.34	1.32
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	<0.04	0.043	<0.04	0.045	<0.04	<0.04	0.043	0.058	0.052	<0.04	<0.04
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	140	133	127	138	99	87	94	95	93	93	100
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Strontium (D)	ug/L	0.02	-	-	2500	-	-	1880	2500	55.5	58.7	63.3	85.4	47.2	45.6	47	46.8	46.6	39.8	38.2
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	1980	2180	2290	3050	1620	1590	1840	1770	1510	1400	1310
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0202	0.0207	0.0243	0.0375	0.0146	0.0147	0.0151	0.0143	0.0147	0.0135	0.0128
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0064	0.0082	0.0073	0.0075	<0.005	<0.005	0.0057	0.0053	0.0062	<0.005	<0.005
Zinc (D)	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4	<0.5	1.3	<0.5	1.16	0.83	<0.5	0.68	0.85	<0.5	1.05	0.71
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Other																				
Cyanide (free)	mg/L	0.001	-	0.0004	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	94.9	97.1	98.7	117	-	-	-	-	-	-	-
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	<0.0064	<0.0044	<0.0065	<0.0071	-	-	-	-	-	<0.0077	<0.0056

Notes

DL = 2021 detection limits	FWAL = freshwater aquatic life guideline
HH DW = Health Canada drinking water quality guidel	SSWQO = site-specific water quality objective

FEIS = predicted concentrations at the edge of the mixing zone (Agnico Eagle, 2014).

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQO	Action Level (min | max)	Benchmark (min | max)	September		
										MEL-03		
										MEL-03-03	MEL-03-04	MEL-03-05
										9/5/2021	9/5/2021	9/5/2021
Field Measurements												
Temperature	C	-	-	-	-	-	-	-	-	10.12	10.04	9.88
Sp. Conductivity (field)	uS/cm	-	-	-	-	-	-	-	-	77.9	77.7	77.4
pH (field)	pH units	-	7.1 | 7.95	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.4	7.31	7.3
DO (mg/L)	mg/L	-	-	-	6.5	-	-	6.5	6.5	11.11	11.16	11.22
DO (%)	%	-	-	-	-	-	-	-	-	100.6	101	101.1
Conventional Parameters												
Conductivity (lab)	uS/cm	1	77.5	-	-	-	-	-	-	78.6	78.8	79.9
Hardness	mg/L	0.2 | 1	23.4	-	-	-	-	-	-	22.1	21.5	23
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9.0	6.5 | 9.0	7.37	7.36	7.35
Total Dissolved Solids	mg/L	13	54	68	500	-	1000	375	500	47	42	41
Total Dissolved Solids (Calc)	mg/L	1	39.6	68	500	-	1000	375	500	38	37.4	38.6
Total Suspended Solids	mg/L	1	1	3.1	-	-	-	-	-	<1	<1	<1
Turbidity (lab)	NTU	0.1	-	-	-	-	-	-	-	0.16	0.18	0.17
Major Ions												
Alkalinity, Bicarbonate	mg/L	1.2	25	-	-	-	-	-	-	21.1	20.6	20.9
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	<0.6	<0.6	<0.6
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	1	20.5	-	-	-	-	-	-	17.3	16.9	17.1
Bromide	mg/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	7	6.79	7.26
Calcium (T)	mg/L	0.01	7.33	-	-	-	-	-	-	6.86	6.89	7.19
Chloride	mg/L	0.1	9.56	14	120	-	-	90	120	9.73	9.74	10.1
Fluoride	mg/L	0.02	0.028	0.0084	0.12	1.5	2.8	2.1	2.8	0.027	0.027	0.026
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	1.12	1.11	1.18
Magnesium (T)	mg/L	0.004	1.18	-	-	-	-	-	-	1.12	1.16	1.19
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	0.932	0.922	0.95
Potassium (T)	mg/L	0.02	0.954	-	-	-	-	-	-	0.907	0.945	0.975
Reactive Silica (SiO2)	mg/L	0.01	0.268	-	-	-	-	-	-	0.195	0.187	0.184
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	4.93	4.84	5.01
Sodium (T)	mg/L	0.02	4.85	5.3	-	-	-	-	-	4.81	4.88	5.12
Sulphate	mg/L	0.3	3.87	38	-	-	-	-	-	3.87	3.81	3.79
Nutrients												
Ammonia (as N)	mg/L	0.005 | 0.05	0.0174	0.54	0.141	-	-	0.105	0.141	0.084	<0.05	<0.05
Nitrate (as N)	mg/L	0.005	0.018	0.25	2.9	10	-	2.17	2.9	<0.005	<0.005	<0.005
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	<0.0051	<0.0051	<0.0051
Nitrite (as N)	mg/L	0.001	0.001	0.051	0.06	1	-	0.045	0.06	<0.001	<0.001	<0.001
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.17	0.234	<0.0051
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	-	<0.001	<0.001	<0.001
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.00314	-	-	-	-	-	-	0.0024	0.0041	0.003
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.104	0.234	0.114
Total Kjeldahl Nitrogen	mg/L	0.05	0.25	-	-	-	-	-	-	0.17	<0.05	0.13
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.104	0.234	0.114
Total Phosphorus	mg/L	0.001 | 0.003	0.006	0.0049	-	-	-	-	-	0.0061	0.0053	0.0034
Organic/Inorganic Carbon												
Dissolved Organic Carbon	mg/L	0.5	2.72	-	-	-	-	-	-	2.66	2.77	2.71
Total Organic Carbon	mg/L	0.5	3	-	-	-	-	-	-	2.64	2.32	2.65
Total Metals												
Aluminum (T)	ug/L	1	5.32	9.1	100	-	-	75	100	2.7	4.3	3.6
Antimony (T)	ug/L	0.02	0.02	0.51	-	6	-	4.5	6	<0.02	<0.02	<0.02
Arsenic (T)	ug/L	0.02	0.275	3.8	5	10	25	18.8	25	0.257	0.306	0.316
Barium (T)	ug/L	0.02	8.05	77	-	1000	-	750	1000	7.26	7.44	7.96
Beryllium (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005
Bismuth (T)	ug/L	0.005	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005
Boron (T)	ug/L	5	6.52	23	1500	5000	-	1120	1500	<5	<5	<5
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.05	0.043 | 0.067	5	-	0.032 | 0.050	0.043 | 0.067	<0.005	<0.005	<0.005
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0077	0.0083	0.0082
Chromium (T)	ug/L	0.1	0.103	1.1	5	50	-	3.75	5	<0.1	<0.1	<0.1
Cobalt (T)	ug/L	0.005	0.016	-	0.78	-	-	0.585	0.78	0.0097	0.0089	0.0122
Copper (T)	ug/L	0.05	0.86	2	-	2000	-	1500	2000	0.649	3.42	0.722
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05
Iron (T)	ug/L	1	15	42	300	-	1060	795	1060	7.4	9.5	9.7
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.017	0.017	0.017
Lead (T)	ug/L	0.01	0.0222	0.15	-	5	-	3.75	5	<0.01	0.015	0.015
Lithium (T)	ug/L	0.5	0.72	-	-	-	-	-	-	0.71	0.72	0.88
Manganese (T)	ug/L	0.05	3.06	5.5	-	120	-	90	120	1.94	2.02	2.02
Mercury (T)	ug/L	0.5	8.00E-04	0.02	0.026	1	-	0.0195	0.026	<5e-04	<5e-04	0.00053
Molybdenum (T)	ug/L	0.05	0.107	5.2	73	-	-	54.8	73	0.081	0.098	0.093
Nickel (T)	ug/L	0.05	0.441	2.7	25	-	-	18.8	25	0.387	0.398	0.426
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.3	1.35	1.34
Selenium (T)	ug/L	0.04	0.049	0.16	1	50	-	0.75	1	<0.04	<0.04	<0.04
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	83	84	88
Silver (T)	ug/L	0.005 | 0.01	0.005	0.1	0.25	-	-	0.188	0.25	<0.005	<0.005	<0.005
Strontium (T)	ug/L	0.02	36.1	-	2500	7000	-	1880	2500	37.6	38.2	40.2
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	1440	1400	1260
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02
Thallium (T)	ug/L	0.005	0.005	0.1	0.8	-	-	0.6	0.8	<0.005	<0.005	<0.005
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Tin (T)	ug/L	0.02	0.0384	-	-	-	-	-	-	<0.02	<0.02	<0.02
Titanium (T)	ug/L	0.05 | 0.35	0.17	-	-	-	-	-	-	<0.1	0.141	0.096
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01
Uranium (T)	ug/L	0.001	0.0164	1.5	15	20	-	11.2	15	0.0138	0.0147	0.0148
Vanadium (T)	ug/L	0.05	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	0.0058
Zinc (T)	ug/L	0.5	1.7	6.7	-	-	-	-	-	0.7	1.35	3.04
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01
Dissolved Metals												
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	1.5	1	1.9
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	0.303	0.283	0.325
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	7.55	7.3	7.66
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Boron (D)	ug/L	5	-	-	-	-	-	-	-	<5	<5	<5
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0089	0.0082	0.0073
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0062	0.005	<0.005
Copper (D)	ug/L	0.05	-	-	0.297 | 3.83	-	-	0.223 | 2.87	0.297 | 3.83	0.671	0.619	0.686
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05
Iron (D)	ug/L	1	-	-	-	-	-	-	-	3.7	2.8	3.9
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01
Lead (D)	ug/L	0.01	0.0125	-	4.52 | 6.36	-	-	3.39 | 4.77	4.52 | 6.36	0.012	<0.01	<0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	0.71	0.71	0.85
Manganese (D)	ug/L	0.05	1.2	-	210 | 330	-	-	158 | 248	210 | 330	0.296	0.275	0.336
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	<5e-04	<5e-04	<5e-04
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.07	0.08	0.075
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.386	0.368	0.422
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	<50	<50	<50
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	1.35	1.32	1.31
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	<0.04	<0.04	0.056
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	78	78	96
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Strontium (D)	ug/L	0.02	-	-	2500	-	-	1880	2500	38.5	40.2	39.6
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	1390	1410	1430
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	<0.1	<0.1	<0.1
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	<0.02	<0.02	<0.02
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0143	0.0137	0.0155
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0051	<0.005	<0.005
Zinc (D)	ug/L	0.5	1.9	-	5.96 | 12.4	-	-	4.47 | 9.3	5.96 | 12.4	<0.5	0.59	0.55
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	<0.01	<0.01	<0.01
Other												
Cyanide (free)	mg/L	0.001	-	0.0004	-	-	-	-	-	<0.001	<0.001	<0.001
Cyanide (Total)	mg/L	0.001	0.001	0.009	0.005	0.2	-	0.00375	0.005	<0.001	<0.001	<0.001
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	-	-	-
Radium-226	Bq/l	0.003 | 0.0086	-	-	-	-	-	-	-	-	<0.003	<0.0073

Notes

DL = 2021 detection limits

FWAL = freshwater aquatic life guideline

HH DW = Health Canada drinking water quality guidel

SSWQO = site-specific water quality objective

FEIS = predicted concentrations at the edge of the mixing zone (Agnico Eagle, 2014).

APPENDIX D

PENINSULA LAKES WATER QUALITY – SUPPORTING INFORMATION

Appendix D1

Peninsula Lakes Water Quality –Summary Statistics

APPENDIX D1 – TABLES

Table D1-1. Normal range values for the Peninsula Lakes water quality program. 2
Table D1-2. Lake A8 – Summary statistics and screening results for the July and August 2021 sampling events. 4
Table D1-3. Lake B7 – Summary statistics and screening results for the July and August 2021 sampling events. 7
Table D1-4. Lake D7 – Summary statistics and screening results for the July and August 2021 sampling events. 10
Table D1-5. Water chemistry results from the 2021 snow core monitoring program. 13

Peninsula Lakes Normal Range Derivation

The approach to calculating the normal range in the Peninsula Lakes followed the methods in Barrett et al. (2015). The approach takes into consideration underlying distribution of the baseline/reference data (i.e., are the baseline data normally distributed) when determining which method to use to estimate the limits of the normal range. Three methods were proposed in the AEMP Design Document (Golder 2016) for calculating the normal range for a given variable (e.g., water quality parameters). A brief description of each method is provided below as per the methods described in the 2018 Interpretive report (Golder 2019):

> Prediction Interval (PI) – If the baseline/reference data are normally distributed, the normal range is calculated using the 80% prediction interval. Normality [of the raw data] is assessed using the Shapiro-Wilk test, using $\alpha = 0.05$ to indicate a significant departure from normality.
>
> PI Method (Box- – When the baseline/reference data are not normally distributed, but normality could be achieved after Box-Cox transformation (Box and Cox 1964), the normal range is calculated on the Box-Cox transformed data and the upper and lower bound of the normal ranges are back-transformed.
>
> Percentile – If neither the untransformed data nor Box-Cox transformed datasets are normally distributed, the normal range boundaries are defined as the 10th and 90th percentile of the baseline data. In cases where the percentile method is used, a dataset of 1,000 samples is randomly generated from the normal range dataset and the 10th and 90th percentile are calculated from the distribution of 1,000 samples to estimate the normal range.

Normal range estimates were calculated separately for Lake A8, Lake B7, and Lake D7 using samples collected during the open-water sampling events[1]. The baseline period for the Peninsula Lakes ended in 2017; meaning no new data are included in normal range calculations for Lake A8, Lake B7, and Lake D7.

Normal range values derived for each of the three Peninsula Lakes are provided in Table D1-1.

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[1] Normal ranges were not derived for the ice-covered sampling events due to insufficient reference and baseline data for the winter months.

Table D1-1. Normal range values for the Peninsula Lakes water quality program.

Parameter	Units	Detection Limit	Lake A8					Lake B7					Lake D7				
			N	Outliers	Method	Normal Range		N	Outliers	Method	Normal Range		N	Outliers	Method	Normal Range	
						Lower	Upper				Lower	Upper				Lower	Upper
Conventional Parameters																	
pH (field)	pH units	0.1	21	1	PI	7.7	8.3	25	0	PI(λ)	7	8.2	21	0	PI(λ)	7.6	8.3
Sp. Conductivity (field)	uS/cm	1	20	0	Percentile	100	334	24	1	Percentile	101	302	20	1	Percentile	111	159
Hardness	mg/L	0.2	20	0	Percentile	37	123	24	1	Percentile	42	118	20	1	Percentile	41	56
Alkalinity, Total	mg/L	1	15	0	PI(λ)	29	83.6	24	0	Percentile	29	110	20	1	Percentile	38	55
Total Dissolved Solids	mg/L		17	0	Percentile	57	152	19	0	Percentile	77	171	19	1	Percentile	57	81
Total Suspended Solids	mg/L	1	19	1	Percentile	0	4	24	0	PI(λ)	0	3	20	0	Percentile	0	2
Turbidity (lab)	NTU	0.1	17	0	PI(λ)	0.37	0.87	21	0	PI(λ)	0.34	0.69	18	0	PI	0.51	1.1
Alkalinity, Bicarbonate	mg/L	1.2	20	0	PI(λ)	36	91	24	0	Percentile	32	135	19	1	Percentile	46	68
Major Ions																	
Calcium (T)	mg/L	0.02	20	0	Percentile	12	40	24	1	Percentile	14	39	20	1	Percentile	13	17
Chloride	mg/L	0.1	20	0	Percentile	7	61	24	1	Percentile	5	25	20	0	Percentile	8	25
Fluoride	mg/L	0.02	13	0	PI	0.03	0.04	16	0	PI(λ)	0.02	0.04	16	0	Percentile	0.03	0.05
Magnesium (T)	mg/L	0.004	20	0	Percentile	1.7	5.6	24	0	Percentile	1.4	5.3	20	1	Percentile	2.2	3.3
Potassium (T)	mg/L	0.02	20	0	Percentile	0.7	2.5	24	0	Percentile	0.9	2.8	20	1	PI(λ)	1	1.8
Reactive Silica (SiO2)	mg/L	0.01	17	1	PI	0.18	1.3	21	0	Percentile	0.34	2.3	17	1	Percentile	0.14	0.28
Sodium (T)	mg/L	0.005	20	0	Percentile	1.9	8.4	24	0	Percentile	2.1	7.5	20	0	Percentile	5.2	17
Sulphate	mg/L	0.3	20	0	PI	2.7	9.3	24	0	Percentile	3.8	6	20	0	Percentile	2.5	10
Nutrients																	
Nitrate (as N)	mg/L	0.005	13	0	Percentile	0	0.015	16	1	Percentile	0	0.005	15	0	DL	0	0.005
Nitrite (as N)	mg/L	0.005	13	0	DL	0	0.0005	16	0	DL	0	0.005	15	0	DL	0	0.0005
Ammonia (as N)	mg/L	0.005	13	0	Percentile	0	0.011	16	0	Percentile	0	0.025	15	0	PI	0	0.009
Total Kjeldahl Nitrogen	mg/L	0.05	19	0	PI(λ)	0.22	0.63	23	0	PI(λ)	0.27	0.73	19	1	PI(λ)	0.26	0.52
Total Nitrogen	mg/L	0.05	10	0	PI	0.25	0.37	12	0	PI	0.28	0.42	12	0	PI	0.25	0.43
Total Phosphorus	mg/L	0.001	19	0	PI	0.004	0.009	23	1	PI(λ)	0.006	0.01	20	1	Percentile	0.01	0.02
Total Diss Phosphorus	mg/L	0.001	19	0	PI(λ)	0.002	0.006	24	0	PI(λ)	0.002	0.008	19	1	PI(λ)	0.003	0.008
Orthophosphate (PO4-P)	mg/L	0.001	19	0	Percentile	0	0.0023	24	1	DL	0	0.001	19	0	Percentile	0	0.003
Organic/Inorganic Carbon																	
Total Organic Carbon	mg/L	0.5	17	1	PI	3.5	4.7	23	1	PI(λ)	4.6	7.6	19	0	Percentile	3.5	14
Dissolved Organic Carbon	mg/L	0.5	14	1	PI	3.5	4.9	17	1	PI	4.8	5.5	15	0	PI(λ)	3.4	5.1
Metals																	
Aluminum (T)	ug/L	0.3	13	0	PI(λ)	1.1	3	16	0	PI(λ)	1.4	6.6	15	0	PI	3.8	6.7
Antimony (T)	ug/L	0.02	13	0	Percentile	0	0.4	16	0	DL	0	0.02	15	0	Percentile	0	0.03
Arsenic (T)	ug/L	0.02	13	0	PI	1.7	2.4	16	0	PI(λ)	1.3	1.8	15	0	PI	0.9	1.2
Barium (T)	ug/L	0.05	13	0	PI	23	32	16	0	Percentile	18	20	15	0	PI	15	17
Beryllium (T)	ug/L	0.01	13	0	DL	0	0.01	16	0	DL	0	0.01	15	0	DL	0	0.01
Bismuth (T)	ug/L	0.01	13	0	DL	0	0.01	16	0	DL	0	0.01	15	0	DL	0	0.01
Boron (T)	ug/L	1	13	0	Percentile	2.5	5	16	0	Percentile	2.5	8	15	0	PI	9.4	17
Cadmium (T)	ug/L	0.005	13	0	DL	0	0.005	16	1	Percentile	0	0.007	15	1	DL	0	0.005
Chromium (T)	ug/L	0.06	13	0	DL	0	0.06	16	0	DL	0	0.06	15	0	DL	0	0.06
Cobalt (T)	ug/L	0.01	13	0	PI	0.02	0.05	16	1	PI	0.03	0.05	15	0	Percentile	0.04	0.05

Table D1-1. Normal range values for the Peninsula Lakes water quality program.

Parameter	Units	Detection Limit	Lake A8					Lake B7					Lake D7				
			N	Outliers	Method	Normal Range		N	Outliers	Method	Normal Range		N	Outliers	Method	Normal Range	
						Lower	Upper				Lower	Upper				Lower	Upper
Copper (T)	ug/L	0.1	13	0	PI	0.54	0.89	16	0	Percentile	0.6	1.13	15	0	PI	0.55	1
Iron (T)	ug/L	1	13	0	PI	18	67	16	0	PI	51	103	15	0	PI(λ)	41	112
Lead (T)	ug/L	0.01	13	0	Percentile	0.01	0.03	16	0	Percentile	0.01	0.08	15	0	Percentile	0.01	0.02
Lithium (T)	ug/L	0.5	13	0	Percentile	7.5	10	16	0	PI(λ)	4.1	7.5	15	0	PI	1.2	1.9
Manganese (T)	ug/L	0.05	13	0	PI	3	13	16	0	Percentile	4.2	8.6	15	0	PI	8.6	13
Mercury (T)	ug/L	0.0005	13	0	PI	0	0.0012	16	0	PI(λ)	0	0.004	15	0	PI	0	0.001
Molybdenum (T)	ug/L	0.05	13	0	Percentile	0.17	0.22	16	0	PI(λ)	0.14	0.24	15	0	PI(λ)	0.28	0.48
Nickel (T)	ug/L	0.06	13	0	PI	0.75	0.92	16	0	PI(λ)	0.81	1.4	15	0	PI	0.55	0.75
Selenium (T)	ug/L	0.02	13	0	DL	0	0.02	16	0	Percentile	0.02	0.04	15	0	Percentile	0.02	0.06
Silver (T)	ug/L	0.005	13	0	DL	0	0.005	16	1	DL	0	0.005	15	0	DL	0	0.005
Strontium (T)	ug/L	0.05	13	0	PI(λ)	203	273	16	0	PI	136	155	15	0	PI(λ)	63	83
Thallium (T)	ug/L	0.005	13	0	DL	0	0.005	16	0	Percentile	0	0.005	15	0	DL	0	0.005
Tin (T)	ug/L	0.05	13	0	DL	0	0.05	16	0	DL	0	0.05	15	0	DL	0	0.05
Titanium (T)	ug/L	0.1	13	0	Percentile	0.05	0.25	16	0	Percentile	0	0.25	15	0	PI(λ)	0.16	0.34
Uranium (T)	ug/L	0.01	13	0	PI(λ)	0.027	0.054	16	0	PI	0.023	0.03	15	0	PI	0.06	0.1
Vanadium (T)	ug/L	0.01	13	0	DL	0	0.01	16	1	DL	0	0.01	15	0	PI(λ)	0.04	0.07
Zinc (T)	ug/L	0.8	13	0	Percentile	0.4	1.2	16	1	Percentile	0	1.9	15	0	Percentile	0	2
Zinc (D)	ug/L	0.8	13	0	Percentile	0	8.5	16	0	Percentile	0	2.2	15	0	Percentile	0	1.4
Other																	
Cyanide (Total)	mg/L	0.001	17	0	DL	0	0.001	23	0	DL	0	0.001	18	0	DL	0	0.001

Table D1-2. Lake A8 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake A8 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Field Measurements																
Temperature	C	-	-	-	-	6	0	0	11.9	11.9	3.36	1.37	8.6	15.1	-	-
Sp. Conductivity (field)	uS/cm	-	334	-	-	6	0	0	247	251	17.9	7.29	221	265	-	-
pH (field)	pH units	-	7.7 | 8.3	-	6.5 | 9	6	0	0	8.12	8.16	0.237	0.0968	7.73	8.35	-	0
DO (mg/L)	mg/L	-	-	-	6.5	6	0	0	11.5	11.4	1.18	0.482	10.3	12.9	-	0
DO (%)	%	-	-	-	-	6	0	0	105	105	3.51	1.43	101	111	-	-
Conventional Parameters																
Conductivity (lab)	uS/cm	1	-	-	-	6	0	0	244	244	19.9	8.12	215	266	-	-
Hardness	mg/L	0.2	-	-	-	6	0	0	89.6	91.4	3.66	1.5	83.9	92.4	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9	6	0	0	7.85	7.84	0.0473	0.0193	7.81	7.94	-	0
Total Dissolved Solids	mg/L	13 | 20	-	162	375	6	0	0	180	190	29.4	12	134	208	-	0
Total Dissolved Solids (Calculated)	mg/L	1	152	-	375	6	0	0	120	120	9.09	3.71	108	131	0	0
Total Suspended Solids	mg/L	1	4	2.9	-	6	5	83	-	1	-	-	1	1.6	0	-
Turbidity (lab)	NTU	0.1	0.87	-	-	6	0	0	0.427	0.395	0.0864	0.0353	0.35	0.54	0	-
Major Ions																
Alkalinity, Bicarbonate	mg/L	1.2	91	-	-	6	0	0	61.3	60.2	2.58	1.05	59.2	65.5	0	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	6	6	100	-	0.6	-	-	0.6	0.6	0	-
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	6	6	100	-	0.34	-	-	0.34	0.34	0	-
Alkalinity, Total	mg/L	1	83.6	51	-	6	0	0	50.2	49.4	2.12	0.867	48.5	53.7	0	-
Bromide	mg/L	0.1	-	-	-	6	0	0	0.238	0.25	0.0492	0.0201	0.18	0.3	-	-
Calcium (D)	mg/L	0.01	-	-	-	6	0	0	29	29.6	1.18	0.481	27.3	30	-	-
Calcium (T)	mg/L	0.01	40	47	-	6	0	0	28.2	28.8	0.991	0.405	26.7	29	0	-
Chloride	mg/L	0.1	61	74	90	6	0	0	38.5	39.5	6.02	2.46	30.2	44.7	0	0
Fluoride	mg/L	0.02	0.04	0.038	2.1	6	0	0	0.0323	0.032	0.00242	0.000989	0.03	0.036	0	0
Magnesium (D)	mg/L	0.004	-	-	-	6	0	0	4.2	4.16	0.266	0.108	3.8	4.55	-	-
Magnesium (T)	mg/L	0.004	5.6	6.9	-	6	0	0	4.11	4.06	0.336	0.137	3.67	4.5	0	-
Potassium (D)	mg/L	0.02	-	-	-	6	0	0	1.98	2.01	0.147	0.06	1.73	2.13	-	-
Potassium (T)	mg/L	0.02	2.5	2.3	-	6	0	0	1.88	1.92	0.144	0.0589	1.71	2.05	0	-
Reactive Silica (SiO2)	mg/L	0.01 | 0.02	1.3	-	-	6	0	0	0.363	0.281	0.14	0.057	0.268	0.587	0	-
Sodium (D)	mg/L	0.02	-	-	-	6	0	0	7.73	7.82	0.904	0.369	6.57	8.78	-	-
Sodium (T)	mg/L	0.02	8.4	8.3	-	6	0	0	7.48	7.46	1.01	0.413	6.33	8.68	33	-
Sulphate	mg/L	0.3	9.3	11.6	164	6	0	0	9.06	8.35	2.1	0.856	6.43	11.6	33	0
Nutrients																
Ammonia (as N)	mg/L	0.005 | 0.05	0.011	0.118	1.37	6	2	33	0.0247	0.0314	0.0241	0.00984	0.005	0.071	0	0
Nitrate (as N)	mg/L	0.005	0.015	0.2	2.17	6	5	83	-	0.005	-	-	0.005	0.0094	0	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	6	5	83	-	0.0051	-	-	0.0051	0.0094	-	-
Nitrite (as N)	mg/L	0.001	0.0005	-	0.045	6	6	100	-	0.001	-	-	0.001	0.001	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	6	3	50	-	0.148	-	-	0.0051	0.355	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.0023	0.00215	-	6	5	83	-	0.001	-	-	0.001	0.0015	0	-
Total Diss Phosphorus	mg/L	0.001	0.006	0.006	-	6	0	0	0.00297	0.00295	0.000582	0.000238	0.0024	0.0039	0	-

Table D1-2. Lake A8 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake A8 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	6	0	0	0.279	0.258	0.0567	0.0231	0.239	0.389	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.63	0.58	-	6	0	0	0.321	0.325	0.0389	0.0159	0.274	0.367	0	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	6	0	0	0.278	0.253	0.0571	0.0233	0.239	0.389	-	-
Total Phosphorus	mg/L	0.003	0.009	-	-	6	0	0	0.0066	0.0065	0.00116	0.000473	0.0053	0.0085	0	-
Organic/Inorganic Carbon																
Dissolved Organic Carbon	mg/L	0.5	4.9	-	-	6	0	0	4.6	4.47	0.79	0.322	3.76	6.01	17	-
Total Organic Carbon	mg/L	0.5	4.7	-	-	6	0	0	4.55	4.44	0.649	0.265	4.01	5.77	17	-
Total Metals																
Aluminum	ug/L	1	3	4.6	75	6	0	0	5.38	5.4	1.16	0.474	4.1	7.3	100	0
Antimony	ug/L	0.02	0.4	0.2	4.5	6	0	0	0.0325	0.0355	0.00635	0.00259	0.023	0.038	0	0
Arsenic	ug/L	0.02	2.4	1.7	18.8	6	0	0	4.88	5.15	1.6	0.654	2.76	6.66	100	0
Barium	ug/L	0.02	32	23	750	6	0	0	23.6	23.6	0.893	0.365	22.4	24.9	0	0
Beryllium	ug/L	0.005	0.01	0.47	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Boron	ug/L	5	5	27	1120	6	2	33	4.73	5.6	1.75	0.713	5	6.2	67	0
Cadmium	ug/L	0.005	0.005	0.083	0.103	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Chromium	ug/L	0.1	0.06	1.87	3.75	6	6	100	-	0.1	-	-	0.1	0.1	0	0
Cobalt	ug/L	0.005	0.05	0.24	0.711	6	0	0	0.0395	0.038	0.00756	0.00309	0.0323	0.0485	0	0
Copper	ug/L	0.05	0.89	2.7	1.53	6	0	0	0.833	0.78	0.138	0.0563	0.722	1.07	33	0
Iron	ug/L	1	67	96	795	6	0	0	54.2	51.4	15.4	6.3	40.8	82.4	17	0
Lead	ug/L	0.01	0.03	2	3.75	6	0	0	0.0543	0.0505	0.0182	0.00742	0.032	0.077	100	0
Lithium	ug/L	0.5	10	5.3	-	6	0	0	8.06	9.05	1.63	0.667	5.72	9.19	0	-
Manganese	ug/L	0.05	13	30	90	6	0	0	7.68	7.14	3.7	1.51	3.9	13.8	17	0
Mercury	ug/L	0.5	0.0012	0.04	0.0195	6	2	33	0.000448	0.000525	0.000156	6.37E-05	0.0005	0.0006	0	0
Molybdenum	ug/L	0.05	0.22	0.59	54.8	6	0	0	0.272	0.268	0.0241	0.00985	0.242	0.303	100	0
Nickel	ug/L	0.05	0.92	2.3	62.7	6	0	0	0.768	0.735	0.116	0.0475	0.645	0.976	17	0
Selenium	ug/L	0.04	0.02	0.16	0.75	6	5	83	-	0.04	-	-	0.04	0.042	100	0
Silver	ug/L	0.005	0.005	0.068	0.188	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Strontium	ug/L	0.02	273	101	1880	6	0	0	207	220	26.4	10.8	169	229	0	0
Thallium	ug/L	0.005	0.005	0.047	0.6	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Tin	ug/L	0.02	0.05	0.26	-	6	6	100	-	0.02	-	-	0.02	0.02	0	-
Titanium	ug/L	0.05	0.25	1.25	-	6	1	17	0.166	0.174	0.11	0.0448	0.05	0.317	17	-
Uranium	ug/L	0.001	0.054	0.061	11.2	6	0	0	0.0537	0.0526	0.00761	0.00311	0.0418	0.0637	33	0
Vanadium	ug/L	0.05	0.01	0.35	-	6	4	67	-	0.05	-	-	0.05	0.06	100	-
Zinc	ug/L	0.5	1.2	5.1	-	6	3	50	-	0.675	-	-	0.5	1.13	0	-
Dissolved Metals																
Aluminum	ug/L	1	-	-	-	6	0	0	1.72	1.75	0.496	0.202	1.2	2.5	-	-
Antimony	ug/L	0.02	-	-	-	6	0	0	0.0325	0.035	0.00446	0.00182	0.024	0.035	-	-
Arsenic	ug/L	0.02	-	-	-	6	0	0	4.22	4.48	1.41	0.576	2.33	5.71	-	-
Barium	ug/L	0.02	-	-	-	6	0	0	23.6	23.5	1.02	0.418	22.2	24.9	-	-
Beryllium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Boron	ug/L	5	-	-	-	6	2	33	4.97	5.95	1.92	0.786	5	6.5	-	-

Table D1-2. Lake A8 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake A8 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Cadmium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Chromium	ug/L	0.1	-	-	-	6	6	100	-	0.1	-	-	0.1	0.1	0	-
Cobalt	ug/L	0.005	-	-	-	6	0	0	0.02	0.0202	0.00331	0.00135	0.015	0.025	-	-
Copper	ug/L	0.05	-	-	-	6	0	0	0.782	0.724	0.143	0.0585	0.666	1.05	-	-
Iron	ug/L	1	-	-	-	6	0	0	22.4	21	7.85	3.2	15.3	37	-	-
Lead	ug/L	0.01	-	-	5.89	6	0	0	0.0212	0.019	0.00682	0.00279	0.013	0.03	-	0
Lithium	ug/L	0.5	-	-	-	6	0	0	8.56	9.18	1.85	0.755	6.18	10.3	-	-
Manganese	ug/L	0.05	-	-	262	6	0	0	1.34	1.12	0.496	0.203	0.875	2.19	-	0
Mercury	ug/L	0.5	-	-	-	6	6	100	-	5.00E-04	-	-	5.00E-04	0.0005	-	-
Molybdenum	ug/L	0.05	-	-	-	6	0	0	0.305	0.288	0.0803	0.0328	0.242	0.458	-	-
Nickel	ug/L	0.05	-	-	-	6	0	0	0.74	0.73	0.121	0.0495	0.622	0.961	-	-
Selenium	ug/L	0.04	-	-	-	6	5	83	-	0.04	-	-	0.04	0.041	-	-
Silver	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Strontium	ug/L	0.02	-	-	1880	6	0	0	205	220	25.9	10.6	170	224	-	0
Thallium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Tin	ug/L	0.02	-	-	-	6	6	100	-	0.02	-	-	0.02	0.02	0	-
Titanium	ug/L	0.05	-	-	-	6	6	100	-	0.05	-	-	0.05	0.05	0	-
Uranium	ug/L	0.001	-	-	-	6	0	0	0.0542	0.056	0.0085	0.00347	0.0393	0.0614	-	-
Vanadium	ug/L	0.05	-	-	-	6	6	100	-	0.05	-	-	0.05	0.05	0	-
Zinc	ug/L	0.5	8.5	-	15.4	6	5	83	-	0.5	-	-	0.5	1.01	0	0
Other																
Cyanide (free)	mg/L	0.001	-	-	-	6	6	100	-	0.001	-	-	0.001	0.001	0	-
Cyanide (Total)	mg/L	0.001	0.001	-	0.00375	6	6	100	-	0.001	-	-	0.001	0.001	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	6	6	100	-	0.001	-	-	0.001	0.001	0	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Grey shading indicates an exceedance of normal range or action level thresholds.

Abbreviations: DL = detection limit, NR = normal range, Act Lvl = action level.

Table D1-3. Lake B7 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake B7 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Field Measurements																
Temperature	C	-	-	-	-	6	0	0	12.8	12.7	3.14	1.28	9.5	16.3	-	-
Sp. Conductivity (field)	uS/cm	-	302	-	-	6	0	0	248	247	10.6	4.33	237	264	-	-
pH (field)	pH units	-	7.7 | 8.3	-	6.5 | 9	6	0	0	8.19	8.22	0.272	0.111	7.89	8.46	-	0
DO (mg/L)	mg/L	-	-	-	6.5	6	0	0	10.8	10.6	0.585	0.239	10.2	11.7	-	0
DO (%)	%	-	-	-	-	6	0	0	102	103	4.5	1.84	93.8	106	-	-
Conventional Parameters																
Conductivity (lab)	uS/cm	1	-	-	-	6	0	0	244	243	12.6	5.14	230	263	-	-
Hardness	mg/L	0.2	-	-	-	6	0	0	85.4	85.4	3.75	1.53	81.3	91.1	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9	6	0	0	7.75	7.75	0.0379	0.0155	7.69	7.79	-	0
Total Dissolved Solids	mg/L	13 | 20	-	-	375	6	0	0	180	183	14.8	6.03	155	194	-	0
Total Dissolved Solids (Calculated)	mg/L	1	171	-	375	6	0	0	119	118	7.61	3.11	111	129	0	0
Total Suspended Solids	mg/L	1	3	-	-	6	4	67	-	1	-	-	1	1.1	0	-
Turbidity (lab)	NTU	0.1	0.69	-	-	6	0	0	0.398	0.4	0.0449	0.0183	0.33	0.45	0	-
Major Ions																
Alkalinity, Bicarbonate	mg/L	1.2	135	-	-	6	0	0	55.1	55	0.383	0.156	54.9	55.9	0	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	6	6	100	-	0.6	-	-	0.6	0.6	0	-
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	6	6	100	-	0.34	-	-	0.34	0.34	0	-
Alkalinity, Total	mg/L	1	110	-	-	6	0	0	45.2	45.1	0.303	0.124	45	45.8	0	-
Bromide	mg/L	0.1	-	-	-	6	0	0	0.163	0.17	0.0197	0.00803	0.13	0.18	-	-
Calcium (D)	mg/L	0.01	-	-	-	6	0	0	29	29	1.11	0.454	27.9	30.8	-	-
Calcium (T)	mg/L	0.01	39	-	-	6	0	0	29.3	29.4	1.16	0.472	28	31.2	0	-
Chloride	mg/L	0.1	25	-	90	6	0	0	40.2	40	4.14	1.69	36.2	45.2	100	0
Fluoride	mg/L	0.02	0.04	-	2.1	6	0	0	0.0305	0.0305	0.00315	0.00128	0.027	0.034	0	0
Magnesium (D)	mg/L	0.004	-	-	-	6	0	0	3.14	3.12	0.288	0.117	2.83	3.46	-	-
Magnesium (T)	mg/L	0.004	5.3	-	-	6	0	0	3.21	3.18	0.189	0.0772	3	3.47	0	-
Potassium (D)	mg/L	0.02	-	-	-	6	0	0	1.93	1.92	0.0833	0.034	1.83	2.03	-	-
Potassium (T)	mg/L	0.02	2.8	-	-	6	0	0	1.97	1.96	0.0413	0.0169	1.92	2.03	0	-
Reactive Silica (SiO2)	mg/L	0.01	2.3	-	-	6	0	0	0.41	0.409	0.0258	0.0105	0.382	0.443	0	-
Sodium (D)	mg/L	0.02	-	-	-	6	0	0	7.63	7.58	0.385	0.157	7.17	8.19	-	-
Sodium (T)	mg/L	0.02	7.5	-	-	6	0	0	7.68	7.64	0.307	0.125	7.39	8.21	67	-
Sulphate	mg/L	0.3	6	-	164	6	0	0	9.44	9.11	2.01	0.822	7.61	12.2	100	0
Nutrients																
Ammonia (as N)	mg/L	0.005 | 0.05	0.025	-	1.37	6	1	17	0.0549	0.0323	0.0614	0.0251	0.012	0.151	50	0
Nitrate (as N)	mg/L	0.005	0.005	-	2.17	6	5	83	-	0.005	-	-	0.005	0.0089	17	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	6	5	83	-	0.0051	-	-	0.0051	0.0089	-	-
Nitrite (as N)	mg/L	0.001	0.005	-	0.045	6	6	100	-	0.001	-	-	0.001	0.001	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	6	3	50	-	0.165	-	-	0.0051	0.38	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	6	4	67	-	0.001	-	-	0.001	0.0014	33	-
Total Diss Phosphorus	mg/L	0.001	0.008	-	-	6	0	0	0.00338	0.00325	0.000842	0.000344	0.0025	0.0046	0	-

Table D1-3. Lake B7 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake B7 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	6	0	0	0.337	0.329	0.0266	0.0109	0.311	0.384	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.73	-	-	6	0	0	0.387	0.364	0.0574	0.0234	0.325	0.461	0	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	6	0	0	0.336	0.328	0.0277	0.0113	0.311	0.384	-	-
Total Phosphorus	mg/L	0.003	0.01	-	-	6	0	0	0.00958	0.00805	0.00402	0.00164	0.0061	0.0162	33	-
Organic/Inorganic Carbon																
Dissolved Organic Carbon	mg/L	0.5	5.5	-	-	6	0	0	5.56	5.52	0.697	0.285	4.8	6.29	50	-
Total Organic Carbon	mg/L	0.5	7.6	-	-	6	0	0	5.13	5.22	0.555	0.227	4.44	5.82	0	-
Total Metals																
Aluminum	ug/L	1	6.6	-	75	6	0	0	4.18	4.3	0.935	0.382	2.9	5.5	0	0
Antimony	ug/L	0.02	0.02	-	4.5	6	0	0	0.035	0.035	0.00228	0.000931	0.032	0.039	100	0
Arsenic	ug/L	0.02	1.8	-	18.8	6	0	0	6.25	6.24	1.14	0.467	4.97	8.15	100	0
Barium	ug/L	0.02	20	-	750	6	0	0	25.4	25.5	0.299	0.122	25	25.8	100	0
Beryllium	ug/L	0.005	0.01	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Boron	ug/L	5	8	-	1120	6	0	0	14.8	14.8	0.997	0.407	13.8	16.5	0	0
Cadmium	ug/L	0.005	0.007	-	0.0998	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Chromium	ug/L	0.1	0.06	-	3.75	6	6	100	-	0.1	-	-	0.1	0.1	0	0
Cobalt	ug/L	0.005	0.05	-	0.702	6	0	0	0.0529	0.0546	0.0068	0.00277	0.043	0.0623	67	0
Copper	ug/L	0.05	1.13	-	1.5	6	0	0	0.948	0.952	0.0589	0.0241	0.868	1.04	0	0
Iron	ug/L	1	103	-	795	6	0	0	55.3	54.6	7.26	2.96	48.3	64.4	0	0
Lead	ug/L	0.01	0.08	-	3.75	6	0	0	0.0593	0.062	0.0114	0.00465	0.046	0.073	0	0
Lithium	ug/L	0.5	7.5	-	-	6	0	0	19.8	19.8	0.632	0.258	18.9	20.6	100	-
Manganese	ug/L	0.05	8.6	-	90	6	0	0	5.9	5.93	1.65	0.674	4.27	7.69	0	0
Mercury	ug/L	0.5	0.004	-	0.0195	6	0	0	0.000858	0.000725	0.000461	0.000188	0.0005	0.00168	0	0
Molybdenum	ug/L	0.05	0.24	-	54.8	6	0	0	0.301	0.316	0.0348	0.0142	0.244	0.338	100	0
Nickel	ug/L	0.05	1.4	-	61.3	6	0	0	0.828	0.825	0.0734	0.03	0.756	0.912	0	0
Selenium	ug/L	0.04	0.04	-	0.75	6	3	50	-	0.045	-	-	0.04	0.062	50	0
Silver	ug/L	0.005	0.005	-	0.188	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Strontium	ug/L	0.02	155	-	1880	6	0	0	302	300	10.4	4.23	288	317	100	0
Thallium	ug/L	0.005	0.005	-	0.6	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Tin	ug/L	0.02	0.05	-	-	6	6	100	-	0.02	-	-	0.02	0.02	0	-
Titanium	ug/L	0.05	0.25	-	-	6	0	0	0.115	0.102	0.0385	0.0157	0.076	0.186	0	-
Uranium	ug/L	0.001	0.03	-	11.2	6	0	0	0.0562	0.0561	0.00756	0.00308	0.048	0.0665	100	0
Vanadium	ug/L	0.05	0.01	-	-	6	3	50	-	0.054	-	-	0.05	0.065	100	-
Zinc	ug/L	0.5	1.9	-	-	6	0	0	1.16	0.995	0.705	0.288	0.58	2.36	17	-
Dissolved Metals																
Aluminum	ug/L	1	-	-	-	6	0	0	1.68	1.6	0.256	0.105	1.4	2	-	-
Antimony	ug/L	0.02	-	-	-	6	0	0	0.0333	0.0325	0.00327	0.00133	0.03	0.039	-	-
Arsenic	ug/L	0.02	-	-	-	6	0	0	5.5	5.5	1	0.41	4.38	7.22	-	-
Barium	ug/L	0.02	-	-	-	6	0	0	24.5	24.4	1.13	0.461	23.1	26.1	-	-
Beryllium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Boron	ug/L	5	-	-	-	6	0	0	14.7	14.6	0.794	0.324	13.8	16	0	-

Table D1-3. Lake B7 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake B7 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Cadmium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Chromium	ug/L	0.1	-	-	-	6	6	100	-	0.1	-	-	0.1	0.1	0	-
Cobalt	ug/L	0.005	-	-	-	6	0	0	0.033	0.032	0.00322	0.00132	0.0308	0.0394	-	-
Copper	ug/L	0.05	-	-	-	6	0	0	0.924	0.89	0.0801	0.0327	0.846	1.03	-	-
Iron	ug/L	1	-	-	-	6	0	0	26.1	26.5	2.3	0.939	23.1	29.5	-	-
Lead	ug/L	0.01	-	-	6.52	6	0	0	0.0262	0.027	0.00483	0.00197	0.018	0.032	-	0
Lithium	ug/L	0.5	-	-	-	6	0	0	19.8	19.8	0.436	0.178	19.4	20.6	-	-
Manganese	ug/L	0.05	-	-	330	6	0	0	0.903	0.952	0.204	0.0835	0.611	1.16	-	0
Mercury	ug/L	0.5	-	-	-	6	2	33	0.000425	5.00E-04	0.000136	5.57E-05	5.00E-04	0.00054	0	-
Molybdenum	ug/L	0.05	-	-	-	6	0	0	0.288	0.282	0.0378	0.0154	0.244	0.345	-	-
Nickel	ug/L	0.05	-	-	-	6	0	0	0.815	0.806	0.103	0.0421	0.713	0.933	-	-
Selenium	ug/L	0.04	-	-	-	6	4	67	-	0.04	-	-	0.04	0.056	-	-
Silver	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Strontium	ug/L	0.02	-	-	1880	6	0	0	296	296	13.5	5.52	282	318	-	0
Thallium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Tin	ug/L	0.02	-	-	-	6	6	100	-	0.02	-	-	0.02	0.02	0	-
Titanium	ug/L	0.05	-	-	-	6	6	100	-	0.05	-	-	0.05	0.05	0	-
Uranium	ug/L	0.001	-	-	-	6	0	0	0.0573	0.0565	0.00886	0.00362	0.0484	0.072	-	-
Vanadium	ug/L	0.05	-	-	-	6	6	100	-	0.05	-	-	0.05	0.05	0	-
Zinc	ug/L	0.5	2.2	-	16.5	6	0	0	0.805	0.715	0.254	0.104	0.54	1.2	0	0
Other																
Cyanide (free)	mg/L	0.001	-	-	-	6	6	100	-	0.001	-	-	0.001	0.001	0	-
Cyanide (Total)	mg/L	0.001	0.001	-	0.00375	6	6	100	-	0.001	-	-	0.001	0.001	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	6	6	100	-	0.001	-	-	0.001	0.001	0	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Grey shading indicates an exceedance of normal range or action level thresholds.

Abbreviations: DL = detection limit, NR = normal range, Act Lvl = action level.

Table D1-4. Lake D7 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake D7 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Field Measurements																
Temperature	C	-	-	-	-	6	0	0	12.5	12.6	3.93	1.6	8.5	16.4	-	-
Sp. Conductivity (field)	uS/cm	-	159	-	-	6	0	0	123	123	6.06	2.47	117	128	-	-
pH (field)	pH units	-	7.7 | 8.3	-	6.5 | 9	6	0	0	7.89	7.98	0.298	0.121	7.3	8.13	-	0
DO (mg/L)	mg/L	-	-	-	6.5	6	0	0	10.8	10.6	0.785	0.321	10.1	11.9	-	0
DO (%)	%	-	-	-	-	6	0	0	101	102	4.6	1.88	91.8	104	-	-
Conventional Parameters																
Conductivity (lab)	uS/cm	1	-	-	-	6	0	0	130	130	6.34	2.59	120	140	-	-
Hardness	mg/L	0.2	-	-	-	6	0	0	42.8	43.2	1.7	0.694	40.3	44.5	-	-
pH (lab)	pH units	0.1	-	-	6.5 | 9	6	0	0	7.74	7.73	0.0103	0.00422	7.73	7.75	-	0
Total Dissolved Solids	mg/L	13	-	136	375	6	0	0	68.7	69.5	11	4.51	49	79	-	0
Total Dissolved Solids (Calculated)	mg/L	1	81	-	375	6	0	0	65	65	2.99	1.22	60.7	69.9	0	0
Total Suspended Solids	mg/L	1	2	5.1	-	6	2	33	1.32	1.55	0.655	0.268	1	2	0	-
Turbidity (lab)	NTU	0.1	1.1	-	-	6	0	0	0.785	0.765	0.0935	0.0382	0.66	0.93	0	-
Major Ions																
Alkalinity, Bicarbonate	mg/L	1.2	68	-	-	6	0	0	53.6	53.6	1.61	0.659	52	55.3	0	-
Alkalinity, Carbonate	mg/L	0.6	-	-	-	6	6	100	-	0.6	-	-	0.6	0.6	0	-
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	6	6	100	-	0.34	-	-	0.34	0.34	0	-
Alkalinity, Total	mg/L	1	55	83	-	6	0	0	43.9	43.9	1.32	0.539	42.6	45.3	0	-
Bromide	mg/L	0.1	-	-	-	6	6	100	-	0.1	-	-	0.1	0.1	0	-
Calcium (D)	mg/L	0.01	-	-	-	6	0	0	12.8	12.8	0.532	0.217	12.1	13.4	-	-
Calcium (T)	mg/L	0.01	17	36	-	6	0	0	12.8	12.9	0.367	0.15	12.4	13.3	0	-
Chloride	mg/L	0.1	25	15	90	6	0	0	10.3	9.56	1.95	0.797	8.84	14.2	0	0
Fluoride	mg/L	0.02	0.05	0.036	2.1	6	0	0	0.0373	0.0375	0.00294	0.0012	0.034	0.04	0	0
Magnesium (D)	mg/L	0.004	-	-	-	6	0	0	2.65	2.7	0.12	0.049	2.45	2.74	-	-
Magnesium (T)	mg/L	0.004	3.3	5.2	-	6	0	0	2.65	2.66	0.1	0.0409	2.5	2.75	0	-
Potassium (D)	mg/L	0.02	-	-	-	6	0	0	1.31	1.29	0.0465	0.019	1.28	1.4	-	-
Potassium (T)	mg/L	0.02	1.8	2.3	-	6	0	0	1.32	1.31	0.0343	0.014	1.28	1.38	0	-
Reactive Silica (SiO2)	mg/L	0.01	0.28	-	-	6	0	0	0.196	0.196	0.0152	0.00619	0.173	0.216	0	-
Sodium (D)	mg/L	0.02	-	-	-	6	0	0	7.53	7.01	1.12	0.457	6.82	9.69	-	-
Sodium (T)	mg/L	0.02	17	8.1	-	6	0	0	7.61	7.08	1.09	0.444	6.89	9.7	0	-
Sulphate	mg/L	0.3	10	5.5	164	6	0	0	3.98	4.07	0.496	0.203	3.37	4.45	0	0
Nutrients																
Ammonia (as N)	mg/L	0.005 | 0.05	0.009	0.086	1.37	6	3	50	-	0.0384	-	-	0.0154	0.05	100	0
Nitrate (as N)	mg/L	0.005	0.005	1.2	2.17	6	4	67	-	0.005	-	-	0.005	0.0164	33	0
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	6	4	67	-	0.0051	-	-	0.0051	0.0164	-	-
Nitrite (as N)	mg/L	0.001	0.0005	-	0.045	6	6	100	-	0.001	-	-	0.001	0.001	0	0
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	6	3	50	-	0.166	-	-	0.0051	0.377	-	-
Orthophosphate (PO4-P)	mg/L	0.001	0.003	0.00072	-	6	3	50	-	0.0011	-	-	0.001	0.0014	0	-

Table D1-4. Lake D7 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake D7 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.008	0.0071	-	6	0	0	0.00478	0.0051	0.00083	0.000339	0.0037	0.0057	0	-
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	6	0	0	0.296	0.288	0.0253	0.0103	0.271	0.344	-	-
Total Kjeldahl Nitrogen	mg/L	0.05	0.52	0.88	-	6	0	0	0.356	0.345	0.0469	0.0191	0.312	0.445	0	-
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	6	0	0	0.292	0.284	0.0266	0.0109	0.271	0.344	-	-
Total Phosphorus	mg/L	0.003	0.02	-	-	6	0	0	0.0106	0.0106	0.00025	0.000102	0.0102	0.0109	0	-
Organic/Inorganic Carbon																
Dissolved Organic Carbon	mg/L	0.5	5.1	-	-	6	0	0	4.62	4.62	0.636	0.259	3.84	5.27	33	-
Total Organic Carbon	mg/L	0.5	14	-	-	6	0	0	4.34	4.34	0.367	0.15	3.93	4.71	0	-
Total Metals																
Aluminum	ug/L	1	6.7	37	75	6	0	0	13.8	13.7	1.27	0.519	12.5	15.6	100	0
Antimony	ug/L	0.02	0.03	0.13	4.5	6	5	83	-	0.02	-	-	0.02	0.038	17	0
Arsenic	ug/L	0.02	1.2	1.3	18.8	6	0	0	1.13	1.11	0.163	0.0665	0.963	1.32	50	0
Barium	ug/L	0.02	17	34	750	6	0	0	15.1	15.1	0.635	0.259	14.5	15.8	0	0
Beryllium	ug/L	0.005	0.01	0.26	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Boron	ug/L	5	17	10	1120	6	0	0	13.1	13.1	0.489	0.199	12.5	13.6	0	0
Cadmium	ug/L	0.005	0.005	0.071	0.0559	6	2	33	0.00473	0.0051	0.00186	0.000759	0.005	0.0068	67	0
Chromium	ug/L	0.1	0.06	1.6	3.75	6	5	83	-	0.1	-	-	0.1	0.11	100	0
Cobalt	ug/L	0.005	0.05	0.33	0.585	6	0	0	0.05	0.0501	0.00253	0.00103	0.0466	0.0536	50	0
Copper	ug/L	0.05	1	2.1	1.5	6	0	0	0.889	0.876	0.104	0.0425	0.789	1	0	0
Iron	ug/L	1	112	175	795	6	0	0	81.9	79.1	18.3	7.47	64	103	0	0
Lead	ug/L	0.01	0.02	0.14	3.75	6	0	0	0.0485	0.046	0.0146	0.00594	0.033	0.072	100	0
Lithium	ug/L	0.5	1.9	4.9	-	6	0	0	1.39	1.38	0.0297	0.0121	1.35	1.44	0	-
Manganese	ug/L	0.05	13	67	90	6	0	0	7.53	7.37	1.37	0.558	6.19	9.42	0	0
Mercury	ug/L	0.5	0.001	0.012	0.0195	6	0	0	0.000775	0.00069	0.000334	0.000136	0.00054	0.00143	0	0
Molybdenum	ug/L	0.05	0.48	0.61	54.8	6	0	0	0.466	0.475	0.078	0.0319	0.377	0.545	50	0
Nickel	ug/L	0.05	0.75	2.3	18.8	6	0	0	0.693	0.697	0.0715	0.0292	0.608	0.762	50	0
Selenium	ug/L	0.04	0.06	0.48	0.75	6	4	67	-	0.04	-	-	0.04	0.054	0	0
Silver	ug/L	0.005	0.005	0.025	0.188	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Strontium	ug/L	0.02	83	162	1880	6	0	0	69.8	71	3.07	1.25	65.6	73.3	0	0
Thallium	ug/L	0.005	0.005	0.039	0.6	6	6	100	-	0.005	-	-	0.005	0.005	0	0
Tin	ug/L	0.02	0.05	0.21	-	6	5	83	-	0.02	-	-	0.02	0.026	0	-
Titanium	ug/L	0.05	0.34	2.38	-	6	0	0	0.826	0.854	0.0893	0.0365	0.688	0.909	100	-
Uranium	ug/L	0.001	0.1	0.13	11.2	6	0	0	0.0681	0.0682	0.00656	0.00268	0.06	0.0765	0	0
Vanadium	ug/L	0.05	0.07	0.71	-	6	0	0	0.123	0.121	0.0315	0.0129	0.093	0.154	100	-
Zinc	ug/L	0.5	2	5.8	-	6	1	17	1.67	1.57	1.02	0.415	0.5	3.08	33	-
Dissolved Metals																
Aluminum	ug/L	1	-	-	-	6	0	0	2.63	2.7	0.606	0.247	1.9	3.4	-	-
Antimony	ug/L	0.02	-	-	-	6	6	100	-	0.02	-	-	0.02	0.02	0	-
Arsenic	ug/L	0.02	-	-	-	6	0	0	0.906	0.918	0.132	0.0538	0.745	1.04	-	-
Barium	ug/L	0.02	-	-	-	6	0	0	14.7	14.8	0.456	0.186	14.2	15.2	-	-
Beryllium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-

Table D1-4. Lake D7 Summary statistics and screening results for the July and August 2021 sampling events.

Parameter	Units	DL (min | max)	Normal Range (min | max)	FEIS[a]	Action Level[b] (min | max)	Lake D7 July and August 2021 Sampling										
						N	N<DL	% <DL	Mean	Median	SD	SE	Min	Max	% > NR	% > Act Lvl
Boron	ug/L	5	-	-	-	6	0	0	13.6	13.6	0.207	0.0843	13.4	13.9	0	-
Cadmium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Chromium	ug/L	0.1	-	-	-	6	6	100	-	0.1	-	-	0.1	0.1	0	-
Cobalt	ug/L	0.005	-	-	-	6	0	0	0.0173	0.0177	0.00273	0.00111	0.0135	0.0212	-	-
Copper	ug/L	0.05	-	-	-	6	0	0	0.827	0.813	0.103	0.0421	0.709	0.944	-	-
Iron	ug/L	1	-	-	-	6	0	0	25	24.5	11.1	4.54	14.5	36.3	-	-
Lead	ug/L	0.01	-	-	5.06	6	2	33	0.0157	0.0155	0.0105	0.00427	0.01	0.03	-	0
Lithium	ug/L	0.5	-	-	-	6	0	0	1.42	1.41	0.0472	0.0193	1.36	1.5	-	-
Manganese	ug/L	0.05	-	-	240	6	0	0	0.62	0.571	0.173	0.0705	0.406	0.843	-	0
Mercury	ug/L	0.5	-	-	-	6	4	67	-	5.00E-04	-	-	5.00E-04	0.00246	0	-
Molybdenum	ug/L	0.05	-	-	-	6	0	0	0.608	0.475	0.389	0.159	0.371	1.39	-	-
Nickel	ug/L	0.05	-	-	-	6	0	0	0.64	0.633	0.0614	0.0251	0.579	0.707	-	-
Selenium	ug/L	0.04	-	-	-	6	2	33	0.0392	0.043	0.0157	0.00642	0.04	0.055	-	-
Silver	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Strontium	ug/L	0.02	-	-	1880	6	0	0	69	70.1	3.03	1.24	64.7	72.4	-	0
Thallium	ug/L	0.005	-	-	-	6	6	100	-	0.005	-	-	0.005	0.005	0	-
Tin	ug/L	0.02	-	-	-	6	6	100	-	0.02	-	-	0.02	0.02	0	-
Titanium	ug/L	0.05	-	-	-	6	0	0	0.0585	0.0595	0.00378	0.00154	0.051	0.061	-	-
Uranium	ug/L	0.001	-	-	-	6	0	0	0.0677	0.0679	0.00658	0.00269	0.0604	0.0751	-	-
Vanadium	ug/L	0.05	-	-	-	6	3	50	-	0.065	-	-	0.05	0.082	-	-
Zinc	ug/L	0.5	1.4	-	8.1	6	3	50	-	0.86	-	-	0.5	2	17	0
Other																
Cyanide (free)	mg/L	0.001	-	-	-	6	6	100	-	0.001	-	-	0.001	0.001	0	-
Cyanide (Total)	mg/L	0.001	0.001	-	0.00375	6	6	100	-	0.001	-	-	0.001	0.001	0	0
Cyanide (WAD)	mg/L	0.001	-	-	-	6	6	100	-	0.001	-	-	0.001	0.001	0	-

Notes

[a] FEIS predictions for the edge of the mixing zone as presented in Agnico Eagle (2014).

[b] The AEMP Action Level is 75% of the AEMP Benchmark.

Grey shading indicates an exceedance of normal range or action level thresholds.

Abbreviations: DL = detection limit, NR = normal range, Act Lvl = action level.

Table D1-5. Water chemistry results from the 2021 snow core monitoring program (April 2021).

Parameter	Units	DL	SNOCOR6	SNOCOR7	SNOCOR BOUNDARY	SNOCOR4	SNOCOR5
			Background	NW of Mine	North of Camp	South of Tiri Pits 1 & 2 (Lake A8)	East of WRSF 3
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	0.5	3.91	15.2	4.89	40.6	6.29
Dissolved Hardness (CaCO3)	mg/L	0.5	1.58	5.19	2.14	9.9	2.58
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	1	1.5	8.3	1.9	13	3.4
Carb. Alkalinity (calc. as CaCO3)	mg/L	1	<1.0	<1.0	<1.0	<1.0	<1.0
Conventional Parameters							
pH	pH		6.18	7.23	6.63	7.72	6.37
Alkalinity (Total as CaCO3)	mg/L	1	1.5	8.3	1.9	13	3.4
Conductivity	uS/cm	1	11	27	10	45	18
Total Dissolved Solids	mg/L	10	10	25	<10	65	35
Total Suspended Solids	mg/L	10	48	160	51	580	62
Turbidity	NTU	0.1	2.9	11	9.1	86	2.1
Dissolved Organic Carbon	mg/L	0.4	1.5	0.87	0.46	1.1	2.3
Total Organic Carbon (TOC)	mg/L	0.4	2	1.3	1.1	1.6	3.2
Major Ions							
Total Calcium (Ca)	mg/L	0.05	0.963	4.08	1.27	10.6	1.51
Dissolved Calcium (Ca)	mg/L	0.05	0.443	1.78	0.711	3.51	0.641
Total Magnesium (Mg)	mg/L	0.05	0.365	1.21	0.414	3.42	0.61
Dissolved Magnesium (Mg)	mg/L	0.05	0.114	0.183	0.089	0.275	0.239
Total Potassium (K)	mg/L	0.05	0.255	0.45	0.145	1.36	0.415
Dissolved Potassium (K)	mg/L	0.05	0.179	0.164	0.075	0.306	0.314
Total Sodium (Na)	mg/L	0.05	0.927	1.2	0.406	1.95	1.62
Dissolved Sodium (Na)	mg/L	0.05	0.919	1.22	0.407	1.65	1.7
Dissolved Sulphate (SO4)	mg/L	1	<1.0	1.3	<1.0	2.3	<1.0
Dissolved Chloride (Cl-)	mg/L	1	1.6	3.4	<1.0	3.7	3
Total Metals							
Aluminum (Al)	mg/L	0.003	0.422	1.88	0.645	5.38	0.69
Antimony (Sb)	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)	mg/L	0.0001	0.0161	0.11	0.022	0.27	0.0127
Barium (Ba)	mg/L	0.001	0.0036	0.013	0.0046	0.0469	0.013
Beryllium (Be)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron (B)	mg/L	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Cadmium (Cd)	mg/L	0.00001	0.000046	0.000076	0.000059	0.000091	0.000113
Chromium (Cr)	mg/L	0.001	0.0015	0.0034	0.0015	0.0119	0.0026
Cobalt (Co)	mg/L	0.0002	<0.00020	0.00065	0.00023	0.00415	0.00047
Copper (Cu)	mg/L	0.0005	0.00282	0.00855	0.00231	0.0153	0.00313
Iron (Fe)	mg/L	0.01	1.35	7.06	2.11	15.8	1.48
Lead (Pb)	mg/L	0.0002	0.00457	0.0281	0.00637	0.0521	0.00478
Lithium (Li)	mg/L	0.002	<0.0020	<0.0020	<0.0020	0.0062	<0.0020
Manganese (Mn)	mg/L	0.001	0.0156	0.058	0.0169	0.165	0.022
Molybdenum (Mo)	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.002	0.0012
Nickel (Ni)	mg/L	0.001	0.0037	0.0046	0.0028	0.0173	0.0081
Selenium (Se)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
Silicon (Si)	mg/L	0.1	0.53	2.23	0.76	7.56	0.72
Silver (Ag)	mg/L	0.00002	<0.000020	0.000021	<0.000020	0.000066	<0.000020
Strontium (Sr)	mg/L	0.001	0.0055	0.0237	0.0067	0.0649	0.0087
Sulphur (S)	mg/L	3	<3.0	<3.0	<3.0	<3.0	<3.0
Thallium (Tl)	mg/L	0.00001	<0.000010	0.000018	<0.000010	0.000057	<0.000010
Tin (Sn)	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Titanium (Ti)	mg/L	0.005	0.0095	0.0425	0.0115	0.138	0.0146
Uranium (U)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.00035	<0.00010
Vanadium (V)	mg/L	0.005	<0.0050	<0.0050	<0.0050	0.0078	<0.0050
Zinc (Zn)	mg/L	0.005	0.0101	0.0129	0.0064	0.0251	0.019
Zirconium (Zr)	mg/L	0.0001	<0.00010	0.00014	<0.00010	0.00096	<0.00010
Dissolved Metals							
Aluminum (Al)	mg/L	0.003	0.0081	0.0132	0.0063	0.101	0.0176
Antimony (Sb)	mg/L	0.0005	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Arsenic (As)	mg/L	0.0001	0.00734	0.0189	0.00425	0.0457	0.0049
Barium (Ba)	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.001	0.0017
Beryllium (Be)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth (Bi)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron (B)	mg/L	0.05	<0.050	<0.050	<0.050	<0.050	<0.050
Cadmium (Cd)	mg/L	0.00001	0.00002	<0.000010	0.000023	0.000026	0.000029
Chromium (Cr)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt (Co)	mg/L	0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Copper (Cu)	mg/L	0.0002	0.00063	0.00124	0.00035	0.00074	0.00076
Iron (Fe)	mg/L	0.005	0.0327	0.0191	0.0092	0.049	0.0509
Lead (Pb)	mg/L	0.0002	0.00028	0.00039	<0.00020	0.00024	0.00051
Lithium (Li)	mg/L	0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Manganese (Mn)	mg/L	0.001	0.0056	0.0087	0.0056	0.0037	0.0071
Molybdenum (Mo)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Selenium (Se)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)	mg/L	0.1	<0.10	<0.10	<0.10	0.11	<0.10

Table D1-5. Water chemistry results from the 2021 snow core monitoring program (April 2021).

Parameter	Units	DL	SNOCOR6	SNOCOR7	SNOCOR BOUNDARY	SNOCOR4	SNOCOR5
			Background	NW of Mine	North of Camp	South of Tiri Pits 1 & 2 (Lake A8)	East of WRSF 3
Silver (Ag)	mg/L	0.00002	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Strontium (Sr)	mg/L	0.001	0.0026	0.0092	0.0038	0.0185	0.0034
Sulphur (S)	mg/L	3	<3.0	<3.0	<3.0	<3.0	<3.0
Thallium (Tl)	mg/L	0.00001	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Tin (Sn)	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Titanium (Ti)	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Uranium (U)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Vanadium (V)	mg/L	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zinc (Zn)	mg/L	0.005	0.005	<0.0050	<0.0050	<0.0050	0.0074
Zirconium (Zr)	mg/L	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010

Notes

Italicized numbers are less than the analytical detection limit

Screening assessment for the snow core chemistry results compared to background:

Negligible (<5-times background)
Low (>5-times background)
Moderate (>10-times background)
High (>20 times background)

Appendix D2

Peninsula Lakes 2021 Surface Water Chemistry Results

Lake D7 Water Chemistry Results, 2021 AEMP

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQO	Benchmark (min | max)	Action Level (min | max)	July			August		
										7/20/2021			8/25/2021		
										D7-01	D7-02	D7-03	D7-01	D7-02	D7-03
Conventional Parameters															
Conductivity (lab)	uS/cm	1	-	-	-	-	-	-	-	140	130	120	129	130	130
Hardness	mg/L	0.2 | 1	-	-	-	-	-	-	-	42.3	41.5	40.3	44.1	44.5	44.1
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9	6.5 | 9	7.73	7.75	7.75	7.73	7.73	7.73
Total Dissolved Solids	mg/L	13	-	136	500	-	-	500	375	69	49	66	79	70	79
TDS (Calculated)	mg/L	1	81	-	500	-	-	500	375	69.9	63.6	60.7	65	65.4	65.1
Total Suspended Solids	mg/L	1	2	5.1	-	-	-	-	-	1.5	*<1*	*<1*	2	1.6	1.8
Turbidity (lab)	NTU	0.1	1.1	-	-	-	-	-	-	0.93	0.77	0.74	0.85	0.66	0.76
Major Ions															
Alkalinity, Bicarbonate	mg/L	1.2	68	-	-	-	-	-	-	52	52.2	52.2	54.9	55.3	55
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	*<0.6*	*<0.6*	*<0.6*	*<0.6*	*<0.6*	*<0.6*
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	*<0.34*	*<0.34*	*<0.34*	*<0.34*	*<0.34*	*<0.34*
Alkalinity, Total	mg/L	1	55	83	-	-	-	-	-	42.6	42.8	42.8	45	45.3	45.1
Bromide	mg/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	12.4	12.4	12.1	13.2	13.4	13.1
Calcium (T)	mg/L	0.01	17	36	-	-	-	-	-	12.5	12.4	12.7	13.1	13.1	13.3
Chloride	mg/L	0.1	25	15	120	-	-	120	90	14.2	10.3	8.84	9.52	9.59	9.52
Fluoride	mg/L	0.02	0.05	0.036	0.12	1.5	2.8	2.8	2.1	0.035	0.034	0.035	0.04	0.04	0.04
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	2.74	2.55	2.45	2.72	2.68	2.74
Magnesium (T)	mg/L	0.004	3.3	5.2	-	-	-	-	-	2.75	2.58	2.5	2.61	2.73	2.72
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	1.4	1.32	1.28	1.29	1.28	1.29
Potassium (T)	mg/L	0.02	1.8	2.3	-	-	-	-	-	1.38	1.34	1.31	1.28	1.31	1.31
Reactive Silica (SiO2)	mg/L	0.01	0.28	-	-	-	-	-	-	0.206	0.202	0.216	0.189	0.19	0.173
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	9.69	7.8	6.99	6.84	6.82	7.03
Sodium (T)	mg/L	0.02	17	8.1	-	-	-	-	-	9.7	7.9	7.1	6.89	7.06	6.99
Sulphate	mg/L	0.3	10	5.5	218	-	-	218	164	3.78	3.47	3.37	4.42	4.45	4.36
Nutrients															
Ammonia (as N)	mg/L	0.005 | 0.05	0.009	0.086	0.141	-	-	0.141	0.106	0.0269	0.0269	0.0154	*<0.05*	*<0.05*	*<0.05*
Nitrate (as N)	mg/L	0.005	0.005	1.2	2.9	10	-	2.9	2.17	0.0164	0.0064	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	0.0164	0.0064	*<0.0051*	*<0.0051*	*<0.0051*	*<0.0051*
Nitrite (as N)	mg/L	0.001	0.0005	-	0.06	1	-	0.06	0.045	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.377	0.348	0.327	*<0.0051*	*<0.0051*	*<0.0051*
Orthophosphate (PO4-P)	mg/L	0.001	0.003	0.00072	-	-	-	-	-	0.0013	0.0012	0.0014	*<0.001*	*<0.001*	*<0.001*
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.008	0.0071	-	-	-	-	-	0.0057	0.0051	0.0051	0.0038	0.0037	0.0053
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.292	0.297	0.284	0.344	0.285	0.271
Total Kjeldahl Nitrogen	mg/L	0.05	0.52	0.88	-	-	-	-	-	0.361	0.341	0.327	0.445	0.349	0.312
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.275	0.29	0.284	0.344	0.285	0.271
Total Phosphorus	mg/L	0.001 | 0.003	0.02	-	0.01	-	-	0.01	0.0075	0.0102	0.0105	0.0107	0.0109	0.0104	0.0107
Organic/Inorganic Carbon															
Dissolved Organic Carbon	mg/L	0.5	5.1	-	-	-	-	-	-	3.84	4.15	4.17	5.23	5.06	5.27
Total Organic Carbon	mg/L	0.5	14	-	-	-	-	-	-	4.05	4.05	3.93	4.71	4.62	4.69
Total Metals															
Aluminum (T)	ug/L	1	6.7	37	100	-	-	100	75	14.9	12.6	12.5	13.2	15.6	14.2
Antimony (T)	ug/L	0.02	0.03	0.13	9	6	-	6	4.5	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	0.038
Arsenic (T)	ug/L	0.02	1.2	1.3	5	10	25	25	18.8	1.32	1.28	1.22	0.984	1	0.963
Barium (T)	ug/L	0.02	17	34	1000	2000	-	1000	750	15.5	15.8	15.8	14.7	14.5	14.5
Beryllium (T)	ug/L	0.005	0.01	0.26	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Bismuth (T)	ug/L	0.005	0.01	0.037	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Boron (T)	ug/L	5	17	10	1500	5000	-	1500	1120	12.6	12.8	12.5	13.4	13.5	13.6
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.071	.0745 | 0.080	7	-	0.0745	0.0559	0.0064	0.0051	0.0051	*<0.005*	*<0.005*	0.0068
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0146	0.0101	0.0089	0.0068	0.0075	0.0084
Chromium (T)	ug/L	0.1	0.06	1.6	5	50	-	5	3.75	0.11	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Cobalt (T)	ug/L	0.005	0.05	0.33	0.78	-	-	0.78	0.585	0.0495	0.0515	0.0466	0.0479	0.0536	0.0507
Copper (T)	ug/L	0.05	1	2.1	2	2000	-	2	1.5	0.795	0.789	0.801	0.995	0.952	1
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Iron (T)	ug/L	1	112	175	300	-	1060	1060	795	103	100	91.7	64	66.1	66.5
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.047	0.045	0.039	0.049	0.048	0.059
Lead (T)	ug/L	0.01	0.02	0.14	-	5	-	5	3.75	0.072	0.057	0.051	0.037	0.033	0.041
Lithium (T)	ug/L	0.5	1.9	4.9	-	-	-	-	-	1.44	1.38	1.35	1.38	1.39	1.4
Manganese (T)	ug/L	0.05	13	67	-	120	-	120	90	9.42	8.48	8.28	6.46	6.36	6.19
Mercury (T)	ug/L	0.5	0.001	0.012	0.026	1	-	0.026	0.0195	0.00065	0.00054	0.00054	0.00143	0.00076	0.00073
Molybdenum (T)	ug/L	0.05	0.48	0.61	73	-	-	73	54.8	0.423	0.377	0.389	0.536	0.545	0.526
Nickel (T)	ug/L	0.05	0.75	2.3	25	-	-	25	18.8	0.642	0.608	0.636	0.752	0.758	0.762
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	*<50*	*<50*	*<50*	*<50*	*<50*	*<50*
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.11	1.09	1.07	1.15	1.19	1.15
Selenium (T)	ug/L	0.04	0.06	0.48	1	50	-	1	0.75	*<0.04*	*<0.04*	0.048	*<0.04*	0.054	*<0.04*
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	118	113	118	107	115	109
Silver (T)	ug/L	0.005 | 0.01	0.005	0.025	0.25	-	-	0.25	0.188	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Strontium (T)	ug/L	0.02	83	162	2500	7000	-	2500	1880	73.3	66.5	65.6	71.2	70.8	71.6
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	1400	1570	1470	1690	1660	1830
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Thallium (T)	ug/L	0.005	0.005	0.039	0.8	-	-	0.8	0.6	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.007	0.0071	0.0052	0.006	0.0075	0.0086
Tin (T)	ug/L	0.02	0.05	0.21	-	-	-	-	-	0.026	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Titanium (T)	ug/L	0.05 | 0.35	0.34	2.38	-	-	-	-	-	0.909	0.826	0.688	0.752	0.882	0.899
Tungsten (T)	ug/L	0.01	-	13	-	-	-	-	-	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium (T)	ug/L	0.001	0.1	0.13	15	20	-	15	11.2	0.0654	0.0623	0.06	0.0765	0.0735	0.0711
Vanadium (T)	ug/L	0.05	0.07	0.71	-	-	-	-	-	0.154	0.154	0.147	0.093	0.095	0.095
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0118	0.0115	0.0087	0.0118	0.0116	0.0092
Zinc (T)	ug/L	0.5	2	5.8	-	-	-	-	-	3.08	1.31	*<0.5*	1.06	2.47	1.83
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	0.013	0.012	0.011	0.013	0.014	0.015
Dissolved Metals															
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	3.1	3.4	2.9	2	1.9	2.5
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	1.01	1.04	1.02	0.794	0.745	0.825
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	15	15.1	15.2	14.5	14.2	14.2
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Boron (D)	ug/L	5	-	-	-	-	-	-	-	13.8	13.9	13.4	13.4	13.6	13.7
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0114	0.0083	0.0061	0.0053	*<0.005*	0.0051
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0176	0.015	0.0135	0.0178	0.0187	0.0212
Copper (D)	ug/L	0.05	-	-	-	-	-	-	-	0.709	0.751	0.75	0.944	0.875	0.935
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Iron (D)	ug/L	1	-	-	-	-	-	-	-	33.7	35.5	36.3	15.2	14.5	15.1
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	0.013	0.013	0.014	0.013	0.012	0.014
Lead (D)	ug/L	0.01	-	-	6.74 | 8	-	-	6.74	5.06	0.03	0.023	0.021	*<0.01*	*<0.01*	0.01
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	1.5	1.43	1.36	1.39	1.41	1.41
Manganese (D)	ug/L	0.05	-	-	320	-	-	320	240	0.843	0.59	0.813	0.516	0.406	0.552
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	*<5e-04*	*<5e-04*	*<5e-04*	0.00246	*<5e-04*	0.00072
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.438	0.393	0.371	1.39	0.545	0.512
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.579	0.592	0.586	0.706	0.673	0.707
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	*<50*	*<50*	*<50*	*<50*	*<50*	*<50*
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	1.12	1.04	1.04	1.13	1.09	1.1
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	0.054	0.044	*<0.04*	0.042	*<0.04*	0.055
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	102	106	130	102	98	114
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Strontium (D)	ug/L	0.02	-	-	2500	-	-	2500	1880	72.4	65.8	64.7	70.2	70.8	69.9
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	1540	1500	1360	1710	1640	1690
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*

Lake D7 Water Chemistry Results, 2021 AEMP

Parameter	**Units**	**DL (min | max)**	**Normal Range**	**FEIS**	**FWAL (min | max)**	**HH DW**	**SSWQO**	**Benchmark (min | max)**	**Action Level (min | max)**	**July**			**August**		
										7/20/2021			8/25/2021		
										D7-01	D7-02	D7-03	D7-01	D7-02	D7-03
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	0.059	0.06	0.059	0.061	0.051	0.061
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0632	0.0604	0.0618	0.0751	0.0731	0.0726
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	0.08	0.082	0.082	*<0.05*	*<0.05*	*<0.05*
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	0.0057	*<0.005*	0.0061	0.0087	0.0069	0.006
Zinc (D)	ug/L	0.5	1.4	-	10.8 | 13.1	-	-	10.8	8.1	2	*<0.5*	*<0.5*	1.27	*<0.5*	1.22
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	0.011	*<0.01*	0.013	0.012	0.017	0.015
Other															
Cyanide (free)	mg/L	0.001	-	-	-	-	-	-	-	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Cyanide (Total)	mg/L	0.001	0.001	-	0.005	0.2	-	0.005	0.00375	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	97.7	98.6	97.2	96.1	95.8	96.5

Notes
DL = 2021 detection limits
FWAL = freshwater aquatic life guideline
HH DW = Health Canada drinking water quality guideline
SSWQO = site-specific water quality objective
FEIS = predicted concentrations for Lake D7 (Agnico Eagle, 2014).

Lake A8 Water Chemistry Results, 2021 AEMP

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQO	Benchmark (min | max)	Action Level (min | max)	July			August		
										7/20/2021			8/25/2021		
										A8-01	A8-02	A8-03	A8-01	A8-02	A8-03
Conventional Parameters															
Conductivity (lab)	uS/cm	1	-	-	-	-	-	-	-	244	245	215	266	266	231
Hardness	mg/L	0.2 | 1	-	-	-	-	-	-	-	92	90.8	83.9	92.3	92.4	86.1
pH (lab)	pH units	0.1	-	-	6.5 | 9.0	-	-	6.5 | 9	6.5 | 9	7.82	7.84	7.86	7.94	7.81	7.83
Total Dissolved Solids	mg/L	13	-	162	500	-	-	500	375	208	180	134	202	199	156
TDS (Calculated)	mg/L	1	152	-	500	-	-	500	375	121	120	108	131	130	113
Total Suspended Solids	mg/L	1	4	2.9	-	-	-	-	-	*<1*	*<1*	*<1*	*<1*	1.6	*<1*
Turbidity (lab)	NTU	0.1	0.87	-	-	-	-	-	-	0.4	0.35	0.53	0.35	0.39	0.54
Major Ions															
Alkalinity, Bicarbonate	mg/L	1.2	91	-	-	-	-	-	-	59.3	59.2	63.3	61	59.5	65.5
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	-	*<0.6*	*<0.6*	*<0.6*	*<0.6*	*<0.6*	*<0.6*
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	-	*<0.34*	*<0.34*	*<0.34*	*<0.34*	*<0.34*	*<0.34*
Alkalinity, Total	mg/L	1	83.6	51	-	-	-	-	-	48.6	48.5	51.9	50	48.8	53.7
Bromide	mg/L	0.1	-	-	-	-	-	-	-	0.3	0.26	0.18	0.24	0.27	0.18
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	-	30	29.6	27.3	29.7	29.5	27.6
Calcium (T)	mg/L	0.01	40	47	-	-	-	-	-	28.9	28.7	26.7	28.9	29	27.3
Chloride	mg/L	0.1	61	74	120	-	-	120	90	39.4	39.6	30.2	44.5	44.7	32.5
Fluoride	mg/L	0.02	0.04	0.038	0.12	1.5	2.8	2.8	2.1	0.03	0.03	0.031	0.033	0.034	0.036
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	-	4.16	4.1	3.8	4.44	4.55	4.17
Magnesium (T)	mg/L	0.004	5.6	6.9	-	-	-	-	-	3.95	3.9	3.67	4.49	4.5	4.17
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	-	2.13	2.09	1.89	2	2.03	1.73
Potassium (T)	mg/L	0.02	2.5	2.3	-	-	-	-	-	1.92	1.92	1.71	2	2.05	1.71
Reactive Silica (SiO2)	mg/L	0.01	1.3	-	-	-	-	-	-	0.283	0.279	0.491	0.272	0.268	0.587
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	-	7.83	7.81	6.8	8.6	8.78	6.57
Sodium (T)	mg/L	0.02	8.4	8.3	-	-	-	-	-	7.47	7.45	6.33	8.56	8.68	6.39
Sulphate	mg/L	0.3	9.3	11.6	218	-	-	218	164	8.17	8.02	6.43	11.6	11.6	8.53
Nutrients															
Ammonia (as N)	mg/L	0.005 | 0.05	0.011	0.118	0.141	-	-	0.141	0.106	0.0127	0.005	0.0095	*<0.05*	0.071	*<0.05*
Nitrate (as N)	mg/L	0.005	0.015	0.2	2.9	10	-	2.9	2.17	*<0.005*	0.0094	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	-	*<0.0051*	0.0094	*<0.0051*	*<0.0051*	*<0.0051*	*<0.0051*
Nitrite (as N)	mg/L	0.001	0.0005	-	0.06	1	-	0.06	0.045	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	-	0.31	0.29	0.355	*<0.0051*	*<0.0051*	*<0.0051*
Orthophosphate (PO4-P)	mg/L	0.001	0.0023	0.00215	-	-	-	-	-	0.0015	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.006	0.006	-	-	-	-	-	0.0039	0.0032	0.0027	0.0024	0.0024	0.0032
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	-	0.247	0.268	0.389	0.286	0.239	0.245
Total Kjeldahl Nitrogen	mg/L	0.05	0.63	0.58	-	-	-	-	-	0.31	0.281	0.355	0.274	0.367	0.34
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	-	0.247	0.259	0.389	0.286	0.239	0.245
Total Phosphorus	mg/L	0.001 | 0.003	0.009	-	0.01	-	-	0.01	0.0075	0.0053	0.0056	0.0085	0.0066	0.0064	0.0072
Organic/Inorganic Carbon															
Dissolved Organic Carbon	mg/L	0.5	4.9	-	-	-	-	-	-	4.05	3.76	4.62	4.82	4.33	6.01
Total Organic Carbon	mg/L	0.5	4.7	-	-	-	-	-	-	4.01	4.04	4.58	4.58	4.3	5.77
Total Metals															
Aluminum (T)	ug/L	1	3	4.6	100	-	-	100	75	5.2	4.1	5.6	4.3	5.8	7.3
Antimony (T)	ug/L	0.02	0.4	0.2	9	6	-	6	4.5	0.038	0.037	0.026	0.035	0.036	0.023
Arsenic (T)	ug/L	0.02	2.4	1.7	5	10	25	25	18.8	6.66	6.35	3.19	5.17	5.13	2.76
Barium (T)	ug/L	0.02	32	23	1000	2000	-	1000	750	24.2	24.9	22.9	23.6	23.7	22.4
Beryllium (T)	ug/L	0.005	0.01	0.47	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Bismuth (T)	ug/L	0.005	0.01	0.076	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Boron (T)	ug/L	5	5	27	1500	5000	-	1500	1120	5.5	5.7	*<5*	6	6.2	*<5*
Cadmium (T)	ug/L	0.005 | 0.01	0.005	0.083	0.137 | 0.148	7	-	0.137	0.103	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	-	0.0226	0.0231	0.0143	0.0198	0.0206	0.0126
Chromium (T)	ug/L	0.1	0.06	1.87	5	50	-	5	3.75	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Cobalt (T)	ug/L	0.005	0.05	0.24	0.948 | 0.987	-	-	0.948	0.711	0.0427	0.0331	0.0485	0.0323	0.0332	0.0474
Copper (T)	ug/L	0.05	0.89	2.7	2.04 | 2.21	2000	-	2.04	1.53	0.764	0.722	0.724	0.795	0.925	1.07
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Iron (T)	ug/L	1	67	96	300	-	1060	1060	795	53.3	49.6	82.4	40.8	40.9	58.1
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	-	0.012	0.012	0.021	0.015	0.016	0.027
Lead (T)	ug/L	0.01	0.03	2	-	5	-	5	3.75	0.077	0.075	0.041	0.049	0.052	0.032
Lithium (T)	ug/L	0.5	10	5.3	-	-	-	-	-	8.98	9.12	5.72	9.19	9.13	6.2
Manganese (T)	ug/L	0.05	13	30	-	120	-	120	90	7.33	6.94	13.8	4.28	3.9	9.82
Mercury (T)	ug/L	0.5	0.0012	0.04	0.026	1	-	0.026	0.0195	0.00052	*<5e-04*	0.00053	*<5e-04*	0.00054	0.0006
Molybdenum (T)	ug/L	0.05	0.22	0.59	73	-	-	73	54.8	0.264	0.271	0.242	0.299	0.303	0.256
Nickel (T)	ug/L	0.05	0.92	2.3	83.6 | 90	-	-	83.6	62.7	0.701	0.645	0.813	0.754	0.716	0.976
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	-	*<50*	*<50*	*<50*	*<50*	*<50*	*<50*
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	-	1.97	1.98	1.72	2.06	2.1	1.8
Selenium (T)	ug/L	0.04	0.02	0.16	1	50	-	1	0.75	*<0.04*	*<0.04*	0.042	*<0.04*	*<0.04*	*<0.04*
Silicon (T)	ug/L	50	-	-	-	-	-	-	-	133	135	238	140	167	301
Silver (T)	ug/L	0.005 | 0.01	0.005	0.068	0.25	-	-	0.25	0.188	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Strontium (T)	ug/L	0.02	273	101	2500	7000	-	2500	1880	220	221	169	226	229	178
Sulfur (T)	ug/L	500	-	-	-	-	-	-	-	3050	3060	2830	4200	4030	3120
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	-	0.027	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Thallium (T)	ug/L	0.005	0.005	0.047	0.8	-	-	0.8	0.6	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Tin (T)	ug/L	0.02	0.05	0.26	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Titanium (T)	ug/L	0.05 | 0.35	0.25	1.25	-	-	-	-	-	0.069	*<0.05*	0.211	0.138	0.238	0.317
Tungsten (T)	ug/L	0.01	-	29	-	-	-	-	-	0.118	0.122	0.022	0.084	0.082	0.018
Uranium (T)	ug/L	0.001	0.054	0.061	15	20	-	15	11.2	0.0517	0.0536	0.0418	0.0637	0.0599	0.0513
Vanadium (T)	ug/L	0.05	0.01	0.35	-	-	-	-	-	0.053	*<0.05*	0.06	*<0.05*	*<0.05*	*<0.05*
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	*<0.005*	0.0056	0.0081	0.0071	0.0054	0.007
Zinc (T)	ug/L	0.5	1.2	5.1	-	-	-	-	-	*<0.5*	0.85	0.99	*<0.5*	1.13	*<0.5*
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	-	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.016
Dissolved Metals															
Aluminum (D)	ug/L	1	-	-	-	-	-	-	-	1.6	1.9	2.5	1.2	1.2	1.9
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	-	0.035	0.035	0.024	0.035	0.035	0.031
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	-	5.58	5.71	2.75	4.45	4.51	2.33
Barium (D)	ug/L	0.02	-	-	-	-	-	-	-	24.7	24.9	23.5	23	23.5	22.2
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Boron (D)	ug/L	5	-	-	-	-	-	-	-	6.5	6.4	*<5*	5.9	6	*<5*
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0237	0.0234	0.0136	0.0191	0.0195	0.0117
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	-	0.0183	0.015	0.025	0.0203	0.0202	0.0213
Copper (D)	ug/L	0.05	-	-	-	-	-	-	-	0.666	0.699	0.699	0.748	0.833	1.05
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Iron (D)	ug/L	1	-	-	-	-	-	-	-	20.5	21.5	37	16.3	15.3	24.1
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	-	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.012
Lead (D)	ug/L	0.01	-	-	7.85 | 9.88	-	-	7.85	5.89	0.029	0.03	0.017	0.019	0.019	0.013
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	-	10.3	10.2	6.33	9.16	9.19	6.18
Manganese (D)	ug/L	0.05	-	-	350	-	-	350	262	1.08	1.07	2.19	1.15	0.875	1.68
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	-	*<5e-04*	*<5e-04*	*<5e-04*	*<5e-04*	*<5e-04*	*<5e-04*
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	-	0.458	0.278	0.242	0.297	0.313	0.242
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	-	0.622	0.639	0.74	0.72	0.757	0.961
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	-	*<50*	*<50*	*<50*	*<50*	*<50*	*<50*
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	-	2.07	2.1	1.77	2.05	2.04	1.76
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	-	*<0.04*	0.041	*<0.04*	*<0.04*	*<0.04*	*<0.04*
Silicon (D)	ug/L	50	-	-	-	-	-	-	-	150	151	258	130	143	292
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Strontium (D)	ug/L	0.02	-	-	2500	-	-	2500	1880	220	221	170	224	223	174
Sulfur (D)	ug/L	500	-	-	-	-	-	-	-	3550	3480	2650	3990	4190	3140
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*

Lake A8 Water Chemistry Results, 2021 AEMP

Parameter	Units	DL (min | max)	Normal Range	FEIS	FWAL (min | max)	HH DW	SSWQO	Benchmark (min | max)	Action Level (min | max)	July			August		
										7/20/2021			8/25/2021		
										A8-01	A8-02	A8-03	A8-01	A8-02	A8-03
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Tin (D)	ug/L	0.02	-	-	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	-	0.103	0.106	0.019	0.078	0.075	0.024
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	-	0.0596	0.0524	0.0393	0.0611	0.0614	0.0515
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	0.0061
Zinc (D)	ug/L	0.5	8.5	-	20.6 | 24	-	-	20.6	15.4	*<0.5*	*<0.5*	1.01	*<0.5*	*<0.5*	*<0.5*
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	-	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	0.015
Other															
Cyanide (free)	mg/L	0.001	-	-	-	-	-	-	-	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Cyanide (Total)	mg/L	0.001	0.001	-	0.005	0.2	-	0.005	0.00375	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	-	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	-	99.1	97.9	99.8	91	92	94.5

Notes

DL = 2021 detection limits

FWAL = freshwater aquatic life guideline

HH DW = Health Canada drinking water quality guideline

SSWQO = site-specific water quality objective

FEIS = predicted concentrations for Lake A8 (Agnico Eagle, 2014).

Lake B7 Water Chemistry Results, 2021 AEMP

Parameter	Units	DL (min | max)	Normal Range	FWAL (min | max)	HH DW	SSWQO	Benchmark (min | max)	Action Level (min | max)	July			August		
									7/20/2021			8/25/2021		
									B7-01	B7-02	B7-03	B7-01	B7-02	B7-03
Conventional Parameters														
Conductivity (lab)	uS/cm	1	-	-	-	-	-	-	238	233	230	263	252	248
Hardness	mg/L	0.2 | 1	-	-	-	-	-	-	84.7	81.6	81.3	91.1	86	87.8
pH (lab)	pH units	0.1	-	6.5 | 9.0	-	-	6.5 | 9	6.5 | 9	7.79	7.79	7.69	7.75	7.75	7.73
Total Dissolved Solids	mg/L	13	-	500	-	-	500	375	181	170	155	194	192	185
TDS (Calculated)	mg/L	1	171	500	-	-	500	375	113	112	111	129	124	123
Total Suspended Solids	mg/L	1	3	-	-	-	-	-	*<1*	*<1*	*<1*	1	1.1	*<1*
Turbidity (lab)	NTU	0.1	0.69	-	-	-	-	-	0.41	0.37	0.44	0.45	0.39	0.33
Major Ions														
Alkalinity, Bicarbonate	mg/L	1.2	135	-	-	-	-	-	55.9	54.9	55	55	55.1	54.9
Alkalinity, Carbonate	mg/L	0.6	-	-	-	-	-	-	*<0.6*	*<0.6*	*<0.6*	*<0.6*	*<0.6*	*<0.6*
Alkalinity, Hydroxide	mg/L	0.34	-	-	-	-	-	-	*<0.34*	*<0.34*	*<0.34*	*<0.34*	*<0.34*	*<0.34*
Alkalinity, Total	mg/L	1	110	-	-	-	-	-	45.8	45	45.1	45.1	45.2	45
Bromide	mg/L	0.1	-	-	-	-	-	-	0.13	0.18	0.15	0.18	0.17	0.17
Calcium (D)	mg/L	0.01	-	-	-	-	-	-	29.1	27.9	27.9	30.8	28.8	29.7
Calcium (T)	mg/L	0.01	39	-	-	-	-	-	29.1	28.3	28	31.2	29.6	29.8
Chloride	mg/L	0.1	25	120	-	-	120	90	36.5	36.9	36.2	45.2	43.7	43
Fluoride	mg/L	0.02	0.04	0.12	1.5	2.8	2.8	2.1	0.028	0.028	0.027	0.034	0.033	0.033
Magnesium (D)	mg/L	0.004	-	-	-	-	-	-	2.92	2.9	2.83	3.46	3.41	3.33
Magnesium (T)	mg/L	0.004	5.3	-	-	-	-	-	3.1	3.04	3	3.47	3.27	3.36
Potassium (D)	mg/L	0.02	-	-	-	-	-	-	1.88	1.86	1.83	2.03	2.01	1.96
Potassium (T)	mg/L	0.02	2.8	-	-	-	-	-	1.95	1.93	1.92	2.03	1.98	1.99
Reactive Silica (SiO2)	mg/L	0.01	2.3	-	-	-	-	-	0.408	0.437	0.443	0.41	0.382	0.383
Sodium (D)	mg/L	0.02	-	-	-	-	-	-	7.35	7.43	7.17	8.19	7.92	7.74
Sodium (T)	mg/L	0.02	7.5	-	-	-	-	-	7.53	7.39	7.42	8.21	7.78	7.76
Sulphate	mg/L	0.3	6	218	-	-	218	164	7.61	7.68	7.72	12.2	10.9	10.5
Nutrients														
Ammonia (as N)	mg/L	0.005 | 0.05	0.025	0.141	-	-	0.141	0.106	0.0126	0.012	0.0146	0.114	0.151	*<0.05*
Nitrate (as N)	mg/L	0.005	0.005	2.9	10	-	2.9	2.17	*<0.005*	*<0.005*	0.0089	*<0.005*	*<0.005*	*<0.005*
Nitrate + Nitrite (as N)	mg/L	0.0051	-	-	-	-	-	-	*<0.0051*	*<0.0051*	0.0089	*<0.0051*	*<0.0051*	*<0.0051*
Nitrite (as N)	mg/L	0.001	0.005	0.06	1	-	0.06	0.045	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*	*<0.001*
Nitrogen	mg/L	0.0051 | 0.05	-	-	-	-	-	-	0.358	0.325	0.38	*<0.0051*	*<0.0051*	*<0.0051*
Orthophosphate (PO4-P)	mg/L	0.001	0.001	-	-	-	-	-	0.0014	*<0.001*	0.0011	*<0.001*	*<0.001*	*<0.001*
Total Diss Phosphorus	mg/L	0.001 | 0.003	0.008	-	-	-	-	-	0.0037	0.0046	0.004	0.0027	0.0028	0.0025
Total Dissolved Nitrogen	mg/L	0.05	-	-	-	-	-	-	0.32	0.311	0.322	0.336	0.349	0.384
Total Kjeldahl Nitrogen	mg/L	0.05	0.73	-	-	-	-	-	0.358	0.325	0.371	0.461	0.456	0.351
Total Kjeldahl Nitrogen (diss)	mg/L	0.05	-	-	-	-	-	-	0.32	0.311	0.314	0.336	0.349	0.384
Total Phosphorus	mg/L	0.001 | 0.003	0.01	0.01	-	-	0.01	0.0075	0.0077	0.0162	0.0084	0.0061	0.0064	0.0127
Organic/Inorganic Carbon														
Dissolved Organic Carbon	mg/L	0.5	5.5	-	-	-	-	-	4.96	5.05	4.8	6.27	6	6.29
Total Organic Carbon	mg/L	0.5	7.6	-	-	-	-	-	4.59	4.44	4.96	5.82	5.47	5.52
Total Metals														
Aluminum (T)	ug/L	1	6.6	100	-	-	100	75	5.5	4.5	3.4	4.1	2.9	4.7
Antimony (T)	ug/L	0.02	0.02	9	6	-	6	4.5	0.035	0.034	0.032	0.039	0.035	0.035
Arsenic (T)	ug/L	0.02	1.8	5	10	25	25	18.8	8.15	6.67	6.28	6.21	5.2	4.97
Barium (T)	ug/L	0.02	20	1000	2000	-	1000	750	25.6	25.6	25.8	25.2	25	25.3
Beryllium (T)	ug/L	0.005	0.01	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Bismuth (T)	ug/L	0.005	0.01	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Boron (T)	ug/L	5	8	1500	5000	-	1500	1120	14.6	13.8	13.8	16.5	15	14.9
Cadmium (T)	ug/L	0.005 | 0.01	0.007	0.133 | 0.147	7	-	0.133	0.0998	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Cesium (T)	ug/L	0.005	-	-	-	-	-	-	0.0369	0.0328	0.0342	0.036	0.0309	0.0319
Chromium (T)	ug/L	0.1	0.06	5	50	-	5	3.75	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Cobalt (T)	ug/L	0.005	0.05	0.936 | 0.981	-	-	0.936	0.702	0.0623	0.054	0.0553	0.0554	0.043	0.0473
Copper (T)	ug/L	0.05	1.13	2 | 2.18	2000	-	2	1.5	0.941	0.907	0.868	1.04	0.962	0.972
Gallium (T)	ug/L	0.05	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Iron (T)	ug/L	1	103	300	-	1060	1060	795	64.4	61.6	59.3	50	48.3	48.4
Lanthanum (T)	ug/L	0.01 | 0.02	-	-	-	-	-	-	0.018	0.015	0.016	0.025	0.023	0.027
Lead (T)	ug/L	0.01	0.08	-	5	-	5	3.75	0.073	0.067	0.066	0.058	0.046	0.046
Lithium (T)	ug/L	0.5	7.5	-	-	-	-	-	20.3	19.3	18.9	20.6	19.7	20
Manganese (T)	ug/L	0.05	8.6	-	120	-	120	90	7.21	7.3	7.69	4.31	4.27	4.65
Mercury (T)	ug/L	0.5	0.004	0.026	1	-	0.026	0.0195	0.00054	0.0005	0.0005	0.00168	0.00102	0.00091
Molybdenum (T)	ug/L	0.05	0.24	73	-	-	73	54.8	0.338	0.275	0.244	0.316	0.315	0.319
Nickel (T)	ug/L	0.05	1.4	81.7 | 89	-	-	81.7	61.3	0.761	0.756	0.767	0.912	0.887	0.883
Niobium (T)	ug/L	0.1	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Phosphorus (T)	ug/L	50	-	-	-	-	-	-	*<50*	*<50*	*<50*	*<50*	*<50*	*<50*
Rhenium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Rubidium (T)	ug/L	0.005	-	-	-	-	-	-	1.97	1.94	1.97	2.05	2.03	2.03
Selenium (T)	ug/L	0.04	0.04	1	50	-	1	0.75	0.062	0.05	*<0.04*	*<0.04*	*<0.04*	0.05
Silicon (T)	ug/L	50	-	-	-	-	-	-	217	279	231	200	185	184
Silver (T)	ug/L	0.005 | 0.01	0.005	0.25	-	-	0.25	0.188	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Strontium (T)	ug/L	0.02	155	2500	7000	-	2500	1880	296	298	288	317	310	302
Sulfur (T)	ug/L	500	-	-	-	-	-	-	3270	3000	2980	4450	3750	3830
Tantalum (T)	ug/L	0.1	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Tellurium (T)	ug/L	0.02	-	-	-	-	-	-	0.028	0.026	0.027	*<0.02*	*<0.02*	0.021
Thallium (T)	ug/L	0.005	0.005	0.8	-	-	0.8	0.6	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Thorium (T)	ug/L	0.005	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Tin (T)	ug/L	0.02	0.05	-	-	-	-	-	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*	*<0.02*
Titanium (T)	ug/L	0.05 | 0.35	0.25	-	-	-	-	-	0.186	0.097	0.076	0.098	0.128	0.106
Tungsten (T)	ug/L	0.01	-	-	-	-	-	-	0.03	0.028	0.028	0.03	0.029	0.029
Uranium (T)	ug/L	0.001	0.03	15	20	-	15	11.2	0.0519	0.048	0.049	0.0665	0.0612	0.0603
Vanadium (T)	ug/L	0.05	0.01	-	-	-	-	-	0.065	0.06	0.058	*<0.05*	*<0.05*	*<0.05*
Yttrium (T)	ug/L	0.005 | 0.01	-	-	-	-	-	-	0.0055	0.007	0.0059	0.0086	0.0065	0.0067
Zinc (T)	ug/L	0.5	1.9	-	-	-	-	-	1.43	2.36	0.63	0.6	0.58	1.36
Zirconium (T)	ug/L	0.01	-	-	-	-	-	-	*<0.01*	*<0.01*	*<0.01*	0.013	0.012	0.016
Dissolved Metals														
Aluminum (D)	ug/L	1	-	-	-	-	-	-	1.5	1.6	2	2	1.6	1.4
Antimony (D)	ug/L	0.02	-	-	-	-	-	-	0.032	0.03	0.031	0.039	0.035	0.033
Arsenic (D)	ug/L	0.02	-	-	-	-	-	-	7.22	5.79	5.45	5.54	4.64	4.38
Barium (D)	ug/L	0.02	-	-	-	-	-	-	24.5	23.5	23.1	26.1	24.3	25.4
Beryllium (D)	ug/L	0.005	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Bismuth (D)	ug/L	0.005	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Boron (D)	ug/L	5	-	-	-	-	-	-	14.5	14.1	13.8	16	14.8	15.2
Cadmium (D)	ug/L	0.005	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Cesium (D)	ug/L	0.005	-	-	-	-	-	-	0.0357	0.034	0.0292	0.0318	0.0318	0.0296
Chromium (D)	ug/L	0.1	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Cobalt (D)	ug/L	0.005	-	-	-	-	-	-	0.0312	0.0314	0.0308	0.0394	0.0327	0.0325
Copper (D)	ug/L	0.05	-	-	-	-	-	-	0.89	0.868	0.846	1.02	1.03	0.889
Gallium (D)	ug/L	0.05	-	-	-	-	-	-	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*	*<0.05*
Iron (D)	ug/L	1	-	-	-	-	-	-	29.5	26.8	26.2	27.1	24	23.1
Lanthanum (D)	ug/L	0.01	-	-	-	-	-	-	*<0.01*	*<0.01*	*<0.01*	0.012	0.013	0.012
Lead (D)	ug/L	0.01	-	8.69 | 10.2	-	-	8.69	6.52	0.032	0.026	0.028	0.029	0.024	0.018
Lithium (D)	ug/L	0.5	-	-	-	-	-	-	19.9	19.5	19.4	20.6	19.6	19.9
Manganese (D)	ug/L	0.05	-	440	-	-	440	330	0.925	0.715	0.611	1.16	1.03	0.979
Mercury (D)	ug/L	0.5	-	-	-	-	-	-	0.0005	*<5e-04*	0.00051	0.00054	*<5e-04*	0.0005
Molybdenum (D)	ug/L	0.05	-	-	-	-	-	-	0.272	0.26	0.244	0.345	0.291	0.318
Nickel (D)	ug/L	0.05	-	-	-	-	-	-	0.722	0.731	0.713	0.933	0.91	0.88
Niobium (D)	ug/L	0.1	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Phosphorus (D)	ug/L	50	-	-	-	-	-	-	*<50*	*<50*	*<50*	*<50*	*<50*	*<50*
Rhenium (D)	ug/L	0.005	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Rubidium (D)	ug/L	0.005	-	-	-	-	-	-	1.93	1.87	1.84	2.01	2.03	1.99
Selenium (D)	ug/L	0.04	-	-	-	-	-	-	0.052	*<0.04*	*<0.04*	0.056	*<0.04*	*<0.04*
Silicon (D)	ug/L	50	-	-	-	-	-	-	202	224	212	212	192	191
Silver (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*	*<0.005*
Strontium (D)	ug/L	0.02	-	2500	-	-	2500	1880	292	282	282	318	299	300
Sulfur (D)	ug/L	500	-	-	-	-	-	-	3230	2780	2910	4480	3930	3830
Tantalum (D)	ug/L	0.1	-	-	-	-	-	-	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*	*<0.1*
Tellurium (D)	ug/L	0.02	-	-	-	-	-	-	0.024	*<0.02*	0.022	*<0.02*	*<0.02*	*<0.02*

Lake B7 Water Chemistry Results, 2021 AEMP

Parameter	**Units**	**DL (min | max)**	**Normal Range**	**FWAL (min | max)**	**HH DW**	**SSWQO**	**Benchmark (min | max)**	**Action Level (min | max)**	**July**			**August**		
									7/20/2021			8/25/2021		
									B7-01	B7-02	B7-03	B7-01	B7-02	B7-03
Thallium (D)	ug/L	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium (D)	ug/L	0.005	-	-	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tin (D)	ug/L	0.02	-	-	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Titanium (D)	ug/L	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Tungsten (D)	ug/L	0.01	-	-	-	-	-	-	0.027	0.027	0.03	0.027	0.026	0.023
Uranium (D)	ug/L	0.001	-	-	-	-	-	-	0.0484	0.0538	0.0491	0.072	0.0611	0.0592
Vanadium (D)	ug/L	0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Yttrium (D)	ug/L	0.005 | 0.01	-	-	-	-	-	-	<0.005	<0.005	0.0053	0.007	0.0059	0.006
Zinc (D)	ug/L	0.5	2.2	22 | 27.4	-	-	22	16.5	0.63	1.03	0.71	0.72	1.2	0.54
Zirconium (D)	ug/L	0.01	-	-	-	-	-	-	<0.01	<0.01	<0.01	0.012	0.014	0.012
Other														
Cyanide (free)	mg/L	0.001	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (Total)	mg/L	0.001	0.001	0.005	0.2	-	0.005	0.00375	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide (WAD)	mg/L	0.001	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ion Ratio (+/-)	%	1	-	-	-	-	-	-	97.9	95.3	95.2	91.7	89.4	91.9

Notes

DL = 2021 detection limits

FWAL = freshwater aquatic life guideline

HH DW = Health Canada drinking water quality guideline

SSWQO = site-specific water quality objective

APPENDIX E

PHYTOPLANKTON – SUPPORTING INFORMATION

Appendix E1

Summary Statistics

APPENDIX E1 TABLES

Table E1-1. Phytoplankton richness, biomass, and density by major taxa group for individual samples, 2013 to 2021. 1

Table E1-2. Phytoplankton biomass (mg/m^3) for the dominant taxa in 2021. 7

Table E1-1. Phytoplankton richness, biomass, and density by major taxa group for individual samples, 2013 to 2021.

					Richness							Biomass							Density						
Year	Area	Sample ID	Year - Month	Phase	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte
2013	MEL-01	DP01-P-1D	2013-8	Baseline	9	16	7	4	2	2	-	6.83	78.25222	16.36446	31.14918	27.46692	4.73	-	256040	1365760	121576	310328	2000	7800	-
2013	MEL-01	DP01-P-1S	2013-8	Baseline	9	11	6	5	2	4	-	6.56767	78.57833	16.00866	21.43946	15.05322	7.94336	-	404104	1524208	103608	199768	1200	153864	-
2013	MEL-01	DP01-P-2D	2013-8	Baseline	5	14	5	5	3	3	-	7.70953	74.35975	13.28451	25.00214	23.04356	2.47139	-	316896	834544	133544	266224	2200	24152	-
2013	MEL-01	DP01-P-2S	2013-8	Baseline	11	12	5	5	3	3	-	5.30082	72.89461	18.11329	38.59646	9.52846	4.19366	-	289360	1415248	88640	387352	800	89408	-
2013	MEL-01	DP01-P-3S	2013-8	Baseline	11	13	5	5	2	2	-	5.47257	104.9929	16.01481	22.93814	5.02194	2.92072	-	302928	1654920	153680	249456	400	17768	-
2013	MEL-01	DP01-P-4S	2013-8	Baseline	7	15	6	3	2	2	-	7.64753	70.68863	21.5605	28.23915	34.75356	2.31	-	346032	1022728	125776	252456	2200	3600	-
2013	MEL-01	DP01-P-5S	2013-8	Baseline	7	13	5	5	2	3	-	4.2559	85.76571	15.39285	27.4677	13.98972	2.30002	-	316896	1459352	96624	327880	1200	10984	-
2015	MEL-01	MEL-0101	2015-7	Pre-construction	3	21	7	5	5	-	-	1.69479	479.8351	35.95072	20.93462	95.63766	-	-	36120	4336168	455272	101792	7000	-	-
2015	MEL-01	MEL-0102	2015-7	Pre-construction	6	21	8	5	5	1	-	2.90066	486.0529	48.57756	22.23375	95.72492	1.11496	-	36320	4615944	643872	97808	6600	28736	-
2015	MEL-01	MEL-0103	2015-7	Pre-construction	7	21	9	5	5	2	-	17.43029	503.2976	60.3211	17.58937	63.1389	1.31496	-	61072	4599776	702512	92608	5400	28936	-
2015	MEL-01	MEL-0104	2015-7	Pre-construction	6	20	8	5	4	1	-	3.08031	440.674	51.76603	30.55548	105.2701	0.22	-	57872	3795568	579984	127544	8600	200	-
2015	MEL-01	MEL-0105	2015-7	Pre-construction	3	22	9	5	5	-	1	0.75493	411.2841	39.0153	18.91542	77.79066	-	2.74448	21752	3586632	431536	81640	6800	-	400
2015	MEL-01	MEL-0101	2015-8	Pre-construction	12	17	6	6	4	-	-	9.30173	182.296	18.60181	13.91913	65.43524	-	-	166832	1890792	271624	68056	5800	-	-
2015	MEL-01	MEL-0102	2015-8	Pre-construction	14	20	9	5	2	1	1	31.79633	239.1956	30.97375	19.61865	27.40672	1.60922	1.68892	331264	2425608	345480	86424	5600	28736	200
2015	MEL-01	MEL-0103	2015-8	Pre-construction	10	23	9	5	3	1	-	16.85655	206.3806	78.62947	19.61739	41.1331	1.11496	-	216720	2088560	317528	126128	6600	28736	-
2015	MEL-01	MEL-0104	2015-8	Pre-construction	8	24	8	5	3	-	-	34.20908	240.7961	22.63456	18.43589	33.96602	-	-	287960	2337200	175864	85824	5000	-	-
2015	MEL-01	MEL-0105	2015-8	Pre-construction	10	20	8	5	4	-	-	24.97145	184.6267	17.32669	16.33531	83.53396	-	-	152864	1726160	191600	64672	9200	-	-
2015	MEL-01	MEL-0101	2015-9	Pre-construction	9	17	10	6	3	-	-	8.0171	132.529	41.28229	44.24495	22.81216	-	-	302328	1885808	298160	305728	3600	-	-
2015	MEL-01	MEL-0102	2015-9	Pre-construction	9	19	8	5	4	1	1	8.36767	155.9335	42.99877	35.89206	39.28442	0.46976	1.86778	181800	2065408	281344	194184	3200	200	200
2015	MEL-01	MEL-0104	2015-9	Pre-construction	11	15	8	5	4	-	-	12.58203	182.2539	33.28516	29.32337	43.81246	-	-	139896	2509616	307912	184800	4400	-	-
2015	MEL-01	MEL-0105	2015-9	Pre-construction	9	13	7	5	5	1	-	8.56276	194.4082	35.6994	45.10491	59.26091	0.21	-	111960	2236824	301216	272208	12384	400	-
2015	MEL-02	MEL-0201	2015-7	Pre-construction	6	22	9	6	6	1	-	8.49243	426.1077	55.82007	17.72508	76.39356	0.28	-	58272	3540544	557232	59488	12184	400	-
2015	MEL-02	MEL-0202	2015-7	Pre-construction	6	24	9	5	6	-	1	5.81147	470.9847	55.85492	13.61507	64.92759	-	1.52304	37320	4101696	695512	76840	19168	-	200
2015	MEL-02	MEL-0203	2015-7	Pre-construction	6	23	9	5	4	1	-	11.0981	534.0052	54.59073	18.28003	56.42064	0.145	-	37720	4031456	708712	78640	6200	200	-
2015	MEL-02	MEL-0204	2015-7	Pre-construction	4	23	7	6	5	-	-	4.14848	440.6168	30.648	29.53683	42.20972	-	-	29336	3546928	494344	145896	3400	-	-
2015	MEL-02	MEL-0205	2015-7	Pre-construction	6	23	8	6	5	-	-	3.24071	512.2912	39.51753	21.40304	34.9789	-	-	57672	4225424	517928	81640	3200	-	-
2015	MEL-02	MEL-0201	2015-8	Pre-construction	11	18	9	4	4	-	-	19.31632	116.8645	14.91877	16.53341	33.07795	-	-	155264	1236048	125944	76840	9784	-	-
2015	MEL-02	MEL-0202	2015-8	Pre-construction	9	19	8	5	5	1	-	15.04512	151.8581	26.21794	40.09915	28.4927	0.145	-	232888	1639152	156880	236688	9584	200	-
2015	MEL-02	MEL-0203	2015-8	Pre-construction	9	20	9	4	3	-	-	18.16005	149.6121	18.38331	42.48849	22.59556	-	-	202552	1638952	194600	220336	5400	-	-
2015	MEL-02	MEL-0204	2015-8	Pre-construction	13	16	7	4	3	1	-	14.75913	101.814	14.98859	35.17041	10.723	0.4	-	168432	1244432	69488	250456	1800	400	-
2015	MEL-02	MEL-0205	2015-8	Pre-construction	13	15	8	5	4	2	-	22.00874	110.6591	27.81944	30.26728	14.93246	2.05614	-	221720	1308488	217568	184400	2600	1600	-
2015	MEL-02	MEL-0201	2015-9	Pre-construction	8	21	7	5	5	1	1	26.96755	150.9187	16.57396	32.13287	40.39582	3.17804	1.29308	159648	1784032	132344	190584	10584	200	200
2015	MEL-02	MEL-0202	2015-9	Pre-construction	9	21	7	4	4	2	-	17.87459	162.9273	19.55705	18.68342	13.8913	0.6242	-	137296	1742728	98024	118544	8984	7384	-
2015	MEL-02	MEL-0203	2015-9	Pre-construction	8	17	7	3	4	-	-	21.33696	112.1897	12.74188	18.00581	18.16717	-	-	188584	1445384	148712	109560	22752	-	-
2015	MEL-02	MEL-0204	2015-9	Pre-construction	7	21	5	4	4	-	-	20.29495	133.7708	19.37476	19.21222	15.27491	-	-	152864	1496872	159696	111360	16168	-	-
2015	MEL-02	MEL-0205	2015-9	Pre-construction	10	20	8	4	3	1	-	34.365	145.6284	32.07127	30.92227	16.8467	0.66	-	246656	1591664	130776	176816	1800	600	-
2016	MEL-01	MEL-0101	2016-7	Pre-construction	7	18	8	5	4	-	-	4.63001	243.9741	69.96633	14.70315	31.08814	-	-	58672	2444760	753800	37536	5800	-	-
2016	MEL-01	MEL-0102	2016-7	Pre-construction	7	20	7	6	4	-	-	18.53196	388.1432	72.88592	15.42661	55.96056	-	-	187584	3718944	848592	98792	8400	-	-
2016	MEL-01	MEL-0103	2016-7	Pre-construction	7	21	7	6	4	-	1	9.13171	310.8018	83.74902	12.29255	75.58652	-	1.84976	158648	3154792	993656	96792	10400	-	200
2016	MEL-01	MEL-0104	2016-7	Pre-construction	5	21	10	5	5	-	-	8.55448	336.8533	100.8553	18.11534	46.50406	-	-	79624	3354544	965952	59688	5800	-	-
2016	MEL-01	MEL-0105	2016-7	Pre-construction	6	23	11	6	5	1	-	8.5529	331.2802	109.2343	32.36829	47.4818	0.3	-	79824	3387880	1300832	129744	5000	200	-
2016	MEL-01	MEL-0101	2016-8	Pre-construction	9	23	6	5	2	1	-	22.58555	228.8285	14.53875	24.19514	24.62994	0.15	-	246856	2122280	95824	150880	5800	200	-
2016	MEL-01	MEL-0102	2016-8	Pre-construction	10	21	6	5	4	1	-	17.91103	231.0425	12.61031	24.96451	28.55176	13.00017	-	245856	2746688	140112	163048	11384	114944	-

Table E1-1. Phytoplankton richness, biomass, and density by major taxa group for individual samples, 2013 to 2021.

					Richness							Biomass							Density						
Year	Area	Sample ID	Year - Month	Phase	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte
2016	MEL-01	MEL-0103	2016-8	Pre-construction	10	21	4	5	4	2	-	25.77719	227.1436	5.80924	27.52514	51.93518	0.64712	-	325080	1987484	93208	150480	12984	3000	-
2016	MEL-01	MEL-0104	2016-8	Pre-construction	11	22	7	4	4	1	-	23.70694	300.9755	27.68025	35.79	57.89399	0.2	-	239472	2452344	136344	201568	15184	400	-
2016	MEL-01	MEL-0105	2016-8	Pre-construction	11	24	6	4	3	-	-	16.32495	226.8784	12.75343	18.12244	50.32664	-	-	231088	2430592	130944	85624	7400	-	-
2016	MEL-01	MEL-0101	2016-9	Pre-construction	8	20	7	4	4	-	1	4.97761	393.4196	16.23161	24.8436	72.44564	-	0.40716	80424	2372120	111640	138312	8400	-	200
2016	MEL-01	MEL-0102	2016-9	Pre-construction	13	21	6	3	5	-	-	7.61058	404.8247	15.86083	33.68736	40.26762	-	-	97792	2458128	161712	173432	5400	-	-
2016	MEL-01	MEL-0103	2016-9	Pre-construction	10	17	7	4	4	1	1	6.73823	367.4487	19.23658	22.36111	39.02642	0.4	0.40716	73840	1814168	223016	155264	4800	400	200
2016	MEL-01	MEL-0104	2016-9	Pre-construction	11	17	7	4	6	1	-	11.25511	388.7078	18.677	30.80521	70.73475	0.51046	-	195768	2221656	224784	159464	23568	200	-
2016	MEL-01	MEL-0105	2016-9	Pre-construction	14	17	7	5	6	-	-	12.29771	350.1824	26.30889	26.68158	106.3289	-	-	277392	2343784	222184	109376	34552	-	-
2016	MEL-02	MEL-0201	2016-7	Pre-construction	9	20	6	6	3	1	-	9.24603	357.4195	48.62016	27.32961	19.67454	2.46204	-	101976	3529960	485376	116360	5200	12600	-
2016	MEL-02	MEL-0202	2016-7	Pre-construction	4	11	6	2	1	-	-	1.40565	48.96471	10.78337	4.03466	1.26264	-	-	32736	668112	58688	72040	400	-	-
2016	MEL-02	MEL-0203	2016-7	Pre-construction	9	22	6	5	4	1	-	12.77901	289.2565	32.41325	20.36808	26.69968	12.35648	-	144680	2948656	461392	112360	2600	114944	-
2016	MEL-02	MEL-0204	2016-7	Pre-construction	9	20	8	5	4	1	-	8.66361	347.1775	47.93312	23.12301	24.68422	1.2572	-	73840	3064000	364416	92808	4400	7184	-
2016	MEL-02	MEL-0205	2016-7	Pre-construction	9	24	8	6	2	2	-	6.2204	397.9456	39.18336	27.50241	18.68634	5.45076	-	101376	3250184	340664	107976	2800	43704	-
2016	MEL-02	MEL-0201	2016-8	Pre-construction	8	18	9	5	4	-	-	16.04976	102.2864	30.74432	28.89719	14.02674	-	-	238472	1530792	81456	172232	9584	-	-
2016	MEL-02	MEL-0202	2016-8	Pre-construction	8	16	8	5	3	2	-	11.22168	126.9836	54.18876	31.23581	19.33504	0.2896	-	152464	1537976	101208	185400	4600	7384	-
2016	MEL-02	MEL-0203	2016-8	Pre-construction	11	21	6	5	3	2	-	11.25732	172.6155	21.85726	31.54215	65.96784	1.03277	-	174016	1855672	41136	181816	18800	14968	-
2016	MEL-02	MEL-0204	2016-8	Pre-construction	10	21	7	5	2	-	-	16.82682	120.7512	23.76464	47.89241	27.986	-	-	239872	1596048	69472	288976	6000	-	-
2016	MEL-02	MEL-0205	2016-8	Pre-construction	10	18	7	5	4	-	-	12.55588	170.7614	29.06971	42.25634	29.98056	-	-	187784	1847688	125344	235904	18368	-	-
2016	MEL-02	MEL-0201	2016-9	Pre-construction	7	22	6	4	5	2	-	6.06922	181.9914	36.15218	27.38603	41.09828	2.7682	-	58472	1753312	92472	134512	6200	400	-
2016	MEL-02	MEL-0202	2016-9	Pre-construction	7	23	7	4	3	2	-	10.41031	194.5172	26.09999	27.64396	25.46656	0.6215	-	88808	1771264	149912	136712	3400	400	-
2016	MEL-02	MEL-0203	2016-9	Pre-construction	4	20	5	4	5	1	-	8.74159	196.6132	28.77651	21.50061	45.52826	5.01731	-	86808	1714992	141360	112760	7400	129312	-
2016	MEL-02	MEL-0204	2016-9	Pre-construction	8	18	6	5	5	-	-	8.45107	245.3095	18.6173	28.58678	32.52604	-	-	108760	1874240	112592	164048	3600	-	-
2016	MEL-02	MEL-0205	2016-9	Pre-construction	7	20	6	4	4	-	-	5.48463	177.1869	22.18149	28.6271	34.17492	-	-	65656	1685056	54920	170432	4600	-	-
2016	MEL-03	MEL-0301	2016-7	Pre-construction	7	20	9	5	4	1	-	2.88303	206.9657	10.10629	18.53912	32.61557	5.53926	-	101976	1639768	87824	105376	10784	200	-
2016	MEL-03	MEL-0302	2016-7	Pre-construction	8	18	8	4	3	1	-	11.45133	210.9662	33.94617	17.79574	27.17974	0.73277	-	296144	1740544	102408	118544	3200	14368	-
2016	MEL-03	MEL-0303	2016-7	Pre-construction	8	18	8	4	4	2	-	4.4586	279.5179	21.03646	27.56748	25.94068	1.3984	-	101176	2547152	112176	197168	10184	14768	-
2016	MEL-03	MEL-0304	2016-7	Pre-construction	6	20	6	4	4	-	-	4.65794	282.0928	10.52744	16.17004	24.42602	-	-	158248	2263576	99992	96792	4000	-	-
2016	MEL-03	MEL-0305	2016-7	Pre-construction	10	20	7	5	4	1	-	7.05766	214.873	23.17415	23.80637	46.50388	2.11928	-	133912	1826152	74256	162648	4600	35920	-
2016	MEL-03	MEL-0301	2016-8	Pre-construction	7	20	5	4	3	-	-	7.68136	160.1066	13.4111	16.61021	9.78222	-	-	100976	1632168	15384	110160	1000	-	-
2016	MEL-03	MEL-0302	2016-8	Pre-construction	8	21	6	4	2	1	-	10.55712	165.7784	15.85049	16.37362	9.2517	0.36638	-	191184	1575696	86024	103776	2000	7184	-
2016	MEL-03	MEL-0303	2016-8	Pre-construction	8	21	7	4	2	-	-	12.92174	175.5539	8.76038	39.21062	12.4915	-	-	213736	1625584	105176	296544	2600	-	-
2016	MEL-03	MEL-0304	2016-8	Pre-construction	12	21	6	4	3	1	-	14.40923	163.3067	5.88642	24.86581	27.74566	0.28018	-	303128	1525008	53288	191184	4600	7184	-
2016	MEL-03	MEL-0305	2016-8	Pre-construction	10	22	4	4	4	-	-	12.95037	157.2759	7.61786	32.05656	31.57886	-	-	181000	1798800	96592	187600	20968	-	-
2016	MEL-03	MEL-0301	2016-9	Pre-construction	11	18	5	4	5	-	-	11.42699	183.4445	36.70558	30.55019	24.55019	-	-	137696	1699424	328496	217920	16568	-	-
2016	MEL-03	MEL-0302	2016-9	Pre-construction	6	22	9	2	3	-	-	6.55486	184.1367	26.02266	14.64587	10.3933	-	-	66056	1850488	81272	88608	2400	-	-
2016	MEL-03	MEL-0303	2016-9	Pre-construction	10	20	7	3	4	-	-	6.3166	130.713	14.98202	16.28181	12.07308	-	-	123528	1403680	68672	109960	1800	-	-
2016	MEL-03	MEL-0304	2016-9	Pre-construction	8	19	7	3	4	-	-	3.06888	256.7865	18.39704	11.81324	15.42688	-	-	43904	2466512	189632	87608	2000	-	-
2016	MEL-03	MEL-0306	2016-9	Pre-construction	5	23	8	2	3	-	-	1.82127	154.5676	21.55554	21.75515	17.60684	-	-	22352	1618400	144928	139296	3200	-	-
2016	MEL-04	MEL-0401	2016-8	Pre-construction	10	19	4	3	3	2	-	8.7351	101.1372	6.45553	28.44354	13.5733	0.88277	-	216920	949488	32336	181200	2400	14568	-
2016	MEL-04	MEL-0402	2016-8	Pre-construction	13	20	5	4	3	1	-	13.68491	124.2565	11.85853	31.98974	10.31728	0.25144	-	288760	1438800	91608	213736	8184	7184	-
2016	MEL-04	MEL-0403	2016-8	Pre-construction	7	11	5	2	-	-	-	4.61121	27.20069	9.40055	1.25701	-	-	-	188143.3	634951.9	96052.5	24922.7	-	-	-
2016	MEL-04	MEL-0404	2016-8	Pre-construction	9	22	6	3	2	1	-	11.60408	145.4873	11.7225	30.95152	3.59872	0.25144	-	208736	1346208	71856	212736	400	7184	-
2016	MEL-04	MEL-0405	2016-8	Pre-construction	11	21	6	3	3	1	-	7.72315	117.1367	19.10597	27.68527	8.30454	0.75432	-	253640	1366360	62072	203352	7984	21552	-

Table E1-1. Phytoplankton richness, biomass, and density by major taxa group for individual samples, 2013 to 2021.

					Richness							Biomass							Density						
Year	Area	Sample ID	Year - Month	Phase	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte
2016	MEL-05	MEL-0501	2016-8	Pre-construction	11	21	5	4	4	-	-	11.63659	195.3123	25.00418	82.16067	37.87034	-	-	153864	2158000	100992	498928	5800	-	-
2016	MEL-05	MEL-0502	2016-8	Pre-construction	8	14	5	3	4	1	-	6.33577	102.9322	9.5402	41.28285	29.48794	0.25144	-	129912	1350792	56088	260440	10584	7184	-
2016	MEL-05	MEL-0503	2016-8	Pre-construction	7	19	6	4	2	1	-	7.07937	137.1747	6.8189	35.83462	3.35178	1.83192	-	165932	1495672	48304	248856	1800	35920	-
2016	MEL-05	MEL-0504	2016-8	Pre-construction	9	20	5	5	2	-	-	10.27335	114.5561	17.65307	34.54273	9.11518	-	-	123928	1243432	41720	192384	3000	-	-
2016	MEL-05	MEL-0505	2016-8	Pre-construction	11	21	6	4	2	1	-	20.41775	118.4235	14.52866	44.42263	15.32928	1.0776	-	266608	1165608	62072	281992	3200	21552	-
2017	MEL-01	MEL-0101	2017-7	Construction	9	22	6	5	7	2	-	11.54959	439.0047	26.30566	23.24744	99.58157	0.80116	-	72840	4195272	283824	165648	63936	28936	-
2017	MEL-01	MEL-0102	2017-7	Construction	7	21	6	5	5	-	-	20.83472	319.4038	38.6889	22.68196	58.49226	-	-	158848	3415016	401016	206952	7400	-	-
2017	MEL-01	MEL-0103	2017-7	Construction	8	23	9	5	4	-	-	10.95549	368.704	32.31417	22.93986	51.51824	-	-	80624	3560896	293224	220720	23368	-	-
2017	MEL-01	MEL-0104	2017-7	Construction	6	19	9	6	5	1	-	21.51566	399.6511	35.55732	21.84031	55.04276	0.1	-	187384	3730712	315792	144896	8800	200	-
2017	MEL-01	MEL-0105	2017-7	Construction	4	21	8	5	5	2	-	15.99699	358.707	32.37416	14.26036	57.22884	0.54	-	144080	3662856	352080	119344	7200	600	-
2017	MEL-01	MEL-0101	2017-8	Construction	10	22	7	4	3	1	-	23.83786	164.2753	20.51426	29.55405	55.06648	0.11	-	259824	1905560	108824	196768	8200	200	-
2017	MEL-01	MEL-0102	2017-8	Construction	10	19	6	5	3	1	-	22.38956	171.0854	8.6662	36.55516	19.22535	0.77	-	210936	2027688	55536	239272	25552	1400	-
2017	MEL-01	MEL-0103	2017-8	Construction	9	18	8	5	4	1	-	9.48974	199.5926	28.8435	44.37268	60.03606	0.11	-	131512	1913344	105656	270608	9200	200	-
2017	MEL-01	MEL-0104	2017-8	Construction	12	21	6	5	5	1	-	9.72453	195.3789	9.21431	52.56335	82.3381	0.11	-	138096	2108912	85256	348832	19984	200	-
2017	MEL-01	MEL-0105	2017-8	Construction	10	18	7	5	5	1	-	31.01437	211.9984	15.63744	27.13627	50.31335	0.66	-	339848	2357552	137560	162248	15584	1200	-
2017	MEL-01	MEL-0101	2017-9	Construction	7	14	9	3	5	-	1	7.82017	102.965	46.2391	23.14649	16.63496	-	1.1913	130712	1315672	237824	173016	8784	-	200
2017	MEL-01	MEL-0102	2017-9	Construction	7	17	9	4	5	-	-	13.94244	105.1249	28.09068	12.16713	30.59006	-	-	223104	1466936	228624	80424	5200	-	-
2017	MEL-01	MEL-0103	2017-9	Construction	5	14	9	4	4	1	-	7.83224	75.62105	34.91367	11.85306	38.80452	0.15	-	151664	1279552	197520	86608	5400	200	-
2017	MEL-01	MEL-0104	2017-9	Construction	7	15	8	3	6	-	-	9.48258	111.3828	32.08148	15.93663	34.39546	-	-	245056	1509240	248656	115544	10184	-	-
2017	MEL-01	MEL-0105	2017-9	Construction	10	12	8	4	3	-	-	21.42576	64.15086	28.65311	7.46436	35.87254	-	-	332664	798024	183936	44704	11784	-	-
2017	MEL-02	MEL-0201	2017-7	Construction	9	21	8	4	3	-	-	11.33388	196.2031	8.34343	18.24911	27.38244	-	-	66656	1821352	150680	196368	5400	-	-
2017	MEL-02	MEL-0202	2017-7	Construction	7	22	8	5	3	-	-	14.5747	254.373	5.46964	11.87132	9.92473	-	-	73640	2505232	56688	110960	9384	-	-
2017	MEL-02	MEL-0203	2017-7	Construction	7	19	7	5	4	1	-	3.30251	332.9308	7.5596	14.72513	41.15856	5.41602	-	137496	3015696	71656	160448	8000	21552	-
2017	MEL-02	MEL-0204	2017-7	Construction	7	23	8	5	2	-	-	9.19427	243.7582	8.96663	10.78592	15.7617	-	-	66456	2503032	65672	109960	3400	-	-
2017	MEL-02	MEL-0205	2017-7	Construction	9	20	9	4	2	-	-	12.80014	221.8815	13.27817	9.34579	15.02862	-	-	81624	2237224	125544	81024	2400	-	-
2017	MEL-02	MEL-0201	2017-8	Construction	12	18	7	5	3	1	-	14.83027	120.6995	19.40171	32.52184	21.33551	0.2	-	274992	1465736	156664	197568	16568	200	-
2017	MEL-02	MEL-0202	2017-8	Construction	13	17	8	4	3	1	-	16.19559	115.8066	21.96686	35.57287	18.05568	0.3	-	324280	1523408	88624	224904	17568	600	-
2017	MEL-02	MEL-0203	2017-8	Construction	12	18	4	5	2	1	-	24.48951	127.3313	9.6888	33.91485	13.29632	10.59209	-	389536	1466536	27352	217920	2400	28736	-
2017	MEL-02	MEL-0204	2017-8	Construction	11	19	7	4	4	1	-	58.55457	146.9558	17.49589	40.38737	28.2183	0.1	-	353816	1553544	101192	254640	11784	200	-
2017	MEL-02	MEL-0205	2017-8	Construction	12	17	7	4	2	-	-	13.64701	100.6714	7.99407	36.51006	21.90512	-	-	153064	1394496	61872	219520	5200	-	-
2017	MEL-02	MEL-0201	2017-9	Construction	7	15	8	2	3	1	-	8.73771	71.74341	27.1235	8.77946	17.37974	0.05452	-	80624	776672	129776	51688	3600	200	-
2017	MEL-02	MEL-0202	2017-9	Construction	3	14	7	2	2	-	-	12.05249	76.49231	16.99287	5.01684	9.39162	-	-	64856	784856	205784	29536	2600	-	-
2017	MEL-02	MEL-0203	2017-9	Construction	7	18	8	2	4	1	-	11.95864	87.05755	25.49852	9.5636	22.27416	0.14	-	81824	922952	134760	52288	18368	200	-
2017	MEL-02	MEL-0204	2017-9	Construction	7	16	8	3	2	1	-	7.44743	66.60943	24.74685	5.79248	12.59964	0.02172	-	51488	763704	174696	37120	4600	200	-
2017	MEL-02	MEL-0205	2017-9	Construction	7	18	8	3	3	-	-	14.84606	91.13928	24.07807	11.1893	15.31854	-	-	152464	979624	125424	66256	3400	-	-
2017	MEL-03	MEL-0301	2017-7	Construction	6	20	7	5	2	-	-	6.08192	184.872	7.80159	10.76796	6.68674	-	-	36720	1934296	96192	88608	1400	-	-
2017	MEL-03	MEL-0302	2017-7	Construction	7	15	8	4	4	-	-	4.90934	158.4633	9.91537	15.6159	20.65934	-	-	50888	1783632	95008	152464	3800	-	-
2017	MEL-03	MEL-0303	2017-7	Construction	6	17	7	5	3	2	-	3.78657	200.8919	8.17908	16.25767	15.01272	0.34032	-	36520	2207288	132112	139296	2600	600	-
2017	MEL-03	MEL-0304	2017-7	Construction	7	19	6	5	5	-	-	5.18464	183.5193	4.65163	8.00461	22.23104	-	-	52088	2307664	67656	60072	11184	-	-
2017	MEL-03	MEL-0305	2017-7	Construction	4	16	6	5	2	1	-	1.83973	208.0064	8.11764	10.65327	8.88822	0.03528	-	22352	2157800	145480	109360	3000	200	-
2017	MEL-03	MEL-0301	2017-8	Construction	9	19	5	5	3	-	-	5.29366	137.187	4.17546	28.48544	27.49828	-	-	137696	1310288	26352	189184	18768	-	-
2017	MEL-03	MEL-0302	2017-8	Construction	13	19	6	4	2	-	-	9.18625	120.2467	6.47043	36.23775	30.3088	-	-	131312	1396296	54088	252640	4600	-	-
2017	MEL-03	MEL-0303	2017-8	Construction	8	19	6	4	2	-	1	8.15739	122.4596	5.27774	22.85338	20.61888	-	2.07806	166032	1480504	66656	146080	3600	-	200

Table E1-1. Phytoplankton richness, biomass, and density by major taxa group for individual samples, 2013 to 2021.

					Richness							Biomass							Density						
Year	Area	Sample ID	Year - Month	Phase	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte
2017	MEL-03	MEL-0304	2017-8	Construction	10	21	6	4	3	1	-	5.24855	150.6933	7.25897	19.65726	12.0253	0.1	-	102176	1684056	54688	124128	10984	200	-
2017	MEL-03	MEL-0305	2017-8	Construction	7	19	8	4	3	1	-	13.10443	149.8285	13.44809	34.04788	36.89398	0.92584	-	109360	1950464	67072	217920	5400	200	-
2017	MEL-03	MEL-0301	2017-9	Construction	6	16	8	2	2	-	-	7.00784	109.2105	19.72846	19.64789	11.72058	-	-	86808	1243632	99608	137096	2200	-	-
2017	MEL-03	MEL-0302	2017-9	Construction	3	14	8	3	2	-	-	2.77211	72.03031	10.81964	5.63311	4.04736	-	-	36120	970240	70456	80024	1000	-	-
2017	MEL-03	MEL-0303	2017-9	Construction	6	15	7	2	2	1	-	8.39302	98.21	10.14472	6.74111	12.98508	0.15	-	73840	1100352	50504	43704	4600	200	-
2017	MEL-03	MEL-0304	2017-9	Construction	6	14	7	2	2	-	-	8.8546	103.9744	11.58566	5.27822	20.46192	-	-	95192	814192	84824	29736	3200	-	-
2017	MEL-03	MEL-0305	2017-9	Construction	5	14	8	3	3	-	-	7.61309	95.04074	13.36237	10.3873	19.73184	-	-	87208	1043680	114760	66056	3200	-	-
2017	MEL-04	MEL-0401	2017-8	Construction	12	18	8	3	2	-	-	7.30786	102.4476	8.12602	48.87283	5.88436	-	-	146280	1351392	47504	318696	1000	-	-
2017	MEL-04	MEL-0402	2017-8	Construction	9	18	6	4	2	1	-	8.16855	119.3525	11.36022	37.33786	6.39	19.25887	-	131112	1523408	53888	231688	1000	57472	-
2017	MEL-04	MEL-0403	2017-8	Construction	9	17	6	5	3	-	-	5.22465	110.8616	10.42542	55.07959	10.34066	-	-	116344	1523608	76040	368984	2000	-	-
2017	MEL-04	MEL-0404	2017-8	Construction	11	17	6	3	3	1	-	10.4814	129.9814	10.21758	32.05857	12.05524	38.51773	-	231688	1667888	69456	210136	7784	114944	-
2017	MEL-04	MEL-0405	2017-8	Construction	8	19	5	4	2	1	-	8.63106	141.6825	3.94587	35.42884	14.1313	0.43	-	181000	1761680	38720	231888	2200	200	-
2017	MEL-05	MEL-0501	2017-8	Construction	13	20	6	5	3	1	-	9.49143	155.7917	13.00733	57.09428	19.35025	0.2	-	196368	2012720	119944	364200	10384	400	-
2017	MEL-05	MEL-0502	2017-8	Construction	12	22	5	5	2	-	-	13.84731	155.8914	14.77814	28.16004	13.10948	-	-	319096	1776048	126128	183600	2200	-	-
2017	MEL-05	MEL-0503	2017-8	Construction	13	21	7	5	2	-	-	10.7468	127.8001	9.71837	37.78541	10.7028	-	-	102776	1444584	46104	240872	3200	-	-
2017	MEL-05	MEL-0504	2017-8	Construction	11	18	7	5	3	-	-	8.23267	124.3247	10.30689	35.03765	19.01167	-	-	159448	1660304	48904	225904	9984	-	-
2017	MEL-05	MEL-0505	2017-8	Construction	7	20	5	4	2	-	-	4.33659	129.896	7.33632	51.93327	10.13076	-	-	108760	1329840	67456	321496	1800	-	-
2018	MEL-01	MEL-0101	2018-8	Construction	14	16	9	5	2	2	-	28.4407	165.4517	60.69499	42.39156	40.6437	1.48737	-	683680	2321032	448784	179032	4800	29336	-
2018	MEL-01	MEL-0106	2018-8	Construction	10	19	8	5	3	1	-	23.50235	179.5961	55.58664	58.81424	38.27892	0.6	-	690864	2450744	343792	267640	4400	800	-
2018	MEL-01	MEL-0107	2018-8	Construction	16	16	8	5	4	2	-	25.13321	138.7066	60.90357	46.35466	57.96762	7.2916	-	698848	2227440	367712	147312	5800	1000	-
2018	MEL-01	MEL-0108	2018-8	Construction	11	18	6	5	3	1	-	21.22137	141.2432	70.01861	45.19185	18.83678	0.45	-	339448	2163384	319904	168064	2600	600	-
2018	MEL-01	MEL-0109	2018-8	Construction	11	18	9	5	3	1	-	40.28164	166.1458	63.0984	58.13751	38.34458	0.75	-	620424	2385488	424448	213568	4200	1000	-
2018	MEL-02	MEL-0202	2018-8	Construction	9	9	6	1	3	-	-	8.34793	35.77056	35.09461	5.47328	20.6386	-	-	252240	538800	366032	3200	2600	-	-
2018	MEL-02	MEL-0203	2018-8	Construction	11	19	10	4	4	-	-	33.66578	155.8521	29.12657	50.64436	59.60638	-	-	598272	1998352	215352	229320	7200	-	-
2018	MEL-02	MEL-0205	2018-8	Construction	8	16	7	4	4	1	-	26.63059	120.0303	31.11655	31.53233	37.591	0.15	-	367584	2004336	272024	164248	11384	200	-
2018	MEL-02	MEL-0206	2018-8	Construction	8	14	8	3	2	1	-	17.49274	56.95398	40.04541	15.14053	11.7589	1.28163	-	260624	820576	279456	88008	1800	28736	-
2018	MEL-02	MEL-0208	2018-8	Construction	11	15	8	3	2	-	-	12.87352	108.8193	37.81753	27.24674	21.9255	-	-	196168	1401480	261088	134712	3600	-	-
2018	MEL-03	MEL-0301	2018-8	Construction	7	17	9	3	4	-	-	28.47983	192.9468	17.99219	32.90856	33.22354	-	-	195368	2746488	153080	184800	3400	-	-
2018	MEL-03	MEL-0302	2018-8	Construction	9	19	9	5	2	1	-	16.45953	144.3344	17.15516	44.37279	31.62776	0.15	-	239272	1933696	139912	251656	4000	200	-
2018	MEL-03	MEL-0303	2018-8	Construction	10	17	8	5	4	-	-	9.58006	186.7282	17.90364	31.7463	54.73848	-	-	138696	3313424	118760	191384	5600	-	-
2018	MEL-03	MEL-0304	2018-8	Construction	8	16	7	5	1	1	-	13.59063	172.9595	15.17007	59.99451	5.83744	0.89369	-	159648	2150416	73856	359416	1600	28736	-
2018	MEL-03	MEL-0305	2018-8	Construction	10	20	9	4	2	1	-	22.33304	157.5682	21.18887	35.44773	14.65	0.43878	-	175616	2364536	129128	205952	2600	200	-
2018	MEL-04	MEL-0401	2018-8	Construction	10	21	8	3	3	-	-	31.81077	119.5798	20.86866	31.59541	24.58532	-	-	143096	1904960	130328	203552	2000	-	-
2018	MEL-04	MEL-0402	2018-8	Construction	7	17	8	5	3	-	-	30.92551	130.5736	26.62306	48.57894	13.46506	-	-	260424	1811168	81640	326080	1200	-	-
2018	MEL-04	MEL-0403	2018-8	Construction	7	17	5	4	3	1	-	7.76998	125.0505	14.8267	63.0362	11.70462	4.92086	-	181400	1810768	162648	426456	800	1400	-
2018	MEL-04	MEL-0405	2018-8	Construction	9	16	7	5	3	-	-	20.70343	132.2923	18.19799	57.23306	27.94762	-	-	296144	2054824	135312	390336	2600	-	-
2018	MEL-05	MEL-0501	2018-8	Construction	8	18	7	3	2	-	-	16.68879	130.8599	16.26311	26.68083	18.84958	-	-	145280	2400056	108376	174016	1200	-	-
2018	MEL-05	MEL-0502	2018-8	Construction	6	12	7	2	1	-	-	11.10864	69.90656	35.87076	15.76711	22.57992	-	-	118744	1078800	206768	75240	1200	-	-
2018	MEL-05	MEL-0503	2018-8	Construction	8	14	5	2	2	-	-	18.52496	84.50042	21.96931	29.42792	7.91492	-	-	176216	1056248	229704	182200	800	-	-
2018	MEL-05	MEL-0504	2018-8	Construction	6	14	9	2	1	1	-	24.84797	67.7809	24.84733	13.63111	8.48232	0.6	-	232088	1070816	167448	74040	600	800	-
2018	MEL-05	MEL-0505	2018-8	Construction	6	13	7	2	1	2	-	9.13956	72.43555	25.40181	16.18307	6.2394	2.30692	-	159848	1020128	232504	88608	400	15168	-
2019	MEL-01	MEL-0101	2019-8	Operation	12	23	8	4	4	1	-	29.81707	295.0213	28.41818	28.21259	63.22628	0.3	-	304528	2363952	149712	38952	7800	600	-
2019	MEL-01	MEL-0106	2019-8	Operation	8	22	7	4	4	1	-	14.06924	254.3795	20.61564	35.31989	61.85348	0.3	-	144680	2181752	110592	40952	8400	600	-

Table E1-1. Phytoplankton richness, biomass, and density by major taxa group for individual samples, 2013 to 2021.

Year	Area	Sample ID	Year - Month	Phase	Richness							Biomass							Density						
					Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte
2019	MEL-01	MEL-0107	2019-8	Operation	9	22	9	4	5	1	-	26.43026	241.9812	35.13352	37.85889	79.19676	0.4	-	231488	2334416	164864	91040	10200	800	-
2019	MEL-01	MEL-0108	2019-8	Operation	8	23	8	4	4	1	-	19.30558	319.7422	30.10911	27.69542	40.19366	0.3	-	239472	2715368	176464	69672	5600	600	-
2019	MEL-01	MEL-0109	2019-8	Operation	8	21	8	4	3	1	-	24.39728	279.3592	42.54219	42.90335	49.16064	0.3	-	339248	2267160	268256	145312	8000	600	-
2019	MEL-02	MEL-0201	2019-8	Operation	8	18	8	3	4	-	-	12.06442	195.6335	30.82299	6.74694	21.25332	-	-	117144	1553944	129328	52288	2600	-	-
2019	MEL-02	MEL-0202	2019-8	Operation	9	17	9	5	2	-	-	10.2943	124.1091	19.57734	7.43782	20.138	-	-	173816	1286936	108576	67256	2600	-	-
2019	MEL-02	MEL-0203	2019-8	Operation	11	18	10	5	2	-	-	8.90548	173.6099	35.21378	10.65537	16.74528	-	-	140096	1683256	111192	68056	2400	-	-
2019	MEL-02	MEL-0204	2019-8	Operation	9	18	9	5	3	-	-	19.2319	168.4575	19.94693	118.7574	17.33526	-	-	166632	1535192	75056	1331240	2200	-	-
2019	MEL-02	MEL-0205	2019-8	Operation	11	20	9	4	4	1	-	13.79272	187.1339	29.17246	10.30587	23.35402	0.1	-	155064	1935896	117960	75240	9384	200	-
2019	MEL-03	MEL-0301	2019-8	Operation	6	18	9	4	3	-	-	3.23872	154.1558	19.91445	6.66646	25.31036	-	-	122728	1281952	105176	37720	3000	-	-
2019	MEL-03	MEL-0302	2019-8	Operation	7	21	6	5	4	-	-	7.93527	201.9255	13.27007	5.45199	14.85578	-	-	65456	1749312	159248	24352	2000	-	-
2019	MEL-03	MEL-0303	2019-8	Operation	8	20	7	3	3	1	-	13.01575	205.6078	11.3587	3.95036	11.0003	0.1	-	102176	1455568	138496	29736	1600	200	-
2019	MEL-03	MEL-0304	2019-8	Operation	9	18	6	3	1	1	-	12.45964	184.9438	5.00502	7.68277	1.37646	0.14	-	74040	1705208	53688	53088	200	200	-
2019	MEL-03	MEL-0305	2019-8	Operation	7	18	8	5	3	1	-	7.58806	181.3488	27.13389	8.19874	11.63222	1.46554	-	87408	1719976	154264	32936	1400	28736	-
2019	MEL-04	MEL-0401	2019-8	Operation	7	20	6	5	3	1	-	11.30209	199.6094	11.08431	15.66162	6.55262	0.1	-	137296	1626384	89408	152664	1000	200	-
2019	MEL-04	MEL-0402	2019-8	Operation	8	21	8	4	2	-	-	5.02141	182.9104	13.1791	11.41228	4.74306	-	-	166232	1906960	67872	82024	800	-	-
2019	MEL-04	MEL-0403	2019-8	Operation	6	17	8	4	2	-	-	2.19907	176.7209	15.15998	9.639	11.97878	-	-	52288	1804984	70256	88408	600	-	-
2019	MEL-04	MEL-0404	2019-8	Operation	8	18	7	4	1	1	-	4.94963	143.6089	9.08832	6.49843	3.6484	0.57472	-	67056	1337424	110360	65856	1000	57472	-
2019	MEL-04	MEL-0405	2019-8	Operation	6	19	8	4	2	-	-	10.67709	187.3247	13.5576	7.80164	6.5674	-	-	88008	1661904	98992	80024	800	-	-
2019	MEL-05	MEL-0501	2019-8	Operation	8	19	8	4	3	-	-	6.50132	133.4201	10.03789	7.93249	24.37638	-	-	123528	1101152	61072	80424	3400	-	-
2019	MEL-05	MEL-0502	2019-8	Operation	9	18	10	3	3	-	-	5.41405	171.5609	18.85313	20.88295	32.66422	-	-	87608	1676872	93008	197368	2400	-	-
2019	MEL-05	MEL-0503	2019-8	Operation	11	19	6	4	2	1	-	6.32551	114.2585	19.95132	8.30284	6.17174	3.54028	-	104176	921752	132512	80024	600	57472	-
2019	MEL-05	MEL-0504	2019-8	Operation	6	17	6	4	3	1	-	21.44772	163.9479	14.60515	13.51593	11.88134	0.6	-	109760	1352392	48104	117344	1800	1200	-
2019	MEL-05	MEL-0505	2019-8	Operation	5	20	9	4	3	2	-	1.60874	162.7619	17.51846	8.84564	13.57896	1.87014	-	29936	1676472	107176	87408	2400	28936	-
2020	MEL-01	MEL-0101	2020-8	Operation	9	10	7	5	2	1	-	7.12402	50.53537	51.13091	84.33306	11.74792	1.3	-	100192	714416	328904	187296	2400	2600	-
2020	MEL-01	MEL-0106	2020-8	Operation	6	12	6	5	2	1	-	23.29321	68.67773	26.96363	79.0287	17.69863	1.5	-	970840	1066432	341160	206848	23952	3000	-
2020	MEL-01	MEL-0107	2020-8	Operation	11	12	7	5	3	3	-	14.2458	102.3095	35.54556	66.91335	18.42772	8.6248	-	444624	1970616	425816	301808	3200	75440	-
2020	MEL-01	MEL-0108	2020-8	Operation	8	12	6	4	3	1	-	15.51597	34.95275	34.12067	72.0712	16.65078	1.5	-	460976	441224	330024	229784	10384	3000	-
2020	MEL-01	MEL-0109	2020-8	Operation	9	12	6	4	1	1	-	18.84482	78.97529	24.76778	80.04215	8.1288	1.5	-	540000	1094168	252952	413568	2000	3000	-
2020	MEL-02	MEL-0201	2020-8	Operation	8	14	7	4	1	1	-	27.48119	78.05958	35.03304	37.2966	3.25152	0.4	-	500296	1078400	258088	368600	800	800	-
2020	MEL-02	MEL-0202	2020-8	Operation	7	13	7	4	2	1	-	4.59168	60.54853	79.15422	36.20842	7.74552	0.4	-	348232	1200128	275000	278008	1400	800	-
2020	MEL-02	MEL-0203	2020-8	Operation	6	14	7	5	1	1	-	3.62196	66.31459	22.10765	25.46612	4.87728	0.5	-	65456	977824	230920	147696	1200	1000	-
2020	MEL-02	MEL-0204	2020-8	Operation	7	8	8	4	2	1	-	5.719	100.5767	31.97474	43.39205	6.52664	0.5	-	130712	1487088	158512	352048	600	1000	-
2020	MEL-02	MEL-0205	2020-8	Operation	4	10	7	5	2	1	-	27.46998	77.82088	20.84191	34.78265	7.53072	0.1	-	567736	1221880	261856	265240	1600	200	-
2020	MEL-03	MEL-0301	2020-8	Operation	9	14	5	4	3	1	-	5.7573	151.6052	9.61537	19.70891	14.02316	0.1	-	135512	2040656	51888	233488	2400	200	-
2020	MEL-03	MEL-0302	2020-8	Operation	4	9	4	3	2	-	-	8.19921	176.4151	10.16452	24.58189	7.32952	-	-	97392	1559128	145680	305528	1400	-	-
2020	MEL-03	MEL-0303	2020-8	Operation	11	15	5	3	2	-	-	22.75196	195.839	5.78752	26.53104	4.0296	-	-	604656	1883608	108760	348032	800	-	-
2020	MEL-03	MEL-0304	2020-8	Operation	8	11	5	4	3	-	-	6.15754	126.435	11.29854	18.05047	18.46668	-	-	131712	1817752	132312	224704	2400	-	-
2020	MEL-03	MEL-0305	2020-8	Operation	4	12	7	4	1	1	-	1.70038	103.2096	23.46474	18.68271	8.02648	0.1	-	14968	1587664	95592	232088	2200	200	-
2020	MEL-04	MEL-0401	2020-8	Operation	4	15	5	4	1	1	-	2.07288	103.4132	8.57892	21.43112	1.84056	0.2	-	8784	1107336	88208	192784	200	400	-
2020	MEL-04	MEL-0402	2020-8	Operation	3	11	5	5	1	-	-	0.76654	141.2909	6.68414	14.25324	0.81288	-	-	29136	1731744	182600	98392	200	-	-
2020	MEL-04	MEL-0403	2020-8	Operation	7	13	7	4	3	1	-	11.08988	101.8998	11.89652	18.08589	8.3527	0.4	-	132712	1351192	80040	184000	600	800	-
2020	MEL-04	MEL-0404	2020-8	Operation	7	14	5	4	1	-	-	7.17271	115.4893	10.72953	19.8399	2.43864	-	-	59272	1228864	158648	178016	600	-	-
2020	MEL-04	MEL-0405	2020-8	Operation	6	12	6	4	1	1	-	3.39304	61.99956	6.94035	17.59418	1.62576	0.1	-	152464	1106736	66056	183400	400	200	-

Table E1-1. Phytoplankton richness, biomass, and density by major taxa group for individual samples, 2013 to 2021.

					Richness							Biomass							Density						
Year	Area	Sample ID	Year - Month	Phase	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte	Chlorophyte	Chrysophyte	Diatoms	Cryptophyte	Dinoflagellates	Cyanophyte	Euglenophyte
2020	MEL-05	MEL-0501	2020-8	Operation	5	10	6	4	3	2	-	3.65441	128.9414	14.16859	15.46673	4.3798	2.80291	-	31536	1501856	69656	140896	600	29336	-
2020	MEL-05	MEL-0502	2020-8	Operation	9	11	5	3	3	1	-	4.70974	93.23865	8.64301	15.96044	12.0419	0.3	-	123528	1221880	103376	189184	1600	600	-
2020	MEL-05	MEL-0503	2020-8	Operation	5	14	5	5	3	1	-	2.55588	103.5148	11.60217	13.48025	15.19358	3.58625	-	252440	1243432	175216	146480	1000	28736	-
2020	MEL-05	MEL-0504	2020-8	Operation	9	10	5	4	2	-	-	5.41335	101.849	16.97641	16.75532	16.15112	-	-	138296	1544560	103776	175616	2600	-	-
2020	MEL-05	MEL-0505	2020-8	Operation	3	11	5	3	2	1	-	1.92408	90.52127	10.38097	9.06982	11.7076	0.5	-	29936	1623584	68856	75440	2600	1000	-
2021	MEL-01	MEL-0101	2021-8	Operation	14	15	9	5	5	2	-	21.97634	219.3861	41.23334	9.45431	77.088	4.55466	-	456792	1994368	394968	33336	10400	64656	-
2021	MEL-01	MEL-0106	2021-8	Operation	12	16	10	6	3	1	-	22.14067	227.1812	39.50462	21.31188	75.13056	0.8	-	325680	1999352	437088	79840	12000	1600	-
2021	MEL-01	MEL-0107	2021-8	Operation	9	20	11	4	3	1	-	29.15034	223.5552	93.47633	16.96922	66.15468	0.6	-	256040	1972016	951984	16784	10400	1200	-
2021	MEL-01	MEL-0108	2021-8	Operation	8	15	9	4	5	1	-	13.58384	209.6305	52.95251	17.54934	60.24454	0.3	-	234288	1814168	382400	15584	9000	600	-
2021	MEL-01	MEL-0109	2021-8	Operation	12	21	11	4	3	1	-	42.51533	201.0373	45.84483	16.22755	50.87708	0.4	-	714416	1885208	449872	63872	7200	800	-
2021	MEL-01	MEL-0110	2021-8	Operation	11	17	10	6	5	1	-	51.1092	268.747	84.07428	12.69712	52.5818	0.5	-	1029912	2460328	880712	20568	7000	1000	-
2021	MEL-02	MEL-0202	2021-8	Operation	10	15	10	4	3	2	-	10.99149	77.65641	37.99885	6.75907	13.62684	0.48	-	268208	1006560	176448	24952	2200	800	-
2021	MEL-02	MEL-0203	2021-8	Operation	14	20	9	5	3	2	-	18.79378	93.45062	31.19415	8.90276	15.2776	0.61725	-	397720	1230064	212768	46904	3200	7384	-
2021	MEL-02	MEL-0205	2021-8	Operation	10	16	10	4	4	2	1	23.4929	148.5011	54.66185	13.74137	22.44638	1.13737	0.95294	210736	1459352	221784	63672	3200	28936	200
2021	MEL-02	MEL-0206	2021-8	Operation	10	18	11	5	3	1	-	10.93379	111.8477	65.02485	12.23039	13.68884	0.18	-	181400	1300904	344480	90008	2200	200	-
2021	MEL-02	MEL-0208	2021-8	Operation	11	14	10	6	5	-	-	11.94172	96.01369	69.63263	13.07485	38.14012	-	-	367984	1050264	475608	69456	4600	-	-
2021	MEL-03	MEL-0301	2021-8	Operation	8	19	9	3	4	-	-	26.94529	106.9343	14.21171	4.19892	52.6561	-	-	195368	1294520	184000	2600	3000	-	-
2021	MEL-03	MEL-0302	2021-8	Operation	10	14	8	5	3	1	-	16.55798	174.4105	42.34303	18.85729	6.99636	2.83768	-	208936	1991368	278408	203552	1000	35920	-
2021	MEL-03	MEL-0303	2021-8	Operation	7	14	7	5	4	-	-	2.75067	66.95912	15.03697	7.6355	23.50494	-	-	73840	886432	136712	52688	2600	-	-
2021	MEL-03	MEL-0304	2021-8	Operation	8	13	7	3	4	-	-	6.88463	87.78894	11.42665	12.80907	23.50494	-	-	31536	971840	119744	130912	2600	-	-
2021	MEL-03	MEL-0305	2021-8	Operation	10	12	9	3	4	-	-	8.86916	109.9442	30.10381	7.66843	45.62874	-	-	68056	960272	184016	59472	2000	-	-
2021	MEL-04	MEL-0401	2021-8	Operation	6	11	6	4	3	1	-	4.28269	116.1462	14.75534	7.30371	13.27088	0.2	-	116744	1028912	100592	23952	1800	400	-
2021	MEL-04	MEL-0402	2021-8	Operation	5	17	9	6	2	-	-	4.30134	93.03356	16.23187	7.66224	12.82192	-	-	324880	814592	201968	38520	1400	-	-
2021	MEL-04	MEL-0403	2021-8	Operation	11	16	9	3	3	1	-	7.58498	105.8088	26.19329	3.17478	21.72084	2.30718	-	203752	1662904	182616	8584	2600	200	-
2021	MEL-04	MEL-0404	2021-8	Operation	12	18	7	3	4	1	-	29.30744	124.0887	12.64674	7.54843	15.35886	0.51725	-	311112	1340824	177616	24552	1600	7184	-
2021	MEL-04	MEL-0405	2021-8	Operation	7	16	5	4	3	1	-	6.69143	86.41114	15.28074	9.84218	19.84928	0.1	-	267608	993592	127728	33536	2400	200	-
2021	MEL-05	MEL-0501	2021-8	Operation	7	18	9	4	3	-	-	7.29852	90.37826	55.1546	4.45217	24.70674	-	-	316696	822176	187000	23952	3200	-	-
2021	MEL-05	MEL-0502	2021-8	Operation	8	14	6	4	3	1	-	5.92837	83.95608	32.5854	5.09758	22.3943	0.51725	-	152664	864080	300744	10584	2600	7184	-
2021	MEL-05	MEL-0503	2021-8	Operation	9	15	8	5	2	1	-	6.3487	94.71917	18.17943	16.62906	11.7962	0.1	-	226104	935920	96408	78840	1400	200	-
2021	MEL-05	MEL-0504	2021-8	Operation	8	14	6	3	3	1	-	11.91293	89.93221	14.08667	8.49369	7.41432	0.51725	-	173616	713216	118144	54288	1400	7184	-
2021	MEL-05	MEL-0505	2021-8	Operation	5	13	10	4	4	3	-	6.38235	107.0175	17.86693	13.3923	15.00106	5.28581	-	231888	1309688	131528	83624	1800	57872	-
2021	MEL-06	MEL-0601	2021-8	Operation	14	14	11	5	4	1	-	47.2706	209.2849	59.84941	15.56184	46.77362	0.4	-	650760	1460752	558848	15784	6800	800	-
2021	MEL-06	MEL-0602	2021-8	Operation	11	14	9	6	5	1	-	20.35065	203.1464	43.49748	33.40894	81.67604	0.4	-	392936	2021104	486992	184216	17584	800	-

Table E1-2. Phytoplankton biomass (mg/m^3) for the dominant taxa in 2021.

				Dominant Taxa 1			Dominant Taxa 2			Dominant Taxa 3			Dominant Taxa 4			Dominant Taxa 5		
Area	Sample ID	Date	Total Biomass	Species	MTG	Biomass	Species	MTG	Biomass	Species	MTG	Biomass	Species	MTG	Biomass	Species	MTG	Biomass
MEL-01	MEL-0101	8/14/2021	374	Chrysochromulina laurentiana Kling	Chrysophyte	65.2	Dinobryon bavaricum Imhof	Chrysophyte	60.1	Chrysococcus sp.	Chrysophyte	38.1	Gymnodinium sp.	Dinoflagellates	31.3	Dinobryon sociale Ehrenberg	Chrysophyte	23.3
	MEL-0106	8/14/2021	386	Dinobryon sociale Ehrenberg	Chrysophyte	63	Chrysococcus sp.	Chrysophyte	40.9	Chrysochromulina laurentiana Kling	Chrysophyte	39.7	Uroglena volvox Ehrenberg	Chrysophyte	35.8	Peridinium aciculiferum Lemmermann	Dinoflagellates	29
	MEL-0107	8/14/2021	430	Dinobryon sociale Ehrenberg	Chrysophyte	60.4	Gymnodinium sp.	Dinoflagellates	35	Cyclotella pseudostelligera	Diatoms	34.8	Chrysochromulina laurentiana Kling	Chrysophyte	34	Uroglena volvox Ehrenberg	Chrysophyte	30.9
	MEL-0108	8/14/2021	354	Dinobryon sociale Ehrenberg	Chrysophyte	89.1	Chrysococcus sp.	Chrysophyte	34.8	Chrysochromulina laurentiana Kling	Chrysophyte	22.7	Peridinium pusillum (Penard) Lemmermann	Dinoflagellates	19.6	Cyclotella pseudostelligera	Diatoms	19.4
	MEL-0109	8/14/2021	357	Dinobryon sociale Ehrenberg	Chrysophyte	65.5	Chrysochromulina laurentiana Kling	Chrysophyte	39.7	Chrysococcus sp.	Chrysophyte	39	Gymnodinium sp.	Dinoflagellates	31.3	Planctonema lauterbornii Schmidle	Chlorophyte	27.9
	MEL-0110	8/14/2021	470	Dinobryon sociale Ehrenberg	Chrysophyte	90.5	Chrysochromulina laurentiana Kling	Chrysophyte	53.9	Chrysococcus sp.	Chrysophyte	38.1	Uroglena volvox Ehrenberg	Chrysophyte	32.5	Cyclotella pseudostelligera	Diatoms	27.1
MEL-02	MEL-0202	8/15/2021	148	Dinobryon sociale Ehrenberg	Chrysophyte	24.4	Chrysococcus sp.	Chrysophyte	21.6	Chrysochromulina laurentiana Kling	Chrysophyte	14.2	Cyclotella stelligera Cleve and Grunow	Diatoms	11.6	Cyclotella bodanica Eulenst.	Diatoms	9.26
	MEL-0203	8/15/2021	168	Dinobryon sociale Ehrenberg	Chrysophyte	32.6	Chrysococcus sp.	Chrysophyte	25.8	Cyclotella stelligera Cleve and Grunow	Diatoms	11.3	Uroglena volvox Ehrenberg	Chrysophyte	10.4	Peridinium pusillum (Penard) Lemmermann	Dinoflagellates	9.79
	MEL-0205	8/15/2021	265	Dinobryon sociale Ehrenberg	Chrysophyte	45.9	Chrysococcus sp.	Chrysophyte	31.5	Uroglena volvox Ehrenberg	Chrysophyte	30.9	Chrysochromulina laurentiana Kling	Chrysophyte	25.5	Cyclotella pseudostelligera	Diatoms	23.2
	MEL-0206	8/15/2021	214	Cyclotella pseudostelligera	Diatoms	38.7	Dinobryon sociale Ehrenberg	Chrysophyte	37.4	Chrysococcus sp.	Chrysophyte	23.5	Chrysochromulina laurentiana Kling	Chrysophyte	14.2	Uroglena volvox Ehrenberg	Chrysophyte	8.13
	MEL-0208	8/15/2021	229	Dinobryon sociale Ehrenberg	Chrysophyte	37.2	Cyclotella pseudostelligera	Diatoms	31	Chrysochromulina laurentiana Kling	Chrysophyte	22.7	Chrysococcus sp.	Chrysophyte	16	Gymnodinium sp.	Dinoflagellates	14.7
MEL-03	MEL-0301	8/7/2021	205	Dinobryon sociale Ehrenberg	Chrysophyte	29	Peridinium limbatum (Stokes) Lemmermann	Dinoflagellates	28.8	Chrysococcus sp.	Chrysophyte	24.9	Planctonema lauterbornii Schmidle	Chlorophyte	22.8	Uroglena volvox Ehrenberg	Chrysophyte	16.3
	MEL-0302	8/6/2021	262	Dinobryon sociale Ehrenberg	Chrysophyte	46.6	Chrysococcus sp.	Chrysophyte	45.1	Chrysochromulina laurentiana Kling	Chrysophyte	28.3	Cyclotella pseudostelligera	Diatoms	23.2	Uroglena volvox Ehrenberg	Chrysophyte	20.3
	MEL-0303	8/7/2021	116	Chrysococcus sp.	Chrysophyte	28.2	Gymnodinium sp.	Dinoflagellates	14.7	Dinobryon sertularia Ehrenberg	Chrysophyte	14.2	Uroglena volvox Ehrenberg	Chrysophyte	9.75	Gymnodinium helveticum Penard	Dinoflagellates	4.71
	MEL-0304	8/7/2021	142	Chrysococcus sp.	Chrysophyte	30.1	Uroglena volvox Ehrenberg	Chrysophyte	22.8	Chrysochromulina laurentiana Kling	Chrysophyte	17	Gymnodinium sp.	Dinoflagellates	14.7	Rhodomonas minuta Skuja	Cryptophyte	10.2
	MEL-0305	8/7/2021	202	Dinobryon sociale Ehrenberg	Chrysophyte	30.9	Peridinium limbatum (Stokes) Lemmermann	Dinoflagellates	28.8	Chrysococcus sp.	Chrysophyte	21.1	Chrysochromulina laurentiana Kling	Chrysophyte	17	Dinobryon sertularia Ehrenberg	Chrysophyte	16.3
MEL-04	MEL-0401	8/6/2021	156	Dinobryon sociale Ehrenberg	Chrysophyte	42.7	Chrysococcus sp.	Chrysophyte	23	Chrysochromulina laurentiana Kling	Chrysophyte	22.7	Dinobryon sertularia Ehrenberg	Chrysophyte	12.5	Uroglena volvox Ehrenberg	Chrysophyte	11.4
	MEL-0402	8/6/2021	134	Dinobryon sertularia Ehrenberg	Chrysophyte	26.3	Dinobryon sociale Ehrenberg	Chrysophyte	24.8	Chrysococcus sp.	Chrysophyte	17.4	Gymnodinium sp.	Dinoflagellates	9.2	Chrysochromulina laurentiana Kling	Chrysophyte	8.5
	MEL-0403	8/6/2021	167	Chrysochromulina laurentiana Kling	Chrysophyte	28.3	Dinobryon sertularia Ehrenberg	Chrysophyte	24.4	Chrysococcus sp.	Chrysophyte	18.8	Gymnodinium sp.	Dinoflagellates	18.4	Kephyrion sp.	Chrysophyte	12
	MEL-0404	8/6/2021	189	Chrysococcus sp.	Chrysophyte	28.7	Dinobryon sertularia Ehrenberg	Chrysophyte	27.8	Planctonema lauterbornii Schmidle	Chlorophyte	20.3	Dinobryon sociale Ehrenberg	Chrysophyte	19	Chrysochromulina laurentiana Kling	Chrysophyte	17
	MEL-0405	8/6/2021	138	Dinobryon sociale Ehrenberg	Chrysophyte	32.9	Chrysococcus sp.	Chrysophyte	25.4	Gymnodinium sp.	Dinoflagellates	14.7	Large chrysophyceae	Chrysophyte	6.45	Dinobryon sertularia Ehrenberg	Chrysophyte	6.37
MEL-05	MEL-0501	8/10/2021	182	Dinobryon sociale Ehrenberg	Chrysophyte	55.5	Tabellaria fenestrata (Lyngbye) Kutzing	Diatoms	21.9	Cyclotella pseudostelligera	Diatoms	15.5	Gymnodinium sp.	Dinoflagellates	14.7	Chrysochromulina laurentiana Kling	Chrysophyte	8.5
	MEL-0502	8/10/2021	150	Dinobryon sociale Ehrenberg	Chrysophyte	52.1	Gymnodinium sp.	Dinoflagellates	12.9	Chrysococcus sp.	Chrysophyte	12.7	Cyclotella ocellata Pant.	Diatoms	12	Cyclotella bodanica Eulenst.	Diatoms	9.88
	MEL-0503	8/10/2021	148	Dinobryon sociale Ehrenberg	Chrysophyte	33.6	Chrysochromulina laurentiana Kling	Chrysophyte	17	Chrysococcus sp.	Chrysophyte	14.1	Uroglena volvox Ehrenberg	Chrysophyte	13	Gymnodinium sp.	Dinoflagellates	11
	MEL-0504	8/10/2021	132	Dinobryon sociale Ehrenberg	Chrysophyte	35.9	Chrysochromulina laurentiana Kling	Chrysophyte	17	Uroglena volvox Ehrenberg	Chrysophyte	14.6	Chrysococcus sp.	Chrysophyte	9.87	Planctonema lauterbornii Schmidle	Chlorophyte	7.62
	MEL-0505	8/10/2021	165	Dinobryon sociale Ehrenberg	Chrysophyte	48.5	Chrysococcus sp.	Chrysophyte	23	Dinobryon sertularia Ehrenberg	Chrysophyte	8.94	Uroglena volvox Ehrenberg	Chrysophyte	8.13	Large chrysophyceae	Chrysophyte	7.74

Notes

MTG = major taxa group

Appendix E2

2021 Chlorophyll-a Results

Area	Station	Sample ID	Year	Month	Replicate	Chlorophyll-a (µg/L)	QA_sample	Flag	Note
MEL-01	1	MEL-01-01-PC	2021	August	1	2.79			
MEL-01	1	MEL-01-01-PC	2021	August	2	2.53			
MEL-01	1	MEL-01-01-PC	2021	August	3	2.63			
MEL-01	6	MEL-01-06-PC	2021	August	1	2.81			
MEL-01	6	MEL-01-06-PC	2021	August	2	2.93			
MEL-01	6	MEL-01-06-PC	2021	August	3	2.65			
MEL-01	7	MEL-01-07-PC	2021	August	1	2.68			
MEL-01	7	MEL-01-07-PC	2021	August	2	2.61			
MEL-01	7	MEL-01-07-PC	2021	August	3	2.69			
MEL-01	8	MEL-01-08-PC	2021	August	1	2.89			
MEL-01	8	MEL-01-08-PC	2021	August	2	2.61			
MEL-01	8	MEL-01-08-PC	2021	August	3	2.54			
MEL-01	9	MEL-01-09-PC	2021	August	1	2.54			
MEL-01	9	MEL-01-09-PC	2021	August	2	3.38			
MEL-01	9	MEL-01-09-PC	2021	August	3	0.53		Remove	Issue during filtering; less than 500 mL collected
MEL-01	10	MEL-01-10-PC	2021	August	1	3.05			
MEL-01	10	MEL-01-10-PC	2021	August	2	2.66			
MEL-01	10	MEL-01-10-PC	2021	August	3	3.06			
MEL-02	6	MEL-02-06-PC	2021	August	1	1.13		Incorrect Sample ID	Labelled as MEL-02-01
MEL-02	6	MEL-02-06-PC	2021	August	2	1.17		Incorrect Sample ID	Labelled as MEL-02-01
MEL-02	6	MEL-02-06-PC	2021	August	3	1.07		Incorrect Sample ID	Labelled as MEL-02-01
MEL-02	2	MEL-02-02-PC	2021	August	1	1.09			
MEL-02	2	MEL-02-02-PC	2021	August	2	1.07			
MEL-02	2	MEL-02-02-PC	2021	August	3	1.13			
MEL-02	3	MEL-02-03-PC	2021	August	1	1.11			
MEL-02	3	MEL-02-03-PC	2021	August	2	1.04			
MEL-02	3	MEL-02-03-PC	2021	August	3	1.11			
MEL-02	8	MEL-02-08-PC	2021	August	1	1.44		Incorrect Sample ID	Labelled as MEL-02-04
MEL-02	8	MEL-02-08-PC	2021	August	2	1.42		Incorrect Sample ID	Labelled as MEL-02-04
MEL-02	8	MEL-02-08-PC	2021	August	3	1.48		Incorrect Sample ID	Labelled as MEL-02-04
MEL-02	5	MEL-02-05-PC	2021	August	1	1.21			
MEL-02	5	MEL-02-05-PC	2021	August	2	1.24			
MEL-02	5	MEL-02-05-PC	2021	August	3	1.30			
MEL-03	1	MEL-03-01-PC	2021	August	1	0.41			
MEL-03	1	MEL-03-01-PC	2021	August	2	0.36			
MEL-03	1	MEL-03-01-PC	2021	August	3	0.44			
MEL-03	2	MEL-03-02-PC	2021	August	1	0.32			
MEL-03	2	MEL-03-02-PC	2021	August	2	0.43			
MEL-03	2	MEL-03-02-PC	2021	August	3	0.39			
MEL-03	3	MEL-03-03-PC	2021	August	1	0.49			
MEL-03	3	MEL-03-03-PC	2021	August	2	0.39			
MEL-03	3	MEL-03-03-PC	2021	August	3	0.44			
MEL-03	4	MEL-03-04-PC	2021	August	1	0.42			
MEL-03	4	MEL-03-04-PC	2021	August	2	0.43			
MEL-03	4	MEL-03-04-PC	2021	August	3	0.43			
MEL-03	5	MEL-03-05-PC	2021	August	1	0.44			
MEL-03	5	MEL-03-05-PC	2021	August	2	0.43			
MEL-03	5	MEL-03-05-PC	2021	August	3	0.42			
MEL-04	1	MEL-04-01-PC	2021	August	1	0.35			
MEL-04	1	MEL-04-01-PC	2021	August	2	0.45			
MEL-04	1	MEL-04-01-PC	2021	August	3	0.41			
MEL-04	2	MEL-04-02-PC	2021	August	1	0.45			
MEL-04	2	MEL-04-02-PC	2021	August	2	0.39			
MEL-04	2	MEL-04-02-PC	2021	August	3	0.41			
MEL-04	3	MEL-04-03-PC	2021	August	1	0.41			
MEL-04	3	MEL-04-03-PC	2021	August	2	0.49			
MEL-04	3	MEL-04-03-PC	2021	August	3	0.39			
MEL-04	4	MEL-04-04-PC	2021	August	1	0.57			
MEL-04	4	MEL-04-04-PC	2021	August	2	0.48			
MEL-04	4	MEL-04-04-PC	2021	August	3	0.58			
MEL-04	5	MEL-04-05-PC	2021	August	1	0.54			
MEL-04	5	MEL-04-05-PC	2021	August	2	0.58			
MEL-04	5	MEL-04-05-PC	2021	August	3	0.59			
MEL-05	1	MEL-05-01-PC	2021	August	1	0.59			
MEL-05	1	MEL-05-01-PC	2021	August	2	0.56			
MEL-05	1	MEL-05-01-PC	2021	August	3	0.57			
MEL-05	2	MEL-05-02-PC	2021	August	1	0.58			
MEL-05	2	MEL-05-02-PC	2021	August	2	0.56			
MEL-05	2	MEL-05-02-PC	2021	August	3	0.61			
MEL-05	3	MEL-05-03-PC	2021	August	1	0.57			
MEL-05	3	MEL-05-03-PC	2021	August	2	0.60			
MEL-05	3	MEL-05-03-PC	2021	August	3	0.61			
MEL-05	4	MEL-05-04-PC	2021	August	1	0.61			
MEL-05	4	MEL-05-04-PC	2021	August	2	0.54			
MEL-05	4	MEL-05-04-PC	2021	August	3	0.56			
MEL-05	5	MEL-05-05-PC	2021	August	1	0.51			
MEL-05	5	MEL-05-05-PC	2021	August	2	0.55			
MEL-05	5	MEL-05-05-PC	2021	August	3	N/A		Remove	Not collected
MEL-01	10	AUG-DUP-01-PC	2021	August	1	2.86	DUP		
MEL-01	10	AUG-DUP-01-PC	2021	August	2	3.03	DUP		
MEL-01	10	AUG-DUP-01-PC	2021	August	3	2.74	DUP		
MEL-02	3	AUG-DUP-02-PC	2021	August	1	1.19	DUP		
MEL-02	3	AUG-DUP-02-PC	2021	August	2	1.10	DUP		
MEL-02	3	AUG-DUP-02-PC	2021	August	3	1.18	DUP		
		MEL-BLANK-01	2021	August	1	<0.04	BLANK		
		MEL-BLANK-02	2021	August	2	<0.04	BLANK		
		MEL-BLANK-03	2021	August	3	<0.04	BLANK		

Appendix E3

2021 Phytoplankton Taxonomy Results

Phytoplankton species data for Meliadine 2021 (Azimuth Consulting Group)

1st number in species code = group
1=cyanophyte 2=chlorophyte 3= Euglenophyte 4=chrysophyte 5=diatoms 6=Cryptophyte 7=Dinoflagellates

RECOUNT = QA\QC sample
Total daily biomass is sum of all species on a date.
* Sample was incorrectly labelled as MEL-03-03 when sent to the lab. Reassigned as MEL-03-01 for analysis.

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	$µm^3$
MEL-01	1	MEL - 0101 - PC		14/Aug/21	1008	Aphanocapsa sp.	35920	3.59	0.00	0.00	100.00
MEL-01	1	MEL - 0101 - PC		14/Aug/21	1014	Chroococcus limneticus Lemmermann	28736	0.96	4.00	4.00	33.50
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2112	Sphaerocystis schroeteri Chodat	43104	1.56	4.10	4.10	36.10
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2121	Oocystis lacustris Chodat	35920	1.02	6.00	3.00	28.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2130	Scenedesmus quadricauda (Turp.) Brebisson	28736	1.27	7.90	4.00	44.10
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2137	Dictyosphaerium simplex Sukja	57472	0.24	2.00	2.00	4.20
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.41	9.00	4.00	56.50
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2146	Crucigeniella rectangularis (Nag.) Komarek	28736	0.52	5.10	4.00	18.20
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2164	Quadrigula closterioides (Bohl.) Printz	172416	3.79	14.00	2.00	22.00
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2167	Elakatothrix gelatinosa Willen	28736	0.50	11.00	2.00	17.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2169	Planctonema lauterbornii Schmidle	21552	7.62	18.00	5.00	353.40
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	2200	0.84	13.50	12.00	381.70
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	28736	1.08	6.00	6.00	37.70
MEL-01	1	MEL - 0101 - PC		14/Aug/21	2206	Botryococcus braunii Kutzing	1400	2.01	14.00	14.00	1436.80
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4351	Small chrysophyceae	474144	2.66	2.20	2.20	5.60
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4355	Chrysochromulina parva Lackey	28736	1.88	5.00	5.00	65.40
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4357	Chrysococcus sp.	581904	38.06	5.00	5.00	65.40
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4362	Kephyrion sp.	129312	1.82	3.00	3.00	14.10
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	400	0.39	18.60	10.00	973.90
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4383	Dinobryon bavaricum Imhof	265808	60.13	12.00	6.00	226.20
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	43104	9.75	12.00	6.00	226.20
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	4000	13.56	0.00	0.00	3390.00
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4394	Epiphyxis sp.	28736	2.07	8.60	4.00	72.00
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	71840	1.96	5.80	3.00	27.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4401	Uroglena volvox Ehrenberg	165232	18.69	6.00	6.00	113.10
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4413	Chrysochromulina laurentiana Kling	165232	65.20	9.10	9.10	394.60
MEL-01	1	MEL - 0101 - PC		14/Aug/21	4414	Stichogloea spp.	21552	1.08	6.00	4.00	50.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	4600	8.36	10.50	21.00	1818.40
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5508	Cyclotella pseudostelligera	21552	11.61	7.00	14.00	538.80
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5511	Rhizosolenia eriense H.L. Smith	71840	6.09	12.00	3.00	84.80
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	4600	3.51	81.00	6.00	763.40
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5518	Synedra acus Kutzing	11400	1.09	91.00	2.00	95.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5524	Asterionella formosa Hassall	400	0.04	100.00	2.00	104.70
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5551	Cyclotella michiganiana Skvortzow	272992	6.69	2.50	5.00	24.50
MEL-01	1	MEL - 0101 - PC		14/Aug/21	5720	Cyclotella bodanica Eulenst.	400	3.09	17.00	34.00	7717.30
MEL-01	1	MEL - 0101 - PC		14/Aug/21	6554	Rhodomonas minuta Skuja	7184	0.56	9.00	5.00	78.50
MEL-01	1	MEL - 0101 - PC		14/Aug/21	6558	Cryptomonas erosa Ehrenberg	4000	7.20	26.30	14.00	1799.40
MEL-01	1	MEL - 0101 - PC		14/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.28	19.90	10.00	694.60
MEL-01	1	MEL - 0101 - PC		14/Aug/21	6565	Cryptomonas rostratiformis Skuja	200	0.45	33.00	14.00	2257.80
MEL-01	1	MEL - 0101 - PC		14/Aug/21	6568	Katablepharis ovalis Skuja	21552	0.96	8.00	4.00	44.70
MEL-01	1	MEL - 0101 - PC		14/Aug/21	7631	Gymnodinium helveticum Penard	400	9.42	50.00	30.00	23561.90
MEL-01	1	MEL - 0101 - PC		14/Aug/21	7632	Gymnodinium sp.	3400	31.29	26.00	26.00	9202.80
MEL-01	1	MEL - 0101 - PC		14/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	4.89	36.00	36.00	24429.00
MEL-01	1	MEL - 0101 - PC		14/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	5000	18.82	19.30	19.30	3764.20
MEL-01	1	MEL - 0101 - PC		14/Aug/21	7641	Peridinium aciculiferum Lemmermann	1400	12.67	30.00	24.00	9047.80
MEL-01	6	MEL - 0106 - PC		14/Aug/21	1073	Snowella sp	1600	0.80	0.00	0.00	500.00
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2112	Sphaerocystis schroeteri Chodat	179600	6.48	4.10	4.10	36.10
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2121	Oocystis lacustris Chodat	50288	1.42	6.00	3.00	28.30
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2137	Dictyosphaerium simplex Sukja	28736	0.12	2.00	2.00	4.20
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2167	Elakatothrix gelatinosa Willen	21552	0.34	10.00	2.00	15.70
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2169	Planctonema lauterbornii Schmidle	28736	10.16	18.00	5.00	353.40
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1400	0.53	13.50	12.00	381.70
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.61	26.90	24.00	3031.10
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2213	Spirogyra sp.	200	0.75	0.00	0.00	3725.00
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2235	Ankistrodesmus spiralis Lemmermann	7184	0.41	36.00	2.00	56.50
MEL-01	6	MEL - 0106 - PC		14/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4351	Small chrysophyceae	258624	1.45	2.20	2.20	5.60
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4357	Chrysococcus sp.	625008	40.88	5.00	5.00	65.40
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4361	Kephyrion boreale Skuja	43104	5.12	6.10	6.10	118.80
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4362	Kephyrion sp.	114944	1.98	3.20	3.20	17.20
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	400	0.39	18.60	10.00	973.90
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4383	Dinobryon bavaricum Imhof	79024	17.88	12.00	6.00	226.20
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	50288	11.38	12.00	6.00	226.20
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	251440	56.88	12.00	6.00	226.20
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	1800	6.10	0.00	0.00	3390.00
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	35920	0.98	5.80	3.00	27.30
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4401	Uroglena volvox Ehrenberg	316096	35.75	6.00	6.00	113.10
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4413	Chrysochromulina laurentiana Kling	100576	39.69	9.10	9.10	394.60
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4414	Stichogloea spp.	86208	4.34	6.00	4.00	50.30
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4415	Bicosoeca lacustris Clark	7184	0.32	4.40	4.40	44.60
MEL-01	6	MEL - 0106 - PC		14/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.20	5.80	3.00	27.30
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	6200	11.27	10.50	21.00	1818.40
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5508	Cyclotella pseudostelligera	7184	3.87	7.00	14.00	538.80
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5511	Rhizosolenia eriense H.L. Smith	21552	1.83	12.00	3.00	84.80
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	3200	4.27	26.00	14.00	1334.10
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5518	Synedra acus Kutzing	11000	1.05	91.00	2.00	95.30
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	200	0.49	260.00	6.00	2450.40

Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Density	Biomass	Length	Width	Volume
							Cells/L	mg/m^3	µm	µm	µm^3
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5524	Asterionella formosa Hassall	6200	0.65	100.00	2.00	104.70
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5551	Cyclotella michiganiana Skvortzow	373568	9.15	2.50	5.00	24.50
MEL-01	6	MEL - 0106 - PC		14/Aug/21	5720	Cyclotella bodanica Eulenst.	800	6.17	17.00	34.00	7717.30
MEL-01	6	MEL - 0106 - PC		14/Aug/21	6554	Rhodomonas minuta Skuja	35920	2.82	9.00	5.00	78.50
MEL-01	6	MEL - 0106 - PC		14/Aug/21	6558	Cryptomonas erosa Ehrenberg	6600	11.88	26.30	14.00	1799.40
MEL-01	6	MEL - 0106 - PC		14/Aug/21	6559	Cryptomonas ovata Ehrenberg	600	3.43	41.00	20.00	5724.70
MEL-01	6	MEL - 0106 - PC		14/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.90	10.00	694.60
MEL-01	6	MEL - 0106 - PC		14/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.44	35.00	14.00	2394.60
MEL-01	6	MEL - 0106 - PC		14/Aug/21	6568	Katablepharis ovalis Skuja	35920	1.61	8.00	4.00	44.70
MEL-01	6	MEL - 0106 - PC		14/Aug/21	7632	Gymnodinium sp.	2400	22.09	26.00	26.00	9202.80
MEL-01	6	MEL - 0106 - PC		14/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	6400	24.09	19.30	19.30	3764.20
MEL-01	6	MEL - 0106 - PC		14/Aug/21	7641	Peridinium aciculiferum Lemmermann	3200	28.95	30.00	24.00	9047.80
MEL-01	7	MEL - 0107 - PC		14/Aug/21	1073	Snowella sp	1200	0.60	0.00	0.00	500.00
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2112	Sphaerocystis schroeteri Chodat	114944	4.15	4.10	4.10	36.10
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2137	Dictyosphaerium simplex Sukja	50288	0.21	2.00	2.00	4.20
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2169	Planctonema lauterbornii Schmidle	50288	17.77	18.00	5.00	353.40
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	2000	0.77	13.60	12.00	387.40
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2193	Staurodesmus paradoxum Meyen	400	1.21	26.90	24.00	3031.10
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2206	Botryococcus braunii Kutzing	2000	2.87	14.00	14.00	1436.80
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2213	Spirogyra sp.	200	0.43	0.00	0.00	2150.00
MEL-01	7	MEL - 0107 - PC		14/Aug/21	2235	Ankistrodesmus spiralis Lemmermann	21552	1.19	35.00	2.00	55.00
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4351	Small chrysophyceae	474144	2.66	2.20	2.20	5.60
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4352	Large chrysophyceae	79024	14.19	7.00	7.00	179.60
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4357	Chrysococcus sp.	373568	24.43	5.00	5.00	65.40
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4362	Kephyrion sp.	143680	2.47	3.20	3.20	17.20
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	1000	0.97	18.60	10.00	973.90
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4381	Dinobryon mucronatom Nygaard	21552	2.82	10.00	5.00	130.90
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4383	Dinobryon bavaricum Imhof	64656	14.63	12.00	6.00	226.20
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.63	0.00	0.00	3125.00
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	129312	29.25	12.00	6.00	226.20
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	400	1.36	0.00	0.00	3390.00
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	237072	53.63	12.00	6.00	226.20
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	2000	6.78	0.00	0.00	3390.00
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4401	Uroglena volvox Ehrenberg	272992	30.88	6.00	6.00	113.10
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4413	Chrysochromulina laurentiana Kling	86208	34.02	9.10	9.10	394.60
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	35920	0.98	5.80	3.00	27.30
MEL-01	7	MEL - 0107 - PC		14/Aug/21	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	6200	11.27	10.50	21.00	1818.40
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5508	Cyclotella pseudostelligera	64656	34.84	7.00	14.00	538.80
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5511	Rhizosolenia eriense H.L. Smith	143680	12.18	12.00	3.00	84.80
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	12400	9.47	81.00	6.00	763.40
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5515	Fragilaria crotonensis Kitton	9200	2.70	70.00	4.00	293.20
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5518	Synedra acus Kutzing	14000	1.33	91.00	2.00	95.30
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	200	0.49	260.00	6.00	2450.40
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5524	Asterionella formosa Hassall	4400	0.46	100.00	2.00	104.70
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5551	Cyclotella michiganiana Skvortzow	689664	16.90	2.50	5.00	24.50
MEL-01	7	MEL - 0107 - PC		14/Aug/21	5720	Cyclotella bodanica Eulenst.	400	3.09	17.00	34.00	7717.30
MEL-01	7	MEL - 0107 - PC		14/Aug/21	6554	Rhodomonas minuta Skuja	7184	0.56	8.90	5.00	77.70
MEL-01	7	MEL - 0107 - PC		14/Aug/21	6558	Cryptomonas erosa Ehrenberg	8200	14.76	26.30	14.00	1799.40
MEL-01	7	MEL - 0107 - PC		14/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1000	0.70	20.00	10.00	698.10
MEL-01	7	MEL - 0107 - PC		14/Aug/21	6565	Cryptomonas rostratiformis Skuja	400	0.96	35.00	14.00	2394.60
MEL-01	7	MEL - 0107 - PC		14/Aug/21	7632	Gymnodinium sp.	3800	34.97	26.00	26.00	9202.80
MEL-01	7	MEL - 0107 - PC		14/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	5400	20.33	19.30	19.30	3764.20
MEL-01	7	MEL - 0107 - PC		14/Aug/21	7641	Peridinium aciculiferum Lemmermann	1200	10.86	30.00	24.00	9047.80
MEL-01	8	MEL - 0108 - PC		14/Aug/21	1073	Snowella sp	600	0.30	0.00	0.00	500.00
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2112	Sphaerocystis schroeteri Chodat	114944	4.15	4.10	4.10	36.10
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2137	Dictyosphaerium simplex Sukja	93392	0.39	2.00	2.00	4.20
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2169	Planctonema lauterbornii Schmidle	14368	5.08	18.00	5.00	353.40
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	3000	1.16	13.60	12.00	387.40
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2195	Staurodesmus bullardii G.M. Smith	200	0.42	23.30	22.00	2084.50
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2206	Botryococcus braunii Kutzing	800	1.15	14.00	14.00	1436.80
MEL-01	8	MEL - 0108 - PC		14/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4351	Small chrysophyceae	265808	1.49	2.20	2.20	5.60
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4352	Large chrysophyceae	93392	16.77	7.00	7.00	179.60
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4357	Chrysococcus sp.	531616	34.77	5.00	5.00	65.40
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4361	Kephyrion boreale Skuja	28736	3.41	6.10	6.10	118.80
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4362	Kephyrion sp.	86208	1.48	3.20	3.20	17.20
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.63	0.00	0.00	3125.00
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	50288	11.38	12.00	6.00	226.20
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	800	3.19	0.00	0.00	3990.00
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	352016	79.63	12.00	6.00	226.20
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	2800	9.49	0.00	0.00	3390.00
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	71840	1.96	5.80	3.00	27.30
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4401	Uroglena volvox Ehrenberg	143680	16.25	6.00	6.00	113.10
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4413	Chrysochromulina laurentiana Kling	57472	22.68	9.10	9.10	394.60
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4414	Stichogloea spp.	122128	6.14	6.00	4.00	50.30
MEL-01	8	MEL - 0108 - PC		14/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.36	6.00	4.00	50.30
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	4400	8.00	10.50	21.00	1818.40
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5508	Cyclotella pseudostelligera	35920	19.35	7.00	14.00	538.80
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5511	Rhizosolenia eriense H.L. Smith	57472	4.87	12.00	3.00	84.80
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	4000	3.05	81.00	6.00	763.40
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5518	Synedra acus Kutzing	10600	1.01	91.00	2.00	95.30
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5524	Asterionella formosa Hassall	3000	0.31	100.00	2.00	104.70
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5551	Cyclotella michiganiana Skvortzow	258624	6.34	2.50	5.00	24.50
MEL-01	8	MEL - 0108 - PC		14/Aug/21	5720	Cyclotella bodanica Eulenst.	1200	9.26	17.00	34.00	7717.30
MEL-01	8	MEL - 0108 - PC		14/Aug/21	6554	Rhodomonas minuta Skuja	7184	0.56	8.90	5.00	77.70
MEL-01	8	MEL - 0108 - PC		14/Aug/21	6558	Cryptomonas erosa Ehrenberg	7400	13.26	26.20	14.00	1792.50
MEL-01	8	MEL - 0108 - PC		14/Aug/21	6559	Cryptomonas ovata Ehrenberg	400	2.29	41.00	20.00	5724.70
MEL-01	8	MEL - 0108 - PC		14/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.44	35.00	14.00	2394.60
MEL-01	8	MEL - 0108 - PC		14/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-01	8	MEL - 0108 - PC		14/Aug/21	7632	Gymnodinium sp.	2000	18.41	26.00	26.00	9202.80
MEL-01	8	MEL - 0108 - PC		14/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	4.89	36.00	36.00	24429.00
MEL-01	8	MEL - 0108 - PC		14/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	5200	19.57	19.30	19.30	3764.20
MEL-01	8	MEL - 0108 - PC		14/Aug/21	7641	Peridinium aciculiferum Lemmermann	1400	12.67	30.00	24.00	9047.80
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	1073	Snowella sp	1400	0.70	0.00	0.00	500.00
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	2112	Sphaerocystis schroeteri Chodat	222704	8.04	4.10	4.10	36.10
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	2137	Dictyosphaerium simplex Sukja	64656	0.27	2.00	2.00	4.20
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	2169	Planctonema lauterbornii Schmidle	21552	7.62	18.00	5.00	353.40
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	2000	0.77	13.60	12.00	387.40
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	2206	Botryococcus braunii Kutzing	800	1.15	14.00	14.00	1436.80
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4351	Small chrysophyceae	330464	1.85	2.20	2.20	5.60
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4352	Large chrysophyceae	64656	11.61	7.00	7.00	179.60
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4357	Chrysococcus sp.	581904	38.06	5.00	5.00	65.40
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4361	Kephyrion boreale Skuja	14368	1.71	6.10	6.10	118.80
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4362	Kephyrion sp.	71840	1.24	3.20	3.20	17.20
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4381	Dinobryon mucronatom Nygaard	14368	1.88	10.00	5.00	130.90
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	400	1.25	0.00	0.00	3125.00
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4388	Dinobryon sertularia Ehrenberg	86208	19.50	12.00	6.00	226.20
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4388	Dinobryon sertularia Ehrenberg	1200	4.07	0.00	0.00	3390.00
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4390	Dinobryon sociale Ehrenberg	316096	71.50	12.00	6.00	226.20
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4390	Dinobryon sociale Ehrenberg	2000	6.78	0.00	0.00	3390.00
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	57472	1.57	5.80	3.00	27.30
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4401	Uroglena volvox Ehrenberg	143680	16.25	6.00	6.00	113.10
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4413	Chrysochromulina laurentiana Kling	57472	22.68	9.10	9.10	394.60
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4414	Stichogloea spp.	100576	5.06	6.00	4.00	50.30
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	4437	Pteridomonas sp.	14368	3.42	8.80	8.80	237.90
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	4800	8.73	10.50	21.00	1818.40
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5508	Cyclotella pseudostelligera	28736	15.48	7.00	14.00	538.80
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5509	Cyclotella ocellata Pant.	21552	2.25	4.05	8.10	104.30
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5511	Rhizosolenia eriense H.L. Smith	14368	1.22	12.00	3.00	84.80
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	3200	2.44	81.00	6.00	763.40
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5518	Synedra acus Kutzing	11800	1.12	91.00	2.00	95.30
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5524	Asterionella formosa Hassall	3800	0.40	100.00	2.00	104.70
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5551	Cyclotella michiganiana Skvortzow	215520	5.28	2.50	5.00	24.50
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	5720	Cyclotella bodanica Eulenst.	800	6.17	17.00	34.00	7717.30
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	6554	Rhodomonas minuta Skuja	28736	2.23	8.90	5.00	77.70
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	6558	Cryptomonas erosa Ehrenberg	9200	16.49	26.20	14.00	1792.50
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	6559	Cryptomonas ovata Ehrenberg	200	1.14	41.00	20.00	5724.70
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	6565	Cryptomonas rostratiformis Skuja	1200	2.96	36.00	14.00	2463.00
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	7632	Gymnodinium sp.	2200	20.25	26.00	26.00	9202.80
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	400	9.77	36.00	36.00	24429.00
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	4200	15.81	19.30	19.30	3764.20
MEL-01	8R	MEL - 0108R - PC	Lab Dup	14/Aug/21	7641	Peridinium aciculiferum Lemmermann	1800	16.29	30.00	24.00	9047.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	1073	Snowella sp	800	0.40	0.00	0.00	500.00
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2112	Sphaerocystis schroeteri Chodat	129312	4.67	4.10	4.10	36.10
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2121	Oocystis lacustris Chodat	64656	1.83	6.00	3.00	28.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2137	Dictyosphaerium simplex Sukja	100576	0.42	2.00	2.00	4.20
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.45	10.00	4.00	62.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2145	Crucigenia quadrata Morr.	172416	0.81	3.00	3.00	4.70
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2164	Quadrigula closterioides (Bohl.) Printz	114944	2.53	14.00	2.00	22.00
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2169	Planctonema lauterbornii Schmidle	79024	27.93	18.00	5.00	353.40
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	2400	0.92	13.50	12.00	381.70
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	43104	1.63	6.00	6.00	37.70
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4351	Small chrysophyceae	416672	2.33	2.20	2.20	5.60
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4355	Chrysochromulina parva Lackey	21552	1.41	5.00	5.00	65.40
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4357	Chrysococcus sp.	596272	39.00	5.00	5.00	65.40
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	14368	5.30	8.90	8.90	369.10
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4362	Kephyrion sp.	122128	1.72	3.00	3.00	14.10
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	1000	0.97	18.60	10.00	973.90
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4381	Dinobryon mucronatom Nygaard	7184	0.94	10.00	5.00	130.90
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4383	Dinobryon bavaricum Imhof	28736	6.50	12.00	6.00	226.20
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	200	0.68	0.00	0.00	3390.00
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	265808	60.13	12.00	6.00	226.20
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	1600	5.42	0.00	0.00	3390.00
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	7184	0.20	5.80	3.00	27.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4400	Ochromonas sp.	7184	0.46	7.60	4.00	63.70
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4401	Uroglena volvox Ehrenberg	165232	18.69	6.00	6.00	113.10
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4401	Uroglena volvox Ehrenberg	200	2.26	0.00	0.00	11300.00
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4413	Chrysochromulina laurentiana Kling	100576	39.69	9.10	9.10	394.60
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4414	Stichogloea spp.	64656	3.25	6.00	4.00	50.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.20	5.80	3.00	27.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	4400	8.00	10.50	21.00	1818.40
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5508	Cyclotella pseudostelligera	21552	11.61	7.00	14.00	538.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5509	Cyclotella ocellata Pant.	28736	3.00	4.05	8.10	104.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5511	Rhizosolenia eriense H.L. Smith	50288	4.26	12.00	3.00	84.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1600	1.22	81.00	6.00	763.40
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	2400	3.20	26.00	14.00	1334.10
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5518	Synedra acus Kutzing	14200	1.35	91.00	2.00	95.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	600	1.36	240.00	6.00	2261.90
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5524	Asterionella formosa Hassall	9600	1.01	100.00	2.00	104.70
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5551	Cyclotella michiganiana Skvortzow	316096	7.74	2.50	5.00	24.50
MEL-01	9	MEL - 0109 - PC		14/Aug/21	5720	Cyclotella bodanica Eulenst.	400	3.09	17.00	34.00	7717.30
MEL-01	9	MEL - 0109 - PC		14/Aug/21	6554	Rhodomonas minuta Skuja	57472	4.51	9.00	5.00	78.50
MEL-01	9	MEL - 0109 - PC		14/Aug/21	6558	Cryptomonas erosa Ehrenberg	4600	8.28	26.30	14.00	1799.40
MEL-01	9	MEL - 0109 - PC		14/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.28	19.90	10.00	694.60
MEL-01	9	MEL - 0109 - PC		14/Aug/21	6565	Cryptomonas rostratiformis Skuja	1400	3.16	33.00	14.00	2257.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	7632	Gymnodinium sp.	3400	31.29	26.00	26.00	9202.80
MEL-01	9	MEL - 0109 - PC		14/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	2800	10.54	19.30	19.30	3764.20
MEL-01	9	MEL - 0109 - PC		14/Aug/21	7641	Peridinium aciculiferum Lemmermann	1000	9.05	30.00	24.00	9047.80

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-01	10	MEL - 0110 - PC		14/Aug/21	1073	Snowella sp	1000	0.50	0.00	0.00	500.00
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2112	Sphaerocystis schroeteri Chodat	524432	18.93	4.10	4.10	36.10
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2121	Oocystis lacustris Chodat	50288	1.42	6.00	3.00	28.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2137	Dictyosphaerium simplex Sukja	28736	0.12	2.00	2.00	4.20
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.45	10.00	4.00	62.80
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2145	Crucigenia quadrata Morr.	28736	0.14	3.00	3.00	4.70
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2164	Quadrigula closterioides (Bohl.) Printz	172416	3.79	14.00	2.00	22.00
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2167	Elakatothrix gelatinosa Willen	122128	2.11	11.00	2.00	17.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2169	Planctonema lauterbornii Schmidle	57472	20.31	18.00	5.00	353.40
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1200	0.46	13.60	12.00	387.40
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	35920	1.35	6.00	6.00	37.70
MEL-01	10	MEL - 0110 - PC		14/Aug/21	2206	Botryococcus braunii Kutzing	1400	2.01	14.00	14.00	1436.80
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4351	Small chrysophyceae	488512	2.74	2.20	2.20	5.60
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4357	Chrysococcus sp.	581904	38.06	5.00	5.00	65.40
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4361	Kephyrion boreale Skuja	21552	2.56	6.10	6.10	118.80
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4362	Kephyrion sp.	129312	1.82	3.00	3.00	14.10
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4383	Dinobryon bavaricum Imhof	50288	11.38	12.00	6.00	226.20
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	71840	16.25	12.00	6.00	226.20
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4388	Dinobryon sertularia Ehrenberg	200	0.68	0.00	0.00	3390.00
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	352016	79.63	12.00	6.00	226.20
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4390	Dinobryon sociale Ehrenberg	3200	10.85	0.00	0.00	3390.00
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	79024	2.16	5.80	3.00	27.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4401	Uroglena volvox Ehrenberg	287360	32.50	6.00	6.00	113.10
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4413	Chrysochromulina laurentiana Kling	136496	53.86	9.10	9.10	394.60
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4414	Stichogloea spp.	143680	7.23	6.00	4.00	50.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	64656	1.77	5.80	3.00	27.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	4600	8.36	10.50	21.00	1818.40
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5508	Cyclotella pseudostelligera	50288	27.10	7.00	14.00	538.80
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5509	Cyclotella ocellata Pant.	57472	5.99	4.05	8.10	104.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5511	Rhizosolenia eriense H.L. Smith	193968	16.45	12.00	3.00	84.80
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	3200	2.44	81.00	6.00	763.40
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5518	Synedra acus Kutzing	15400	1.47	91.00	2.00	95.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5524	Asterionella formosa Hassall	8600	0.90	100.00	2.00	104.70
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5551	Cyclotella michiganiana Skvortzow	545984	13.38	2.50	5.00	24.50
MEL-01	10	MEL - 0110 - PC		14/Aug/21	5720	Cyclotella bodanica Eulenst.	1000	7.72	17.00	34.00	7717.30
MEL-01	10	MEL - 0110 - PC		14/Aug/21	6554	Rhodomonas minuta Skuja	7184	0.56	9.00	5.00	78.50
MEL-01	10	MEL - 0110 - PC		14/Aug/21	6558	Cryptomonas erosa Ehrenberg	5600	10.08	26.30	14.00	1799.40
MEL-01	10	MEL - 0110 - PC		14/Aug/21	6559	Cryptomonas ovata Ehrenberg	200	1.14	41.00	20.00	5724.70
MEL-01	10	MEL - 0110 - PC		14/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.90	10.00	694.60
MEL-01	10	MEL - 0110 - PC		14/Aug/21	6565	Cryptomonas rostratiformis Skuja	200	0.45	33.00	14.00	2257.80
MEL-01	10	MEL - 0110 - PC		14/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.32	8.00	4.00	44.70
MEL-01	10	MEL - 0110 - PC		14/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-01	10	MEL - 0110 - PC		14/Aug/21	7632	Gymnodinium sp.	2400	22.09	26.00	26.00	9202.80
MEL-01	10	MEL - 0110 - PC		14/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
MEL-01	10	MEL - 0110 - PC		14/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	3400	12.80	19.30	19.30	3764.20
MEL-01	10	MEL - 0110 - PC		14/Aug/21	7641	Peridinium aciculiferum Lemmermann	800	7.24	30.00	24.00	9047.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	1008	Aphanocapsa sp.	200	0.18	0.00	0.00	900.00
MEL-02	2	MEL - 0202 - PC		15/Aug/21	1073	Snowella sp	600	0.30	0.00	0.00	500.00
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2105	Chlamydomonas spp.	7184	0.20	6.00	3.00	28.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2112	Sphaerocystis schroeteri Chodat	86208	3.11	4.10	4.10	36.10
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2121	Oocystis lacustris Chodat	50288	1.42	6.00	3.00	28.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.45	10.00	4.00	62.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2167	Elakatothrix gelatinosa Willen	100576	1.74	11.00	2.00	17.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1000	0.38	13.50	12.00	381.70
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2205	Mougeotia sp.	600	2.23	61.00	8.80	3710.10
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2206	Botryococcus braunii Kutzing	800	1.15	14.00	14.00	1436.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4351	Small chrysophyceae	316096	1.77	2.20	2.20	5.60
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4357	Chrysococcus sp.	330464	21.61	5.00	5.00	65.40
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4362	Kephyrion sp.	86208	1.22	3.00	3.00	14.10
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4372	Mallomonas tonsurata Teiling and Krieger	200	0.29	23.00	11.00	1457.20
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4383	Dinobryon bavaricum Imhof	7184	1.63	12.00	6.00	226.20
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	400	1.36	0.00	0.00	3390.00
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	107760	24.38	12.00	6.00	226.20
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	43104	1.18	5.80	3.00	27.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4413	Chrysochromulina laurentiana Kling	35920	14.17	9.10	9.10	394.60
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4414	Stichogloea spp.	35920	1.81	6.00	4.00	50.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	6400	11.64	10.50	21.00	1818.40
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5508	Cyclotella pseudostelligera	7184	3.87	7.00	14.00	538.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5509	Cyclotella ocellata Pant.	57472	5.99	4.05	8.10	104.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5511	Rhizosolenia eriense H.L. Smith	7184	0.61	12.00	3.00	84.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	4800	3.66	81.00	6.00	763.40
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5518	Synedra acus Kutzing	2600	0.25	91.00	2.00	95.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5524	Asterionella formosa Hassall	3200	0.34	100.00	2.00	104.70
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5551	Cyclotella michiganiana Skvortzow	86208	2.11	2.50	5.00	24.50
MEL-02	2	MEL - 0202 - PC		15/Aug/21	5720	Cyclotella bodanica Eulenst.	1200	9.26	17.00	34.00	7717.30
MEL-02	2	MEL - 0202 - PC		15/Aug/21	6554	Rhodomonas minuta Skuja	21552	1.69	9.00	5.00	78.50
MEL-02	2	MEL - 0202 - PC		15/Aug/21	6558	Cryptomonas erosa Ehrenberg	1600	2.88	26.30	14.00	1799.40
MEL-02	2	MEL - 0202 - PC		15/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1200	0.83	19.90	10.00	694.60
MEL-02	2	MEL - 0202 - PC		15/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.35	33.00	14.00	2257.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	7632	Gymnodinium sp.	400	3.68	26.00	26.00	9202.80
MEL-02	2	MEL - 0202 - PC		15/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1200	4.52	19.30	19.30	3764.20
MEL-02	2	MEL - 0202 - PC		15/Aug/21	7641	Peridinium aciculiferum Lemmermann	600	5.43	30.00	24.00	9047.80
MEL-02	3	MEL - 0203 - PC		15/Aug/21	1012	Aphanothece sp.	7184	0.52	0.00	0.00	72.00
MEL-02	3	MEL - 0203 - PC		15/Aug/21	1073	Snowella sp	200	0.10	0.00	0.00	500.00
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2101	Carteria spp.	7184	4.48	10.60	10.60	623.60
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2112	Sphaerocystis schroeteri Chodat	186784	6.74	4.10	4.10	36.10

Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Density Cells/L	Biomass mg/m^3	Length µm	Width µm	Volume µm^3
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2121	Oocystis lacustris Chodat	50288	1.42	6.00	3.00	28.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2164	Quadrigula closterioides (Bohl.) Printz	28736	0.63	14.00	2.00	22.00
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2167	Elakatothrix gelatinosa Willen	100576	1.74	11.00	2.00	17.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1200	0.46	13.50	12.00	381.70
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2213	Spirogyra sp.	200	0.43	0.00	0.00	2125.00
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2235	Ankistrodesmus spiralis Lemmermann	7184	0.41	36.00	2.00	56.50
MEL-02	3	MEL - 0203 - PC		15/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4351	Small chrysophyceae	373568	2.09	2.20	2.20	5.60
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4357	Chrysococcus sp.	395120	25.84	5.00	5.00	65.40
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4362	Kephyrion sp.	129312	1.82	3.00	3.00	14.10
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4381	Dinobryon mucronatom Nygaard	7184	0.94	10.00	5.00	130.90
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4383	Dinobryon bavaricum Imhof	7184	1.63	12.00	6.00	226.20
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	200	0.68	0.00	0.00	3390.00
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	129312	29.25	12.00	6.00	226.20
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	1000	3.39	0.00	0.00	3390.00
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4401	Uroglena volvox Ehrenberg	71840	8.13	6.00	6.00	113.10
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4401	Uroglena volvox Ehrenberg	200	2.26	0.00	0.00	11300.00
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4413	Chrysochromulina laurentiana Kling	21552	8.50	9.10	9.10	394.60
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.59	5.80	3.00	27.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	6200	11.27	10.50	21.00	1818.40
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5508	Cyclotella pseudostelligera	7184	3.87	7.00	14.00	538.80
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1800	1.37	81.00	6.00	763.40
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5515	Fragilaria crotonensis Kitton	2400	0.71	71.00	4.00	297.40
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5518	Synedra acus Kutzing	4800	0.46	91.00	2.00	95.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	400	0.98	260.00	6.00	2450.40
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5524	Asterionella formosa Hassall	2200	0.23	100.00	2.00	104.70
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5551	Cyclotella michiganiana Skvortzow	186784	4.58	2.50	5.00	24.50
MEL-02	3	MEL - 0203 - PC		15/Aug/21	5720	Cyclotella bodanica Eulenst.	1000	7.72	17.00	34.00	7717.30
MEL-02	3	MEL - 0203 - PC		15/Aug/21	6554	Rhodomonas minuta Skuja	35920	2.82	9.00	5.00	78.50
MEL-02	3	MEL - 0203 - PC		15/Aug/21	6558	Cryptomonas erosa Ehrenberg	2000	3.60	26.30	14.00	1799.40
MEL-02	3	MEL - 0203 - PC		15/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1200	0.81	19.30	10.00	673.70
MEL-02	3	MEL - 0203 - PC		15/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.35	33.00	14.00	2257.80
MEL-02	3	MEL - 0203 - PC		15/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.32	8.00	4.00	44.70
MEL-02	3	MEL - 0203 - PC		15/Aug/21	7632	Gymnodinium sp.	400	3.68	26.00	26.00	9202.80
MEL-02	3	MEL - 0203 - PC		15/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	2600	9.79	19.30	19.30	3764.20
MEL-02	3	MEL - 0203 - PC		15/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-02	5	MEL - 0205 - PC		15/Aug/21	1014	Chroococcus limneticus Lemmermann	28736	1.04	4.10	4.10	36.10
MEL-02	5	MEL - 0205 - PC		15/Aug/21	1073	Snowella sp	200	0.10	0.00	0.00	500.00
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2112	Sphaerocystis schroeteri Chodat	86208	3.11	4.10	4.10	36.10
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2121	Oocystis lacustris Chodat	21552	0.61	6.00	3.00	28.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.45	10.00	4.00	62.80
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2167	Elakatothrix gelatinosa Willen	50288	0.87	11.00	2.00	17.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2169	Planctonema lauterbornii Schmidle	43104	15.23	18.00	5.00	353.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2182	Euastrum spp.	400	1.23	26.00	26.00	3067.60
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1200	0.46	13.50	12.00	381.70
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
MEL-02	5	MEL - 0205 - PC		15/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-02	5	MEL - 0205 - PC		15/Aug/21	3301	Euglena acus Ehrenberg	200	0.95	91.00	10.00	4764.70
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4351	Small chrysophyceae	193968	1.09	2.20	2.20	5.60
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4355	Chrysochromulina parva Lackey	28736	1.88	5.00	5.00	65.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4357	Chrysococcus sp.	481328	31.48	5.00	5.00	65.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4361	Kephyrion boreale Skuja	14368	1.71	6.10	6.10	118.80
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4362	Kephyrion sp.	21552	0.30	3.00	3.00	14.10
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	400	1.36	0.00	0.00	3390.00
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	193968	43.88	12.00	6.00	226.20
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	600	2.03	0.00	0.00	3390.00
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4401	Uroglena volvox Ehrenberg	272992	30.88	6.00	6.00	113.10
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4413	Chrysochromulina laurentiana Kling	64656	25.51	9.10	9.10	394.60
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	114944	3.14	5.80	3.00	27.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	6400	11.64	10.50	21.00	1818.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5508	Cyclotella pseudostelligera	43104	23.22	7.00	14.00	538.80
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5509	Cyclotella ocellata Pant.	21552	2.25	4.05	8.10	104.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	2200	1.68	81.00	6.00	763.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5515	Fragilaria crotonensis Kitton	4000	1.19	71.00	4.00	297.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5518	Synedra acus Kutzing	3800	0.36	91.00	2.00	95.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5524	Asterionella formosa Hassall	17200	1.80	100.00	2.00	104.70
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5551	Cyclotella michiganiana Skvortzow	122128	2.99	2.50	5.00	24.50
MEL-02	5	MEL - 0205 - PC		15/Aug/21	5720	Cyclotella bodanica Eulenst.	1200	9.26	17.00	34.00	7717.30
MEL-02	5	MEL - 0205 - PC		15/Aug/21	6554	Rhodomonas minuta Skuja	57472	4.51	9.00	5.00	78.50
MEL-02	5	MEL - 0205 - PC		15/Aug/21	6558	Cryptomonas erosa Ehrenberg	2800	5.04	26.30	14.00	1799.40
MEL-02	5	MEL - 0205 - PC		15/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	2200	1.48	19.30	10.00	673.70
MEL-02	5	MEL - 0205 - PC		15/Aug/21	6565	Cryptomonas rostratiformis Skuja	1200	2.71	33.00	14.00	2257.80
MEL-02	5	MEL - 0205 - PC		15/Aug/21	7632	Gymnodinium sp.	800	7.36	26.00	26.00	9202.80
MEL-02	5	MEL - 0205 - PC		15/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
MEL-02	5	MEL - 0205 - PC		15/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	2000	7.53	19.30	19.30	3764.20
MEL-02	5	MEL - 0205 - PC		15/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-02	6	MEL - 0206 - PC		15/Aug/21	1008	Aphanocapsa sp.	200	0.18	0.00	0.00	900.00
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2101	Carteria spp.	7184	4.11	10.30	10.30	572.20

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2113	Pediastrum duplex Meyen	200	0.62	0.00	0.00	3100.00
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2121	Oocystis lacustris Chodat	64656	1.53	5.00	3.00	23.60
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2167	Elakatothrix gelatinosa Willen	93392	1.62	11.00	2.00	17.30
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2182	Euastrum spp.	200	0.37	22.00	22.00	1858.40
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	600	0.23	13.50	12.00	381.70
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2191	Staurodesmus cuspidatus (Brebisson and Ralfs) Teiling	200	0.39	23.00	21.00	1938.90
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
MEL-02	6	MEL - 0206 - PC		15/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4351	Small chrysophyceae	330464	1.85	2.20	2.20	5.60
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4357	Chrysococcus sp.	359200	23.49	5.00	5.00	65.40
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	7184	2.56	8.80	8.80	356.80
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4362	Kephyrion sp.	129312	1.82	3.00	3.00	14.10
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	400	0.39	18.60	10.00	973.90
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4383	Dinobryon bavaricum Imhof	14368	3.25	12.00	6.00	226.20
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	200	0.68	0.00	0.00	3390.00
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	165232	37.38	12.00	6.00	226.20
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	43104	1.18	5.80	3.00	27.30
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4401	Uroglena volvox Ehrenberg	71840	8.13	6.00	6.00	113.10
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4413	Chrysochromulina laurentiana Kling	35920	14.17	9.10	9.10	394.60
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4414	Stichogloea spp.	43104	2.17	6.00	4.00	50.30
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.59	5.80	3.00	27.30
MEL-02	6	MEL - 0206 - PC		15/Aug/21	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3600	6.55	10.50	21.00	1818.40
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5508	Cyclotella pseudostelligera	71840	38.71	7.00	14.00	538.80
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5509	Cyclotella ocellata Pant.	21552	2.25	4.05	8.10	104.30
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5511	Rhizosolenia eriense H.L. Smith	28736	2.44	12.00	3.00	84.80
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	800	0.61	81.00	6.00	763.40
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5515	Fragilaria crotonensis Kitton	6800	2.02	71.00	4.00	297.40
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5518	Synedra acus Kutzing	4600	0.44	91.00	2.00	95.30
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	200	0.45	240.00	6.00	2261.90
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5524	Asterionella formosa Hassall	4400	0.46	100.00	2.00	104.70
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5551	Cyclotella michiganiana Skvortzow	201152	4.93	2.50	5.00	24.50
MEL-02	6	MEL - 0206 - PC		15/Aug/21	5720	Cyclotella bodanica Eulenst.	800	6.17	17.00	34.00	7717.30
MEL-02	6	MEL - 0206 - PC		15/Aug/21	6554	Rhodomonas minuta Skuja	86208	6.77	9.00	5.00	78.50
MEL-02	6	MEL - 0206 - PC		15/Aug/21	6558	Cryptomonas erosa Ehrenberg	1400	2.52	26.30	14.00	1799.40
MEL-02	6	MEL - 0206 - PC		15/Aug/21	6559	Cryptomonas ovata Ehrenberg	200	1.14	41.00	20.00	5724.70
MEL-02	6	MEL - 0206 - PC		15/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	2000	1.35	19.30	10.00	673.70
MEL-02	6	MEL - 0206 - PC		15/Aug/21	6565	Cryptomonas rostratiformis Skuja	200	0.45	33.00	14.00	2257.80
MEL-02	6	MEL - 0206 - PC		15/Aug/21	7632	Gymnodinium sp.	800	7.36	26.00	26.00	9202.80
MEL-02	6	MEL - 0206 - PC		15/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1200	4.52	19.30	19.30	3764.20
MEL-02	6	MEL - 0206 - PC		15/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2105	Chlamydomonas spp.	14368	0.72	6.00	4.00	50.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2112	Sphaerocystis schroeteri Chodat	35920	1.39	4.20	4.20	38.80
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2121	Oocystis lacustris Chodat	100576	2.85	6.00	3.00	28.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2137	Dictyosphaerium simplex Sukja	122128	0.51	2.00	2.00	4.20
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2167	Elakatothrix gelatinosa Willen	43104	0.75	11.00	2.00	17.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2169	Planctonema lauterbornii Schmidle	7184	2.54	18.00	5.00	353.40
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1000	0.38	13.50	12.00	381.70
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2193	Staurodesmus paradoxum Meyen	400	1.13	26.00	24.00	2831.60
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	35920	1.35	6.00	6.00	37.70
MEL-02	8	MEL - 0208 - PC		15/Aug/21	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4351	Small chrysophyceae	272992	1.53	2.20	2.20	5.60
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4355	Chrysochromulina parva Lackey	28736	1.88	5.00	5.00	65.40
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4357	Chrysococcus sp.	244256	15.97	5.00	5.00	65.40
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4362	Kephyrion sp.	150864	2.13	3.00	3.00	14.10
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	143680	32.50	12.00	6.00	226.20
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4390	Dinobryon sociale Ehrenberg	1400	4.75	0.00	0.00	3390.00
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4394	Epiphyxis sp.	14368	1.08	9.00	4.00	75.40
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4401	Uroglena volvox Ehrenberg	50288	5.69	6.00	6.00	113.10
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4413	Chrysochromulina laurentiana Kling	57472	22.68	9.10	9.10	394.60
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	4415	Bicosoeca lacustris Clark	7184	0.28	4.20	4.20	38.80
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	6800	12.37	10.50	21.00	1818.40
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5508	Cyclotella pseudostelligera	57472	30.97	7.00	14.00	538.80
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5511	Rhizosolenia eriense H.L. Smith	21552	1.83	12.00	3.00	84.80
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	6800	5.19	81.00	6.00	763.40
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5518	Synedra acus Kutzing	5200	0.50	91.00	2.00	95.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	200	0.45	240.00	6.00	2261.90
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5524	Asterionella formosa Hassall	10200	1.07	100.00	2.00	104.70
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5551	Cyclotella michiganiana Skvortzow	359200	8.80	2.50	5.00	24.50
MEL-02	8	MEL - 0208 - PC		15/Aug/21	5720	Cyclotella bodanica Eulenst.	1000	7.72	17.00	34.00	7717.30
MEL-02	8	MEL - 0208 - PC		15/Aug/21	6554	Rhodomonas minuta Skuja	57472	4.51	9.00	5.00	78.50
MEL-02	8	MEL - 0208 - PC		15/Aug/21	6558	Cryptomonas erosa Ehrenberg	2400	4.32	26.30	14.00	1799.40
MEL-02	8	MEL - 0208 - PC		15/Aug/21	6559	Cryptomonas ovata Ehrenberg	200	1.14	41.00	20.00	5724.70
MEL-02	8	MEL - 0208 - PC		15/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1400	0.97	19.90	10.00	694.60
MEL-02	8	MEL - 0208 - PC		15/Aug/21	6565	Cryptomonas rostratiformis Skuja	800	1.81	33.00	14.00	2257.80
MEL-02	8	MEL - 0208 - PC		15/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.32	8.00	4.00	44.70
MEL-02	8	MEL - 0208 - PC		15/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-02	8	MEL - 0208 - PC		15/Aug/21	7632	Gymnodinium sp.	1600	14.72	26.00	26.00	9202.80
MEL-02	8	MEL - 0208 - PC		15/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
MEL-02	8	MEL - 0208 - PC		15/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	2000	7.53	19.30	19.30	3764.20
MEL-02	8	MEL - 0208 - PC		15/Aug/21	7641	Peridinium aciculiferum Lemmermann	600	5.43	30.00	24.00	9047.80
MEL-03	2	MEL - 0302 - PC		6/Aug/21	1012	Aphanothece sp.	35920	2.84	0.00	0.00	79.00
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2112	Sphaerocystis schroeteri Chodat	86208	3.11	4.10	4.10	36.10
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2121	Oocystis lacustris Chodat	21552	0.61	6.00	3.00	28.30
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2137	Dictyosphaerium simplex Sukja	14368	0.06	2.00	2.00	4.20
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	7184	0.45	10.00	4.00	62.80
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2167	Elakatothrix gelatinosa Willen	28736	0.50	11.00	2.00	17.30

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2169	Planctonema lauterbornii Schmidle	28736	10.16	18.00	5.00	353.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2182	Euastrum spp.	200	0.37	22.00	22.00	1858.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	200	0.08	13.50	12.00	381.70
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	21552	0.81	6.00	6.00	37.70
MEL-03	2	MEL - 0302 - PC		6/Aug/21	2205	Mougeotia sp.	200	0.41	66.00	6.30	2057.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4351	Small chrysophyceae	380752	2.13	2.20	2.20	5.60
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4352	Large chrysophyceae	79024	14.19	7.00	7.00	179.60
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4357	Chrysococcus sp.	689664	45.10	5.00	5.00	65.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4362	Kephyrion sp.	294544	4.15	3.00	3.00	14.10
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	600	2.03	0.00	0.00	3390.00
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	193968	43.88	12.00	6.00	226.20
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	800	2.71	0.00	0.00	3390.00
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4394	Epiphyxis sp.	28736	2.17	9.00	4.00	75.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4401	Uroglena volvox Ehrenberg	179600	20.31	6.00	6.00	113.10
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4413	Chrysochromulina laurentiana Kling	71840	28.35	9.10	9.10	394.60
MEL-03	2	MEL - 0302 - PC		6/Aug/21	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3200	5.82	10.50	21.00	1818.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5508	Cyclotella pseudostelligera	43104	23.22	7.00	14.00	538.80
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5509	Cyclotella ocellata Pant.	35920	3.75	4.05	8.10	104.30
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	4600	3.51	81.00	6.00	763.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	800	1.07	26.00	14.00	1334.10
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5518	Synedra acus Kutzing	2200	0.21	91.00	2.00	95.30
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5524	Asterionella formosa Hassall	1800	0.19	100.00	2.00	104.70
MEL-03	2	MEL - 0302 - PC		6/Aug/21	5551	Cyclotella michiganiana Skvortzow	186784	4.58	2.50	5.00	24.50
MEL-03	2	MEL - 0302 - PC		6/Aug/21	6554	Rhodomonas minuta Skuja	165232	12.97	9.00	5.00	78.50
MEL-03	2	MEL - 0302 - PC		6/Aug/21	6558	Cryptomonas erosa Ehrenberg	1800	3.24	26.30	14.00	1799.40
MEL-03	2	MEL - 0302 - PC		6/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.90	10.00	694.60
MEL-03	2	MEL - 0302 - PC		6/Aug/21	6565	Cryptomonas rostratiformis Skuja	400	0.90	33.00	14.00	2257.80
MEL-03	2	MEL - 0302 - PC		6/Aug/21	6568	Katablepharis ovalis Skuja	35920	1.61	8.00	4.00	44.70
MEL-03	2	MEL - 0302 - PC		6/Aug/21	7632	Gymnodinium sp.	400	3.68	26.00	26.00	9202.80
MEL-03	2	MEL - 0302 - PC		6/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	400	1.51	19.30	19.30	3764.20
MEL-03	2	MEL - 0302 - PC		6/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2137	Dictyosphaerium simplex Sukja	35920	0.15	2.00	2.00	4.20
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2167	Elakatothrix gelatinosa Willen	86208	1.49	11.00	2.00	17.30
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2169	Planctonema lauterbornii Schmidle	64656	22.85	18.00	5.00	353.40
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	200	0.08	13.50	12.00	381.70
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2206	Botryococcus braunii Kutzing	600	0.86	14.00	14.00	1436.80
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4351	Small chrysophyceae	359200	2.01	2.20	2.20	5.60
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4357	Chrysococcus sp.	380752	24.90	5.00	5.00	65.40
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	14368	6.05	9.30	9.30	421.20
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4362	Kephyrion sp.	143680	2.03	3.00	3.00	14.10
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4372	Mallomonas tonsurata Teiling and Krieger	200	0.29	23.00	11.00	1457.20
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4378	Dinobryon borgei Lemmermann	21552	0.91	9.00	3.00	42.40
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4383	Dinobryon bavaricum Imhof	21552	4.88	12.00	6.00	226.20
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	600	2.03	0.00	0.00	3390.00
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4390	Dinobryon sociale Ehrenberg	122128	27.63	12.00	6.00	226.20
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4390	Dinobryon sociale Ehrenberg	400	1.36	0.00	0.00	3390.00
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4401	Uroglena volvox Ehrenberg	143680	16.25	6.00	6.00	113.10
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4413	Chrysochromulina laurentiana Kling	21552	8.50	9.10	9.10	394.60
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	4437	Pteridomonas sp.	14368	3.42	8.80	8.80	237.90
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	1200	2.18	10.50	21.00	1818.40
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5509	Cyclotella ocellata Pant.	28736	3.00	4.05	8.10	104.30
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5511	Rhizosolenia eriense H.L. Smith	21552	1.83	12.00	3.00	84.80
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5518	Synedra acus Kutzing	2200	0.21	91.00	2.00	95.30
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	200	0.45	240.00	6.00	2261.90
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5524	Asterionella formosa Hassall	200	0.02	100.00	2.00	104.70
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5551	Cyclotella michiganiana Skvortzow	129312	3.17	2.50	5.00	24.50
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	5720	Cyclotella bodanica Eulenst.	400	3.09	17.00	34.00	7717.30
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	6558	Cryptomonas erosa Ehrenberg	1600	2.88	26.30	14.00	1799.40
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	600	0.42	19.90	10.00	694.60
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	6565	Cryptomonas rostratiformis Skuja	400	0.90	33.00	14.00	2257.80
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	7631	Gymnodinium helveticum Penard	400	9.42	50.00	30.00	23561.90
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	7632	Gymnodinium sp.	1000	9.20	26.00	26.00	9202.80
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	7637	Peridinium limbatum (Stokes) Lemmermann	200	28.76	65.00	65.00	143793.30
MEL-03	1	MEL - 0301 - PC*		7/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1400	5.27	19.30	19.30	3764.20
MEL-03	3	MEL - 0303 - PC		7/Aug/21	2112	Sphaerocystis schroeteri Chodat	21552	0.78	4.10	4.10	36.10
MEL-03	3	MEL - 0303 - PC		7/Aug/21	2137	Dictyosphaerium simplex Sukja	43104	0.18	2.00	2.00	4.20
MEL-03	3	MEL - 0303 - PC		7/Aug/21	2167	Elakatothrix gelatinosa Willen	7184	0.12	11.00	2.00	17.30
MEL-03	3	MEL - 0303 - PC		7/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-03	3	MEL - 0303 - PC		7/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1400	0.53	13.50	12.00	381.70
MEL-03	3	MEL - 0303 - PC		7/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-03	3	MEL - 0303 - PC		7/Aug/21	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4351	Small chrysophyceae	193968	1.09	2.20	2.20	5.60
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4357	Chrysococcus sp.	431040	28.19	5.00	5.00	65.40
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4362	Kephyrion sp.	57472	0.81	3.00	3.00	14.10
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	600	0.59	18.90	10.00	989.60
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	1800	6.10	0.00	0.00	3390.00
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4390	Dinobryon sociale Ehrenberg	400	1.36	0.00	0.00	3390.00
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4401	Uroglena volvox Ehrenberg	86208	9.75	6.00	6.00	113.10
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4413	Chrysochromulina laurentiana Kling	7184	2.83	9.10	9.10	394.60
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	$µm^3$
MEL-03	3	MEL - 0303 - PC		7/Aug/21	4436	Dinobryon attenuatum Hill	7184	0.86	9.20	5.00	120.40
MEL-03	3	MEL - 0303 - PC		7/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	2000	3.64	10.50	21.00	1818.40
MEL-03	3	MEL - 0303 - PC		7/Aug/21	5509	Cyclotella ocellata Pant.	43104	4.50	4.05	8.10	104.30
MEL-03	3	MEL - 0303 - PC		7/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1800	1.37	81.00	6.00	763.40
MEL-03	3	MEL - 0303 - PC		7/Aug/21	5518	Synedra acus Kutzing	400	0.04	91.00	2.00	95.30
MEL-03	3	MEL - 0303 - PC		7/Aug/21	5524	Asterionella formosa Hassall	2800	0.29	100.00	2.00	104.70
MEL-03	3	MEL - 0303 - PC		7/Aug/21	5551	Cyclotella michiganiana Skvortzow	86208	2.11	2.50	5.00	24.50
MEL-03	3	MEL - 0303 - PC		7/Aug/21	5720	Cyclotella bodanica Eulenst.	400	3.09	17.00	34.00	7717.30
MEL-03	3	MEL - 0303 - PC		7/Aug/21	6554	Rhodomonas minuta Skuja	43104	3.38	9.00	5.00	78.50
MEL-03	3	MEL - 0303 - PC		7/Aug/21	6558	Cryptomonas erosa Ehrenberg	1200	2.16	26.30	14.00	1799.40
MEL-03	3	MEL - 0303 - PC		7/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	600	0.42	19.90	10.00	694.60
MEL-03	3	MEL - 0303 - PC		7/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.35	33.00	14.00	2257.80
MEL-03	3	MEL - 0303 - PC		7/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.32	8.00	4.00	44.70
MEL-03	3	MEL - 0303 - PC		7/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-03	3	MEL - 0303 - PC		7/Aug/21	7632	Gymnodinium sp.	1600	14.72	26.00	26.00	9202.80
MEL-03	3	MEL - 0303 - PC		7/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	600	2.26	19.30	19.30	3764.20
MEL-03	3	MEL - 0303 - PC		7/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2121	Oocystis lacustris Chodat	7184	0.20	6.00	3.00	28.30
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2169	Planctonema lauterbornii Schmidle	7184	2.54	18.00	5.00	353.40
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	800	0.31	13.50	12.00	381.70
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2205	Mougeotia sp.	600	1.10	44.00	7.30	1841.60
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2206	Botryococcus braunii Kutzing	800	1.15	14.00	14.00	1436.80
MEL-03	4	MEL - 0304 - PC		7/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4351	Small chrysophyceae	129312	0.72	2.20	2.20	5.60
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4357	Chrysococcus sp.	459776	30.07	5.00	5.00	65.40
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4362	Kephyrion sp.	57472	0.81	3.00	3.00	14.10
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	200	0.68	0.00	0.00	3390.00
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	1800	6.10	0.00	0.00	3390.00
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4401	Uroglena volvox Ehrenberg	201152	22.75	6.00	6.00	113.10
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4413	Chrysochromulina laurentiana Kling	43104	17.01	9.10	9.10	394.60
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.20	5.80	3.00	27.30
MEL-03	4	MEL - 0304 - PC		7/Aug/21	4436	Dinobryon attenuatum Hill	7184	0.88	9.40	5.00	123.00
MEL-03	4	MEL - 0304 - PC		7/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	1600	2.91	10.50	21.00	1818.40
MEL-03	4	MEL - 0304 - PC		7/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-03	4	MEL - 0304 - PC		7/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-03	4	MEL - 0304 - PC		7/Aug/21	5518	Synedra acus Kutzing	2200	0.21	91.00	2.00	95.30
MEL-03	4	MEL - 0304 - PC		7/Aug/21	5524	Asterionella formosa Hassall	200	0.02	100.00	2.00	104.70
MEL-03	4	MEL - 0304 - PC		7/Aug/21	5551	Cyclotella michiganiana Skvortzow	107760	2.64	2.50	5.00	24.50
MEL-03	4	MEL - 0304 - PC		7/Aug/21	5720	Cyclotella bodanica Eulenst.	600	4.63	17.00	34.00	7717.30
MEL-03	4	MEL - 0304 - PC		7/Aug/21	6554	Rhodomonas minuta Skuja	129312	10.15	9.00	5.00	78.50
MEL-03	4	MEL - 0304 - PC		7/Aug/21	6558	Cryptomonas erosa Ehrenberg	1400	2.52	26.30	14.00	1799.40
MEL-03	4	MEL - 0304 - PC		7/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.90	10.00	694.60
MEL-03	4	MEL - 0304 - PC		7/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-03	4	MEL - 0304 - PC		7/Aug/21	7632	Gymnodinium sp.	1600	14.72	26.00	26.00	9202.80
MEL-03	4	MEL - 0304 - PC		7/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	600	2.26	19.30	19.30	3764.20
MEL-03	4	MEL - 0304 - PC		7/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	2121	Oocystis lacustris Chodat	14368	0.41	6.00	3.00	28.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	2169	Planctonema lauterbornii Schmidle	21552	7.62	18.00	5.00	353.40
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	400	0.15	13.50	12.00	381.70
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	28736	1.08	6.00	6.00	37.70
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4351	Small chrysophyceae	172416	0.97	2.20	2.20	5.60
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4357	Chrysococcus sp.	416672	27.25	5.00	5.00	65.40
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4362	Kephyrion sp.	28736	0.41	3.00	3.00	14.10
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4388	Dinobryon sertularia Ehrenberg	14368	3.25	12.00	6.00	226.20
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4388	Dinobryon sertularia Ehrenberg	1400	4.75	0.00	0.00	3390.00
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4390	Dinobryon sociale Ehrenberg	400	1.36	0.00	0.00	3390.00
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	14368	0.39	5.80	3.00	27.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4401	Uroglena volvox Ehrenberg	280176	31.69	6.00	6.00	113.10
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4413	Chrysochromulina laurentiana Kling	28736	11.34	9.10	9.10	394.60
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	28736	0.78	5.80	3.00	27.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	1200	2.18	10.50	21.00	1818.40
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5509	Cyclotella ocellata Pant.	14368	1.50	4.05	8.10	104.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5511	Rhizosolenia eriense H.L. Smith	14368	1.22	12.00	3.00	84.80
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	800	1.07	26.00	14.00	1334.10
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5518	Synedra acus Kutzing	3600	0.34	91.00	2.00	95.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5524	Asterionella formosa Hassall	800	0.08	100.00	2.00	104.70
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5551	Cyclotella michiganiana Skvortzow	122128	2.99	2.50	5.00	24.50
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	5720	Cyclotella bodanica Eulenst.	800	6.17	17.00	34.00	7717.30
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	6554	Rhodomonas minuta Skuja	100576	7.90	9.00	5.00	78.50
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	6558	Cryptomonas erosa Ehrenberg	1000	1.80	26.30	14.00	1799.40
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	800	0.56	19.90	10.00	694.60
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	7632	Gymnodinium sp.	1000	9.20	26.00	26.00	9202.80
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	600	2.26	19.30	19.30	3764.20
MEL-03	4R	MEL - 0304R - PC	Lab Dup	7/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2105	Chlamydomonas spp.	7184	0.36	6.00	4.00	50.30
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2112	Sphaerocystis schroeteri Chodat	28736	1.04	4.10	4.10	36.10
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2121	Oocystis lacustris Chodat	21552	0.61	6.00	3.00	28.30
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2169	Planctonema lauterbornii Schmidle	7184	2.54	18.00	5.00	353.40
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2178	Cosmarium sp.	1200	1.68	20.00	20.00	1396.30
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1200	0.46	13.50	12.00	381.70
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2191	Staurodesmus cuspidatus (Brebisson and Ralfs) Teiling	200	0.37	23.00	20.00	1846.60
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
MEL-03	5	MEL - 0305 - PC		7/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4351	Small chrysophyceae	201152	1.13	2.20	2.20	5.60

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4357	Chrysococcus sp.	323280	21.14	5.00	5.00	65.40
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	14368	5.30	8.90	8.90	369.10
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4362	Kephyrion sp.	143680	2.03	3.00	3.00	14.10
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4375	Synura sphagnicola Korschikow	7184	5.01	11.00	11.00	696.90
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	35920	8.13	12.00	6.00	226.20
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4388	Dinobryon sertularia Ehrenberg	2400	8.14	0.00	0.00	3390.00
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4390	Dinobryon sociale Ehrenberg	100576	22.75	12.00	6.00	226.20
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4390	Dinobryon sociale Ehrenberg	2400	8.14	0.00	0.00	3390.00
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4401	Uroglena volvox Ehrenberg	64656	7.31	6.00	6.00	113.10
MEL-03	5	MEL - 0305 - PC		7/Aug/21	4413	Chrysochromulina laurentiana Kling	43104	17.01	9.10	9.10	394.60
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3800	6.91	10.50	21.00	1818.40
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5508	Cyclotella pseudostelligera	21552	11.61	7.00	14.00	538.80
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	600	0.46	81.00	6.00	763.40
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	1600	2.13	26.00	14.00	1334.10
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5518	Synedra acus Kutzing	4000	0.38	91.00	2.00	95.30
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5524	Asterionella formosa Hassall	1000	0.10	100.00	2.00	104.70
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5551	Cyclotella michiganiana Skvortzow	143680	3.52	2.50	5.00	24.50
MEL-03	5	MEL - 0305 - PC		7/Aug/21	5720	Cyclotella bodanica Eulenst.	600	4.23	16.50	33.00	7056.20
MEL-03	5	MEL - 0305 - PC		7/Aug/21	6554	Rhodomonas minuta Skuja	57472	4.51	9.00	5.00	78.50
MEL-03	5	MEL - 0305 - PC		7/Aug/21	6558	Cryptomonas erosa Ehrenberg	1600	2.88	26.30	14.00	1799.40
MEL-03	5	MEL - 0305 - PC		7/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.28	19.90	10.00	694.60
MEL-03	5	MEL - 0305 - PC		7/Aug/21	7631	Gymnodinium helveticum Penard	400	9.42	50.00	30.00	23561.90
MEL-03	5	MEL - 0305 - PC		7/Aug/21	7632	Gymnodinium sp.	400	3.68	26.00	26.00	9202.80
MEL-03	5	MEL - 0305 - PC		7/Aug/21	7637	Peridinium limbatum (Stokes) Lemmermann	200	28.76	65.00	65.00	143793.30
MEL-03	5	MEL - 0305 - PC		7/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1000	3.76	19.30	19.30	3764.20
MEL-04	1	MEL - 0401 - PC		6/Aug/21	1073	Snowella sp	400	0.20	0.00	0.00	500.00
MEL-04	1	MEL - 0401 - PC		6/Aug/21	2137	Dictyosphaerium simplex Sukja	14368	0.06	2.00	2.00	4.20
MEL-04	1	MEL - 0401 - PC		6/Aug/21	2167	Elakatothrix gelatinosa Willen	100576	1.74	11.00	2.00	17.30
MEL-04	1	MEL - 0401 - PC		6/Aug/21	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
MEL-04	1	MEL - 0401 - PC		6/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	800	0.31	13.50	12.00	381.70
MEL-04	1	MEL - 0401 - PC		6/Aug/21	2193	Staurodesmus paradoxum Meyen	400	1.13	26.00	24.00	2831.60
MEL-04	1	MEL - 0401 - PC		6/Aug/21	2195	Staurodesmus bullardii G.M. Smith	200	0.49	24.60	23.00	2429.30
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4351	Small chrysophyceae	186784	1.05	2.20	2.20	5.60
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4357	Chrysococcus sp.	352016	23.02	5.00	5.00	65.40
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4362	Kephyrion sp.	100576	1.42	3.00	3.00	14.10
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	43104	9.75	12.00	6.00	226.20
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	800	2.71	0.00	0.00	3390.00
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	179600	40.63	12.00	6.00	226.20
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	600	2.03	0.00	0.00	3390.00
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4401	Uroglena volvox Ehrenberg	100576	11.38	6.00	6.00	113.10
MEL-04	1	MEL - 0401 - PC		6/Aug/21	4413	Chrysochromulina laurentiana Kling	57472	22.68	9.10	9.10	394.60
MEL-04	1	MEL - 0401 - PC		6/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	800	1.45	10.50	21.00	1818.40
MEL-04	1	MEL - 0401 - PC		6/Aug/21	5511	Rhizosolenia eriense H.L. Smith	7184	0.61	12.00	3.00	84.80
MEL-04	1	MEL - 0401 - PC		6/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	5800	7.74	26.00	14.00	1334.10
MEL-04	1	MEL - 0401 - PC		6/Aug/21	5518	Synedra acus Kutzing	200	0.02	91.00	2.00	95.30
MEL-04	1	MEL - 0401 - PC		6/Aug/21	5551	Cyclotella michiganiana Skvortzow	86208	2.11	2.50	5.00	24.50
MEL-04	1	MEL - 0401 - PC		6/Aug/21	5720	Cyclotella bodanica Eulenst.	400	2.82	16.50	33.00	7056.20
MEL-04	1	MEL - 0401 - PC		6/Aug/21	6554	Rhodomonas minuta Skuja	21552	1.69	9.00	5.00	78.50
MEL-04	1	MEL - 0401 - PC		6/Aug/21	6558	Cryptomonas erosa Ehrenberg	1800	3.24	26.30	14.00	1799.40
MEL-04	1	MEL - 0401 - PC		6/Aug/21	6559	Cryptomonas ovata Ehrenberg	400	2.23	40.00	20.00	5585.10
MEL-04	1	MEL - 0401 - PC		6/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	200	0.14	19.90	10.00	694.60
MEL-04	1	MEL - 0401 - PC		6/Aug/21	7632	Gymnodinium sp.	1000	9.20	26.00	26.00	9202.80
MEL-04	1	MEL - 0401 - PC		6/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	600	2.26	19.30	19.30	3764.20
MEL-04	1	MEL - 0401 - PC		6/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-04	2	MEL - 0402 - PC		6/Aug/21	2121	Oocystis lacustris Chodat	7184	0.20	6.00	3.00	28.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	2137	Dictyosphaerium simplex Sukja	244256	1.03	2.00	2.00	4.20
MEL-04	2	MEL - 0402 - PC		6/Aug/21	2167	Elakatothrix gelatinosa Willen	71840	1.24	11.00	2.00	17.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1000	0.38	13.50	12.00	381.70
MEL-04	2	MEL - 0402 - PC		6/Aug/21	2247	Oocystis gigas Archer	600	1.45	18.00	16.00	2412.70
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4351	Small chrysophyceae	86208	0.48	2.20	2.20	5.60
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4357	Chrysococcus sp.	265808	17.38	5.00	5.00	65.40
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	7184	2.56	8.80	8.80	356.80
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4362	Kephyrion sp.	71840	1.01	3.00	3.00	14.10
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4378	Dinobryon borgei Lemmermann	28736	1.22	9.00	3.00	42.40
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	86208	19.50	12.00	6.00	226.20
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	2000	6.78	0.00	0.00	3390.00
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	100576	22.75	12.00	6.00	226.20
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	600	2.03	0.00	0.00	3390.00
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	43104	1.18	5.80	3.00	27.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4401	Uroglena volvox Ehrenberg	57472	6.50	6.00	6.00	113.10
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4413	Chrysochromulina laurentiana Kling	21552	8.50	9.10	9.10	394.60
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4414	Stichogloea spp.	21552	1.08	6.00	4.00	50.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	7184	0.20	5.80	3.00	27.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	2000	3.64	10.50	21.00	1818.40
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5509	Cyclotella ocellata Pant.	21552	2.25	4.05	8.10	104.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5511	Rhizosolenia eriense H.L. Smith	21552	1.83	12.00	3.00	84.80
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1800	1.37	81.00	6.00	763.40
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5518	Synedra acus Kutzing	1800	0.17	91.00	2.00	95.30
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5524	Asterionella formosa Hassall	1800	0.19	100.00	2.00	104.70
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5551	Cyclotella michiganiana Skvortzow	150864	3.70	2.50	5.00	24.50
MEL-04	2	MEL - 0402 - PC		6/Aug/21	5720	Cyclotella bodanica Eulenst.	400	2.82	16.50	33.00	7056.20
MEL-04	2	MEL - 0402 - PC		6/Aug/21	6554	Rhodomonas minuta Skuja	28736	2.26	9.00	5.00	78.50
MEL-04	2	MEL - 0402 - PC		6/Aug/21	6558	Cryptomonas erosa Ehrenberg	1800	3.24	26.30	14.00	1799.40
MEL-04	2	MEL - 0402 - PC		6/Aug/21	6559	Cryptomonas ovata Ehrenberg	200	1.12	40.00	20.00	5585.10
MEL-04	2	MEL - 0402 - PC		6/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	400	0.28	19.90	10.00	694.60
MEL-04	2	MEL - 0402 - PC		6/Aug/21	6565	Cryptomonas rostratiformis Skuja	200	0.45	33.00	14.00	2257.80
MEL-04	2	MEL - 0402 - PC		6/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.32	8.00	4.00	44.70
MEL-04	2	MEL - 0402 - PC		6/Aug/21	7632	Gymnodinium sp.	1000	9.20	26.00	26.00	9202.80
MEL-04	2	MEL - 0402 - PC		6/Aug/21	7641	Peridinium aciculiferum Lemmermann	400	3.62	30.00	24.00	9047.80
MEL-04	3	MEL - 0403 - PC		6/Aug/21	1044	Anabaena planctonica Brunnthaler	200	2.31	425.00	7.20	11535.90

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2112	Sphaerocystis schroeteri Chodat	7184	0.26	4.10	4.10	36.10
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2121	Oocystis lacustris Chodat	14368	0.41	6.00	3.00	28.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2130	Scenedesmus quadricauda (Turp.) Brebisson	28736	0.86	7.90	3.30	30.00
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2137	Dictyosphaerium simplex Sukja	114944	0.48	2.00	2.00	4.20
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2167	Elakatothrix gelatinosa Willen	28736	0.50	11.00	2.00	17.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2182	Euastrum spp.	200	2.23	40.00	40.00	11170.10
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1000	0.38	13.50	12.00	381.70
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2206	Botryococcus braunii Kutzing	800	1.15	14.00	14.00	1436.80
MEL-04	3	MEL - 0403 - PC		6/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4351	Small chrysophyceae	215520	1.21	2.20	2.20	5.60
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4357	Chrysococcus sp.	287360	18.79	5.00	5.00	65.40
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4362	Kephyrion sp.	847712	11.95	3.00	3.00	14.10
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	71840	16.25	12.00	6.00	226.20
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	2400	8.14	0.00	0.00	3390.00
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	800	2.71	0.00	0.00	3390.00
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	7184	0.20	5.80	3.00	27.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4401	Uroglena volvox Ehrenberg	93392	10.56	6.00	6.00	113.10
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4403	Chrysosphaerella longispina Lauterborn	200	2.65	0.00	0.00	13250.00
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4413	Chrysochromulina laurentiana Kling	71840	28.35	9.10	9.10	394.60
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4414	Stichogloea spp.	14368	0.72	6.00	4.00	50.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	21552	0.59	5.80	3.00	27.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	2800	5.09	10.50	21.00	1818.40
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5508	Cyclotella pseudostelligera	21552	11.61	7.00	14.00	538.80
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5509	Cyclotella ocellata Pant.	28736	3.00	4.05	8.10	104.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5511	Rhizosolenia eriense H.L. Smith	7184	0.61	12.00	3.00	84.80
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	1200	0.92	81.00	6.00	763.40
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5518	Synedra acus Kutzing	2200	0.21	91.00	2.00	95.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5524	Asterionella formosa Hassall	3800	0.40	100.00	2.00	104.70
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5551	Cyclotella michiganiana Skvortzow	114944	2.82	2.50	5.00	24.50
MEL-04	3	MEL - 0403 - PC		6/Aug/21	5720	Cyclotella bodanica Eulenst.	200	1.54	17.00	34.00	7717.30
MEL-04	3	MEL - 0403 - PC		6/Aug/21	6554	Rhodomonas minuta Skuja	7184	0.56	9.00	5.00	78.50
MEL-04	3	MEL - 0403 - PC		6/Aug/21	6558	Cryptomonas erosa Ehrenberg	1200	2.16	26.30	14.00	1799.40
MEL-04	3	MEL - 0403 - PC		6/Aug/21	6565	Cryptomonas rostratiformis Skuja	200	0.45	33.00	14.00	2257.80
MEL-04	3	MEL - 0403 - PC		6/Aug/21	7632	Gymnodinium sp.	2000	18.41	26.00	26.00	9202.80
MEL-04	3	MEL - 0403 - PC		6/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	400	1.51	19.30	19.30	3764.20
MEL-04	3	MEL - 0403 - PC		6/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-04	4	MEL - 0404 - PC		6/Aug/21	1012	Aphanothece sp.	7184	0.52	0.00	0.00	72.00
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2112	Sphaerocystis schroeteri Chodat	86208	3.11	4.10	4.10	36.10
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2121	Oocystis lacustris Chodat	35920	1.02	6.00	3.00	28.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2137	Dictyosphaerium simplex Sukja	21552	0.09	2.00	2.00	4.20
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2164	Quadrigula closterioides (Bohl.) Printz	28736	0.63	14.00	2.00	22.00
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2167	Elakatothrix gelatinosa Willen	64656	1.12	11.00	2.00	17.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2169	Planctonema lauterbornii Schmidle	57472	20.31	18.00	5.00	353.40
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2182	Euastrum spp.	400	0.74	22.00	22.00	1858.40
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1200	0.46	13.50	12.00	381.70
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2195	Staurodesmus bullardii G.M. Smith	200	0.52	25.50	23.00	2610.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
MEL-04	4	MEL - 0404 - PC		6/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4351	Small chrysophyceae	359200	2.01	2.20	2.20	5.60
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4357	Chrysococcus sp.	438224	28.66	5.00	5.00	65.40
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	7184	2.56	8.80	8.80	356.80
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4362	Kephyrion sp.	129312	1.82	3.00	3.00	14.10
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	400	0.39	18.60	10.00	973.90
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4383	Dinobryon bavaricum Imhof	28736	6.50	12.00	6.00	226.20
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	71840	16.25	12.00	6.00	226.20
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	3400	11.53	0.00	0.00	3390.00
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	71840	16.25	12.00	6.00	226.20
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	800	2.71	0.00	0.00	3390.00
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4401	Uroglena volvox Ehrenberg	71840	8.13	6.00	6.00	113.10
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4413	Chrysochromulina laurentiana Kling	43104	17.01	9.10	9.10	394.60
MEL-04	4	MEL - 0404 - PC		6/Aug/21	4418	Salpingoeca frequentissima (Zach.) Lemmermann	35920	0.98	5.80	3.00	27.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	1800	3.27	10.50	21.00	1818.40
MEL-04	4	MEL - 0404 - PC		6/Aug/21	5509	Cyclotella ocellata Pant.	35920	3.75	4.05	8.10	104.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	5511	Rhizosolenia eriense H.L. Smith	7184	0.61	12.00	3.00	84.80
MEL-04	4	MEL - 0404 - PC		6/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	200	0.15	81.00	6.00	763.40
MEL-04	4	MEL - 0404 - PC		6/Aug/21	5518	Synedra acus Kutzing	3000	0.29	91.00	2.00	95.30
MEL-04	4	MEL - 0404 - PC		6/Aug/21	5551	Cyclotella michiganiana Skvortzow	129312	3.17	2.50	5.00	24.50
MEL-04	4	MEL - 0404 - PC		6/Aug/21	5720	Cyclotella bodanica Eulenst.	200	1.41	16.50	33.00	7056.20
MEL-04	4	MEL - 0404 - PC		6/Aug/21	6554	Rhodomonas minuta Skuja	21552	1.69	9.00	5.00	78.50
MEL-04	4	MEL - 0404 - PC		6/Aug/21	6558	Cryptomonas erosa Ehrenberg	2000	3.60	26.30	14.00	1799.40
MEL-04	4	MEL - 0404 - PC		6/Aug/21	6565	Cryptomonas rostratiformis Skuja	1000	2.26	33.00	14.00	2257.80
MEL-04	4	MEL - 0404 - PC		6/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-04	4	MEL - 0404 - PC		6/Aug/21	7632	Gymnodinium sp.	600	5.52	26.00	26.00	9202.80
MEL-04	4	MEL - 0404 - PC		6/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	400	1.51	19.30	19.30	3764.20
MEL-04	4	MEL - 0404 - PC		6/Aug/21	7641	Peridinium aciculiferum Lemmermann	400	3.62	30.00	24.00	9047.80
MEL-04	5	MEL - 0405 - PC		6/Aug/21	1073	Snowella sp	200	0.10	0.00	0.00	500.00
MEL-04	5	MEL - 0405 - PC		6/Aug/21	2112	Sphaerocystis schroeteri Chodat	100576	3.63	4.10	4.10	36.10
MEL-04	5	MEL - 0405 - PC		6/Aug/21	2137	Dictyosphaerium simplex Sukja	122128	0.51	2.00	2.00	4.20
MEL-04	5	MEL - 0405 - PC		6/Aug/21	2167	Elakatothrix gelatinosa Willen	43104	0.75	11.00	2.00	17.30
MEL-04	5	MEL - 0405 - PC		6/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-04	5	MEL - 0405 - PC		6/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1000	0.38	13.50	12.00	381.70
MEL-04	5	MEL - 0405 - PC		6/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-04	5	MEL - 0405 - PC		6/Aug/21	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4351	Small chrysophyceae	186784	1.05	2.20	2.20	5.60
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4352	Large chrysophyceae	35920	6.45	7.00	7.00	179.60
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4355	Chrysochromulina parva Lackey	21552	1.41	5.00	5.00	65.40

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	μm^3
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4357	Chrysococcus sp.	387936	25.37	5.00	5.00	65.40
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4362	Kephyrion sp.	71840	1.01	3.00	3.00	14.10
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4388	Dinobryon sertularia Ehrenberg	1400	4.75	0.00	0.00	3390.00
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	136496	30.88	12.00	6.00	226.20
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4390	Dinobryon sociale Ehrenberg	600	2.03	0.00	0.00	3390.00
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	50288	1.37	5.80	3.00	27.30
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4401	Uroglena volvox Ehrenberg	50288	5.69	6.00	6.00	113.10
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4413	Chrysochromulina laurentiana Kling	7184	2.83	9.10	9.10	394.60
MEL-04	5	MEL - 0405 - PC		6/Aug/21	4414	Stichogloea spp.	21552	1.08	6.00	4.00	50.30
MEL-04	5	MEL - 0405 - PC		6/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3400	6.18	10.50	21.00	1818.40
MEL-04	5	MEL - 0405 - PC		6/Aug/21	5509	Cyclotella ocellata Pant.	21552	2.25	4.05	8.10	104.30
MEL-04	5	MEL - 0405 - PC		6/Aug/21	5518	Synedra acus Kutzing	1600	0.15	91.00	2.00	95.30
MEL-04	5	MEL - 0405 - PC		6/Aug/21	5551	Cyclotella michiganiana Skvortzow	100576	2.46	2.50	5.00	24.50
MEL-04	5	MEL - 0405 - PC		6/Aug/21	5720	Cyclotella bodanica Eulenst.	600	4.23	16.50	33.00	7056.20
MEL-04	5	MEL - 0405 - PC		6/Aug/21	6554	Rhodomonas minuta Skuja	28736	2.26	9.00	5.00	78.50
MEL-04	5	MEL - 0405 - PC		6/Aug/21	6558	Cryptomonas erosa Ehrenberg	3000	5.40	26.30	14.00	1799.40
MEL-04	5	MEL - 0405 - PC		6/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1200	0.83	19.90	10.00	694.60
MEL-04	5	MEL - 0405 - PC		6/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.35	33.00	14.00	2257.80
MEL-04	5	MEL - 0405 - PC		6/Aug/21	7632	Gymnodinium sp.	1600	14.72	26.00	26.00	9202.80
MEL-04	5	MEL - 0405 - PC		6/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	400	1.51	19.30	19.30	3764.20
MEL-04	5	MEL - 0405 - PC		6/Aug/21	7641	Peridinium aciculiferum Lemmermann	400	3.62	30.00	24.00	9047.80
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2112	Sphaerocystis schroeteri Chodat	158048	5.71	4.10	4.10	36.10
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2137	Dictyosphaerium simplex Sukja	86208	0.36	2.00	2.00	4.20
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2167	Elakatothrix gelatinosa Willen	28736	0.50	11.00	2.00	17.30
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	600	0.23	13.60	12.00	387.40
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	2235	Ankistrodesmus spiralis Lemmermann	7184	0.41	36.00	2.00	56.50
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4351	Small chrysophyceae	251440	1.41	2.20	2.20	5.60
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4357	Chrysococcus sp.	330464	21.61	5.00	5.00	65.40
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	7184	2.00	8.10	8.10	278.30
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4362	Kephyrion sp.	107760	1.52	3.00	3.00	14.10
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4388	Dinobryon sertularia Ehrenberg	1800	6.10	0.00	0.00	3390.00
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4390	Dinobryon sociale Ehrenberg	186784	42.25	12.00	6.00	226.20
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4390	Dinobryon sociale Ehrenberg	200	0.68	0.00	0.00	3390.00
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	35920	0.98	5.80	3.00	27.30
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4401	Uroglena volvox Ehrenberg	79024	8.94	6.00	6.00	113.10
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4413	Chrysochromulina laurentiana Kling	21552	8.50	9.10	9.10	394.60
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3400	6.18	10.50	21.00	1818.40
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	5509	Cyclotella ocellata Pant.	14368	1.50	4.05	8.10	104.30
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	800	0.61	81.00	6.00	763.40
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	5518	Synedra acus Kutzing	1200	0.11	91.00	2.00	95.30
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	5551	Cyclotella michiganiana Skvortzow	64656	1.58	2.50	5.00	24.50
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	5720	Cyclotella bodanica Eulenst.	800	5.64	16.50	33.00	7056.20
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	6554	Rhodomonas minuta Skuja	14368	1.13	9.00	5.00	78.50
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	6558	Cryptomonas erosa Ehrenberg	4000	7.20	26.30	14.00	1799.40
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1000	0.69	19.90	10.00	694.60
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	6565	Cryptomonas rostratiformis Skuja	400	0.90	33.00	14.00	2257.80
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	7632	Gymnodinium sp.	1200	11.04	26.00	26.00	9202.80
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	200	0.75	19.30	19.30	3764.20
MEL-04	5R	MEL - 0405R - PC	Lab Dup	6/Aug/21	7641	Peridinium aciculiferum Lemmermann	800	7.24	30.00	24.00	9047.80
MEL-05	1	MEL - 0501 - PC		10/Aug/21	2112	Sphaerocystis schroeteri Chodat	86208	3.11	4.10	4.10	36.10
MEL-05	1	MEL - 0501 - PC		10/Aug/21	2121	Oocystis lacustris Chodat	86208	2.44	6.00	3.00	28.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	2137	Dictyosphaerium simplex Sukja	136496	0.57	2.00	2.00	4.20
MEL-05	1	MEL - 0501 - PC		10/Aug/21	2167	Elakatothrix gelatinosa Willen	7184	0.12	11.00	2.00	17.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
MEL-05	1	MEL - 0501 - PC		10/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4351	Small chrysophyceae	229888	1.29	2.20	2.20	5.60
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4357	Chrysococcus sp.	93392	6.11	5.00	5.00	65.40
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4362	Kephyrion sp.	143680	2.03	3.00	3.00	14.10
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	800	0.78	18.60	10.00	973.90
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4378	Dinobryon borgei Lemmermann	35920	1.52	9.00	3.00	42.40
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4384	Dinobryon bavaricum v vanhoeffenii (Bachmann) Krieger	200	0.63	0.00	0.00	3125.00
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	28736	6.50	12.00	6.00	226.20
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	215520	48.75	12.00	6.00	226.20
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	2000	6.78	0.00	0.00	3390.00
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	7184	0.20	5.80	3.00	27.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4401	Uroglena volvox Ehrenberg	7184	0.81	6.00	6.00	113.10
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4403	Chrysosphaerella longispina Lauterborn	200	2.03	0.00	0.00	10125.00
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4411	Bitrichia chodatii (Reverdin) Chodat	7184	0.36	6.00	4.00	50.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4413	Chrysochromulina laurentiana Kling	21552	8.50	9.10	9.10	394.60
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	4437	Pteridomonas sp.	7184	1.59	8.60	8.60	222.00
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3800	6.91	10.50	21.00	1818.40
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5508	Cyclotella pseudostelligera	28736	15.48	7.00	14.00	538.80
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5509	Cyclotella ocellata Pant.	35920	3.75	4.05	8.10	104.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	28736	21.94	81.00	6.00	763.40
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5518	Synedra acus Kutzing	1400	0.13	91.00	2.00	95.30
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5523	Synedra ulna (Nitzsch) Ehrenberg	200	0.45	240.00	6.00	2261.90
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5524	Asterionella formosa Hassall	1400	0.15	100.00	2.00	104.70
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5551	Cyclotella michiganiana Skvortzow	86208	2.11	2.50	5.00	24.50
MEL-05	1	MEL - 0501 - PC		10/Aug/21	5720	Cyclotella bodanica Eulenst.	600	4.23	16.50	33.00	7056.20
MEL-05	1	MEL - 0501 - PC		10/Aug/21	6558	Cryptomonas erosa Ehrenberg	800	1.44	26.30	14.00	1799.40
MEL-05	1	MEL - 0501 - PC		10/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1000	0.69	19.90	10.00	694.60

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-05	1	MEL - 0501 - PC		10/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.35	33.00	14.00	2257.80
MEL-05	1	MEL - 0501 - PC		10/Aug/21	6568	Katablepharis ovalis Skuja	21552	0.96	8.00	4.00	44.70
MEL-05	1	MEL - 0501 - PC		10/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-05	1	MEL - 0501 - PC		10/Aug/21	7632	Gymnodinium sp.	1600	14.72	26.00	26.00	9202.80
MEL-05	1	MEL - 0501 - PC		10/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1400	5.27	19.30	19.30	3764.20
MEL-05	2	MEL - 0502 - PC		10/Aug/21	1012	Aphanothece sp.	7184	0.52	0.00	0.00	72.00
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2112	Sphaerocystis schroeteri Chodat	43104	1.56	4.10	4.10	36.10
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2121	Oocystis lacustris Chodat	79024	2.24	6.00	3.00	28.30
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2137	Dictyosphaerium simplex Sukja	21552	0.09	2.00	2.00	4.20
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2167	Elakatothrix gelatinosa Willen	7184	0.12	11.00	2.00	17.30
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2178	Cosmarium sp.	400	0.56	20.00	20.00	1396.30
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	800	0.31	13.50	12.00	381.70
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
MEL-05	2	MEL - 0502 - PC		10/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4351	Small chrysophyceae	229888	1.29	2.20	2.20	5.60
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4355	Chrysochromulina parva Lackey	57472	3.76	5.00	5.00	65.40
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4357	Chrysococcus sp.	193968	12.69	5.00	5.00	65.40
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4362	Kephyrion sp.	100576	1.42	3.00	3.00	14.10
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	400	0.39	18.60	10.00	973.90
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	600	2.03	0.00	0.00	3390.00
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	215520	48.75	12.00	6.00	226.20
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	1000	3.39	0.00	0.00	3390.00
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4401	Uroglena volvox Ehrenberg	28736	3.25	6.00	6.00	113.10
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4413	Chrysochromulina laurentiana Kling	7184	2.83	9.10	9.10	394.60
MEL-05	2	MEL - 0502 - PC		10/Aug/21	4437	Pteridomonas sp.	7184	1.71	8.80	8.80	237.90
MEL-05	2	MEL - 0502 - PC		10/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3400	6.18	10.50	21.00	1818.40
MEL-05	2	MEL - 0502 - PC		10/Aug/21	5509	Cyclotella ocellata Pant.	114944	11.99	4.05	8.10	104.30
MEL-05	2	MEL - 0502 - PC		10/Aug/21	5518	Synedra acus Kutzing	1200	0.11	91.00	2.00	95.30
MEL-05	2	MEL - 0502 - PC		10/Aug/21	5524	Asterionella formosa Hassall	200	0.02	100.00	2.00	104.70
MEL-05	2	MEL - 0502 - PC		10/Aug/21	5551	Cyclotella michiganiana Skvortzow	179600	4.40	2.50	5.00	24.50
MEL-05	2	MEL - 0502 - PC		10/Aug/21	5720	Cyclotella bodanica Eulenst.	1400	9.88	16.50	33.00	7056.20
MEL-05	2	MEL - 0502 - PC		10/Aug/21	6554	Rhodomonas minuta Skuja	7184	0.56	9.00	5.00	78.50
MEL-05	2	MEL - 0502 - PC		10/Aug/21	6558	Cryptomonas erosa Ehrenberg	1400	2.52	26.30	14.00	1799.40
MEL-05	2	MEL - 0502 - PC		10/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1600	1.11	19.90	10.00	694.60
MEL-05	2	MEL - 0502 - PC		10/Aug/21	6565	Cryptomonas rostratiformis Skuja	400	0.90	33.00	14.00	2257.80
MEL-05	2	MEL - 0502 - PC		10/Aug/21	7632	Gymnodinium sp.	1400	12.88	26.00	26.00	9202.80
MEL-05	2	MEL - 0502 - PC		10/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
MEL-05	2	MEL - 0502 - PC		10/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1000	3.76	19.30	19.30	3764.20
MEL-05	3	MEL - 0503 - PC		10/Aug/21	1073	Snowella sp	200	0.10	0.00	0.00	500.00
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2112	Sphaerocystis schroeteri Chodat	57472	2.07	4.10	4.10	36.10
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2113	Pediastrum duplex Meyen	200	0.55	0.00	0.00	2725.00
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2137	Dictyosphaerium simplex Sukja	114944	0.48	2.00	2.00	4.20
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2167	Elakatothrix gelatinosa Willen	35920	0.62	11.00	2.00	17.30
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2178	Cosmarium sp.	600	0.84	20.00	20.00	1396.30
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	2400	0.92	13.50	12.00	381.70
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-05	3	MEL - 0503 - PC		10/Aug/21	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4351	Small chrysophyceae	201152	1.13	2.20	2.20	5.60
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4355	Chrysochromulina parva Lackey	28736	1.88	5.00	5.00	65.40
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4357	Chrysococcus sp.	215520	14.10	5.00	5.00	65.40
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4362	Kephyrion sp.	93392	1.32	3.00	3.00	14.10
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4363	Spiniferomonas serrata	21552	2.56	6.10	6.10	118.80
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	400	0.39	18.60	10.00	973.90
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4378	Dinobryon borgei Lemmermann	28736	1.22	9.00	3.00	42.40
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	800	2.71	0.00	0.00	3390.00
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	136496	30.88	12.00	6.00	226.20
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	800	2.71	0.00	0.00	3390.00
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4401	Uroglena volvox Ehrenberg	114944	13.00	6.00	6.00	113.10
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4413	Chrysochromulina laurentiana Kling	43104	17.01	9.10	9.10	394.60
MEL-05	3	MEL - 0503 - PC		10/Aug/21	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	4400	8.00	10.50	21.00	1818.40
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5508	Cyclotella pseudostelligera	7184	3.87	7.00	14.00	538.80
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5509	Cyclotella ocellata Pant.	21552	2.25	4.05	8.10	104.30
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5515	Fragilaria crotonensis Kitton	3000	0.89	71.00	4.00	297.40
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5518	Synedra acus Kutzing	1000	0.10	91.00	2.00	95.30
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5524	Asterionella formosa Hassall	1600	0.17	100.00	2.00	104.70
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5551	Cyclotella michiganiana Skvortzow	57472	1.41	2.50	5.00	24.50
MEL-05	3	MEL - 0503 - PC		10/Aug/21	5720	Cyclotella bodanica Eulenst.	200	1.50	17.50	33.00	7483.90
MEL-05	3	MEL - 0503 - PC		10/Aug/21	6554	Rhodomonas minuta Skuja	64656	5.08	9.00	5.00	78.50
MEL-05	3	MEL - 0503 - PC		10/Aug/21	6558	Cryptomonas erosa Ehrenberg	5200	9.36	26.30	14.00	1799.40
MEL-05	3	MEL - 0503 - PC		10/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1400	0.97	19.90	10.00	694.60
MEL-05	3	MEL - 0503 - PC		10/Aug/21	6565	Cryptomonas rostratiformis Skuja	400	0.90	33.00	14.00	2257.80
MEL-05	3	MEL - 0503 - PC		10/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.32	8.00	4.00	44.70
MEL-05	3	MEL - 0503 - PC		10/Aug/21	7632	Gymnodinium sp.	1200	11.04	26.00	26.00	9202.80
MEL-05	3	MEL - 0503 - PC		10/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	200	0.75	19.30	19.30	3764.20
MEL-05	4	MEL - 0504 - PC		10/Aug/21	1012	Aphanothece sp.	7184	0.52	0.00	0.00	72.00
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2112	Sphaerocystis schroeteri Chodat	43104	1.56	4.10	4.10	36.10
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2137	Dictyosphaerium simplex Sukja	50288	0.21	2.00	2.00	4.20
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2154	Coelastrum microporum Naegeli	200	0.54	0.00	0.00	2680.00
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2167	Elakatothrix gelatinosa Willen	57472	0.99	11.00	2.00	17.30
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2169	Planctonema lauterbornii Schmidle	21552	7.62	18.00	5.00	353.40
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	600	0.23	13.50	12.00	381.70
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2206	Botryococcus braunii Kutzing	200	0.29	14.00	14.00	1436.80
MEL-05	4	MEL - 0504 - PC		10/Aug/21	2247	Oocystis gigas Archer	200	0.48	18.00	16.00	2412.70
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4351	Small chrysophyceae	114944	0.64	2.20	2.20	5.60
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4352	Large chrysophyceae	21552	3.87	7.00	7.00	179.60
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4357	Chrysococcus sp.	150864	9.87	5.00	5.00	65.40
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4362	Kephyrion sp.	43104	0.61	3.00	3.00	14.10
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	7184	1.63	12.00	6.00	226.20
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	800	2.71	0.00	0.00	3390.00

Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Density	Biomass	Length	Width	Volume
							Cells/L	mg/m^3	µm	µm	µm^3
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	143680	32.50	12.00	6.00	226.20
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	1000	3.39	0.00	0.00	3390.00
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4401	Uroglena volvox Ehrenberg	129312	14.63	6.00	6.00	113.10
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4413	Chrysochromulina laurentiana Kling	43104	17.01	9.10	9.10	394.60
MEL-05	4	MEL - 0504 - PC		10/Aug/21	4414	Stichogloea spp.	28736	1.45	6.00	4.00	50.30
MEL-05	4	MEL - 0504 - PC		10/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	1800	3.27	10.50	21.00	1818.40
MEL-05	4	MEL - 0504 - PC		10/Aug/21	5509	Cyclotella ocellata Pant.	43104	4.50	4.05	8.10	104.30
MEL-05	4	MEL - 0504 - PC		10/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-05	4	MEL - 0504 - PC		10/Aug/21	5518	Synedra acus Kutzing	600	0.06	91.00	2.00	95.30
MEL-05	4	MEL - 0504 - PC		10/Aug/21	5551	Cyclotella michiganiana Skvortzow	71840	1.76	2.50	5.00	24.50
MEL-05	4	MEL - 0504 - PC		10/Aug/21	5720	Cyclotella bodanica Eulenst.	600	4.23	16.50	33.00	7056.20
MEL-05	4	MEL - 0504 - PC		10/Aug/21	6554	Rhodomonas minuta Skuja	50288	3.95	9.00	5.00	78.50
MEL-05	4	MEL - 0504 - PC		10/Aug/21	6558	Cryptomonas erosa Ehrenberg	1600	2.88	26.30	14.00	1799.40
MEL-05	4	MEL - 0504 - PC		10/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	2400	1.67	19.90	10.00	694.60
MEL-05	4	MEL - 0504 - PC		10/Aug/21	7632	Gymnodinium sp.	200	1.84	26.00	26.00	9202.80
MEL-05	4	MEL - 0504 - PC		10/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1000	3.76	19.30	19.30	3764.20
MEL-05	4	MEL - 0504 - PC		10/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-05	5	MEL - 0505 - PC		10/Aug/21	1008	Aphanocapsa sp.	200	0.18	0.00	0.00	900.00
MEL-05	5	MEL - 0505 - PC		10/Aug/21	1014	Chroococcus limneticus Lemmermann	57472	5.01	5.50	5.50	87.10
MEL-05	5	MEL - 0505 - PC		10/Aug/21	1073	Snowella sp	200	0.10	0.00	0.00	500.00
MEL-05	5	MEL - 0505 - PC		10/Aug/21	2112	Sphaerocystis schroeteri Chodat	114944	4.15	4.10	4.10	36.10
MEL-05	5	MEL - 0505 - PC		10/Aug/21	2137	Dictyosphaerium simplex Sukja	71840	0.30	2.00	2.00	4.20
MEL-05	5	MEL - 0505 - PC		10/Aug/21	2167	Elakatothrix gelatinosa Willen	43104	0.75	11.00	2.00	17.30
MEL-05	5	MEL - 0505 - PC		10/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1600	0.61	13.50	12.00	381.70
MEL-05	5	MEL - 0505 - PC		10/Aug/21	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4351	Small chrysophyceae	287360	1.61	2.20	2.20	5.60
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4352	Large chrysophyceae	43104	7.74	7.00	7.00	179.60
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4357	Chrysococcus sp.	352016	23.02	5.00	5.00	65.40
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4362	Kephyrion sp.	215520	3.04	3.00	3.00	14.10
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	600	0.58	18.60	10.00	973.90
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4388	Dinobryon sertularia Ehrenberg	1200	4.07	0.00	0.00	3390.00
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	208336	47.13	12.00	6.00	226.20
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4390	Dinobryon sociale Ehrenberg	400	1.36	0.00	0.00	3390.00
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4401	Uroglena volvox Ehrenberg	71840	8.13	6.00	6.00	113.10
MEL-05	5	MEL - 0505 - PC		10/Aug/21	4414	Stichogloea spp.	93392	4.70	6.00	4.00	50.30
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	3800	6.91	10.50	21.00	1818.40
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5508	Cyclotella pseudostelligera	7184	3.87	7.00	14.00	538.80
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5509	Cyclotella ocellata Pant.	14368	1.50	4.05	8.10	104.30
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	800	0.61	81.00	6.00	763.40
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5515	Fragilaria crotonensis Kitton	2000	0.59	71.00	4.00	297.40
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5518	Synedra acus Kutzing	1200	0.11	91.00	2.00	95.30
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5524	Asterionella formosa Hassall	1200	0.13	100.00	2.00	104.70
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5551	Cyclotella michiganiana Skvortzow	100576	2.46	2.50	5.00	24.50
MEL-05	5	MEL - 0505 - PC		10/Aug/21	5720	Cyclotella bodanica Eulenst.	200	1.41	16.50	33.00	7056.20
MEL-05	5	MEL - 0505 - PC		10/Aug/21	6554	Rhodomonas minuta Skuja	79024	6.20	9.00	5.00	78.50
MEL-05	5	MEL - 0505 - PC		10/Aug/21	6558	Cryptomonas erosa Ehrenberg	2200	3.96	26.30	14.00	1799.40
MEL-05	5	MEL - 0505 - PC		10/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1400	0.97	19.90	10.00	694.60
MEL-05	5	MEL - 0505 - PC		10/Aug/21	6565	Cryptomonas rostratiformis Skuja	1000	2.26	33.00	14.00	2257.80
MEL-05	5	MEL - 0505 - PC		10/Aug/21	7632	Gymnodinium sp.	400	3.68	26.00	26.00	9202.80
MEL-05	5	MEL - 0505 - PC		10/Aug/21	7635	Peridinium willei Huitfeldt-Kaas	200	5.75	38.00	38.00	28730.90
MEL-05	5	MEL - 0505 - PC		10/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	1000	3.76	19.30	19.30	3764.20
MEL-05	5	MEL - 0505 - PC		10/Aug/21	7641	Peridinium aciculiferum Lemmermann	200	1.81	30.00	24.00	9047.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	1014	Chroococcus limneticus Lemmermann	28736	1.04	4.10	4.10	36.10
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	1026	Merismopedia tenuissima Lemmermann	71840	0.72	0.00	0.00	10.00
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	1073	Snowella sp	1000	0.50	0.00	0.00	500.00
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2112	Sphaerocystis schroeteri Chodat	43104	1.56	4.10	4.10	36.10
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2113	Pediastrum duplex Meyen	200	0.62	0.00	0.00	3100.00
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2115	Pediastrum tetras (Ehrenberg) Ralfs	28736	0.14	3.00	3.00	4.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2121	Oocystis lacustris Chodat	21552	0.61	6.00	3.00	28.30
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2137	Dictyosphaerium simplex Sukja	57472	0.24	2.00	2.00	4.20
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2145	Crucigenia quadrata Morr.	229888	1.08	3.00	3.00	4.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2167	Elakatothrix gelatinosa Willen	71840	1.24	11.00	2.00	17.30
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2169	Planctonema lauterbornii Schmidle	50288	17.77	18.00	5.00	353.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2178	Cosmarium sp.	600	0.84	20.00	20.00	1396.30
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1600	0.61	13.50	12.00	381.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2193	Staurodesmus paradoxum Meyen	600	1.70	26.00	24.00	2831.60
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2195	Staurodesmus bullardii G.M. Smith	200	0.44	24.00	22.00	2211.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	14368	0.54	6.00	6.00	37.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2206	Botryococcus braunii Kutzing	2600	3.74	14.00	14.00	1436.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2215	Tetraedron caudatum (Corda) Hansgrig	7184	0.03	3.00	3.00	4.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2235	Ankistrodesmus spiralis Lemmermann	7184	0.41	36.00	2.00	56.50
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4351	Small chrysophyceae	517248	2.90	2.20	2.20	5.60
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4355	Chrysochromulina parva Lackey	28736	1.88	5.00	5.00	65.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4357	Chrysococcus sp.	244256	15.97	5.00	5.00	65.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4361	Kephyrion boreale Skuja	28736	3.41	6.10	6.10	118.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4362	Kephyrion sp.	86208	1.22	3.00	3.00	14.10
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	600	0.58	18.60	10.00	973.90
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4388	Dinobryon sertularia Ehrenberg	50288	11.38	12.00	6.00	226.20
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4390	Dinobryon sociale Ehrenberg	395120	89.38	12.00	6.00	226.20
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4390	Dinobryon sociale Ehrenberg	3000	10.17	0.00	0.00	3390.00
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4394	Epiphyxis sp.	7184	0.54	9.00	4.00	75.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	7184	0.20	5.80	3.00	27.30
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4401	Uroglena volvox Ehrenberg	790240	89.38	6.00	6.00	113.10
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	4413	Chrysochromulina laurentiana Kling	35920	14.17	9.10	9.10	394.60
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	7800	14.18	10.50	21.00	1818.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5508	Cyclotella pseudostelligera	7184	3.87	7.00	14.00	538.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5509	Cyclotella ocellata Pant.	7184	0.75	4.05	8.10	104.30
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5511	Rhizosolenia eriense H.L. Smith	165232	14.01	12.00	3.00	84.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	9400	7.18	81.00	6.00	763.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	200	0.27	26.00	14.00	1334.10

							Density	Biomass	Length	Width	Volume
Area	Station	Sample ID	QA Sample ID	Date	Species Code	Species Name	Cells/L	mg/m^3	µm	µm	µm^3
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5515	Fragilaria crotonensis Kitton	4000	1.19	71.00	4.00	297.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5518	Synedra acus Kutzing	12200	1.16	91.00	2.00	95.30
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5524	Asterionella formosa Hassall	17400	1.82	100.00	2.00	104.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5551	Cyclotella michiganiana Skvortzow	431040	10.56	2.50	5.00	24.50
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	5720	Cyclotella bodanica Eulenst.	1000	7.06	16.50	33.00	7056.20
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	6554	Rhodomonas minuta Skuja	21552	1.69	9.00	5.00	78.50
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	6558	Cryptomonas erosa Ehrenberg	5200	9.36	26.30	14.00	1799.40
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	1000	0.69	19.90	10.00	694.60
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	6565	Cryptomonas rostratiformis Skuja	1000	2.26	33.00	14.00	2257.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.32	8.00	4.00	44.70
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	7632	Gymnodinium sp.	4200	38.65	26.00	26.00	9202.80
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	6800	25.60	19.30	19.30	3764.20
MEL-D1		MEL - D1 - PC	Field Dup	1/Aug/21	7641	Peridinium aciculiferum Lemmermann	2200	19.91	30.00	24.00	9047.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	1012	Aphanothece sp.	200	0.18	0.00	0.00	900.00
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	1014	Chroococcus limneticus Lemmermann	57472	5.01	5.50	5.50	87.10
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2112	Sphaerocystis schroeteri Chodat	287360	10.37	4.10	4.10	36.10
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2121	Oocystis lacustris Chodat	21552	0.61	6.00	3.00	28.30
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2137	Dictyosphaerium simplex Sukja	107760	0.45	2.00	2.00	4.20
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2143	Monoraphidium minutum (Nag.) Komarkova-Legnerova	21552	1.35	10.00	4.00	62.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2167	Elakatothrix gelatinosa Willen	50288	0.87	11.00	2.00	17.30
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2169	Planctonema lauterbornii Schmidle	57472	20.31	18.00	5.00	353.40
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2178	Cosmarium sp.	200	0.28	20.00	20.00	1396.30
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2187	Staurodesmus extensus (Andersson) Teiling	1400	0.53	13.50	12.00	381.70
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2193	Staurodesmus paradoxum Meyen	200	0.57	26.00	24.00	2831.60
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2199	Spondylosium planum (Wolle) W. and G.S. West	7184	0.27	6.00	6.00	37.70
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2206	Botryococcus braunii Kutzing	400	0.57	14.00	14.00	1436.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	2247	Oocystis gigas Archer	400	0.97	18.00	16.00	2412.70
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4351	Small chrysophyceae	510064	2.86	2.20	2.20	5.60
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4352	Large chrysophyceae	7184	1.29	7.00	7.00	179.60
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4355	Chrysochromulina parva Lackey	7184	0.47	5.00	5.00	65.40
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4357	Chrysococcus sp.	265808	17.38	5.00	5.00	65.40
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4358	Chrysostephanosphaera globulifera Scherffel	7184	2.56	8.80	8.80	356.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4361	Kephyrion boreale Skuja	7184	0.85	6.10	6.10	118.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4362	Kephyrion sp.	71840	1.01	3.00	3.00	14.10
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4363	Spiniferomonas serrata	7184	0.85	6.10	6.10	118.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4368	Mallomonas crassisquama (Asmund) Fott	200	0.19	18.60	10.00	973.90
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4378	Dinobryon borgei Lemmermann	7184	0.30	9.00	3.00	42.40
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4388	Dinobryon sertularia Ehrenberg	21552	4.88	12.00	6.00	226.20
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4390	Dinobryon sociale Ehrenberg	294544	66.63	12.00	6.00	226.20
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4390	Dinobryon sociale Ehrenberg	800	2.71	0.00	0.00	3390.00
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4396	Chrysolykos skuja (Nauwerck) Willen	21552	0.59	5.80	3.00	27.30
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4401	Uroglena volvox Ehrenberg	57472	6.50	6.00	6.00	113.10
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4413	Chrysochromulina laurentiana Kling	57472	22.68	9.10	9.10	394.60
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	4414	Stichogloea spp.	7184	0.36	6.00	4.00	50.30
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5507	Cyclotella stelligera Cleve and Grunow	8800	16.00	10.50	21.00	1818.40
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5508	Cyclotella pseudostelligera	28736	15.48	7.00	14.00	538.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5511	Rhizosolenia eriense H.L. Smith	64656	5.03	11.00	3.00	77.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5513	Tabellaria fenestrata (Lyngbye) Kutzing	3200	2.44	81.00	6.00	763.40
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5514	Tabellaria flocculosa (Roth) Kutzing	400	0.53	26.00	14.00	1334.10
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5518	Synedra acus Kutzing	4200	0.40	91.00	2.00	95.30
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5524	Asterionella formosa Hassall	4000	0.42	100.00	2.00	104.70
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5551	Cyclotella michiganiana Skvortzow	158048	3.87	2.50	5.00	24.50
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	5720	Cyclotella bodanica Eulenst.	1600	11.29	16.50	33.00	7056.20
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	6554	Rhodomonas minuta Skuja	57472	4.51	9.00	5.00	78.50
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	6558	Cryptomonas erosa Ehrenberg	2000	3.60	26.30	14.00	1799.40
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	6562	Cryptomonas reflexa (Marsson) Skuja	2400	1.67	19.90	10.00	694.60
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	6565	Cryptomonas rostratiformis Skuja	600	1.35	33.00	14.00	2257.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	6568	Katablepharis ovalis Skuja	7184	0.25	7.00	4.00	34.20
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	7631	Gymnodinium helveticum Penard	200	4.71	50.00	30.00	23561.90
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	7632	Gymnodinium sp.	1000	9.20	26.00	26.00	9202.80
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	7639	Peridinium pusillum (Penard) Lemmermann	800	3.01	19.30	19.30	3764.20
MEL-D2		MEL - D2 - PC	Field Dup	1/Aug/21	7641	Peridinium aciculiferum Lemmermann	1000	9.05	30.00	24.00	9047.80

APPENDIX F

SEDIMENT CHEMISTRY – SUPPORTING INFORMATION

Appendix F1

Summary Statistics

APPENDIX F1 TABLES

Table F1-1. Sediment chemistry results from the 2021 AEMP in Meliadine Lake.................................. ii
Table F1-2. Sediment chemistry summary statistics for Meliadine Lake in 2021. 1
Table F1-3. Sediment chemistry summary statistics for Meliadine Lake in 2018. 4
Table F1-4. Sediment chemistry summary statistics for Meliadine Lake in 2016. 7
Table F1-5. Sediment chemistry summary statistics for Meliadine Lake in 2015. 10

Table F1-1. Sediment chemistry results from the 2021 AEMP in Meliadine Lake.

Client Sample ID			MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Date Sampled			14-Aug-2021	15-Aug-2021	14-Aug-2021	14-Aug-2021	14-Aug-2021	15-Aug-2021	15-Aug-2021	15-Aug-2021	15-Aug-2021	15-Aug-2021	10-Aug-2021	10-Aug-2021	10-Aug-2021	10-Aug-2021	7-Aug-2021	10-Aug-2021	10-Aug-2021	10-Aug-2021	10-Aug-2021	10-Aug-2021
Time Sampled			20:00	20:00	17:40	13:35	21:20	13:00	15:00	17:00	12:00	18:30	9:30	8:45	7:50	10:38	19:15	20:20	15:30	17:00	17:45	18:50
ALS Sample ID	DL	Units	L2629453-1	L2629453-2	L2629453-3	L2629453-4	L2629453-5	L2629453-6	L2629453-7	L2629453-8	L2629453-9	L2629453-10	L2629453-11	L2629453-12	L2629453-13	L2629453-14	L2629453-15	L2629453-16	L2629453-17	L2629453-18	L2629453-19	L2629453-20
Physical Tests (Soil)																						
pH (1:2 soil:water)	0.10	pH	5.84	6.13	5.77	5.82	5.12	5.83	5.69	6.19	6.08	5.97	5.99	6.47	6.11	6.74	6.69	6.91	6.56	6.81	6.62	6.54
Particle Size																						
Cobbles (>3in.)	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Gravel (4.75mm - 3in.)	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Medium Sand (0.425mm - 2.0mm)	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0	2.7	1.7	<1.0	<1.0	2.5	<1.0	<1.0	<1.0	1.7	1.0	1.7	<1.0	<1.0	<1.0	<1.0
Fines (<0.075mm)	1.0	%	87.5	80.7	92.6	94.1	89.3	87.5	74.3	80.8	83.5	69.8	76.4	68.5	82.4	67.7	54.1	50.3	69.1	62.9	80.1	87.1
Coarse Sand (2.0mm - 4.75mm)	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fine Sand (0.075mm - 0.425mm)	1.0	%	12.2	18.8	6.6	5.6	9.9	9.8	24.0	18.2	15.8	27.7	22.7	30.8	17.0	30.6	44.9	48.0	29.9	36.3	19.2	12.3
Organic / Inorganic Carbon																						
Total Organic Carbon	0.050	%	4.4	3.58	5.18	4.9	6.74	10	8.2	8.47	8.82	8.38	7.78	6.05	8.49	5.06	4.57	3.92	8.4	6.01	9.27	10.3
Metals																						
Aluminum (Al)	50	mg/kg	11900	10100	13300	14000	11100	10500	9050	11500	10300	8680	7310	6820	8500	6900	6100	7710	9280	7260	10400	10600
Antimony (Sb)	0.10	mg/kg	0.17	0.12	0.14	0.17	0.20	0.15	0.14	0.16	0.16	0.15	0.14	0.10	0.13	<0.10	<0.10	<0.10	0.13	0.11	0.14	0.12
Arsenic (As)	0.10	mg/kg	47.5	35.5	58.6	50.7	66.0	19.9	17.8	14.3	21.1	23.8	6.24	4.57	7.79	4.56	3.35	5.50	7.59	6.69	11.1	10.5
Barium (Ba)	0.50	mg/kg	116	93.1	138	146	82.2	121	89.7	109	100	95.8	63.3	62.2	70.6	73.1	66.5	62.6	67.4	65.6	90.1	99.6
Beryllium (Be)	0.10	mg/kg	0.28	0.23	0.29	0.31	0.24	0.27	0.22	0.26	0.23	0.20	0.17	0.17	0.21	0.17	0.14	0.15	0.16	0.16	0.21	0.22
Bismuth (Bi)	0.20	mg/kg	0.31	0.24	0.32	0.36	0.27	0.30	0.24	0.23	0.22	0.21	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Boron (B)	5.0	mg/kg	6.1	<5.0	5.8	6.2	6.9	9.4	7.2	7.4	7.5	8.6	7.4	<5.0	7.8	<5.0	<5.0	<5.0	6.4	5.8	8.3	8.1
Cadmium (Cd)	0.020	mg/kg	0.446	0.459	0.462	0.503	0.358	0.385	0.307	0.430	0.331	0.339	0.220	0.177	0.270	0.160	0.152	0.142	0.211	0.189	0.267	0.245
Calcium (Ca)	50	mg/kg	4990	4230	4580	4880	4040	5900	5000	5590	5330	5570	4700	4140	5970	4310	3910	3600	4540	4150	5540	5380
Chromium (Cr)	0.50	mg/kg	43.6	38.5	48.2	53.3	41.7	38.9	33.6	40.9	38.3	32.2	25.4	24.2	27.7	24.1	21.0	29.5	34.9	27.1	37.9	40.1
Cobalt (Co)	0.10	mg/kg	13.3	9.75	15.9	19.0	14.3	11.3	9.19	10.1	10.9	8.99	6.18	5.61	6.60	5.85	5.32	6.37	7.83	6.25	8.45	9.00
Copper (Cu)	0.50	mg/kg	62.8	55.5	78.3	87.3	61.7	87.3	56.1	87.1	75.5	68.8	46.8	49.2	52.2	47.8	38.1	45.1	68.9	56.2	80.9	89.1
Iron (Fe)	50	mg/kg	34700	26800	38300	38600	38800	23000	19200	20500	21200	18900	11900	10600	13100	11500	9450	12300	13900	12000	15600	17200
Lead (Pb)	0.50	mg/kg	12.7	9.33	11.8	13.0	12.0	13.8	12.3	10.3	9.80	10.6	8.81	5.52	9.95	4.21	3.78	4.49	7.46	5.71	8.98	8.18
Lithium (Li)	2.0	mg/kg	13.6	12.5	14.5	16.1	12.2	13.1	12.2	12.2	11.9	10.5	11.7	10.9	12.2	10.6	9.8	9.0	10.3	8.6	12.0	11.7
Magnesium (Mg)	20	mg/kg	6430	5700	7190	7530	6080	5820	5340	5910	5810	5000	4350	4110	4760	4060	3680	5140	5890	4350	6040	6360
Manganese (Mn)	1.0	mg/kg	804	882	921	932	340	475	385	423	629	513	158	140	190	157	140	150	166	156	219	233
Mercury (Hg)	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	0.057	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Molybdenum (Mo)	0.10	mg/kg	3.99	3.33	5.17	5.47	5.09	4.25	2.48	3.71	3.83	3.09	1.78	1.77	2.16	1.76	1.23	2.53	1.88	1.96	2.51	3.28
Nickel (Ni)	0.50	mg/kg	57.2	45.6	71.3	82.2	56.1	52.8	41.7	52.2	48.5	43.7	28.9	26.1	32.2	26.7	21.3	26.6	35.3	28.5	41.2	43.0
Phosphorus (P)	50	mg/kg	997	932	1020	1170	878	745	748	771	757	728	642	569	867	592	556	486	556	542	630	653
Potassium (K)	100	mg/kg	1990	1730	2180	2380	1900	1760	1460	1830	1650	1470	1430	1340	1620	1310	1130	1020	1180	1010	1450	1460
Selenium (Se)	0.20	mg/kg	0.86	0.78	1.12	1.18	0.91	1.05	0.76	1.07	0.91	0.80	0.51	0.51	0.75	0.46	0.34	0.47	0.60	0.58	0.80	0.95
Silver (Ag)	0.10	mg/kg	0.15	0.13	0.17	0.20	0.16	0.19	0.12	0.17	0.15	0.11	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	0.12
Sodium (Na)	50	mg/kg	328	267	330	355	325	312	229	314	302	277	262	207	301	215	185	153	201	185	253	239
Strontium (Sr)	0.50	mg/kg	31.3	26.0	29.1	30.5	25.4	33.5	29.4	33.1	29.4	31.7	24.4	19.9	29.6	19.7	18.0	17.6	21.7	20.3	27.0	26.2
Sulfur (S)	1000	mg/kg	1300	<1000	1300	1300	2900	2100	1800	1900	1800	2400	2600	1700	3200	1200	<1000	<1000	2100	1400	2600	2200
Thallium (Tl)	0.050	mg/kg	0.279	0.255	0.325	0.392	0.227	0.258	0.201	0.295	0.248	0.214	0.119	0.136	0.144	0.146	0.116	0.112	0.113	0.121	0.140	0.166
Tin (Sn)	2.0	mg/kg	<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	<2.0	<2.0
Titanium (Ti)	1.0	mg/kg	709	636	692	744	618	483	517	590	536	449	562	485	572	549	570	509	405	445	481	472
Tungsten (W)	0.50	mg/kg	<0.50	0.64	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.65	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	0.050	mg/kg	3.29	3.14	3.78	4.32	2.89	3.66	2.48	3.40	2.97	2.47	1.59	1.69	1.83	1.51	1.32	1.26	1.62	1.48	2.19	2.23
Vanadium (V)	0.20	mg/kg	50.3	44.7	56.5	61.3	47.0	41.7	35.0	46.6	40.3	33.9	28.3	27.7	31.9	27.7	24.5	31.6	35.7	30.2	40.6	43.8
Zinc (Zn)	2.0	mg/kg	75.5	65.2	88.1	98.7	78.0	88.4	67.7	96.7	86.0	75.3	46.6	43.6	47.9	46.2	37.6	41.6	49.8	44.3	56.6	62.8
Zirconium (Zr)	1.0	mg/kg	1.4	1.0	1.6	1.8	2.1	2.0	1.0	1.1	<1.0	<1.0	1.4	1.1	1.4	1.0	<1.0	<1.0	1.3	<1.0	1.5	1.5

Table F1-2. Sediment chemistry summary statistics for Meliadine Lake in 2021.

Area	Class	Parameter	ISQG[a]	PEL[a]	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
NEAR-FIELD (MEL-01)														
MEL-01	Physical	% Clay[b]	-	-	5	0	3.94	4.5	1.07	0.48	2.3	4.8	-	-
MEL-01	Physical	% Fines[b]	-	-	5	0	84.1	85.7	7.05	3.15	73.2	91.6	-	-
MEL-01	Physical	% Sand[b]	-	-	5	0	15.6	14.4	7.31	3.27	8.4	26.8	-	-
MEL-01	Physical	% Silt[b]	-	-	5	0	80.2	81	6.03	2.7	70.9	86.8	-	-
MEL-01	Physical	% TOC	-	-	5	0	4.96	4.9	1.17	0.521	3.58	6.74	-	-
MEL-01	Metals	Aluminum	-	-	5	0	12100	11900	1590	710	10100	14000	-	-
MEL-01	Metals	Antimony	-	-	5	0	0.16	0.17	0.0308	0.0138	0.12	0.2	-	-
MEL-01	Metals	Arsenic	5.9	17	5	0	51.7	50.7	11.5	5.16	35.5	66	5	5
MEL-01	Metals	Barium	-	-	5	0	115	116	27.6	12.3	82.2	146	-	-
MEL-01	Metals	Beryllium	-	-	5	0	0.27	0.28	0.0339	0.0152	0.23	0.31	-	-
MEL-01	Metals	Bismuth	-	-	5	0	0.3	0.31	0.0464	0.0207	0.24	0.36	-	-
MEL-01	Metals	Boron	-	-	5	1	6	6.1	0.689	0.308	5	6.9	-	-
MEL-01	Metals	Cadmium	0.6	3.5	5	0	0.446	0.459	0.0534	0.0239	0.358	0.503	0	0
MEL-01	Metals	Calcium	-	-	5	0	4540	4580	408	182	4040	4990	-	-
MEL-01	Metals	Chromium	37.3	90	5	0	45.1	43.6	5.79	2.59	38.5	53.3	5	0
MEL-01	Metals	Cobalt	-	-	5	0	14.4	14.3	3.4	1.52	9.75	19	-	-
MEL-01	Metals	Copper	35.7	197	5	0	69.1	62.8	13.2	5.9	55.5	87.3	5	0
MEL-01	Metals	Iron	-	-	5	0	35400	38300	5110	2290	26800	38800	-	-
MEL-01	Metals	Lead	35	91.3	5	0	11.8	12	1.45	0.647	9.33	13	0	0
MEL-01	Metals	Lithium	-	-	5	0	13.8	13.6	1.59	0.71	12.2	16.1	-	-
MEL-01	Metals	Magnesium	-	-	5	0	6590	6430	762	341	5700	7530	-	-
MEL-01	Metals	Manganese	-	-	5	0	776	882	249	111	340	932	-	-
MEL-01	Metals	Mercury	0.17	0.488	5	4	0.0514	0.05	-	-	0.05	0.057	0	0
MEL-01	Metals	Molybdenum	-	-	5	0	4.61	5.09	0.909	0.407	3.33	5.47	-	-
MEL-01	Metals	Nickel	-	-	5	0	62.5	57.2	14.3	6.4	45.6	82.2	-	-
MEL-01	Metals	Phosphorus	-	-	5	0	999	997	110	49.4	878	1170	-	-
MEL-01	Metals	Potassium	-	-	5	0	2040	1990	252	113	1730	2380	-	-
MEL-01	Metals	Selenium	-	-	5	0	0.97	0.91	0.172	0.0769	0.78	1.18	-	-
MEL-01	Metals	Silver	-	-	5	0	0.162	0.16	0.0259	0.0116	0.13	0.2	-	-
MEL-01	Metals	Sodium	-	-	5	0	321	328	32.5	14.5	267	355	-	-
MEL-01	Metals	Strontium	-	-	5	0	28.5	29.1	2.65	1.18	25.4	31.3	-	-
MEL-01	Metals	Sulfur	-	-	5	1	1560	1300	760	340	1000	2900	-	-
MEL-01	Metals	Thallium	-	-	5	0	0.296	0.279	0.0648	0.029	0.227	0.392	-	-
MEL-01	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-01	Metals	Titanium	-	-	5	0	680	692	52.1	23.3	618	744	-	-
MEL-01	Metals	Tungsten	-	-	5	4	0.528	0.5	-	-	0.5	0.64	-	-
MEL-01	Metals	Uranium	-	-	5	0	3.48	3.29	0.569	0.254	2.89	4.32	-	-
MEL-01	Metals	Vanadium	-	-	5	0	52	50.3	6.85	3.07	44.7	61.3	-	-
MEL-01	Metals	Zinc	123	315	5	0	81.1	78	12.8	5.71	65.2	98.7	0	0
MEL-01	Metals	Zirconium	-	-	5	0	1.58	1.6	0.415	0.185	1	2.1	-	-
MID-FIELD (MEL-02)														
MEL-02	Physical	% Clay[b]	-	-	5	0	4.72	4.5	0.554	0.248	4.1	5.4	-	-
MEL-02	Physical	% Fines[b]	-	-	5	0	75.1	76.5	7.45	3.33	66	84.8	-	-
MEL-02	Physical	% Sand[b]	-	-	5	0	24.9	23.5	7.49	3.35	15.2	34.1	-	-
MEL-02	Physical	% Silt[b]	-	-	5	0	70.3	72	6.98	3.12	61.9	79.6	-	-
MEL-02	Physical	% TOC	-	-	5	0	8.77	8.47	0.722	0.323	8.2	10	-	-
MEL-02	Metals	Aluminum	-	-	5	0	10000	10300	1140	512	8680	11500	-	-
MEL-02	Metals	Antimony	-	-	5	0	0.152	0.15	0.00837	0.00374	0.14	0.16	-	-
MEL-02	Metals	Arsenic	5.9	17	5	0	19.4	19.9	3.57	1.6	14.3	23.8	5	4
MEL-02	Metals	Barium	-	-	5	0	103	100	12.2	5.47	89.7	121	-	-
MEL-02	Metals	Beryllium	-	-	5	0	0.236	0.23	0.0288	0.0129	0.2	0.27	-	-
MEL-02	Metals	Bismuth	-	-	5	0	0.24	0.23	0.0354	0.0158	0.21	0.3	-	-
MEL-02	Metals	Boron	-	-	5	0	8.02	7.5	0.944	0.422	7.2	9.4	-	-
MEL-02	Metals	Cadmium	0.6	3.5	5	0	0.358	0.339	0.049	0.0219	0.307	0.43	0	0
MEL-02	Metals	Calcium	-	-	5	0	5480	5570	335	150	5000	5900	-	-
MEL-02	Metals	Chromium	37.3	90	5	0	36.8	38.3	3.7	1.66	32.2	40.9	3	0
MEL-02	Metals	Cobalt	-	-	5	0	10.1	10.1	1.02	0.455	8.99	11.3	-	-
MEL-02	Metals	Copper	35.7	197	5	0	75	75.5	13.2	5.89	56.1	87.3	5	0
MEL-02	Metals	Iron	-	-	5	0	20600	20500	1660	741	18900	23000	-	-
MEL-02	Metals	Lead	35	91.3	5	0	11.4	10.6	1.66	0.741	9.8	13.8	0	0
MEL-02	Metals	Lithium	-	-	5	0	12	12.2	0.942	0.421	10.5	13.1	-	-
MEL-02	Metals	Magnesium	-	-	5	0	5580	5810	392	175	5000	5910	-	-
MEL-02	Metals	Manganese	-	-	5	0	485	475	94.2	42.1	385	629	-	-
MEL-02	Metals	Mercury	0.17	0.488	5	5	0.05	0.05	-	-	-	0.05	0	0
MEL-02	Metals	Molybdenum	-	-	5	0	3.47	3.71	0.693	0.31	2.48	4.25	-	-
MEL-02	Metals	Nickel	-	-	5	0	47.8	48.5	4.97	2.22	41.7	52.8	-	-
MEL-02	Metals	Phosphorus	-	-	5	0	750	748	15.8	7.08	728	771	-	-
MEL-02	Metals	Potassium	-	-	5	0	1630	1650	167	74.7	1460	1830	-	-
MEL-02	Metals	Selenium	-	-	5	0	0.918	0.91	0.141	0.063	0.76	1.07	-	-
MEL-02	Metals	Silver	-	-	5	0	0.148	0.15	0.0335	0.015	0.11	0.19	-	-

Table F1-2. Sediment chemistry summary statistics for Meliadine Lake in 2021.

Area	Class	Parameter	ISQG[a]	PEL[a]	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
MEL-02	Metals	Sodium	-	-	5	0	287	302	35.5	15.9	229	314	-	-
MEL-02	Metals	Strontium	-	-	5	0	31.4	31.7	1.96	0.877	29.4	33.5	-	-
MEL-02	Metals	Sulfur	-	-	5	0	2000	1900	255	114	1800	2400	-	-
MEL-02	Metals	Thallium	-	-	5	0	0.243	0.248	0.0373	0.0167	0.201	0.295	-	-
MEL-02	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-02	Metals	Titanium	-	-	5	0	515	517	53.5	23.9	449	590	-	-
MEL-02	Metals	Tungsten	-	-	5	5	0.5	0.5	-	-	-	0.5	-	-
MEL-02	Metals	Uranium	-	-	5	0	3	2.97	0.536	0.24	2.47	3.66	-	-
MEL-02	Metals	Vanadium	-	-	5	0	39.5	40.3	5.18	2.32	33.9	46.6	-	-
MEL-02	Metals	Zinc	123	315	5	0	82.8	86	11.4	5.09	67.7	96.7	0	0
MEL-02	Metals	Zirconium	-	-	5	2	1.22	1	0.438	0.196	1	2	-	-
REFERENCE (MEL-03 & MEL-05)														
MEL-03	Physical	% Clay[b]	-	-	5	0	2.86	3	1.2	0.537	1.5	4.5	-	-
MEL-03	Physical	% Fines[b]	-	-	5	0	64	63	11.1	4.95	47.8	76.8	-	-
MEL-03	Physical	% Sand[b]	-	-	5	0	36	36.9	11	4.94	23.1	52.1	-	-
MEL-03	Physical	% Silt[b]	-	-	5	0	61.1	60	9.95	4.45	46.3	72.3	-	-
MEL-03	Physical	% TOC	-	-	5	0	6.39	6.05	1.7	0.76	4.57	8.49	-	-
MEL-03	Metals	Aluminum	-	-	5	0	7130	6900	883	395	6100	8500	-	-
MEL-03	Metals	Antimony	-	-	5	2	0.114	0.1	0.0195	0.00872	0.1	0.14	-	-
MEL-03	Metals	Arsenic	5.9	17	5	0	5.3	4.57	1.73	0.774	3.35	7.79	2	0
MEL-03	Metals	Barium	-	-	5	0	67.1	66.5	4.67	2.09	62.2	73.1	-	-
MEL-03	Metals	Beryllium	-	-	5	0	0.172	0.17	0.0249	0.0111	0.14	0.21	-	-
MEL-03	Metals	Bismuth	-	-	5	5	0.2	0.2	-	-	-	0.2	-	-
MEL-03	Metals	Boron	-	-	5	3	6.04	5	-	-	5	7.8	-	-
MEL-03	Metals	Cadmium	0.6	3.5	5	0	0.196	0.177	0.0491	0.022	0.152	0.27	0	0
MEL-03	Metals	Calcium	-	-	5	0	4610	4310	815	365	3910	5970	-	-
MEL-03	Metals	Chromium	37.3	90	5	0	24.5	24.2	2.43	1.09	21	27.7	0	0
MEL-03	Metals	Cobalt	-	-	5	0	5.91	5.85	0.498	0.223	5.32	6.6	-	-
MEL-03	Metals	Copper	35.7	197	5	0	46.8	47.8	5.28	2.36	38.1	52.2	5	0
MEL-03	Metals	Iron	-	-	5	0	11300	11500	1370	614	9450	13100	-	-
MEL-03	Metals	Lead	35	91.3	5	0	6.45	5.52	2.78	1.24	3.78	9.95	0	0
MEL-03	Metals	Lithium	-	-	5	0	11	10.9	0.94	0.42	9.8	12.2	-	-
MEL-03	Metals	Magnesium	-	-	5	0	4190	4110	398	178	3680	4760	-	-
MEL-03	Metals	Manganese	-	-	5	0	157	157	20.4	9.13	140	190	-	-
MEL-03	Metals	Mercury	0.17	0.488	5	5	0.05	0.05	-	-	-	0.05	0	0
MEL-03	Metals	Molybdenum	-	-	5	0	1.74	1.77	0.331	0.148	1.23	2.16	-	-
MEL-03	Metals	Nickel	-	-	5	0	27	26.7	4	1.79	21.3	32.2	-	-
MEL-03	Metals	Phosphorus	-	-	5	0	645	592	128	57.4	556	867	-	-
MEL-03	Metals	Potassium	-	-	5	0	1370	1340	179	80	1130	1620	-	-
MEL-03	Metals	Selenium	-	-	5	0	0.514	0.51	0.149	0.0667	0.34	0.75	-	-
MEL-03	Metals	Silver	-	-	5	5	0.1	0.1	-	-	-	0.1	-	-
MEL-03	Metals	Sodium	-	-	5	0	234	215	46.8	20.9	185	301	-	-
MEL-03	Metals	Strontium	-	-	5	0	22.3	19.9	4.71	2.11	18	29.6	-	-
MEL-03	Metals	Sulfur	-	-	5	1	1940	1700	937	419	1000	3200	-	-
MEL-03	Metals	Thallium	-	-	5	0	0.132	0.136	0.014	0.00625	0.116	0.146	-	-
MEL-03	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-03	Metals	Titanium	-	-	5	0	548	562	36.1	16.2	485	572	-	-
MEL-03	Metals	Tungsten	-	-	5	4	0.53	0.5	-	-	0.5	0.65	-	-
MEL-03	Metals	Uranium	-	-	5	0	1.59	1.59	0.192	0.0857	1.32	1.83	-	-
MEL-03	Metals	Vanadium	-	-	5	0	28	27.7	2.63	1.18	24.5	31.9	-	-
MEL-03	Metals	Zinc	123	315	5	0	44.4	46.2	4.1	1.83	37.6	47.9	0	0
MEL-03	Metals	Zirconium	-	-	5	1	1.18	1.1	0.205	0.0917	1	1.4	-	-
MEL-05	Physical	% Clay[b]	-	-	5	0	2.46	2.8	1.26	0.563	0.8	4.1	-	-
MEL-05	Physical	% Fines[b]	-	-	5	0	65.2	65.5	15.9	7.1	43.6	84	-	-
MEL-05	Physical	% Sand[b]	-	-	5	0	34.8	34.4	15.9	7.11	16	56.4	-	-
MEL-05	Physical	% Silt[b]	-	-	5	0	62.7	62.6	14.7	6.56	42.8	79.9	-	-
MEL-05	Physical	% TOC	-	-	5	0	7.58	8.4	2.59	1.16	3.92	10.3	-	-
MEL-05	Metals	Aluminum	-	-	5	0	9050	9280	1520	681	7260	10600	-	-
MEL-05	Metals	Antimony	-	-	5	1	0.12	0.12	0.0158	0.00707	0.1	0.14	-	-
MEL-05	Metals	Arsenic	5.9	17	5	0	8.28	7.59	2.43	1.09	5.5	11.1	4	0
MEL-05	Metals	Barium	-	-	5	0	77.1	67.4	16.7	7.46	62.6	99.6	-	-
MEL-05	Metals	Beryllium	-	-	5	0	0.18	0.16	0.0324	0.0145	0.15	0.22	-	-
MEL-05	Metals	Bismuth	-	-	5	5	0.2	0.2	-	-	-	0.2	-	-
MEL-05	Metals	Boron	-	-	5	1	6.72	6.4	1.44	0.645	5	8.3	-	-
MEL-05	Metals	Cadmium	0.6	3.5	5	0	0.211	0.211	0.0488	0.0218	0.142	0.267	0	0
MEL-05	Metals	Calcium	-	-	5	0	4640	4540	820	367	3600	5540	-	-
MEL-05	Metals	Chromium	37.3	90	5	0	33.9	34.9	5.5	2.46	27.1	40.1	2	0
MEL-05	Metals	Cobalt	-	-	5	0	7.58	7.83	1.23	0.551	6.25	9	-	-
MEL-05	Metals	Copper	35.7	197	5	0	68	68.9	17.9	7.99	45.1	89.1	5	0
MEL-05	Metals	Iron	-	-	5	0	14200	13900	2210	987	12000	17200	-	-
MEL-05	Metals	Lead	35	91.3	5	0	6.96	7.46	1.84	0.821	4.49	8.98	0	0

Table F1-2. Sediment chemistry summary statistics for Meliadine Lake in 2021.

Area	Class	Parameter	ISQG[a]	PEL[a]	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
MEL-05	Metals	Lithium	-	-	5	0	10.3	10.3	1.54	0.687	8.6	12	-	-
MEL-05	Metals	Magnesium	-	-	5	0	5560	5890	809	362	4350	6360	-	-
MEL-05	Metals	Manganese	-	-	5	0	185	166	38.4	17.2	150	233	-	-
MEL-05	Metals	Mercury	0.17	0.488	5	5	0.05	0.05	-	-	-	0.05	0	0
MEL-05	Metals	Molybdenum	-	-	5	0	2.43	2.51	0.562	0.251	1.88	3.28	-	-
MEL-05	Metals	Nickel	-	-	5	0	34.9	35.3	7.34	3.28	26.6	43	-	-
MEL-05	Metals	Phosphorus	-	-	5	0	573	556	67.9	30.4	486	653	-	-
MEL-05	Metals	Potassium	-	-	5	0	1220	1180	221	99	1010	1460	-	-
MEL-05	Metals	Selenium	-	-	5	0	0.68	0.6	0.192	0.086	0.47	0.95	-	-
MEL-05	Metals	Silver	-	-	5	3	0.106	0.1	-	-	0.1	0.12	-	-
MEL-05	Metals	Sodium	-	-	5	0	206	201	40.5	18.1	153	253	-	-
MEL-05	Metals	Strontium	-	-	5	0	22.6	21.7	3.98	1.78	17.6	27	-	-
MEL-05	Metals	Sulfur	-	-	5	1	1860	2100	647	289	1000	2600	-	-
MEL-05	Metals	Thallium	-	-	5	0	0.13	0.121	0.0229	0.0102	0.112	0.166	-	-
MEL-05	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-05	Metals	Titanium	-	-	5	0	462	472	39.4	17.6	405	509	-	-
MEL-05	Metals	Tungsten	-	-	5	5	0.5	0.5	-	-	-	0.5	-	-
MEL-05	Metals	Uranium	-	-	5	0	1.76	1.62	0.434	0.194	1.26	2.23	-	-
MEL-05	Metals	Vanadium	-	-	5	0	36.4	35.7	5.8	2.59	30.2	43.8	-	-
MEL-05	Metals	Zinc	123	315	5	0	51	49.8	8.74	3.91	41.6	62.8	0	0
MEL-05	Metals	Zirconium	-	-	5	2	1.26	1.3	0.251	0.112	1	1.5	-	-

Notes

[a] ISQG (Interim Sediment Quality Guideline) and PEL (Probable Effects Level) thresholds as per CCME (2002).

[b] Particle size classes: fines = <0.05mm, clay = <2um, silt = 2um-0.05mm, sand = 0.05-2mm.

Table F1-3. Sediment chemistry summary statistics for Meliadine Lake in 2018.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
NEAR-FIELD (MEL-01)														
MEL-01	Physical	% Fines[b]	-	-	5	0	78.9	76	14	6.27	58.3	93	-	-
MEL-01	Physical	% Clay[b]	-	-	5	0	10.3	11	4.32	1.93	3.3	15	-	-
MEL-01	Physical	% Silt[b]	-	-	5	0	68.6	64	12.2	5.46	55	82	-	-
MEL-01	Physical	% Sand[b]	-	-	5	0	21.1	24	14.5	6.48	6.3	42	-	-
MEL-01	Physical	% TOC	-	-	5	0	4.5	4.5	1.07	0.479	3	5.7	-	-
MEL-01	Metals	Aluminum	-	-	5	0	13000	12700	1310	588	11100	14500	-	-
MEL-01	Metals	Antimony	-	-	5	0	0.152	0.15	0.0192	0.0086	0.13	0.18	-	-
MEL-01	Metals	Arsenic	5.9	17	5	0	23.6	23.4	7.21	3.22	14.8	32.5	5	4
MEL-01	Metals	Barium	-	-	5	0	115	115	19.8	8.88	89.5	136	-	-
MEL-01	Metals	Beryllium	-	-	5	0	0.324	0.33	0.0329	0.0147	0.28	0.37	-	-
MEL-01	Metals	Bismuth	-	-	5	0	0.322	0.32	0.0455	0.0203	0.25	0.37	-	-
MEL-01	Metals	Boron	-	-	5	0	6.84	6.9	0.915	0.409	5.9	8.2	-	-
MEL-01	Metals	Cadmium	0.6	3.5	5	0	0.519	0.524	0.069	0.0309	0.411	0.603	1	0
MEL-01	Metals	Calcium	-	-	5	0	4370	4460	360	161	3760	4700	-	-
MEL-01	Metals	Chromium	37.3	90	5	0	51.2	50.6	5.45	2.44	42.8	56.5	5	0
MEL-01	Metals	Cobalt	-	-	5	0	16.1	15.7	6.9	3.09	8.52	27.1	-	-
MEL-01	Metals	Copper	35.7	197	5	0	80.6	80.9	13.1	5.85	60.5	95.1	5	0
MEL-01	Metals	Iron	-	-	5	0	27000	29400	4670	2090	20200	31600	-	-
MEL-01	Metals	Lead	35	91.3	5	0	11.1	10.8	1.7	0.762	8.84	13.3	0	0
MEL-01	Metals	Lithium	-	-	5	0	15.2	15.1	1.75	0.781	12.9	17.2	-	-
MEL-01	Metals	Magnesium	-	-	5	0	7250	7180	722	323	6160	8030	-	-
MEL-01	Metals	Manganese	-	-	5	0	360	351	72.4	32.4	273	471	-	-
MEL-01	Metals	Mercury	0.17	0.488	5	0	0.0299	0.028	0.00931	0.00416	0.0189	0.0444	0	0
MEL-01	Metals	Molybdenum	-	-	5	0	5.33	4.44	2.53	1.13	2.95	9.44	-	-
MEL-01	Metals	Nickel	-	-	5	0	67.2	69	14.2	6.36	47.4	85.4	-	-
MEL-01	Metals	Potassium	-	-	5	0	2300	2290	242	108	1940	2530	-	-
MEL-01	Metals	Selenium	-	-	5	0	0.95	0.94	0.172	0.077	0.69	1.15	-	-
MEL-01	Metals	Silver	-	-	5	0	0.192	0.2	0.0335	0.015	0.14	0.22	-	-
MEL-01	Metals	Sodium	-	-	5	0	318	330	44.4	19.8	250	360	-	-
MEL-01	Metals	Strontium	-	-	5	0	24.4	24.8	2.46	1.1	20.4	26.8	-	-
MEL-01	Metals	Thallium	-	-	5	0	0.364	0.365	0.0728	0.0326	0.261	0.448	-	-
MEL-01	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-01	Metals	Titanium	-	-	5	0	726	739	58.2	26	641	786	-	-
MEL-01	Metals	Uranium	-	-	5	0	4.3	4.22	0.508	0.227	3.64	5.06	-	-
MEL-01	Metals	Vanadium	-	-	5	0	57.6	56.9	6.88	3.07	47.3	66.1	-	-
MEL-01	Metals	Zinc	123	315	5	0	90.7	93.9	12.4	5.53	70.5	101	0	0
MID-FIELD (MEL-02)														
MEL-02	Physical	% Fines[b]	-	-	5	0	50.3	53.5	15.4	6.88	32.6	68	-	-
MEL-02	Physical	% Clay[b]	-	-	5	0	11.1	9.5	3.93	1.76	7.3	17	-	-
MEL-02	Physical	% Silt[b]	-	-	5	0	39.2	44	12	5.36	24	51	-	-
MEL-02	Physical	% Sand[b]	-	-	5	0	49.6	46	15.3	6.86	33	68	-	-
MEL-02	Physical	% TOC	-	-	5	0	6.68	6.2	1.63	0.731	4.6	9	-	-
MEL-02	Metals	Aluminum	-	-	5	0	10100	10500	1750	782	7560	12000	-	-
MEL-02	Metals	Antimony	-	-	5	2	0.116	0.11	0.0182	0.00812	0.1	0.14	-	-
MEL-02	Metals	Arsenic	5.9	17	5	0	11.3	11.3	2.92	1.3	8.37	15.7	5	0
MEL-02	Metals	Barium	-	-	5	0	107	115	14.4	6.44	90.9	120	-	-
MEL-02	Metals	Beryllium	-	-	5	0	0.26	0.28	0.0324	0.0145	0.22	0.29	-	-
MEL-02	Metals	Bismuth	-	-	5	2	0.226	0.23	0.0251	0.0112	0.2	0.25	-	-
MEL-02	Metals	Boron	-	-	5	1	6.56	7	1.33	0.595	5	8.2	-	-
MEL-02	Metals	Cadmium	0.6	3.5	5	0	0.332	0.342	0.0819	0.0366	0.221	0.446	0	0
MEL-02	Metals	Calcium	-	-	5	0	4690	5070	641	287	3840	5250	-	-
MEL-02	Metals	Chromium	37.3	90	5	0	43.6	45	9.13	4.08	30.9	53.7	4	0
MEL-02	Metals	Cobalt	-	-	5	0	10	10.4	1.79	0.801	7.6	11.9	-	-
MEL-02	Metals	Copper	35.7	197	5	0	80.3	87.8	17.7	7.91	55.5	98.8	5	0
MEL-02	Metals	Iron	-	-	5	0	18000	19000	3550	1590	12900	21700	-	-
MEL-02	Metals	Lead	35	91.3	5	0	8.38	8.7	1.67	0.746	6.09	10.3	0	0
MEL-02	Metals	Lithium	-	-	5	0	12.2	12.2	1.79	0.799	9.99	14.7	-	-
MEL-02	Metals	Magnesium	-	-	5	0	5920	5930	1000	448	4370	7010	-	-
MEL-02	Metals	Manganese	-	-	5	0	293	300	80.5	36	193	400	-	-
MEL-02	Metals	Mercury	0.17	0.488	5	0	0.0192	0.0179	0.00605	0.0027	0.013	0.0289	0	0
MEL-02	Metals	Molybdenum	-	-	5	0	3.74	3.68	0.939	0.42	2.58	5.17	-	-
MEL-02	Metals	Nickel	-	-	5	0	48.2	50.2	9.77	4.37	37.7	60.1	-	-
MEL-02	Metals	Potassium	-	-	5	0	1730	1840	292	131	1320	2040	-	-
MEL-02	Metals	Selenium	-	-	5	0	0.84	0.91	0.198	0.0884	0.55	1.07	-	-
MEL-02	Metals	Silver	-	-	5	1	0.14	0.15	0.0292	0.013	0.1	0.17	-	-
MEL-02	Metals	Sodium	-	-	5	0	258	290	58.1	26	190	310	-	-
MEL-02	Metals	Strontium	-	-	5	0	25.4	27.2	3.45	1.54	20.4	28.3	-	-
MEL-02	Metals	Thallium	-	-	5	0	0.241	0.252	0.0432	0.0193	0.175	0.287	-	-
MEL-02	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-02	Metals	Titanium	-	-	5	0	560	599	103	46.3	419	677	-	-

Table F1-3. Sediment chemistry summary statistics for Meliadine Lake in 2018.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
MEL-02	Metals	Uranium	-	-	5	0	3.01	3.24	0.749	0.335	1.92	3.79	-	-
MEL-02	Metals	Vanadium	-	-	5	0	42	45.6	7.24	3.24	32.4	48.3	-	-
MEL-02	Metals	Zinc	123	315	5	0	83.1	91.1	13.9	6.22	68	96.3	0	0
REFERENCE (MEL-03 & MEL-05)														
MEL-03	Physical	% Fines[b]	-	-	5	0	42.6	33.5	21	9.38	22.1	73.9	-	-
MEL-03	Physical	% Clay[b]	-	-	5	0	3.64	3.1	2.17	0.969	1.5	6.9	-	-
MEL-03	Physical	% Silt[b]	-	-	5	0	39	32	19	8.48	20	67	-	-
MEL-03	Physical	% Sand[b]	-	-	5	0	57.6	67	21	9.41	26	78	-	-
MEL-03	Physical	% TOC	-	-	5	0	3.66	3	2.93	1.31	0.29	7.7	-	-
MEL-03	Metals	Aluminum	-	-	5	0	7270	6410	2570	1150	5160	11500	-	-
MEL-03	Metals	Antimony	-	-	5	4	0.104	0.1	-	-	0.1	0.12	-	-
MEL-03	Metals	Arsenic	5.9	17	5	0	5.2	5	1.41	0.629	3.41	7.15	1	0
MEL-03	Metals	Barium	-	-	5	0	64.7	62.8	31.4	14	30.7	104	-	-
MEL-03	Metals	Beryllium	-	-	5	0	0.176	0.15	0.0602	0.0269	0.12	0.27	-	-
MEL-03	Metals	Bismuth	-	-	5	4	0.202	0.2	-	-	0.2	0.21	-	-
MEL-03	Metals	Boron	-	-	5	3	5.46	5	-	-	5	6.9	-	-
MEL-03	Metals	Cadmium	0.6	3.5	5	1	0.144	0.175	0.105	0.0469	0.02	0.283	0	0
MEL-03	Metals	Calcium	-	-	5	0	3750	3300	1350	606	2660	5880	-	-
MEL-03	Metals	Chromium	37.3	90	5	0	28.7	23.5	12.5	5.61	18.5	49	1	0
MEL-03	Metals	Cobalt	-	-	5	0	5.77	5.79	2.25	1.01	3.61	9.02	-	-
MEL-03	Metals	Copper	35.7	197	5	0	42.5	40.6	34.3	15.3	7.6	91.9	3	0
MEL-03	Metals	Iron	-	-	5	0	11500	10700	3070	1370	9000	16600	-	-
MEL-03	Metals	Lead	35	91.3	5	0	4.13	3.44	1.63	0.731	2.79	6.86	0	0
MEL-03	Metals	Lithium	-	-	5	0	10.9	9.58	3.39	1.52	7.89	16.5	-	-
MEL-03	Metals	Magnesium	-	-	5	0	4180	3840	1450	647	2930	6500	-	-
MEL-03	Metals	Manganese	-	-	5	0	149	123	61.1	27.3	104	251	-	-
MEL-03	Metals	Mercury	0.17	0.488	5	2	0.00814	0.0064	0.00425	0.0019	0.005	0.0151	0	0
MEL-03	Metals	Molybdenum	-	-	5	0	1.97	1.7	0.63	0.282	1.37	2.81	-	-
MEL-03	Metals	Nickel	-	-	5	0	26.4	24.1	13	5.83	14.8	46.2	-	-
MEL-03	Metals	Potassium	-	-	5	0	1450	1330	469	210	1040	2200	-	-
MEL-03	Metals	Selenium	-	-	5	2	0.402	0.34	0.246	0.11	0.2	0.79	-	-
MEL-03	Metals	Silver	-	-	5	4	0.102	0.1	-	-	0.1	0.11	-	-
MEL-03	Metals	Sodium	-	-	5	0	208	190	89	39.8	130	350	-	-
MEL-03	Metals	Strontium	-	-	5	0	18.3	16	7.62	3.41	12	30.6	-	-
MEL-03	Metals	Thallium	-	-	5	0	0.135	0.15	0.0655	0.0293	0.058	0.214	-	-
MEL-03	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-03	Metals	Titanium	-	-	5	0	570	525	124	55.3	486	787	-	-
MEL-03	Metals	Uranium	-	-	5	0	1.66	1.38	0.881	0.394	0.907	3.1	-	-
MEL-03	Metals	Vanadium	-	-	5	0	29.8	25.3	8.99	4.02	22.3	44.6	-	-
MEL-03	Metals	Zinc	123	315	5	0	41.1	40.6	20.5	9.17	19.6	69.8	0	0
MEL-05	Physical	% Fines[b]	-	-	5	0	48.6	47.4	28.6	12.8	7.5	86.8	-	-
MEL-05	Physical	% Clay[b]	-	-	5	1	8.68	9.4	5.4	2.41	1	16	-	-
MEL-05	Physical	% Silt[b]	-	-	5	0	40.1	38	24.7	11.1	7.5	77	-	-
MEL-05	Physical	% Sand[b]	-	-	5	0	51.2	52	28.5	12.7	13	92	-	-
MEL-05	Physical	% TOC	-	-	5	0	5.67	6.9	2.76	1.23	0.76	7.2	-	-
MEL-05	Metals	Aluminum	-	-	5	0	9250	9500	2940	1310	5590	13600	-	-
MEL-05	Metals	Antimony	-	-	5	2	0.142	0.1	0.0736	0.0329	0.1	0.27	-	-
MEL-05	Metals	Arsenic	5.9	17	5	0	11	9.81	7.03	3.14	3.61	22.7	4	1
MEL-05	Metals	Barium	-	-	5	0	74.8	78.5	39.5	17.7	22.4	132	-	-
MEL-05	Metals	Beryllium	-	-	5	1	0.194	0.21	0.0586	0.0262	0.1	0.26	-	-
MEL-05	Metals	Bismuth	-	-	5	4	0.23	0.2	-	-	0.2	0.35	-	-
MEL-05	Metals	Boron	-	-	5	1	6.18	6.1	1.24	0.554	5	8	-	-
MEL-05	Metals	Cadmium	0.6	3.5	5	0	0.226	0.212	0.141	0.0633	0.033	0.429	0	0
MEL-05	Metals	Calcium	-	-	5	0	4080	4380	1660	740	1530	6080	-	-
MEL-05	Metals	Chromium	37.3	90	5	0	43	46.4	16.5	7.38	21.4	65.4	3	0
MEL-05	Metals	Cobalt	-	-	5	0	8.78	7.79	4.18	1.87	3.94	15.4	-	-
MEL-05	Metals	Copper	35.7	197	5	0	61.2	72.4	30.9	13.8	7.4	84.5	4	0
MEL-05	Metals	Iron	-	-	5	0	16600	14700	6790	3040	10900	28300	-	-
MEL-05	Metals	Lead	35	91.3	5	0	6.17	6.37	3.08	1.38	1.78	10.3	0	0
MEL-05	Metals	Lithium	-	-	5	0	10.5	10.2	3.33	1.49	6.43	15.4	-	-
MEL-05	Metals	Magnesium	-	-	5	0	5910	5820	1880	839	3840	8800	-	-
MEL-05	Metals	Manganese	-	-	5	0	188	186	64.6	28.9	109	285	-	-
MEL-05	Metals	Mercury	0.17	0.488	5	1	0.0106	0.0111	0.00398	0.00178	0.005	0.0155	0	0
MEL-05	Metals	Molybdenum	-	-	5	0	3.57	2.7	3.42	1.53	0.5	9.45	-	-
MEL-05	Metals	Nickel	-	-	5	0	38.9	41.3	18.8	8.42	12.2	64.6	-	-
MEL-05	Metals	Potassium	-	-	5	0	1570	1410	942	421	654	3160	-	-
MEL-05	Metals	Selenium	-	-	5	1	0.7	0.7	0.374	0.167	0.2	1.24	-	-
MEL-05	Metals	Silver	-	-	5	4	0.114	0.1	-	-	0.1	0.17	-	-
MEL-05	Metals	Sodium	-	-	5	1	218	210	93.6	41.9	100	360	-	-
MEL-05	Metals	Strontium	-	-	5	0	20.2	21.4	7.64	3.42	8.3	29.2	-	-
MEL-05	Metals	Thallium	-	-	5	0	0.163	0.143	0.0918	0.041	0.056	0.307	-	-

Table F1-3. Sediment chemistry summary statistics for Meliadine Lake in 2018.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
MEL-05	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-05	Metals	Titanium	-	-	5	0	533	515	174	77.6	350	819	-	-
MEL-05	Metals	Uranium	-	-	5	0	2.76	2.13	2.56	1.15	0.461	7.16	-	-
MEL-05	Metals	Vanadium	-	-	5	0	42.3	39.1	21	9.38	20.3	76.9	-	-
MEL-05	Metals	Zinc	123	315	5	0	48.8	51.2	16.3	7.28	22.2	64	0	0

Notes

[a] ISQG (Interim Sediment Quality Guideline) and PEL (Probable Effects Level) thresholds as per CCME (2002).

[b] Particle size classes: fines = <0.05mm, clay = <2um, silt = 2um-0.05mm, sand = 0.05-2mm.

Table F1-4. Sediment chemistry summary statistics for Meliadine Lake in 2016.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
NEAR-FIELD (MEL-01)														
MEL-01	Physical	% Fines[b]	-	-	5	0	82	77.7	10.3	4.62	70.4	96.6	-	-
MEL-01	Physical	% Clay[b]	-	-	5	0	12	12.6	2.23	0.995	9.3	14.8	-	-
MEL-01	Physical	% Silt[b]	-	-	5	0	69.9	68.4	10.4	4.63	55.6	83.4	-	-
MEL-01	Physical	% Sand[b]	-	-	5	0	18	22.3	10.3	4.62	3.4	29.6	-	-
MEL-01	Physical	% TOC	-	-	5	0	4.52	4.6	1.77	0.791	2.1	6.8	-	-
MEL-01	Metals	Aluminum	-	-	5	0	10700	10700	1140	511	9180	12000	-	-
MEL-01	Metals	Antimony	-	-	5	1	0.172	0.18	0.0563	0.0252	0.1	0.25	-	-
MEL-01	Metals	Arsenic	5.9	17	5	0	97.2	112	56.7	25.4	22.8	151	5	5
MEL-01	Metals	Barium	-	-	5	0	103	100	19.6	8.74	82.9	130	-	-
MEL-01	Metals	Beryllium	-	-	5	0	0.256	0.25	0.0378	0.0169	0.2	0.3	-	-
MEL-01	Metals	Bismuth	-	-	5	1	0.264	0.26	0.0513	0.0229	0.2	0.32	-	-
MEL-01	Metals	Boron	-	-	5	0	7.06	7.2	1.36	0.609	5.3	8.5	-	-
MEL-01	Metals	Cadmium	0.6	3.5	5	0	0.41	0.451	0.107	0.0477	0.236	0.497	0	0
MEL-01	Metals	Calcium	-	-	5	0	3840	3870	285	127	3470	4260	-	-
MEL-01	Metals	Chromium	37.3	90	5	0	43.5	42.1	3.79	1.69	40.2	48.4	5	0
MEL-01	Metals	Cobalt	-	-	5	0	18.7	20.6	5.47	2.44	10.7	23.4	-	-
MEL-01	Metals	Copper	35.7	197	5	0	63.4	64.7	18.3	8.2	33.1	78	4	0
MEL-01	Metals	Iron	-	-	5	0	49400	47700	25100	11200	23300	83400	-	-
MEL-01	Metals	Lead	35	91.3	5	0	11.7	11.7	3.08	1.38	7.72	15	0	0
MEL-01	Metals	Lithium	-	-	5	0	14.2	14.1	1.19	0.532	12.7	16	-	-
MEL-01	Metals	Magnesium	-	-	5	0	6340	6150	542	243	5760	7180	-	-
MEL-01	Metals	Manganese	-	-	5	0	580	635	245	109	261	871	-	-
MEL-01	Metals	Mercury	0.17	0.488	5	0	0.0624	0.0642	0.0275	0.0123	0.0208	0.093	0	0
MEL-01	Metals	Molybdenum	-	-	5	0	7.86	7.05	4	1.79	3.2	13.9	-	-
MEL-01	Metals	Nickel	-	-	5	0	63.3	61.4	14.3	6.42	48.3	78.8	-	-
MEL-01	Metals	Potassium	-	-	5	0	2080	2090	283	127	1800	2520	-	-
MEL-01	Metals	Selenium	-	-	5	0	1.09	1.05	0.222	0.0995	0.87	1.39	-	-
MEL-01	Metals	Silver	-	-	5	0	0.164	0.15	0.0365	0.0163	0.13	0.22	-	-
MEL-01	Metals	Sodium	-	-	5	0	290	280	29.2	13	260	330	-	-
MEL-01	Metals	Strontium	-	-	5	0	20.8	20.9	2.63	1.17	16.9	24.2	-	-
MEL-01	Metals	Sulfur	-	-	5	0	5550	2510	6820	3050	1090	17600	-	-
MEL-01	Metals	Thallium	-	-	5	0	0.275	0.276	0.0355	0.0159	0.235	0.317	-	-
MEL-01	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-01	Metals	Titanium	-	-	5	0	599	596	57.7	25.8	539	690	-	-
MEL-01	Metals	Uranium	-	-	5	0	3.2	3.12	0.312	0.14	2.88	3.54	-	-
MEL-01	Metals	Vanadium	-	-	5	0	51.8	53.7	4.33	1.94	46.6	55.7	-	-
MEL-01	Metals	Zinc	123	315	5	0	77.2	75.9	16.9	7.56	50.8	93.7	0	0
MID-FIELD (MEL-02)														
MEL-02	Physical	% Fines[b]	-	-	5	0	46	48	8.59	3.84	35.8	57	-	-
MEL-02	Physical	% Clay[b]	-	-	5	0	11.3	12.1	4.66	2.08	3.6	15	-	-
MEL-02	Physical	% Silt[b]	-	-	5	0	34.7	35.2	5.12	2.29	28.1	42	-	-
MEL-02	Physical	% Sand[b]	-	-	5	0	54	51.9	8.59	3.84	43	64.2	-	-
MEL-02	Physical	% TOC	-	-	5	0	4.64	5.2	2.67	1.2	0.4	7.6	-	-
MEL-02	Metals	Aluminum	-	-	5	0	10300	10000	1310	584	8850	12300	-	-
MEL-02	Metals	Antimony	-	-	5	2	0.154	0.16	0.0581	0.026	0.1	0.24	-	-
MEL-02	Metals	Arsenic	5.9	17	5	0	21.6	15.5	17	7.6	10.4	51.5	5	2
MEL-02	Metals	Barium	-	-	5	0	99.9	106	26.3	11.8	56.6	128	-	-
MEL-02	Metals	Beryllium	-	-	5	0	0.256	0.25	0.0472	0.0211	0.2	0.33	-	-
MEL-02	Metals	Bismuth	-	-	5	1	0.232	0.22	0.0444	0.0198	0.2	0.31	-	-
MEL-02	Metals	Boron	-	-	5	1	6.18	5.7	1.54	0.687	5	8.8	-	-
MEL-02	Metals	Cadmium	0.6	3.5	5	0	0.325	0.325	0.176	0.0786	0.051	0.534	0	0
MEL-02	Metals	Calcium	-	-	5	0	4260	4340	842	376	2970	5270	-	-
MEL-02	Metals	Chromium	37.3	90	5	0	41.2	40.1	6.48	2.9	32.3	50.2	4	0
MEL-02	Metals	Cobalt	-	-	5	0	10.8	10.8	0.628	0.281	9.9	11.6	-	-
MEL-02	Metals	Copper	35.7	197	5	0	72.2	75.5	32.8	14.7	20.5	111	4	0
MEL-02	Metals	Iron	-	-	5	0	24100	19000	10400	4640	17900	42400	-	-
MEL-02	Metals	Lead	35	91.3	5	0	9.39	8.73	3.48	1.56	5.8	15.2	0	0
MEL-02	Metals	Lithium	-	-	5	0	14	13.5	1.57	0.703	12.5	16	-	-
MEL-02	Metals	Magnesium	-	-	5	0	6010	5880	745	333	5020	6860	-	-
MEL-02	Metals	Manganese	-	-	5	0	332	295	106	47.4	261	518	-	-
MEL-02	Metals	Mercury	0.17	0.488	5	0	0.033	0.0293	0.012	0.00536	0.0203	0.0484	0	0
MEL-02	Metals	Molybdenum	-	-	5	0	6.2	6.03	3.19	1.43	3.48	11.5	-	-
MEL-02	Metals	Nickel	-	-	5	0	44.9	47.8	12.6	5.65	23.5	57.3	-	-
MEL-02	Metals	Potassium	-	-	5	0	1880	1810	219	98	1660	2200	-	-
MEL-02	Metals	Selenium	-	-	5	0	0.86	0.9	0.352	0.157	0.32	1.3	-	-
MEL-02	Metals	Silver	-	-	5	1	0.156	0.15	0.0472	0.0211	0.1	0.23	-	-
MEL-02	Metals	Sodium	-	-	5	0	266	270	89.6	40.1	150	400	-	-
MEL-02	Metals	Strontium	-	-	5	0	23.5	24	5.74	2.57	14.7	30.8	-	-
MEL-02	Metals	Sulfur	-	-	5	0	1940	2040	1080	484	320	2910	-	-
MEL-02	Metals	Thallium	-	-	5	0	0.235	0.225	0.107	0.0477	0.08	0.364	-	-

Table F1-4. Sediment chemistry summary statistics for Meliadine Lake in 2016.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
MEL-02	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-02	Metals	Titanium	-	-	5	0	550	528	49.1	22	509	630	-	-
MEL-02	Metals	Uranium	-	-	5	0	3.37	3.01	1.12	0.502	2.02	4.91	-	-
MEL-02	Metals	Vanadium	-	-	5	0	51.9	53.3	8.72	3.9	43.1	63.5	-	-
MEL-02	Metals	Zinc	123	315	5	0	80.8	86.7	21.4	9.55	44.8	102	0	0
REFERENCE (MEL-03, MEL-04, & MEL-05)														
MEL-03	Physical	% Fines[b]	-	-	5	0	37.7	38.4	20.7	9.27	14.9	59	-	-
MEL-03	Physical	% Clay[b]	-	-	5	0	5.4	5.7	4.88	2.18	0.3	11.5	-	-
MEL-03	Physical	% Silt[b]	-	-	5	0	32.3	32.7	16	7.15	14.1	48.7	-	-
MEL-03	Physical	% Sand[b]	-	-	5	0	56.9	61.7	29.4	13.2	14	85.2	-	-
MEL-03	Physical	% TOC	-	-	5	0	3.74	4.3	2.49	1.11	1	6.5	-	-
MEL-03	Metals	Aluminum	-	-	5	0	5840	6890	1930	863	3000	7500	-	-
MEL-03	Metals	Antimony	-	-	5	4	0.102	0.1	-	-	0.1	0.11	-	-
MEL-03	Metals	Arsenic	5.9	17	5	0	3.88	3.75	1.87	0.837	1.37	6.11	1	0
MEL-03	Metals	Barium	-	-	5	0	59	67.4	25.4	11.4	23	82.4	-	-
MEL-03	Metals	Beryllium	-	-	5	1	0.154	0.17	0.0416	0.0186	0.1	0.19	-	-
MEL-03	Metals	Bismuth	-	-	5	5	0.2	0.2	-	-	-	0.2	-	-
MEL-03	Metals	Boron	-	-	5	3	5.3	5	-	-	5	6	-	-
MEL-03	Metals	Cadmium	0.6	3.5	5	0	0.155	0.162	0.0678	0.0303	0.068	0.241	0	0
MEL-03	Metals	Calcium	-	-	5	0	3360	3840	1050	469	1990	4250	-	-
MEL-03	Metals	Chromium	37.3	90	5	0	20.5	24	7.17	3.21	9.79	26.4	0	0
MEL-03	Metals	Cobalt	-	-	5	0	4.76	5.85	1.76	0.787	2.36	6.18	-	-
MEL-03	Metals	Copper	35.7	197	5	0	37	47.4	19.1	8.55	13.2	54.4	3	0
MEL-03	Metals	Iron	-	-	5	0	9220	10600	3030	1360	4610	11600	-	-
MEL-03	Metals	Lead	35	91.3	5	0	4.8	4.37	2.78	1.24	1.75	9.32	0	0
MEL-03	Metals	Lithium	-	-	5	0	9.43	11.1	2.79	1.25	5.38	11.9	-	-
MEL-03	Metals	Magnesium	-	-	5	0	3430	4110	1130	505	1770	4370	-	-
MEL-03	Metals	Manganese	-	-	5	0	129	146	46.3	20.7	59.9	168	-	-
MEL-03	Metals	Mercury	0.17	0.488	5	1	0.0191	0.0187	0.0116	0.00519	0.005	0.0359	0	0
MEL-03	Metals	Molybdenum	-	-	5	0	1.24	1.29	0.603	0.27	0.47	1.89	-	-
MEL-03	Metals	Nickel	-	-	5	0	22.2	25.9	8.5	3.8	9.76	29.2	-	-
MEL-03	Metals	Potassium	-	-	5	0	1180	1360	410	184	525	1530	-	-
MEL-03	Metals	Selenium	-	-	5	1	0.418	0.46	0.178	0.0796	0.2	0.62	-	-
MEL-03	Metals	Silver	-	-	5	5	0.1	0.1	-	-	-	0.1	-	-
MEL-03	Metals	Sodium	-	-	5	1	188	220	69.1	30.9	100	260	-	-
MEL-03	Metals	Strontium	-	-	5	0	15.8	18	5.51	2.47	8.33	20.7	-	-
MEL-03	Metals	Sulfur	-	-	5	0	1510	1440	1070	478	330	3130	-	-
MEL-03	Metals	Thallium	-	-	5	0	0.107	0.126	0.0352	0.0157	0.056	0.135	-	-
MEL-03	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-03	Metals	Titanium	-	-	5	0	423	484	111	49.5	270	528	-	-
MEL-03	Metals	Uranium	-	-	5	0	1.24	1.45	0.418	0.187	0.673	1.63	-	-
MEL-03	Metals	Vanadium	-	-	5	0	23.2	27.3	7.76	3.47	11.1	29.5	-	-
MEL-03	Metals	Zinc	123	315	5	0	36.7	43.6	14.3	6.38	17.1	48.9	0	0
MEL-04	Physical	% Fines[b]	-	-	5	0	36.6	34.5	19.9	8.89	7.3	59.1	-	-
MEL-04	Physical	% Clay[b]	-	-	5	0	6.34	7	3.7	1.65	1	9.9	-	-
MEL-04	Physical	% Silt[b]	-	-	5	0	30.2	30.1	16.5	7.37	6.3	49.7	-	-
MEL-04	Physical	% Sand[b]	-	-	5	0	63.5	65.5	20	8.92	40.9	92.9	-	-
MEL-04	Physical	% TOC	-	-	5	0	2.52	3	1.85	0.828	0.5	4.9	-	-
MEL-04	Metals	Aluminum	-	-	5	0	6280	7030	2000	896	2730	7640	-	-
MEL-04	Metals	Antimony	-	-	5	3	0.11	0.1	-	-	0.1	0.14	-	-
MEL-04	Metals	Arsenic	5.9	17	5	0	7.12	7.23	3.19	1.43	2.39	11.3	4	0
MEL-04	Metals	Barium	-	-	5	0	65.2	75.6	27.9	12.5	17.9	89.6	-	-
MEL-04	Metals	Beryllium	-	-	5	1	0.168	0.18	0.0396	0.0177	0.1	0.2	-	-
MEL-04	Metals	Bismuth	-	-	5	5	0.2	0.2	-	-	-	0.2	-	-
MEL-04	Metals	Boron	-	-	5	1	6.34	6.2	1.25	0.559	5	7.9	-	-
MEL-04	Metals	Cadmium	0.6	3.5	5	1	0.164	0.194	0.106	0.0472	0.02	0.293	0	0
MEL-04	Metals	Calcium	-	-	5	0	3290	3670	1120	502	1410	4360	-	-
MEL-04	Metals	Chromium	37.3	90	5	0	24.2	27.9	8.57	3.83	8.96	29	0	0
MEL-04	Metals	Cobalt	-	-	5	0	5.67	6.38	2.09	0.936	1.97	7.15	-	-
MEL-04	Metals	Copper	35.7	197	5	0	38.8	54.3	25.8	11.5	9.02	63.2	3	0
MEL-04	Metals	Iron	-	-	5	0	12600	13700	3620	1620	6280	15300	-	-
MEL-04	Metals	Lead	35	91.3	5	0	4.44	4.49	1.95	0.873	1.56	7.03	0	0
MEL-04	Metals	Lithium	-	-	5	0	9.02	9.29	2.29	1.02	5.32	11.3	-	-
MEL-04	Metals	Magnesium	-	-	5	0	3570	4030	1130	506	1600	4420	-	-
MEL-04	Metals	Manganese	-	-	5	0	172	188	51	22.8	95.1	232	-	-
MEL-04	Metals	Mercury	0.17	0.488	5	1	0.0168	0.018	0.00889	0.00397	0.005	0.0269	0	0
MEL-04	Metals	Molybdenum	-	-	5	0	2.46	2.65	1.14	0.51	0.55	3.62	-	-
MEL-04	Metals	Nickel	-	-	5	0	26.4	31.9	11.2	5.02	6.93	34.4	-	-
MEL-04	Metals	Potassium	-	-	5	0	1280	1250	588	263	466	2120	-	-
MEL-04	Metals	Selenium	-	-	5	1	0.468	0.57	0.189	0.0843	0.2	0.63	-	-
MEL-04	Metals	Silver	-	-	5	5	0.1	0.1	-	-	-	0.1	-	-

Table F1-4. Sediment chemistry summary statistics for Meliadine Lake in 2016.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
MEL-04	Metals	Sodium	-	-	5	1	202	220	58.9	26.3	100	250	-	-
MEL-04	Metals	Strontium	-	-	5	0	16.2	18	5.17	2.31	7.67	21.1	-	-
MEL-04	Metals	Sulfur	-	-	5	0	1710	1290	1700	760	120	4600	-	-
MEL-04	Metals	Thallium	-	-	5	1	0.143	0.152	0.0569	0.0254	0.05	0.201	-	-
MEL-04	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-04	Metals	Titanium	-	-	5	0	443	442	142	63.5	233	631	-	-
MEL-04	Metals	Uranium	-	-	5	0	1.76	1.95	0.721	0.322	0.511	2.3	-	-
MEL-04	Metals	Vanadium	-	-	5	0	29.5	33	10.4	4.63	11.4	37.8	-	-
MEL-04	Metals	Zinc	123	315	5	0	37.3	46.2	15.4	6.88	12.8	49.6	0	0
MEL-05	Physical	% Fines[b]	-	-	5	0	37.4	50	20.4	9.11	7	53.4	-	-
MEL-05	Physical	% Clay[b]	-	-	5	0	6.39	8.33	4.2	1.88	0.1	10.3	-	-
MEL-05	Physical	% Silt[b]	-	-	5	0	31.1	39.7	16.3	7.28	6.9	44.4	-	-
MEL-05	Physical	% Sand[b]	-	-	5	0	62.6	50	20.4	9.11	46.6	93	-	-
MEL-05	Physical	% TOC	-	-	5	0	5	4.8	2.83	1.27	0.9	7.9	-	-
MEL-05	Metals	Aluminum	-	-	5	0	7730	7660	1770	793	5170	9630	-	-
MEL-05	Metals	Antimony	-	-	5	4	0.11	0.1	-	-	0.1	0.15	-	-
MEL-05	Metals	Arsenic	5.9	17	5	0	8.65	9.97	3.57	1.6	2.49	11.7	4	0
MEL-05	Metals	Barium	-	-	5	0	66.7	60.4	27.6	12.4	28.9	102	-	-
MEL-05	Metals	Beryllium	-	-	5	1	0.158	0.17	0.0342	0.0153	0.1	0.19	-	-
MEL-05	Metals	Bismuth	-	-	5	5	0.2	0.2	-	-	-	0.2	-	-
MEL-05	Metals	Boron	-	-	5	2	5.76	6	0.727	0.325	5	6.6	-	-
MEL-05	Metals	Cadmium	0.6	3.5	5	0	0.193	0.218	0.0805	0.036	0.058	0.271	0	0
MEL-05	Metals	Calcium	-	-	5	0	3690	3920	1170	521	1800	4980	-	-
MEL-05	Metals	Chromium	37.3	90	5	0	31.2	30.4	7.98	3.57	20.1	39.9	2	0
MEL-05	Metals	Cobalt	-	-	5	0	7.29	7.59	1.9	0.848	4.51	9.17	-	-
MEL-05	Metals	Copper	35.7	197	5	0	55.6	60.7	25.7	11.5	13.8	83.2	4	0
MEL-05	Metals	Iron	-	-	5	0	13200	12600	2990	1340	8990	16900	-	-
MEL-05	Metals	Lead	35	91.3	5	0	5.05	5.68	1.78	0.797	1.99	6.27	0	0
MEL-05	Metals	Lithium	-	-	5	0	9.66	9.78	1.82	0.815	7.06	11.4	-	-
MEL-05	Metals	Magnesium	-	-	5	0	5030	4820	1100	493	3650	6230	-	-
MEL-05	Metals	Manganese	-	-	5	0	155	157	40.8	18.3	94.4	204	-	-
MEL-05	Metals	Mercury	0.17	0.488	5	1	0.0142	0.0148	0.00558	0.00249	0.005	0.0197	0	0
MEL-05	Metals	Molybdenum	-	-	5	0	2.76	2.58	1.48	0.661	0.81	4.46	-	-
MEL-05	Metals	Nickel	-	-	5	0	31.5	34.7	10.7	4.76	14.2	42.9	-	-
MEL-05	Metals	Potassium	-	-	5	0	1280	1140	433	194	691	1750	-	-
MEL-05	Metals	Selenium	-	-	5	1	0.67	0.64	0.304	0.136	0.2	0.94	-	-
MEL-05	Metals	Silver	-	-	5	4	0.1	0.1	-	-	-	0.1	-	-
MEL-05	Metals	Sodium	-	-	5	1	182	190	48.7	21.8	100	230	-	-
MEL-05	Metals	Strontium	-	-	5	0	17.3	18.4	5.36	2.4	8.3	22.8	-	-
MEL-05	Metals	Sulfur	-	-	5	0	2940	3120	1750	785	500	5350	-	-
MEL-05	Metals	Thallium	-	-	5	0	0.122	0.12	0.042	0.0188	0.064	0.173	-	-
MEL-05	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-05	Metals	Titanium	-	-	5	0	411	384	84.8	37.9	322	506	-	-
MEL-05	Metals	Uranium	-	-	5	0	1.63	1.57	0.703	0.314	0.538	2.38	-	-
MEL-05	Metals	Vanadium	-	-	5	0	34.9	32.6	11.3	5.04	19.2	46.9	-	-
MEL-05	Metals	Zinc	123	315	5	0	43.3	45.4	11.2	4.99	24.9	55.2	0	0

Notes

[a] ISQG (Interim Sediment Quality Guideline) and PEL (Probable Effects Level) thresholds as per CCME (2002).

[b] Particle size classes: fines = <0.05mm, clay = <2um, silt = 2um-0.05mm, sand = 0.05-2mm.

Table F1-5. Sediment chemistry summary statistics for Meliadine Lake in 2015.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
NEAR-FIELD (MEL-01)														
MEL-01	Physical	% Fines[b]	-	-	5	0	63.3	68.1	30.8	13.8	11.4	89.6	-	-
MEL-01	Physical	% Clay[b]	-	-	5	0	5.68	5.5	3.43	1.54	0.6	9	-	-
MEL-01	Physical	% Silt[b]	-	-	5	0	57.6	63.5	27.6	12.3	10.8	80.6	-	-
MEL-01	Physical	% Sand[b]	-	-	5	0	36.7	31.9	30.8	13.8	10.4	88.6	-	-
MEL-01	Physical	% TOC	-	-	5	0	4.24	4.8	2.27	1.02	0.4	6.1	-	-
MEL-01	Metals	Aluminum	-	-	5	0	11300	12700	4220	1890	4000	14600	-	-
MEL-01	Metals	Antimony	-	-	5	1	0.184	0.2	0.0555	0.0248	0.1	0.24	-	-
MEL-01	Metals	Arsenic	5.9	17	5	0	54.8	58.9	31.4	14.1	23.3	98.4	5	5
MEL-01	Metals	Barium	-	-	5	0	109	121	50.2	22.5	22.8	149	-	-
MEL-01	Metals	Beryllium	-	-	5	1	0.264	0.29	0.0956	0.0427	0.1	0.34	-	-
MEL-01	Metals	Bismuth	-	-	5	1	0.308	0.31	0.0705	0.0315	0.2	0.38	-	-
MEL-01	Metals	Boron	-	-	5	2	5.88	5.6	0.965	0.432	5	7	-	-
MEL-01	Metals	Cadmium	0.6	3.5	5	0	0.387	0.455	0.195	0.0872	0.044	0.515	0	0
MEL-01	Metals	Calcium	-	-	5	0	3920	4470	1390	621	1450	4720	-	-
MEL-01	Metals	Chromium	37.3	90	5	0	42.6	47.7	16.8	7.51	13.7	55.8	4	0
MEL-01	Metals	Cobalt	-	-	5	0	14.5	16.4	7.26	3.25	4.09	20.9	-	-
MEL-01	Metals	Copper	35.7	197	5	0	65.2	70.2	33	14.8	10.6	98.2	4	0
MEL-01	Metals	Iron	-	-	5	0	37700	39900	17100	7640	15100	57800	-	-
MEL-01	Metals	Lead	35	91.3	5	0	11.3	13.8	5.14	2.3	2.42	15.1	0	0
MEL-01	Metals	Lithium	-	-	5	0	13.1	14.9	4.6	2.06	5.2	16.5	-	-
MEL-01	Metals	Magnesium	-	-	5	0	5930	6620	2190	981	2160	7610	-	-
MEL-01	Metals	Manganese	-	-	5	0	475	503	179	79.8	231	701	-	-
MEL-01	Metals	Mercury	0.17	0.488	5	0	0.0406	0.0498	0.0194	0.00869	0.0077	0.0554	0	0
MEL-01	Metals	Molybdenum	-	-	5	0	4.44	4.11	1.86	0.832	2.35	6.77	-	-
MEL-01	Metals	Nickel	-	-	5	0	59.6	66.6	29.5	13.2	12	83.5	-	-
MEL-01	Metals	Potassium	-	-	5	0	1970	2150	859	384	513	2650	-	-
MEL-01	Metals	Selenium	-	-	5	1	0.932	1	0.439	0.196	0.2	1.3	-	-
MEL-01	Metals	Silver	-	-	5	1	0.17	0.16	0.051	0.0228	0.1	0.24	-	-
MEL-01	Metals	Sodium	-	-	5	1	274	300	101	45.1	100	360	-	-
MEL-01	Metals	Strontium	-	-	5	0	21.9	24.9	7.56	3.38	8.53	26.3	-	-
MEL-01	Metals	Sulfur	-	-	5	0	1480	1910	858	384	160	2200	-	-
MEL-01	Metals	Thallium	-	-	5	1	0.268	0.28	0.131	0.0584	0.05	0.385	-	-
MEL-01	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-01	Metals	Titanium	-	-	5	0	640	707	211	94.4	275	815	-	-
MEL-01	Metals	Uranium	-	-	5	0	3.12	3.49	1.42	0.634	0.714	4.4	-	-
MEL-01	Metals	Vanadium	-	-	5	0	48	52.3	18.8	8.4	15.9	63.9	-	-
MEL-01	Metals	Zinc	123	315	5	0	75.7	79.5	32.1	14.3	21.1	101	0	0
MID-FIELD (MEL-02)														
MEL-02	Physical	% Fines[b]	-	-	5	0	44.7	57.5	29.1	13	7.6	75.3	-	-
MEL-02	Physical	% Clay[b]	-	-	5	0	6.4	6.1	5.65	2.53	0.4	14.9	-	-
MEL-02	Physical	% Silt[b]	-	-	5	0	38.3	49.3	24.1	10.8	7.2	60.4	-	-
MEL-02	Physical	% Sand[b]	-	-	5	0	55.4	42.5	29.1	13	24.7	92.4	-	-
MEL-02	Physical	% TOC	-	-	5	0	4.8	5.2	4.61	2.06	0.1	11	-	-
MEL-02	Metals	Aluminum	-	-	5	0	9890	11900	4150	1860	3300	13700	-	-
MEL-02	Metals	Antimony	-	-	5	2	0.166	0.13	0.0885	0.0396	0.1	0.31	-	-
MEL-02	Metals	Arsenic	5.9	17	5	0	15.9	17.4	7.77	3.47	5.12	25.3	4	3
MEL-02	Metals	Barium	-	-	5	0	81.7	104	51.3	23	16.9	134	-	-
MEL-02	Metals	Beryllium	-	-	5	1	0.208	0.25	0.0876	0.0392	0.1	0.3	-	-
MEL-02	Metals	Bismuth	-	-	5	2	0.24	0.23	0.0534	0.0239	0.2	0.33	-	-
MEL-02	Metals	Boron	-	-	5	2	6.46	5.7	2.09	0.933	5	10	-	-
MEL-02	Metals	Cadmium	0.6	3.5	5	0	0.258	0.339	0.216	0.0965	0.034	0.525	0	0
MEL-02	Metals	Calcium	-	-	5	0	4040	4980	1980	884	1690	5710	-	-
MEL-02	Metals	Chromium	37.3	90	5	0	39.7	47.8	19.5	8.73	10.2	58.3	3	0
MEL-02	Metals	Cobalt	-	-	5	0	14.9	12.5	13.8	6.19	2.5	38.3	-	-
MEL-02	Metals	Copper	35.7	197	5	0	55.3	62.2	43.7	19.5	6.95	109	3	0
MEL-02	Metals	Iron	-	-	5	0	21700	21900	8130	3640	8460	30000	-	-
MEL-02	Metals	Lead	35	91.3	5	0	8.15	9.15	5	2.23	2.56	14.9	0	0
MEL-02	Metals	Lithium	-	-	5	0	12.2	14.1	4.16	1.86	4.87	14.6	-	-
MEL-02	Metals	Magnesium	-	-	5	0	5540	6570	2060	922	2010	7020	-	-
MEL-02	Metals	Manganese	-	-	5	0	290	307	113	50.4	114	428	-	-
MEL-02	Metals	Mercury	0.17	0.488	5	0	0.0229	0.0131	0.0191	0.00854	0.007	0.0508	0	0
MEL-02	Metals	Molybdenum	-	-	5	0	4.07	4.43	2.24	1	0.83	6.88	-	-
MEL-02	Metals	Nickel	-	-	5	0	42.9	57.3	26	11.6	8.68	68.5	-	-
MEL-02	Metals	Potassium	-	-	5	0	1760	2010	857	383	548	2670	-	-
MEL-02	Metals	Selenium	-	-	5	2	0.742	0.93	0.514	0.23	0.2	1.32	-	-
MEL-02	Metals	Silver	-	-	5	2	0.14	0.14	0.0453	0.0202	0.1	0.21	-	-
MEL-02	Metals	Sodium	-	-	5	2	232	280	125	55.8	100	370	-	-
MEL-02	Metals	Strontium	-	-	5	0	21.5	27.3	9.75	4.36	9.87	30.4	-	-
MEL-02	Metals	Sulfur	-	-	5	1	1980	1920	2060	921	100	5090	-	-
MEL-02	Metals	Thallium	-	-	5	1	0.196	0.224	0.148	0.066	0.05	0.401	-	-

Table F1-5. Sediment chemistry summary statistics for Meliadine Lake in 2015.

Area	Class	Parameter	ISQG	PEL	N	N<DL	Mean	Median	SD	SE	Min	Max	N>ISQG	N>PEL
MEL-02	Metals	Tin	-	-	5	5	2	2	-	-	-	2	-	-
MEL-02	Metals	Titanium	-	-	5	0	591	705	205	91.7	252	746	-	-
MEL-02	Metals	Uranium	-	-	5	0	2.53	3.08	1.65	0.737	0.5	4.04	-	-
MEL-02	Metals	Vanadium	-	-	5	0	43.7	48.1	20.4	9.14	12.3	66.6	-	-
MEL-02	Metals	Zinc	123	315	5	0	68.8	89.2	37.2	16.6	18.5	106	0	0

Notes

[a] ISQG (Interim Sediment Quality Guideline) and PEL (Probable Effects Level) thresholds as per CCME (2002).

[b] Particle size classes: fines = <0.05mm, clay = <2um, silt = 2um-0.05mm, sand = 0.05-2mm.

Appendix F2

Supplemental Figures

APPENDIX F2 – FIGURES

Figure F2-1. Fines (clay + silt; <0.05 mm) 1
Figure F2-2. Clay (<2 µm) 1
Figure F2-3. Silt (2 µm to 0.05 mm) 1
Figure F2-4. Sand (0.05 – 2 mm) 2
Figure F2-5. Total organic carbon (<0.05 mm) 2
Figure F2-6. Aluminum 3
Figure F2-7. Antimony 4
Figure F2-8. Arsenic 5
Figure F2-9. Barium 6
Figure F2-10. Beryllium 7
Figure F2-11. Bismuth 8
Figure F2-12. Boron 9
Figure F2-13. Cadmium 10
Figure F2-14. Calcium 11
Figure F2-15. Chromium 12
Figure F2-16. Cobalt 13
Figure F2-17. Copper 14
Figure F2-18. Iron 15
Figure F2-19. Lead 16
Figure F2-20. Lithium 17
Figure F2-21. Magnesium 18
Figure F2-22. Manganese 19
Figure F2-23. Mercury 20
Figure F2-24. Molybdenum 21
Figure F2-25. Nickel 22
Figure F2-26. Potassium 23
Figure F2-27. Selenium 24
Figure F2-28. Silver 25
Figure F2-29. Sodium 26

Figure F2-30. Strontium 27
Figure F2-31. Sulfur 28
Figure F2-32. Thallium 29
Figure F2-33. Tin 30
Figure F2-34. Titanium 31
Figure F2-35. Uranium 32
Figure F2-36. Vanadium 33
Figure F2-37. Zinc 34

Figure F2-1. Fines (clay + silt; <0.05 mm)

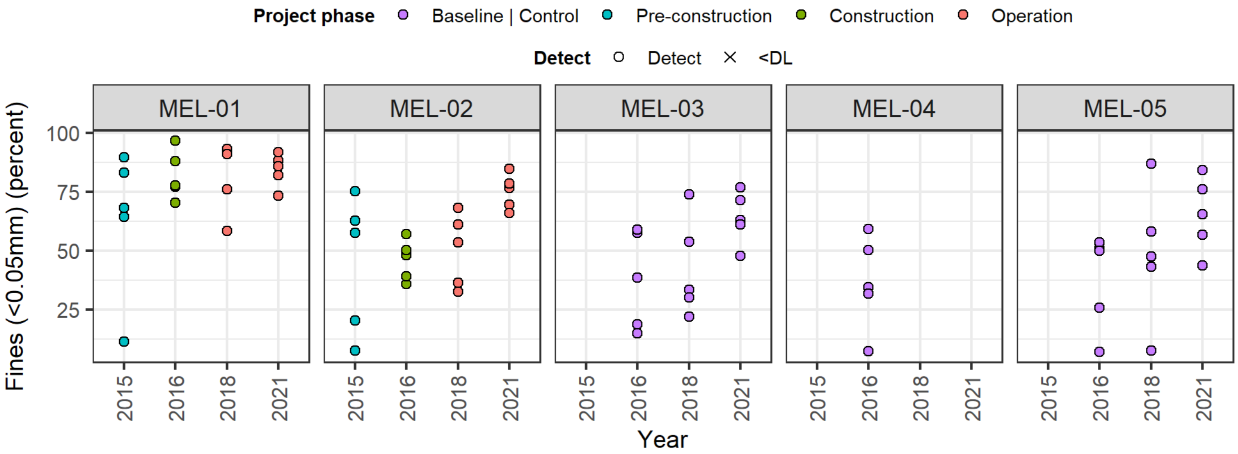


Figure F2-2. Clay (<2 µm)

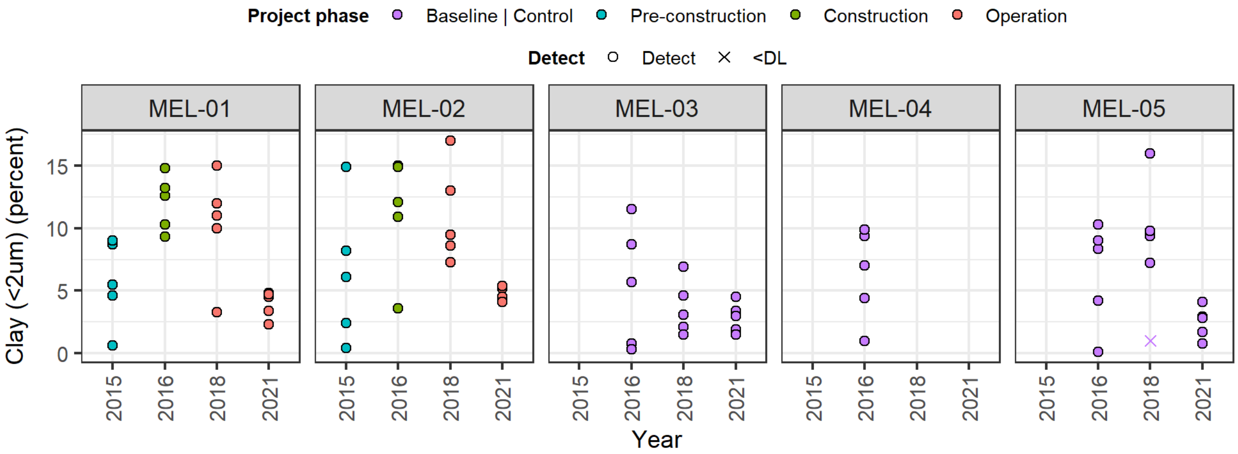


Figure F2-3. Silt (2 µm to 0.05 mm)

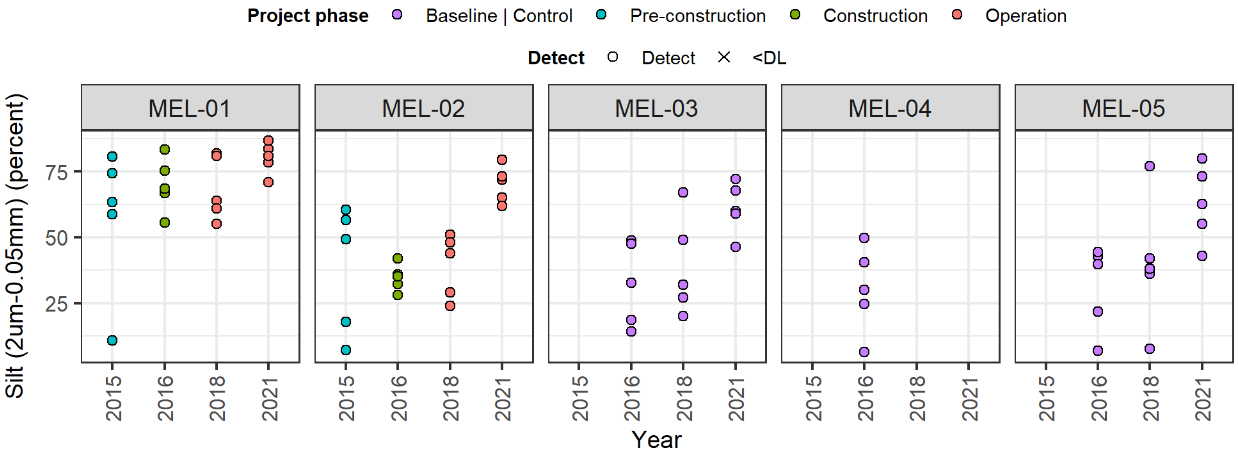


Figure F2-4. Sand (0.05 – 2 mm)

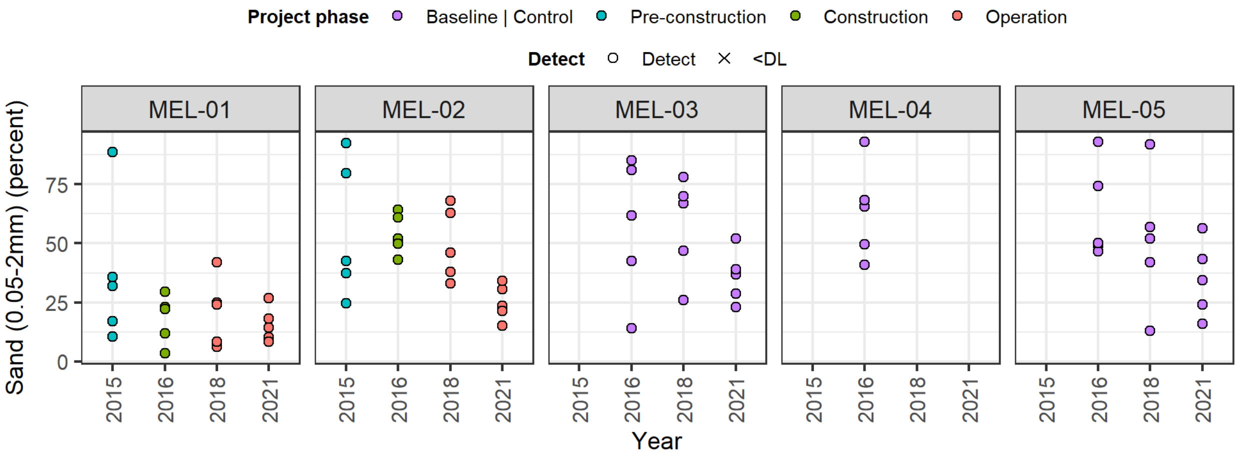


Figure F2-5. Total organic carbon (<0.05 mm)

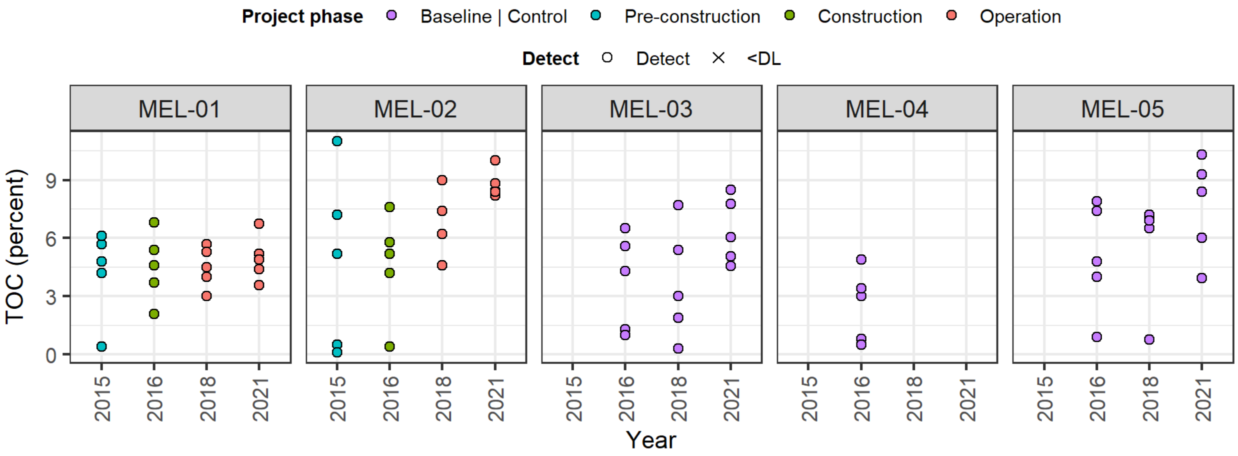


Figure F2-6. Aluminum

Figure F2-7. Antimony

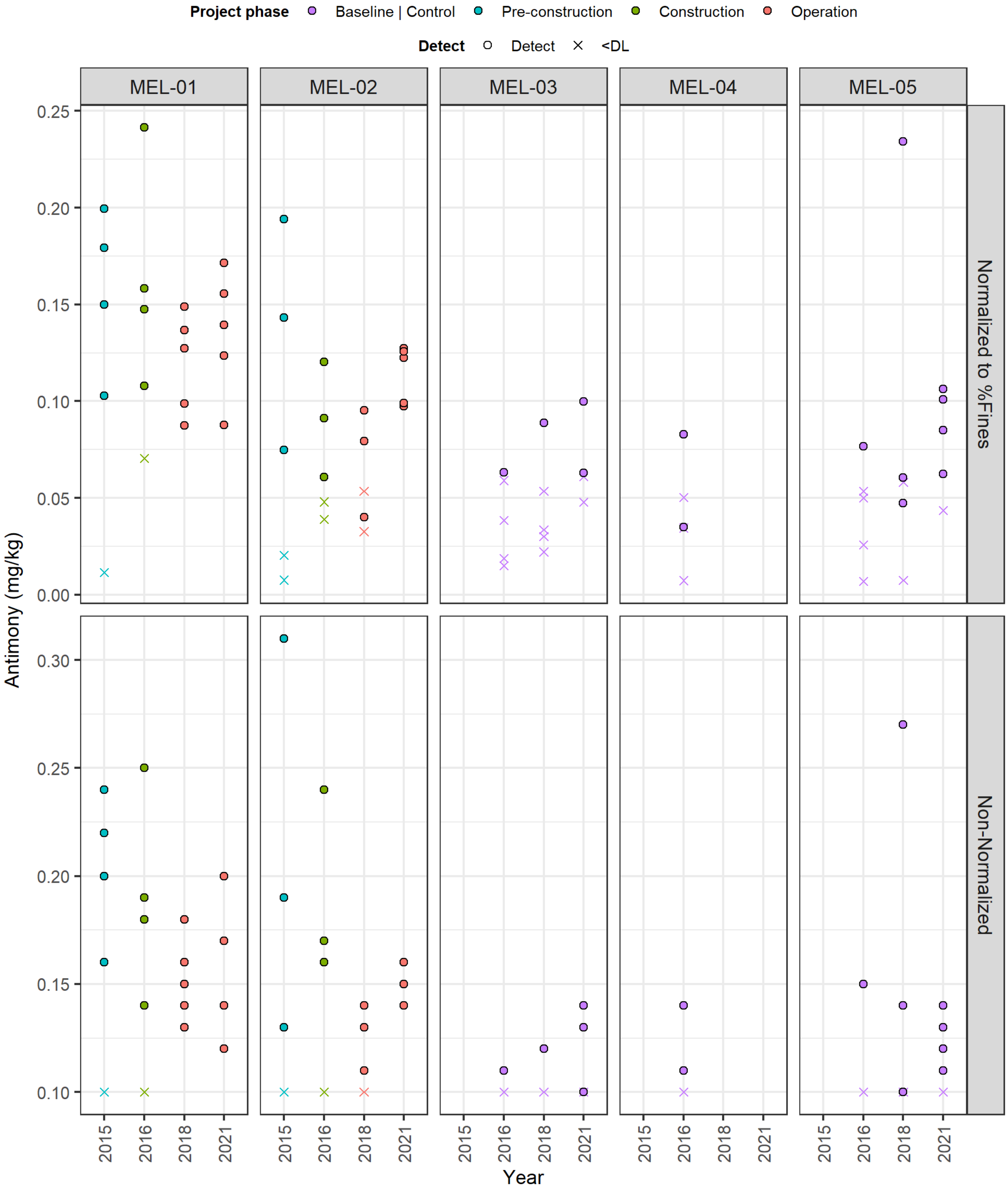


Figure F2-8. **Arsenic**

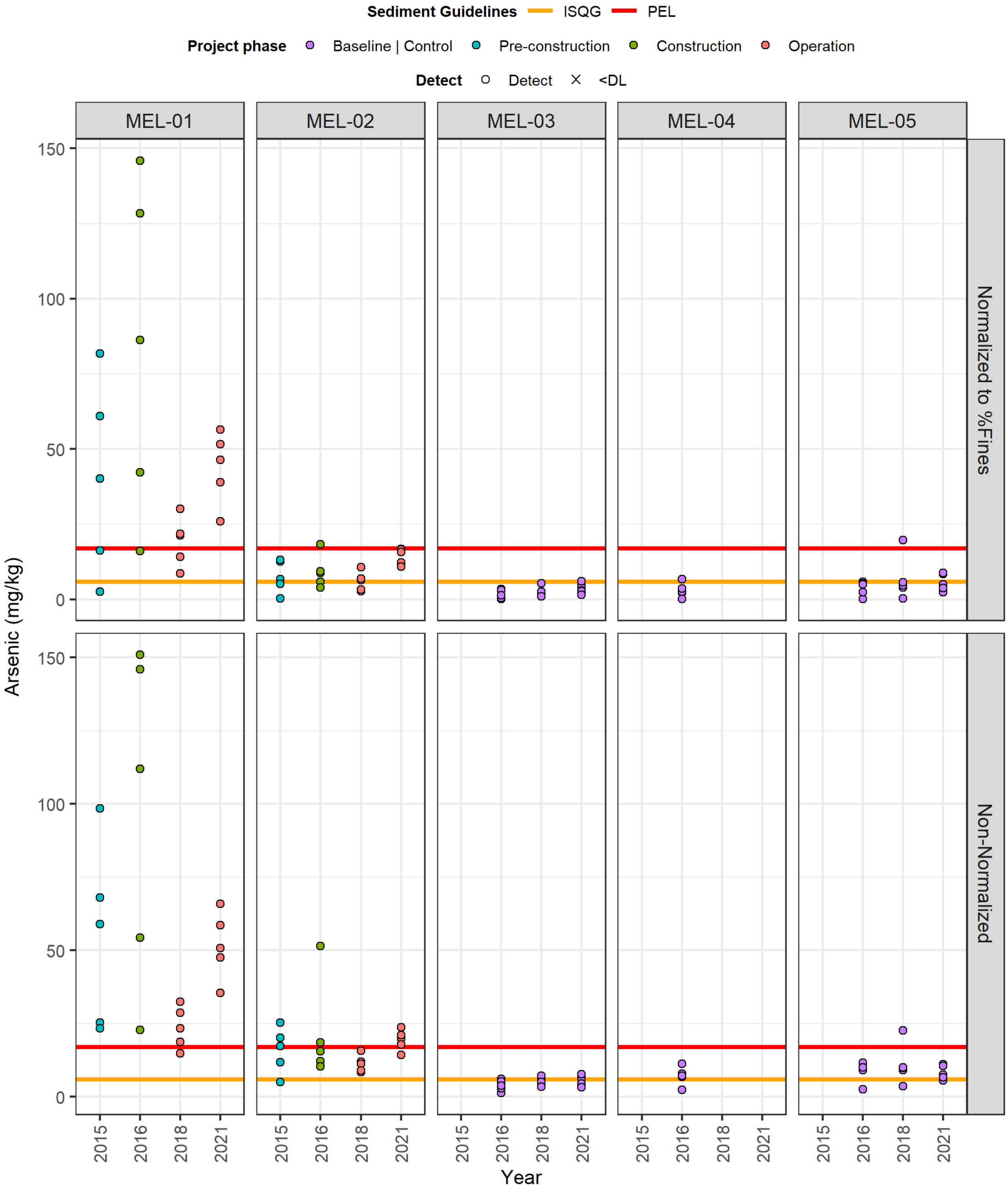


Figure F2-9. Barium

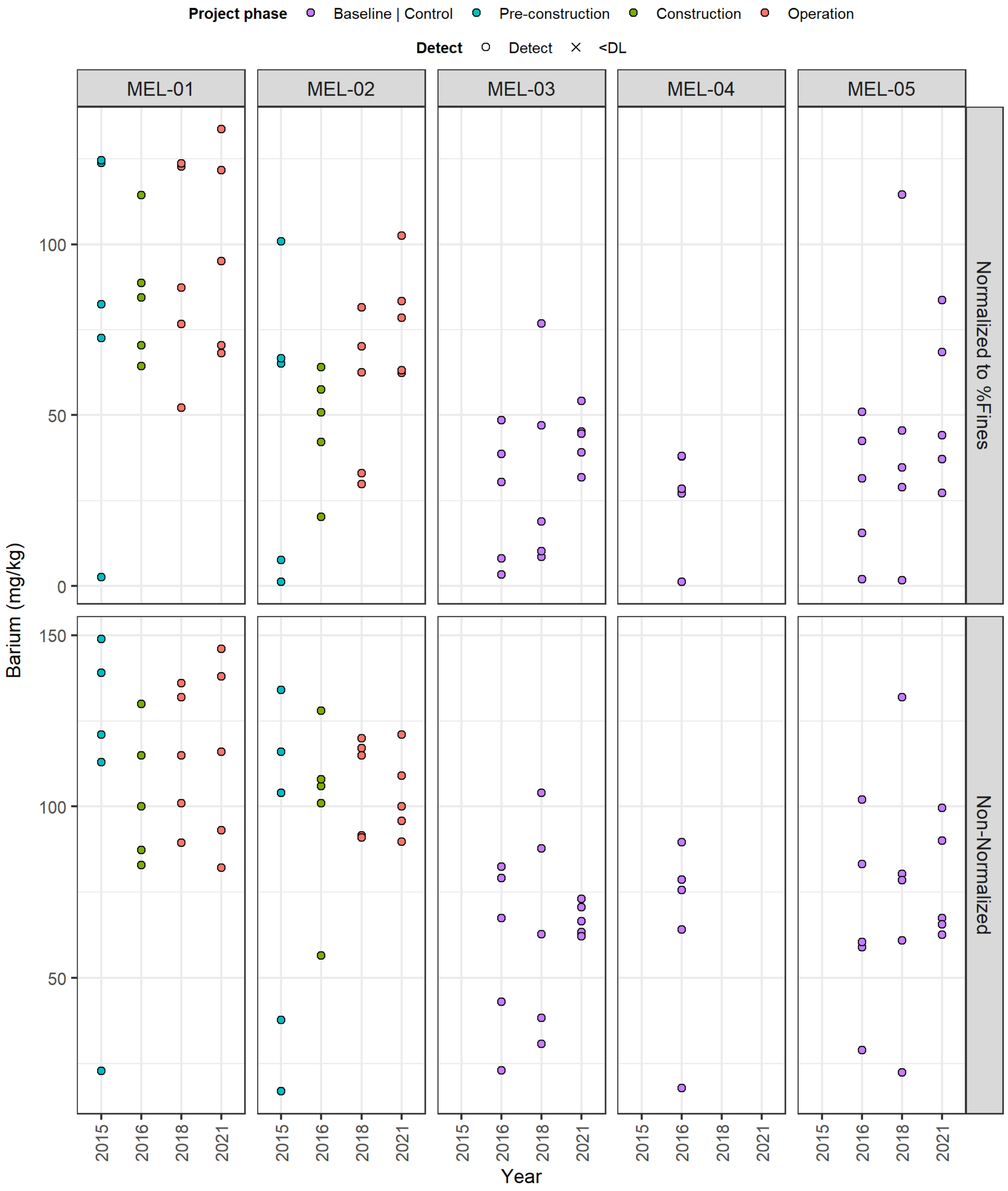


Figure F2-10. Beryllium

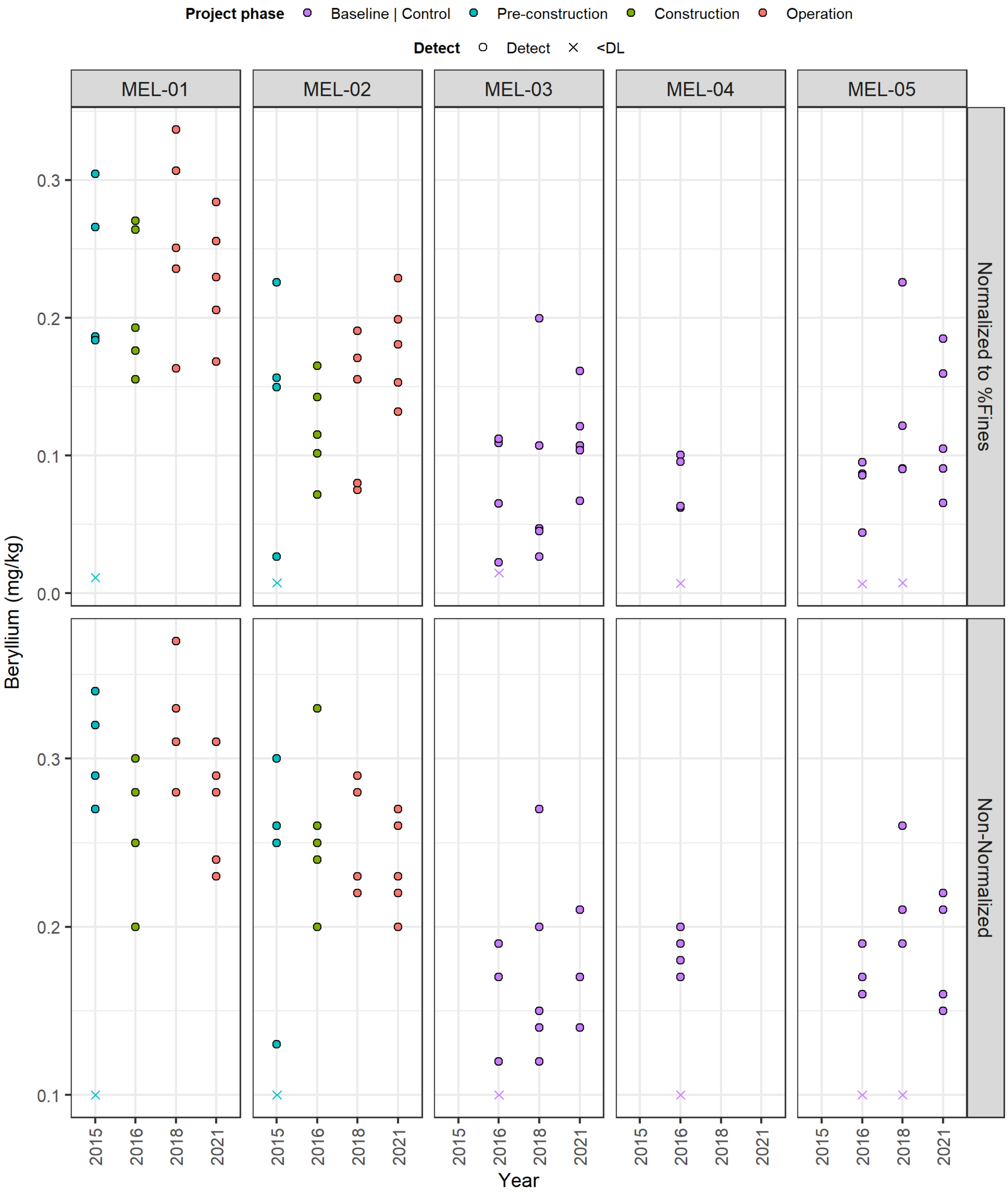


Figure F2-11. Bismuth

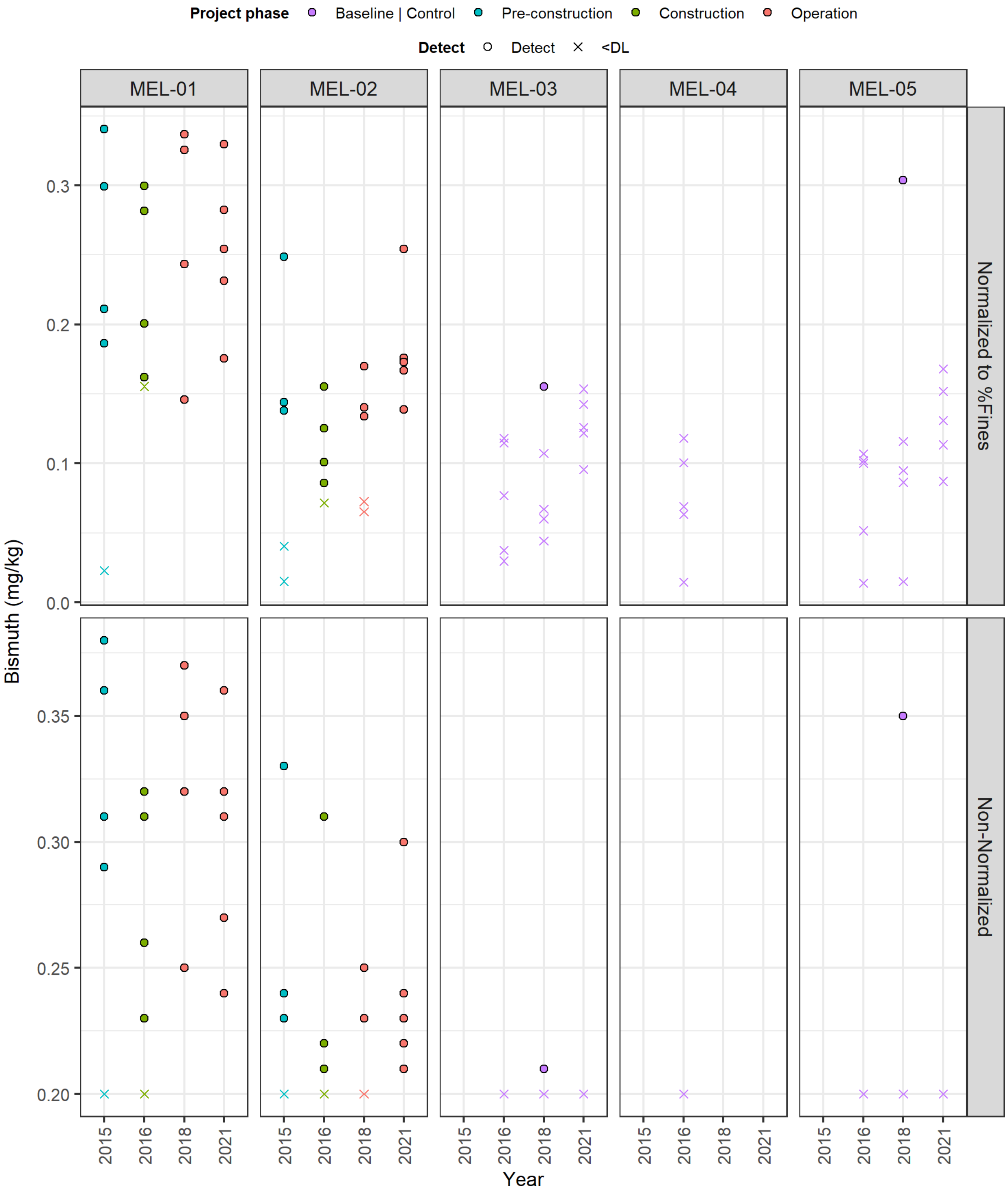


Figure F2-12. Boron

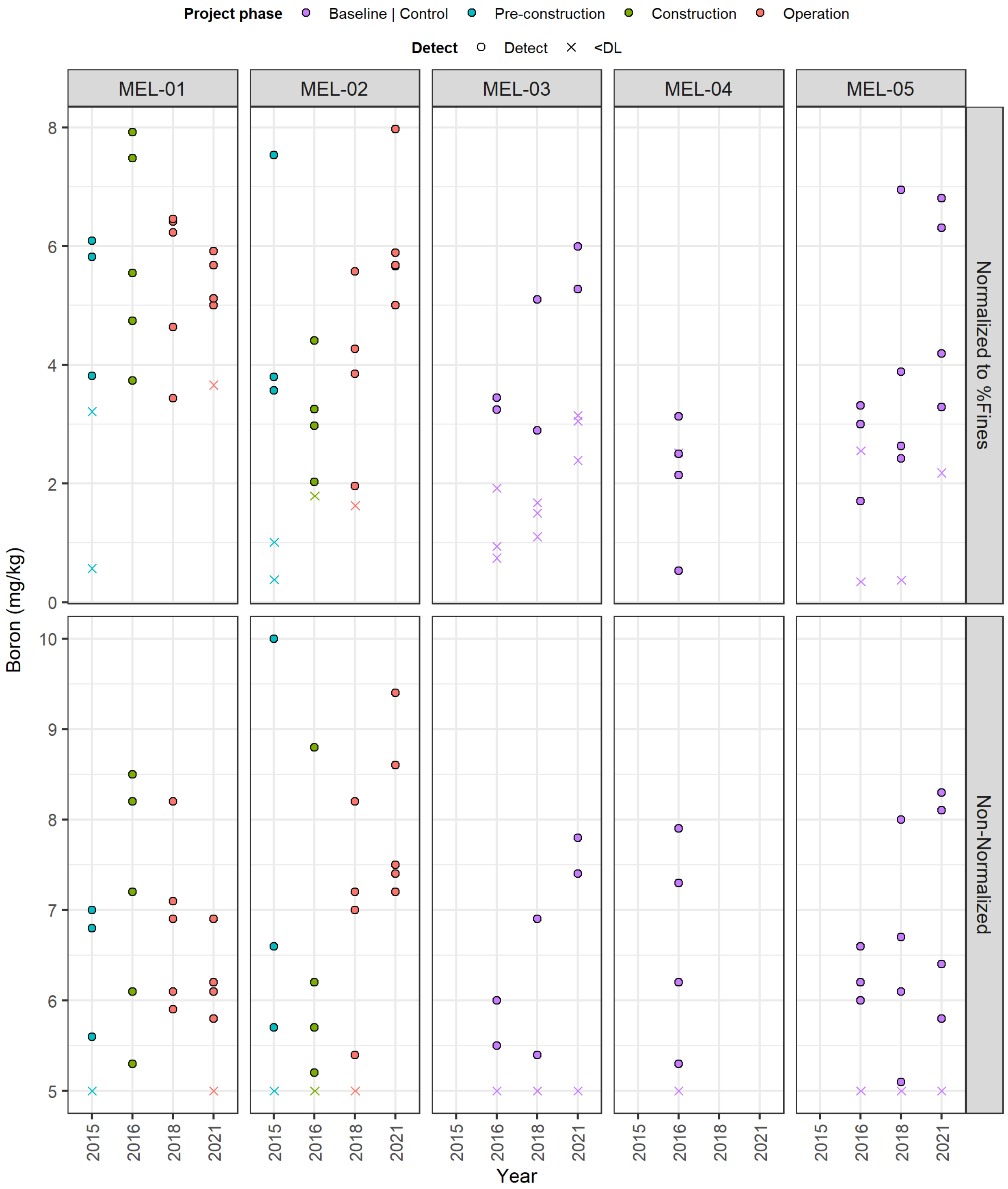


Figure F2-13. Cadmium

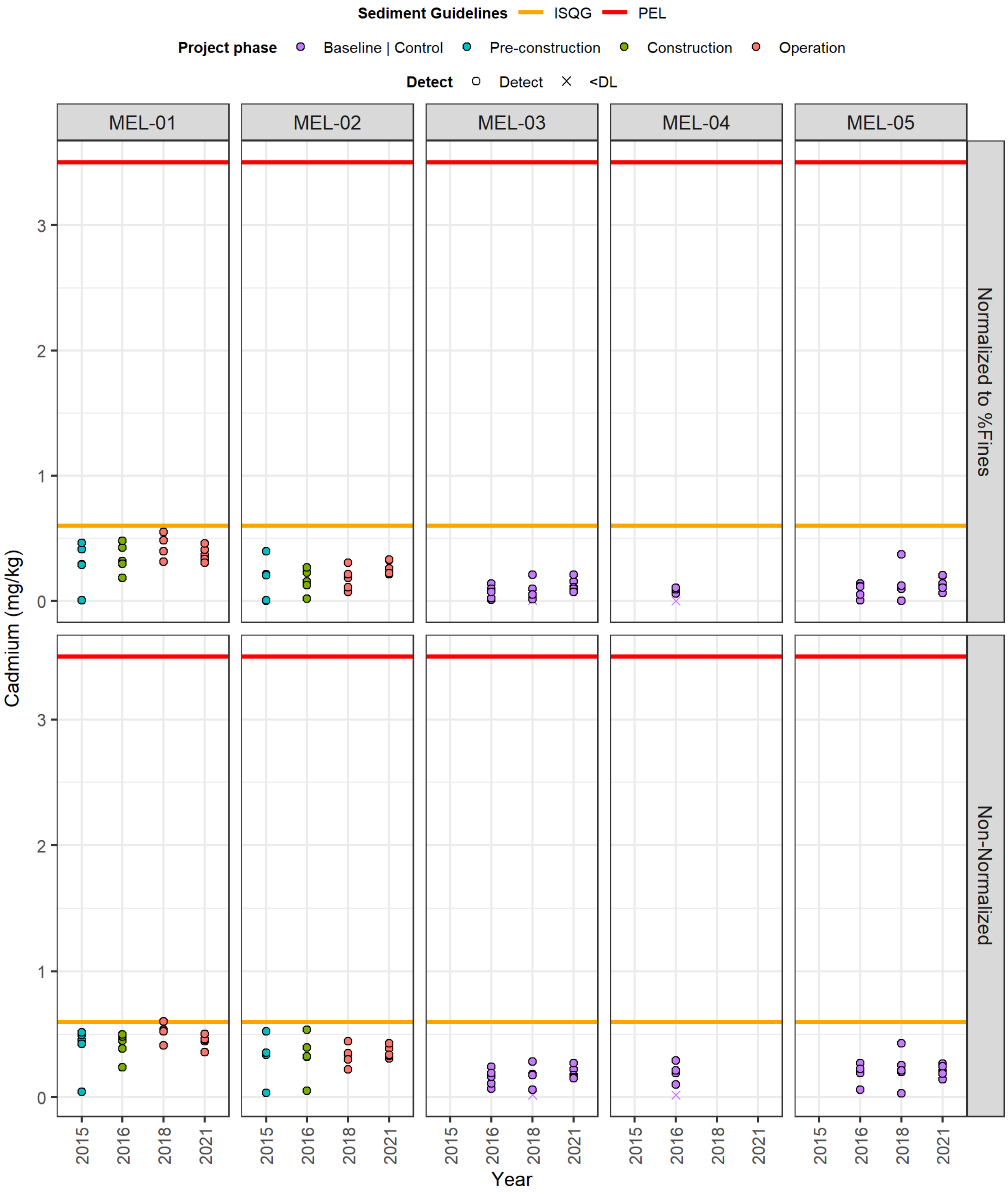


Figure F2-14. Calcium

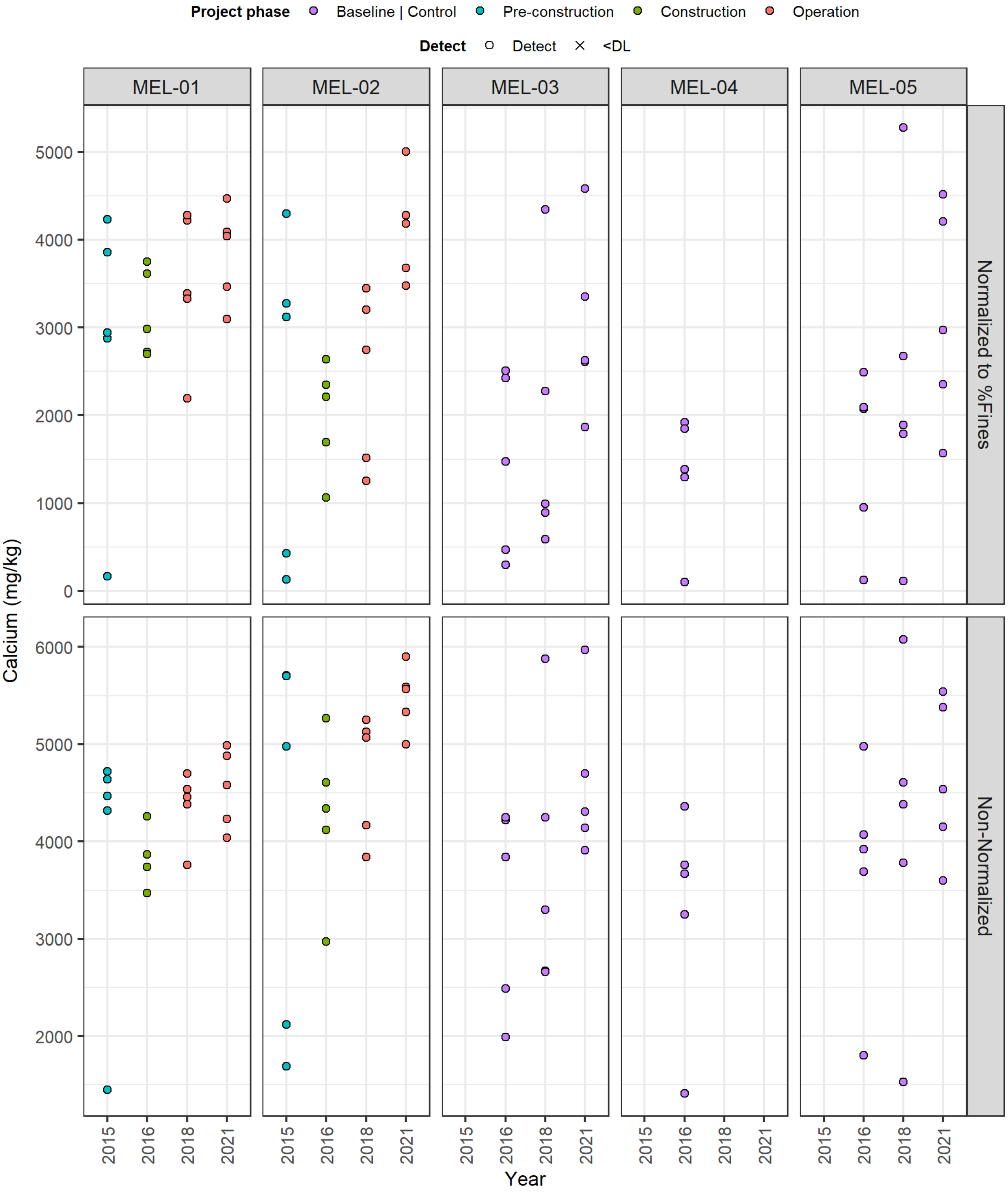


Figure F2-15. Chromium

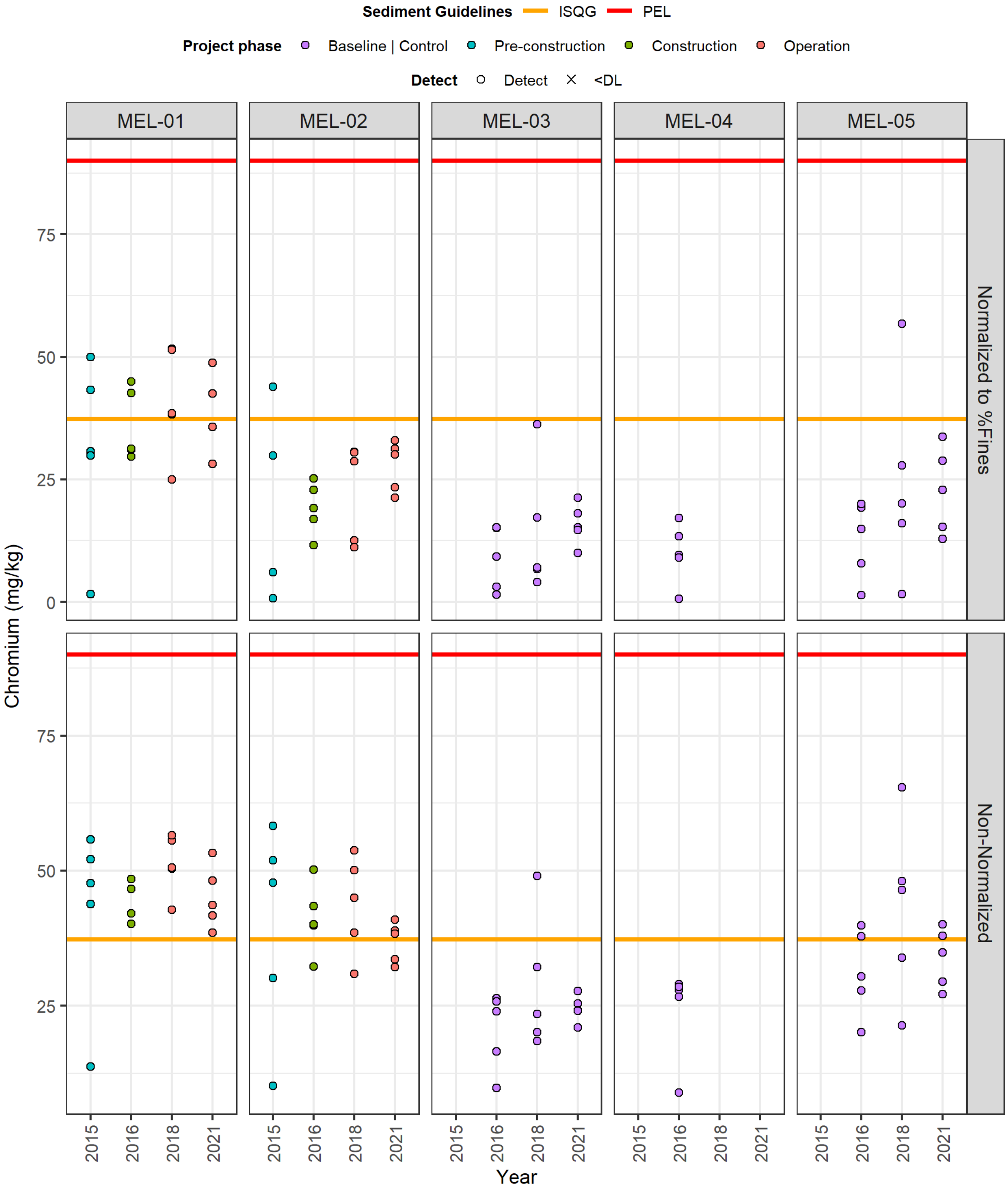


Figure F2-16. Cobalt

Figure F2-17. Copper

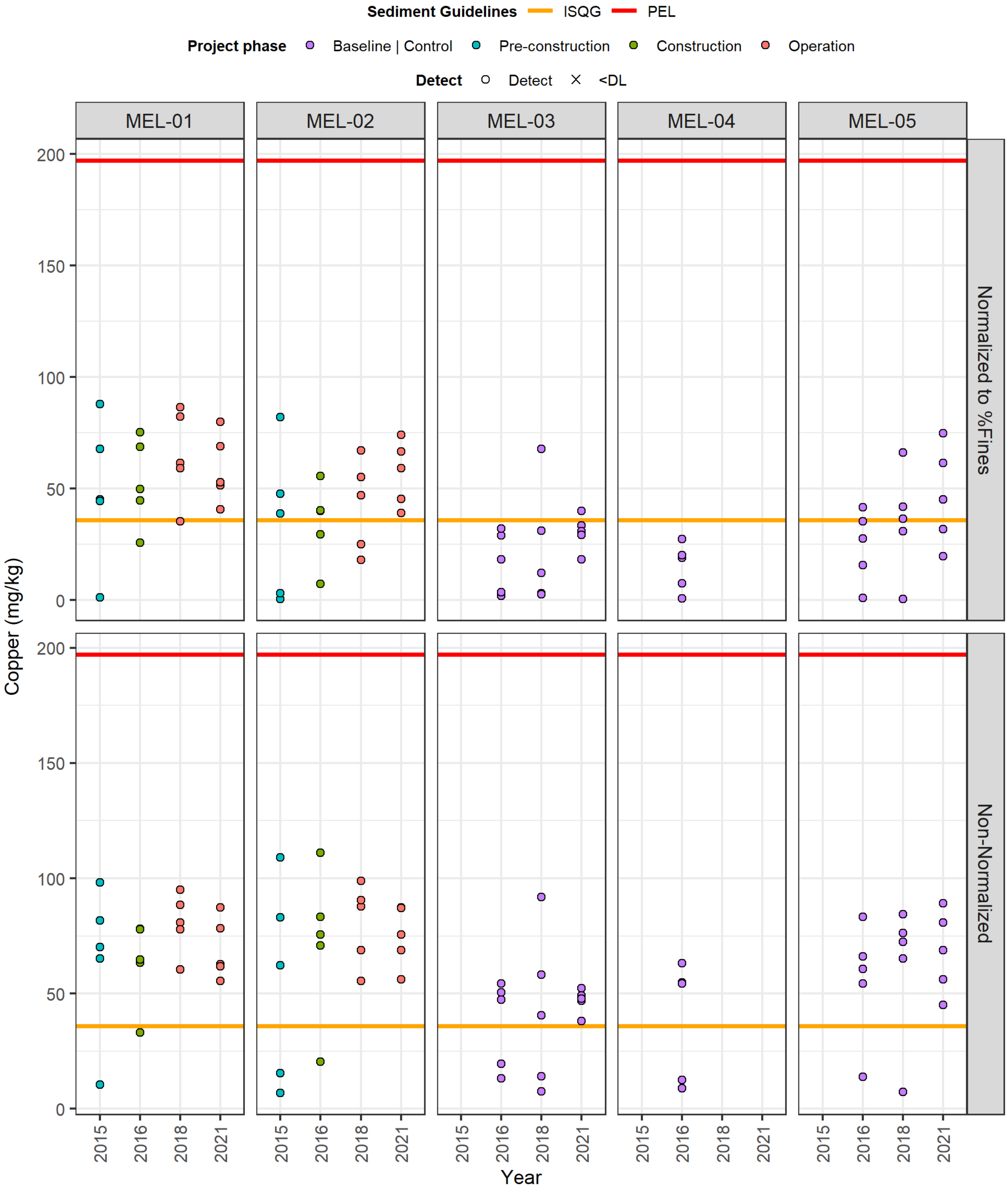


Figure F2-18. Iron

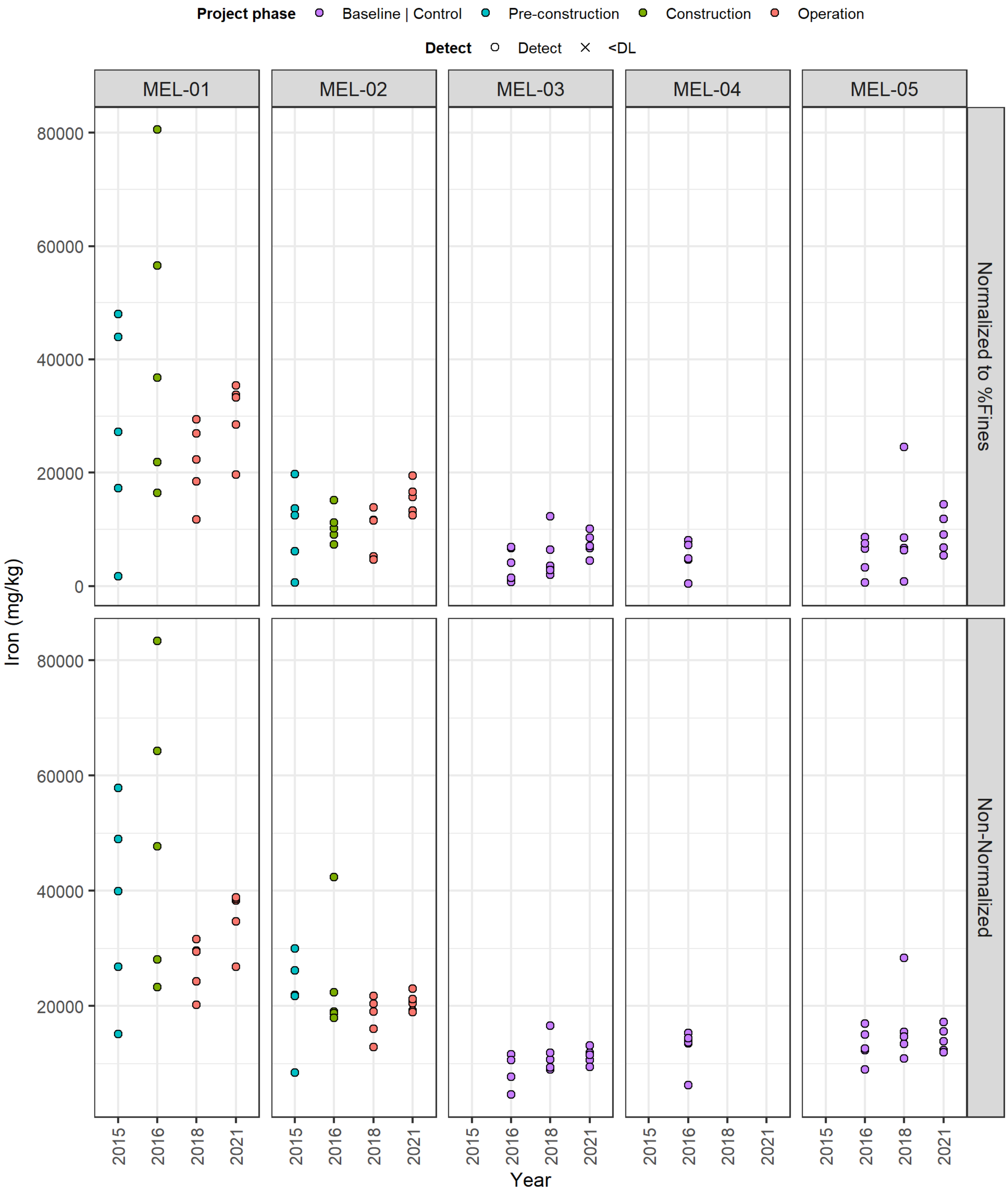


Figure F2-19. Lead

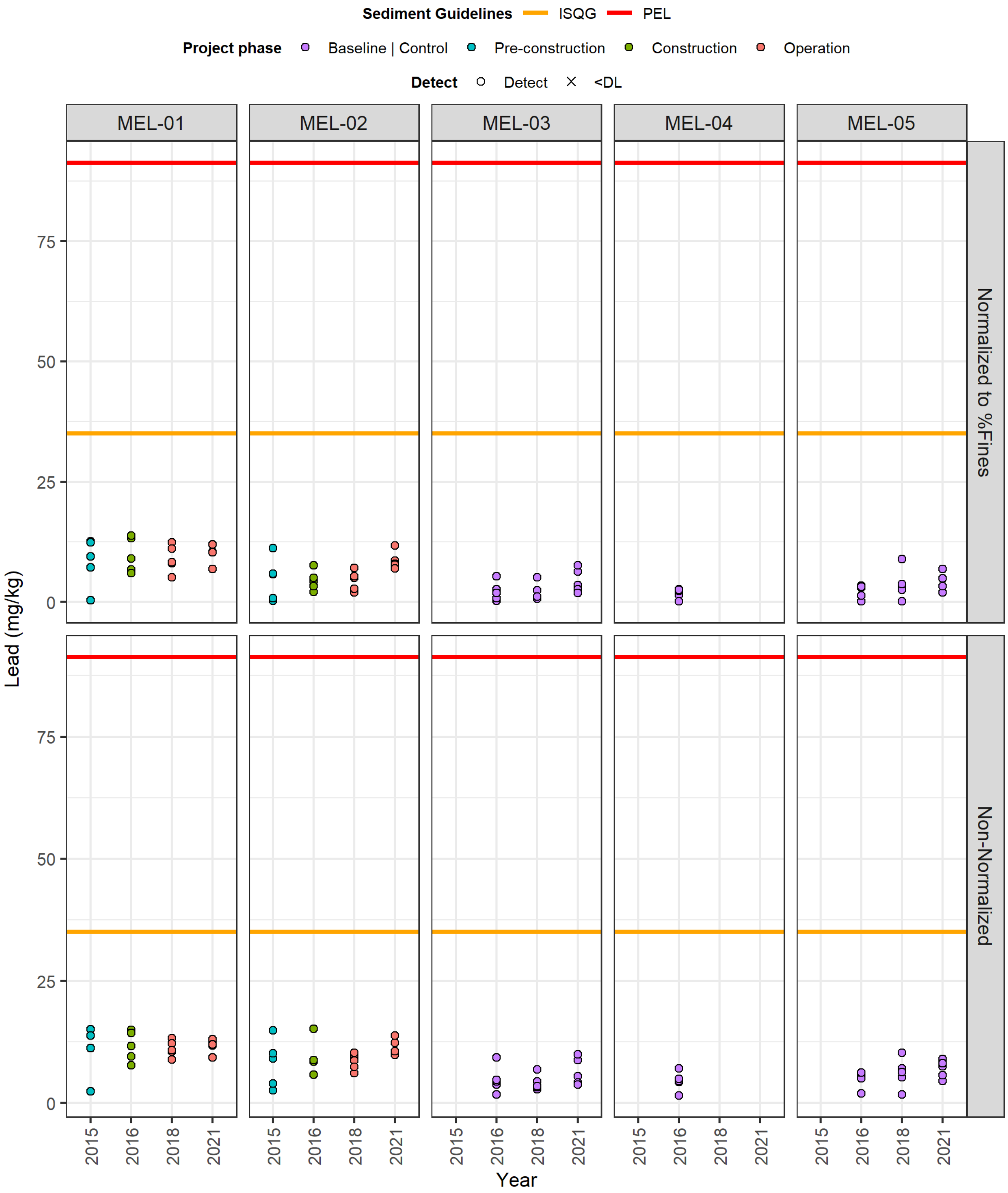


Figure F2-20. Lithium

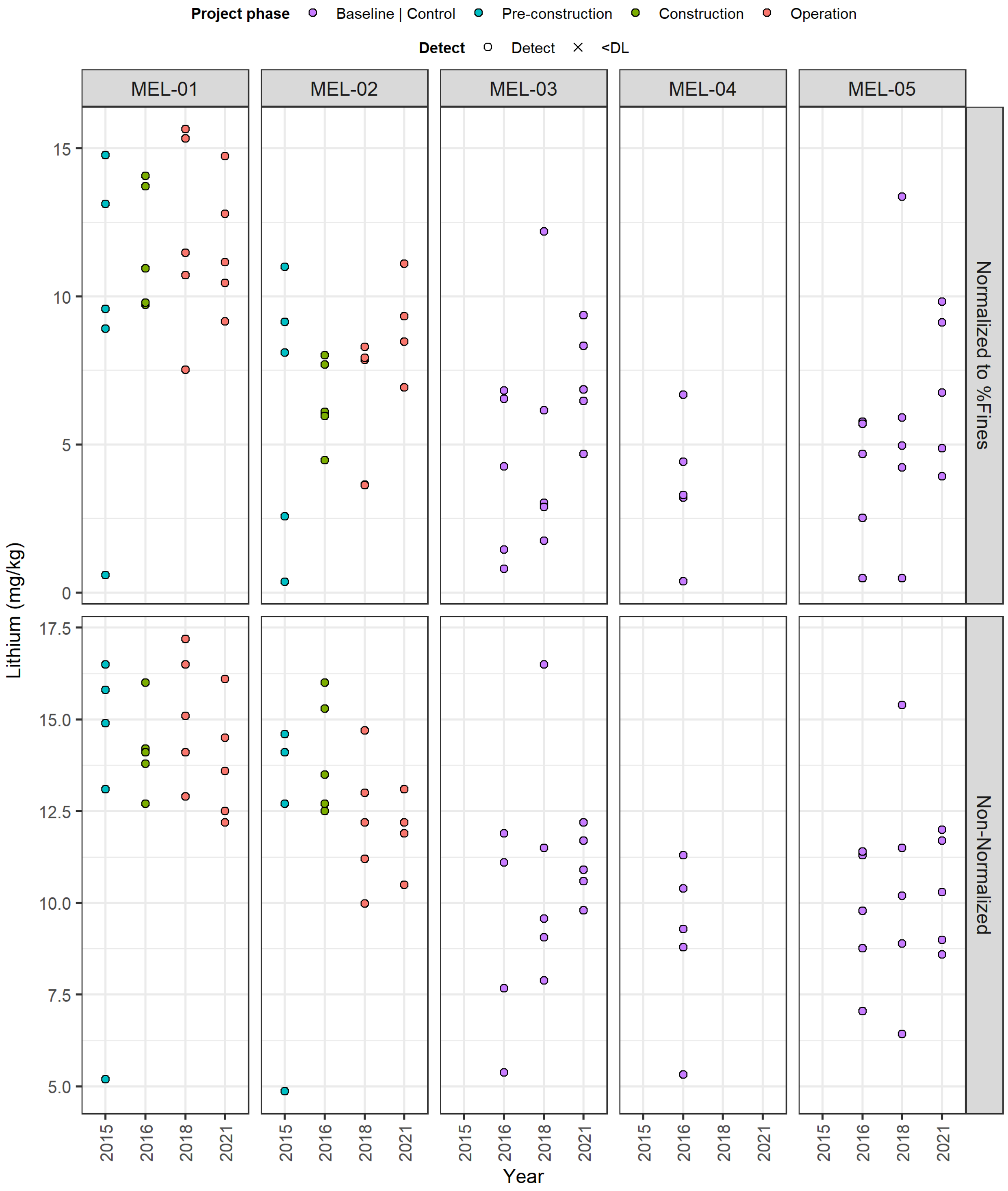


Figure F2-21. Magnesium

Figure F2-22. Manganese

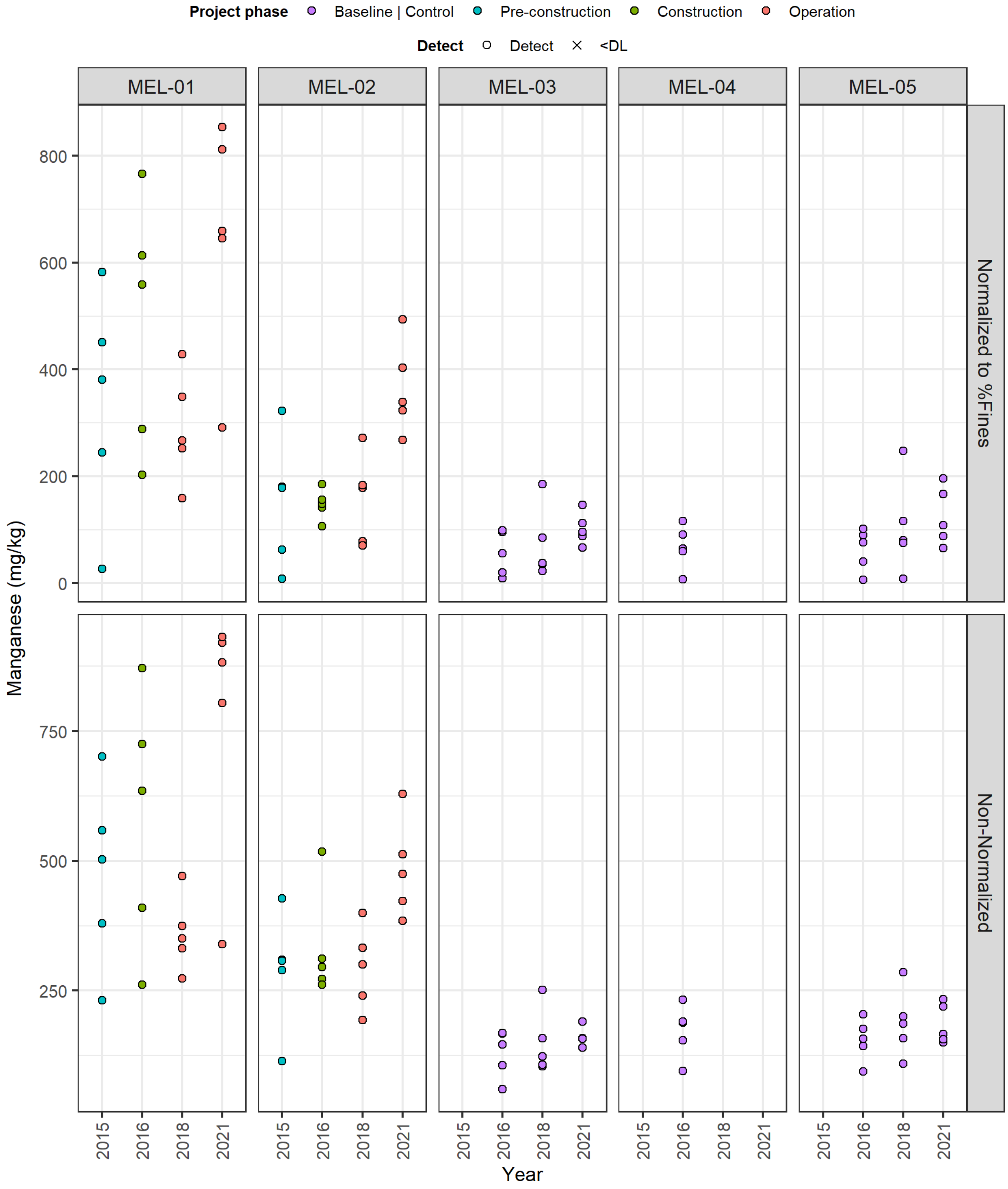


Figure F2-23. Mercury

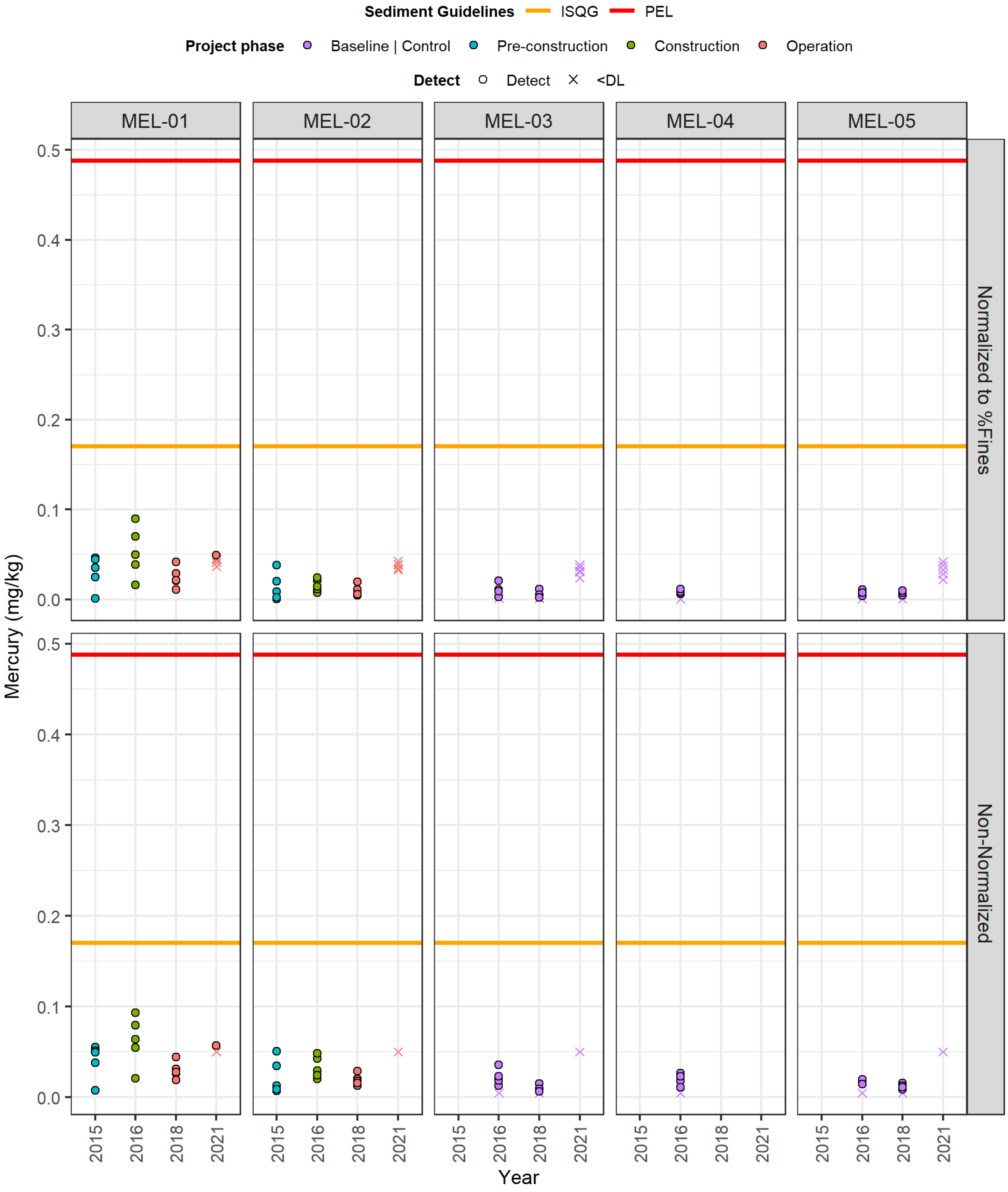


Figure F2-24. Molybdenum

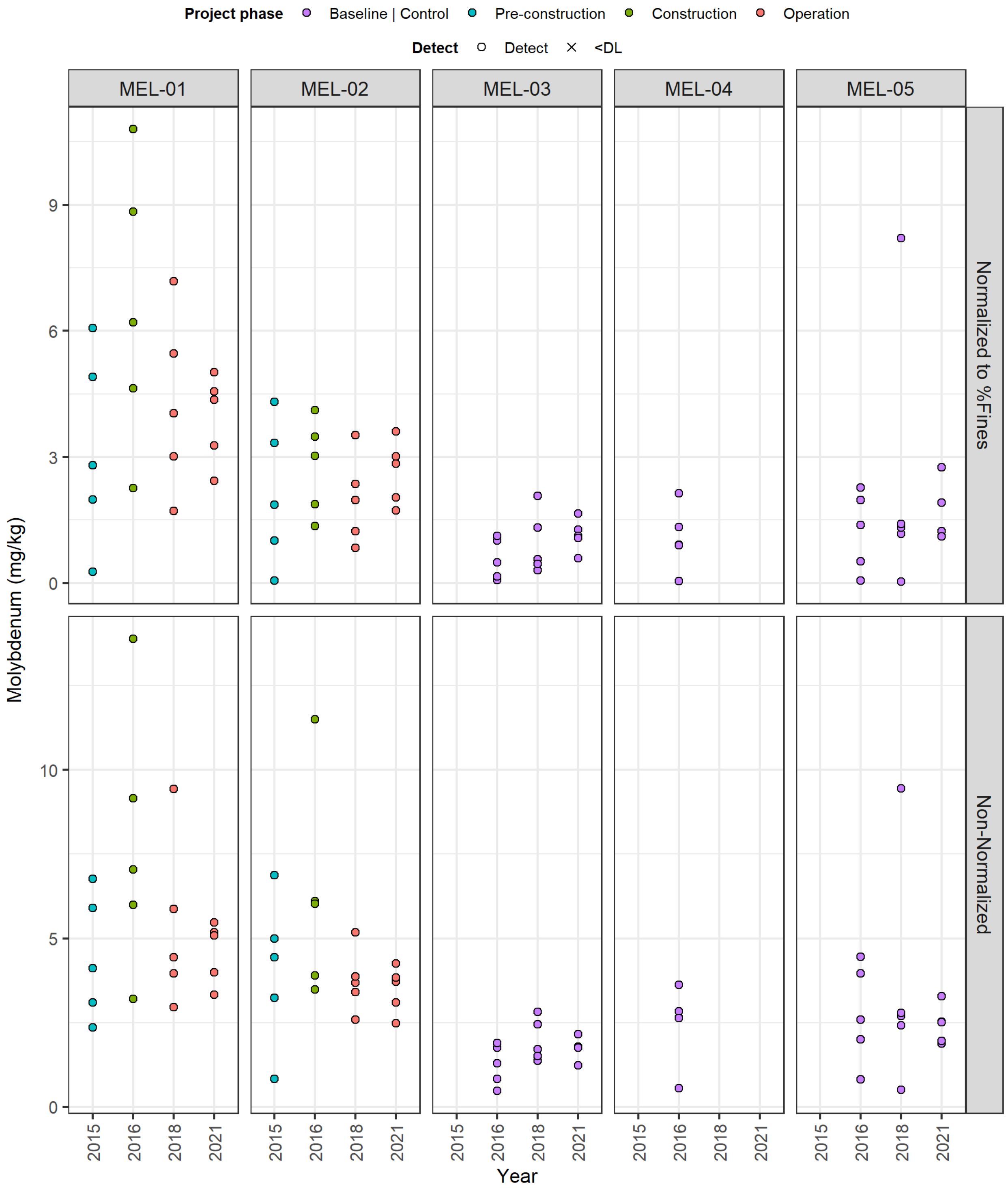


Figure F2-25. Nickel

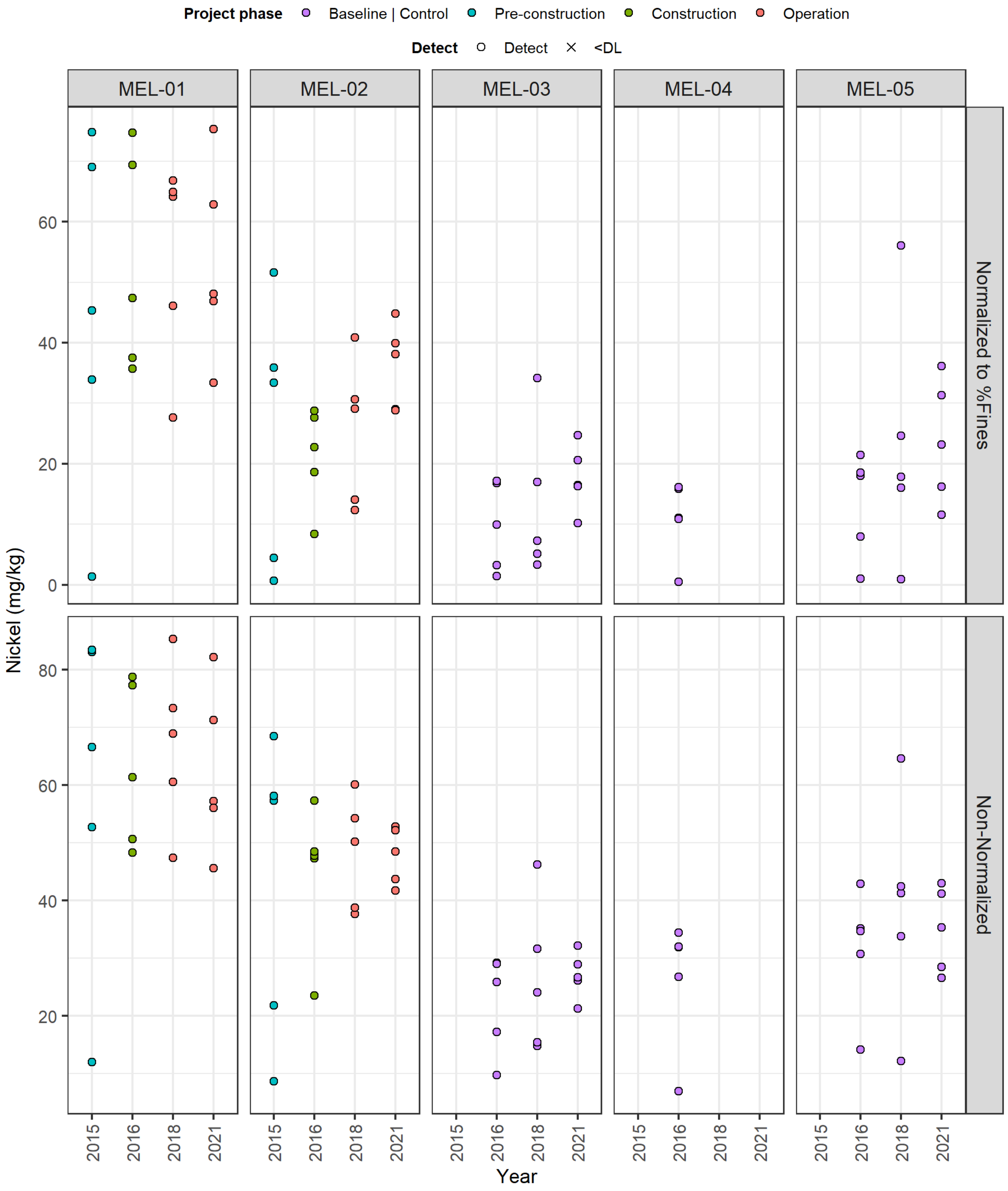


Figure F2-26. Potassium

Figure F2-27. Selenium

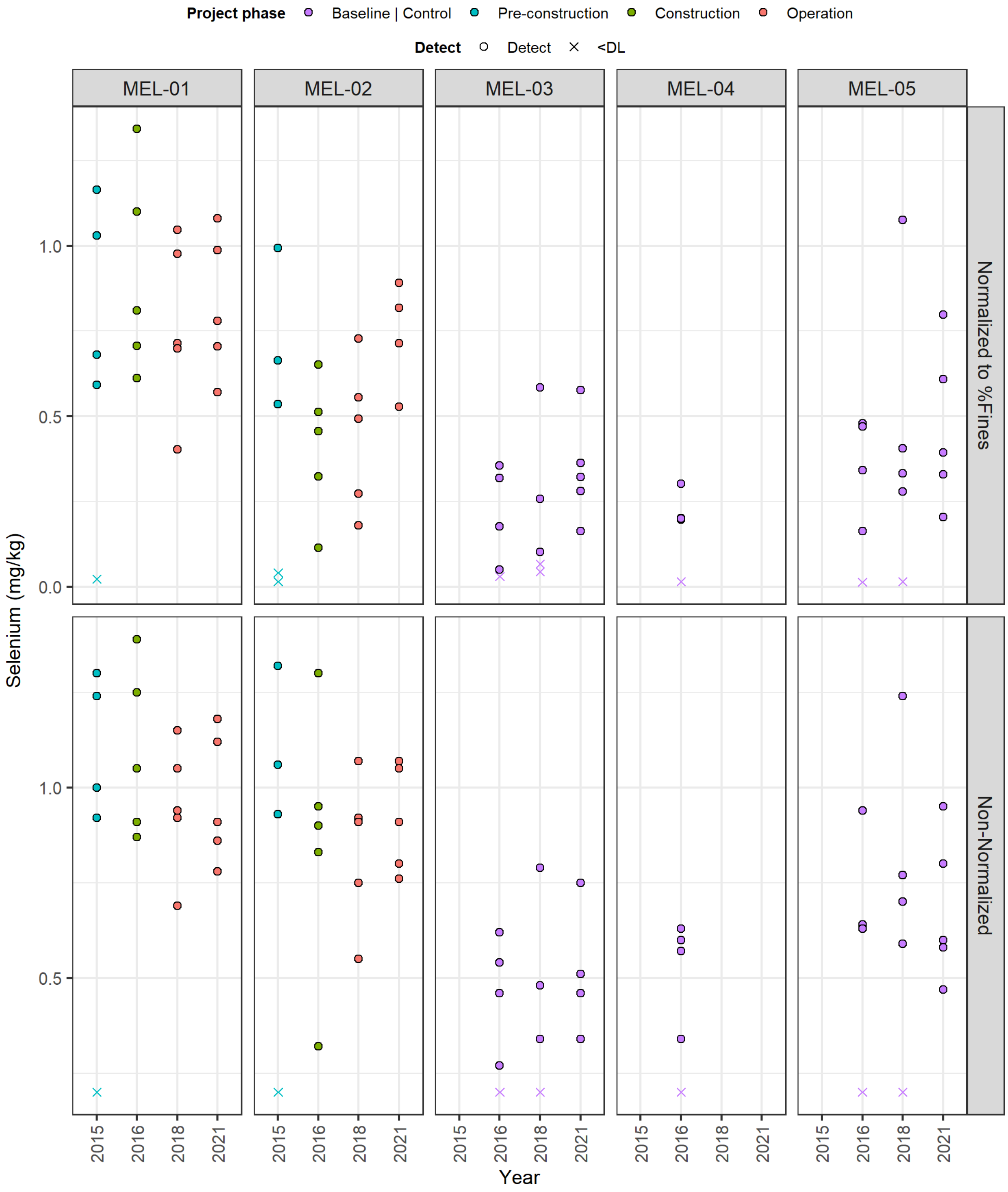


Figure F2-28. Silver

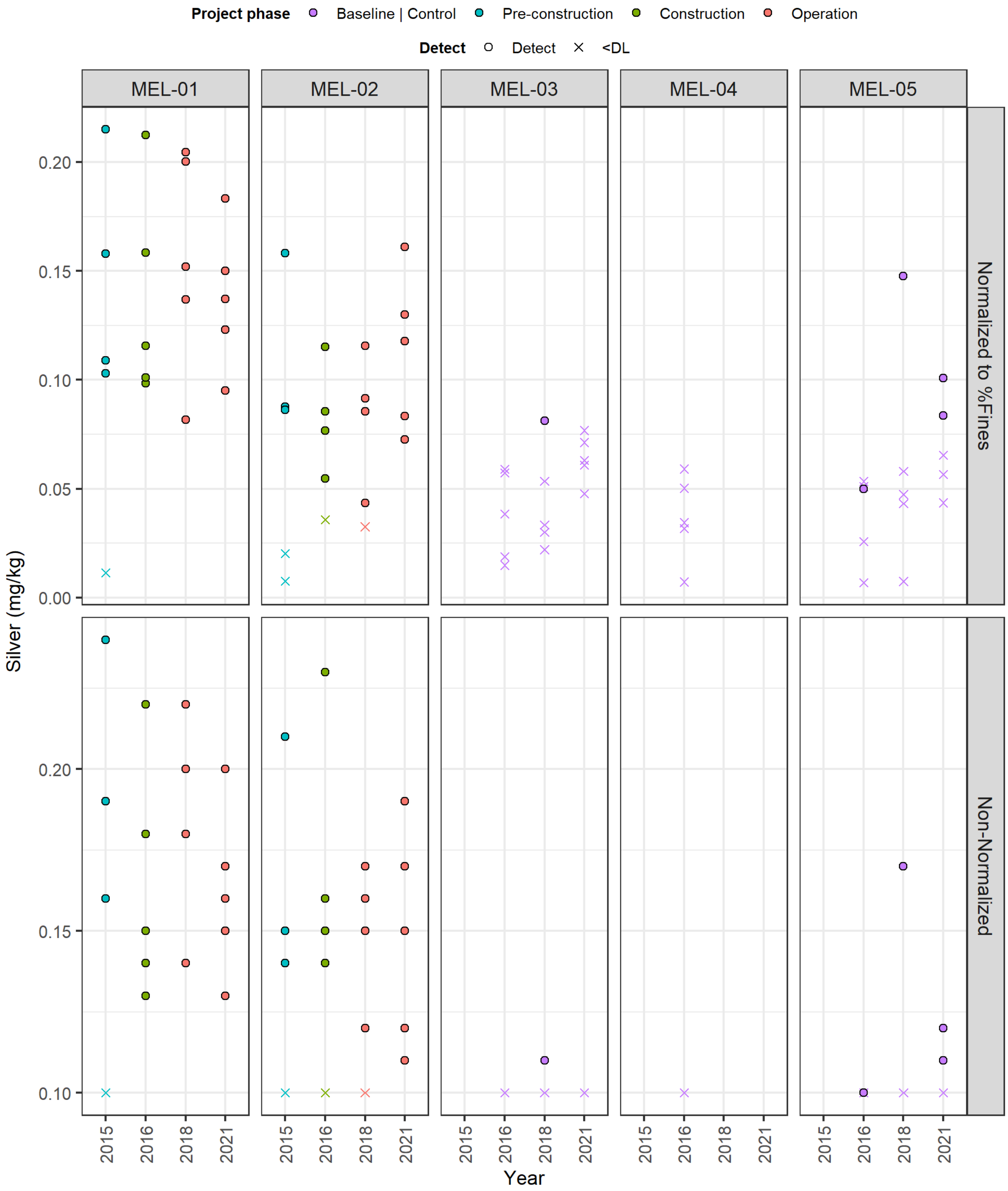


Figure F2-29. Sodium

Figure F2-30. Strontium

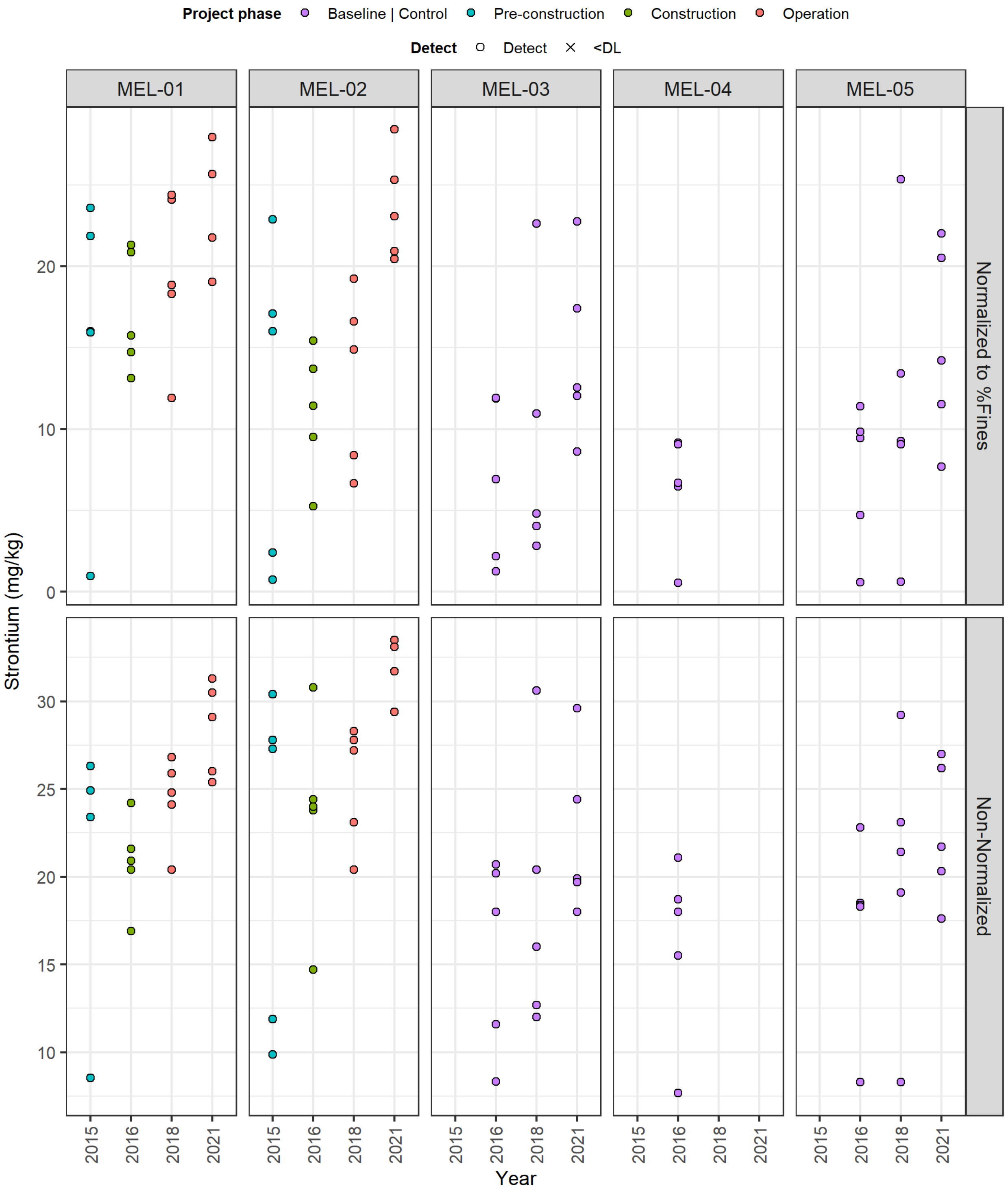


Figure F2-31. Sulfur

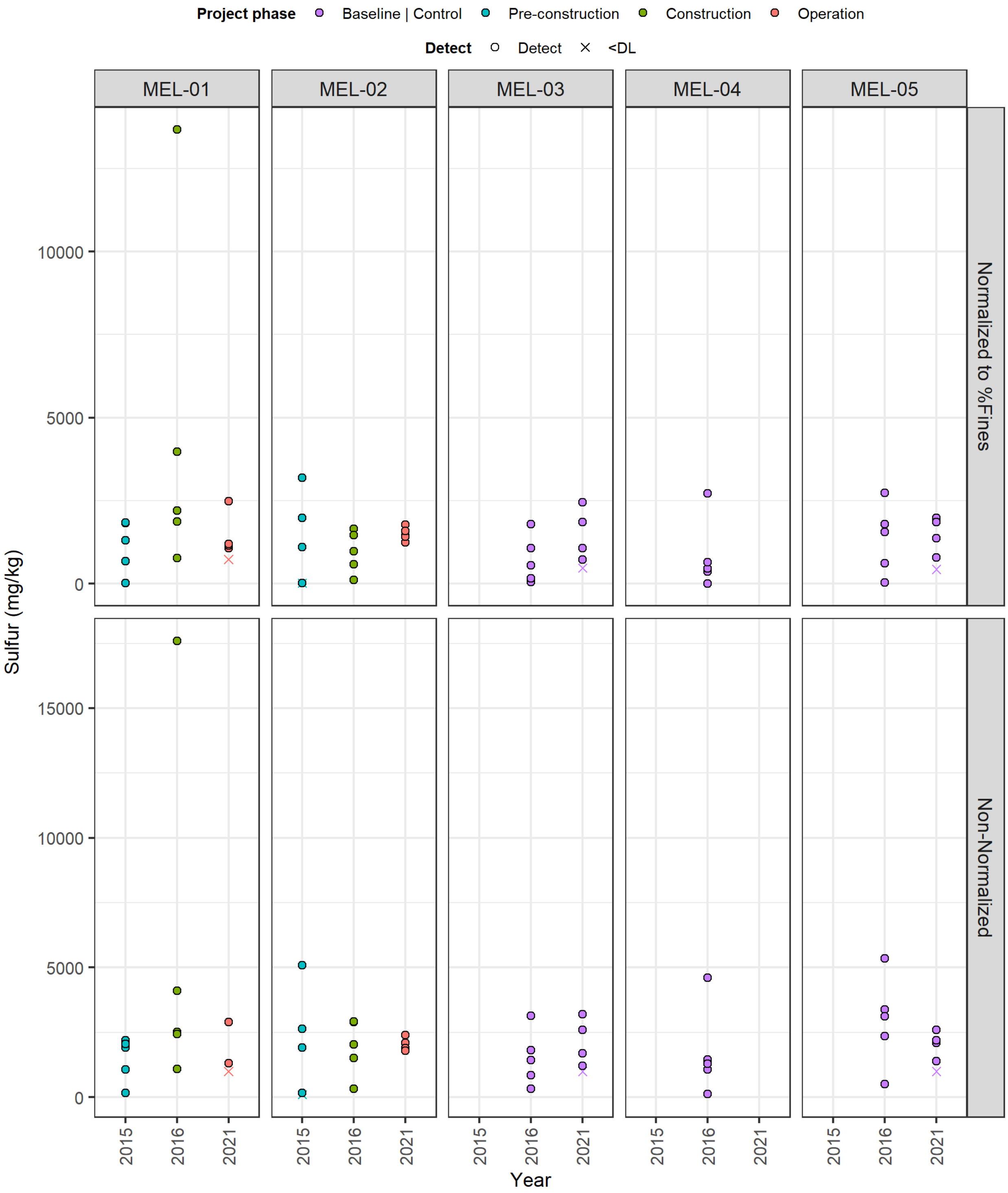


Figure F2-32. Thallium

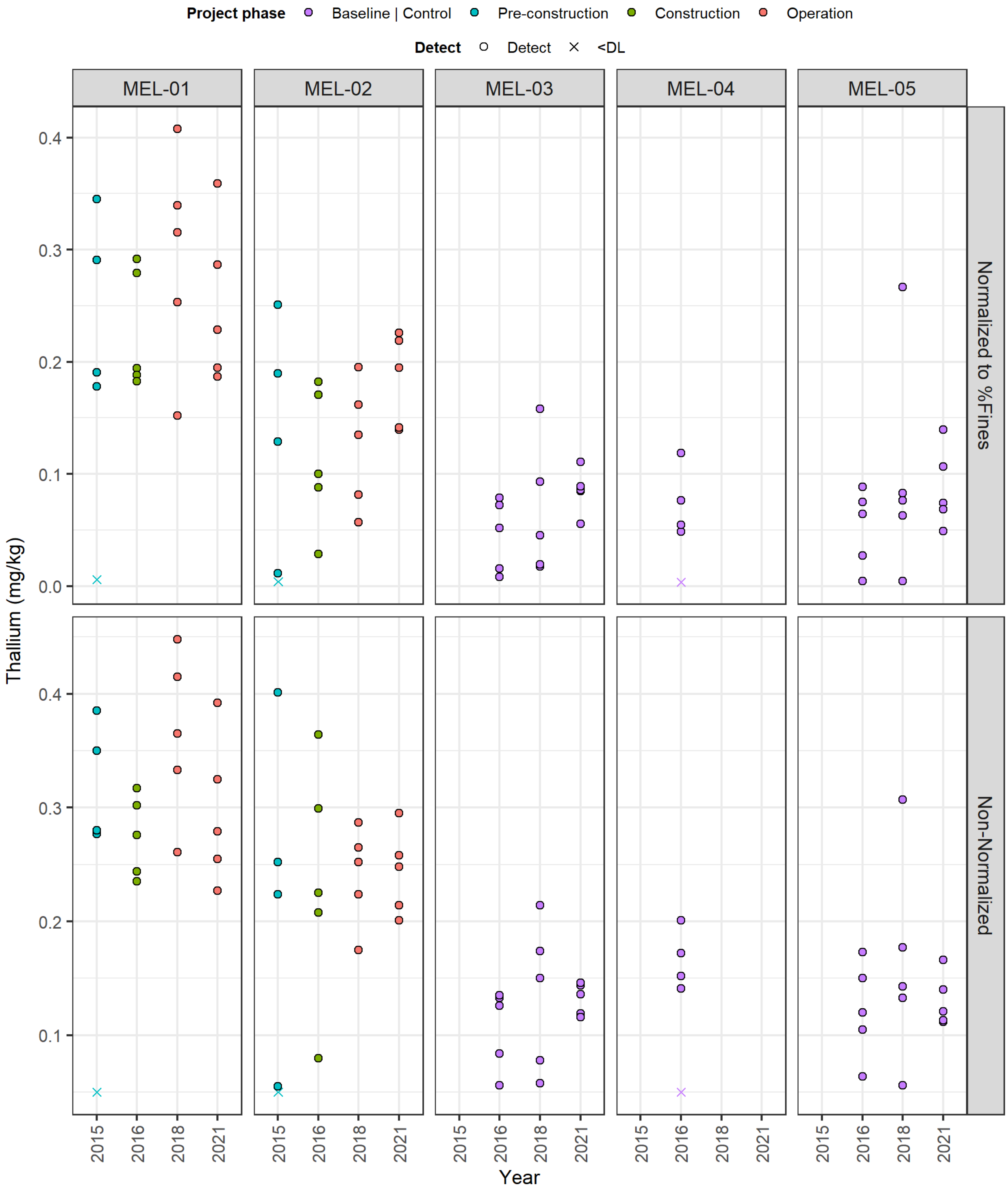


Figure F2-33. Tin

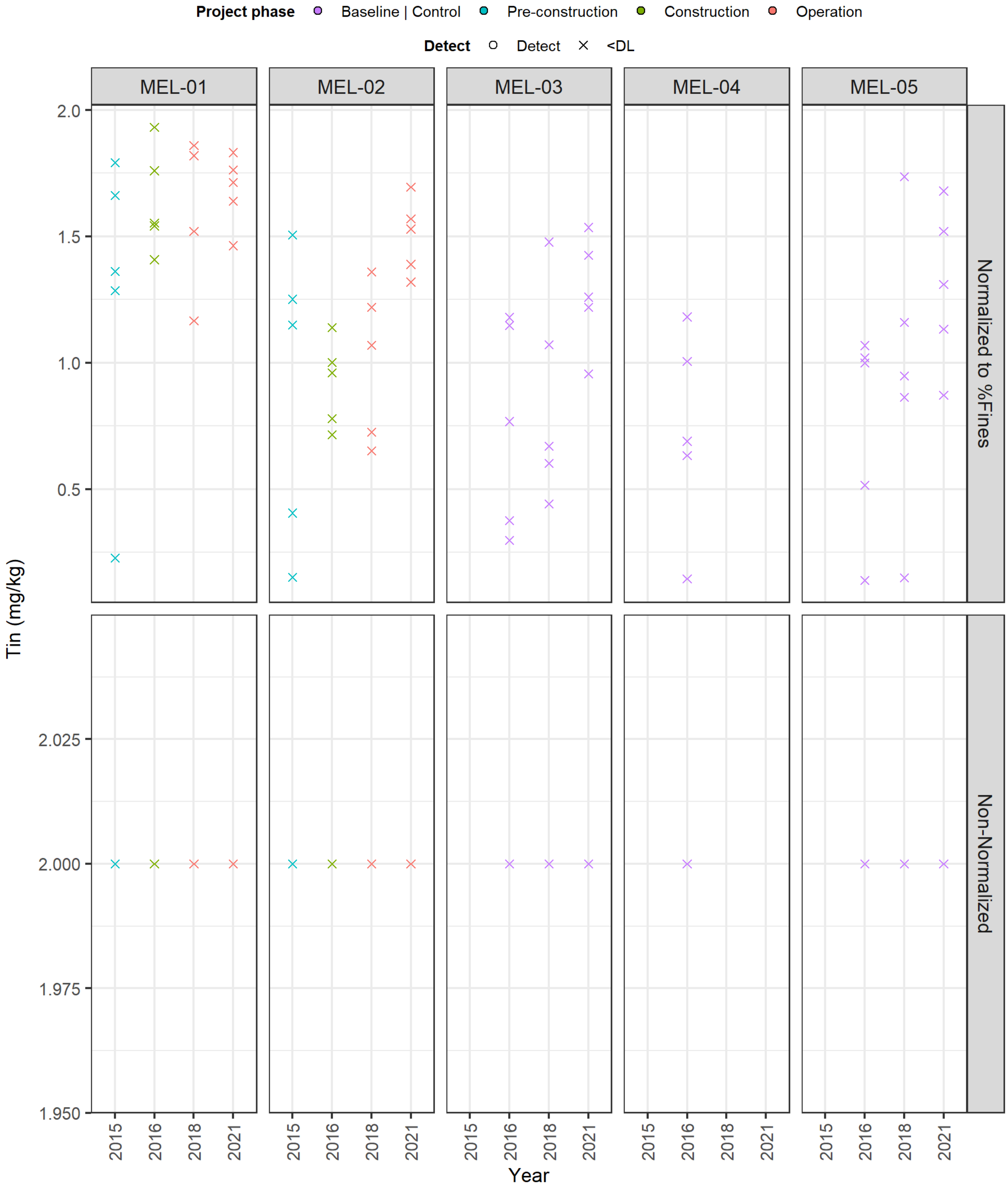


Figure F2-34. Titanium

Figure F2-35. Uranium

Figure F2-36. Vanadium

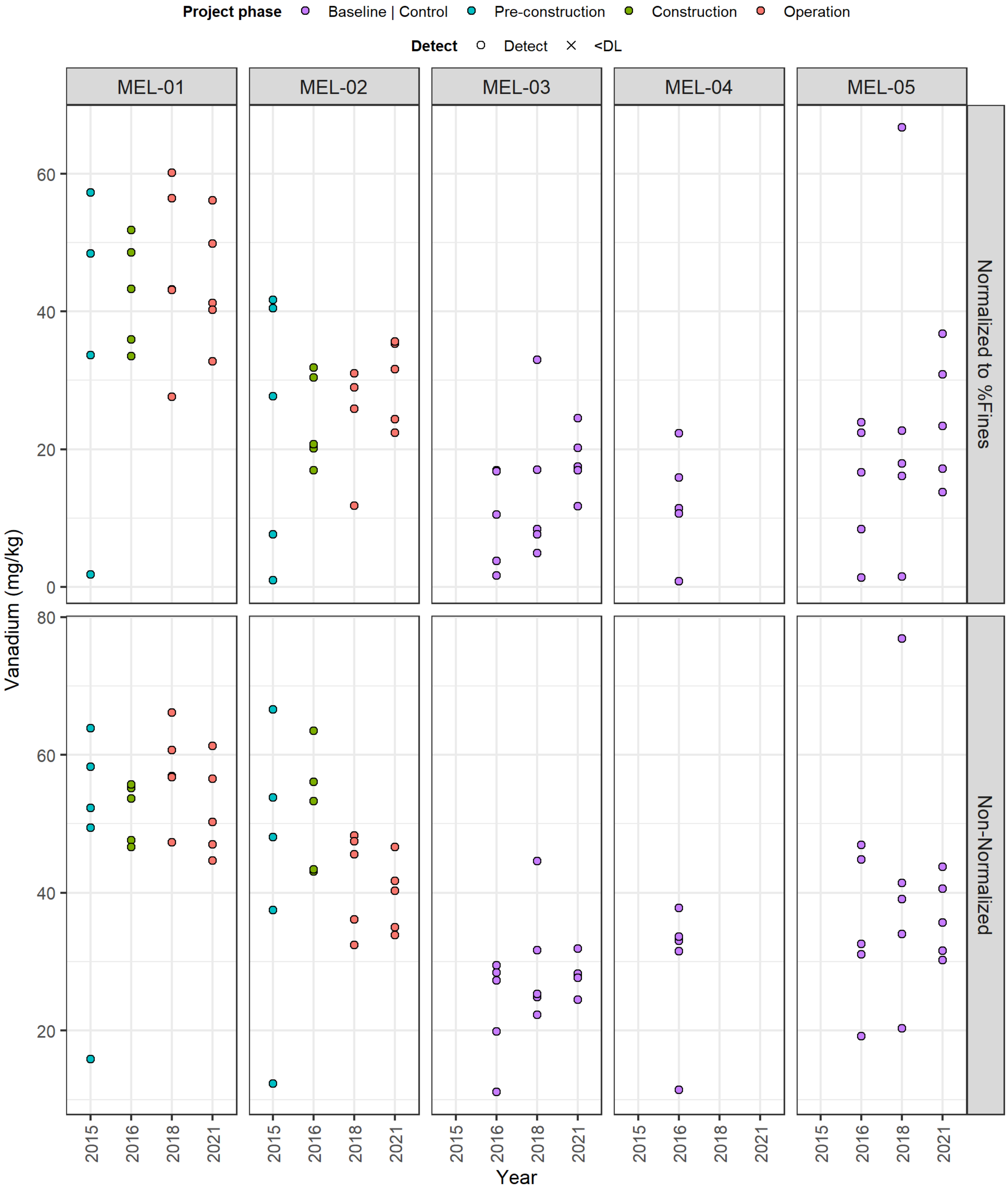
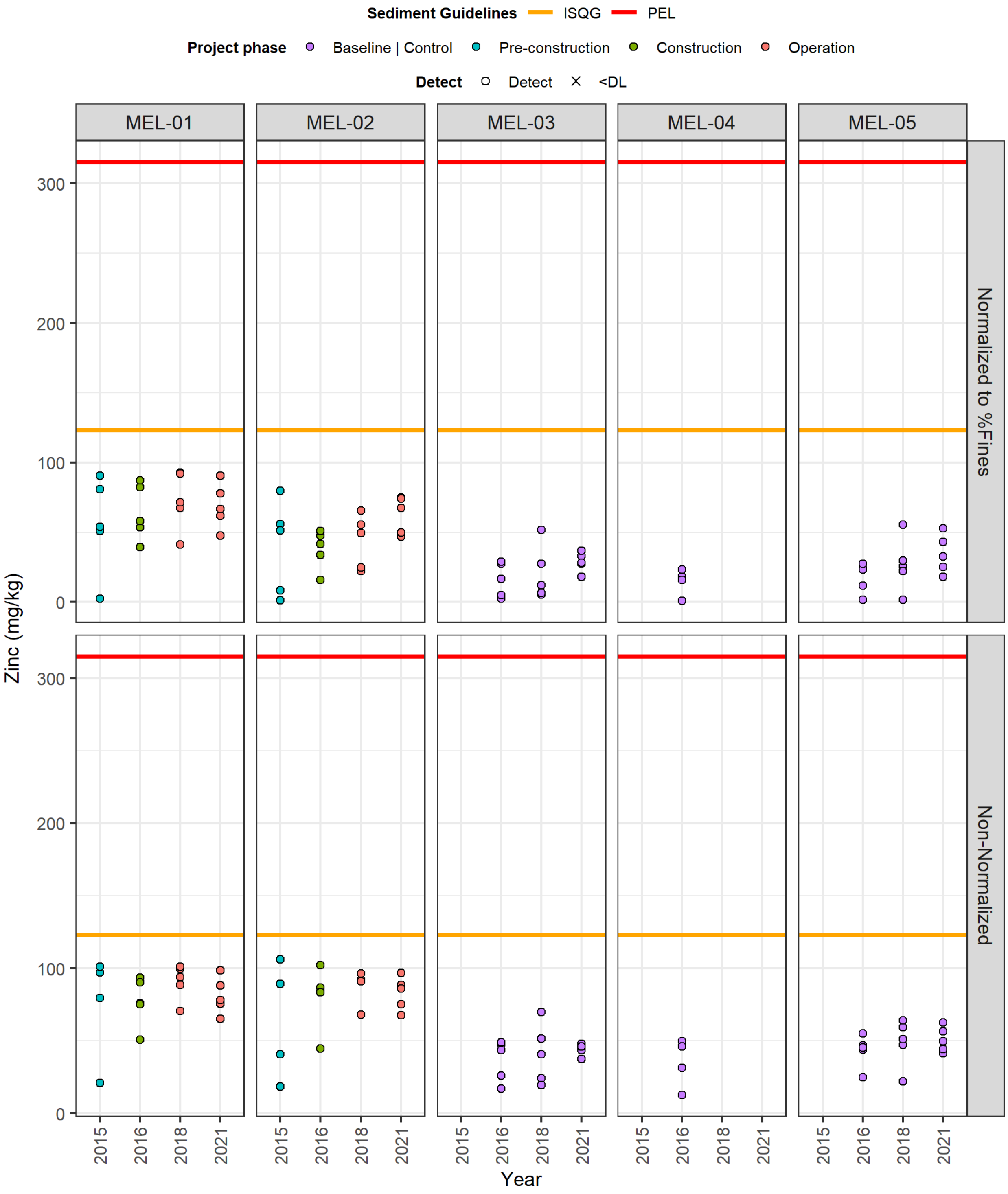


Figure F2-37. Zinc



APPENDIX G

BENTHIC INVERTEBRATES – SUPPORTING INFORMATION

Appendix G1

Data and Summary Statistics

APPENDIX G1 – FIGURES

Figure G1-1. Stress plot for the non-metric multidimensional scaling (nMDS) results. ii
Figure G1-2. Shepard plot for nonmetric multidimensional scaling (nMDS) results. iii

APPENDIX G1 – TABLES

Table G1-1. Benthic invertebrate community summary statistics for the Meliadine Lake study areas (2015-2021). 1
Table G1-2. Top 5 dominant benthic invertebrate taxa by station in Meliadine Lake. 5
Table G1-3. Taxa presence / absence for the 2021 benthic invertebrate community survey. 7

Figure G1-1. Stress plot for the non-metric multidimensional scaling (nMDS) results.

Notes: The stress value for 2-dimensional representation of the Bray-Curtis dissimilarity matrix was 0.174.

Figure G1-2. Shepard plot for nonmetric multidimensional scaling (nMDS) results.

Notes: The correlation statistics indicating the fit between ordination distances and observed dissimilarities.

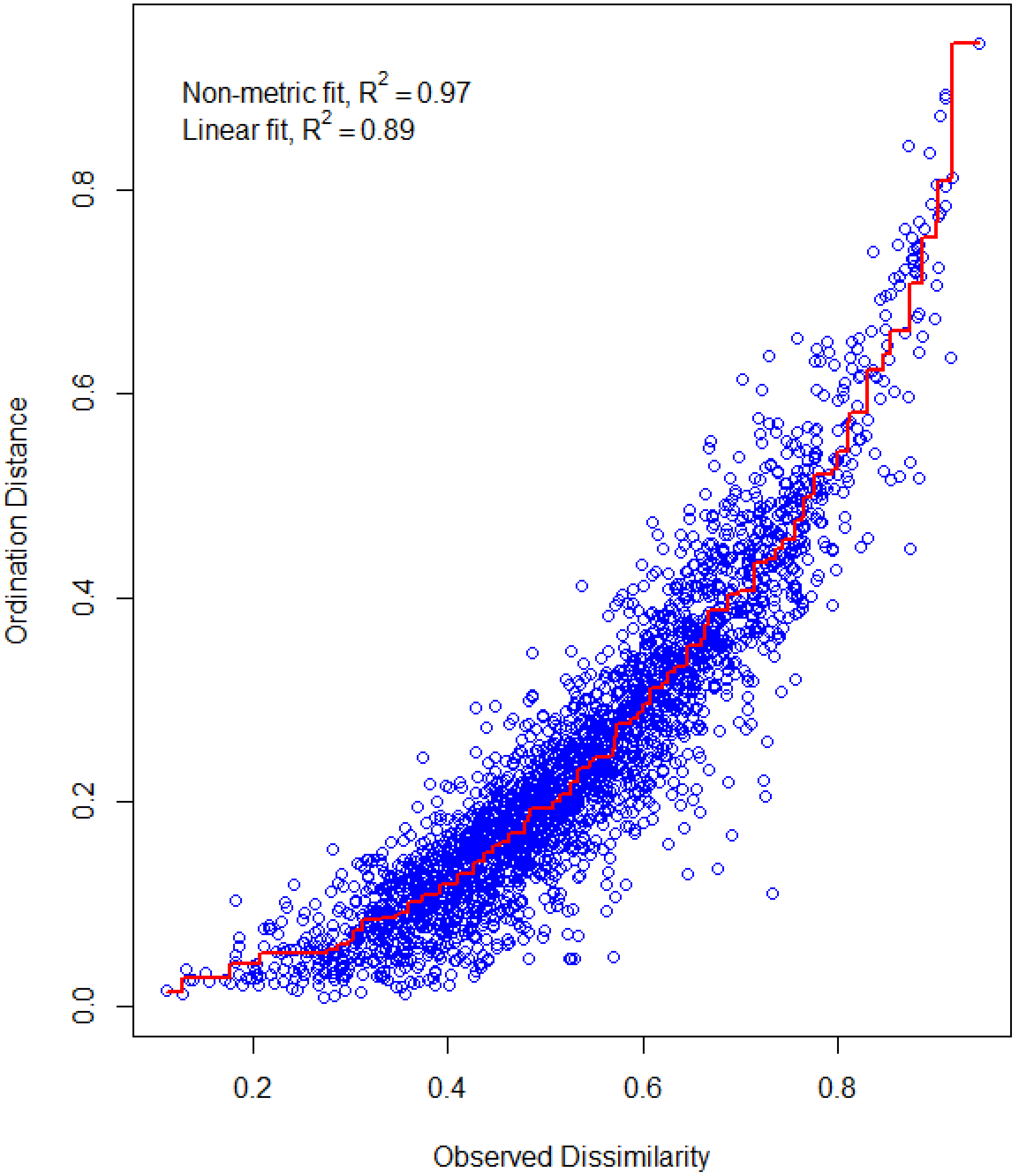


Table G1-1. Benthic invertebrate community summary statistics for the Meliadine Lake study areas (2015-2021).

Area	Endpoint	Taxa Group / Metric	Year	N	Mean	Median	SE	SD	Min	Max
MEL-01	Density (#/m2)	Total	2015	5	493	500	96.9	217	190	802
			2016	5	2290	2430	382	854	1170	3490
			2018	5	695	802	194	434	233	1280
			2021	5	5090	3410	1320	2960	3160	10100
		Dipterans	2015	5	262	259	52.6	118	129	448
			2016	5	1360	1240	264	590	655	2170
			2018	5	426	302	166	371	138	1030
			2021	5	3520	2470	985	2200	2050	7260
		Oligochaetes	2015	5	10.3	8.62	3.23	7.21	0	17.2
			2016	5	22.4	25.9	4.4	9.83	8.62	34.5
			2018	5	1.72	0	1.72	3.86	0	8.62
			2021	5	27.6	25.9	7.42	16.6	8.62	51.7
		Amphipods	2015	5	6.9	0	5.03	11.2	0	25.9
			2016	5	36.2	43.1	15.8	35.2	0	77.6
			2018	5	0	0	0	0	0	0
			2021	5	17.2	0	13.4	29.9	0	69
		Bivalves	2015	5	171	190	35	78.2	34.5	233
			2016	5	833	741	153	342	397	1260
			2018	5	198	224	46.8	105	60.3	328
			2021	5	1350	1120	357	799	560	2660
		Gastropods	2015	5	22.4	17.2	9.28	20.8	0	51.7
			2016	5	32.8	25.9	12.9	28.9	8.62	77.6
			2018	5	55.2	34.5	24.3	54.4	8.62	147
			2021	5	141	121	24	53.7	86.2	207
		Other Taxa	2015	5	20.7	17.2	12.7	28.3	0	69
			2016	5	10.3	8.62	5.03	11.2	0	25.9
			2018	5	13.8	8.62	7	15.7	0	34.5
			2021	5	36.2	34.5	7.42	16.6	17.2	60.3
	Taxa Richness	Total	2015	5	11.8	11	1.39	3.11	9	17
			2016	5	15.4	15	0.927	2.07	13	18
			2018	5	11.2	11	1.53	3.42	8	16
			2021	5	18.2	19	1.11	2.49	14	20
		Dipterans	2015	5	6.6	6	0.678	1.52	5	9
			2016	5	10.2	10	0.8	1.79	8	12
			2018	5	7	6	0.894	2	5	10
			2021	5	12	13	0.775	1.73	9	13
		Oligochaetes	2015	5	0.8	1	0.2	0.447	0	1
			2016	5	1.4	1	0.245	0.548	1	2
			2018	5	0.2	0	0.2	0.447	0	1
			2021	5	1	1	0	0	1	1
		Amphipods	2015	5	0.4	0	0.245	0.548	0	1
			2016	5	0.6	1	0.245	0.548	0	1
			2018	5	0	0	0	0	0	0
			2021	5	0.4	0	0.245	0.548	0	1
		Bivalves	2015	5	2	2	0	0	2	2
			2016	5	1.6	2	0.245	0.548	1	2
			2018	5	1.8	2	0.2	0.447	1	2
			2021	5	1.8	2	0.2	0.447	1	2
		Gastropods	2015	5	0.8	1	0.2	0.447	0	1
			2016	5	1	1	0	0	1	1
			2018	5	1	1	0	0	1	1
			2021	5	1	1	0	0	1	1
		Other Taxa	2015	5	1.2	1	0.583	1.3	0	3
			2016	5	0.6	1	0.245	0.548	0	1
			2018	5	1.2	1	0.583	1.3	0	3
			2021	5	2	2	0.316	0.707	1	3
	Indices	Simpson's (1-D)	2015	5	0.85	0.853	0.0131	0.0293	0.804	0.884
			2016	5	0.821	0.841	0.0253	0.0566	0.741	0.875
			2018	5	0.845	0.84	0.0157	0.0351	0.792	0.885
			2021	5	0.824	0.85	0.0292	0.0654	0.713	0.876
		Simpson's (1/D)	2015	5	6.86	6.78	0.571	1.28	5.11	8.64
			2016	5	6.02	6.3	0.78	1.74	3.86	8.01
			2018	5	6.69	6.25	0.658	1.47	4.82	8.7
			2021	5	6.19	6.65	0.791	1.77	3.49	8.05
		Simpson's (E)	2015	5	0.601	0.605	0.0626	0.14	0.399	0.786
			2016	5	0.404	0.371	0.0685	0.153	0.214	0.616
			2018	5	0.626	0.569	0.081	0.181	0.476	0.939
			2021	5	0.337	0.332	0.034	0.076	0.249	0.424
		Bray-Curtis (Ref1)	2016	5	0.59	0.565	0.0379	0.0846	0.504	0.731
			2018	5	0.498	0.491	0.0268	0.0599	0.445	0.596
			2021	5	0.706	0.761	0.0458	0.102	0.537	0.784
		Bray-Curtis (Ref3)	2016	5	0.62	0.635	0.0515	0.115	0.472	0.786
			2018	5	0.643	0.705	0.0489	0.109	0.474	0.725
			2021	5	0.526	0.529	0.0392	0.0876	0.39	0.611
		Bray-Curtis (Pooled)	2015	5	0.539	0.52	0.041	0.0918	0.429	0.681
			2016	5	0.64	0.652	0.0546	0.122	0.467	0.804

Table G1-1. Benthic invertebrate community summary statistics for the Meliadine Lake study areas (2015-2021).

Area	Endpoint	Taxa Group / Metric	Year	N	Mean	Median	SE	SD	Min	Max
MEL-01	Indices	Bray-Curtis (Pooled)	2018	5	0.549	0.596	0.0467	0.104	0.383	0.652
			2021	5	0.546	0.561	0.0322	0.0721	0.426	0.607
MEL-02	Density (#/m2)	Total	2015	5	224	207	64.8	145	60.3	457
			2016	5	759	690	250	558	224	1670
			2018	5	859	802	225	503	276	1450
			2021	5	5170	4800	473	1060	4340	6930
		Dipterans	2015	5	147	138	41.1	91.8	25.9	284
			2016	5	391	345	92.3	206	155	690
			2018	5	624	595	195	437	94.8	1100
			2021	5	3860	3560	202	451	3490	4410
		Oligochaetes	2015	5	1.72	0	1.72	3.86	0	8.62
			2016	5	3.45	0	2.11	4.72	0	8.62
			2018	5	3.45	0	2.11	4.72	0	8.62
			2021	5	44.3	51.7	8	17.9	13.8	57.5
		Amphipods	2015	5	10.3	8.62	3.23	7.21	0	17.2
			2016	5	25.9	25.9	9.83	22	0	60.3
			2018	5	39.7	34.5	5.17	11.6	34.5	60.3
			2021	5	263	224	85	190	82.8	586
		Bivalves	2015	5	50	51.7	11.7	26.1	17.2	86.2
			2016	5	293	172	146	327	17.2	836
			2018	5	184	147	47.6	106	103	371
			2021	5	977	736	227	508	607	1850
		Gastropods	2015	5	12.1	0	12.1	27	0	60.3
			2016	5	36.2	17.2	24.1	54	0	129
			2018	5	0	0	0	0	0	0
			2021	5	2.3	0	2.3	5.14	0	11.5
		Other Taxa	2015	5	3.45	0	2.11	4.72	0	8.62
			2016	5	8.62	8.62	3.86	8.62	0	17.2
			2018	5	6.9	0	5.03	11.2	0	25.9
			2021	5	23	11.5	12.2	27.3	0	69
	Taxa Richness	Total	2015	5	9	9	1.22	2.74	6	13
			2016	5	11	9	1.45	3.24	8	15
			2018	5	11.8	11	2.08	4.66	7	18
			2021	5	16.2	17	1.43	3.19	12	20
		Dipterans	2015	5	5.4	5	0.748	1.67	3	7
			2016	5	6.8	7	0.917	2.05	5	10
			2018	5	8.2	8	1.71	3.83	4	13
			2021	5	10.2	10	1.02	2.28	8	13
		Oligochaetes	2015	5	0.2	0	0.2	0.447	0	1
			2016	5	0.4	0	0.245	0.548	0	1
			2018	5	0.4	0	0.245	0.548	0	1
			2021	5	1	1	0	0	1	1
		Amphipods	2015	5	1	1	0.316	0.707	0	2
			2016	5	0.8	1	0.2	0.447	0	1
			2018	5	1	1	0	0	1	1
			2021	5	1.2	1	0.2	0.447	1	2
		Bivalves	2015	5	1.8	2	0.2	0.447	1	2
			2016	5	1.4	1	0.245	0.548	1	2
			2018	5	1.6	2	0.245	0.548	1	2
			2021	5	2	2	0	0	2	2
		Gastropods	2015	5	0.2	0	0.2	0.447	0	1
			2016	5	0.6	1	0.245	0.548	0	1
			2018	5	0	0	0	0	0	0
			2021	5	0.2	0	0.2	0.447	0	1
		Other Taxa	2015	5	0.4	0	0.245	0.548	0	1
			2016	5	1	1	0.447	1	0	2
			2018	5	0.6	0	0.4	0.894	0	2
			2021	5	1.6	1	0.6	1.34	0	3
	Indices	Simpson's (1-D)	2015	5	0.82	0.817	0.0122	0.0273	0.785	0.862
			2016	5	0.833	0.849	0.0109	0.0243	0.806	0.852
			2018	5	0.825	0.846	0.034	0.0759	0.699	0.9
			2021	5	0.874	0.876	0.0108	0.0241	0.846	0.906
		Simpson's (1/D)	2015	5	5.66	5.45	0.422	0.943	4.65	7.22
			2016	5	6.1	6.62	0.378	0.845	5.17	6.76
			2018	5	6.49	6.48	1.09	2.44	3.33	10
			2021	5	8.21	8.04	0.739	1.65	6.5	10.6
		Simpson's (E)	2015	5	0.657	0.606	0.0657	0.147	0.554	0.907
			2016	5	0.583	0.574	0.0702	0.157	0.45	0.845
			2018	5	0.604	0.644	0.106	0.238	0.222	0.81
			2021	5	0.52	0.496	0.0613	0.137	0.383	0.744
		Bray-Curtis (Ref1)	2016	5	0.567	0.574	0.0572	0.128	0.448	0.756
			2018	5	0.46	0.475	0.0141	0.0315	0.406	0.484
			2021	5	0.54	0.524	0.0387	0.0865	0.437	0.643
		Bray-Curtis (Ref3)	2016	5	0.519	0.547	0.0616	0.138	0.337	0.679
			2018	5	0.554	0.592	0.061	0.136	0.332	0.683
			2021	5	0.392	0.365	0.0522	0.117	0.227	0.531

Table G1-1. Benthic invertebrate community summary statistics for the Meliadine Lake study areas (2015-2021).

Area	Endpoint	Taxa Group / Metric	Year	N	Mean	Median	SE	SD	Min	Max
MEL-02	Indices	Bray-Curtis (Pooled)	2015	5	0.467	0.45	0.0553	0.124	0.318	0.63
			2016	5	0.5	0.492	0.0712	0.159	0.337	0.68
			2018	5	0.5	0.509	0.0395	0.0883	0.354	0.578
			2021	5	0.4	0.375	0.0513	0.115	0.236	0.532
MEL-03	Density (#/m2)	Total	2016	5	1680	1230	336	750	1110	2770
			2018	5	1270	1240	326	729	241	2300
			2021	5	7010	5430	2070	4630	2660	12400
		Dipterans	2016	5	1360	931	363	812	638	2530
			2018	5	886	940	307	687	164	1930
			2021	5	6190	4910	1960	4390	1910	11400
		Oligochaetes	2016	5	20.7	17.2	5.85	13.1	8.62	34.5
			2018	5	46.6	60.3	21.2	47.5	0	112
			2021	5	198	155	57.1	128	94.8	414
		Amphipods	2016	5	46.6	25.9	18.6	41.6	0	94.8
			2018	5	117	43.1	65.2	146	0	362
			2021	5	100	34.5	65.3	146	0	353
		Bivalves	2016	5	231	190	43.7	97.8	164	397
			2018	5	184	164	61	136	25.9	379
			2021	5	417	345	82.4	184	276	724
		Gastropods	2016	5	6.9	8.62	3.23	7.21	0	17.2
			2018	5	12.1	0	12.1	27	0	60.3
			2021	5	75.9	51.7	33.9	75.7	0	172
		Other Taxa	2016	5	13.8	8.62	5.85	13.1	0	34.5
			2018	5	19	8.62	12.9	28.9	0	69
			2021	5	31	25.9	10.4	23.3	8.62	69
	Taxa Richness	Total	2016	5	14.8	15	1.02	2.28	12	17
			2018	5	14.2	15	1.77	3.96	8	18
			2021	5	17.4	17	1.12	2.51	14	21
		Dipterans	2016	5	9.2	10	0.735	1.64	7	11
			2018	5	9.6	11	1.25	2.79	5	12
			2021	5	10.8	11	0.735	1.64	8	12
		Oligochaetes	2016	5	1.4	1	0.245	0.548	1	2
			2018	5	0.8	1	0.374	0.837	0	2
			2021	5	1.8	2	0.374	0.837	1	3
		Amphipods	2016	5	0.8	1	0.2	0.447	0	1
			2018	5	0.8	1	0.2	0.447	0	1
			2021	5	0.8	1	0.2	0.447	0	1
		Bivalves	2016	5	1.6	2	0.245	0.548	1	2
			2018	5	1.8	2	0.2	0.447	1	2
			2021	5	2	2	0	0	2	2
		Gastropods	2016	5	0.6	1	0.245	0.548	0	1
			2018	5	0.2	0	0.2	0.447	0	1
			2021	5	0.8	1	0.2	0.447	0	1
		Other Taxa	2016	5	1.2	1	0.374	0.837	0	2
			2018	5	1	1	0.548	1.22	0	3
			2021	5	1.2	1	0.2	0.447	1	2
	Indices	Simpson's (1-D)	2016	5	0.819	0.801	0.0255	0.0569	0.744	0.889
			2018	5	0.838	0.837	0.0274	0.0612	0.741	0.895
			2021	5	0.808	0.832	0.0303	0.0678	0.739	0.894
		Simpson's (1/D)	2016	5	6.03	5.04	0.918	2.05	3.91	9.03
			2018	5	6.86	6.13	1.03	2.3	3.87	9.49
			2021	5	5.83	5.94	1.03	2.3	3.83	9.44
		Simpson's (E)	2016	5	0.412	0.336	0.0637	0.142	0.295	0.599
			2018	5	0.506	0.52	0.0812	0.182	0.258	0.766
			2021	5	0.342	0.292	0.0652	0.146	0.213	0.555
		Bray-Curtis (Ref1)	2016	5	0.378	0.459	0.0647	0.145	0.181	0.516
			2018	5	0.512	0.5	0.0559	0.125	0.352	0.693
			2021	5	0.416	0.399	0.111	0.249	0.0422	0.656
		Bray-Curtis (Ref3)	2016	5	0.511	0.474	0.0595	0.133	0.34	0.661
			2018	5	0.571	0.539	0.0661	0.148	0.411	0.739
			2021	5	0.522	0.455	0.0543	0.121	0.408	0.687
		Bray-Curtis (Pooled)	2016	5	0.504	0.448	0.0638	0.143	0.33	0.661
			2018	5	0.514	0.543	0.061	0.137	0.309	0.641
			2021	5	0.497	0.423	0.0536	0.12	0.402	0.658
MEL-04	Density (#/m2)	Total	2016	5	717	612	194	434	276	1210
		Dipterans	2016	5	364	259	90.2	202	155	621
		Oligochaetes	2016	5	24.1	25.9	6.33	14.2	0	34.5
		Amphipods	2016	5	63.8	17.2	35.7	79.9	0	155
		Bivalves	2016	5	253	310	77.6	173	69	422
		Gastropods	2016	5	3.45	0	3.45	7.71	0	17.2
		Other Taxa	2016	5	8.62	8.62	4.72	10.6	0	25.9
	Taxa Richness	Total	2016	5	10.8	10	0.97	2.17	8	13
		Dipterans	2016	5	6.8	7	0.8	1.79	5	9
		Oligochaetes	2016	5	0.8	1	0.2	0.447	0	1
		Amphipods	2016	5	0.6	1	0.245	0.548	0	1
		Bivalves	2016	5	1.6	2	0.245	0.548	1	2

Table G1-1. Benthic invertebrate community summary statistics for the Meliadine Lake study areas (2015-2021).

Area	Endpoint	Taxa Group / Metric	Year	N	Mean	Median	SE	SD	Min	Max
MEL-04	Taxa Richness	Gastropods	2016	5	0.2	0	0.2	0.447	0	1
		Other Taxa	2016	5	0.8	1	0.374	0.837	0	2
	Indices	Simpson's (1-D)	2016	5	0.82	0.836	0.0262	0.0586	0.75	0.883
		Simpson's (1/D)	2016	5	6.04	6.09	0.865	1.93	3.99	8.53
		Simpson's (E)	2016	5	0.562	0.499	0.0758	0.17	0.43	0.853
		Bray-Curtis (Ref1)	2016	5	0.541	0.483	0.0655	0.146	0.412	0.741
		Bray-Curtis (Ref3)	2016	5	0.474	0.425	0.0684	0.153	0.285	0.653
		Bray-Curtis (Pooled)	2016	5	0.441	0.398	0.0639	0.143	0.255	0.604
MEL-05	Density (#/m2)	Total	2016	5	910	1040	171	383	500	1390
			2018	4	1610	1600	224	449	1080	2170
			2021	5	5290	3830	1560	3490	3370	11500
		Dipterans	2016	5	567	724	126	281	190	802
			2018	4	1180	1230	124	249	836	1410
			2021	5	4430	2900	1570	3520	2690	10700
		Oligochaetes	2016	5	27.6	17.2	11.7	26.1	0	69
			2018	4	23.7	8.62	18.4	36.8	0	77.6
			2021	5	82.8	92	21.2	47.4	25.9	138
		Amphipods	2016	5	48.3	17.2	33.5	74.8	0	181
			2018	4	94.8	51.7	63.2	126	0	276
			2021	5	106	94.8	51.8	116	0	299
		Bivalves	2016	5	234	259	43.6	97.4	121	345
			2018	4	220	190	68.4	137	103	397
			2021	5	549	560	24.4	54.7	483	621
		Gastropods	2016	5	19	17.2	11	24.7	0	60.3
			2018	4	58.2	38.8	24	47.9	25.9	129
			2021	5	102	69	33.8	75.6	43.1	218
		Other Taxa	2016	5	13.8	8.62	9.68	21.6	0	51.7
			2018	4	38.8	30.2	23.5	47	0	94.8
			2021	5	16.1	11.5	7.8	17.4	0	34.5
	Taxa Richness	Total	2016	5	13	13	1.58	3.54	9	17
			2018	4	16.8	16	2.06	4.11	13	22
			2021	5	16.2	17	0.86	1.92	13	18
		Dipterans	2016	5	8	8	1.22	2.74	4	11
			2018	4	11.2	11	1.03	2.06	9	14
			2021	5	10.2	10	0.663	1.48	8	12
		Oligochaetes	2016	5	1	1	0.316	0.707	0	2
			2018	4	0.75	0.5	0.479	0.957	0	2
			2021	5	1.4	1	0.245	0.548	1	2
		Amphipods	2016	5	0.8	1	0.2	0.447	0	1
			2018	4	0.75	1	0.25	0.5	0	1
			2021	5	0.8	1	0.2	0.447	0	1
		Bivalves	2016	5	1.8	2	0.2	0.447	1	2
			2018	4	2	2	0	0	2	2
			2021	5	2	2	0	0	2	2
		Gastropods	2016	5	0.6	1	0.245	0.548	0	1
			2018	4	1	1	0	0	1	1
			2021	5	1	1	0	0	1	1
		Other Taxa	2016	5	0.8	1	0.374	0.837	0	2
			2018	4	1	1	0.577	1.15	0	2
			2021	5	0.8	1	0.374	0.837	0	2
	Indices	Simpson's (1-D)	2016	5	0.841	0.842	0.0248	0.0554	0.763	0.908
			2018	4	0.848	0.87	0.0315	0.063	0.758	0.895
			2021	5	0.756	0.825	0.062	0.139	0.512	0.838
		Simpson's (1/D)	2016	5	6.97	6.32	1.14	2.56	4.21	10.8
			2018	4	7.32	7.8	1.21	2.43	4.13	9.56
			2021	5	4.84	5.73	0.755	1.69	2.05	6.16
		Simpson's (E)	2016	5	0.532	0.5	0.0438	0.098	0.422	0.637
			2018	4	0.435	0.462	0.0503	0.101	0.295	0.523
			2021	5	0.294	0.337	0.04	0.0895	0.158	0.363
		Bray-Curtis (Ref1)	2016	5	0.373	0.394	0.0527	0.118	0.179	0.5
			2018	4	0.575	0.552	0.0449	0.0899	0.503	0.692
			2021	5	0.466	0.452	0.02	0.0447	0.429	0.544
		Bray-Curtis (Ref3)	2016	5	0.292	0.239	0.0575	0.129	0.159	0.476
			2018	4	0.301	0.303	0.0116	0.0233	0.273	0.327
			2021	5	0.201	0.105	0.0982	0.22	0.0834	0.593
		Bray-Curtis (Pooled)	2016	5	0.329	0.265	0.0487	0.109	0.227	0.47
			2018	4	0.387	0.396	0.0405	0.0811	0.287	0.469
			2021	5	0.223	0.134	0.0875	0.196	0.128	0.573

Table G1-2. **Top 5 dominant benthic invertebrate taxa by station in Meliadine Lake.**

Year	Area	Station	Status	Sum of Top 5 Taxa	Dominant 1		Dominant 2		Dominant 3		Dominant 4		Dominant 5	
					Taxon	%	Taxon	%	Taxon	%	Taxon	%	Taxon	%
2015	MEL-01	MEL-01-01	Control	82%	Sphaerium sp.	22%	Stictochironomus sp.	21%	Procladius sp.	16%	Pisidium sp.	16%	Microtendipes pedellus group	7%
2015	MEL-01	MEL-01-02	Control	84%	Stictochironomus sp.	31%	Pisidium sp.	22%	Sphaerium sp.	19%	Procladius sp.	7%	Microtendipes pedellus group	5%
2015	MEL-01	MEL-01-03	Control	72%	Stictochironomus sp.	28%	Pisidium sp.	22%	Procladius sp.	8%	Sphaerium sp.	8%	Corynocera sp.	7%
2015	MEL-01	MEL-01-04	Control	68%	Sphaerium sp.	29%	Corynocera sp.	13%	Pisidium sp.	11%	Stictochironomus sp.	7%	Micropsectra sp.	7%
2015	MEL-01	MEL-01-05	Control	64%	Chironomidae indet.	23%	Pisidium sp.	14%	Pagastiella sp.	9%	Microtendipes pedellus group	9%	Procladius sp.	9%
2015	MEL-02	MEL-02-01	Control	77%	Microtendipes pedellus group	35%	Monodiamesa sp.	15%	Pisidium sp.	15%	Sphaerium sp.	8%	Lebertia sp.	4%
2015	MEL-02	MEL-02-02	Control	85%	Pisidium sp.	29%	Hyalella sp.	14%	Gammarus sp.	14%	Microtendipes pedellus group	14%	Micropsectra sp.	14%
2015	MEL-02	MEL-02-03	Control	80%	Stictochironomus sp.	40%	Pagastiella sp.	10%	Chironomidae indet.	10%	Monodiamesa sp.	10%	Pisidium sp.	10%
2015	MEL-02	MEL-02-04	Control	69%	Microtendipes pedellus group	28%	Pisidium sp.	15%	Chironomidae indet.	9%	Valvata sincera	9%	Corynocera sp.	8%
2015	MEL-02	MEL-02-05	Control	79%	Microtendipes pedellus group	29%	Pisidium sp.	25%	Monodiamesa sp.	12%	Pagastiella sp.	8%	Amphipoda indet.	4%
2016	MEL-01	MEL-01-01	Impact	67%	Pisidium sp.	25%	Microtendipes sp.	14%	Stictochironomus sp.	12%	Pisidiidae indet.	9%	Procladius sp.	7%
2016	MEL-01	MEL-01-02	Impact	84%	Pisidium sp.	33%	Stictochironomus sp.	28%	Micropsectra sp.	10%	Pagastiella sp.	7%	Pisidiidae indet.	6%
2016	MEL-01	MEL-01-03	Impact	74%	Stictochironomus sp.	23%	Pisidium sp.	18%	Tanytarsus sp.	17%	Microtendipes sp.	9%	Pisidiidae indet.	7%
2016	MEL-01	MEL-01-04	Impact	80%	Pisidium sp.	30%	Tanytarsus sp.	16%	Pisidiidae indet.	14%	Corynocera sp.	11%	Chironomus sp.	9%
2016	MEL-01	MEL-01-05	Impact	87%	Tanytarsus sp.	40%	Pisidium sp.	28%	Pisidiidae indet.	7%	Procladius sp.	7%	Chironomidae indet.	4%
2016	MEL-02	MEL-02-01	Impact	74%	Stictochironomus sp.	27%	Microtendipes sp.	15%	Monodiamesa sp.	12%	Valvata sp.	12%	Amphipoda indet.	8%
2016	MEL-02	MEL-02-02	Impact	77%	Pisidium sp.	28%	Stictochironomus sp.	15%	Pisidiidae indet.	14%	Microtendipes sp.	12%	Gammarus sp.	8%
2016	MEL-02	MEL-02-03	Impact	87%	Microtendipes sp.	33%	Stictochironomus sp.	21%	Pisidium sp.	15%	Pisidiidae indet.	10%	Pagastiella sp.	8%
2016	MEL-02	MEL-02-04	Impact	82%	Microtendipes sp.	35%	Pisidium sp.	17%	Pagastiella sp.	15%	Stictochironomus sp.	8%	Gammarus sp.	6%
2016	MEL-02	MEL-02-05	Impact	76%	Pisidium sp.	27%	Microtendipes sp.	16%	Pisidiidae indet.	16%	Tanytarsus sp.	9%	Sphaerium sp.	8%
2016	MEL-03	MEL-03-01	Control	67%	Tanytarsus sp.	20%	Pagastiella sp.	17%	Stictochironomus sp.	11%	Paratanytarsus sp.	11%	Pisidium sp.	8%
2016	MEL-03	MEL-03-02	Control	80%	Stictochironomus sp.	36%	Pisidium sp.	22%	Pisidiidae indet.	13%	Microtendipes sp.	5%	Procladius sp.	4%
2016	MEL-03	MEL-03-03	Control	79%	Corynocera sp.	37%	Tanytarsus sp.	20%	Procladius sp.	10%	Pisidium sp.	7%	Paratanytarsus sp.	6%
2016	MEL-03	MEL-03-04	Control	79%	Pagastiella sp.	22%	Corynocera sp.	16%	Stictochironomus sp.	16%	Microtendipes sp.	13%	Pisidium sp.	12%
2016	MEL-03	MEL-03-05	Control	88%	Corynocera sp.	42%	Stictochironomus sp.	24%	Pagastiella sp.	12%	Tanytarsus sp.	6%	Pisidium sp.	4%
2016	MEL-04	MEL-04-01	Control	86%	Pisidium sp.	41%	Stictochironomus sp.	18%	Pagastiella sp.	14%	Pisidiidae indet.	9%	Lumbriculus sp.	4%
2016	MEL-04	MEL-04-02	Control	85%	Stictochironomus sp.	44%	Monodiamesa sp.	17%	Pisidium sp.	12%	Pisidiidae indet.	7%	Lebertia sp.	5%
2016	MEL-04	MEL-04-03	Control	82%	Pisidium sp.	27%	Corynocera sp.	20%	Gammarus sp.	14%	Stictochironomus sp.	14%	Pisidiidae indet.	7%
2016	MEL-04	MEL-04-04	Control	71%	Pisidium sp.	24%	Stictochironomus sp.	20%	Microtendipes sp.	10%	Gammarus sp.	9%	Corynocera sp.	8%
2016	MEL-04	MEL-04-05	Control	67%	Monodiamesa sp.	19%	Lumbriculus sp.	12%	Tanytarsus sp.	12%	Pisidium sp.	12%	Pisidiidae indet.	12%
2016	MEL-05	MEL-05-01	Control	62%	Pisidium sp.	16%	Pagastiella sp.	15%	Gammarus sp.	12%	Chironomidae indet.	10%	Pisidiidae indet.	9%
2016	MEL-05	MEL-05-02	Control	80%	Pagastiella sp.	26%	Pisidium sp.	21%	Stictochironomus sp.	14%	Corynocera sp.	14%	Tanytarsus sp.	5%
2016	MEL-05	MEL-05-03	Control	79%	Corynocera sp.	35%	Tanytarsus sp.	14%	Pisidium sp.	13%	Procladius sp.	11%	Lumbriculus sp.	6%
2016	MEL-05	MEL-05-04	Control	71%	Corynocera sp.	18%	Pagastiella sp.	17%	Pisidium sp.	17%	Stictochironomus sp.	11%	Procladius sp.	8%
2016	MEL-05	MEL-05-05	Control	87%	Pisidium sp.	42%	Stictochironomus sp.	18%	Pisidiidae indet.	11%	Pagastiella sp.	10%	Procladius sp.	7%
2018	MEL-01	MEL-01-01	Impact	69%	Pisidium sp.	20%	Stictochironomus sp.	16%	Micropsectra sp.	14%	Corynocera sp.	11%	Pagastiella sp.	8%
2018	MEL-01	MEL-01-06	Impact	89%	Stictochironomus sp.	35%	Pisidium sp.	21%	Pisidiidae indet.	15%	Sphaerium sp.	9%	Valvata sp.	9%
2018	MEL-01	MEL-01-07	Impact	83%	Corynocera sp.	26%	Micropsectra sp.	21%	Microtendipes sp.	15%	Pisidium sp.	14%	Stictochironomus sp.	7%
2018	MEL-01	MEL-01-08	Impact	83%	Pisidium sp.	27%	Valvata sp.	18%	Stictochironomus sp.	16%	Microtendipes sp.	11%	Sphaerium sp.	11%
2018	MEL-01	MEL-01-09	Impact	75%	Microtendipes sp.	19%	Procladius sp.	15%	Pisidium sp.	15%	Valvata sp.	15%	Micropsectra sp.	11%
2018	MEL-02	MEL-02-02	Impact	62%	Pisidium sp.	16%	Stictochironomus sp.	15%	Microtendipes sp.	11%	Tanytarsus sp.	11%	Micropsectra sp.	9%

Table G1-2. Top 5 dominant benthic invertebrate taxa by station in Meliadine Lake.

Year	Area	Station	Status	Sum of Top 5 Taxa	Dominant 1		Dominant 2		Dominant 3		Dominant 4		Dominant 5	
					Taxon	%	Taxon	%	Taxon	%	Taxon	%	Taxon	%
2018	MEL-02	MEL-02-03	Impact	83%	Chironomidae indet.	32%	Microtendipes sp.	16%	Corynocera sp.	12%	Pisidium sp.	12%	Gammarus sp.	11%
2018	MEL-02	MEL-02-05	Impact	77%	Pisidium sp.	28%	Stictochironomus sp.	16%	Sphaerium sp.	12%	Pisidiidae indet.	12%	Gammarus sp.	9%
2018	MEL-02	MEL-02-06	Impact	71%	Microtendipes sp.	28%	Pisidium sp.	14%	Stictochironomus sp.	11%	Tanytarsus sp.	10%	Corynocera sp.	9%
2018	MEL-02	MEL-02-08	Impact	81%	Corynocera sp.	52%	Microtendipes sp.	11%	Pisidium sp.	8%	Tanytarsus sp.	6%	Stictochironomus sp.	3%
2018	MEL-03	MEL-03-01	Control	63%	Microtendipes sp.	24%	Corynocera sp.	12%	Gammarus sp.	10%	Stictochironomus sp.	10%	Tanytarsus sp.	7%
2018	MEL-03	MEL-03-02	Control	63%	Pisidium sp.	18%	Gammarus sp.	17%	Amphipoda indet.	11%	Lumbriculus sp.	9%	Pisidiidae indet.	9%
2018	MEL-03	MEL-03-03	Control	81%	Corynocera sp.	48%	Tanytarsus sp.	11%	Tanytarsini indet.	8%	Pisidium sp.	8%	Paratanytarsus sp.	6%
2018	MEL-03	MEL-03-04	Control	83%	Stictochironomus sp.	29%	Microtendipes sp.	18%	Gammarus sp.	14%	Corynocera sp.	11%	Pisidiidae indet.	11%
2018	MEL-03	MEL-03-05	Control	76%	Stictochironomus sp.	28%	Corynocera sp.	24%	Pisidium sp.	10%	Pagastiella sp.	7%	Procladius sp.	7%
2018	MEL-05	MEL-05-01	Control	66%	Corynocera sp.	19%	Pagastiella sp.	17%	Gammarus sp.	12%	Pisidium sp.	10%	Pisidiidae indet.	8%
2018	MEL-05	MEL-05-02	Control	65%	Corynocera sp.	24%	Paratanytarsus sp.	14%	Tanytarsini indet.	11%	Tanytarsus sp.	10%	Microtendipes sp.	6%
2018	MEL-05	MEL-05-03	Control	84%	Tanytarsini indet.	38%	Corynocera sp.	30%	Paratanytarsus sp.	7%	Pagastiella sp.	4%	Procladius sp.	4%
2018	MEL-05	MEL-05-04	Control	68%	Corynocera sp.	31%	Chironomidae indet.	13%	Pagastiella sp.	9%	Valvata sp.	8%	Pisidium sp.	7%
2021	MEL-01	MEL-01-01	Impact	77%	Microtendipes sp.	33%	Pisidium sp.	21%	Stictochironomus sp.	10%	Procladius sp.	7%	Polypedilum sp.	5%
2021	MEL-01	MEL-01-06	Impact	74%	Stictochironomus sp.	18%	Pisidium sp.	17%	Microtendipes sp.	15%	Procladius sp.	12%	Pisidiidae indet.	12%
2021	MEL-01	MEL-01-07	Impact	80%	Microtendipes sp.	21%	Stictochironomus sp.	18%	Procladius sp.	14%	Corynocera sp.	14%	Pisidium sp.	13%
2021	MEL-01	MEL-01-08	Impact	79%	Stictochironomus sp.	23%	Pisidium sp.	22%	Microtendipes sp.	18%	Procladius sp.	10%	Pisidiidae indet.	6%
2021	MEL-01	MEL-01-09	Impact	88%	Corynocera sp.	48%	Pisidium sp.	18%	Procladius sp.	9%	Micropsectra sp.	7%	Pisidiidae indet.	6%
2021	MEL-02	MEL-02-02	Impact	73%	Corynocera sp.	20%	Micropsectra sp.	17%	Pisidium sp.	14%	Stictochironomus sp.	13%	Microtendipes sp.	9%
2021	MEL-02	MEL-02-03	Impact	70%	Corynocera sp.	17%	Micropsectra sp.	15%	Microtendipes sp.	14%	Stictochironomus sp.	13%	Pisidium sp.	11%
2021	MEL-02	MEL-02-05	Impact	71%	Microtendipes sp.	29%	Corynocera sp.	12%	Chironomidae indet.	11%	Pisidium sp.	10%	Procladius sp.	10%
2021	MEL-02	MEL-02-06	Impact	75%	Corynocera sp.	30%	Microtendipes sp.	13%	Micropsectra sp.	12%	Pisidium sp.	11%	Stictochironomus sp.	9%
2021	MEL-02	MEL-02-08	Impact	58%	Pisidium sp.	17%	Stictochironomus sp.	12%	Microtendipes sp.	12%	Corynocera sp.	9%	Procladius sp.	9%
2021	MEL-03	MEL-03-01	Control	82%	Micropsectra sp.	26%	Corynocera sp.	23%	Paratanytarsus sp.	15%	Chironomidae indet.	15%	Psectrocladius sp.	3%
2021	MEL-03	MEL-03-02	Control	87%	Corynocera sp.	38%	Micropsectra sp.	32%	Paratanytarsus sp.	9%	Pisidium sp.	4%	Procladius sp.	4%
2021	MEL-03	MEL-03-03	Control	84%	Corynocera sp.	44%	Micropsectra sp.	25%	Paratanytarsus sp.	5%	Chironomus sp.	5%	Pisidium sp.	5%
2021	MEL-03	MEL-03-04	Control	58%	Stictochironomus sp.	24%	Pisidium sp.	9%	Corynocera sp.	9%	Gammarus sp.	8%	Micropsectra sp.	8%
2021	MEL-03	MEL-03-05	Control	66%	Stictochironomus sp.	36%	Procladius sp.	10%	Pisidium sp.	8%	Corynocera sp.	8%	Polypedilum sp.	4%
2021	MEL-05	MEL-05-01	Control	75%	Corynocera sp.	34%	Stictochironomus sp.	17%	Pisidium sp.	12%	Procladius sp.	7%	Micropsectra sp.	5%
2021	MEL-05	MEL-05-02	Control	91%	Corynocera sp.	69%	Stictochironomus sp.	8%	Procladius sp.	6%	Paratanytarsus sp.	5%	Pisidium sp.	3%
2021	MEL-05	MEL-05-03	Control	73%	Corynocera sp.	36%	Pisidium sp.	14%	Stictochironomus sp.	10%	Procladius sp.	7%	Gammarus sp.	7%
2021	MEL-05	MEL-05-04	Control	71%	Corynocera sp.	34%	Procladius sp.	14%	Pisidium sp.	10%	Pagastiella sp.	7%	Stictochironomus sp.	6%
2021	MEL-05	MEL-05-05	Control	82%	Corynocera sp.	43%	Pisidium sp.	12%	Microtendipes sp.	11%	Stictochironomus sp.	9%	Procladius sp.	6%

Notes:

"indet" = taxa were identified at the Family level (e.g., Pisidiidae and Chironomidae)

Table G1-3. Taxa presence / absence for the 2021 benthic invertebrate community survey.

Site:	MEL-01	MEL-01	MEL-01	MEL-01	MEL-01	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-03	MEL-03	MEL-03	MEL-03	MEL-03	MEL-05	MEL-05	MEL-05	MEL-05	MEL-05
Sample:	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08.1	MEL-02-08.2	MEL-02-08.3	MEL-02-08.4	MEL-02-08.5	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Sample Collection Date:	14-Aug-21	15-Aug-21	14-Aug-21	14-Aug-21	14-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	07-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21
CC#:	CC220362	CC220363	CC220364	CC220365	CC220366	CC220367	CC220368	CC220369	CC220370	CC220371	CC220372	CC220373	CC220374	CC220375	CC220376	CC220377	CC220378	CC220379	CC220380	CC220381	CC220382	CC220383	CC220384	CC220385
Phylum: Arthropoda	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Subphylum: Hexapoda	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Insecta	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Ephemeroptera	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Baetidae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Acentrella	No	No	No	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Trichoptera	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Hydropsychidae	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Cheumatopsyche	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Diptera	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Chironomidae	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
| Subfamily: Chironominae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Tribe: Chironomini	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Chironomus	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	Yes	No	Yes	No	No	No	No	No	No	No
Cryptochironomus	No	No	No	No	Yes	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Microtendipes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Pagastiella	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Phaenopsectra	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No	No
Polypedilum	Yes	Yes	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	Yes	No	No	Yes	No	No	No	No	No
Stictochironomus	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
| Tribe: Pseudochironomini	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Pseudochironomus	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
| Tribe: Tanytarsini	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Corynocera	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Micropsectra	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Paratanytarsus	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stempellina	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No
Stempellinella	Yes	No	Yes	Yes	No	Yes	No	Yes	No	No	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	No	Yes	Yes	No
| Subfamily: Orthocladiinae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Corynoneura	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Heterotrissocladius	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	Yes	No	No	No	No	Yes
Nanocladius	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Psectrocladius	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
| Subfamily: Prodiamesinae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Table G1-3. Taxa presence / absence for the 2021 benthic invertebrate community survey.

Site:	MEL-01	MEL-01	MEL-01	MEL-01	MEL-01	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-03	MEL-03	MEL-03	MEL-03	MEL-03	MEL-05	MEL-05	MEL-05	MEL-05	MEL-05
Sample:	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08.1	MEL-02-08.2	MEL-02-08.3	MEL-02-08.4	MEL-02-08.5	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Sample Collection Date:	14-Aug-21	15-Aug-21	14-Aug-21	14-Aug-21	14-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	07-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21
CC#:	CC220362	CC220363	CC220364	CC220365	CC220366	CC220367	CC220368	CC220369	CC220370	CC220371	CC220372	CC220373	CC220374	CC220375	CC220376	CC220377	CC220378	CC220379	CC220380	CC220381	CC220382	CC220383	CC220384	CC220385
Monodiamesa	Yes	Yes	No	No	No	No	No	No	Yes	No	No	No	No	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes
Prodiamesa	Yes	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
| Subfamily: Tanypodinae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Ablabesmyia	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
| Tribe: Procladiini	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Subphylum: Crustacea	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Branchiopoda	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Cladocera	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
| Order: Notostraca	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Triopsidae	No	No	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Subphylum: Chelicerata	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Arachnida	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Trombidiformes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No
| Family: Hygrobatidae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Hygrobates	No	Yes	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Lebertiidae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Lebertia	No	Yes	No	Yes	No	No	No	Yes	Yes	No	No	No	No	Yes	No	No	No	Yes	Yes	No	Yes	Yes	No	No
| Family: Oxidae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Oxus	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	No	Yes	No	No
| Family: Pionidae	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No
	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Malacostraca	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Amphipoda	No	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
| Family: Gammaridae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Gammarus	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
| Family: Hyalellidae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Hyalella	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Maxillipoda	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Copepoda	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Phylum: Mollusca	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Bivalvia	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Veneroida	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Table G1-3. Taxa presence / absence for the 2021 benthic invertebrate community survey.

Site:	MEL-01	MEL-01	MEL-01	MEL-01	MEL-01	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-03	MEL-03	MEL-03	MEL-03	MEL-03	MEL-05	MEL-05	MEL-05	MEL-05	MEL-05
Sample:	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08.1	MEL-02-08.2	MEL-02-08.3	MEL-02-08.4	MEL-02-08.5	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Sample Collection Date:	14-Aug-21	15-Aug-21	14-Aug-21	14-Aug-21	14-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	07-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21
CC#:	CC220362	CC220363	CC220364	CC220365	CC220366	CC220367	CC220368	CC220369	CC220370	CC220371	CC220372	CC220373	CC220374	CC220375	CC220376	CC220377	CC220378	CC220379	CC220380	CC220381	CC220382	CC220383	CC220384	CC220385
| Family: Pisidiidae	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pisidium	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sphaerium	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
| Class: Gastropoda	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Heterostropha	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Valvatidae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Valvata	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Phylum: Annelida	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Subphylum: Clitellata	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Oligochaeta	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Order: Lumbriculida	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Lumbriculidae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
| Order: Tubificida	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Family: Naididae	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No
Slavina appendiculata	No	No	No	No	No	No	Yes	No	No	Yes	No	No	No	No	Yes	No	Yes	No	Yes	No	No	No	Yes	No
Uncinais uncinata	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
| Subfamily: Tubificinae with hair chaetae	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No
| Subfamily: Tubificinae without hair chaetae	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
Taxa present but not included:																								
Phylum: Arthropoda	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Subphylum: Crustacea	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Ostracoda	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Phylum: Nemata	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Phylum: Platyhelminthes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
| Class: Turbellaria	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	No	No	Yes

Appendix G2

2021 Benthic Invertebrate Taxonomy Report

Project: Meliadine AEMP/EEM

Azimuth Consulting Group

Taxonomist: Scott Finlayson

scottfinlayson@cordilleraconsulting.ca

250-494-7553

Site:	MEL-01	MEL-01	MEL-01	MEL-01	MEL-01	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-03	MEL-03	MEL-03	MEL-03	MEL-03	MEL-05	MEL-05	MEL-05	MEL-05	MEL-05
Sample:	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08.1	MEL-02-08.2	MEL-02-08.3	MEL-02-08.4	MEL-02-08.5	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Sample Collection Date:	14-Aug-21	15-Aug-21	14-Aug-21	14-Aug-21	14-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	07-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21
CC#:	CC220362	CC220363	CC220364	CC220365	CC220366	CC220367	CC220368	CC220369	CC220370	CC220371	CC220372	CC220373	CC220374	CC220375	CC220376	CC220377	CC220378	CC220379	CC220380	CC220381	CC220382	CC220383	CC220384	CC220385
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Hexapoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Insecta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Baetidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acentrella	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trichoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Hydropsychidae	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheumatopsyche	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Diptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Chironomidae	0	7	10	13	16	12	40	65	11	6	12	3	0	4	212	8	12	12	8	4	0	1	5	2
| Subfamily: Chironominae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Tribe: Chironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomus	0	0	0	0	0	1	0	0	0	0	0	0	0	0	44	0	64	0	0	0	0	0	0	0
Cryptochironomus	0	0	0	0	8	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes	214	61	76	69	6	52	69	180	67	21	7	25	18	25	0	6	8	15	9	20	0	24	19	42
Pagastiella	2	1	1	5	4	7	19	21	21	5	2	5	2	6	0	4	8	18	11	8	4	17	33	10
Phaenopsectra	0	0	2	5	24	1	0	0	0	0	0	0	0	0	32	2	12	0	0	0	0	0	0	0
Polypedilum	34	23	2	0	6	0	0	0	0	0	0	0	0	0	0	2	0	0	16	0	0	0	0	0
Stictochironomus	64	73	68	88	18	72	64	43	45	17	13	25	15	26	0	0	0	75	130	73	100	43	29	36
| Tribe: Pseudochironomini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0

Site:	MEL-01	MEL-01	MEL-01	MEL-01	MEL-01	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-03	MEL-03	MEL-03	MEL-03	MEL-03	MEL-05	MEL-05	MEL-05	MEL-05	MEL-05
Sample:	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08.1	MEL-02-08.2	MEL-02-08.3	MEL-02-08.4	MEL-02-08.5	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Sample Collection Date:	14-Aug-21	15-Aug-21	14-Aug-21	14-Aug-21	14-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	07-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21
CC#:	CC220362	CC220363	CC220364	CC220365	CC220366	CC220367	CC220368	CC220369	CC220370	CC220371	CC220372	CC220373	CC220374	CC220375	CC220376	CC220377	CC220378	CC220379	CC220380	CC220381	CC220382	CC220383	CC220384	CC220385
| Tribe: Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynocera	26	7	50	3	566	109	83	75	157	18	15	0	7	31	328	238	576	28	29	143	920	160	161	167
Micropsectra	32	7	12	4	84	94	74	47	59	17	18	9	10	9	376	204	328	24	13	22	40	12	12	10
Paratanytarsus	0	2	3	5	0	1	10	0	5	12	13	1	0	5	216	58	68	9	7	8	64	7	13	6
Stempellina	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Stempellinella	2	0	2	1	0	10	0	4	0	0	1	2	0	1	0	0	8	6	0	4	0	1	1	0
| Subfamily: Orthocladiinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corynoneura	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0
Heterotrissocladius	2	0	0	4	0	0	0	0	0	0	0	0	0	0	0	6	0	0	3	0	0	0	0	1
Nanocladius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Psectrocladius	2	3	1	2	0	4	0	0	2	1	1	0	0	0	48	8	20	0	15	18	16	7	13	5
| Subfamily: Prodiamesinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monodiamesa	8	4	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	2	0	1	0	0	0	1
Prodiamesa	2	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
| Subfamily: Tanypodinae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ablabesmyia	2	1	3	1	0	1	6	4	3	8	5	0	0	3	36	10	20	11	12	7	20	9	13	7
| Tribe: Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius	46	48	52	38	110	48	40	59	42	17	17	16	13	6	32	24	60	16	35	28	80	31	65	25
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Branchiopoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Cladocera	0	0	0	0	0	1	2	1	2	0	0	0	0	0	4	2	4	1	1	1	0	1	1	1
| Order: Notostraca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Triopsidae	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Chelicerata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Arachnida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Trombidiformes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
| Family: Hygrobatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hygrobates	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lebertiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lebertia	0	1	0	1	0	0	0	1	3	0	0	0	0	1	0	0	0	1	1	0	4	1	0	0
| Family: Oxidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxus	2	3	2	6	0	1	0	0	3	0	0	0	0	0	4	2	8	0	1	0	0	3	0	0
| Family: Pionidae	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
| Class: Malacostraca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Amphipoda	0	0	0	3	0	9	0	0	2	5	4	3	1	1	0	0	0	16	1	1	0	5	0	2
| Family: Gammaridae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Site:	MEL-01	MEL-01	MEL-01	MEL-01	MEL-01	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-03	MEL-03	MEL-03	MEL-03	MEL-03	MEL-05	MEL-05	MEL-05	MEL-05	MEL-05
Sample:	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08.1	MEL-02-08.2	MEL-02-08.3	MEL-02-08.4	MEL-02-08.5	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Sample Collection Date:	14-Aug-21	15-Aug-21	14-Aug-21	14-Aug-21	14-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	07-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21
CC#:	CC220362	CC220363	CC220364	CC220365	CC220366	CC220367	CC220368	CC220369	CC220370	CC220371	CC220372	CC220373	CC220374	CC220375	CC220376	CC220377	CC220378	CC220379	CC220380	CC220381	CC220382	CC220383	CC220384	CC220385
Gammarus	2	0	0	5	0	16	10	27	21	12	15	4	6	17	0	2	4	25	10	11	0	29	4	9
| Family: Hyalellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Maxillipoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Copepoda	2	1	1	1	2	1	2	1	2	1	1	1	1	1	4	2	4	1	1	1	4	1	1	1
Phylum: Mollusca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Veneroida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Pisidiidae	24	48	17	23	66	21	21	21	8	20	16	15	10	4	4	0	16	4	7	11	8	11	15	11
Pisidium	134	66	48	82	216	80	54	61	58	29	35	32	21	19	28	26	64	29	30	50	44	60	48	46
Sphaerium	12	16	0	5	26	12	8	3	5	3	7	0	0	4	20	6	4	1	3	4	4	1	4	2
| Class: Gastropoda	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Heterostropha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Valvatidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Valvata	24	22	10	11	14	0	0	1	0	0	0	0	0	0	16	6	20	0	2	5	16	8	25	5
Phylum: Annelida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Clitellata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Oligochaeta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Order: Lumbriculida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Lumbriculidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	18	4	11	10	5	16	13	8	2
| Order: Tubificida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Family: Naididae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Slavina appendiculata	0	0	0	0	0	0	3	0	0	1	0	0	0	0	20	0	20	0	1	0	0	0	3	0
Uncinais uncinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
| Subfamily: Tubificinae with hair chaetae	2	0	0	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
| Subfamily: Tubificinae without hair chaetae	4	1	2	2	2	3	2	7	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Totals:	**644**	**397**	**368**	**381**	**1172**	**559**	**509**	**622**	**524**	**194**	**183**	**159**	**109**	**164**	**1452**	**634**	**1332**	**310**	**363**	**425**	**1340**	**445**	**474**	**393**

Site:	MEL-01	MEL-01	MEL-01	MEL-01	MEL-01	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-02	MEL-03	MEL-03	MEL-03	MEL-03	MEL-03	MEL-05	MEL-05	MEL-05	MEL-05	MEL-05
Sample:	MEL-01-01	MEL-01-06	MEL-01-07	MEL-01-08	MEL-01-09	MEL-02-02	MEL-02-03	MEL-02-05	MEL-02-06	MEL-02-08.1	MEL-02-08.2	MEL-02-08.3	MEL-02-08.4	MEL-02-08.5	MEL-03-01	MEL-03-02	MEL-03-03	MEL-03-04	MEL-03-05	MEL-05-01	MEL-05-02	MEL-05-03	MEL-05-04	MEL-05-05
Sample Collection Date:	14-Aug-21	15-Aug-21	14-Aug-21	14-Aug-21	14-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	15-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	07-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21	10-Aug-21
CC#:	CC220362	CC220363	CC220364	CC220365	CC220366	CC220367	CC220368	CC220369	CC220370	CC220371	CC220372	CC220373	CC220374	CC220375	CC220376	CC220377	CC220378	CC220379	CC220380	CC220381	CC220382	CC220383	CC220384	CC220385
Taxa present but not included:																								
Phylum: Arthropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subphylum: Crustacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Ostracoda	2	1	1	1	2	0	2	1	2	1	1	1	0	1	0	2	4	1	1	1	4	1	1	1
Phylum: Nemata	2	1	0	1	2	1	2	1	2	0	1	1	0	1	4	2	4	1	1	1	0	1	1	1
Phylum: Platyhelminthes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
| Class: Turbellaria	2	1	1	0	0	1	2	1	2	1	1	1	1	1	0	0	4	1	1	0	0	0	0	1
Totals:	**6**	**3**	**2**	**2**	**4**	**2**	**6**	**3**	**6**	**2**	**3**	**3**	**1**	**3**	**4**	**4**	**12**	**3**	**3**	**2**	**4**	**2**	**2**	**3**

APPENDIX H

THREESPINE STICKLEBACK– SUPPORTING INFORMATION

Appendix H-1

Threespine Stickleback Data and Summary Statistics

APPENDIX H1 - TABLES

Table H1-1. Mature Threespine Stickleback summary statistics by area for 2021 sampling within Meliadine Lake. 1
Table H1-2. Threespine Stickleback summary statistics by maturity, sex, and area for 2021 sampling within Meliadine Lake. 2
Table H1-3. QA/QC results for the Threespine Stickleback age estimates in 2021. 5
Table H1-4. Small-bodied fish catch data for 2021 sampling within Meliadine Lake. 6

Table H1-1. Mature Threespine Stickleback summary statistics by area for 2021 sampling within Meliadine Lake.

Variable	Site	n	Min	Max	Mean	Median	Standard Deviation	Standard Error
Total Length (mm)	MEL-01	56	47	71	61	63	5.0	0.7
	MEL-03	62	40	79	58	59	8.2	1.0
	MEL-04	52	41	72	56	56	8.3	1.2
Total Weight (g)	MEL-01	56	0.8348	2.8867	1.9356	1.9416	0.47085	0.06292
	MEL-03	62	0.4579	5.5292	1.6127	1.4254	0.80423	0.10214
	MEL-04	52	0.4915	3.6451	1.5910	1.5457	0.75084	0.10412
Carcass Weight (g)	MEL-01	56	0.6967	2.3754	1.5996	1.5931	0.39533	0.05283
	MEL-03	62	0.3733	3.5230	1.2900	1.1984	0.55808	0.07088
	MEL-04	52	0.4178	2.0492	1.2311	1.2188	0.49714	0.06894
Condition	MEL-01	56	0.67	1.05	0.83	0.80	0.084	0.011
	MEL-03	62	0.65	1.12	0.79	0.77	0.089	0.011
	MEL-04	52	0.65	1.27	0.83	0.83	0.106	0.015
Liver Weight (g)	MEL-01	56	0.016	0.1327	0.0678	0.0667	0.02614	0.00349
	MEL-03	62	0.0131	0.2755	0.0552	0.0438	0.04305	0.00547
	MEL-04	52	0.0086	0.2271	0.0654	0.0479	0.05435	0.00754
Gonad Weight (g)	MEL-01	56	0.0029	0.1583	0.0436	0.0241	0.03873	0.00518
	MEL-03	61	0.0019	1.1619	0.0758	0.0195	0.17284	0.02213
	MEL-04	52	0.0046	0.8712	0.0924	0.0211	0.18777	0.02604
Fecundity (# of eggs per female)	MEL-01	0	-	-	-	-	-	-
	MEL-03	4	58	211	123	112	64.0	32.0
	MEL-04	2	96	141	119	119	31.8	22.5
Otolith Age (years)	MEL-01	56	1	5	4	4	0.8	0.1
	MEL-03	62	1	5	3	3	0.9	0.1
	MEL-04	52	2	5	3	4	0.9	0.1

Table H1-2. Threespine Stickleback summary statistics by maturity, sex, and area for 2021 sampling within Meliadine Lake.

Variable	Maturity	Sex	Site	n	Min.	Max.	Mean	Median	Standard Deviation	Standard Error
Total Length (mm)	**Mature**	**Female**	MEL-01	23	56	71	64	64	4.4	0.9
			MEL-03	26	55	79	65	63	6.0	1.2
			MEL-04	18	55	72	64	65	4.8	1.1
		Male	MEL-01	33	47	65	60	61	4.9	0.9
			MEL-03	36	40	61	53	53	5.4	0.9
			MEL-04	34	41	65	52	53	6.4	1.1
	Immature	**All**	MEL-01	22	35	62	42	39	7.4	1.6
			MEL-03	22	33	44	39	38	2.9	0.6
			MEL-04	25	38	54	43	42	3.8	0.8
Total Weight (g)	**Mature**	**Female**	MEL-01	23	1.2886	2.8867	2.0729	2.1112	0.44528	0.09285
			MEL-03	26	1.0849	5.5292	2.1821	2.0258	0.90853	0.17818
			MEL-04	18	1.3907	3.6451	2.2970	2.3640	0.61834	0.14575
		Male	MEL-01	33	0.8348	2.7502	1.8398	1.8200	0.47087	0.08197
			MEL-03	36	0.4579	1.8691	1.2014	1.1588	0.35047	0.05841
			MEL-04	34	0.4915	2.2494	1.2173	1.1964	0.50850	0.08721
	Immature	**All**	MEL-01	22	0.3047	1.8343	0.6237	0.4434	0.40200	0.08571
			MEL-03	22	0.3067	0.5955	0.4428	0.4474	0.08282	0.01766
			MEL-04	25	0.3987	0.8722	0.5690	0.5402	0.12313	0.02463
Carcass Weight (g)	**Mature**	**Female**	MEL-01	23	1.0323	2.3046	1.6610	1.7303	0.36661	0.07644
			MEL-03	26	0.8587	3.5230	1.6797	1.5557	0.59340	0.11637
			MEL-04	18	1.1467	2.0492	1.6512	1.7491	0.31309	0.07380
		Male	MEL-01	33	0.6967	2.3754	1.5568	1.5338	0.41426	0.07211
			MEL-03	36	0.3733	1.6484	1.0085	0.9749	0.31147	0.05191
			MEL-04	34	0.4178	1.9169	1.0087	0.9874	0.42924	0.07361
	Immature	**All**	MEL-01	22	0.2496	1.5206	0.5082	0.3633	0.32999	0.07035
			MEL-03	22	0.2466	0.5165	0.3631	0.3716	0.07182	0.01531
			MEL-04	24	0.3319	0.7468	0.4608	0.4501	0.10567	0.02157

Table H1-2. **Threespine Stickleback summary statistics by maturity, sex, and area for 2021 sampling within Meliadine Lake.**

Variable	Maturity	Sex	Site	n	Min.	Max.	Mean	Median	Standard Deviation	Standard Error
Condition	**Mature**	**Female**	MEL-01	23	0.67	0.97	0.80	0.79	0.068	0.014
			MEL-03	26	0.65	1.12	0.77	0.74	0.102	0.020
			MEL-04	18	0.65	1.27	0.86	0.84	0.140	0.033
		Male	MEL-01	33	0.69	1.05	0.85	0.83	0.089	0.015
			MEL-03	36	0.68	1.01	0.80	0.79	0.077	0.013
			MEL-04	34	0.69	0.96	0.82	0.81	0.083	0.014
	Immature	**All**	MEL-01	22	0.60	0.94	0.75	0.74	0.075	0.016
			MEL-03	22	0.61	1.14	0.76	0.75	0.117	0.025
			MEL-04	25	0.55	0.89	0.74	0.73	0.079	0.016
Liver Weight (g)	**Mature**	**Female**	MEL-01	23	0.0405	0.1327	0.0833	0.0765	0.02373	0.00495
			MEL-03	26	0.0389	0.2755	0.0871	0.0708	0.05031	0.00987
			MEL-04	18	0.0422	0.2271	0.1205	0.1032	0.05728	0.01350
		Male	MEL-01	33	0.016	0.1249	0.0571	0.0587	0.02225	0.00387
			MEL-03	36	0.0131	0.0531	0.0321	0.0321	0.01095	0.00183
			MEL-04	34	0.0086	0.0815	0.0362	0.0341	0.01831	0.00314
	Immature	**All**	MEL-01	22	0.0063	0.0754	0.0219	0.0160	0.01869	0.00398
			MEL-03	22	0.0037	0.0163	0.0107	0.0108	0.00332	0.00071
			MEL-04	25	0.0065	0.0281	0.0153	0.0141	0.00553	0.00111
Gonad Weight (g)	**Mature**	**Female**	MEL-01	23	0.0493	0.1583	0.0830	0.0745	0.0300	0.0063
			MEL-03	26	0.0195	1.1619	0.1590	0.0755	0.2430	0.0477
			MEL-04	18	0.0344	0.8712	0.2391	0.1014	0.2662	0.0627
		Male	MEL-01	33	0.0029	0.0337	0.0161	0.0146	0.0078	0.0014
			MEL-03	35	0.0019	0.0461	0.0140	0.0112	0.0093	0.0016
			MEL-04	34	0.0046	0.0296	0.0148	0.0149	0.0074	0.0013
	Immature	**All**	MEL-01	16	0.0019	0.045	0.0114	0.0051	0.0127	0.0032
			MEL-03	15	0.0006	0.012	0.0054	0.0045	0.0032	0.0008
			MEL-04	23	0.0007	0.0187	0.0088	0.0078	0.0045	0.0009

Table H1-2. Threespine Stickleback summary statistics by maturity, sex, and area for 2021 sampling within Meliadine Lake.

Variable	Maturity	Sex	Site	n	Min.	Max.	Mean	Median	Standard Deviation	Standard Error
Fecundity (# of eggs per female)	**Mature**	**Female**	MEL-01	-	-	-	-	-	-	-
			MEL-03	4	58	211	123	112	64.0	32.0
			MEL-04	2	96	141	119	119	31.8	22.5
Otolith Age (years)	**Mature**	**Female**	MEL-01	23	3	4	4	4	0.5	0.1
			MEL-03	26	2	5	3	3	0.6	0.1
			MEL-04	18	3	5	4	4	0.7	0.2
		Male	MEL-01	33	1	5	4	4	0.9	0.2
			MEL-03	36	1	5	3	3	1.0	0.2
			MEL-04	34	2	5	3	3	0.9	0.1
	Immature	**All**	MEL-01	22	1	3	2	1	0.7	0.2
			MEL-03	22	1	3	2	2	0.6	0.1
			MEL-04	20	1	3	2	2	0.3	0.1

Table H1-3. QA/QC results for the Threespine Stickleback age estimates in 2021.

Fish ID	Otolith Age (years)		
	Original Reading	QA/QC Reading	Difference
THST-002	4	4	0
THST-011	4	4	0
THST-012	3	3	0
THST-013	3	3	0
THST-014	4	4	0
THST-015	4	4	0
THST-016	5	5	0
THST-017	3	4	1
THST-018	4	4	0
THST-019	3	3	0
THST-020	4	4	0
THST-021	4	4	0
THST-022	3	4	1
THST-023	3	3	0
THST-024	4	4	0
THST-025	4	4	0
THST-026	3	3	0
THST-027	2	2	0
THST-028	3	3	0
THST-135	2	2	0
THST-136	4	4	0
THST-137	3	3	0
THST-138	3	3	0
THST-139	1	1	0
THST-140	3	3	0
THST-141	4	4	0
THST-142	3	3	0
THST-143	2	3	1
THST-144	2	3	1
THST-145	3	3	0
THST-146	4	4	0
THST-147	5	5	0
THST-148	4	4	0
THST-149	3	3	0
THST-150	2	2	0
THST-157	4	4	0
THST-158	3	4	1
THST-287	3	3	0
THST-288	4	4	0
THST-289	4	4	0
THST-290	3	3	0
THST-291	3	3	0
THST-292	3	3	0
THST-293	2	2	0
THST-294	4	4	0
THST-295	4	4	0
THST-296	3	3	0
THST-297	2	2	0
THST-298	3	3	0

Table H1-4. Small-bodied fish catch data for 2021 sampling within Meliadine Lake.

Site	Subsite	Total Soak Time (hrs)	Catch Summary						Threespine Stickleback CPUE (fish/hr soak time)
			Threespine Stickleback	Ninespine Stickleback	Slimy Sculpin	Lake Trout	Burbot	Round Whitefish	
MEL-01	MT01	2538	218	7	1	0	0	0	0.086
	MT02	3731	315	2	0	0	0	0	0.084
	Total	**6268**	**533**	**9**	**1**	**0**	**0**	**0**	**0.085**
MEL-03	MT01	1097	70	26	3	0	0	0	0.064
	MT02	558	28	15	0	1	0	0	0.050
	MT03	518	143	13	0	1	0	0	0.276
	MT04	919	376	23	1	0	0	0	0.409
	MT05	377	157	12	0	0	0	0	0.416
	MT06	456	131	12	1	0	1	0	0.287
	MT07	841	293	8	2	0	1	0	0.348
	MT08	855	16	0	0	0	1	0	0.019
	MT09	2610	254	64	4	0	1	0	0.097
	MT10	1777	90	9	2	1	1	0	0.051
	MT11	2213	15	4	0	0	1	0	0.007
	MT12	1377	570	141	1	3	0	0	0.414
	Total	**13597**	**2143**	**327**	**14**	**6**	**6**	**0**	**0.158**
MEL-04	MT01	189	10	2	0	0	0	0	0.053
	MT02	95	0	0	0	0	0	0	0.000
	MT03	186	159	2	0	0	0	0	0.857
	MT04	464	32	2	0	0	1	0	0.069
	MT05	226	0	0	0	0	0	0	0.000
	MT06	4493	614	58	3	3	7	2	0.137
	MT07	4314	320	46	1	1	7	0	0.074
	MT08	158	4	2	0	0	0	0	0.025
	MT09	156	79	2	0	0	0	0	0.506
	MT10	131	2	2	0	0	0	0	0.015
	MT11	3081	292	88	4	2	3	0	0.095
	Total	**13492**	**1512**	**204**	**8**	**6**	**18**	**2**	**0.112**
Overall Total		**33357**	**4188**	**540**	**23**	**12**	**24**	**2**	**0.126**

Appendix H-2

Supplemental Figures

APPENDIX H2 – FIGURES

Figure H2-1. Aluminum 1
Figure H2-2. Arsenic 2
Figure H2-3. Barium 3
Figure H2-4. Cadmium 4
Figure H2-5. Calcium 5
Figure H2-6. Cesium 6
Figure H2-7. Chromium 7
Figure H2-8. Cobalt 8
Figure H2-9. Copper 9
Figure H2-10. Iron 10
Figure H2-11. Lead 11
Figure H2-12. Magnesium 12
Figure H2-13. Manganese 13
Figure H2-14. Mercury 14
Figure H2-15. Moisture 15
Figure H2-16. Molybdenum 16
Figure H2-17. Nickel 17
Figure H2-18. Phosphorus 18
Figure H2-19. Potassium 19
Figure H2-20. Rubidium 20
Figure H2-21. Selenium 21
Figure H2-22. Silver 22
Figure H2-23. Sodium 23
Figure H2-24. Strontium 24
Figure H2-25. Thallium 25
Figure H2-26. Tin 26
Figure H2-27. Uranium 27
Figure H2-28. Zinc 28
Figure H2-29. Zirconium 29

Figure H2-1. Aluminum

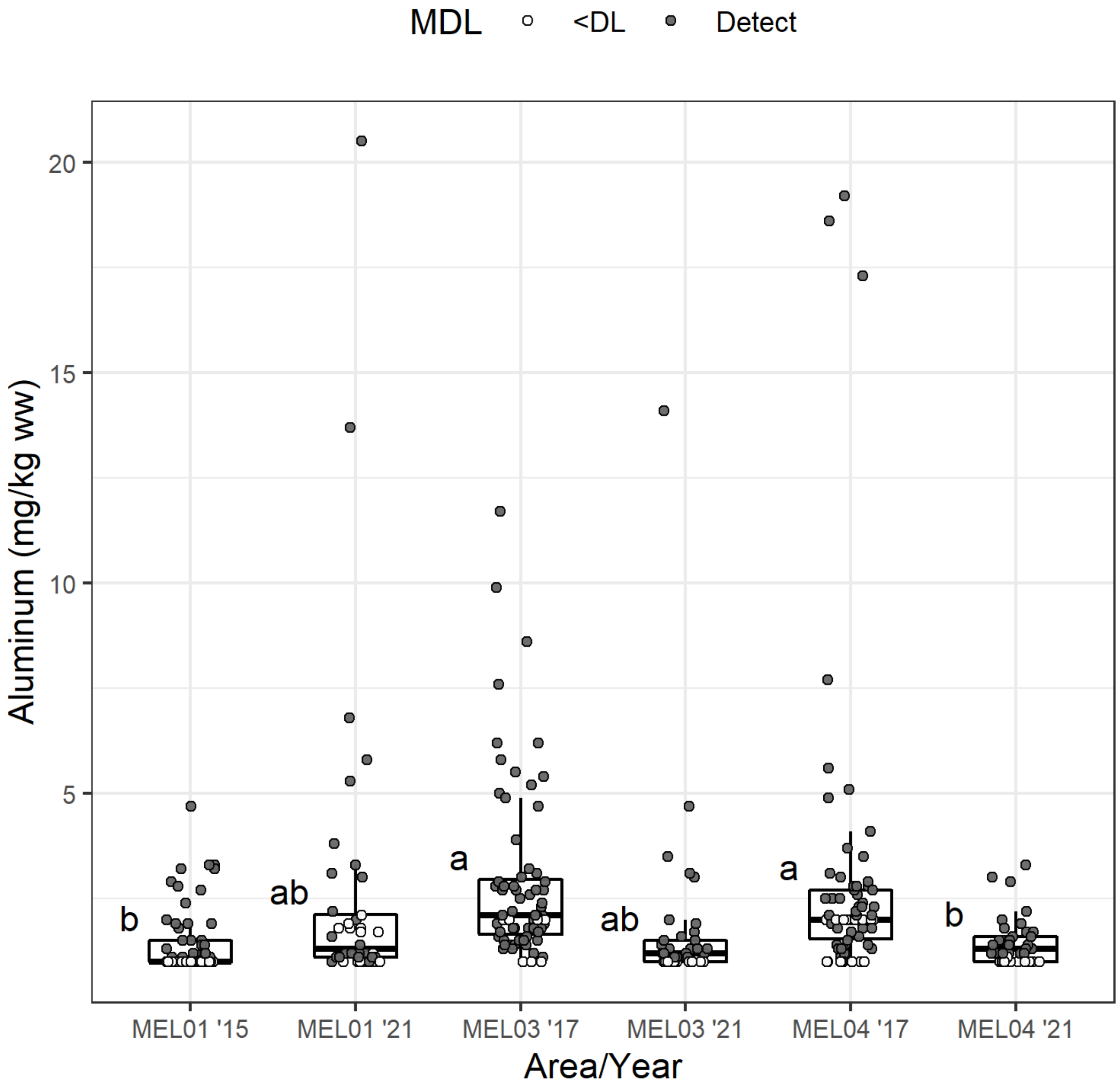


Figure H2-2. Arsenic

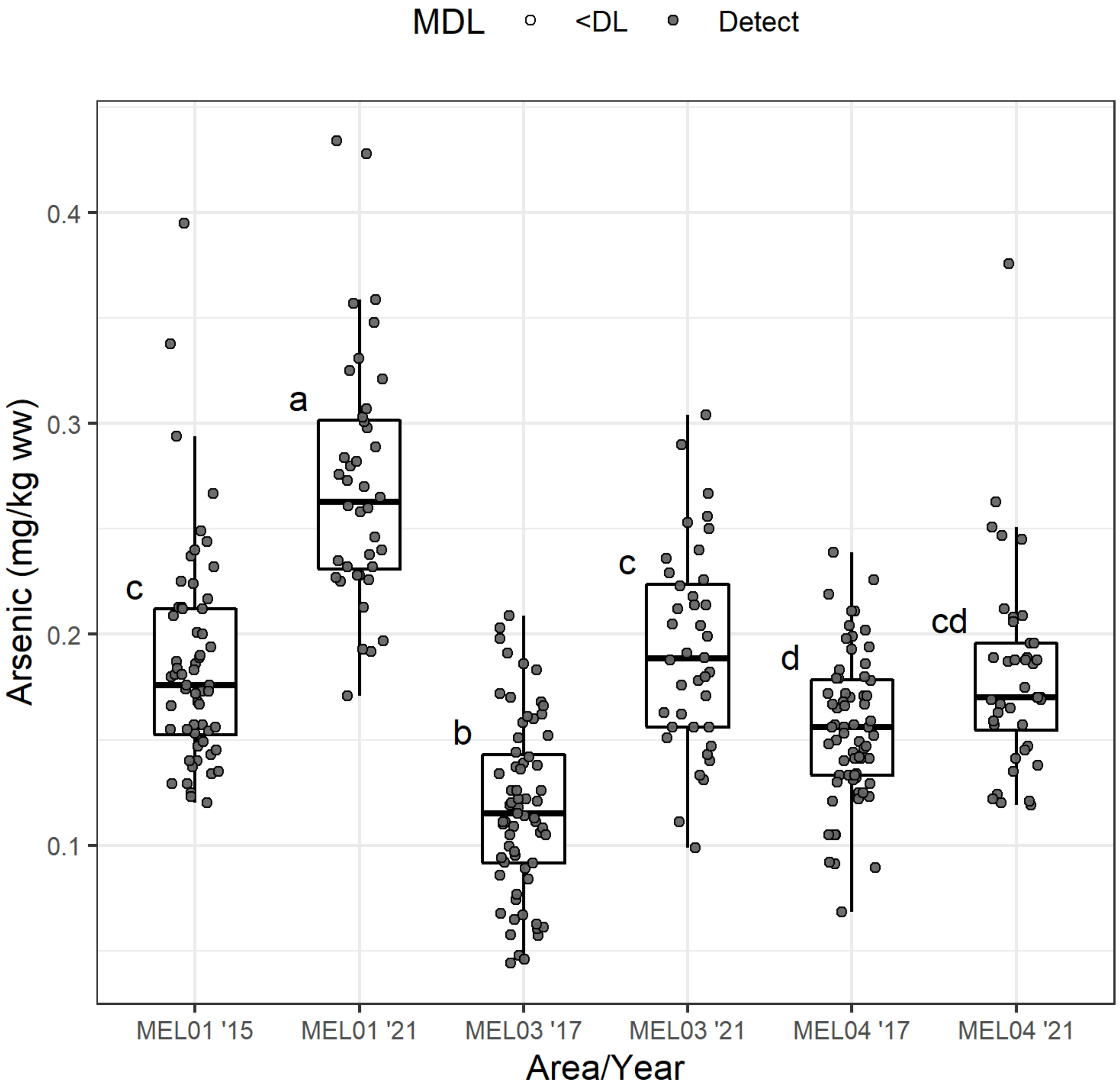


Figure H2-3. Barium

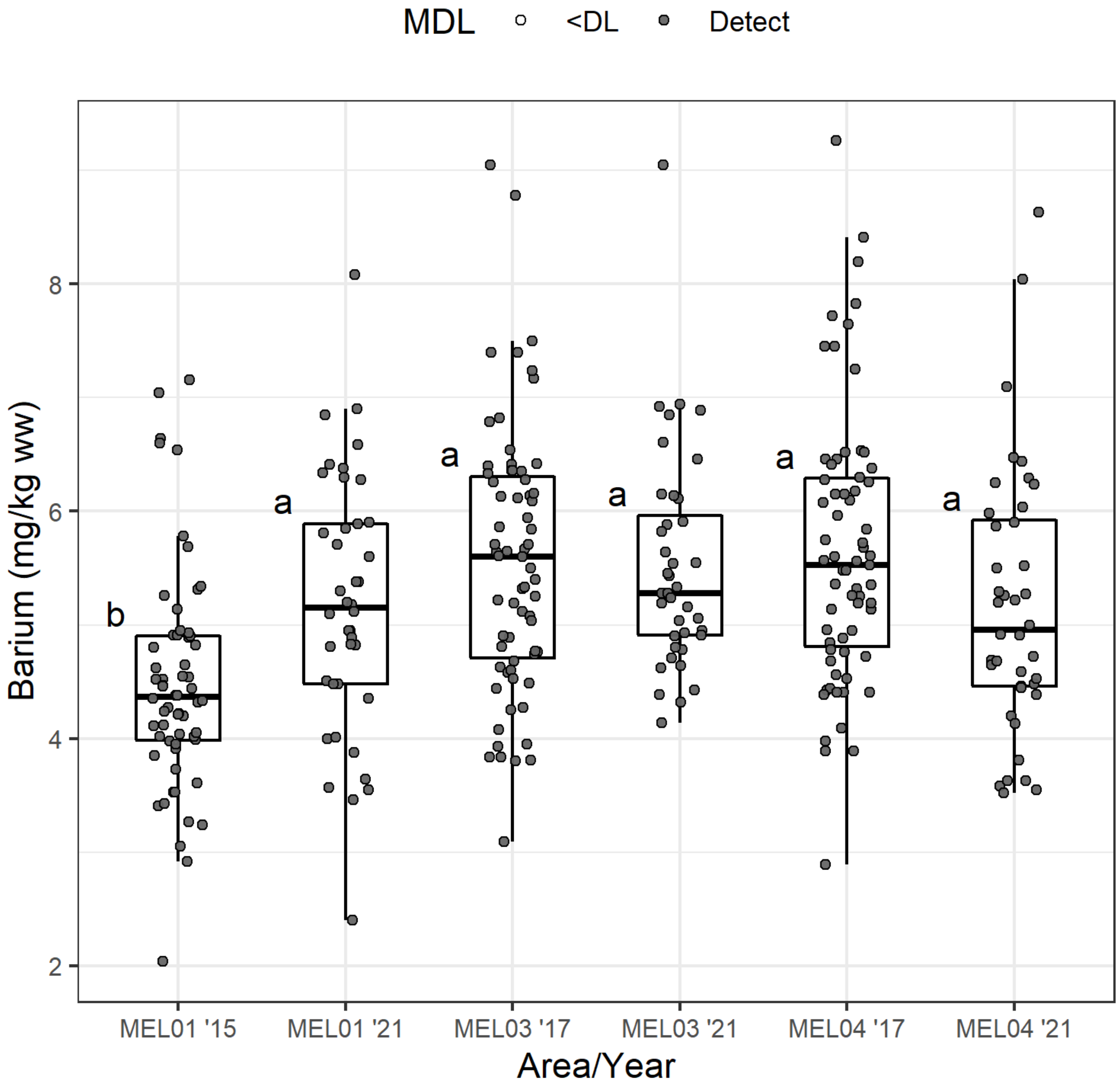


Figure H2-4. Cadmium

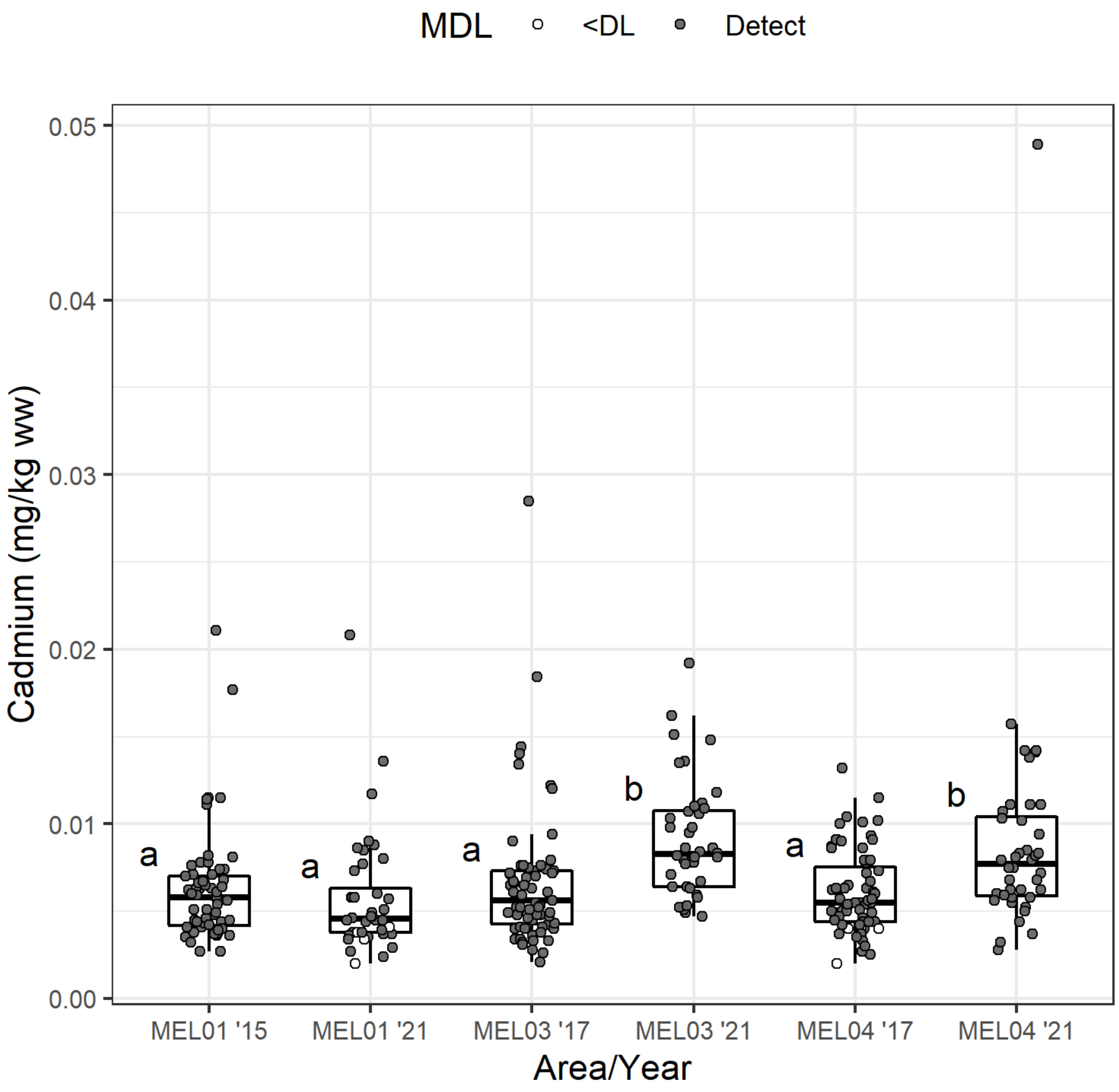


Figure H2-5. Calcium

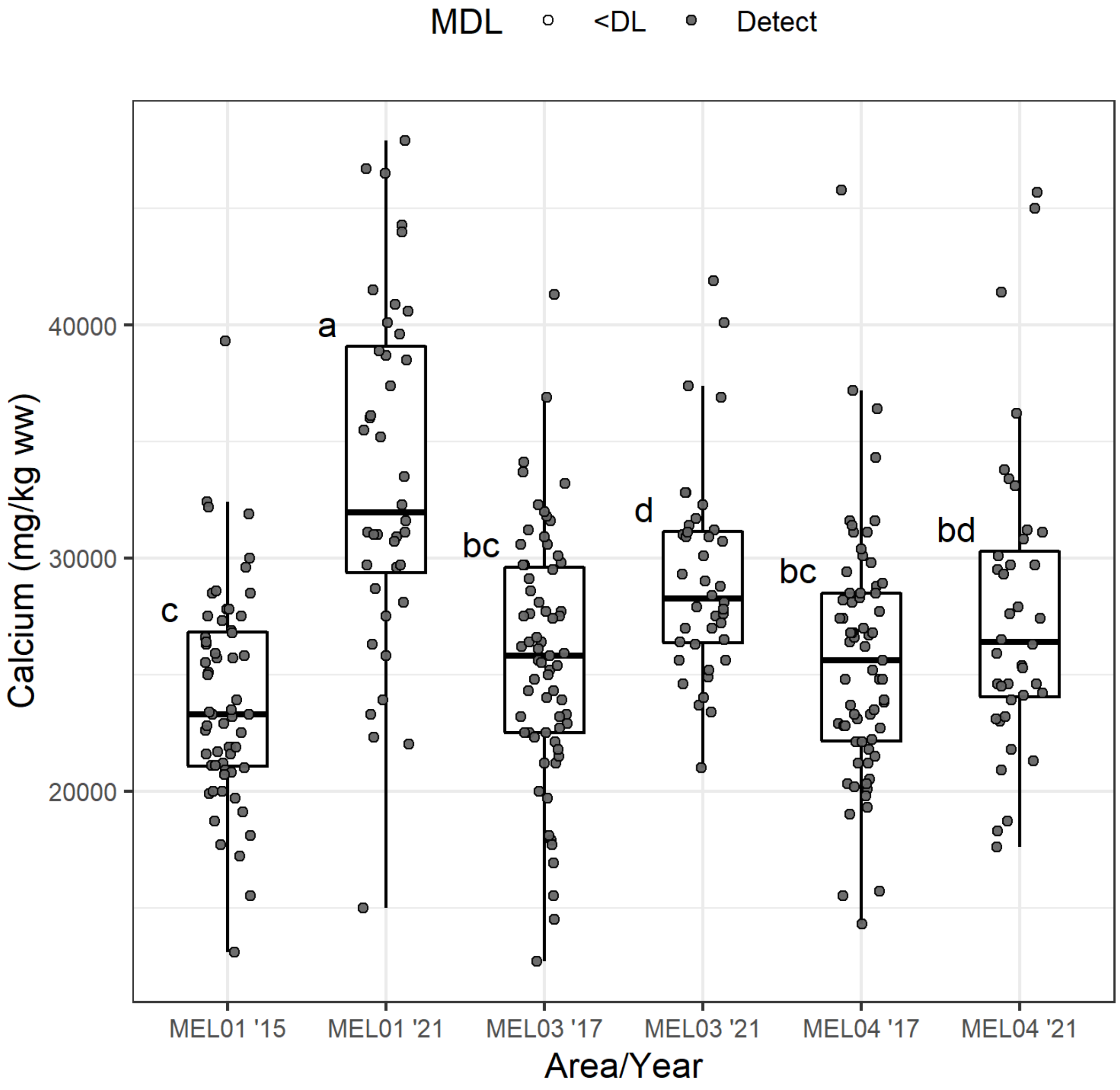


Figure H2-6. Cesium

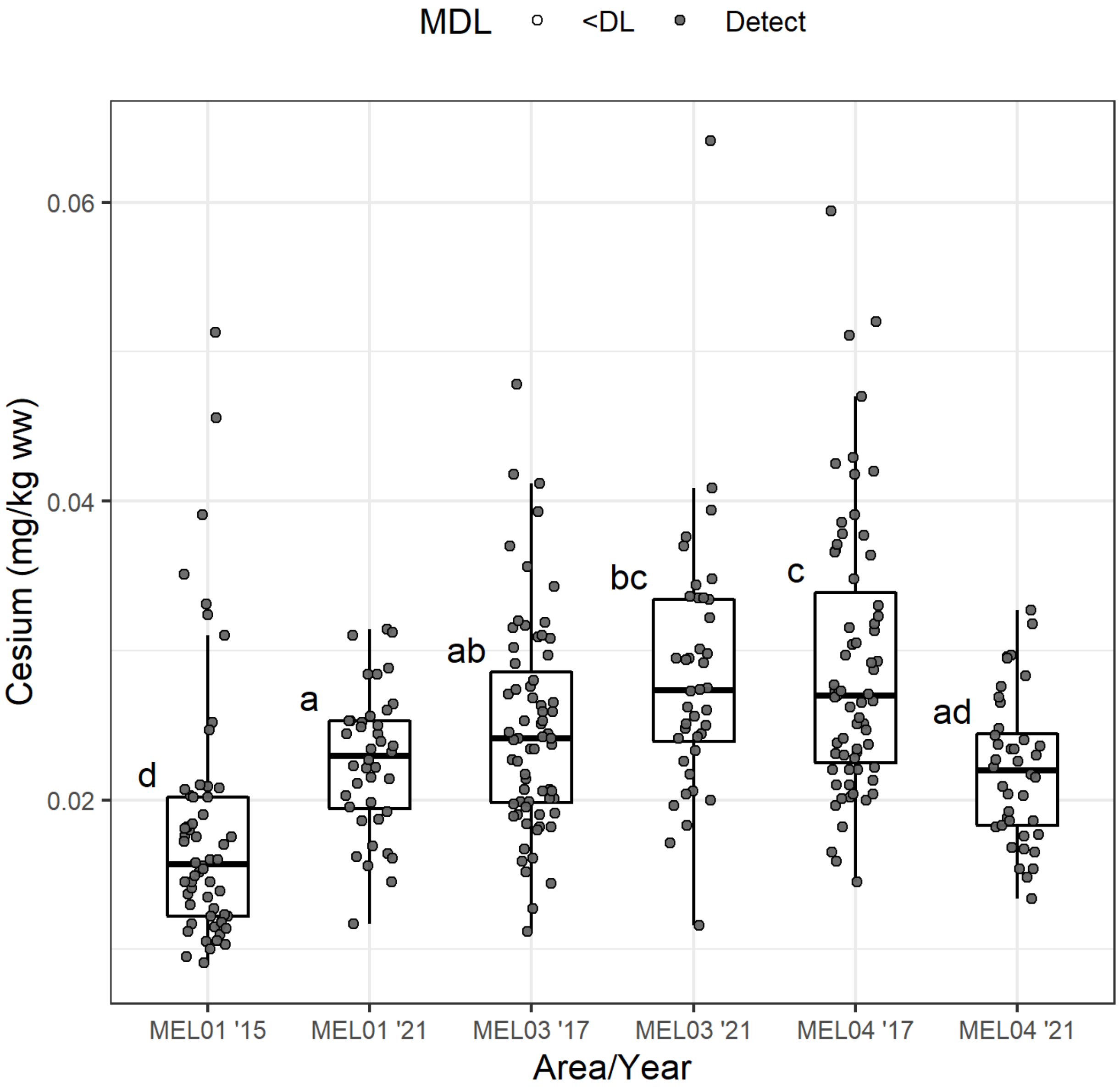


Figure H2-7. Chromium

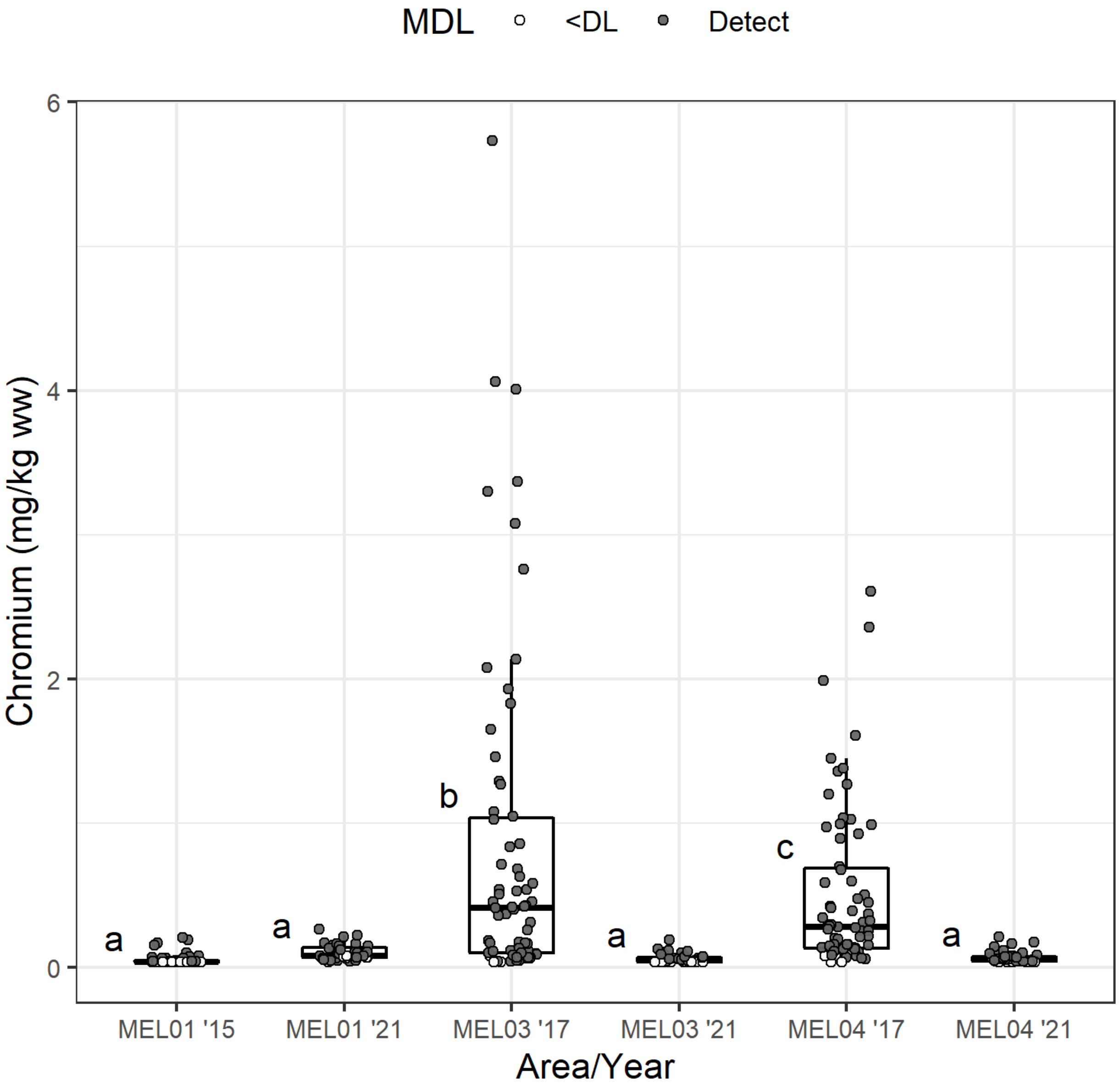


Figure H2-8. Cobalt

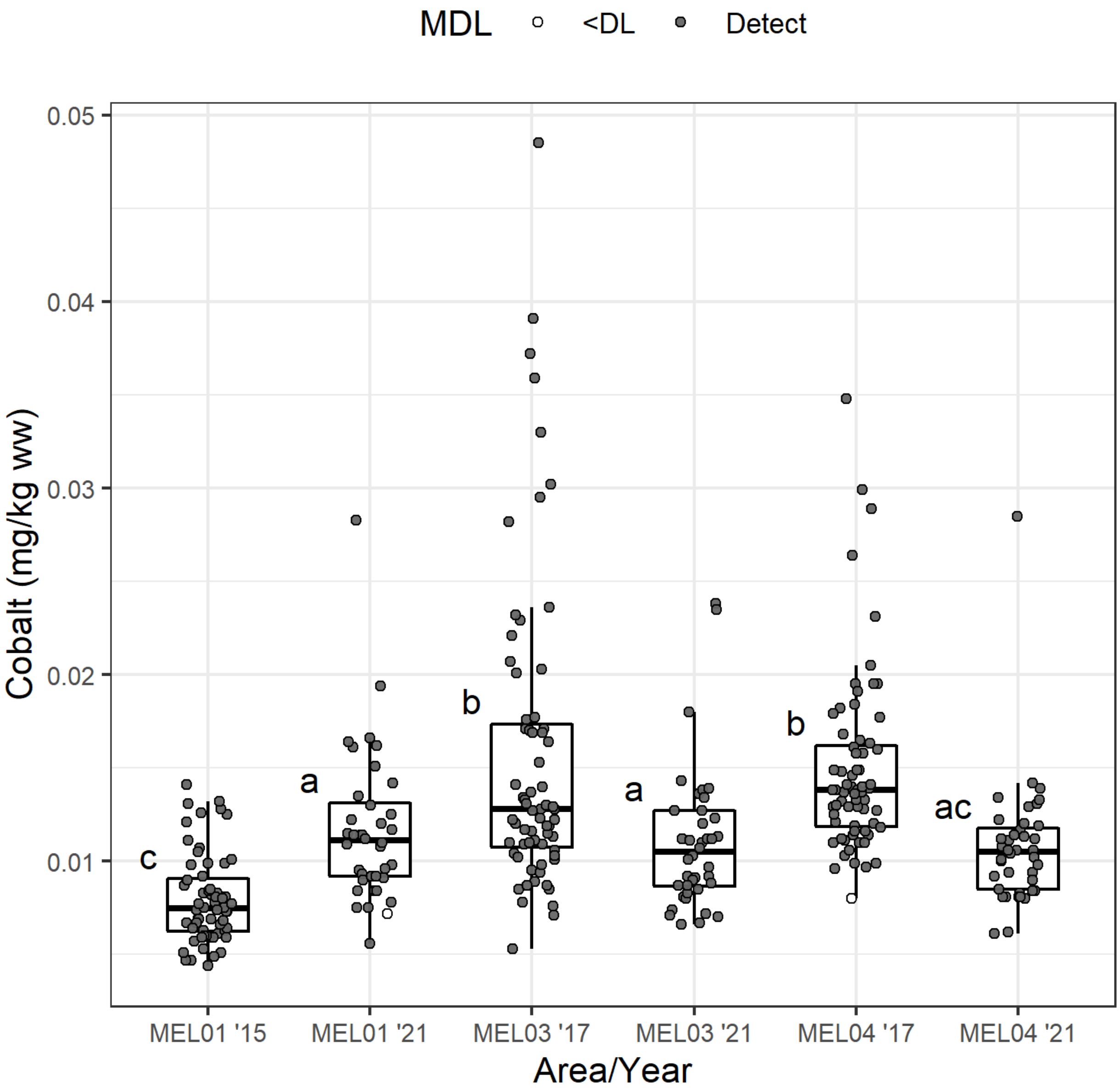


Figure H2-9. Copper

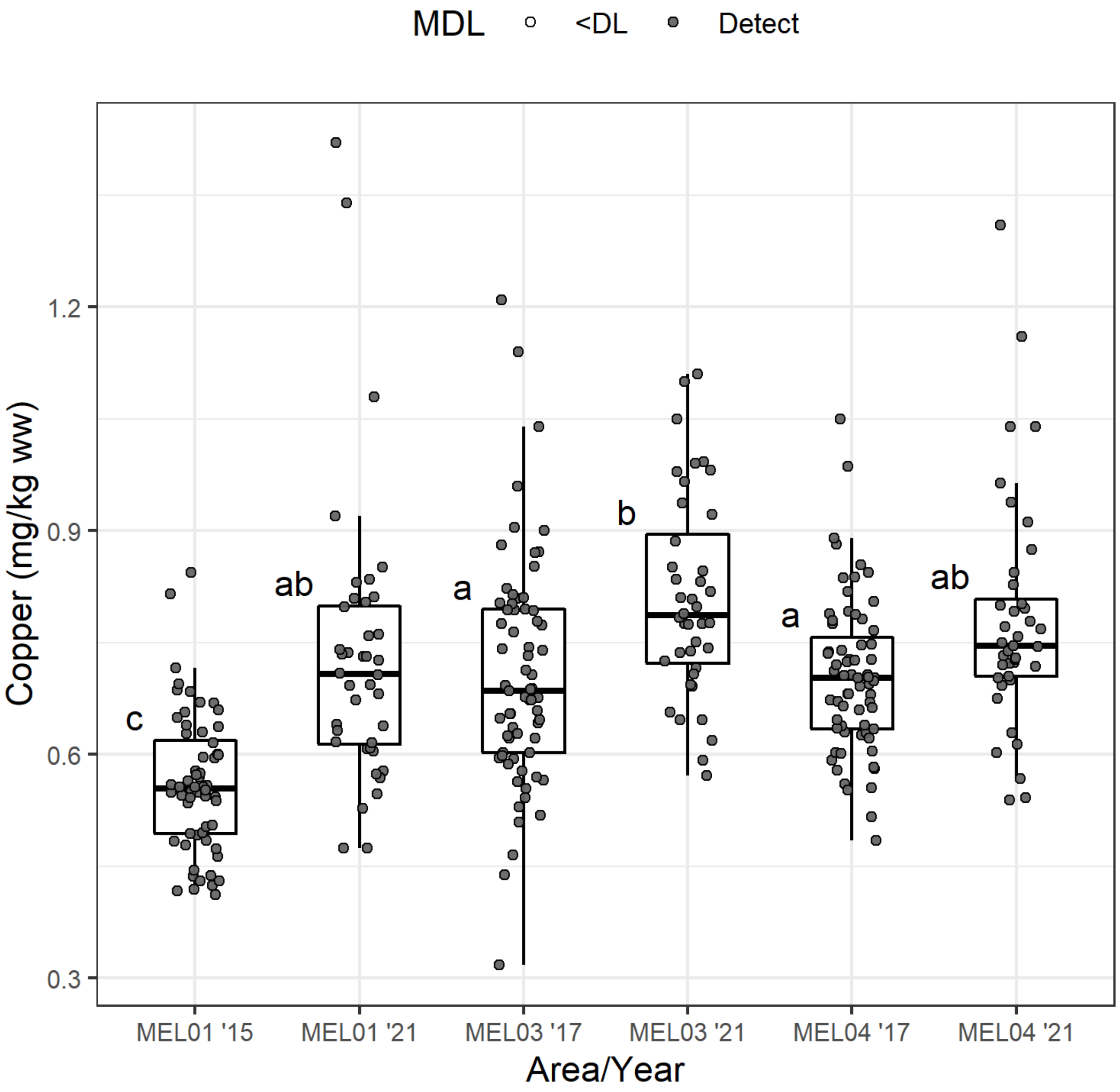


Figure H2-10. Iron

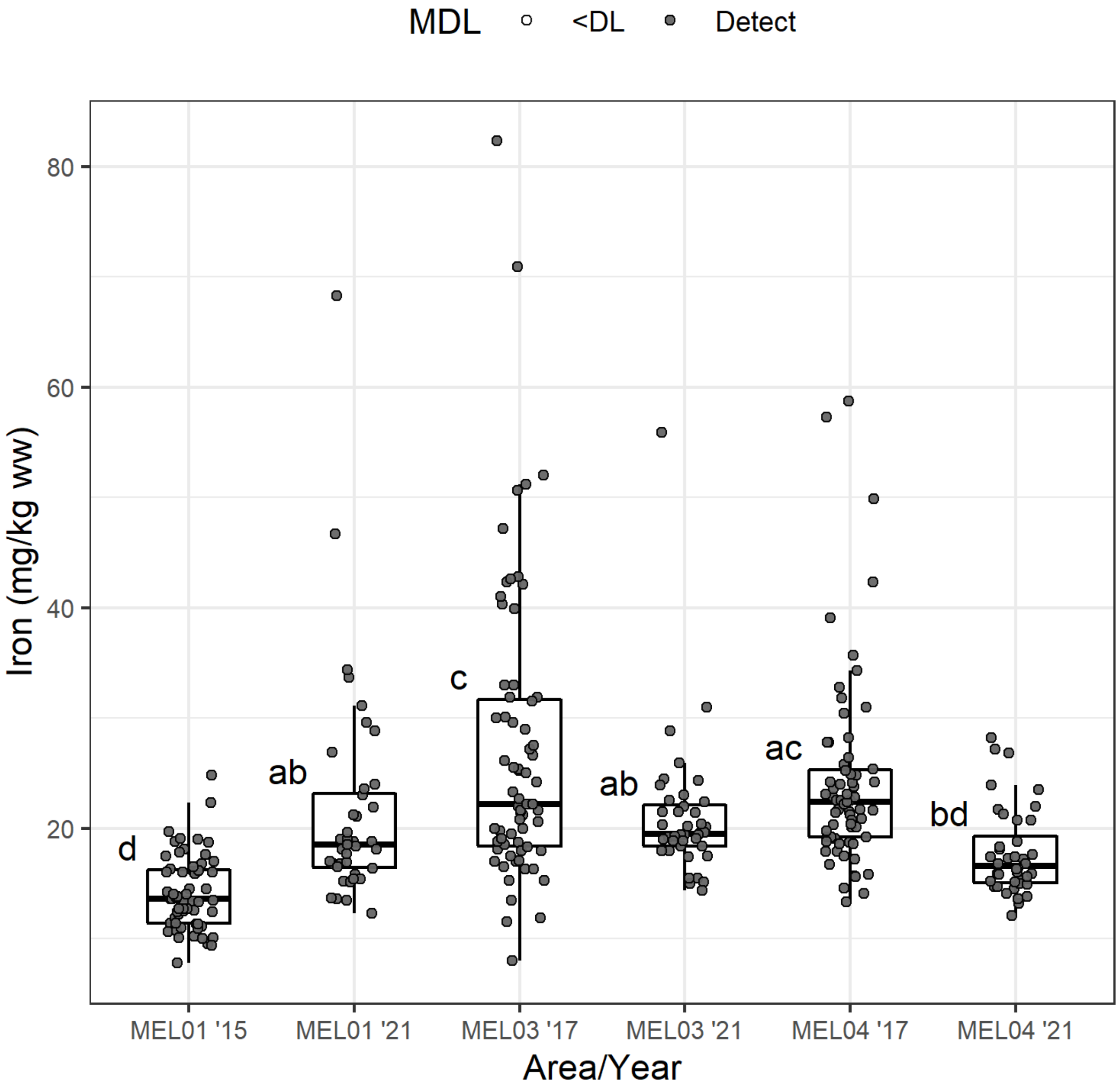


Figure H2-11. Lead

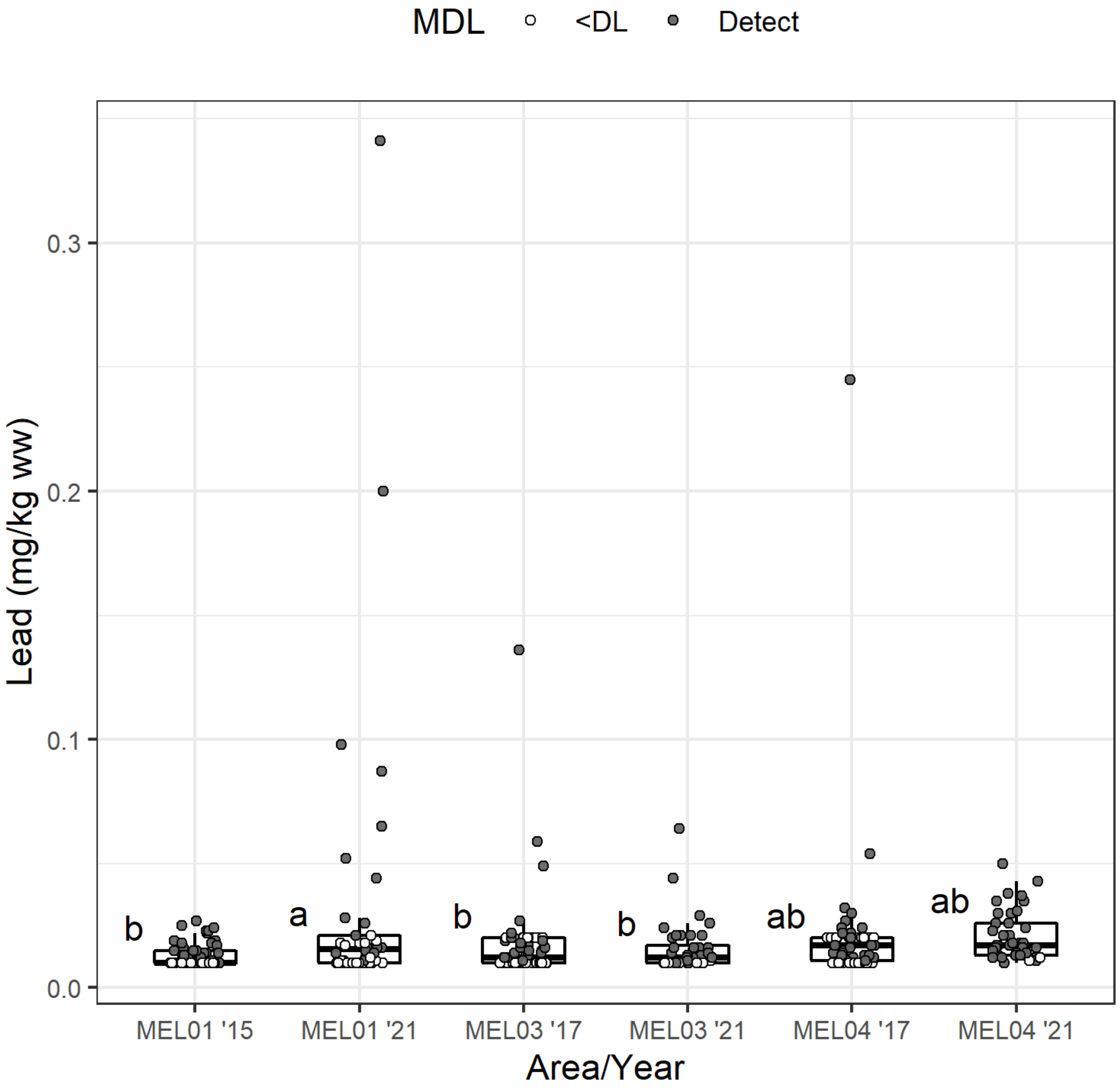


Figure H2-12. Magnesium

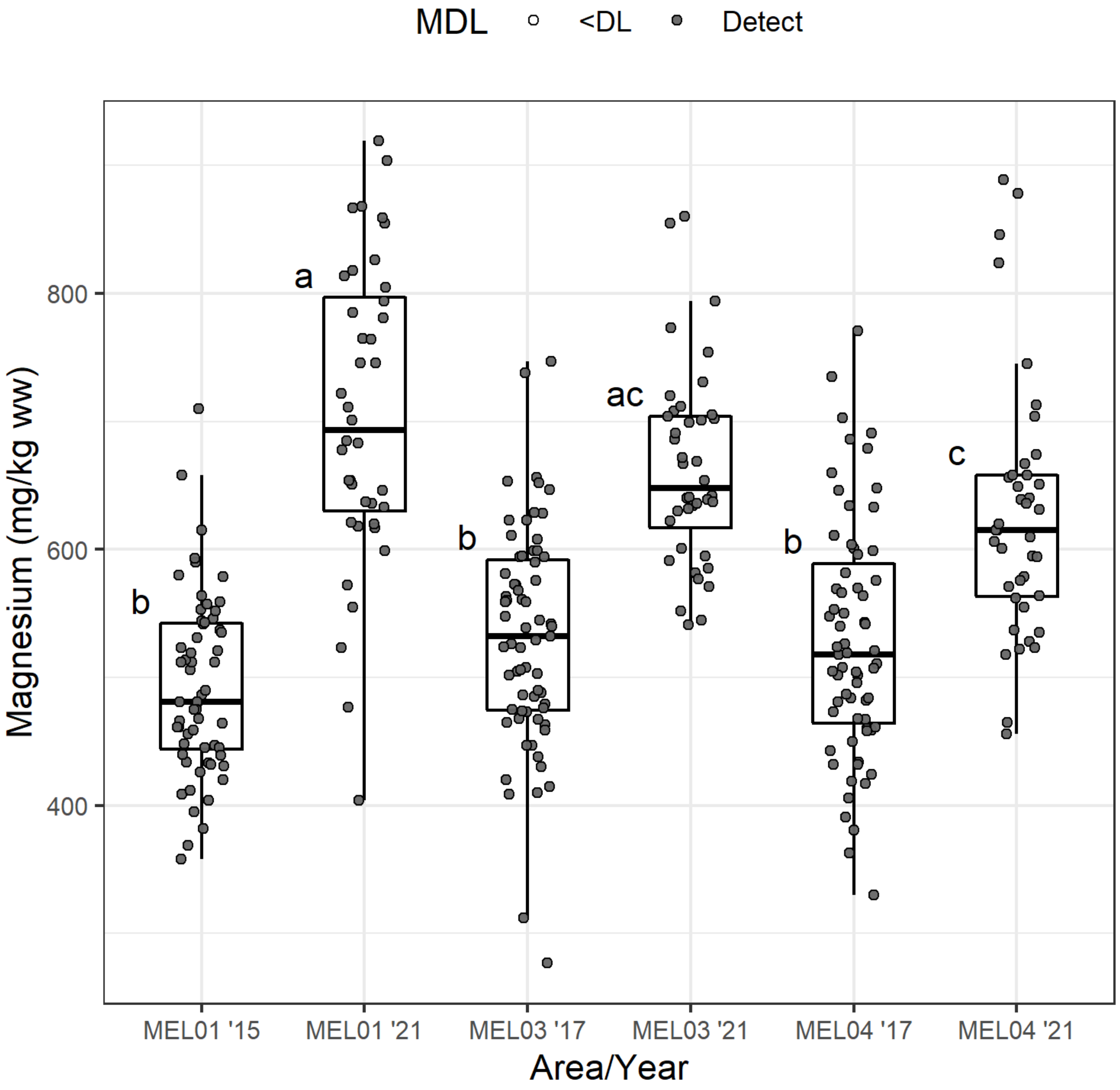


Figure H2-13. Manganese

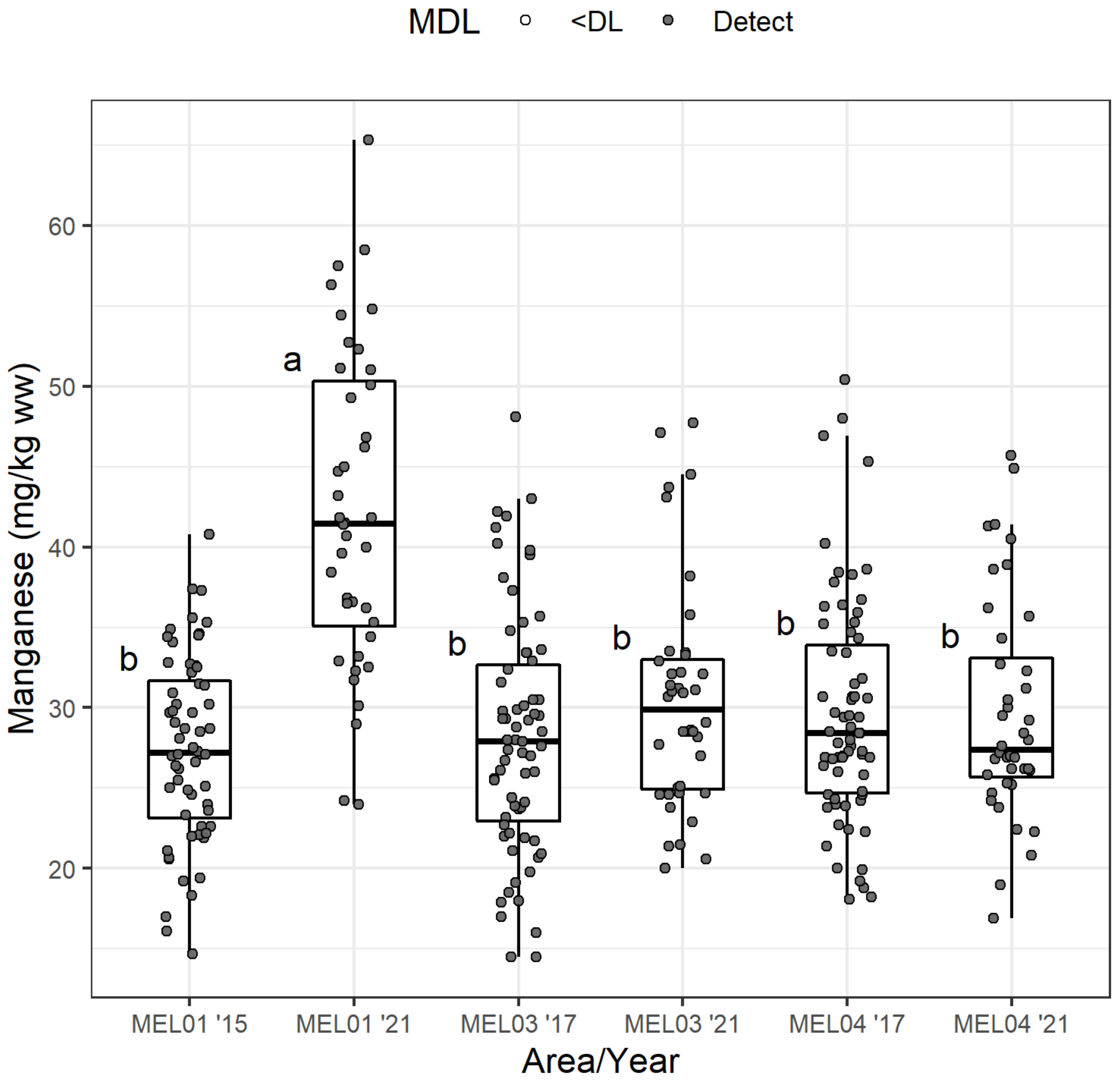


Figure H2-14. Mercury

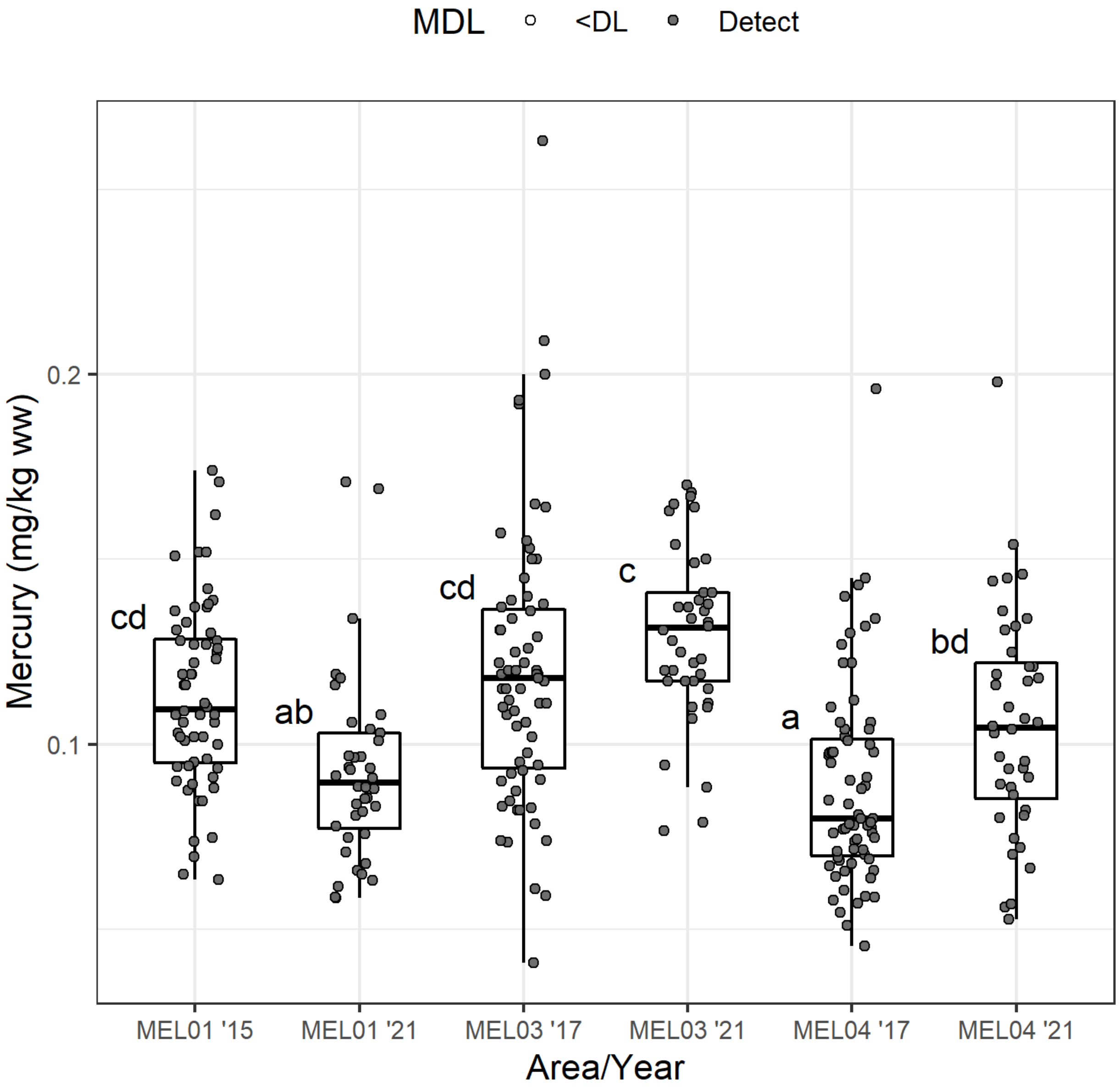


Figure H2-15. Moisture

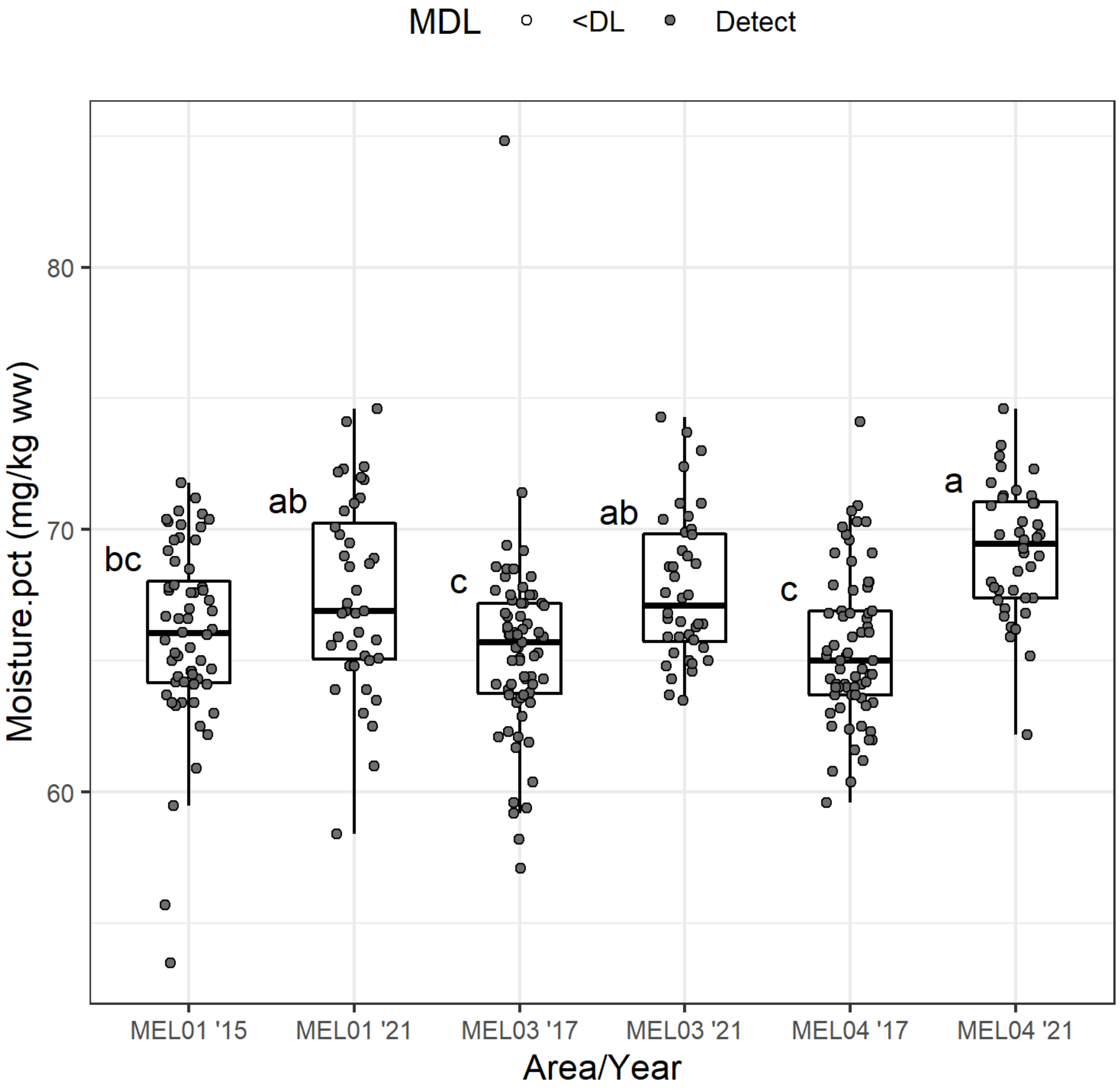


Figure H2-16. Molybdenum

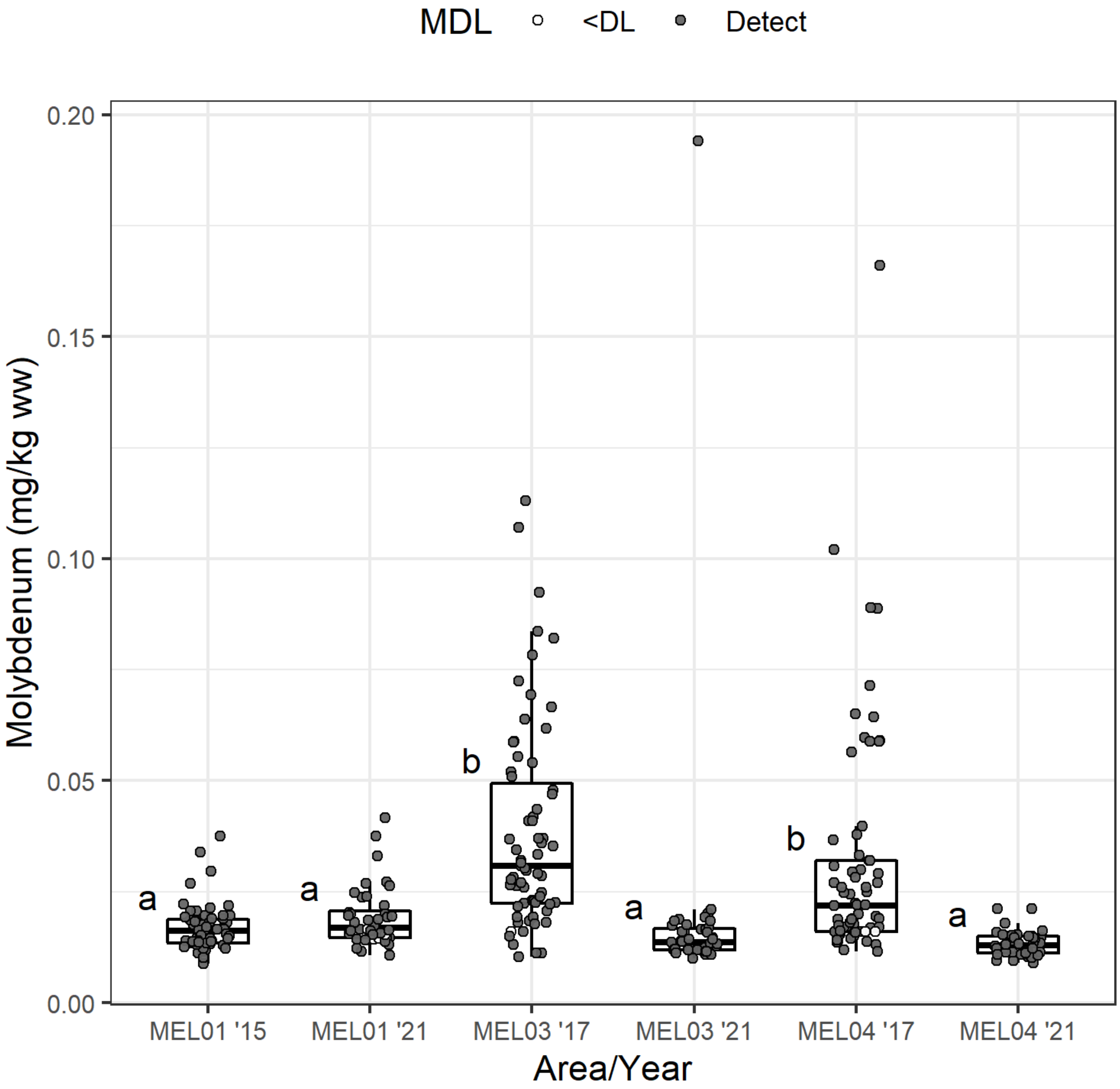


Figure H2-17. Nickel

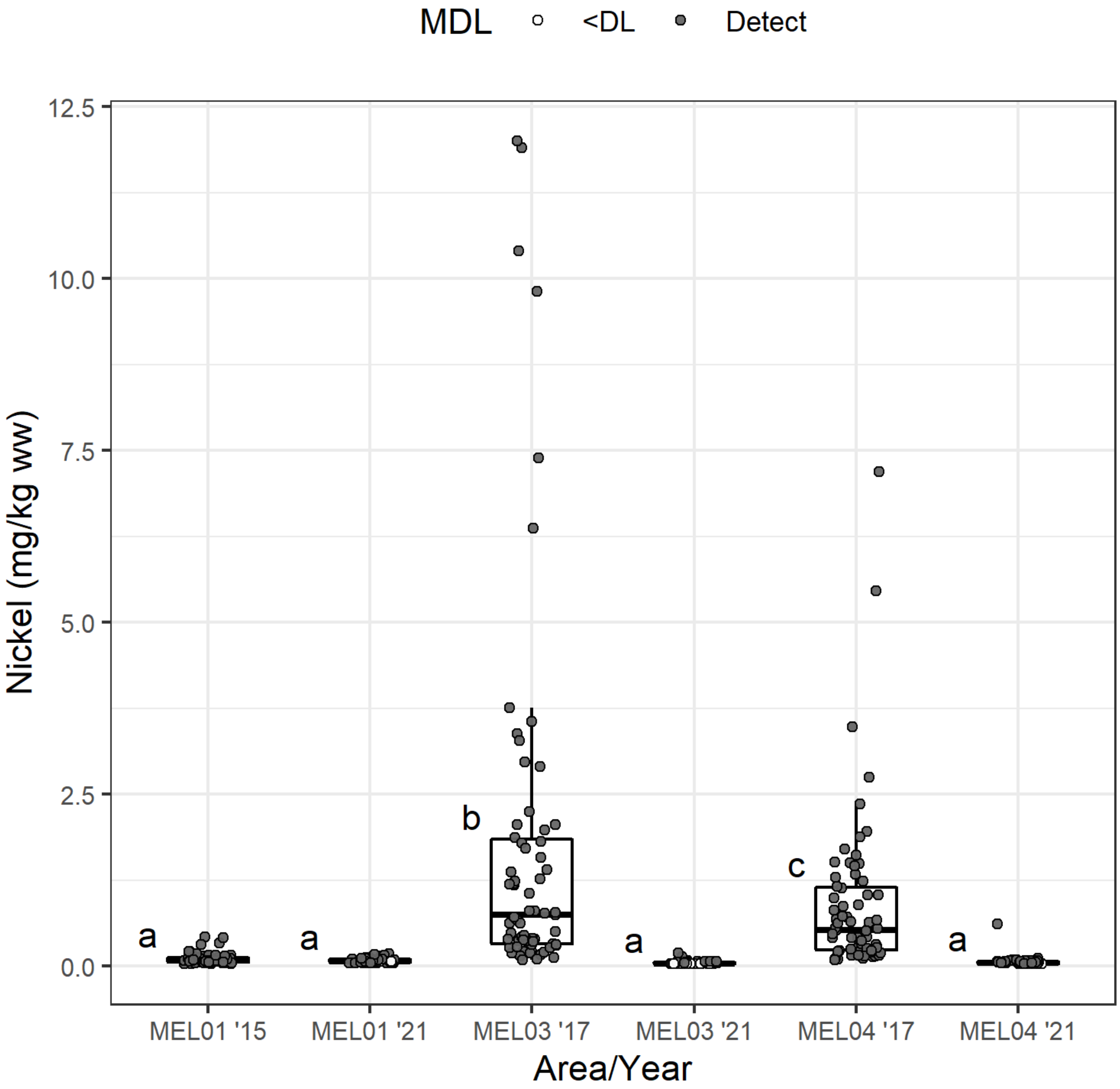


Figure H2-18. Phosphorus

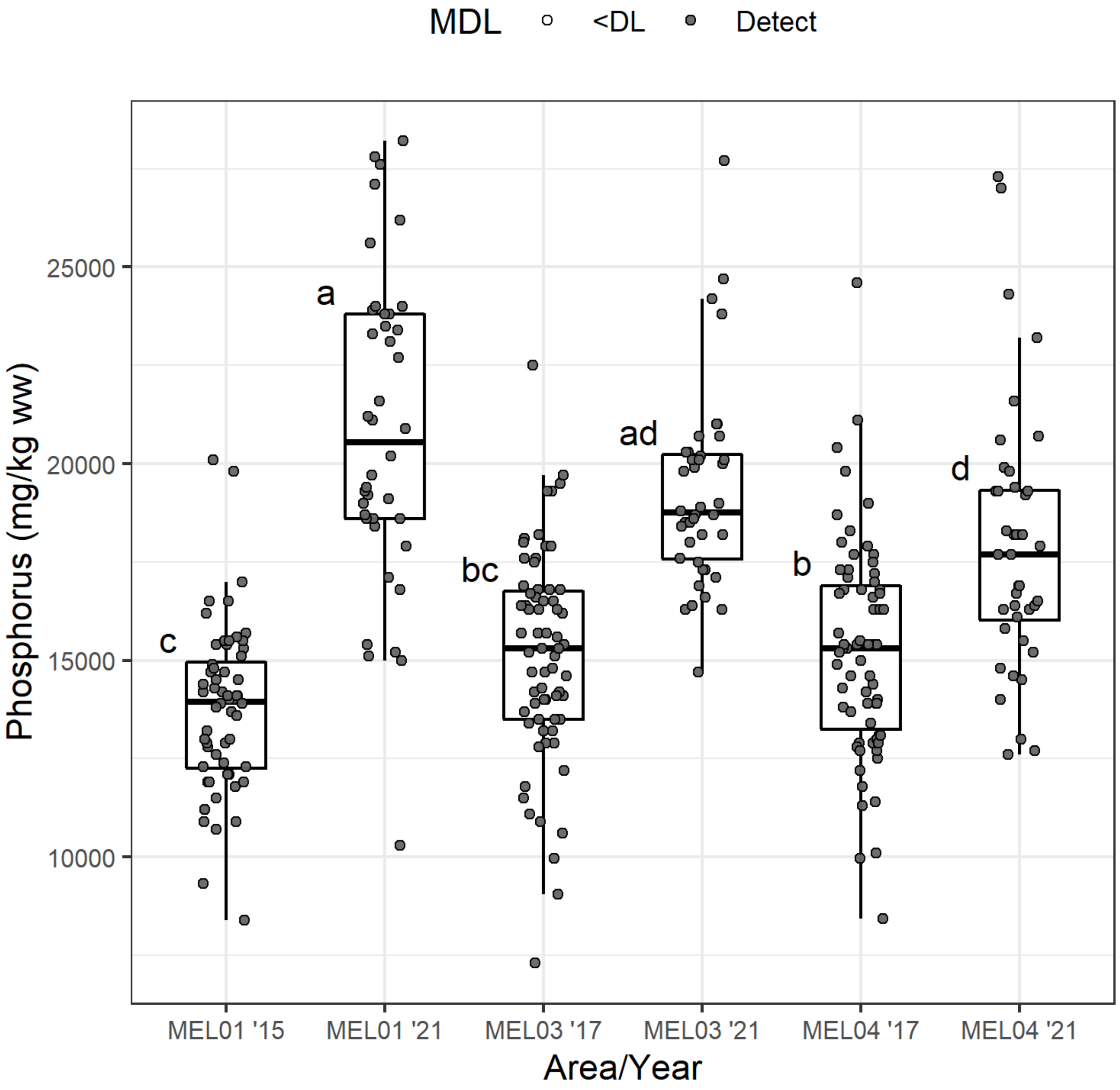


Figure H2-19. Potassium

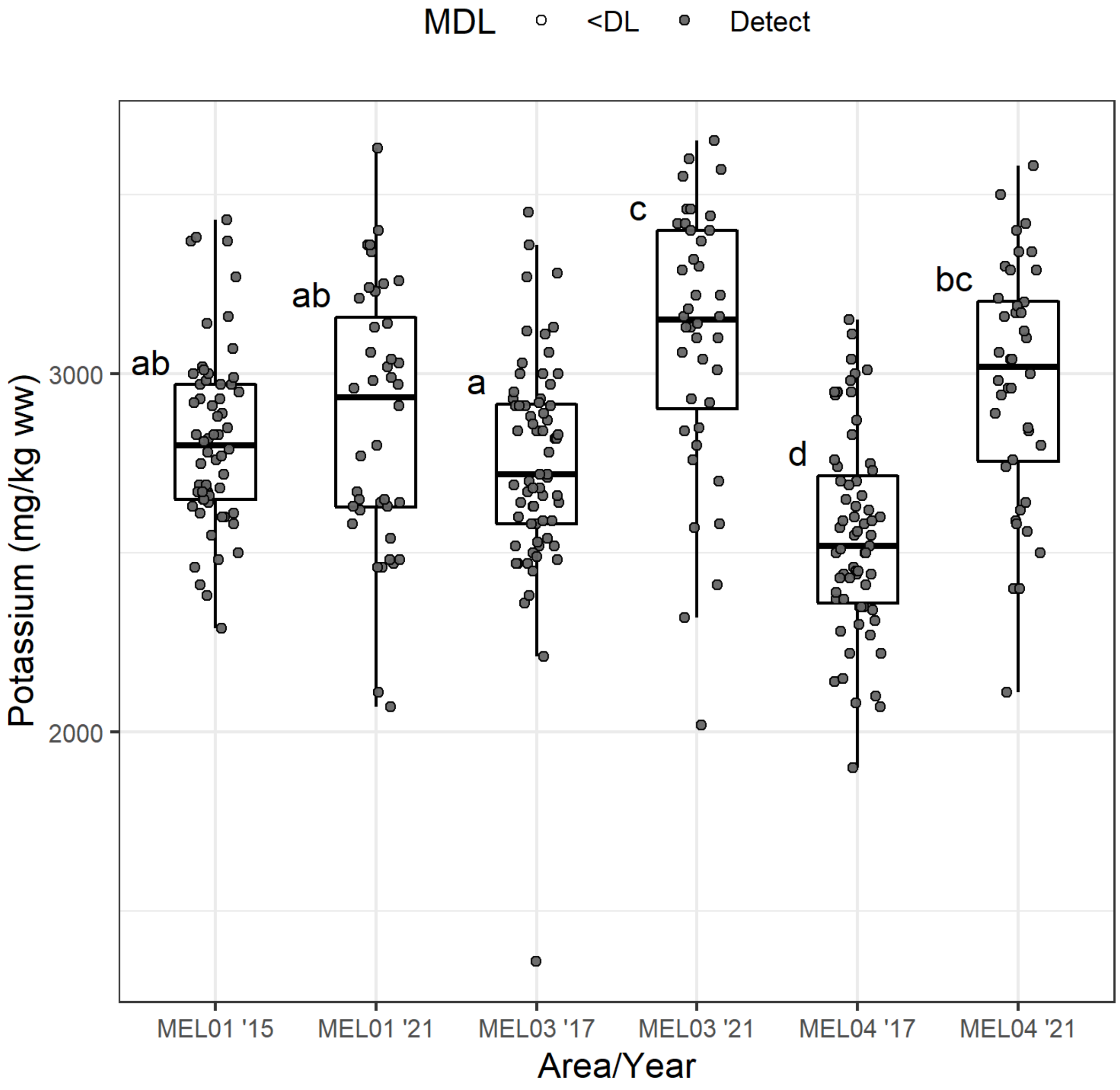


Figure H2-20. Rubidium

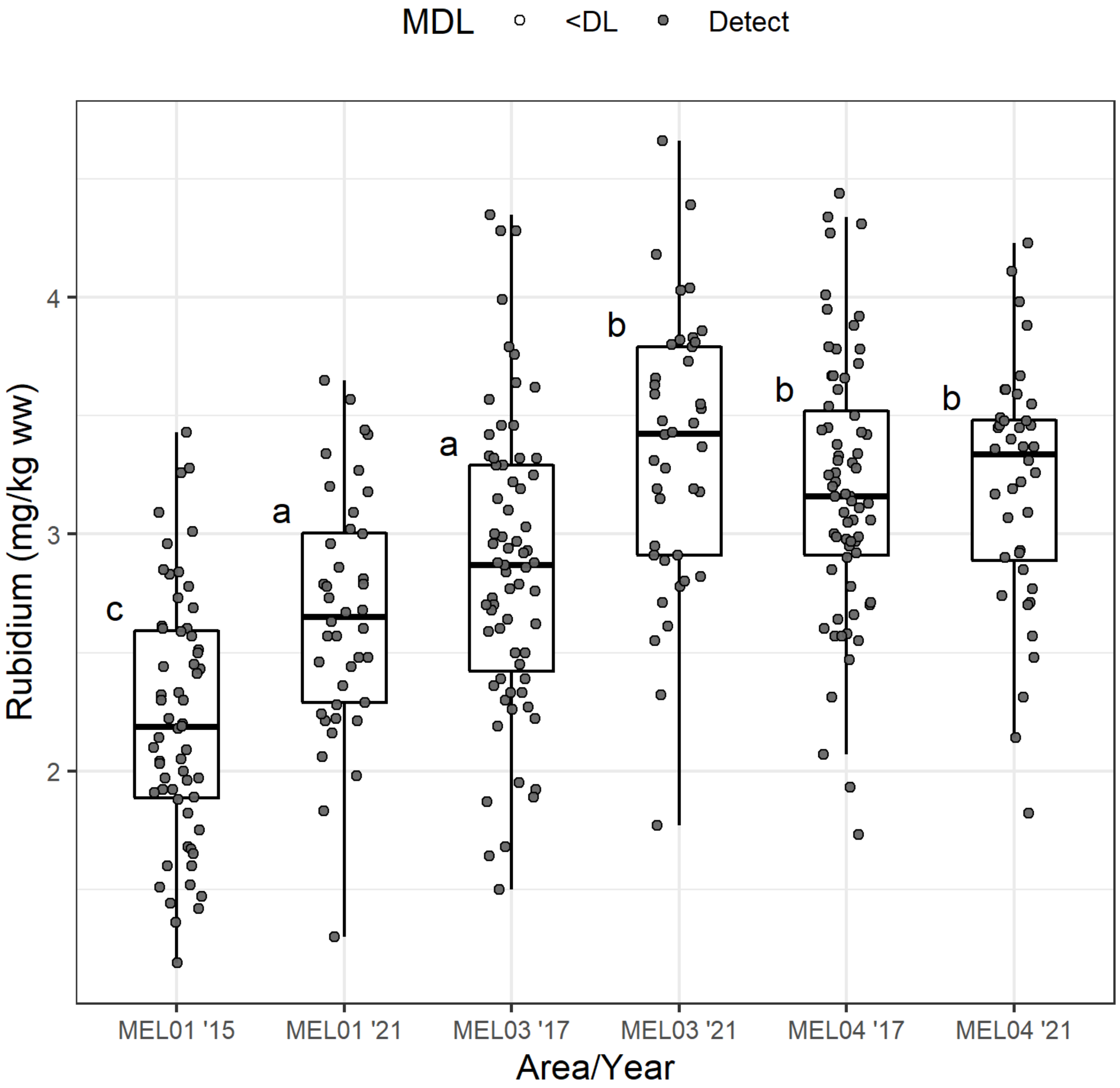


Figure H2-21. Selenium

Figure H2-22. Silver

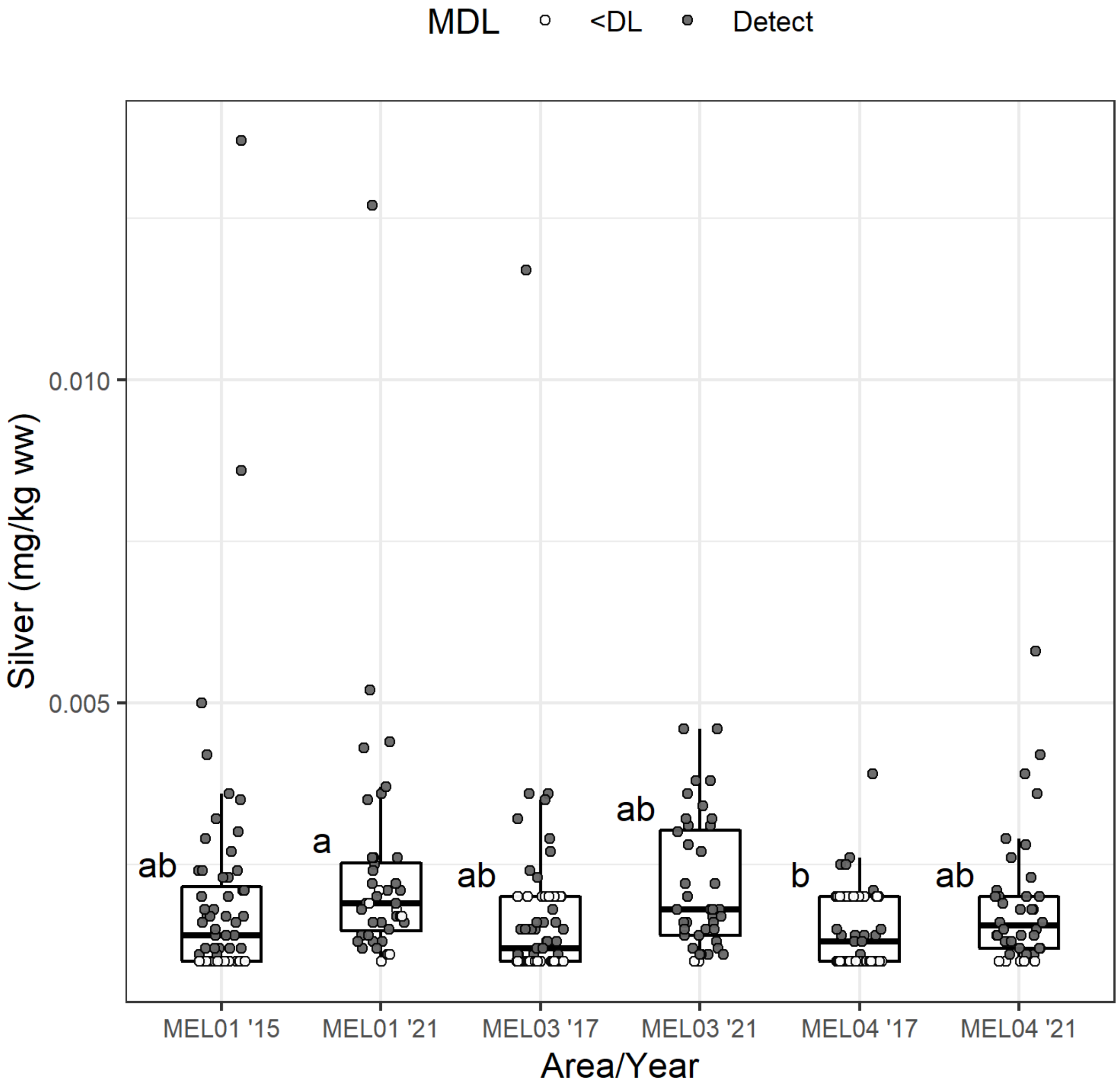


Figure H2-23. Sodium

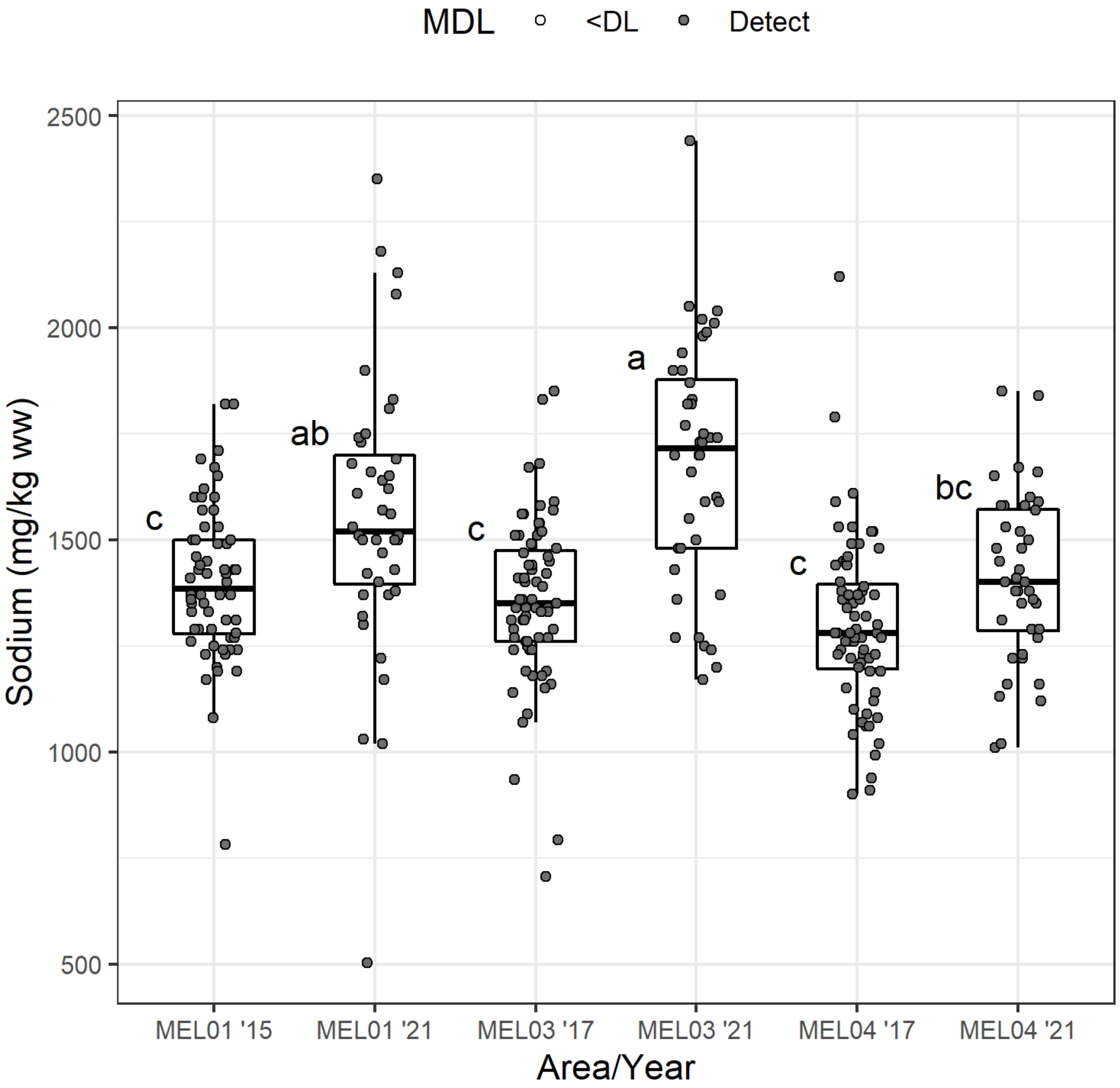


Figure H2-24. Strontium

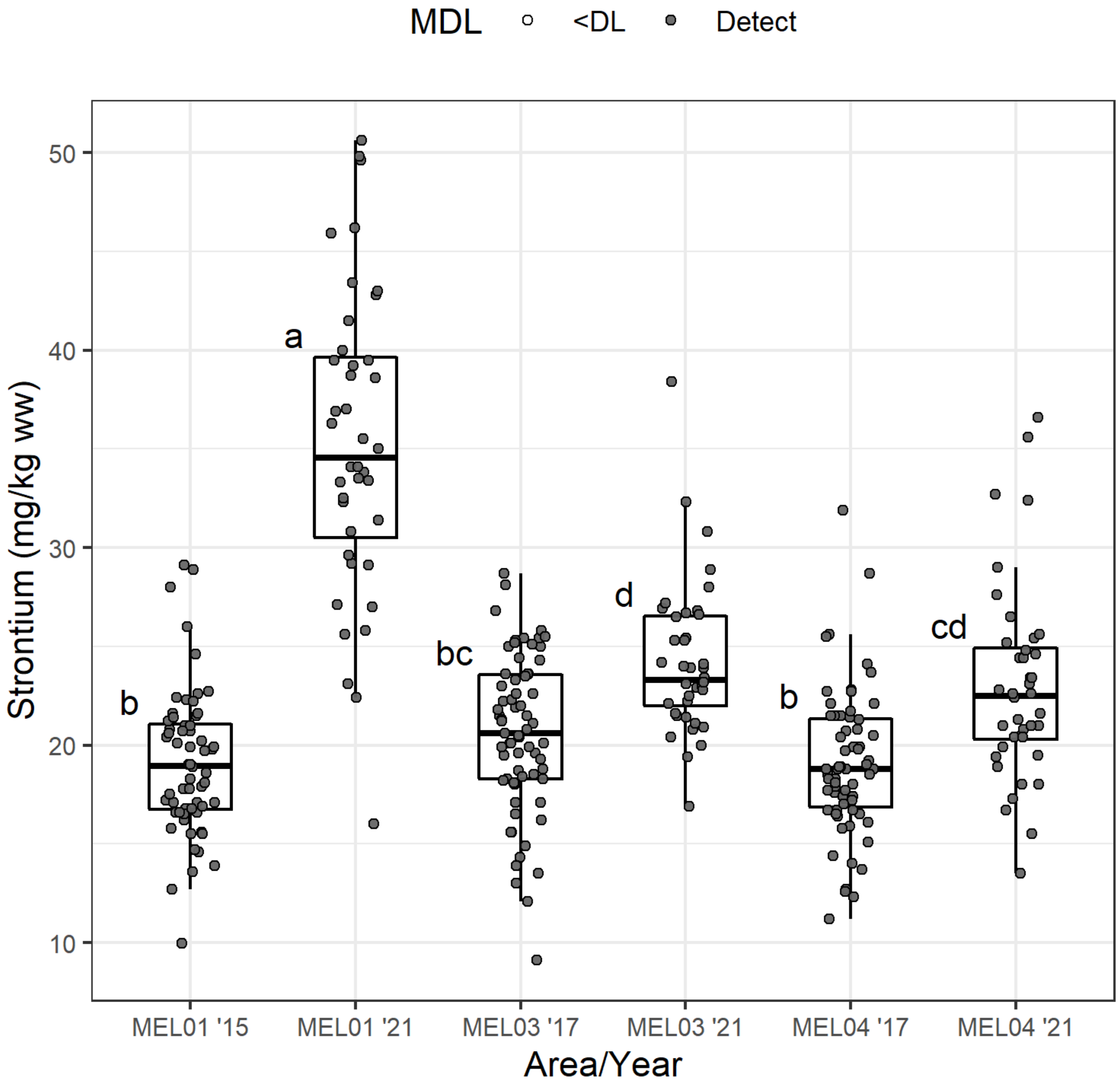


Figure H2-25. Thallium

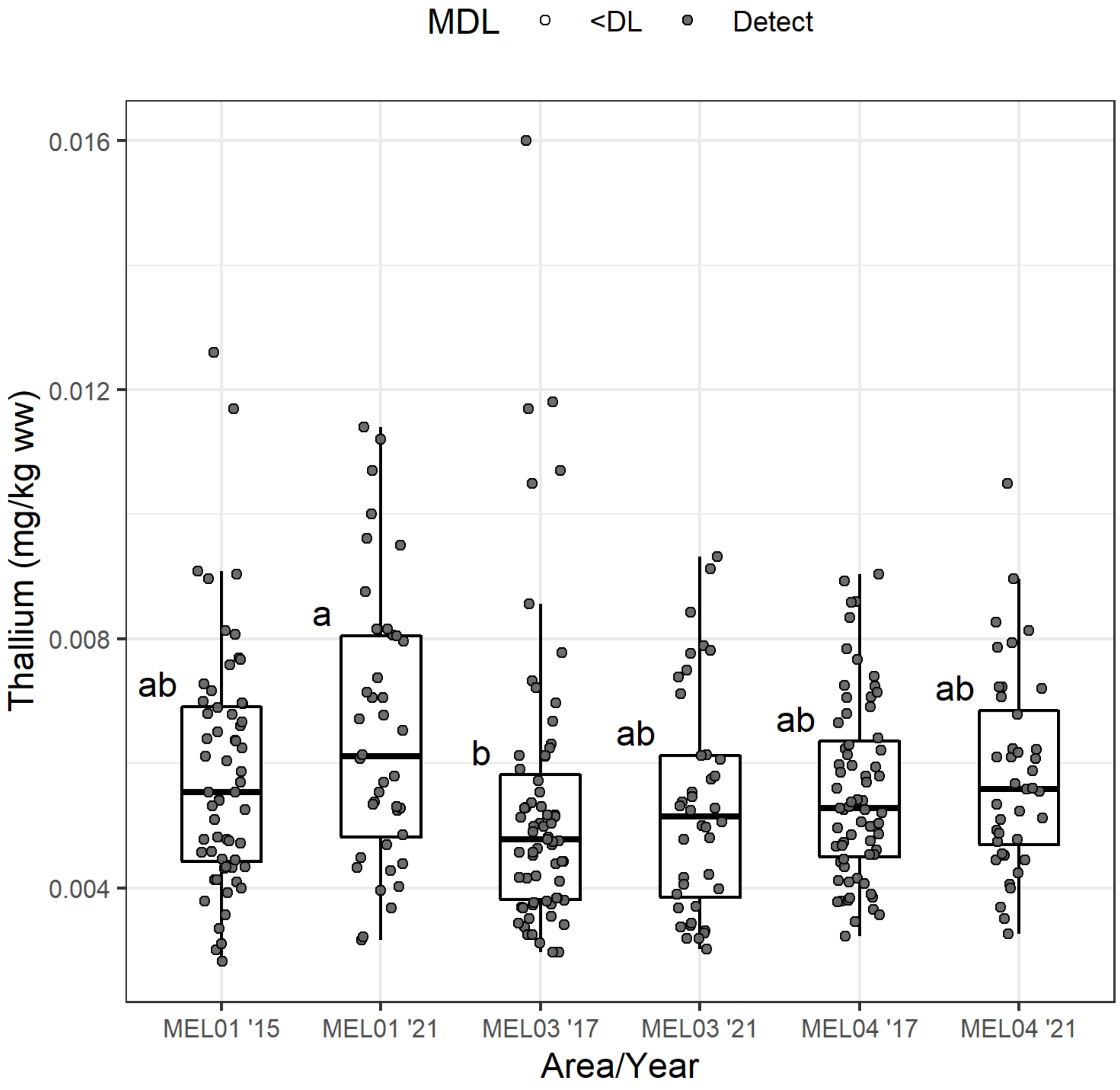


Figure H2-26. Tin

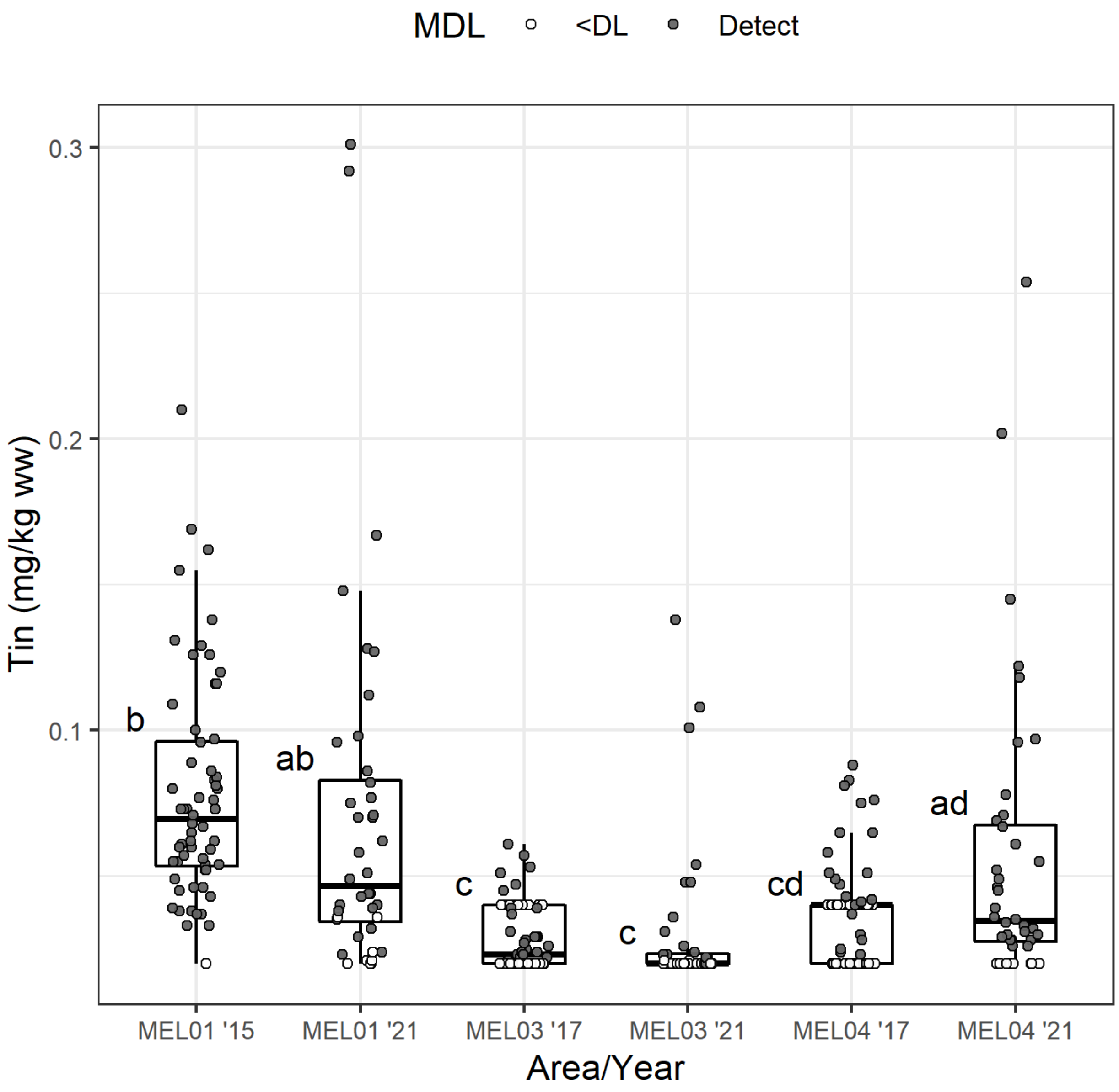


Figure H2-27. Uranium

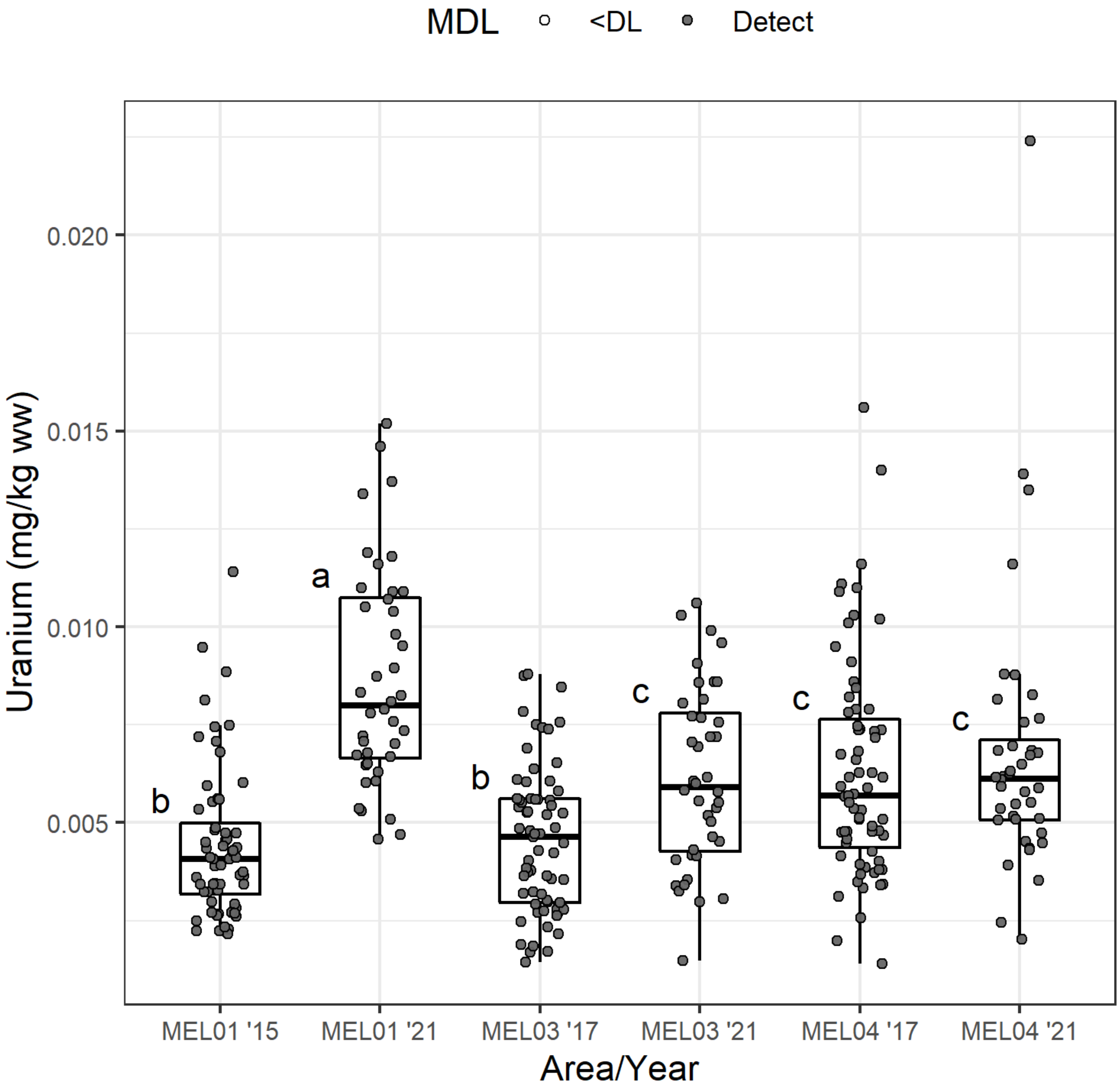


Figure H2-28. Zinc

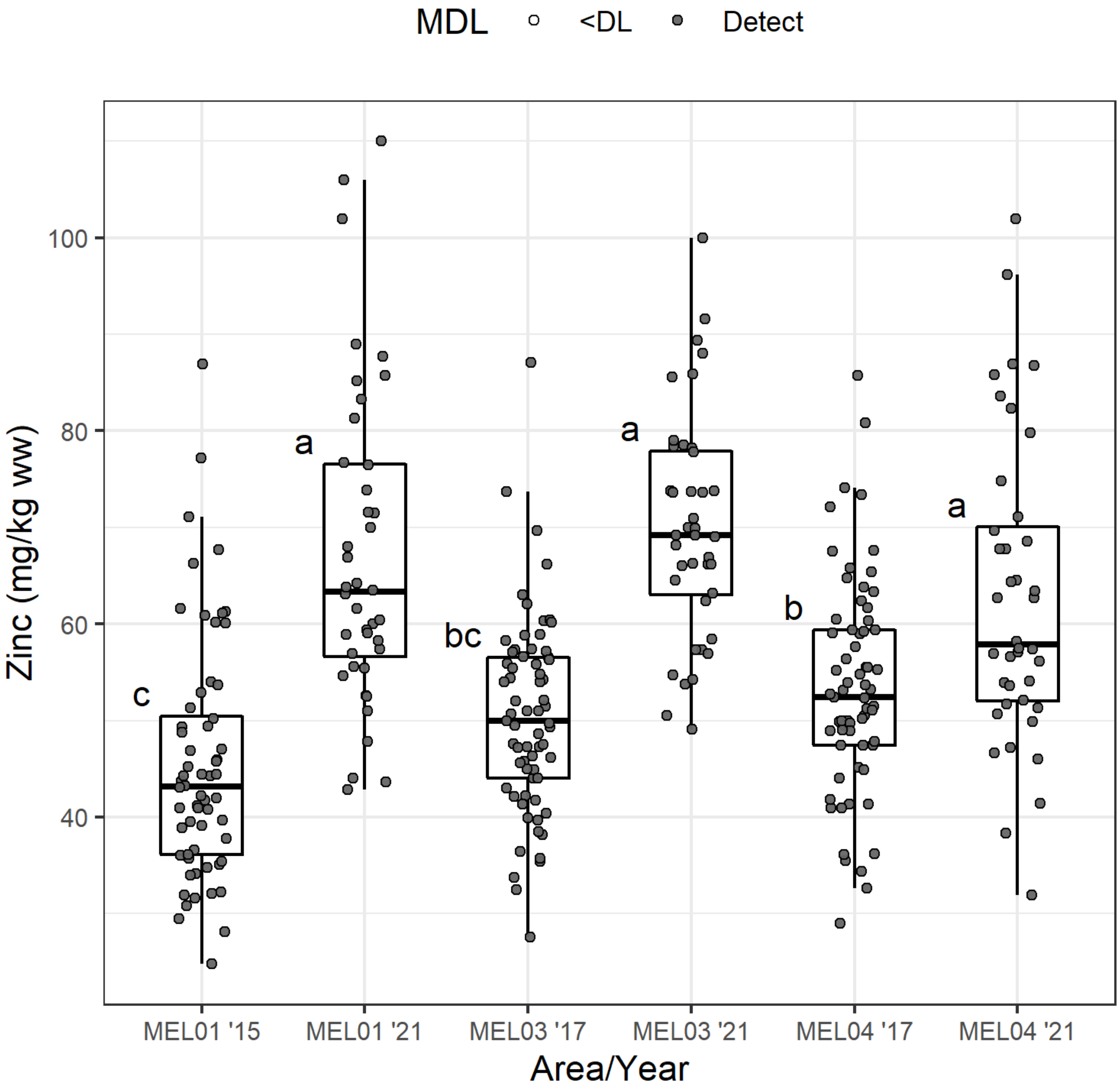
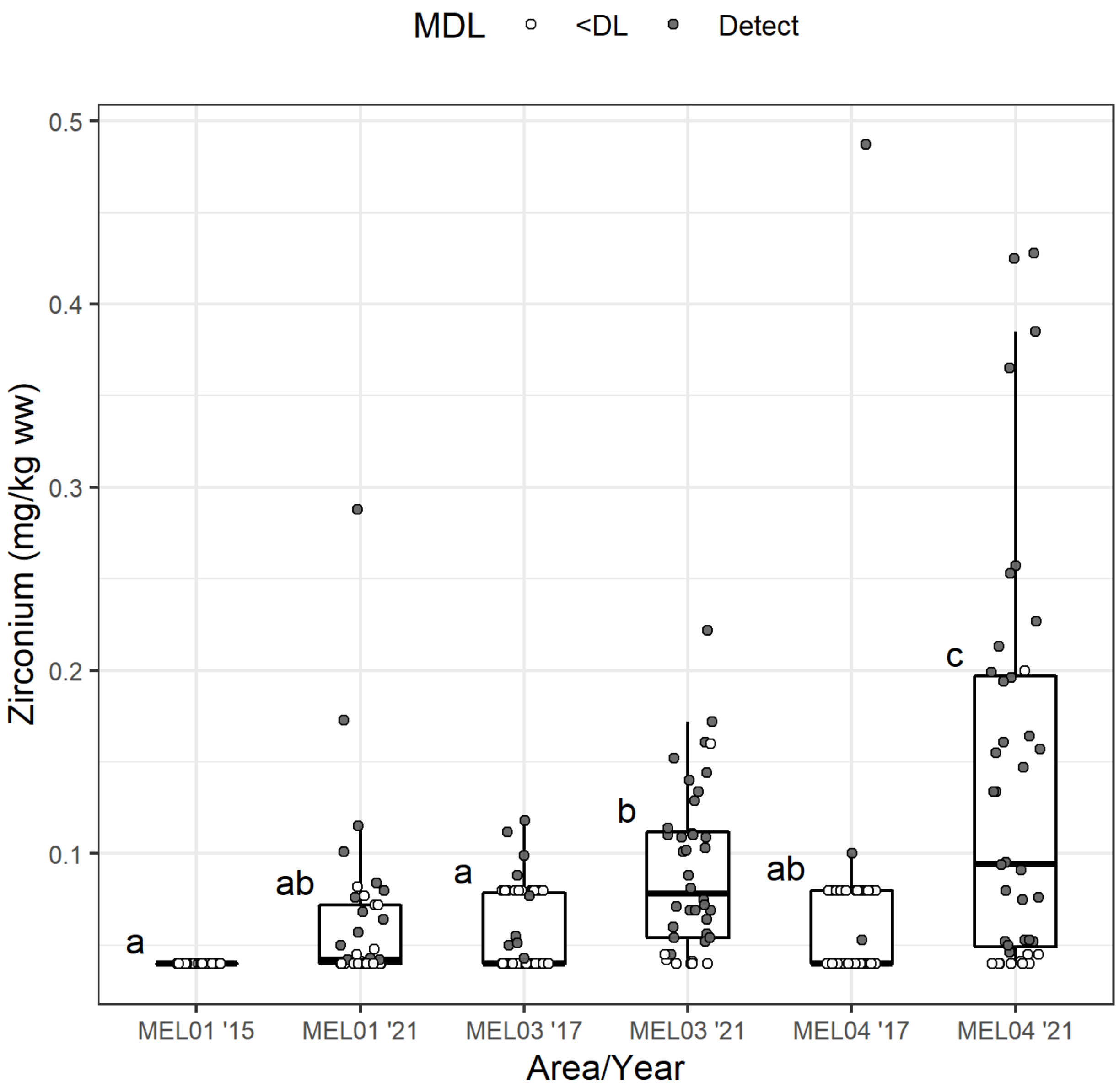


Figure H2-29. Zirconium



Appendix H-3

Threespine Stickleback Chemistry – Supplemental Data and Figures

APPENDIX H3 TABLES

Table H3-1. ANOVA results for comparisons of Stickleback tissue parameters at nearfield and reference locations during baseline (2015/2017) and operational (2021) periods in Meliadine Lake. 1

Table H3-2. Metals, major ions, and nutrient concentrations (mg/kg ww) in Threespine Stickleback carcasses tissue at nearfield and reference locations during baseline (2015 and 2017) and 2021 sampling. 2

Table H3-1. ANOVA results for comparisons of Stickleback tissue parameters at nearfield and reference locations during baseline (2015/2017) and operational (2021) periods in Meliadine Lake.

Parameter	Tissue	Residual	DF	MSE	F statistic	p value	MEL-01		MEL-03		MEL-04	
							2015	2021	2017	2021	2017	2021
Physical Parameters												
Moisture	Carcass	3230	308	10.5	10.8	<0.001	bc	ab	c	ab	c	a
Major Ions and Nutrients												
Calcium	Carcass	9470000000	308	30700000	17.6	<0.001	c	a	bc	d	bc	bd
Magnesium	Carcass	2510000	308	8140	43.7	<0.001	b	a	b	ac	b	c
Phosphorus	Carcass	2570000000	308	8350000	44.1	<0.001	c	a	bc	ad	b	d
Potassium	Carcass	29800000	308	96900	19.3	<0.001	ab	ab	a	c	d	bc
Sodium	Carcass	16300000	308	52900	17.7	<0.001	c	ab	c	a	c	bc
Metals												
Aluminum	Carcass	1910	308	6.19	4.65	0.0004	b	ab	a	ab	a	b
Arsenic	Carcass	0.66	308	0.00214	59.5	<0.001	c	a	b	c	d	cd
Barium	Carcass	381	308	1.24	8.96	<0.001	b	a	a	a	a	a
Cadmium	Carcass	0.005	308	0.0000162	6.36	<0.001	a	a	a	b	a	b
Cesium	Carcass	0.018	308	0.0000584	16.7	<0.001	d	a	ab	bc	c	ad
Chromium	Carcass	112	308	0.365	17.6	<0.001	a	a	b	a	c	a
Cobalt	Carcass	0.00842	308	0.0000273	18.9	<0.001	c	a	b	a	b	ac
Copper	Carcass	5.91	308	0.0192	20.3	<0.001	c	ab	a	b	a	ab
Iron	Carcass	24200	308	78.5	16.4	<0.001	d	ab	c	ab	ac	bd
Lead	Carcass	0.226	308	0.000735	3.19	0.008	b	a	b	b	ab	ab
Manganese	Carcass	16500	308	53.6	24.3	<0.001	b	a	b	b	b	b
Mercury	Carcass	0.261	308	0.000849	15.1	<0.001	cd	ab	cd	c	a	bd
Molybdenum	Carcass	0.117	308	0.000379	14.3	<0.001	a	a	b	a	b	a
Nickel	Carcass	584	308	1.9	15.7	<0.001	a	a	b	a	c	a
Rubidium	Carcass	96.2	308	0.312	30.8	<0.001	c	a	a	b	b	b
Selenium	Carcass	1.53	308	0.00497	62.5	<0.001	a	a	b	b	b	b
Silver	Carcass	0.000615	308	0.000002	2.65	0.023	ab	a	ab	ab	b	ab
Strontium	Carcass	6680	308	21.7	78.1	<0.001	b	a	bc	d	b	cd
Thallium	Carcass	0.00114	308	0.00000369	2.44	0.0347	ab	a	b	ab	ab	ab
Tin	Carcass	0.403	308	0.00131	18.8	<0.001	b	ab	c	c	cd	ad
Uranium	Carcass	0.00195	308	0.00000635	18.8	<0.001	b	a	b	c	c	c
Zinc	Carcass	49900	308	162	29.6	<0.001	c	a	bc	a	b	a
Zirconium	Carcass	0.879	308	0.00286	20.5	<0.001	a	ab	a	b	ab	c

Note:

Grey shading represents nearfield parameters that have significantly increased above baseline conditions (MEL-01 2015 versus 2021) and above concentrations observed at reference locations (MEL-03 and MEL-04) in 2021

Table H3-2. Metals, major ions, and nutrient concentrations (mg/kg ww) in Threespine Stickleback carcasses tissue at nearfield and reference locations during baseline (2015 and 2017) and 2021 sampling.

Location/year	**MEL01 '21**								**MEL01 '15**							
Spatial Exposure	**Near-field**								**Near-field**							
Temporal Exposure	**Mine operation**								**Baseline**							
Summary Statistics	**N**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**	**N**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**
Lipid Content (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moisture Content (%)	40	0	67.5	66.9	3.66	0.579	58.4	74.6	60	0	66	66	3.49	0.45	53.5	71.8
Aluminum	40	40	2.68	1.3	3.7	0.585	1	20.5	60	48	1.46	1	0.805	0.104	1	4.7
Antimony	40	52	0.006	-	-	-	0.002	0.0443	60	95	0.0021	-	-	-	0.002	0.0044
Arsenic	40	0	0.272	0.263	0.059	0.0093	0.171	0.434	60	0	0.186	0.176	0.0512	0.0066	0.12	0.395
Barium	40	0	5.18	5.15	1.14	0.18	2.4	8.08	60	0	4.48	4.36	0.974	0.126	2.04	7.16
Beryllium	40	100	0.0024	-	-	-	-	-	60	100	0.002	-	-	-	-	-
Bismuth	40	88	0.0027	-	-	-	0.002	0.0105	60	97	0.002	-	-	-	0.002	0.0024
Boron	40	80	0.26	-	-	-	0.2	0.56	60	100	0.2	-	-	-	-	-
Cadmium	40	10	0.0057	0.0046	0.0035	0.0006	0.002	0.0208	60	0	0.0063	0.0058	0.0032	0.0004	0.0027	0.0211
Calcium	40	0	33600	32000	7560	1190	15000	47900	60	0	24000	23300	4540	585	13100	39300
Cesium	40	0	0.0226	0.0229	0.0047	0.0007	0.0117	0.0314	60	0	0.018	0.0157	0.0086	0.0011	0.0091	0.0513
Chromium	40	18	0.106	0.083	0.0529	0.0084	0.042	0.266	60	60	0.0553	-	-	-	0.04	0.207
Cobalt	40	2	0.0117	0.0111	0.0041	0.0006	0.0056	0.0283	60	0	0.008	0.0075	0.0024	0.0003	0.0044	0.0141
Copper	40	0	0.732	0.708	0.193	0.0305	0.475	1.42	60	0	0.561	0.554	0.0936	0.0121	0.412	0.844
Iron	40	0	21.7	18.6	10.2	1.62	12.3	68.3	60	0	14.2	13.6	3.37	0.435	7.8	24.8
Lead	40	52	0.034	-	-	-	0.01	0.341	60	50	0.0132	-	-	-	0.01	0.027
Lithium	40	100	0.117	-	-	-	-	-	60	100	0.1	-	-	-	-	-
Magnesium	40	0	705	693	119	18.8	404	919	60	0	493	481	69.8	9.01	358	710
Manganese	40	0	42.3	41.4	9.85	1.56	24	65.3	60	0	27.4	27.2	5.76	0.743	14.7	40.8
Mercury	40	0	0.0928	0.0898	0.0251	0.004	0.0586	0.171	60	0	0.113	0.11	0.0251	0.0032	0.0635	0.174
Molybdenum	40	10	0.0192	0.0169	0.0068	0.0011	0.0106	0.0416	60	0	0.0168	0.0162	0.0052	0.0007	0.0088	0.0375
Nickel	40	15	0.0859	0.075	0.0359	0.0057	0.045	0.188	60	0	0.115	0.09	0.0833	0.0108	0.042	0.423
Phosphorus	40	0	20900	20600	4030	638	10300	28200	60	0	13700	14000	2130	275	8400	20100
Potassium	40	0	2870	2940	365	57.6	2070	3630	60	0	2820	2800	251	32.4	2290	3430
Rubidium	40	0	2.67	2.65	0.505	0.0799	1.3	3.65	60	0	2.22	2.18	0.524	0.0676	1.19	3.43
Selenium	40	0	0.43	0.436	0.0586	0.0093	0.304	0.52	60	0	0.465	0.462	0.0549	0.0071	0.36	0.588
Silver	40	15	0.0024	0.0019	0.0019	0.0003	0.001	0.0127	60	35	0.002	0.0014	0.002	0.0003	0.001	0.0137
Sodium	40	0	1550	1520	332	52.4	503	2350	60	0	1400	1380	182	23.5	781	1820
Strontium	40	0	35.3	34.6	7.82	1.24	16	50.6	60	0	19.1	19	3.69	0.477	9.98	29.1
Tellurium	40	100	0.0047	-	-	-	-	-	60	100	0.004	-	-	-	-	-
Thallium	40	0	0.0065	0.0061	0.0022	0.0003	0.0032	0.0114	60	0	0.0059	0.0055	0.002	0.0003	0.0028	0.0126
Tin	40	20	0.0712	0.0465	0.0642	0.0101	0.02	0.301	60	2	0.0784	0.0695	0.0384	0.005	0.02	0.21
Titanium	40	82	0.179	-	-	-	0.1	0.99	60	77	0.118	-	-	-	0.1	0.39
Uranium	40	0	0.0087	0.008	0.0028	0.0004	0.0046	0.0152	60	0	0.0044	0.0041	0.0019	0.0003	0.0022	0.0114
Vanadium	40	68	0.0268	-	-	-	0.02	0.07	60	88	0.0206	-	-	-	0.02	0.031
Zinc	40	0	67.3	63.3	16.6	2.62	42.8	110	60	0	45.4	43.2	12.5	1.62	24.8	86.9
Zirconium	40	62	0.0621	-	-	-	0.04	0.288	60	100	0.04	-	-	-	-	-

Location/year	**MEL03 '21**								**MEL03 '17**							
Spatial Exposure	**Reference**								**Reference**							
Temporal Exposure	**Mine operation**								**Baseline**							
Summary Statistics	**N**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**	**N**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**
Lipid Content (%)	-	-	-	-	-	-	-	-	48	0	5.75	5.55	2.01	0.29	1	10.8
Moisture Content (%)	40	0	67.8	67.1	2.8	0.443	63.5	74.3	67	0	65.4	65.7	3.67	0.448	57.1	84.8
Aluminum	40	32	1.77	1.2	2.15	0.34	1	14.1	67	12	2.93	2.1	2.15	0.262	1	11.7
Antimony	40	72	0.0032	-	-	-	0.002	0.0234	67	90	0.0026	-	-	-	0.002	0.0075
Arsenic	40	0	0.193	0.188	0.0473	0.0075	0.0986	0.304	67	0	0.118	0.115	0.041	0.005	0.0441	0.209
Barium	40	0	5.52	5.28	0.95	0.15	4.14	9.05	67	0	5.55	5.6	1.17	0.143	3.09	9.05
Beryllium	40	100	0.002	-	-	-	-	-	67	100	0.0024	-	-	-	-	-
Bismuth	40	95	0.0021	-	-	-	0.002	0.0041	67	96	0.0024	-	-	-	0.002	0.0049
Boron	40	88	0.204	-	-	-	0.2	0.24	67	67	0.276	-	-	-	0.2	0.53
Cadmium	40	0	0.0091	0.0083	0.0034	0.0005	0.0047	0.0192	67	0	0.0066	0.0056	0.0041	0.0005	0.0021	0.0285
Calcium	40	0	29200	28200	4420	698	21000	41900	67	0	25800	25800	5300	647	12700	41300
Cesium	40	0	0.0284	0.0274	0.0086	0.0014	0.0116	0.0641	67	0	0.0248	0.0241	0.0072	0.0009	0.0112	0.0478
Chromium	40	40	0.0638	0.0475	0.0329	0.0052	0.04	0.192	67	6	0.845	0.413	1.17	0.143	0.04	5.73
Cobalt	40	0	0.0111	0.0105	0.0039	0.0006	0.0066	0.0238	67	0	0.0158	0.0128	0.0085	0.001	0.0053	0.0485
Copper	40	0	0.811	0.786	0.135	0.0214	0.572	1.11	67	0	0.707	0.685	0.154	0.0188	0.318	1.21
Iron	40	0	21.1	19.5	6.62	1.05	14.4	55.9	67	0	27.1	22.2	13.5	1.64	8	82.3
Lead	40	30	0.0161	0.012	0.0104	0.0017	0.01	0.064	67	55	0.0172	-	-	-	0.01	0.136
Lithium	40	100	0.1	-	-	-	-	-	67	43	0.208	0.19	0.128	0.0156	0.1	0.75
Magnesium	40	0	664	648	76.1	12	541	860	67	0	531	532	85.7	10.5	277	747
Manganese	40	0	30.5	29.9	7.06	1.12	20	47.7	67	0	28.2	27.9	7.46	0.911	14.5	48.1
Mercury	40	0	0.13	0.132	0.0233	0.0037	0.0766	0.17	67	0	0.12	0.118	0.0376	0.0046	0.041	0.263
Molybdenum	40	0	0.0188	0.0136	0.0286	0.0045	0.01	0.194	67	1	0.0384	0.0308	0.0232	0.0028	0.0103	0.113
Nickel	40	50	0.0545	-	-	-	0.04	0.191	67	0	1.79	0.751	2.73	0.333	0.099	12
Phosphorus	40	0	19300	18800	2520	398	14700	27700	67	0	15100	15300	2690	328	7310	22500
Potassium	40	0	3100	3150	370	58.6	2020	3650	67	0	2750	2720	304	37.1	1360	3450
Rubidium	40	0	3.36	3.42	0.581	0.0919	1.77	4.66	67	0	2.87	2.87	0.629	0.0768	1.5	4.35
Selenium	40	0	0.621	0.624	0.0781	0.0123	0.433	0.752	67	0	0.603	0.593	0.0926	0.0113	0.273	0.898
Silver	40	5	0.0022	0.0018	0.001	0.0002	0.001	0.0046	67	58	0.0017	-	-	-	0.001	0.0117
Sodium	40	0	1680	1720	285	45	1170	2440	67	0	1360	1350	198	24.2	706	1850
Strontium	40	0	24.3	23.3	3.84	0.608	16.9	38.4	67	0	20.6	20.6	3.99	0.487	9.12	28.7
Tellurium	40	100	0.004	-	-	-	-	-	67	100	0.0048	-	-	-	-	-
Thallium	40	0	0.0053	0.0052	0.0018	0.0003	0.003	0.0093	67	0	0.0054	0.0048	0.0023	0.0003	0.003	0.016
Tin	40	62	0.0306	-	-	-	0.02	0.138	67	63	0.0289	-	-	-	0.02	0.061
Titanium	40	88	0.145	-	-	-	0.1	1.44	67	52	0.194	-	-	-	0.1	0.81
Uranium	40	0	0.0062	0.0059	0.0023	0.0004	0.0015	0.0106	67	0	0.0046	0.0046	0.0019	0.0002	0.0014	0.0088
Vanadium	40	75	0.0226	-	-	-	0.02	0.05	67	67	0.0297	-	-	-	0.02	0.082
Zinc	40	0	70	69.2	11.7	1.86	49.1	100	67	0	50.4	50	10.1	1.24	27.6	87.1
Zirconium	40	20	0.0912	0.078	0.0446	0.0071	0.04	0.222	67	85	0.0527	-	-	-	0.04	0.118

Location/year	**MEL04 '21**								**MEL04 '17**							
Spatial Exposure	**Reference**								**Reference**							
Temporal Exposure	**Mine operation**								**Baseline**							
Summary Statistics	**N**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**	**N**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**
Lipid Content (%)	-	-	-	-	-	-	-	-	52	10	4.89	5.1	2.32	0.322	0.4	10.6
Moisture Content (%)	40	0	69.2	69.4	2.51	0.396	62.2	74.6	67	0	65.5	65	2.88	0.352	59.6	74.1
Aluminum	40	30	1.46	1.3	0.561	0.0887	1	3.3	67	30	2.97	2	3.56	0.435	1	19.2
Antimony	40	68	0.0025	-	-	-	0.002	0.0089	67	88	0.0032	-	-	-	0.002	0.0138
Arsenic	40	0	0.181	0.17	0.0483	0.0076	0.119	0.376	67	0	0.156	0.156	0.0349	0.0043	0.0682	0.239
Barium	40	0	5.18	4.96	1.18	0.186	3.52	8.63	67	0	5.66	5.53	1.2	0.146	2.89	9.26
Beryllium	40	100	0.002	-	-	-	-	-	67	100	0.0028	-	-	-	-	-
Bismuth	40	100	0.002	-	-	-	-	-	67	97	0.0028	-	-	-	0.002	0.0054
Boron	40	90	0.205	-	-	-	0.2	0.28	67	55	0.442	-	-	-	0.2	4.24
Cadmium	40	0	0.0091	0.0077	0.0072	0.0011	0.0028	0.0489	67	6	0.0061	0.0055	0.0023	0.0003	0.002	0.0132
Calcium	40	0	27800	26400	6390	1010	17600	45700	67	0	25700	25600	5250	642	14300	45800
Cesium	40	0	0.022	0.022	0.0049	0.0008	0.0134	0.0327	67	0	0.029	0.027	0.0091	0.0011	0.0145	0.0594
Chromium	40	18	0.0729	0.0585	0.0411	0.0065	0.04	0.214	67	4	0.514	0.285	0.568	0.0694	0.04	2.61
Cobalt	40	0	0.0107	0.0105	0.0035	0.0006	0.0061	0.0285	67	1	0.0149	0.0138	0.0049	0.0006	0.008	0.0348
Copper	40	0	0.78	0.746	0.157	0.0248	0.539	1.31	67	0	0.704	0.703	0.104	0.0127	0.485	1.05
Iron	40	0	17.7	16.6	3.94	0.622	12.1	28.2	67	0	24.3	22.4	8.84	1.08	13.3	58.7
Lead	40	5	0.0207	0.017	0.01	0.0016	0.01	0.05	67	52	0.0203	-	-	-	0.01	0.245
Lithium	40	100	0.101	-	-	-	-	-	67	100	0.137	-	-	-	-	-
Magnesium	40	0	628	615	101	15.9	456	889	67	0	529	518	92.4	11.3	330	771
Manganese	40	0	29.7	27.4	6.91	1.09	16.9	45.7	67	0	29.6	28.4	7.07	0.864	18.1	50.4
Mercury	40	0	0.105	0.104	0.0304	0.0048	0.0528	0.198	67	0	0.0886	0.0799	0.0273	0.0033	0.0456	0.196
Molybdenum	40	0	0.0132	0.0129	0.0028	0.0004	0.0089	0.0212	67	6	0.0313	0.0218	0.0263	0.0032	0.0116	0.166
Nickel	40	25	0.072	0.0515	0.0896	0.0142	0.04	0.612	67	0	0.909	0.53	1.19	0.145	0.089	7.19
Phosphorus	40	0	18000	17700	3390	536	12600	27300	67	0	15300	15300	2750	336	8440	24600
Potassium	40	0	2980	3020	337	53.3	2110	3580	67	0	2550	2520	277	33.8	1900	3150
Rubidium	40	0	3.2	3.34	0.518	0.0818	1.82	4.23	67	0	3.19	3.16	0.556	0.0679	1.73	4.44
Selenium	40	0	0.578	0.569	0.0719	0.0114	0.435	0.728	67	0	0.592	0.596	0.0568	0.0069	0.436	0.714
Silver	40	18	0.0019	0.0016	0.001	0.0002	0.001	0.0058	67	76	0.0015	-	-	-	0.001	0.0039
Sodium	40	0	1410	1400	201	31.7	1010	1850	67	0	1300	1280	203	24.8	901	2120
Strontium	40	0	23	22.5	5.03	0.795	13.5	36.6	67	0	19	18.8	3.65	0.446	11.2	31.9
Tellurium	40	100	0.0041	-	-	-	-	-	67	100	0.0055	-	-	-	-	-
Thallium	40	0	0.0058	0.0056	0.0016	0.0003	0.0033	0.0105	67	0	0.0056	0.0053	0.0015	0.0002	0.0032	0.009
Tin	40	20	0.0563	0.0345	0.0509	0.0081	0.02	0.254	67	67	0.0373	-	-	-	0.02	0.088
Titanium	40	88	0.109	-	-	-	0.1	0.21	67	67	0.178	-	-	-	0.1	0.95
Uranium	40	0	0.0068	0.0061	0.0035	0.0006	0.002	0.0224	67	0	0.0063	0.0057	0.0028	0.0003	0.0014	0.0156
Vanadium	40	82	0.0218	-	-	-	0.02	0.044	67	81	0.0297	-	-	-	0.02	0.073
Zinc	40	0	62.7	57.8	15.8	2.5	31.9	102	67	0	53.4	52.4	11.1	1.35	29	85.7
Zirconium	40	25	0.14	0.0945	0.111	0.0176	0.04	0.428	67	96	0.0621	-	-	-	0.04	0.487

Note:

Summary statistics were not calculated for parameters with more than 50% of the values as non-detect.

APPENDIX I

LAKE TROUT – SUPPORTING INFORMATION

Appendix I-1

Lake Trout Data and Summary Statistics

APPENDIX I1 - TABLES

Table I1-1. Lake Trout summary statistics by year. 1
Table I1-2. Lake Trout summary statistics by maturity, sex, and year. 2
Table I1-3. Gill net locations and set conditions for Meliadine Lake 2021 sampling. 6
Table I1-4. Catch data for Lake Trout in Meliadine Lake from 2015 and 2021. 7

Table I1-1. Lake Trout summary statistics by year.

Variable	Year	n	Min	Max	Mean	Median	Standard Deviation	Standard Error
Fork Length (mm)	2015	67	398	915	595	598	107.8	13.2
	2021	42	442	826	665	674	86.2	13.3
Total Length (mm)	2015	67	449	1060	655	661	117.7	14.4
	2021	42	480	909	731	736	93.2	14.4
Weight (g)	2015	67	630.0	6750	2438	2200	1279.9	156.4
	2021	42	887.3	5660	3485	3232	1258.1	194.1
Condition	2015	67	0.86	1.32	1.07	1.07	0.117	0.014
	2021	42	0.81	1.71	1.15	1.14	0.167	0.026
Age (years)	2015	67	10	43	19	18	7.1	0.9
	2021	42	15	37	25	27	5.8	0.9
Liver Weight (g)	2015	67	4.49	114.79	23.79	19.23	17.529	2.141
	2021	42	11.40	130.91	47.70	38.16	28.109	4.337
Gonad Weight (g)	2015	67	0.31	753.82	60.73	12.89	140.13	17.12
	2021	42	0.32	567.40	92.56	36.65	138.20	21.32
Fecundity (# of eggs per female)	2015	26	1712	31914	10048	6683	8873.8	1740.3
	2021	4	3460	6850	5335	5515	1578.9	789.5

Table I1-2. Lake Trout summary statistics by maturity, sex, and year.

Variable	Maturity	Sex	Year	n	Min	Max	Mean	Median	Standard Deviation	Standard Error
Fork Length (mm)	Immature	Female	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
		Male	2015	1	465	465	465	465	-	-
			2021	10	442	784	632	629	95.4	30.2
		Unknown	2015	6	434	498	468	468	22.6	9.2
			2021	0	-	-	-	-	-	-
	Mature	Female	2015	32	487	915	636	637	101.3	17.9
			2021	18	549	781	688	717	73.0	17.2
		Male	2015	28	398	773	580	579	100.4	19.0
			2021	14	509	826	659	660	92.7	24.8
		Unknown	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
Total Length (mm)	Immature	Female	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
		Male	2015	1	518	518	518	518	-	-
			2021	10	480	853	693	690	103.8	32.8
		Unknown	2015	6	481	552	516	515	25.3	10.3
			2021	0	-	-	-	-	-	-
	Mature	Female	2015	32	541	1060	700	696	112.5	19.9
			2021	18	604	853	756	784	77.9	18.4
		Male	2015	28	449	841	639	630	107.6	20.3
			2021	14	572	909	726	723	100.1	26.7
		Unknown	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-

Table I1-2. **Lake Trout summary statistics by maturity, sex, and year.**

Variable	Maturity	Sex	Year	n	Min	Max	Mean	Median	Standard Deviation	Standard Error
Weight (g)	Immature	Female	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
		Male	2015	1	1000	1000	1000	1000	-	-
			2021	10	887.3	5473.6	2934.0	2403.1	1385.65	438.18
		Unknown	2015	6	810	1550	1193.3	1212.5	248.23	101.34
			2021	0	-	-	-	-	-	-
	Mature	Female	2015	32	1150	6750	2875	2650	1374.8	243.0
			2021	18	2048.5	5621.1	3749.9	3400.9	1165.8	274.8
		Male	2015	28	630	4950	2258	2195	1068.8	202.0
			2021	14	2000.7	5660	3537	3178	1245.7	332.9
		Unknown	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
Condition	Immature	Female	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
		Male	2015	1	0.99	0.99	0.99	0.99	-	-
			2021	10	0.87	1.30	1.08	1.06	0.140	0.044
		Unknown	2015	6	0.99	1.25	1.15	1.17	0.098	0.040
			2021	0	-	-	-	-	-	-
	Mature	Female	2015	32	0.86	1.32	1.06	1.03	0.129	0.023
			2021	18	0.81	1.36	1.13	1.15	0.139	0.033
		Male	2015	28	0.94	1.27	1.08	1.09	0.104	0.020
			2021	14	0.91	1.71	1.21	1.19	0.202	0.054
		Unknown	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-

Table I1-2. Lake Trout summary statistics by maturity, sex, and year.

Variable	Maturity	Sex	Year	n	Min	Max	Mean	Median	Standard Deviation	Standard Error
Otolith Age (years)	Immature	Female	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
		Male	2015	1	12	12	12	12	-	-
			2021	10	15	33	21	21	5.3	1.7
		Unknown	2015	6	10	14	12	12	1.7	0.7
			2021	0	-	-	-	-	-	-
	Mature	Female	2015	32	12	43	22	22	7.6	1.4
			2021	18	16	37	27	27	5.5	1.3
		Male	2015	28	10	32	19	18	6.0	1.1
			2021	14	20	36	26	27	5.5	1.5
		Unknown	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
Liver Weight (g)	Immature	Female	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
		Male	2015	1	10.53	10.53	10.53	10.53	-	-
			2021	10	11.40	86.88	40.51	30.90	23.753	7.511
		Unknown	2015	6	8.46	14.74	11.57	11.64	2.117	0.864
			2021	0	-	-	-	-	-	-
	Mature	Female	2015	32	10.42	114.79	32.02	26.03	21.422	3.787
			2021	18	24.71	130.91	58.25	42.52	35.327	8.327
		Male	2015	28	4.49	40.21	17.48	17.41	7.882	1.490
			2021	14	22.18	71.78	39.28	39.03	14.107	3.770
		Unknown	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-

Table I1-2. Lake Trout summary statistics by maturity, sex, and year.

Variable	Maturity	Sex	Year	n	Min	Max	Mean	Median	Standard Deviation	Standard Error
Gonad Weight (g)	Immature	Female	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
		Male	2015	1	0.429	0.429	0.429	0.429	-	-
			2021	10	0.320	12.040	5.335	4.415	3.7261	1.1783
		Unknown	2015	6	0.403	1.081	0.725	0.714	0.2250	0.0919
			2021	0	-	-	-	-	-	-
	Mature	Female	2015	32	2.586	753.821	94.070	19.115	194.2758	34.3434
			2021	18	19.620	567.400	131.572	36.010	195.7227	46.1323
		Male	2015	28	0.306	153.585	37.633	15.394	43.1132	8.1476
			2021	14	11.390	185.090	104.697	111.515	44.8452	11.9854
		Unknown	2015	0	-	-	-	-	-	-
			2021	0	-	-	-	-	-	-
Fecundity (# of eggs per female)	Mature	Female	2015	26	1712	31914	10048	6683	8873.8	1740.3
			2021	4	3460	6850	5335	5515	1578.9	789.5

Table I1-3. **Gill net locations and set conditions for Meliadine Lake 2021 sampling.**

Gill net set	Position	UTM (Zone 15, NAD83)		Depth	Temperature (°C)			Sp. Conductivity (µS/cm)		
		Easting	Northing		Min Temp	Max Temp	Ave Temp	Min	Max	Average
GN1-1	Start	542411	6989117	1.8	10.0	10.1	10.0	104.0	105.1	104.5
	End	542469	6989035	1.9	9.6	9.6	9.6	100.9	101.0	101.0
GN2-1	Start	542759	6989103	9.3	9.4	9.6	9.5	100.7	101.0	100.8
	End	542783	6988991	10.2	9.5	9.7	9.6	100.5	104.4	100.8
GN3-1	Start	542906	6989285	3.4	9.6	9.6	9.6	111.5	115.9	114.1
	End	542933	6989225	6.4	9.6	9.7	9.7	106.7	110.7	109.6
GN4-1	Start	542679	6989355	1.4	9.6	9.8	9.7	108.9	112.5	109.8
	End	542706	6989287	6.7	9.6	9.8	9.7	104.9	110.8	107.5

Table I1-4. Catch data for Lake Trout in Meliadine Lake from 2015 and 2021.

Year	Date (y-m-d)	Gear	Set ID	Fish ID	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Condition	Age (Years)	Sex	Maturity	Liver Weight (g)	Gonad Weight (g)	Gonad Condition	Fecundity	Egg Sample Weight (g)	Egg Sample (count)	GSI	LSI	Stomach Contents	Health Assessment Notes
2021	2021-08-14	GN	2,3,4	LT1	604	549	2048.5	1.24	22	F	M	37.84	19.62	Resting	NA	NA	NA	0.958	1.847	Empty	None
2021	2021-08-14	GN	2,3,4	LT2	817	741	4534.2	1.11	27	F	M	54.74	55.03	Resting	NA	NA	NA	1.214	1.207	Whitefish	None
2021	2021-08-14	GN	2,3,4	LT3	694	629	2727.8	1.10	27	F	M	45.55	34.42	Resting	NA	NA	NA	1.262	1.670	Empty	None
2021	2021-08-14	GN	2,3,4	LT4	796	720	3031.2	0.81	30	F	M	27.71	32.41	Resting	NA	NA	NA	1.069	0.914	Empty	None
2021	2021-08-14	GN	2,3,4	LT5	777	716	3427.5	0.93	30	F	M	36.01	185.44	Ripe	3460	38.6	721	5.410	1.051	Empty	None
2021	2021-08-14	GN	2,3,4	LT6	722	650	3234.3	1.18	26	F	M	50.00	41.14	Resting	NA	NA	NA	1.272	1.546	Cisco	None
2021	2021-08-14	GN	2,3,4	LT7	644	576	2594.1	1.36	20	F	M	35.54	29.52	Resting	NA	NA	NA	1.138	1.370	Empty	None
2021	2021-08-14	GN	2,3,4	LT8	683	622	3002.5	1.25	21	M	M	38.02	134.14	Ripe	NA	NA	NA	4.468	1.266	7 Threespine, 1 Csiso, ~20 pebbles, largest is 16mm x 11mm x 9mm	None
2021	2021-08-14	GN	2,3,4	LT9	790	718	4401.8	1.19	32	F	M	61.32	76.82	Resting	NA	NA	NA	1.745	1.393	1 fish ~ 350 mm	1 EC on stomach
2021	2021-08-14	GN	2,3,4	LT10	626	567	2173.9	1.19	21	F	M	24.71	30.96	Resting	NA	NA	NA	1.424	1.137	Empty	None
2021	2021-08-14	GN	2,3,4	LT11	627	569	2394.2	1.30	17	M	I	31.93	2.95	Undeveloped	NA	NA	NA	0.123	1.334	Empty	None
2021	2021-08-14	GN	2,3,4	LT12	572	509	2250.6	1.71	20	M	M	27.26	79.21	Ripe	NA	NA	NA	3.520	1.211	7 Threespine	None
2021	2021-08-14	GN	2,3,4	LT13	633	576	2271.1	1.19	21	M	M	22.18	75.43	Ripe	NA	NA	NA	3.321	0.977	Empty	1 EC on stomach
2021	2021-08-14	GN	2,3,4	LT14	653	590	1977.3	0.96	21	M	I	25.93	4.23	Undeveloped	NA	NA	NA	0.214	1.311	Empty	None
2021	2021-08-14	GN	2,3,4	LT15	632	576	2382	1.25	21	M	M	27.78	115.79	Ripe	NA	NA	NA	4.861	1.166	1 Threespine	None
2021	2021-08-14	GN	2,3,4	LT16	703	640	3212.6	1.23	28	M	M	40.03	117.48	Ripe	NA	NA	NA	3.657	1.246	Fish remains	1 EC on liver
2021	2021-08-14	GN	2,3,4	LT17	651	594	2727.5	1.30	20	M	M	33.89	99.63	Ripe	NA	NA	NA	3.653	1.243	4 Threespine, 2 pebbles	3 EC on stomach
2021	2021-08-14	GN	2,3,4	LT18	716	659	3230.6	1.13	16	M	I	36.45	5.22	Undeveloped	NA	NA	NA	0.162	1.128	Whitefish remains	10 EC on stomach
2021	2021-08-14	GN	2,3,4	LT19	839	759	5524.1	1.26	30	F	M	124.91	566.00	Ripe	4620	68.0	555	10.246	2.261	4 Threespine, 1 UNK ~ 200mm	3EC on stomach
2021	2021-08-14	GN	2,3,4	LT20	826	751	5302.2	1.25	27	F	M	130.91	567.40	Ripe	6850	57.2	691	10.701	2.469	Empty	None
2021	2021-08-14	GN	2,3,4	LT21	689	623	2679.8	1.11	16	F	M	28.27	27.93	Resting	NA	NA	NA	1.042	1.055	Empty	None
2021	2021-08-14	GN	2,3,4	LT22	832	755	3926.8	0.91	36	M	M	41.23	11.39	Resting	NA	NA	NA	0.290	1.050	1 Threespine, 2 pebbles, 1 is sharp, both posterior end of stomach	None
2021	2021-08-14	GN	2,3,4	LT23	614	551	2000.7	1.20	36	M	M	24.40	37.10	Ripe	NA	NA	NA	1.854	1.220	Fish remains	2 EC on Liver
2021	2021-08-14	GN	2,3,4	LT24	755	691	3374.3	1.02	28	F	M	38.29	49.95	Resting	NA	NA	NA	1.480	1.135	Fish remains	None
2021	2021-08-14	GN	2,3,4	LT25	717	652	2412	0.87	24	M	I	29.87	4.60	Undeveloped	NA	NA	NA	0.191	1.238	Empty	None
2021	2021-08-14	GN	2,3,4	LT26	730	668	3314.3	1.11	20	F	M	32.55	33.98	Resting	NA	NA	NA	1.025	0.982	Empty	None
2021	2021-08-14	GN	2,3,4	LT27	742	679	3143	1.00	24	M	M	24.84	96.15	Ripe	NA	NA	NA	3.059	0.790	Empty	None
2021	2021-08-14	GN	2,3,4	LT28	664	605	2215.4	1.00	19	M	I	26.40	2.26	Undeveloped	NA	NA	NA	0.102	1.192	Fish remains	None
2021	2021-08-14	GN	2,3,4	LT29	853	784	5473.6	1.14	25	M	I	86.88	10.23	Undeveloped	NA	NA	NA	0.187	1.587	2 Burbot~270mm each	None
2021	2021-08-14	GN	2,3,4	LT30	853	776	4720.3	1.01	37	F	M	70.21	36.20	Resting	NA	NA	NA	0.767	1.487	Fish remains	None
2021	2021-08-14	GN	2,3,4	LT31	820	751	4849.2	1.14	27	M	M	51.85	136.46	Ripe	NA	NA	NA	2.814	1.069	Empty	None
2021	2021-08-14	GN	2,3,4	LT32	812	737	5140.6	1.28	27	F	M	126.32	512.80	Ripe	6411	57.0	713	9.975	2.457	Empty	None
2021	2021-08-14	GN	2,3,4	LT33	657	596	2105.4	0.99	21	M	I	29.26	3.14	Undeveloped	NA	NA	NA	0.149	1.390	Empty	None
2021	2021-08-14	GN	2,3,4	LT34	909	826	5660	1.00	27	M	M	71.78	185.09	Ripe	NA	NA	NA	3.270	1.268	Empty	None
2021	2021-08-14	GN	2,3,4	LT35	820	746	4672.3	1.13	31	M	M	52.31	154.86	Ripe	NA	NA	NA	3.314	1.120	Empty	None
2021	2021-08-14	GN	2,3,4	LT36	755	684	3819.6	1.19	28	M	M	42.41	115.34	Ripe	NA	NA	NA	3.020	1.110	Empty	None
2021	2021-08-14	GN	2,3,4	LT37	845	781	5621.1	1.18	33	F	M	84.14	35.82	Resting	NA	NA	NA	0.637	1.497	Empty	None
2021	2021-08-14	GN	2,3,4	LT38	803	729	4223.2	1.09	33	M	I	51.53	12.04	Undeveloped	NA	NA	NA	0.285	1.220	Empty	None
2021	2021-08-14	GN	2,3,4	LT39	790	724	3648.8	0.96	33	F	M	39.48	32.85	Resting	NA	NA	NA	0.900	1.082	1 Burbot ~ 300mm	None
2021	2021-08-14	GN	2,3,4	LT40	796	719	5603.5	1.51	27	M	M	51.89	107.69	Ripe	NA	NA	NA	1.922	0.926	1 Whitefish, 2 remains of fish	None
2021	2021-08-14	GN	1	LT41	761	698	4420.5	1.30	22	M	I	75.40	8.36	Undeveloped	NA	NA	NA	0.189	1.706	1 Whitefish and remains	None
2021	2021-08-14	GN	1	LT42	480	442	887.3	1.03	15	M	I	11.40	0.32	Undeveloped	NA	NA	NA	0.036	1.285	Empty	None
2015	2015-08-14	AN	1500	ML15FNFLKTR1008	684	623	2330	0.96	16	M	M	17.88	1.85	Early Stage Development	NA	NA	NA	0.079	0.767	Empty	
2015	2015-08-14	AN	1500	ML15FNFLKTR1011	511	463	1160	1.17	12	M	M	10.46	0.76	Early Stage Development	NA	NA	NA	0.066	0.902	Fish remains, unidentifiable	Ligula in stomach; Photos: P8140417 scaring on dorsal side, P8140418 anal fin damage
2015	2015-08-14	AN	1500	ML15FNFLKTR1015	481	434	810	0.99	10	U	I	8.46	0.40	NA	NA	NA	NA	0.050	1.045	2 RNWH, 2 unidentified fish. RNWH TL = 111mm, 102mm	Cysts
2015	2015-08-14	AN	1500	ML15FNFLKTR1018	449	404	630	0.96	10	M	M	5.13	0.44	Early Stage Development	NA	NA	NA	0.070	0.814	Empty	Cysts on stomach
2015	2015-08-14	AN	1500	ML15FNFLKTR1021	728	659	2710	0.95	21	M	M	17.50	51.55	Late Stage Development	NA	NA	NA	1.902	0.646	3 RNWH, 1 THST (RNWH = 115mm, others not measurable; THST=73mm)	Ligula in gills
2015	2015-08-15	AN	1501	ML15FNFLKTR1056	778	710	3500	0.98	25	F	M	28.73	39.00	Early Stage Development	26397	12.1	8201	1.114	0.821	Empty	5 small cysts on stomach
2015	2015-08-15	AN	1501	ML15FNFLKTR1060	725	661	2500	0.87	22	F	M	20.53	2.95	Resting	NA	NA	NA	0.118	0.821	1 Whitefish approximately 220mm	Slight fraying of fins, Possibly resting female, Cysts on stomach
2015	2015-08-15	AN	1501	ML15FNFLKTR1061	744	680	3650	1.16	26	F	M	65.34	650.00	Late Stage Development	4754	20.1	147	17.808	1.790		Small cyst on stomach
2015	2015-08-15	AN	1501	ML15FNFLKTR1063	623	570	2200	1.19	21	M	M	15.41	77.82	Late Stage Development	NA	NA	NA	3.537	0.701		
2015	2015-08-15	AN	1501	ML15FNFLKTR1064	685	616	2650	1.13	22	F	M	24.75	39.54	Late Stage Development	12897	11.2	3638	1.492	0.934	1 Cisco approximately 118mm	photo P8150436 of cisco in stomach, 2 cysts on stomach
2015	2015-08-15	AN	1501	ML15FNFLKTR1066	604	541	2000	1.26	15	F	M	43.50	228.76	Late Stage Development	2693	22.9	270	11.438	2.175	Small digested fish	
2015	2015-08-15	AN	1502	ML15FNFLKTR1077	732	662	3000	1.03	30	M	M	22.24	105.21	Late Stage Development	NA	NA	NA	3.507	0.741		5 OR 6 Stomach cysts
2015	2015-08-15	AN	1502	ML15FNFLKTR1078	746	672	3700	1.22	25	M	M	27.98	153.59	Late Stage Development	NA	NA	NA	4.151	0.756	3 rocks in stomach	5 OR 6 Stomach cysts
2015	2015-08-15	AN	1502	ML15FNFLKTR1079	715	655	2900	1.03	21	F	M	25.40	22.43	Early Stage Development	6258	5.5	1545	0.773	0.876	1 Cisco approximately 105mm, 2 unidentified remains and a rock	Cysts
2015	2015-08-15	AN	1502	ML15FNFLKTR1082	697	638	2650	1.02	16	F	M	26.67	16.05	Early Stage Development	12216	6.2	4725	0.606	1.006	1 Cisco 105mm	5 OR 6 Stomach cysts
2015	2015-08-15	AN	1502	ML15FNFLKTR1083	661	598	2450	1.15	18	F	M	56.84	395.00	Late Stage Development	3235	22.2	182	16.122	2.320		Photo P8150451 and P8150452 parasites in stomach and 2 or 3 cysts on stomach
2015	2015-08-16	AN	1503	ML15FNFLKTR1130	841	773	4400	0.95	32	M	M	31.40	100.85	Late Stage Development	NA	NA	NA	2.292	0.714		Dead at time of processing,, just died, cysts in body cavity, parasites in stomach
2015	2015-08-16	AN	1503	ML15FNFLKTR1131	816	748	3800	0.91	42	F	M	53.64	4.01	Resting	NA	4.0	NA	0.105	1.412	Fish remain	Dead at time of processing, recently deceased
2015	2015-08-16	AN	1503	ML15FNFLKTR1132	616	559	1875	1.07	16	F	M	21.42	14.90	Early Stage Development	5284	7.3	2588	0.794	1.142	Fish remain	Dead at time of processing, recently deceased
2015	2015-08-16	AN	1503	ML15FNFLKTR1133	583	528	1850	1.26	15	F	M	21.73	12.58	Early Stage Development	3661	6.4	1877	0.680	1.174	Grey mush and fish skeleton	Dead at time of processing, recently deceased, several cysts on stomach
2015	2015-08-16	AN	1503	ML15FNFLKTR1134	777	716	4250	1.16	32	F	M	37.71	7.93	Resting	NA	NA	NA	0.186	0.887	1 suspected whitefish 330mm and 1 burbot 175mm	Photo P8160463 - healed scar, photo P8160465 - white nodules on heart
2015	2015-08-16	AN	1503	ML15FNFLKTR1135	616	580	2190	1.12	18	M	M	18.27	73.87	Late Stage Development	NA	NA	NA	3.373	0.834	5 THST and 7 small rocks (THST 51mm, 53mm, 51mm, 52mm, 30mm)	Numerous cysts on stomach, white nodules on heart
2015	2015-08-16	AN	1503	ML15FNFLKTR1157	586	516	1540	1.12	14	F	M	14.65	7.36	Early Stage Development	4005	3.9	2105	0.478	0.951	2 unidentifiable remains, 2 THST 34mm and 31mm, 2 CISC 115mm and 183	2 cysts in gills
2015	2015-08-16	AN	1503	ML15FNFLKTR1158	552	498	1550	1.25	14	U	I	10.43	1.08	NA	NA	NA	NA	0.070	0.673	Invertebrates	photo P8160473 - stomach invertebrates, 1 small cyst on intestines
2015	2015-08-16	AN	1503	ML15FNFLKTR1159	637	578	2000	1.04	16	M	M	14.83	1.77	Early Stage Development	NA	NA	NA	0.089	0.742		Photo P8160474 - clubbed gills and parasites on gills, Cyst on stomach

Table I1-4. Catch data for Lake Trout in Meliadine Lake from 2015 and 2021.

Year	Date (y-m-d)	Gear	Set ID	Fish ID	Total Length (mm)	Fork Length (mm)	Total Weight (g)	Condition	Age (Years)	Sex	Maturity	Liver Weight (g)	Gonad Weight (g)	Gonad Condition	Fecundity	Egg Sample Weight (g)	Egg Sample (count)	GSI	LSI	Stomach Contents	Health Assessment Notes
2015	2015-08-16	AN	1503	ML15FNFLKTR1160	518	465	1000	0.99	12	M	I	10.53	0.43	Undeveloped	NA	NA	NA	0.043	1.053	1 CISC - 1130mm and 1 unidentified fish remain	parasite in gills
2015	2015-08-16	AN	1503	ML15FNFLKTR1161	545	496	1275	1.04	13	F	M	12.29	3.81	Early Stage Development	1712	3.8	1712	0.299	0.964	Juices	4 cysts on stomach
2015	2015-08-17	GN	1600	ML15FNFLKTR1236	506	461	1075	1.10	11	U	I	11.14	0.76	NA	NA	NA	NA	0.071	1.036	2 Unidentified fish remains	
2015	2015-08-17	GN	1600	ML15FNFLKTR1238	603	551	2125	1.27	17	M	M	16.89	78.14	Late Stage Development	NA	NA	NA	3.677	0.795	1 THST (37mm) 10 unidentified fish remains, small, 1 rock	
2015	2015-08-17	GN	1601	ML15FNFLKTR1242	533	483	1275	1.13	12	U	I	12.15	0.81	NA	NA	NA	NA	0.064	0.953	Unidentifiable fish remains	
2015	2015-08-17	GN	1601	ML15FNFLKTR1245	697	631	2775	1.10	26	M	M	21.11	63.23	Late Stage Development	NA	NA	NA	2.279	0.761	Unidentifiable fish remains; approximately 10 fish stickleback and cisco?; some shells	1 Parasite in gills; cysts on stomach; and tapeworm in stomach
2015	2015-08-17	GN	1601	ML15FNFLKTR1248	1060	915	6750	0.88	43	F	M	44.52	12.89	Resting	NA	NA	NA	0.191	0.660	LKTR remains	Threw up LKTR remains; Yellow liver photo P8170240
2015	2015-08-17	AN	1504	ML15FNFLKTR1251	622	569	1850	1.00	12	F	M	15.05	8.86	Early Stage Development	9212	8.9	9212	0.479	0.814	2 cisco, 1 @ 111mm, other unmeasurable	Cyst on stomach
2015	2015-08-17	AN	1504	ML15FNFLKTR1254	714	646	3100	1.15	22	F	M	28.34	27.68	Early Stage Development	4934	9.9	1761	0.893	0.914	1 large burb @ 218mm; 1 unidentified fish	Cysts
2015	2015-08-17	AN	1504	ML15FNFLKTR1259	601	545	1630	1.01	15	F	M	14.91	10.38	Early Stage Development	4573	5.4	2377	0.637	0.915	empty	Died about 1 hr before processing; 1 small cyst on gill; 1 cyst on stomach
2015	2015-08-17	AN	1504	ML15FNFLKTR1260	617	560	2025	1.15	19	M	M	17.32	40.37	Late Stage Development	NA	NA	NA	1.994	0.855	1 CISC @123mm; 1 stickleback@49mm and 2 unidentified	Died about 1 hr before processing; 1 cyst on stomach; 1 cyst on kidney
2015	2015-08-17	AN	1504	ML15FNFLKTR1261	760	698	3300	0.97	24	M	M	24.77	90.02	Late Stage Development	NA	NA	NA	2.728	0.751	empty	Died about 1 hr before processing
2015	2015-08-17	AN	1504	ML15FNFLKTR1262	577	528	1450	0.99	14	F	M	17.06	6.51	Early Stage Development	4414	6.5	4414	0.449	1.177	empty	
2015	2015-08-17	GN	1600	ML15FNFLKTR1332	872	808	5400	1.02	28	F	M	55.42	41.77	Reabsorbing	31391	22.0	16549	0.774	1.026	LKTR remains	Right pectoral fin either deformed or clipped photo P8170260
2015	2015-08-17	GN	1600	ML15FNFLKTR1333	864	803	6500	1.26	27	F	M	114.79	753.82	Late Stage Development	3923	19.0	99	11.597	1.766	empty	Liver 2-toned photo P8170265
2015	2015-08-17	AN	1504	ML15FNFLKTR1334	787	740	3850	0.95	24	F	M	26.65	23.81	Early Stage Development	12515	9.3	4873	0.618	0.692	empty	Parasites in gills
2015	2015-08-18	GN	1603	ML15FNFLKTR1335	524	475	1300	1.21	14	U	I	12.52	0.63	NA	NA	NA	NA	0.048	0.963	Misc. small fish remains	
2015	2015-08-18	GN	1603	ML15FNFLKTR1336	674	606	2100	0.94	22	F	M	14.37	3.10	Resting	NA	NA	NA	0.148	0.684	empty	
2015	2015-08-18	GN	1603	ML15FNFLKTR1337	694	635	2875	1.12	22	F	M	21.83	33.41	Early Stage Development	8036	7.2	1732	1.162	0.759	empty	Cyst on stomach
2015	2015-08-18	GN	1603	ML15FNFLKTR1338	728	668	2750	0.92	24	F	M	27.06	30.16	Early Stage Development	18291	7.6	4615	1.097	0.984	empty	Liver dark brown in colour
2015	2015-08-18	GN	1603	ML15FNFLKTR1339	751	678	3400	1.09	26	M	M	25.65	7.12	Early Stage Development	NA	NA	NA	0.209	0.754	Fish remains	Cysts on pyloric sceca
2015	2015-08-18	GN	1601	ML15FNFLKTR1340	631	568	2100	1.15	18	F	M	27.81	16.06	Early Stage Development	7120	8.7	3879	0.765	1.324	2 unidentified fish remains	4 cysts on stomach and 1 on air bladder, dead at time of processing (within a half hour of being alive)
2015	2015-08-18	GN	1601	ML15FNFLKTR1341	501	455	1150	1.22	11	U	I	14.74	0.66	NA	NA	NA	NA	0.058	1.281	1 unidentified fish remains	Dead at time of processing (within a half hour of being alive) 1 parasite in gills
2015	2015-08-18	GN	1603	ML15FNFLKTR1342	767	689	2825	0.86	24	F	M	19.85	30.12	Early Stage Development	31914	6.4	6808	1.066	0.703	Unidentifiable substance, very jelly like substance	Dead at time of processing (within a half hour of being alive) 5 cysts on stomach
2015	2015-08-18	AN	1505	ML15FNFLKTR1343	681	616	2200	0.94	19	M	M	13.52	1.68	Early Stage Development	NA	NA	NA	0.076	0.615	1 unidentified fish	Small parasites on gills, cyst on swim bladder, 2 cysts on stomach
2015	2015-08-18	AN	1505	ML15FNFLKTR1344	717	652	3650	1.32	25	F	M	62.75	490.78	Late Stage Development	3939	15.6	125	13.446	1.719	Gravel and 2 THST, 56 mm TL, 54 mm TL	Scar on caudal fin
2015	2015-08-18	AN	1506	ML15FNFLKTR1345	722	665	2750	0.94	17	M	M	20.88	1.17	Early Stage Development	NA	NA	NA	0.043	0.759	Empty	Gill parasites
2015	2015-08-18	AN	1506	ML15FNFLKTR1346	802	722	3325	0.88	29	F	M	28.63	39.20	Early Stage Development	23348	9.2	5508	1.179	0.861	Fish remains	Deformed tail, cysts in liver
2015	2015-08-18	AN	1506	ML15FNFLKTR1347	710	638	2550	0.98	20	M	M	19.23	63.65	Late Stage Development	NA	NA	NA	2.496	0.754	2 rocks and 3 THST, 38 mm TL, 55 mm TL, could not determine length of third THST.	Cyst on liver, kidney and stomach
2015	2015-08-18	AN	1506	ML15FNFLKTR1348	549	503	1590	1.25	16	F	M	17.84	12.65	Early Stage Development	7109	12.7	7109	0.796	1.122	13 small rocks, 8 THST, 48; 61; 44; 58; 36; 32; 54; 32 mm TL	Gill parasites. Asymmetrical gonad development. One lobe much larger than the other. Stomach cysts.
2015	2015-08-18	AN	1506	ML15FNFLKTR1349	515	460	975	1.00	13	M	M	8.29	0.56	Early Stage Development	NA	NA	NA	0.057	0.850	1 Cisco, 105 mm TL	Gill parasites, cyst on stomach
2015	2015-08-18	AN	1506	ML15FNFLKTR1350	553	494	1350	1.12	13	M	M	11.60	0.91	Early Stage Development	NA	NA	NA	0.067	0.859	about 20 stickleback, some parasites (likely from stickleback)	
2015	2015-08-18	AN	1506	ML15FNFLKTR1351	586	530	1890	1.27	18	M	M	16.34	49.15	Late Stage Development	NA	NA	NA	2.600	0.865	3 stickleback, 4 rock	Gill photo P8180493
2015	2015-08-18	AN	1506	ML15FNFLKTR1352	541	487	1150	1.00	12	F	M	10.42	2.59	Early Stage Development	NA	2.6	NA	0.225	0.906	Misc. fish remains	Gill parasites, parasites in gall bladder and in stomach wall
2015	2015-08-18	AN	1506	ML15FNFLKTR1353	506	460	1100	1.13	11	M	M	10.26	0.65	Early Stage Development	NA	NA	NA	0.059	0.933	18 partially digested stickleback	Cysts
2015	2015-08-18	AN	1506	ML15FNFLKTR1354	834	768	4950	1.09	27	M	M	40.21	23.67	Late Stage Development	NA	NA	NA	0.478	0.812	Unidentified fish remains and 35 mm flat stone.	Gill parasites, cyst on stomach, stomach worms, bubble/blister on spleen.
2015	2015-08-18	AN	1506	ML15FNFLKTR1355	550	497	1350	1.10	13	M	M	12.86	0.66	Early Stage Development	NA	NA	NA	0.049	0.953	5 THST, mostly decomposed	
2015	2015-08-18	AN	1506	ML15FNFLKTR1356	664	605	2200	0.99	17	F	M	24.20	22.17	Early Stage Development	7424	7.3	2444	1.008	1.100	3 cisco, one 120 mm TL, only remnants of other 2.	Cysts on esophagus and swim bladder
2015	2015-08-18	AN	1506	ML15FNFLKTR1357	449	398	650	1.03	12	M	M	4.49	0.31	Early Stage Development	NA	NA	NA	0.047	0.690	Fish remains	
2015	2015-08-18	AN	1506	ML15FNFLKTR1358	521	475	1050	0.98	13	M	M	7.96	0.61	Early Stage Development	NA	NA	NA	0.058	0.758	Misc. fish remains	Cysts on stomach
2015	2015-08-18	AN	1506	ML15FNFLKTR1359	678	603	2650	1.21	18	M	M	17.70	62.55	Late Stage Development	NA	NA	NA	2.361	0.668	2 cisco 104; 104; mm TL and 4 cisco partially digested	Cysts
2015	2015-08-18	AN	1506	ML15FNFLKTR1360	596	538	1800	1.16	14	M	M	19.38	1.57	Early Stage Development	NA	NA	NA	0.087	1.076	1 fish mostly digested	Cyst on swim bladder

Notes:

Abbreviations: Gear:AN = angling, GN = gill net; Sex: M = male, F = female, U = unknown; Maturity: M = mature, I = immature; GSI = gonadosomatic index; LSI = liversomatic index.

Appendix I-2

Supplemental Figures

APPENDIX I2 – FIGURES

Figure I2-1. Aluminum in Lake Trout kidney tissue 2
Figure I2-2. Antimony in Lake Trout kidney tissue 2
Figure I2-3. Arsenic in Lake Trout kidney tissue 3
Figure I2-4. Barium in Lake Trout kidney tissue 3
Figure I2-5. Cadmium in Lake Trout kidney tissue 4
Figure I2-6. Calcium in Lake Trout kidney tissue 4
Figure I2-7. Chromium in Lake Trout kidney tissue 5
Figure I2-8. Cobalt in Lake Trout kidney tissue 5
Figure I2-9. Copper in Lake Trout kidney tissue 6
Figure I2-10. Iron in Lake Trout kidney tissue 6
Figure I2-11. Lead in Lake Trout kidney tissue 7
Figure I2-12. Magnesium in Lake Trout kidney tissue 7
Figure I2-13. Manganese in Lake Trout kidney tissue 8
Figure I2-14. Mercury in Lake Trout kidney tissue 8
Figure I2-15. Moisture in Lake Trout kidney tissue 9
Figure I2-16. Molybdenum in Lake Trout kidney tissue 9
Figure I2-17. Nickel in Lake Trout kidney tissue 10
Figure I2-18. Phosphorus in Lake Trout kidney tissue 10
Figure I2-19. Potassium in Lake Trout kidney tissue 11
Figure I2-20. Silver in Lake Trout kidney tissue 11
Figure I2-21. Sodium in Lake Trout kidney tissue 12
Figure I2-22. Strontium in Lake Trout kidney tissue 12
Figure I2-23. Titanium in Lake Trout kidney tissue 13
Figure I2-24. Zinc in Lake Trout kidney tissue 13
Figure I2-25. Aluminum in Lake Trout liver tissue 15
Figure I2-26. Arsenic in Lake Trout liver tissue 15
Figure I2-27. Barium in Lake Trout liver tissue 16
Figure I2-28. Cadmium in Lake Trout liver tissue 16
Figure I2-29. Calcium in Lake Trout liver tissue 17

Figure I2-30. Cobalt in Lake Trout liver tissue 17
Figure I2-31. Copper in Lake Trout liver tissue 18
Figure I2-32. Iron in Lake Trout liver tissue 18
Figure I2-33. Magnesium in Lake Trout liver tissue 19
Figure I2-34. Manganese in Lake Trout liver tissue 19
Figure I2-35. Mercury in Lake Trout liver tissue 20
Figure I2-36. Moisture in Lake Trout liver tissue 20
Figure I2-37. Molybdenum in Lake Trout liver tissue 21
Figure I2-38. Phosphorus in Lake Trout liver tissue 21
Figure I2-39. Potassium in Lake Trout liver tissue 22
Figure I2-40. Silver in Lake Trout liver tissue 22
Figure I2-41. Sodium in Lake Trout liver tissue 23
Figure I2-42. Strontium in Lake Trout liver tissue 23
Figure I2-43. Vanadium in Lake Trout liver tissue 24
Figure I2-44. Zinc in Lake Trout liver tissue 24
Figure I2-45. Arsenic in Lake Trout muscle tissue 26
Figure I2-46. Barium in Lake Trout muscle tissue 26
Figure I2-47. Calcium in Lake Trout muscle tissue 27
Figure I2-48. Copper in Lake Trout muscle tissue 27
Figure I2-49. Iron in Lake Trout muscle tissue 28
Figure I2-50. Magnesium in Lake Trout muscle tissue 28
Figure I2-51. Manganese in Lake Trout muscle tissue 29
Figure I2-52. Mercury in Lake Trout muscle tissue 29
Figure I2-53. Moisture in Lake Trout muscle tissue 30
Figure I2-54. Phosphorus in Lake Trout muscle tissue 30
Figure I2-55. Potassium in Lake Trout muscle tissue 31
Figure I2-56. Sodium in Lake Trout muscle tissue 31
Figure I2-57. Strontium in Lake Trout muscle tissue 32
Figure I2-58. Zinc in Lake Trout muscle tissue 32

LAKE TROUT KIDNEY TISSUE CHEMISTRY COMPARISONS

Figure I2-1. Aluminum in Lake Trout kidney tissue

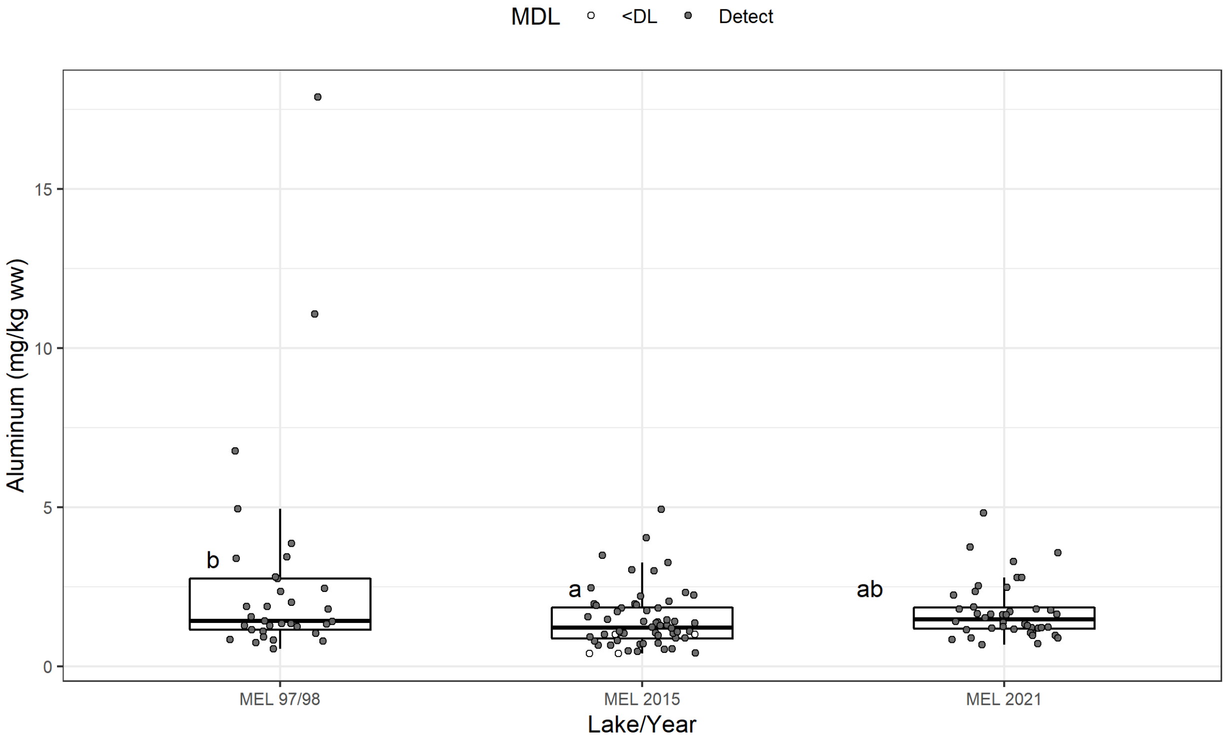


Figure I2-2. Antimony in Lake Trout kidney tissue

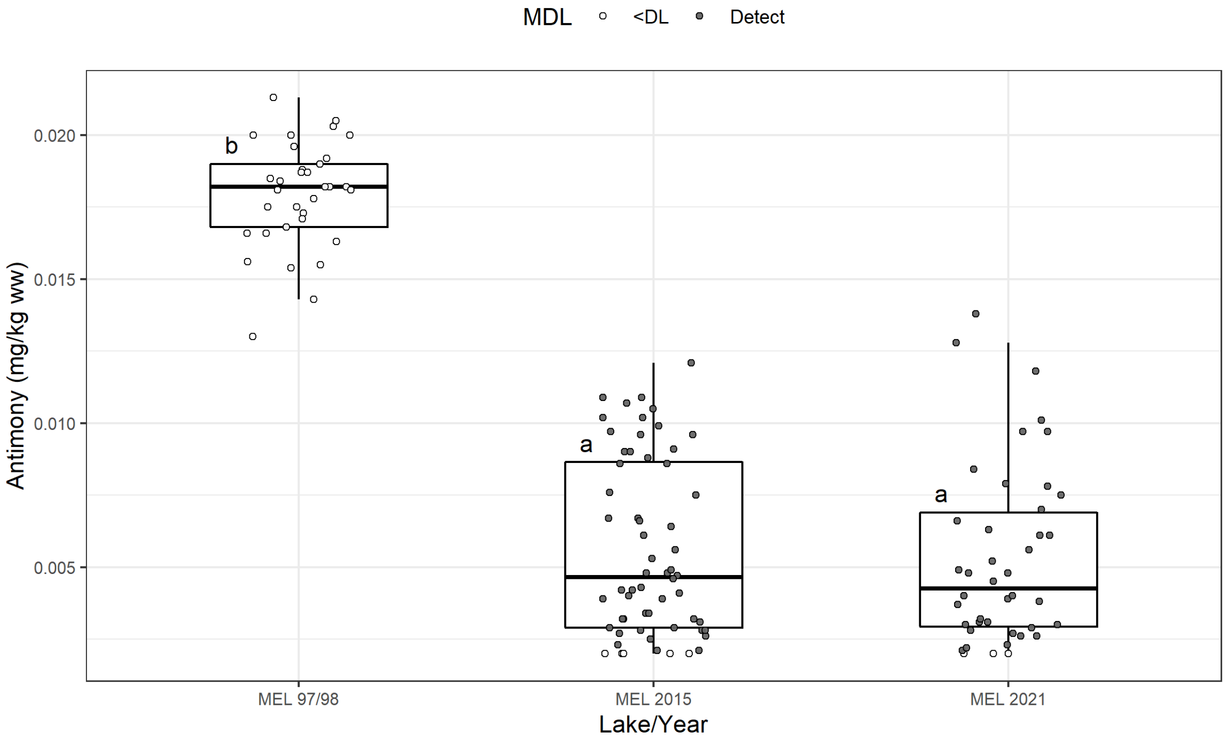


Figure I2-3. Arsenic in Lake Trout kidney tissue

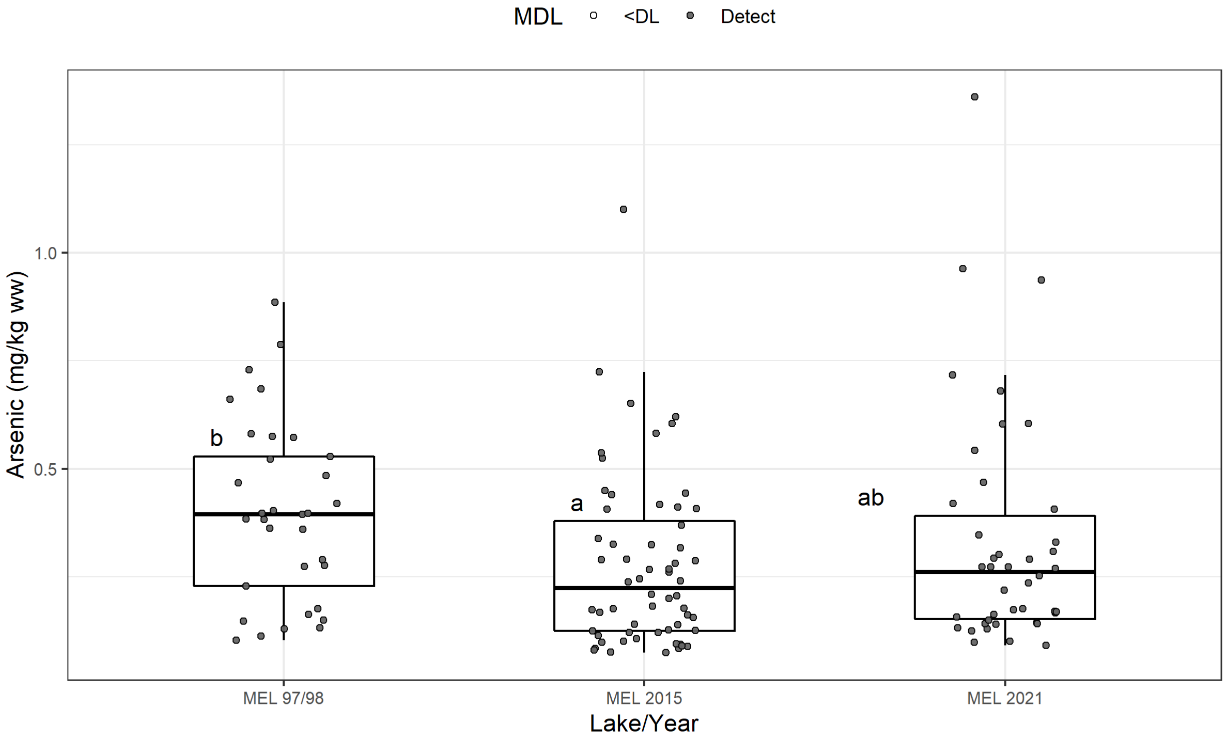


Figure I2-4. Barium in Lake Trout kidney tissue

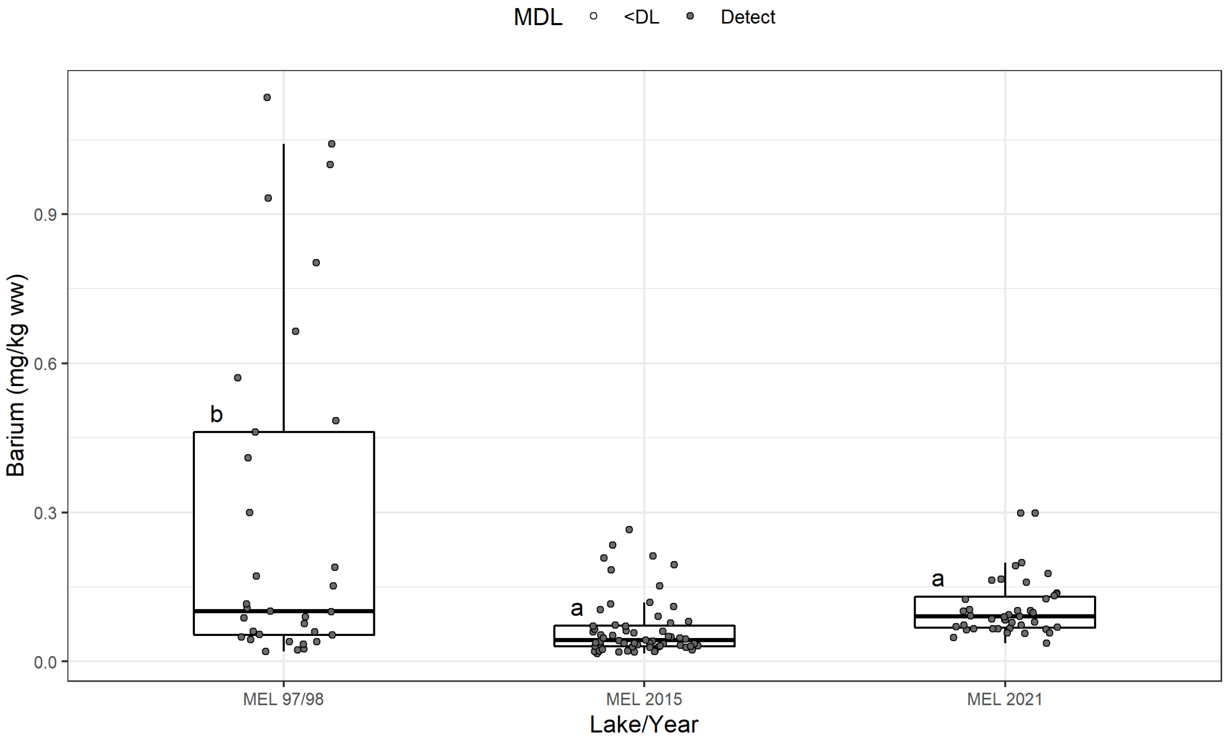


Figure I2-5. Cadmium in Lake Trout kidney tissue

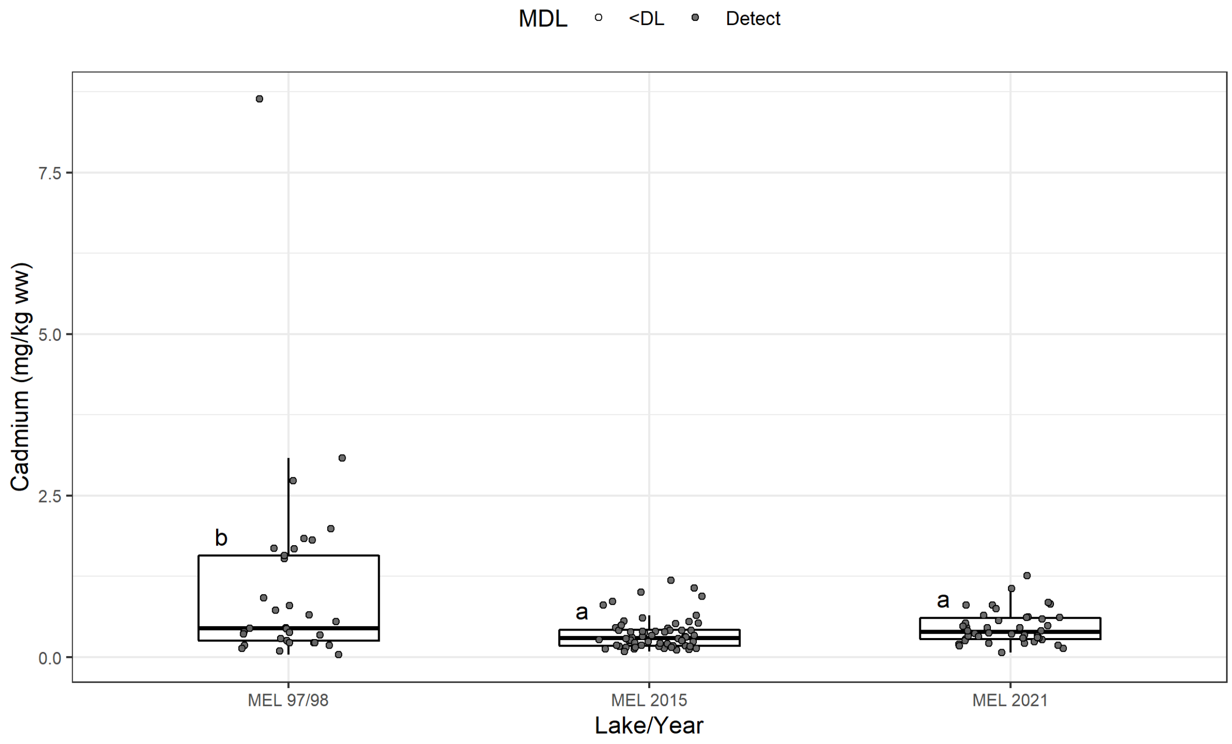


Figure I2-6. Calcium in Lake Trout kidney tissue

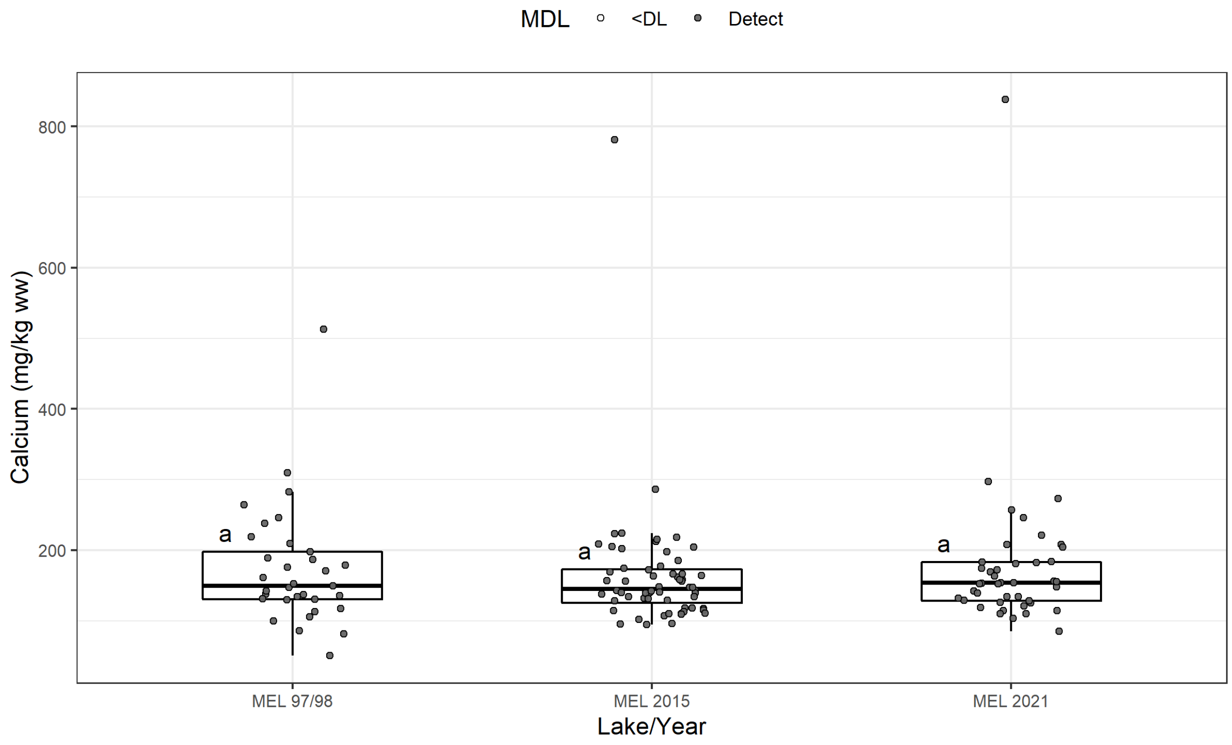


Figure I2-7. Chromium in Lake Trout kidney tissue

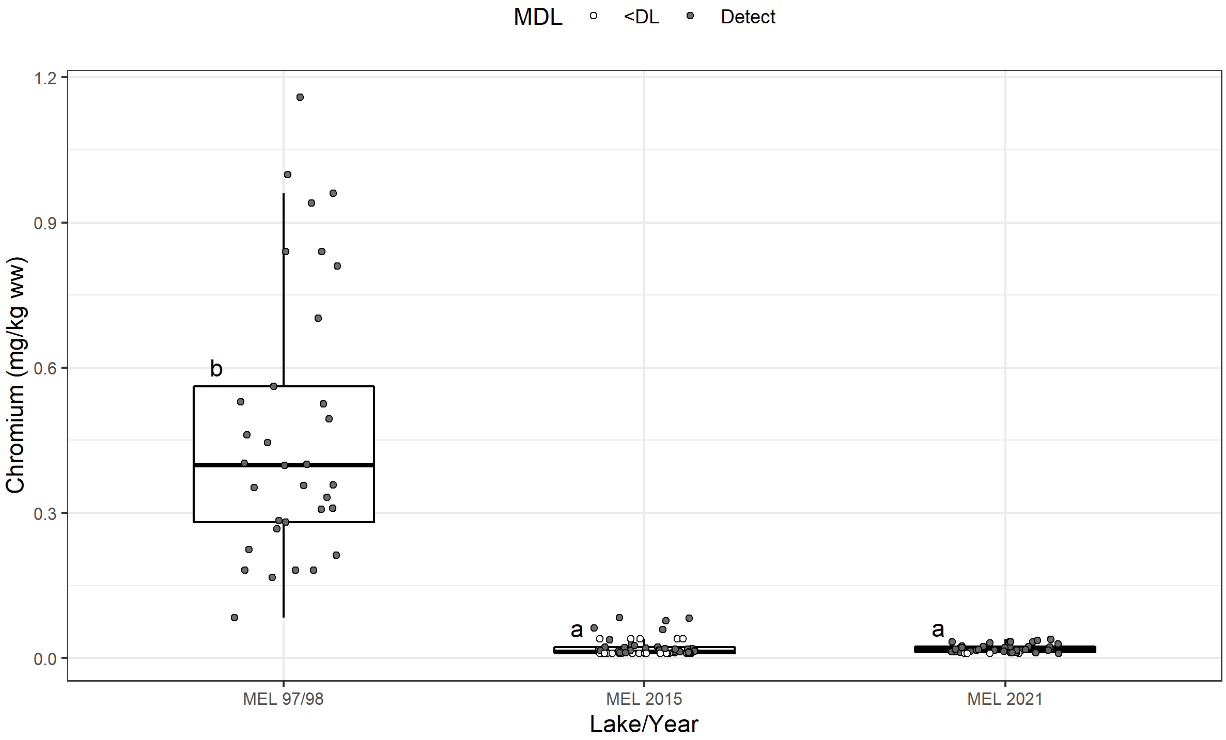


Figure I2-8. Cobalt in Lake Trout kidney tissue

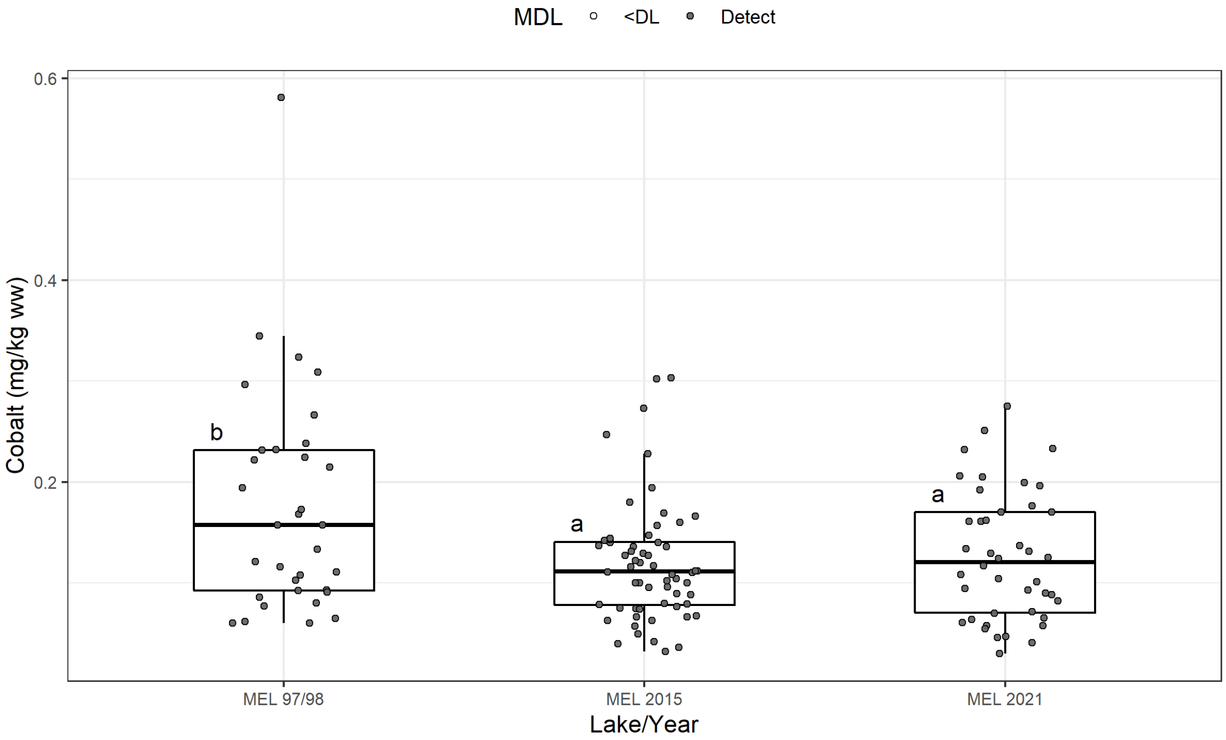


Figure I2-9. Copper in Lake Trout kidney tissue

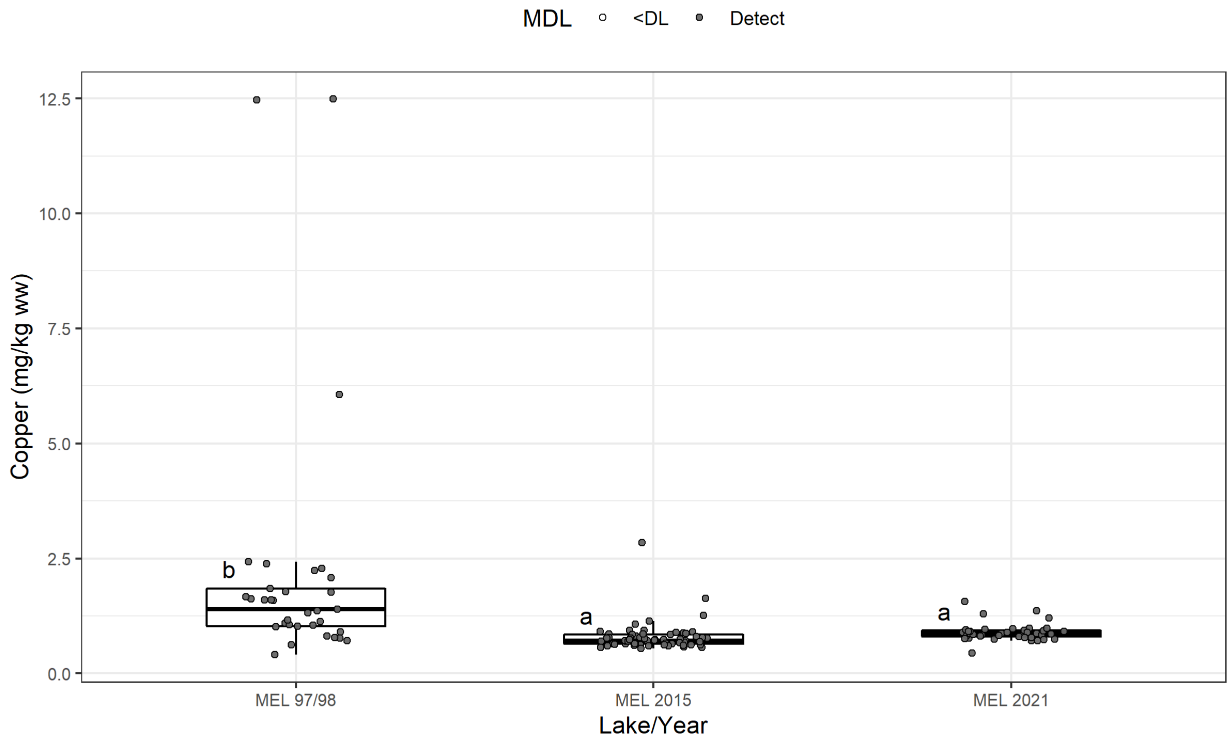


Figure I2-10. Iron in Lake Trout kidney tissue

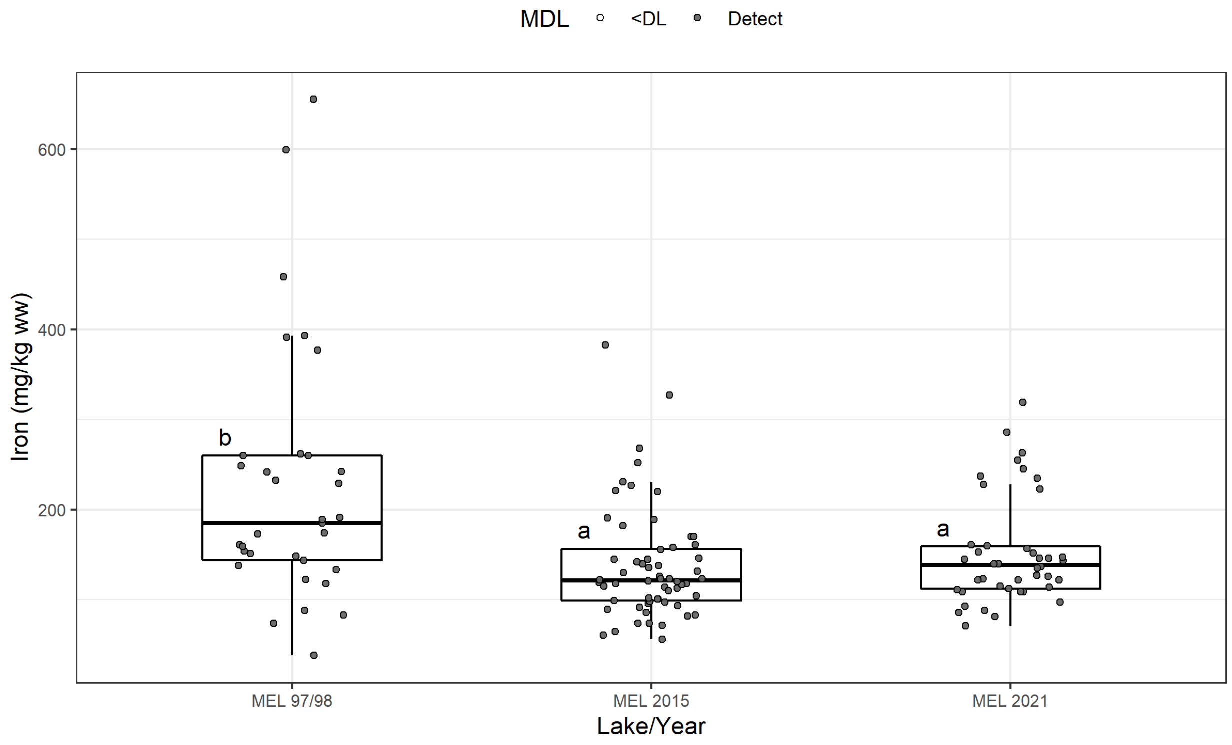


Figure I2-11. Lead in Lake Trout kidney tissue

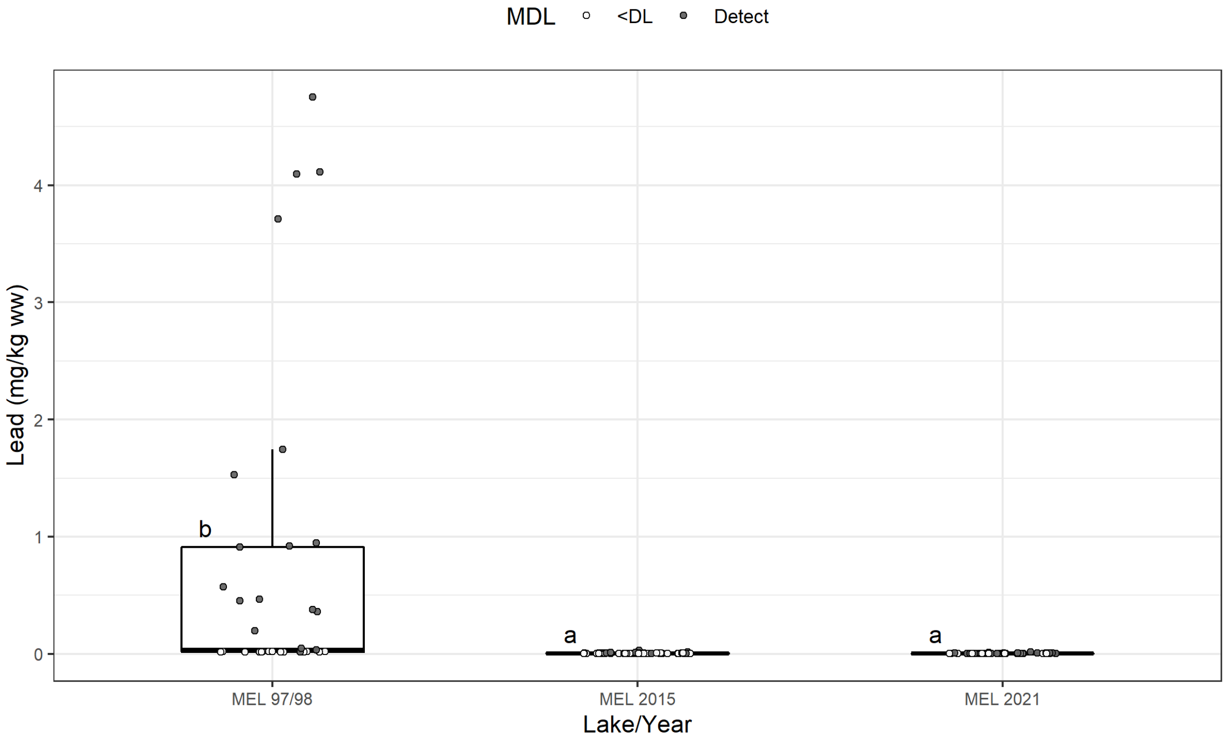


Figure I2-12. Magnesium in Lake Trout kidney tissue

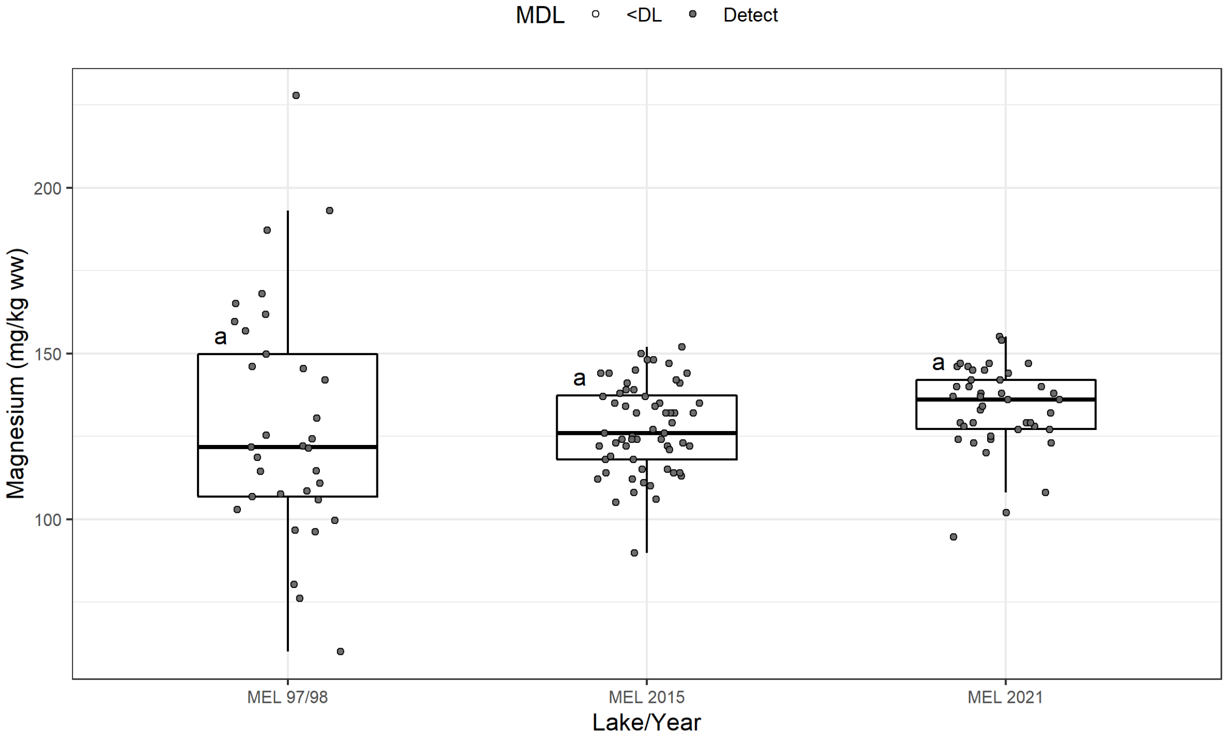


Figure I2-13. Manganese in Lake Trout kidney tissue

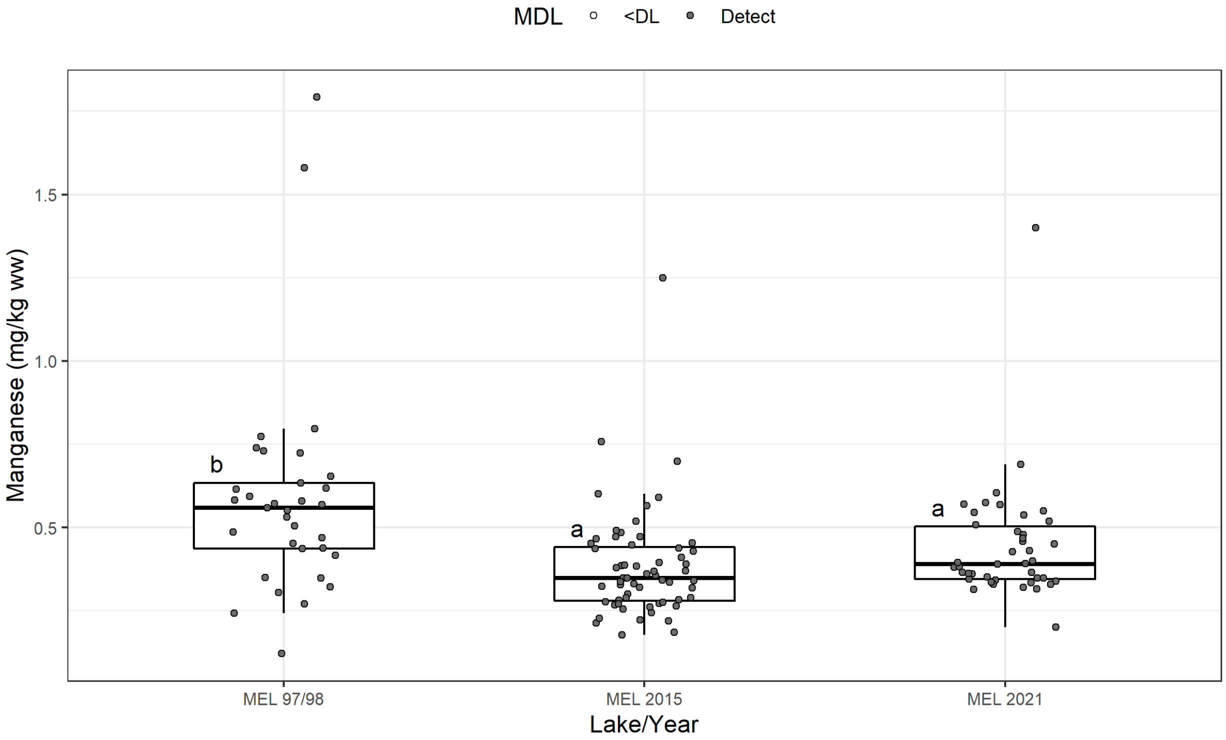


Figure I2-14. Mercury in Lake Trout kidney tissue

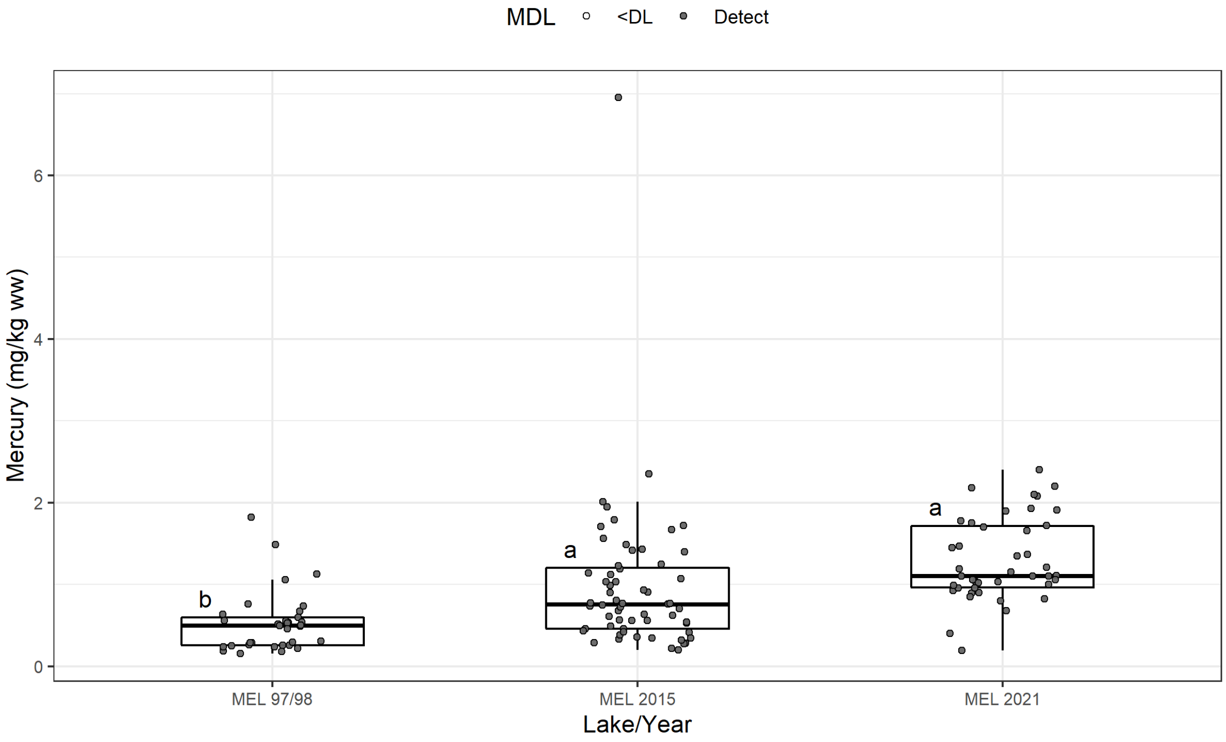


Figure I2-15. Moisture in Lake Trout kidney tissue

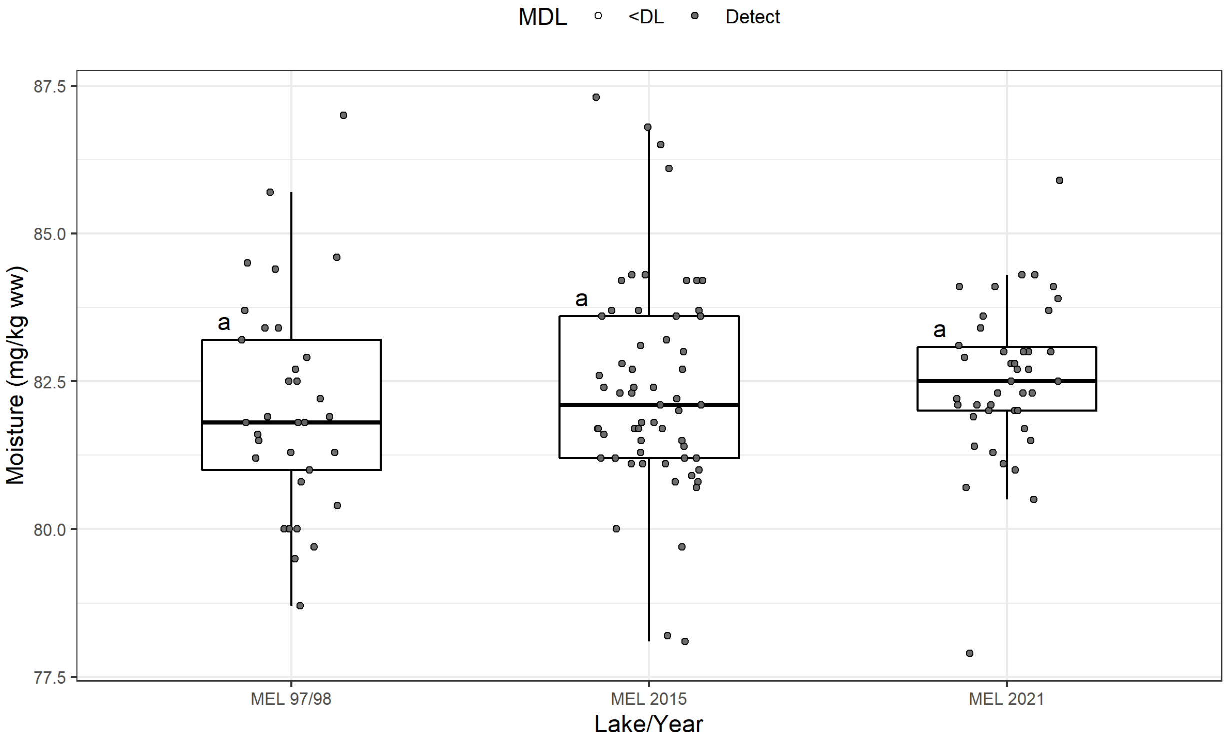


Figure I2-16. Molybdenum in Lake Trout kidney tissue

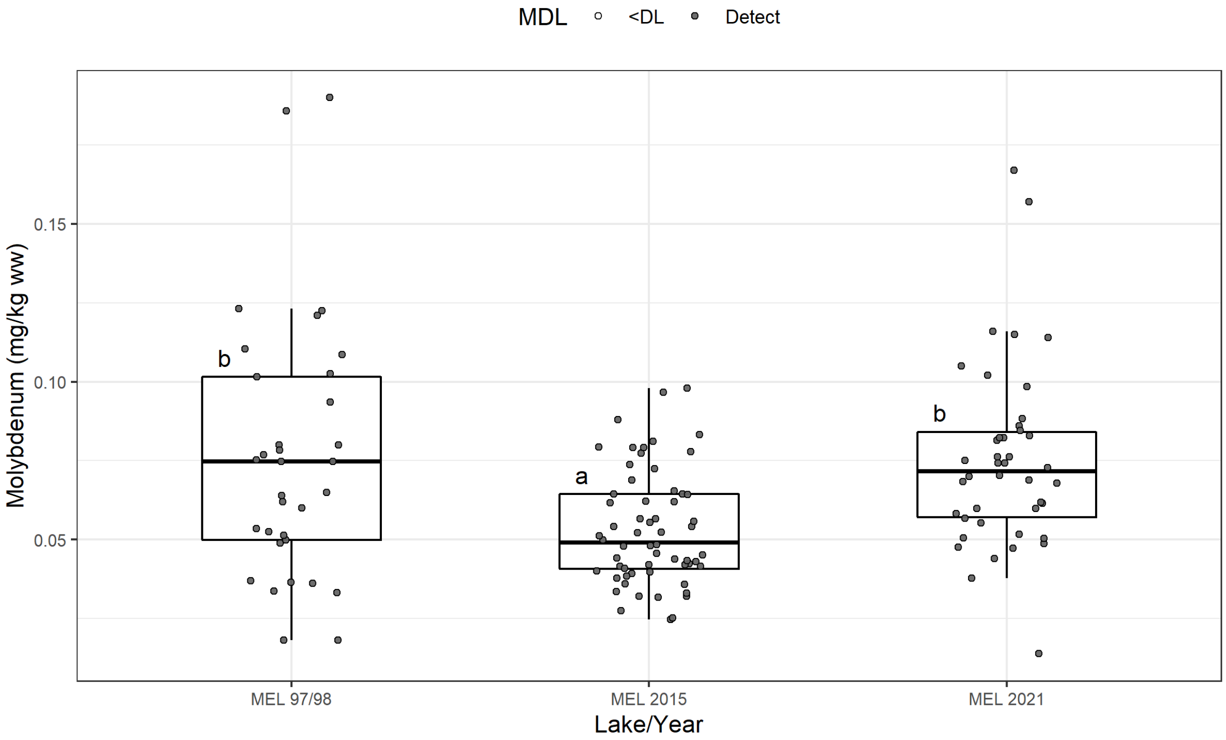


Figure I2-17. Nickel in Lake Trout kidney tissue

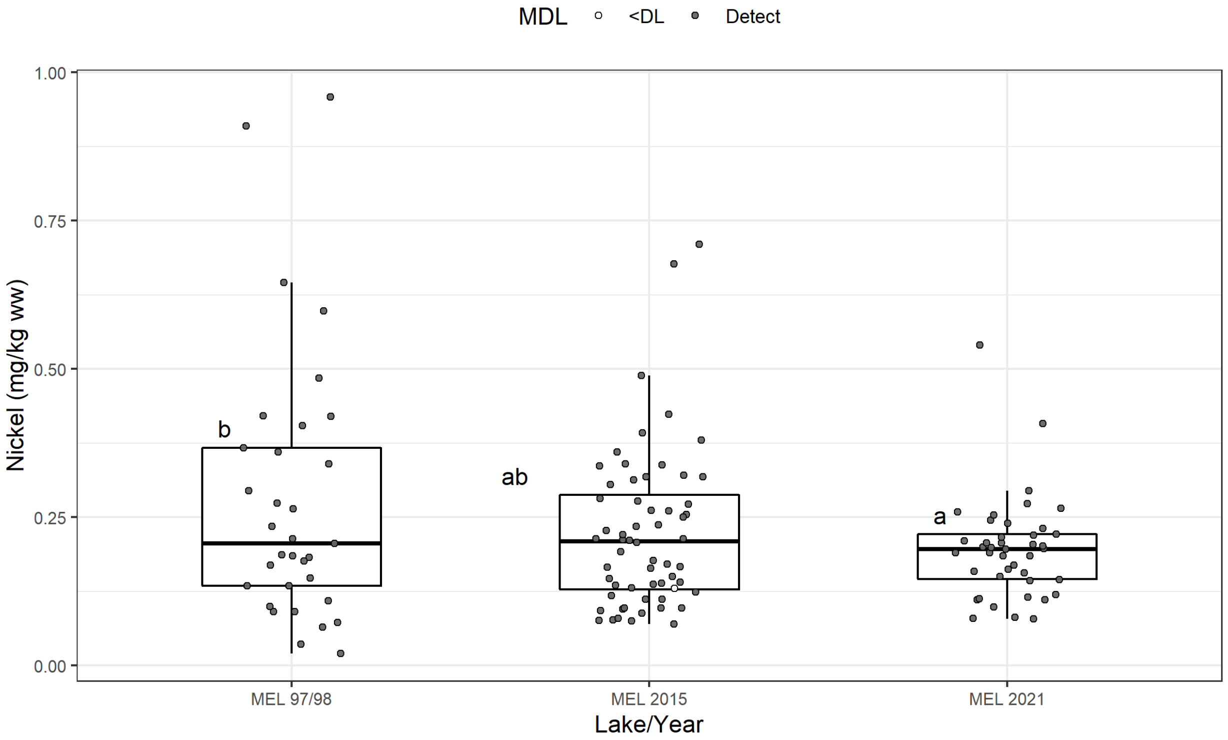


Figure I2-18. Phosphorus in Lake Trout kidney tissue

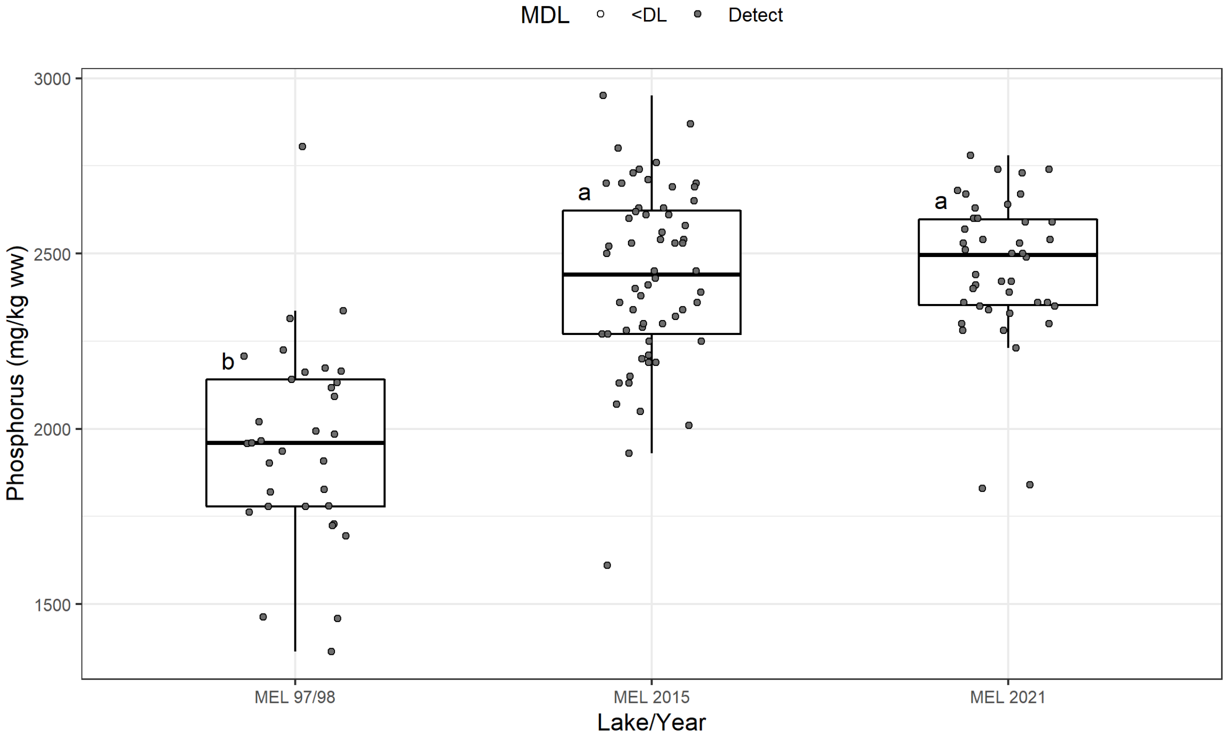


Figure I2-19. Potassium in Lake Trout kidney tissue

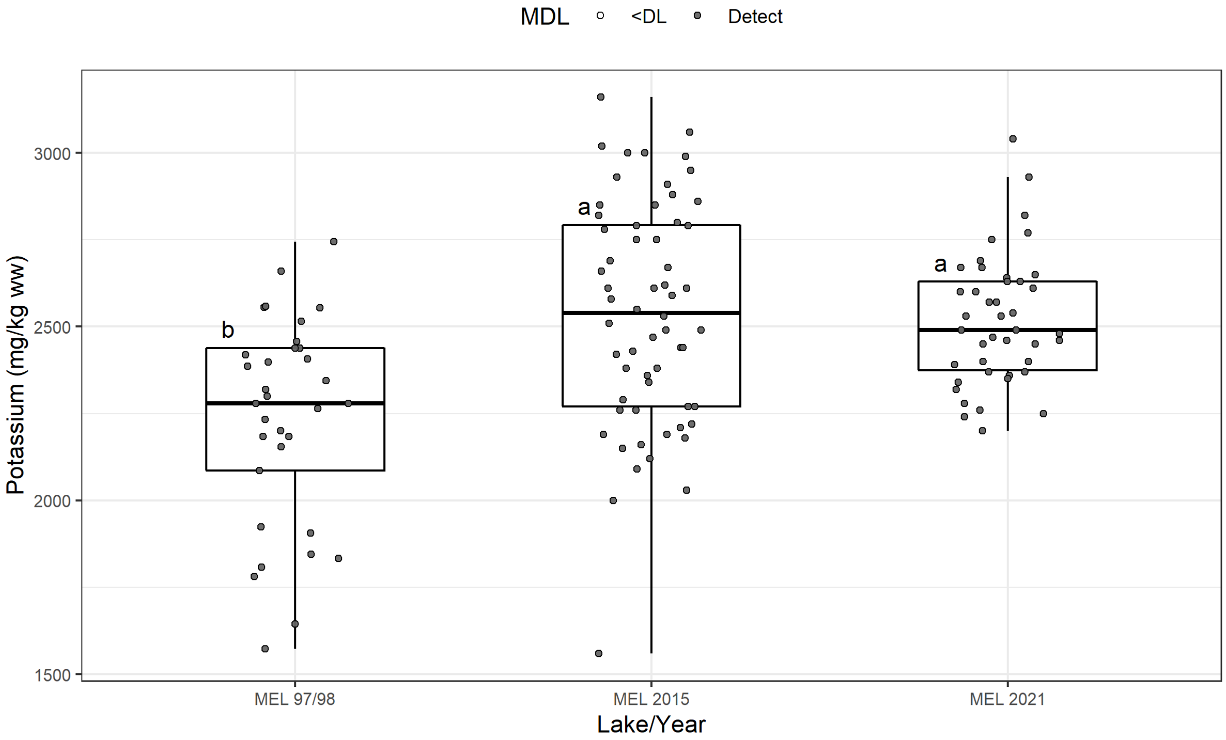


Figure I2-20. Silver in Lake Trout kidney tissue

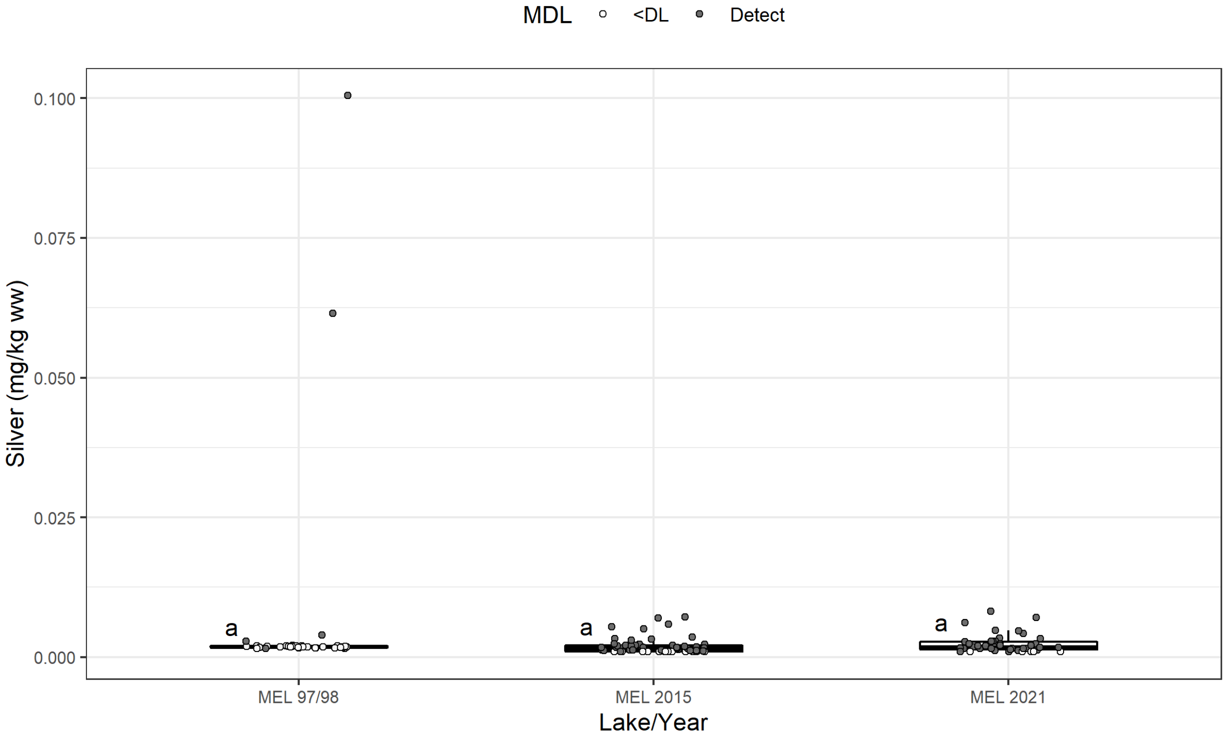


Figure I2-21. Sodium in Lake Trout kidney tissue

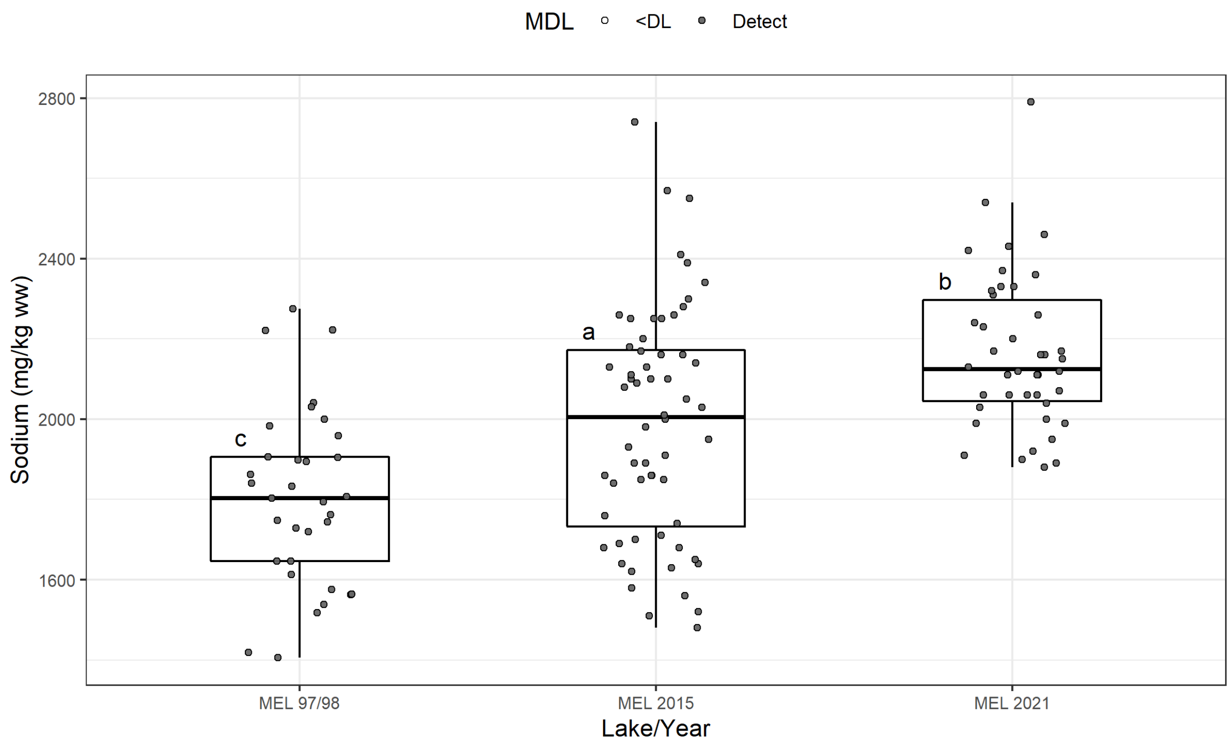


Figure I2-22. Strontium in Lake Trout kidney tissue

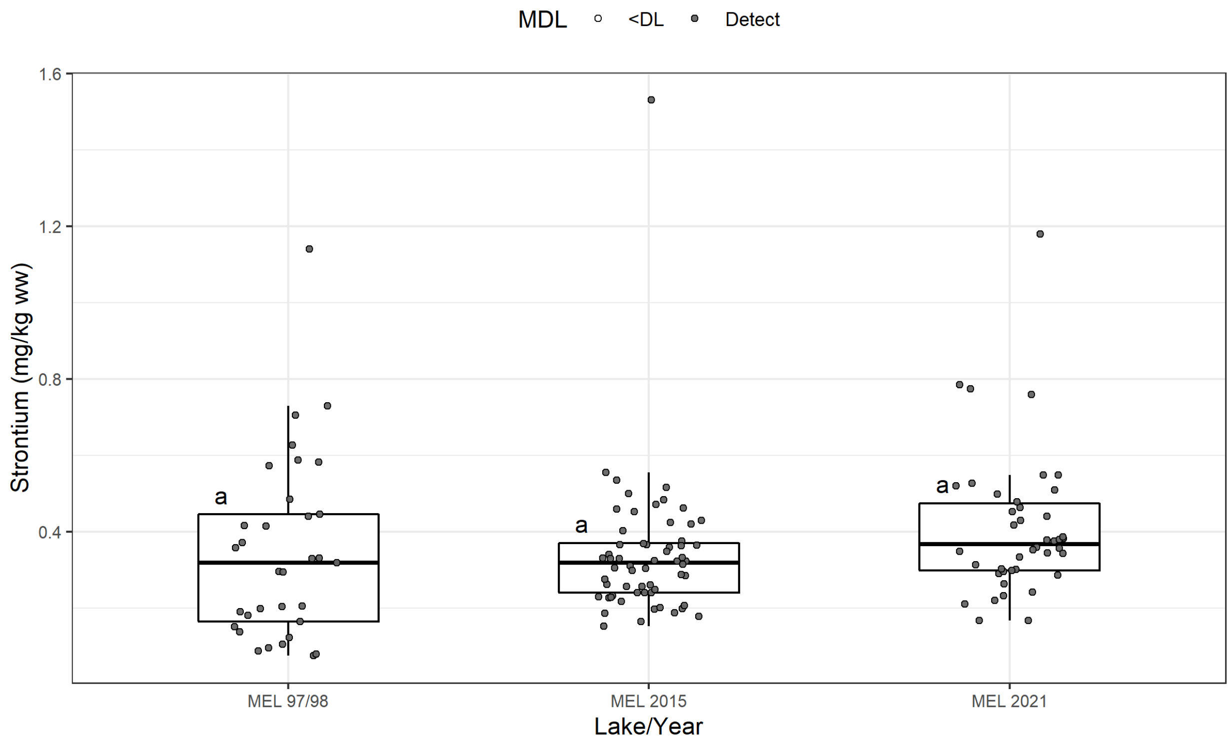


Figure I2-23. Titanium in Lake Trout kidney tissue

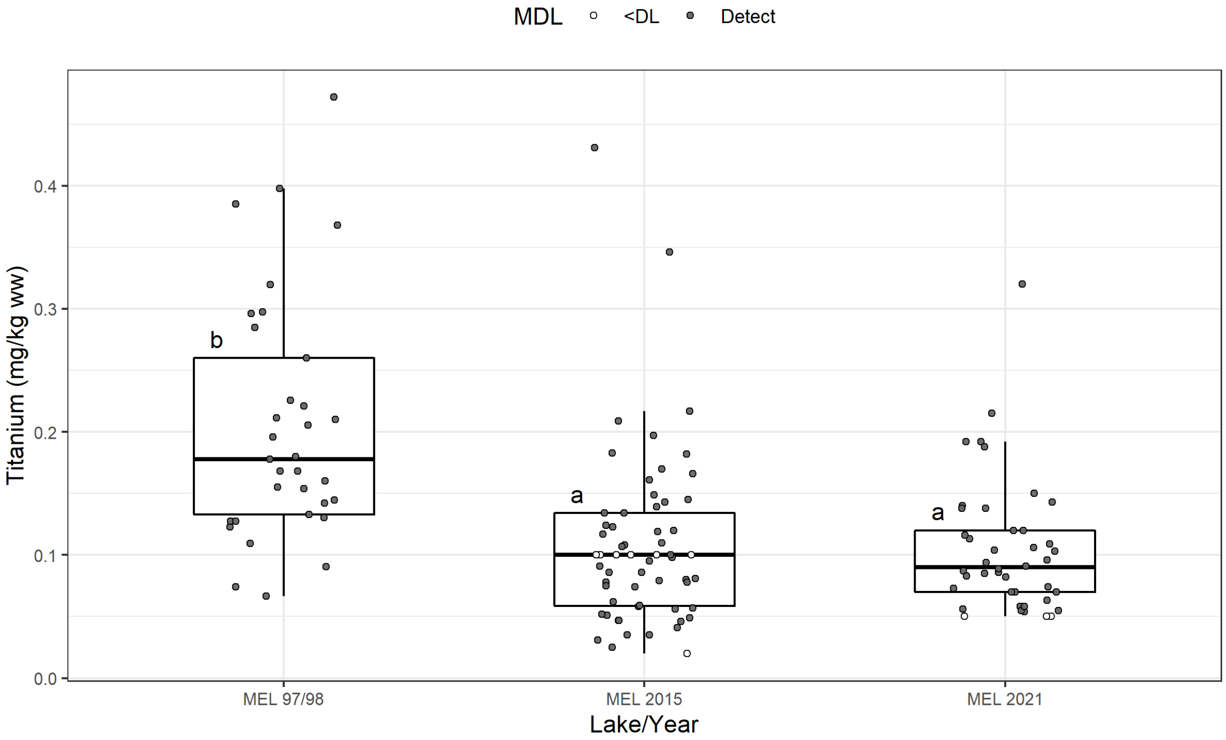
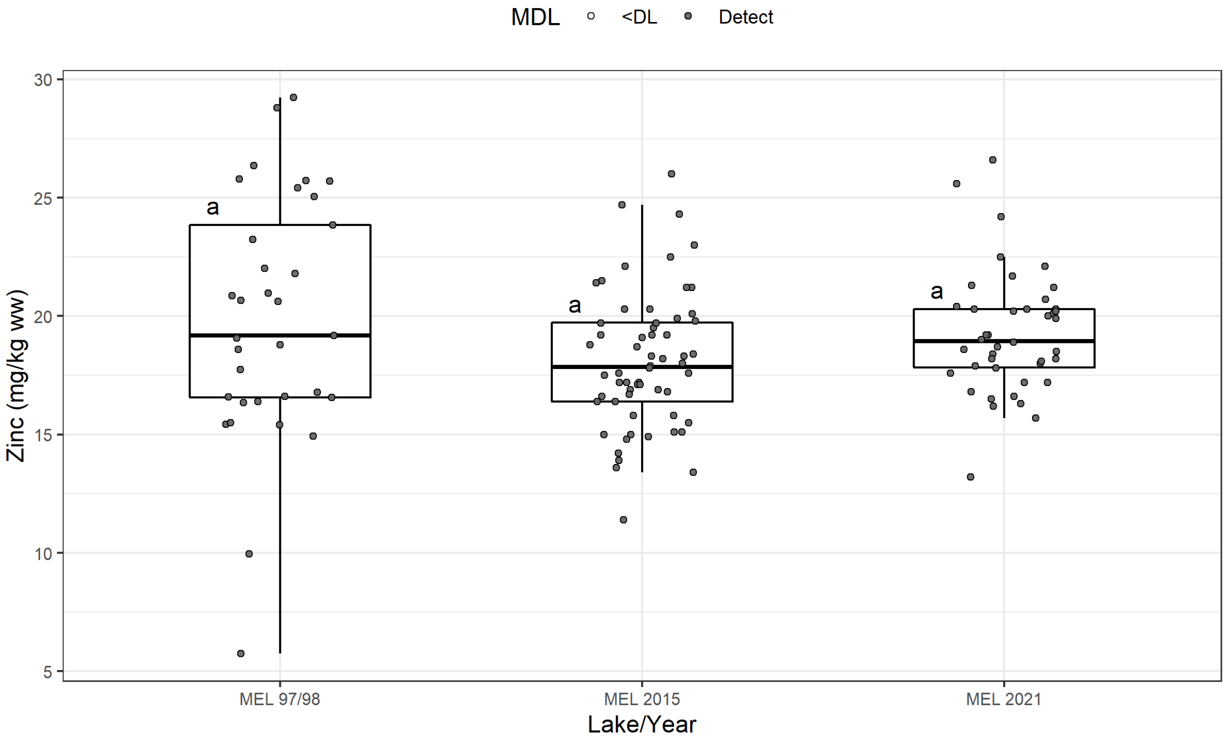


Figure I2-24. Zinc in Lake Trout kidney tissue



LAKE TROUT LIVER TISSUE CHEMISTRY COMPARISONS

Figure I2-25. Aluminum in Lake Trout liver tissue

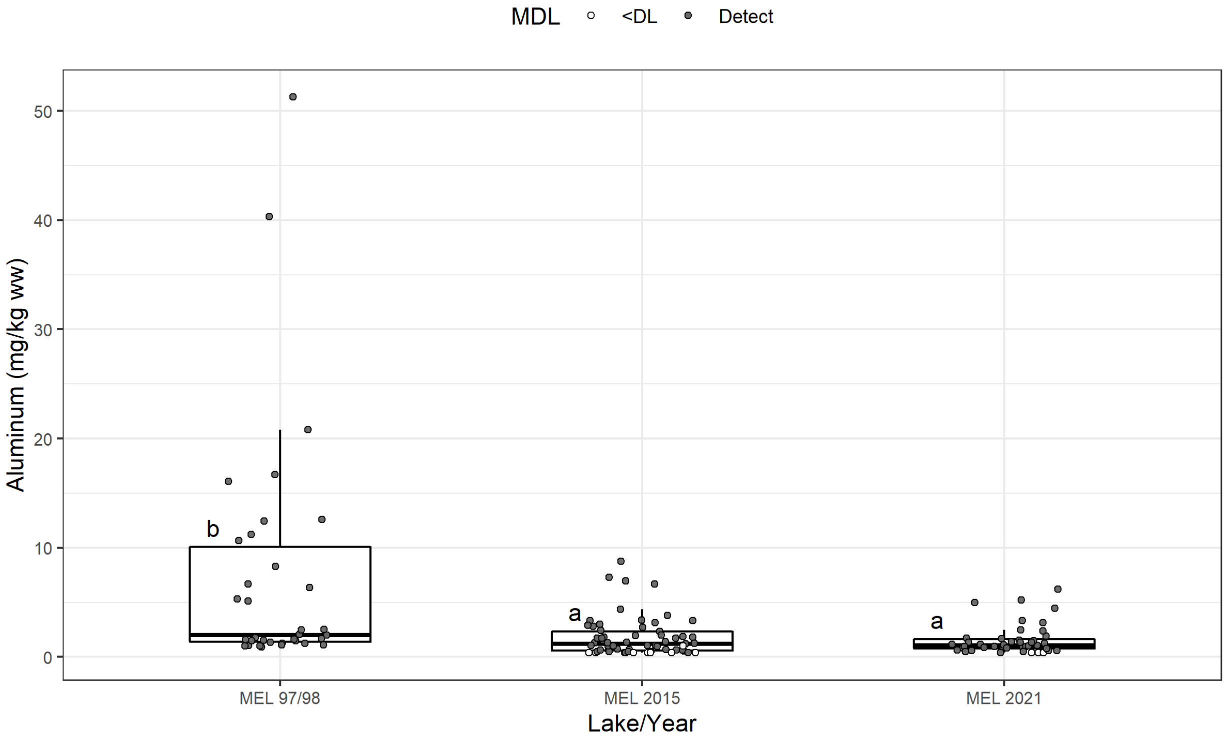


Figure I2-26. Arsenic in Lake Trout liver tissue

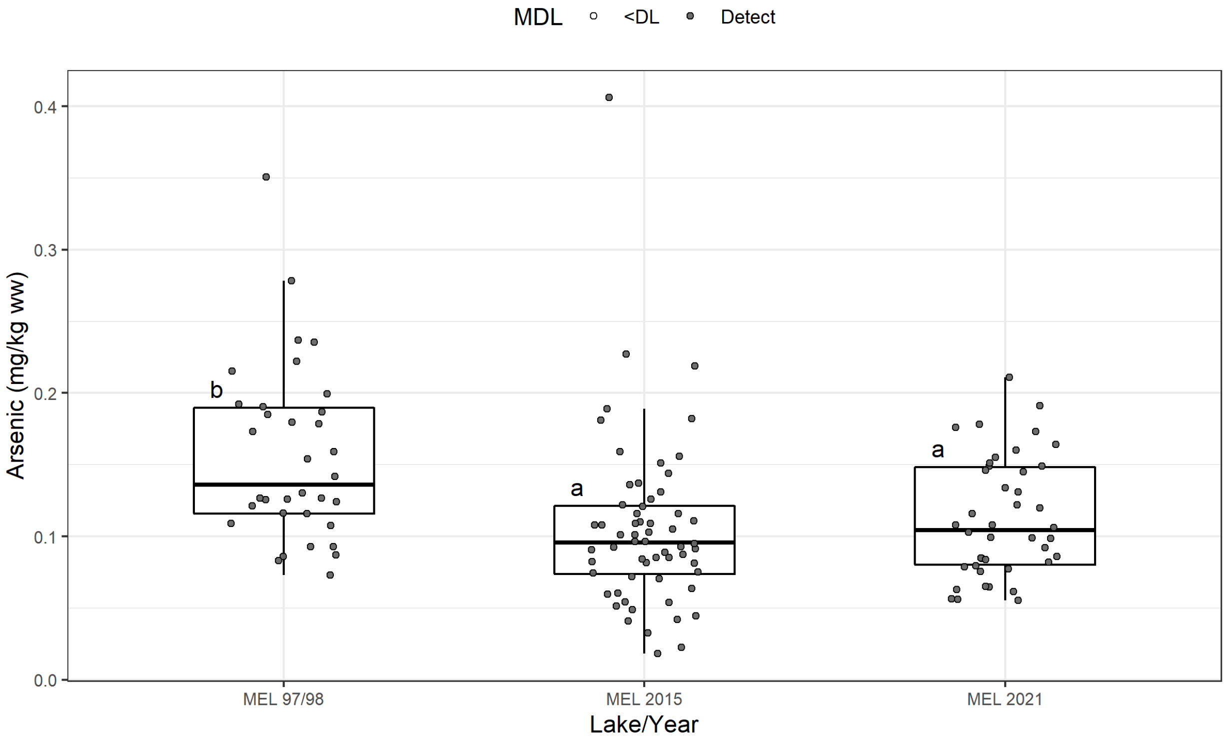


Figure I2-27. Barium in Lake Trout liver tissue

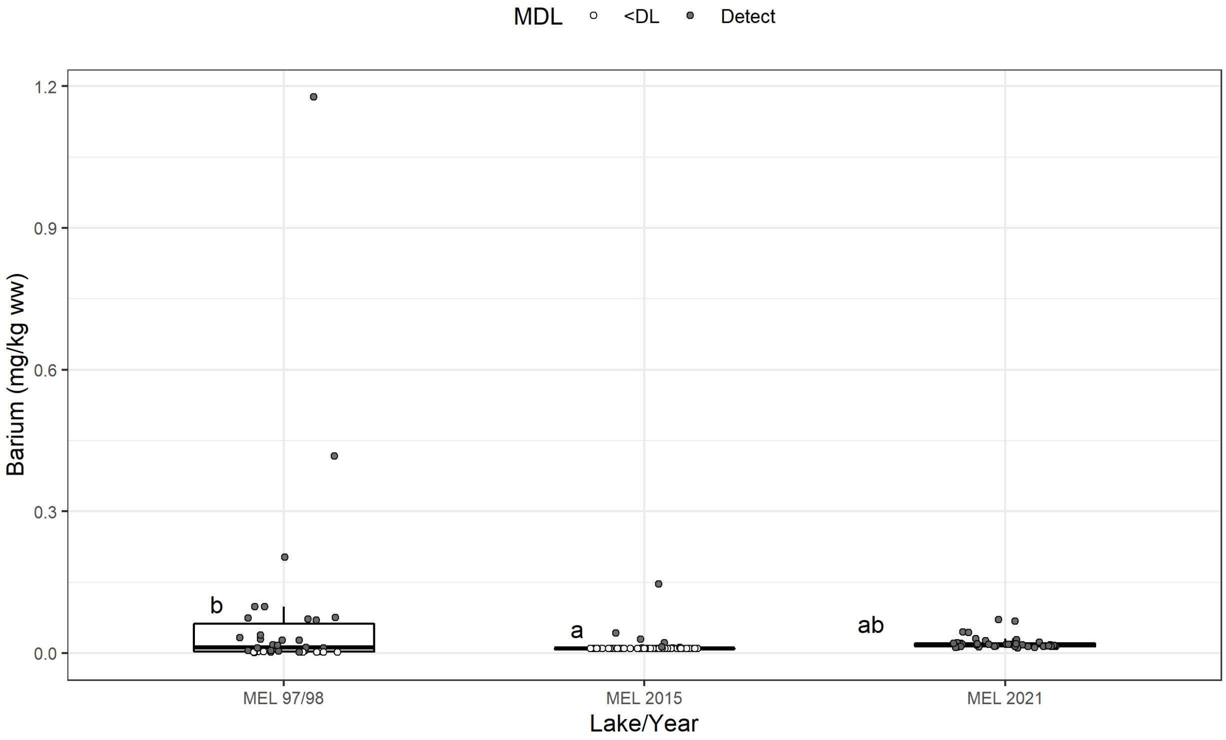


Figure I2-28. Cadmium in Lake Trout liver tissue

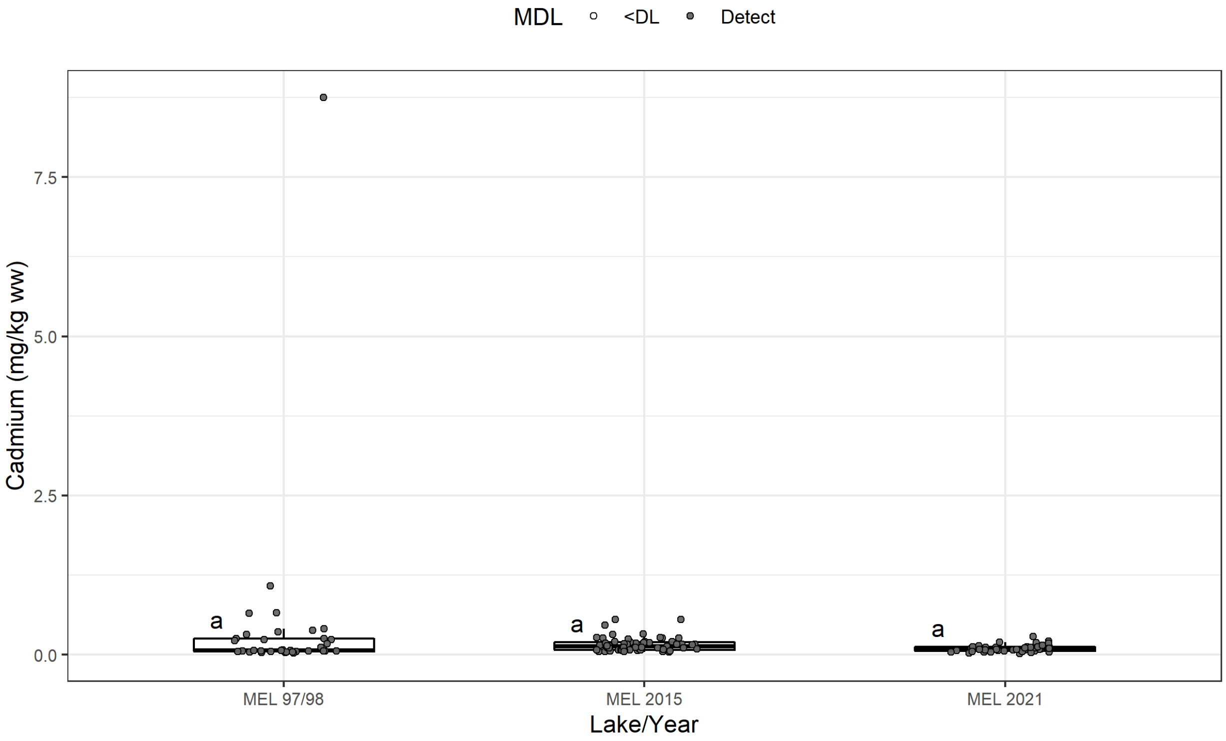


Figure I2-29. Calcium in Lake Trout liver tissue

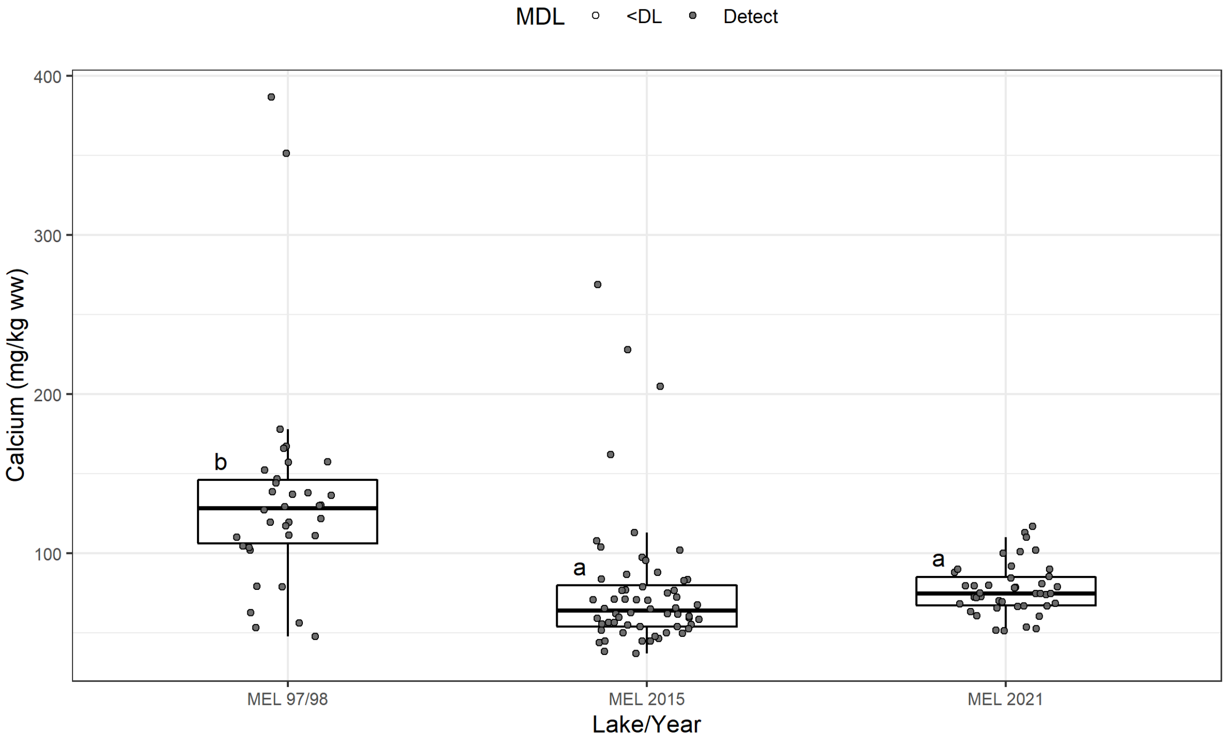


Figure I2-30. Cobalt in Lake Trout liver tissue

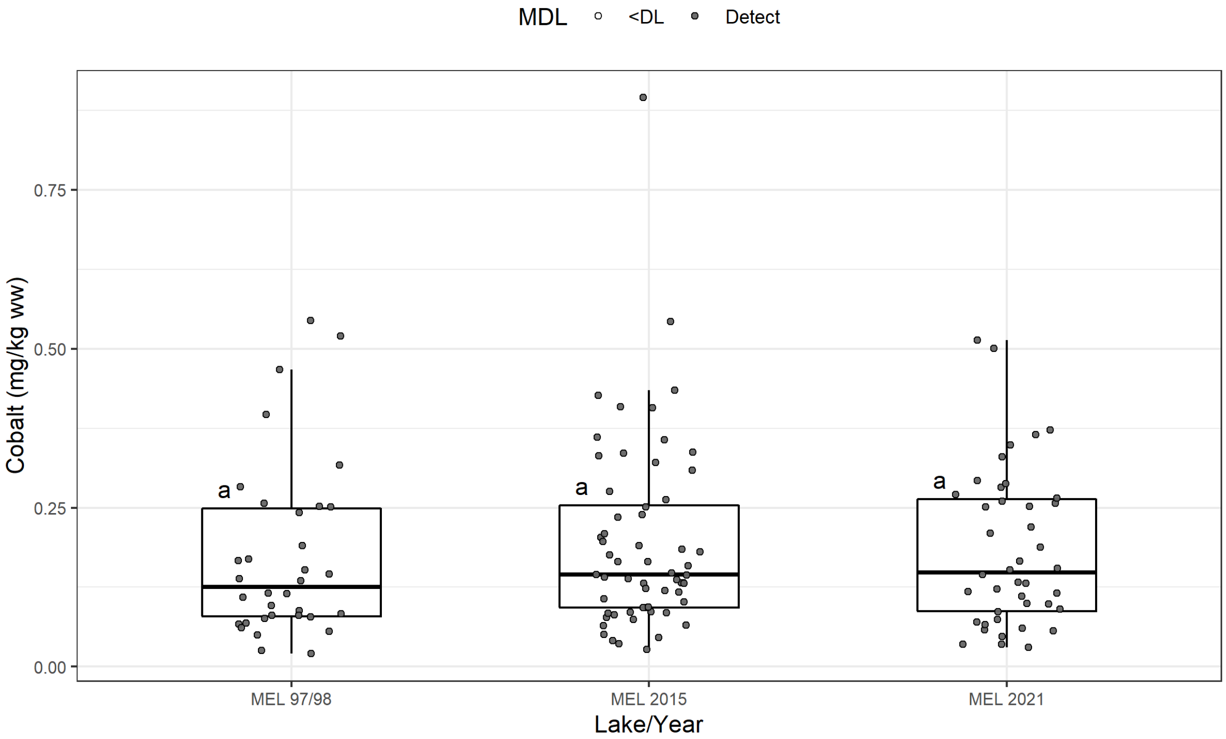


Figure I2-31. Copper in Lake Trout liver tissue

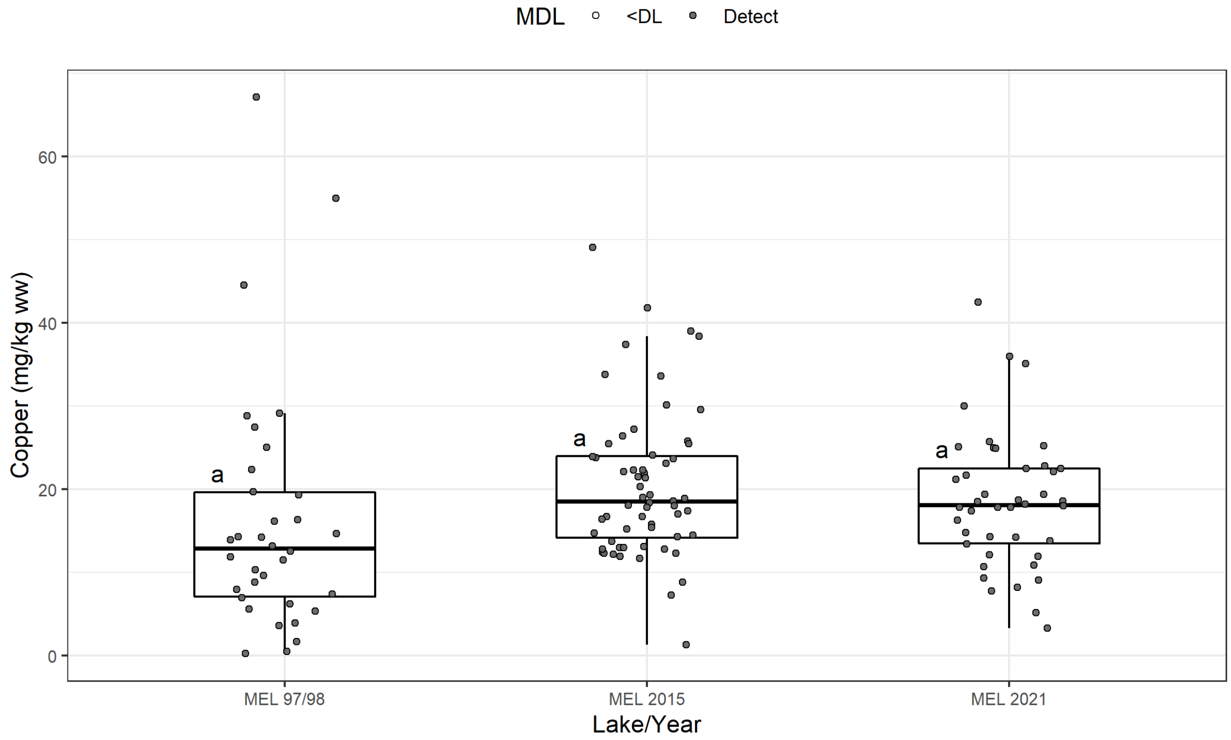


Figure I2-32. Iron in Lake Trout liver tissue

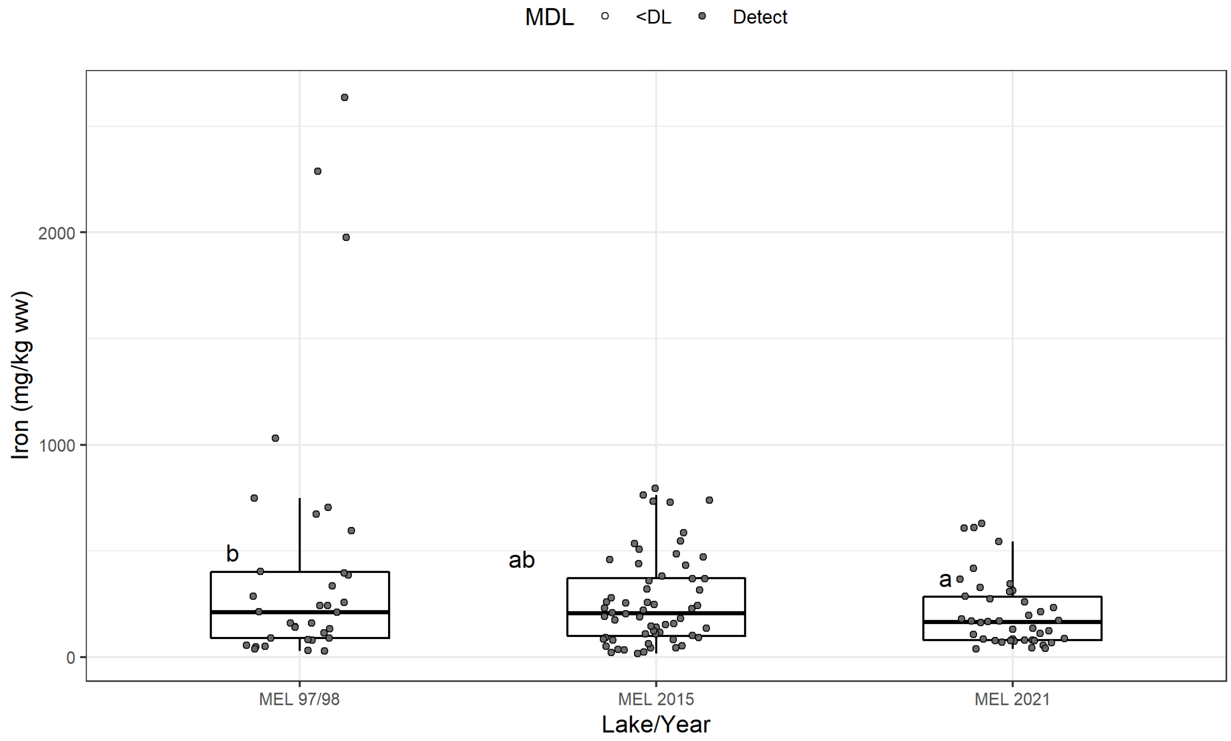


Figure I2-33. Magnesium in Lake Trout liver tissue

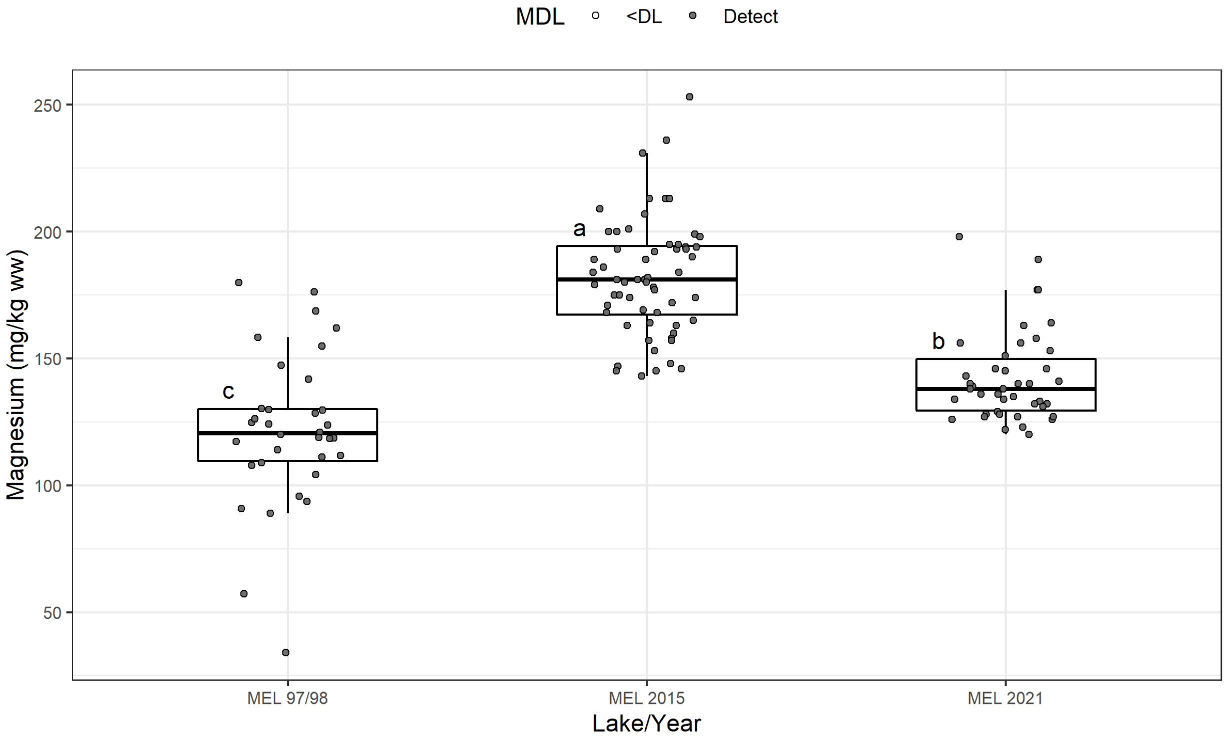


Figure I2-34. Manganese in Lake Trout liver tissue

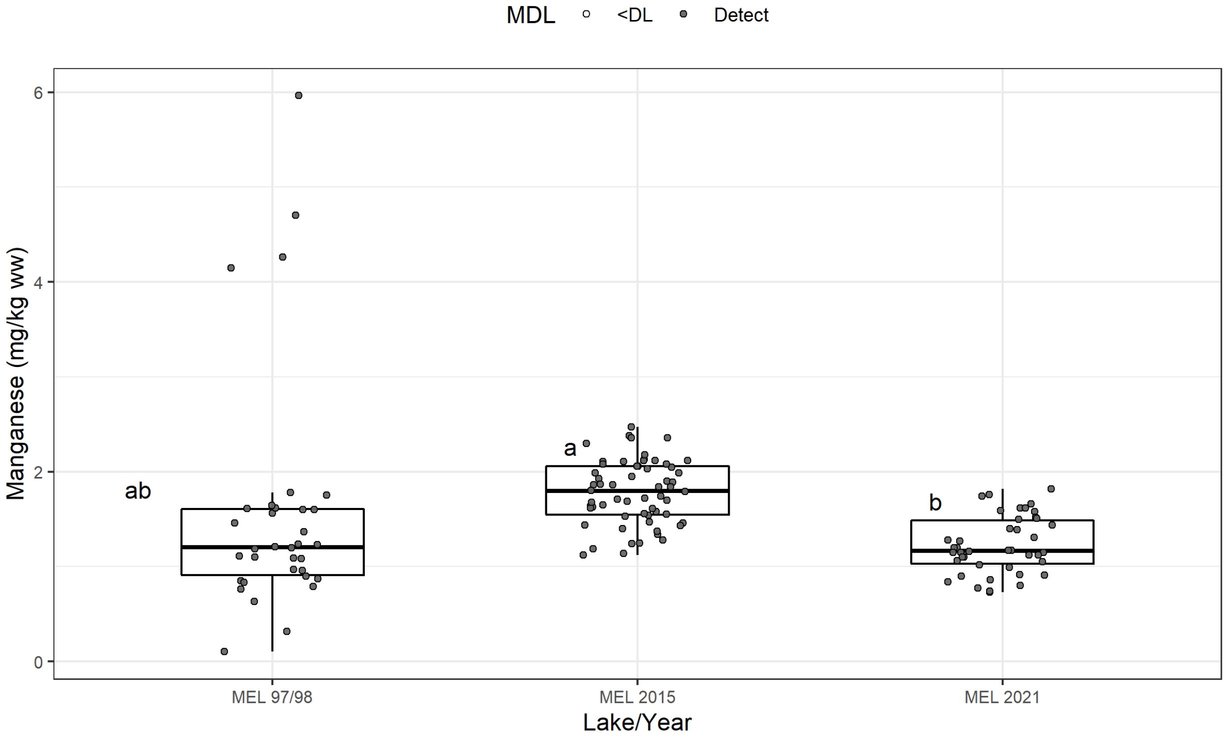


Figure I2-35. Mercury in Lake Trout liver tissue

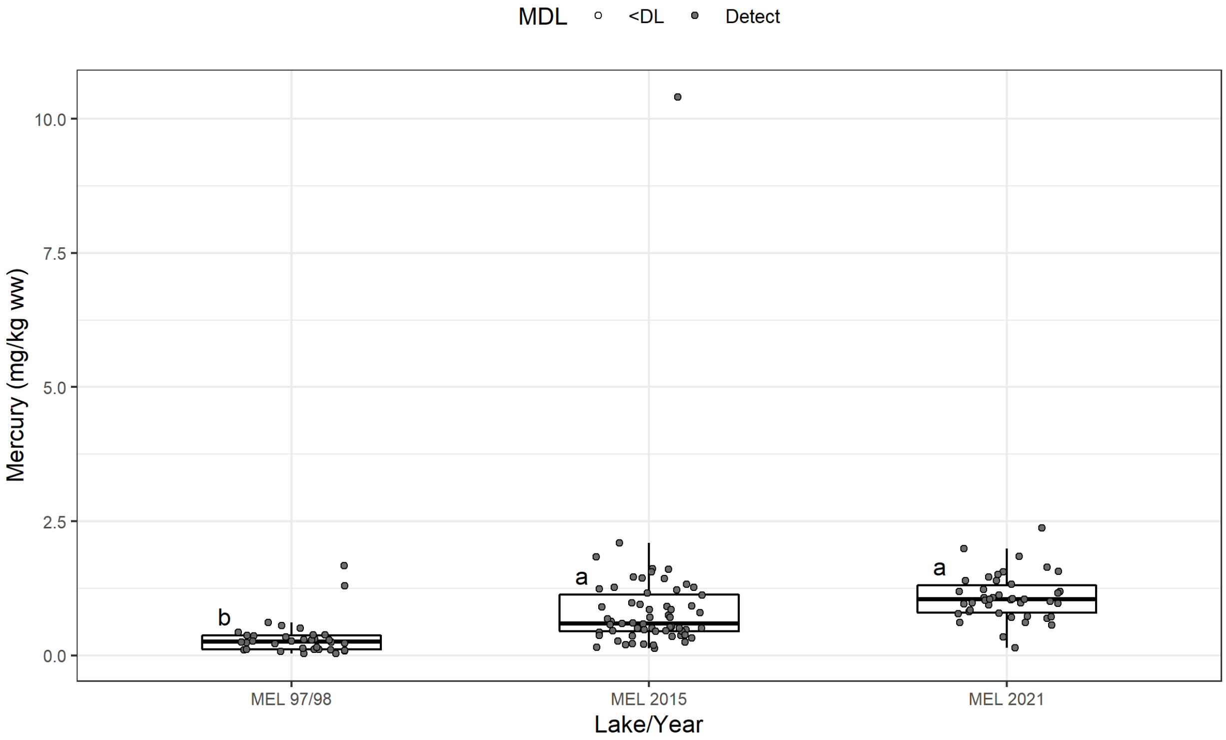


Figure I2-36. Moisture in Lake Trout liver tissue

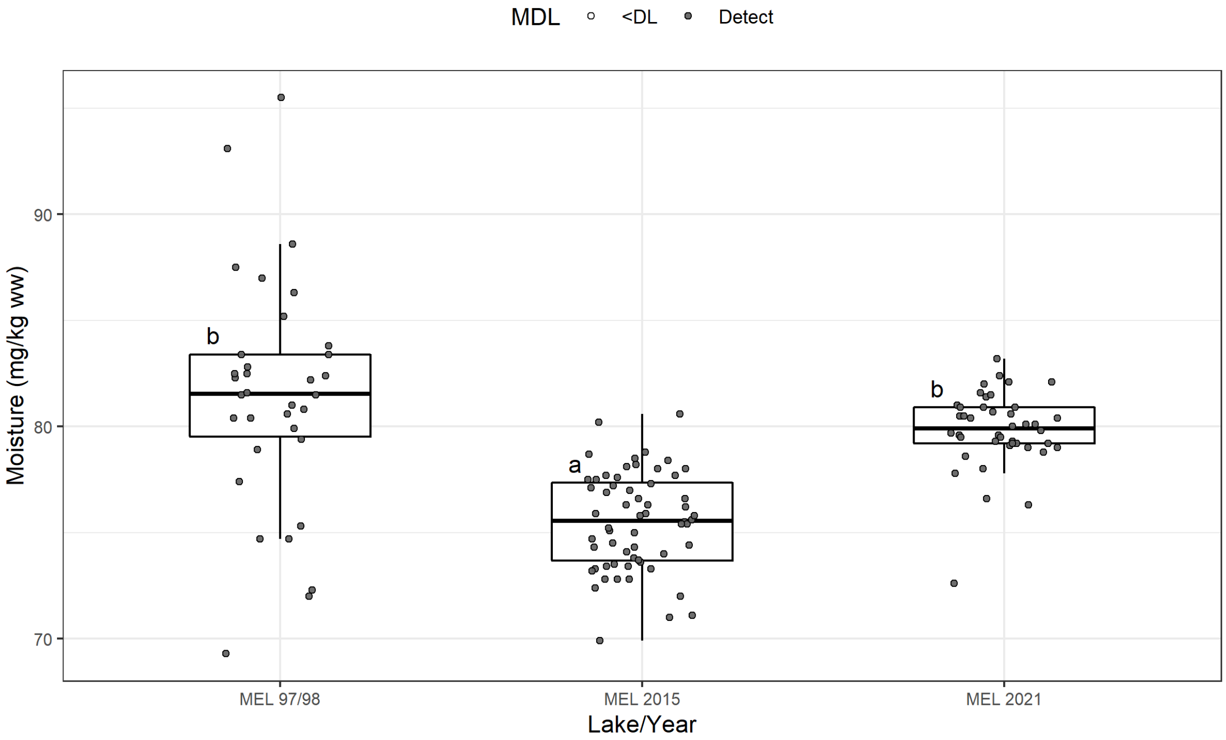


Figure I2-37. Molybdenum in Lake Trout liver tissue

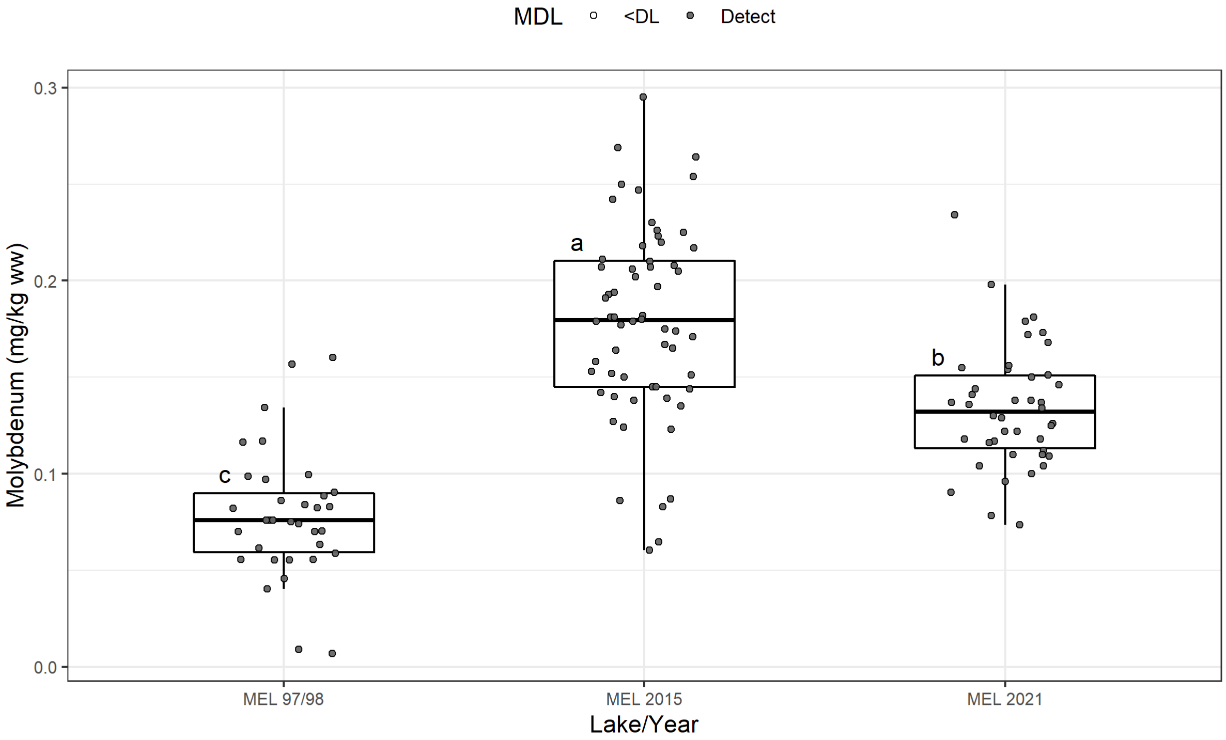


Figure I2-38. Phosphorus in Lake Trout liver tissue

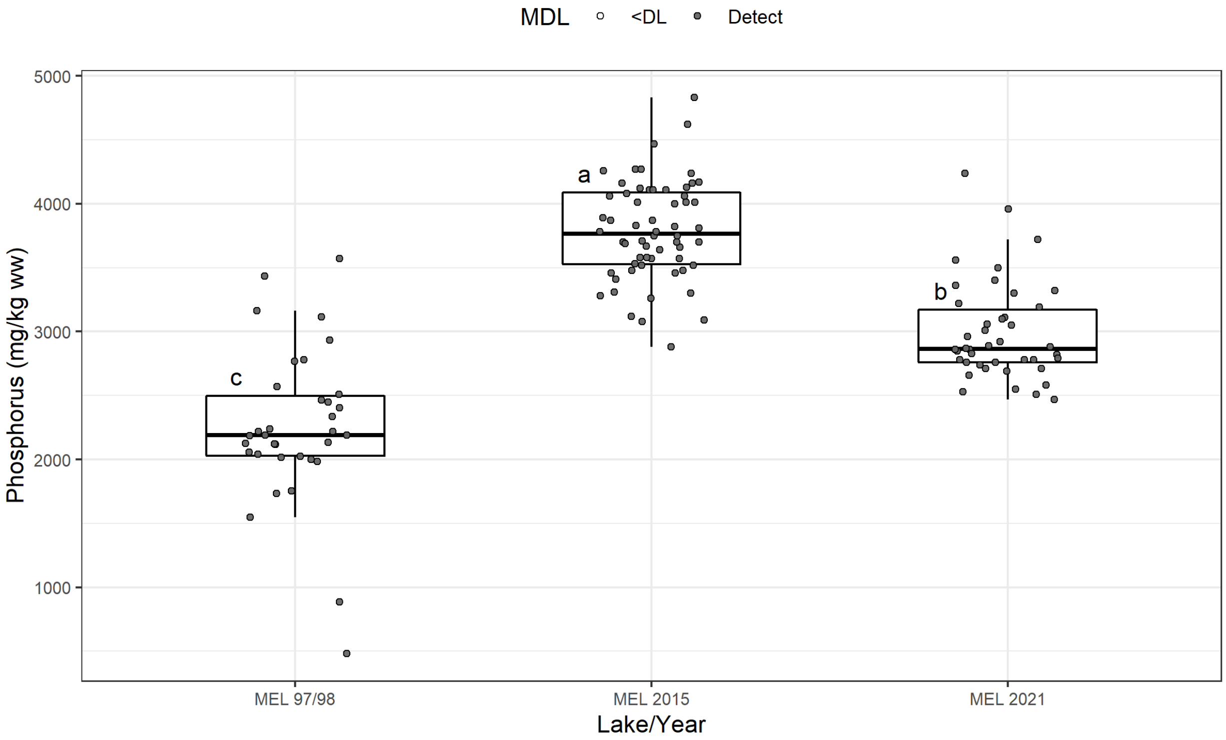


Figure I2-39. Potassium in Lake Trout liver tissue

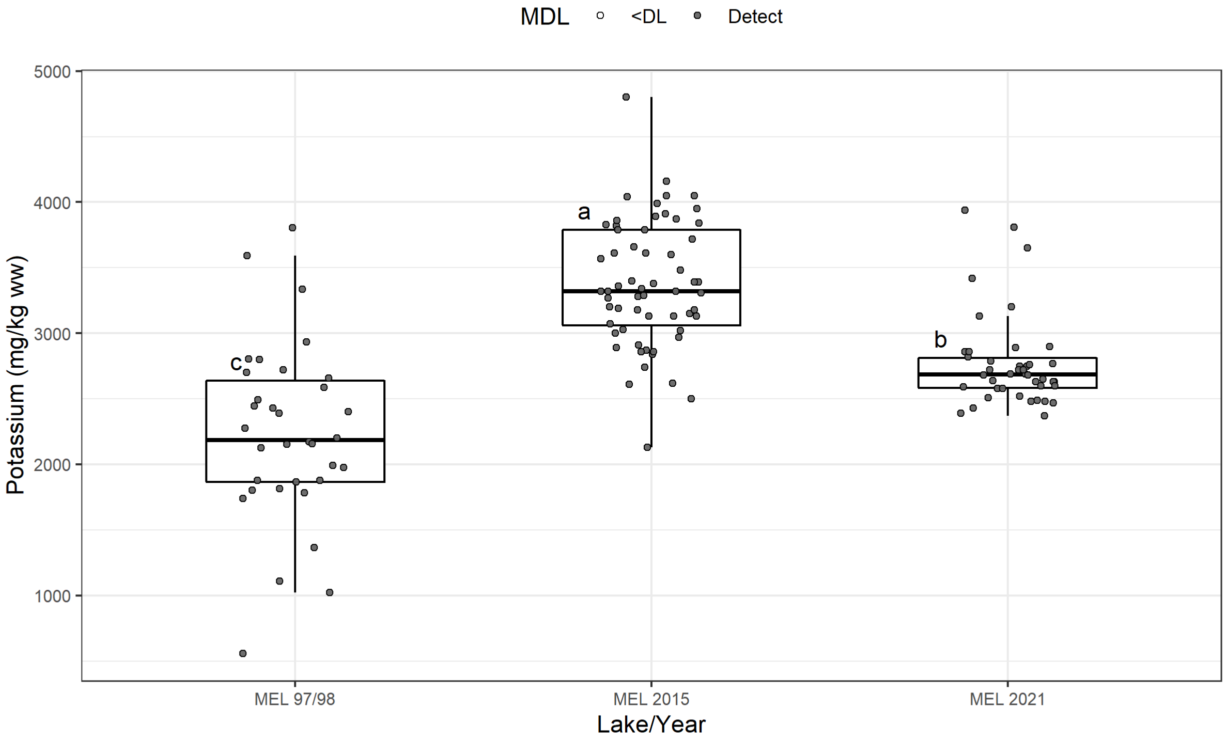


Figure I2-40. Silver in Lake Trout liver tissue

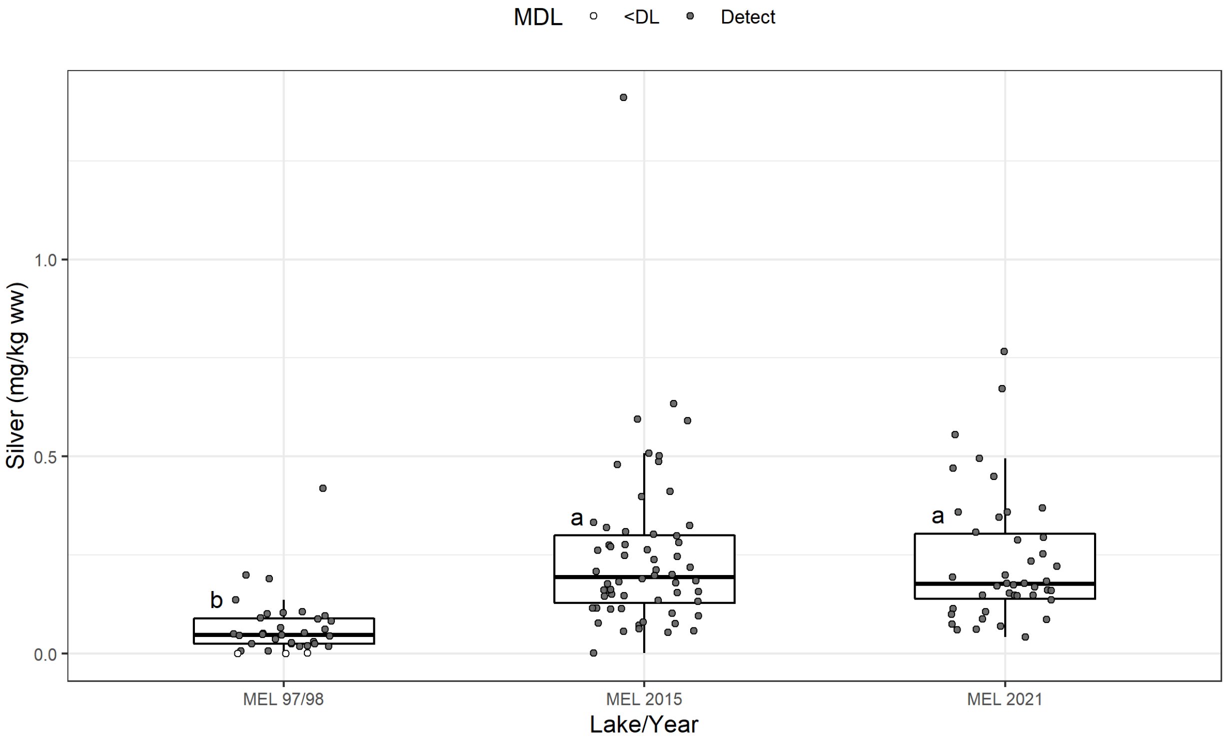


Figure I2-41. Sodium in Lake Trout liver tissue

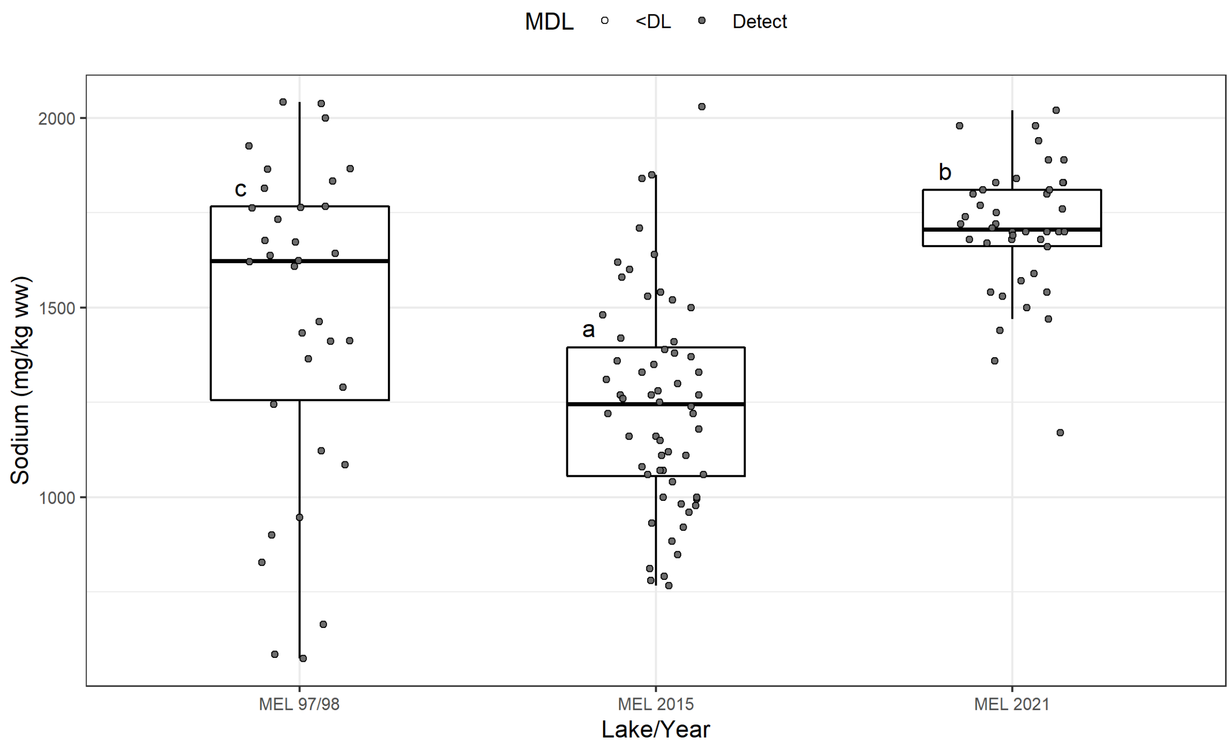


Figure I2-42. Strontium in Lake Trout liver tissue

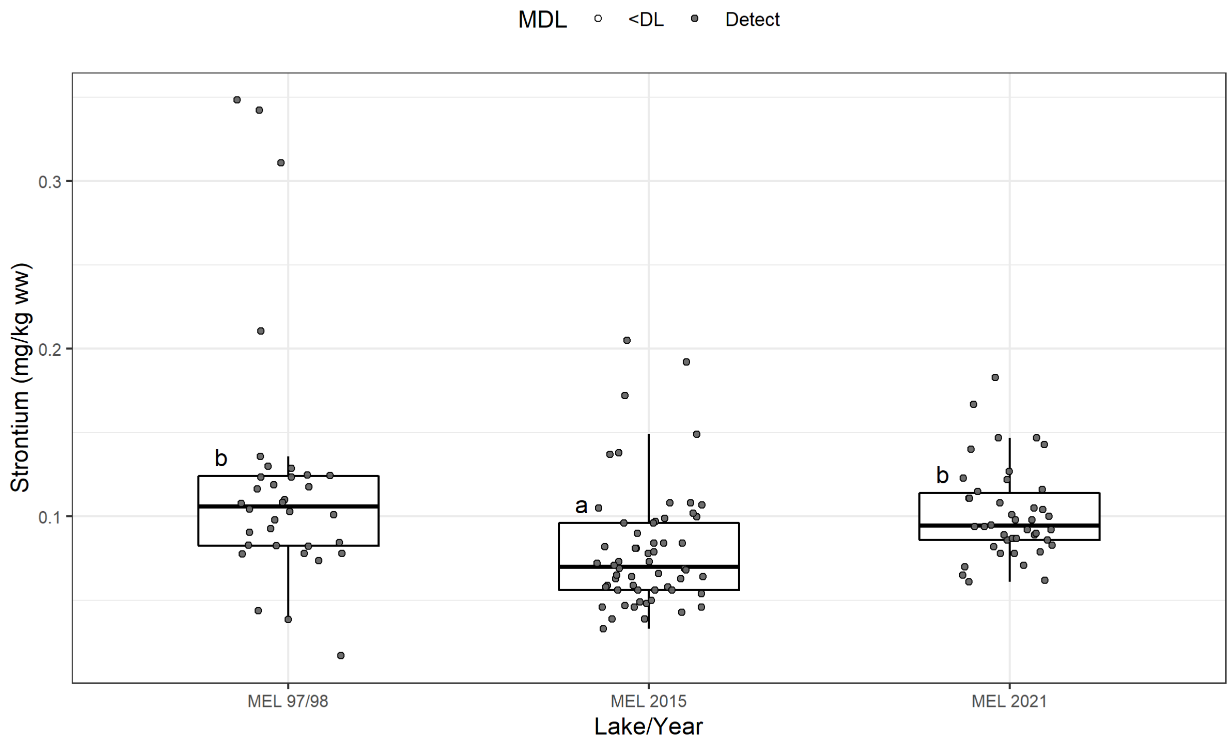


Figure I2-43. Vanadium in Lake Trout liver tissue

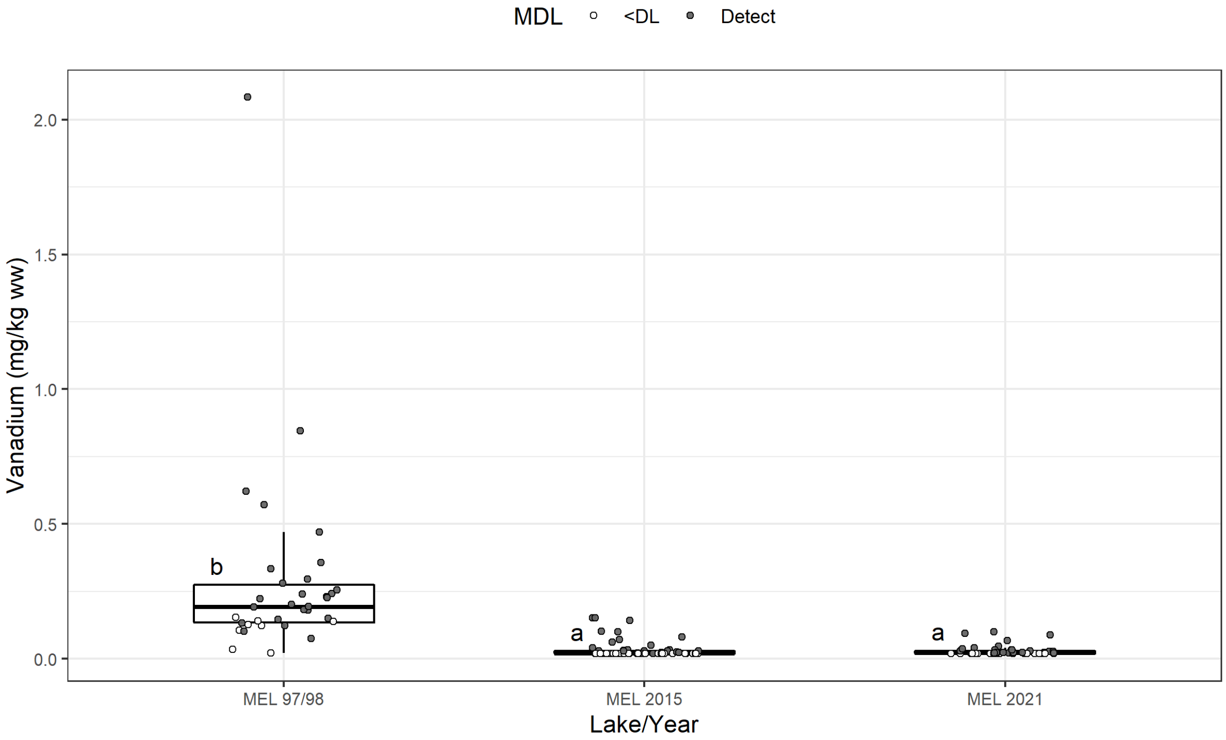
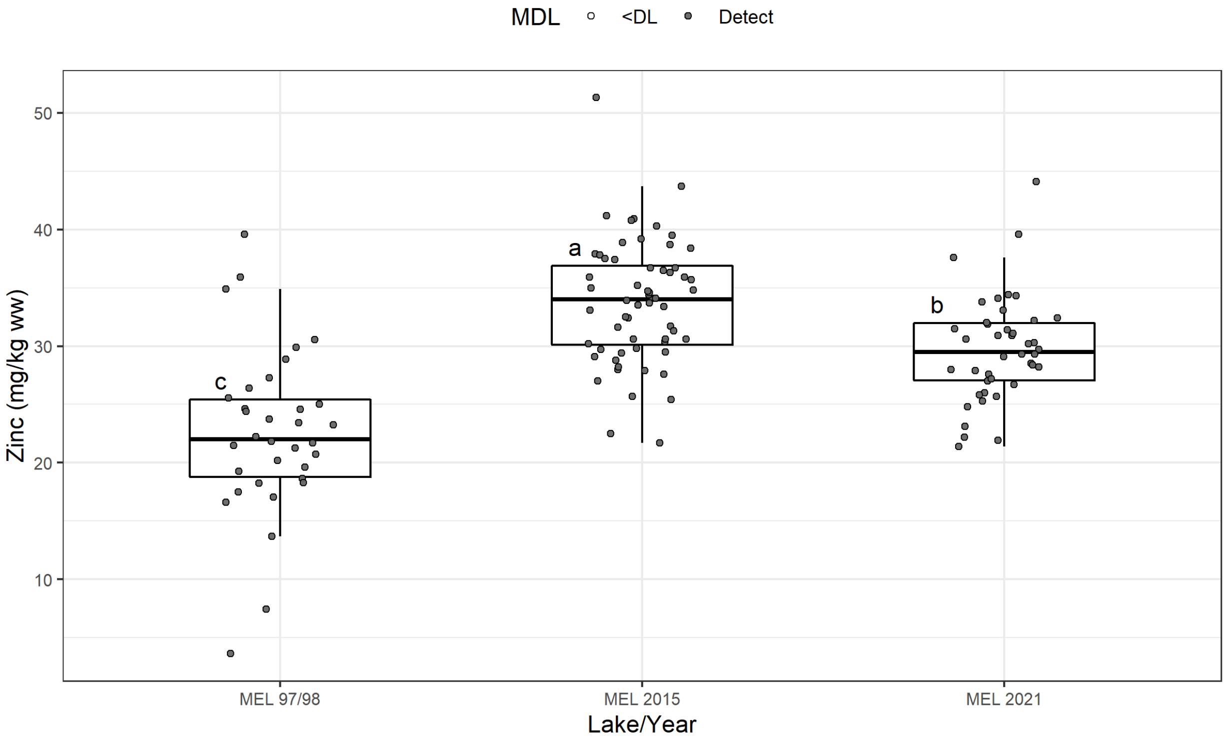


Figure I2-44. Zinc in Lake Trout liver tissue



LAKE TROUT MUSCLE TISSUE CHEMISTRY COMPARISONS

Figure I2-45. Arsenic in Lake Trout muscle tissue

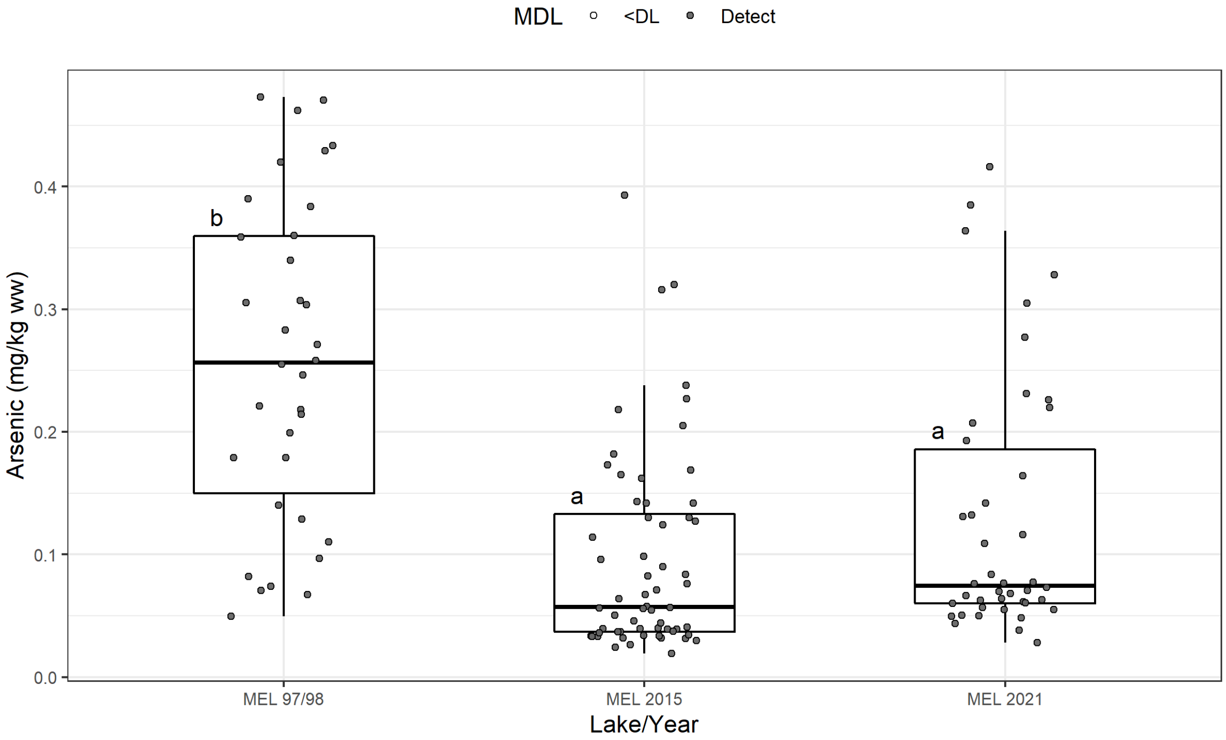


Figure I2-46. Barium in Lake Trout muscle tissue

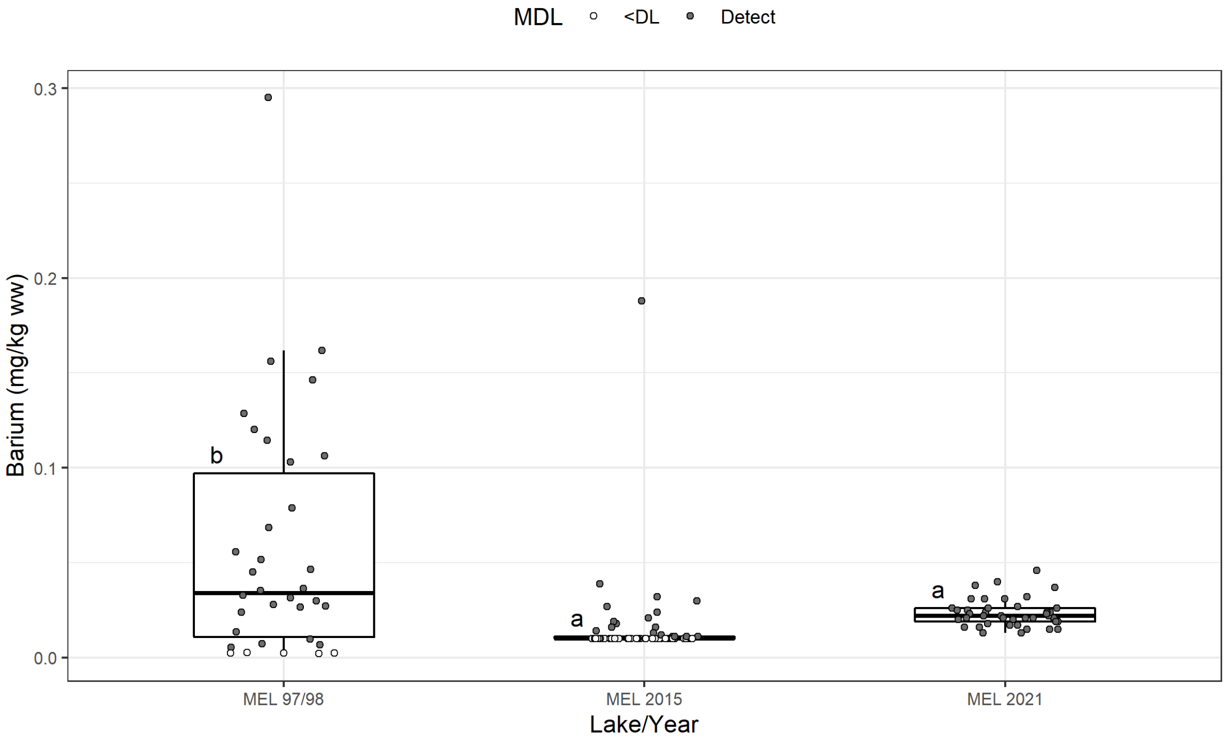


Figure I2-47. Calcium in Lake Trout muscle tissue

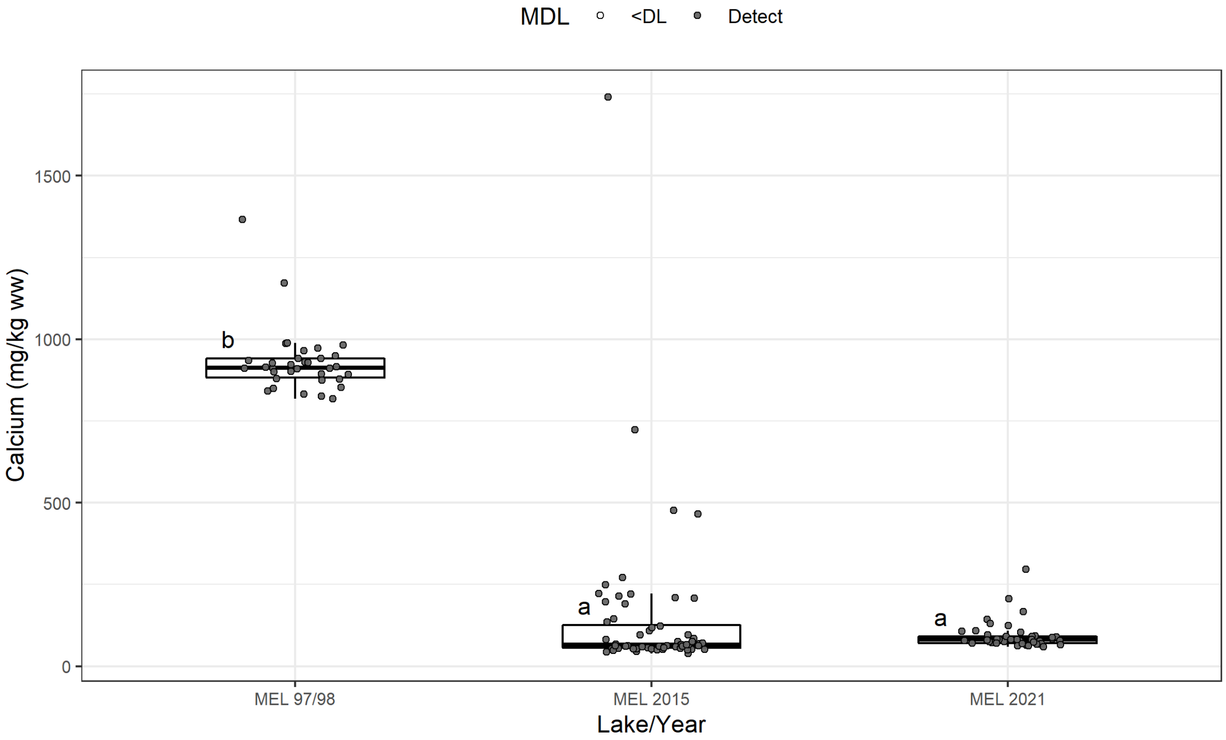


Figure I2-48. Copper in Lake Trout muscle tissue

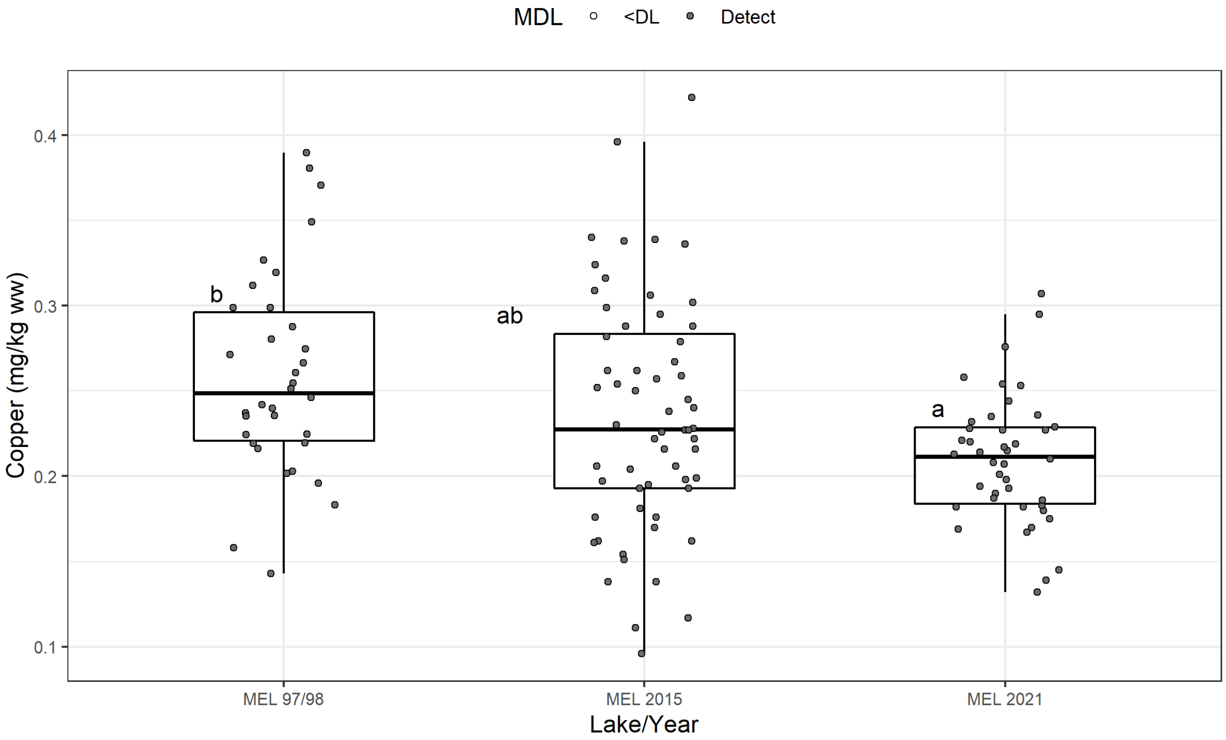


Figure I2-49. Iron in Lake Trout muscle tissue

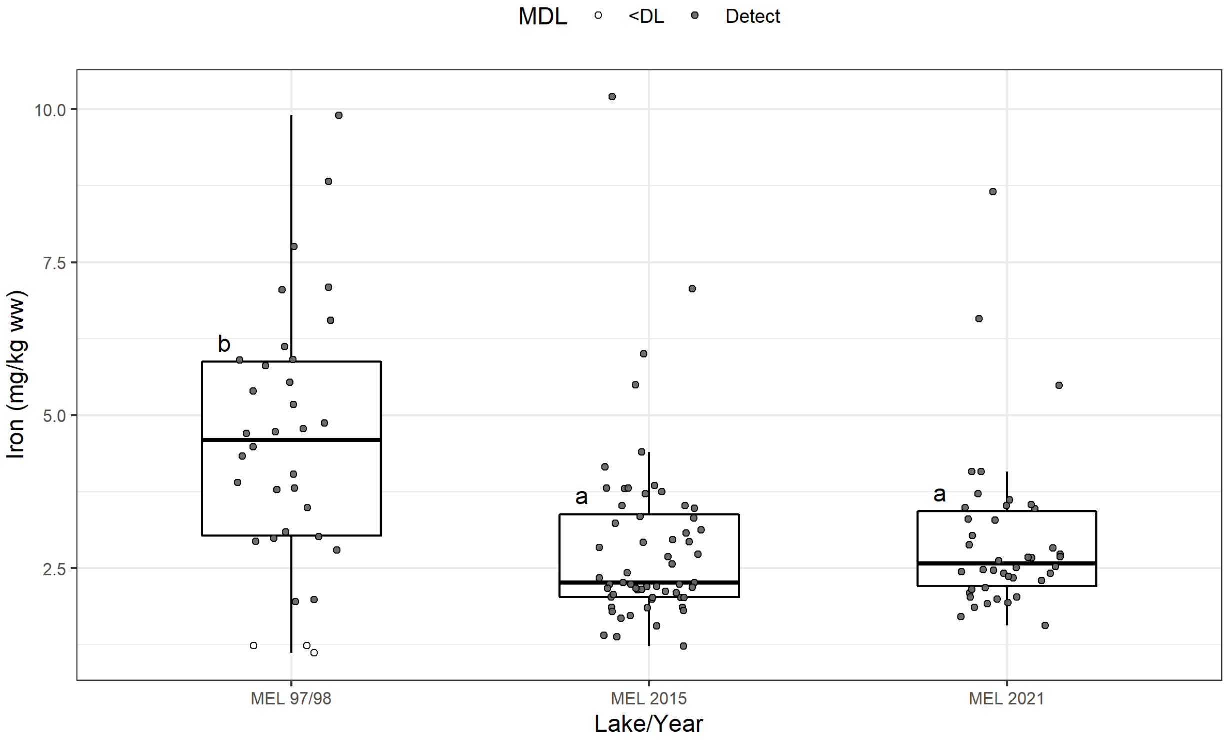


Figure I2-50. Magnesium in Lake Trout muscle tissue

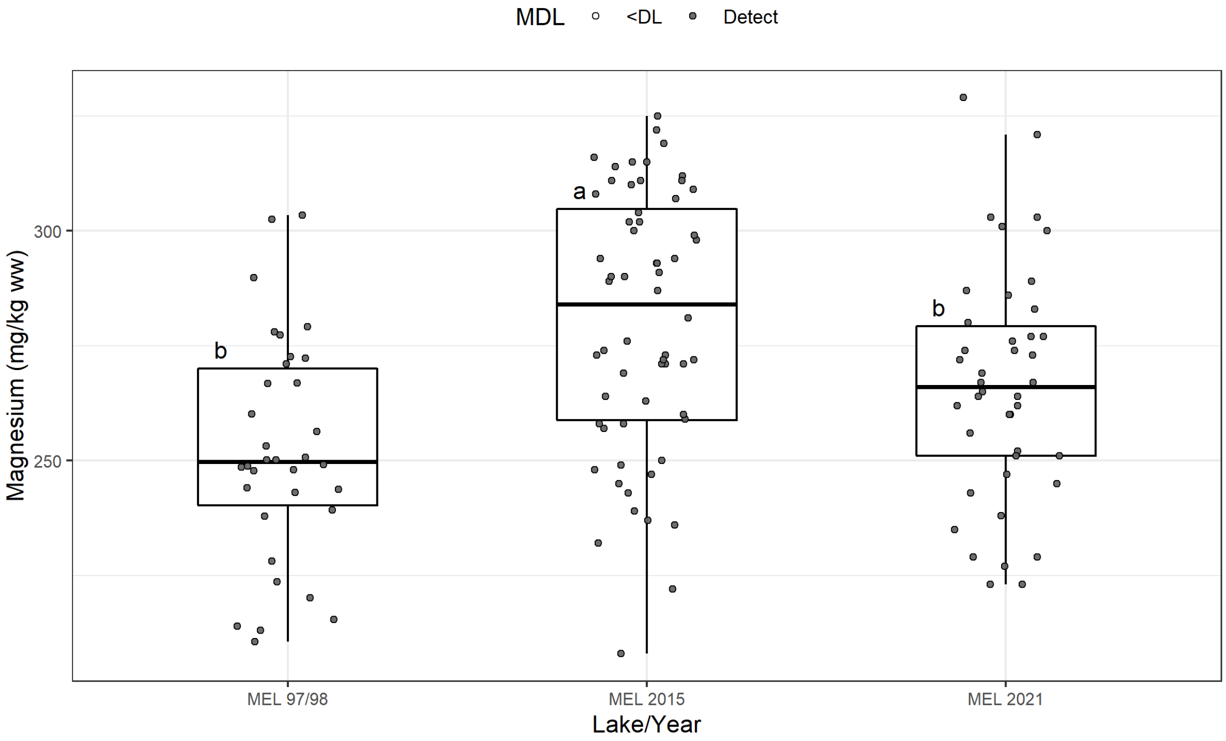


Figure I2-51. Manganese in Lake Trout muscle tissue

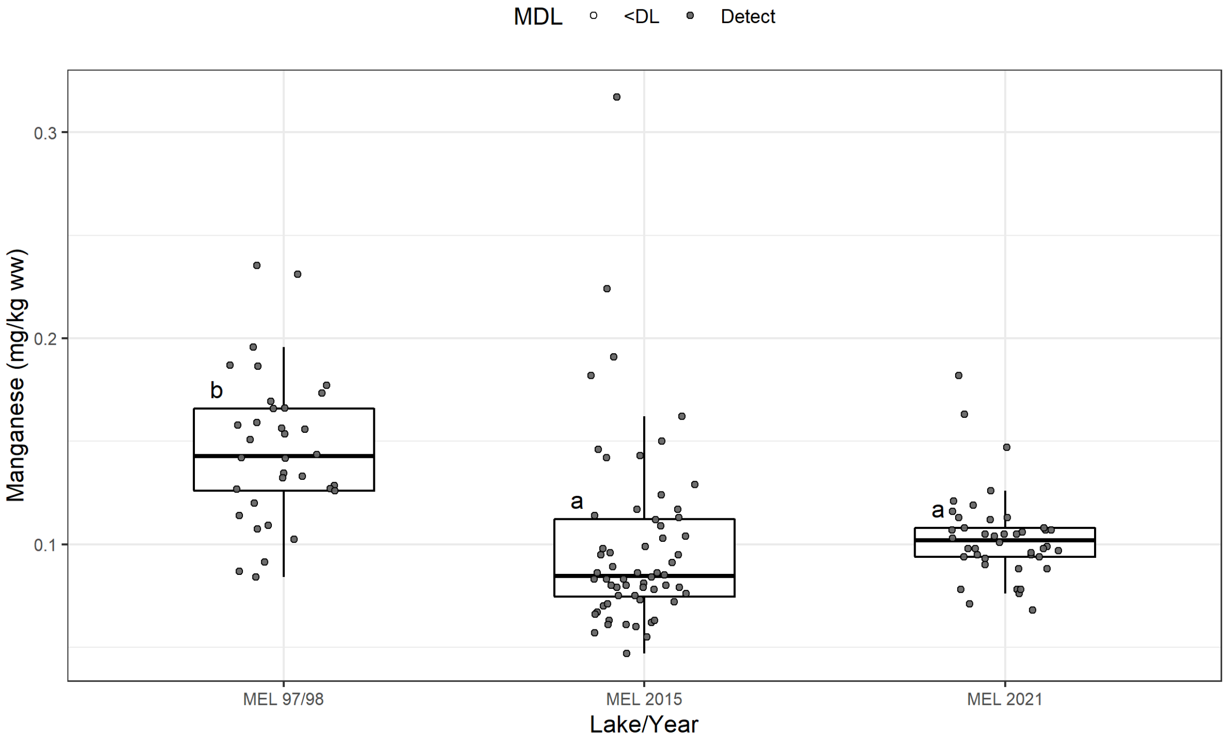


Figure I2-52. Mercury in Lake Trout muscle tissue

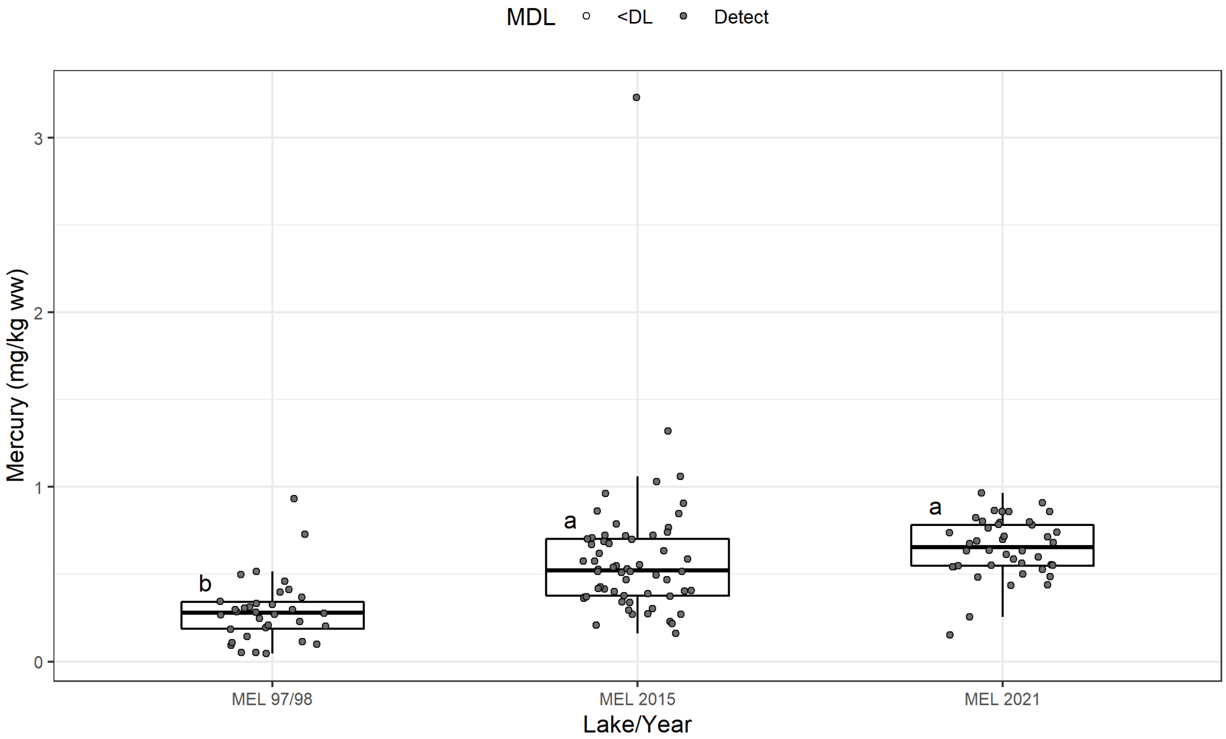


Figure I2-53. Moisture in Lake Trout muscle tissue

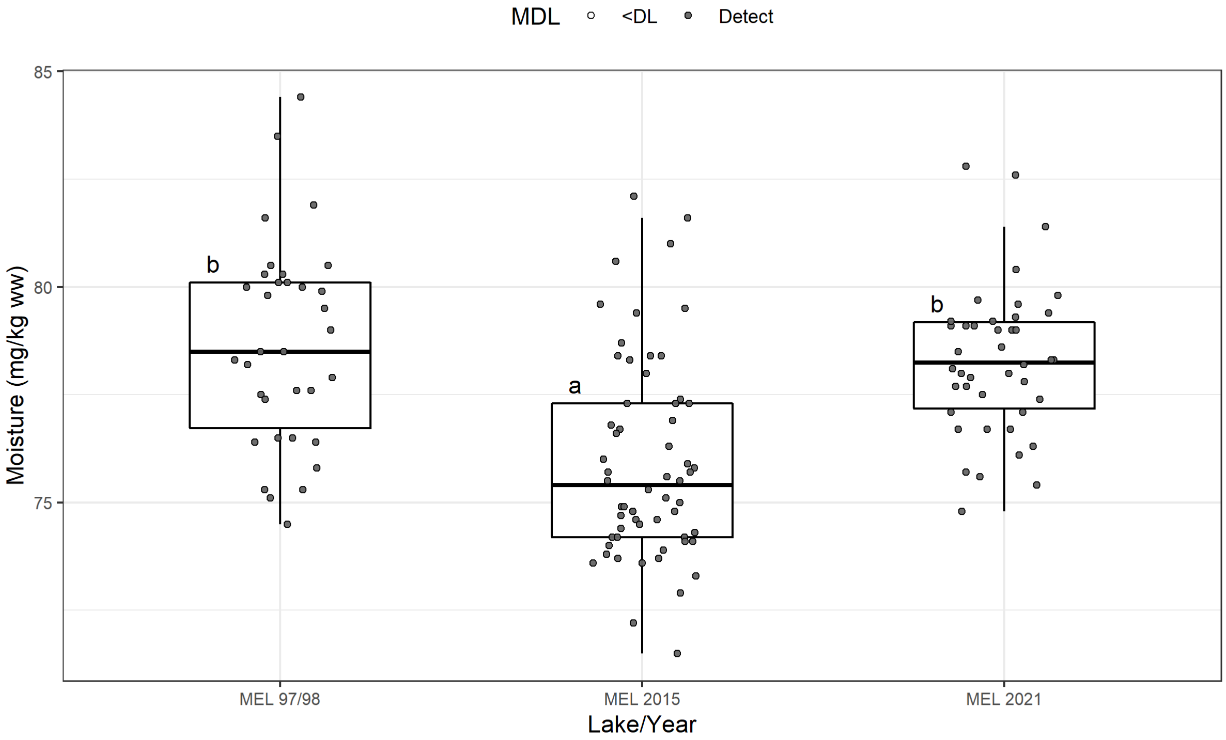


Figure I2-54. Phosphorus in Lake Trout muscle tissue

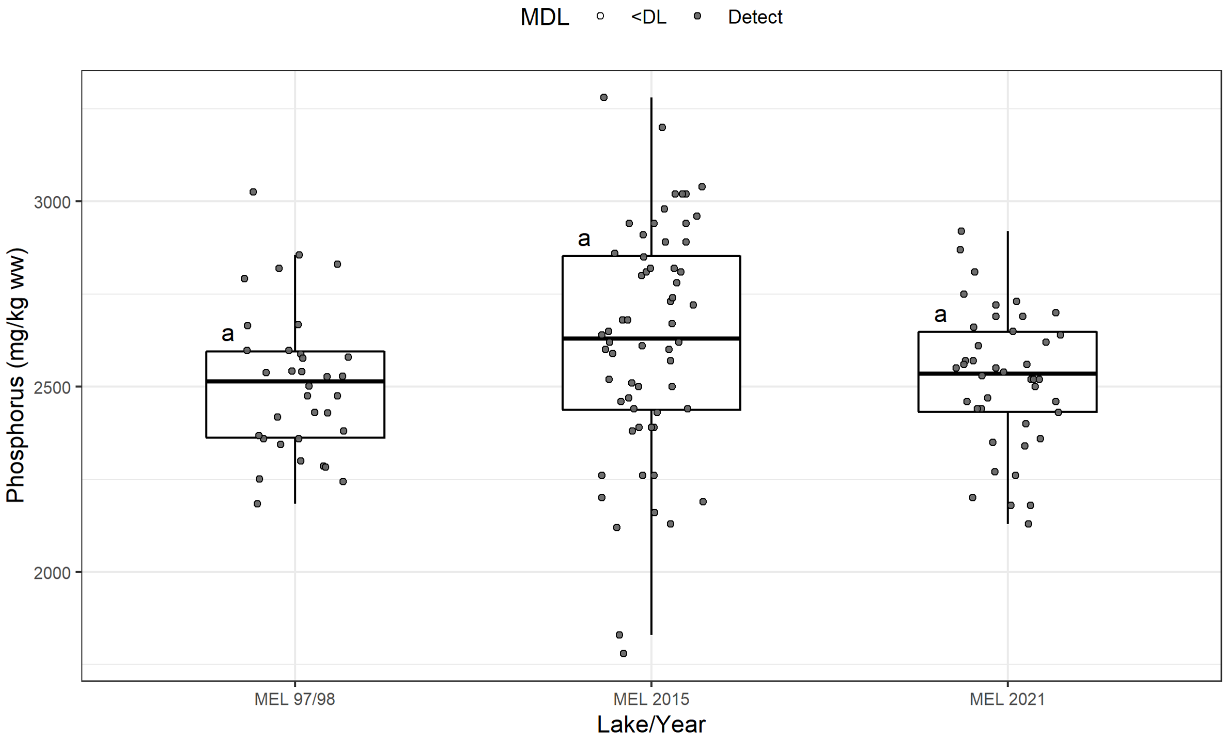


Figure I2-55. Potassium in Lake Trout muscle tissue

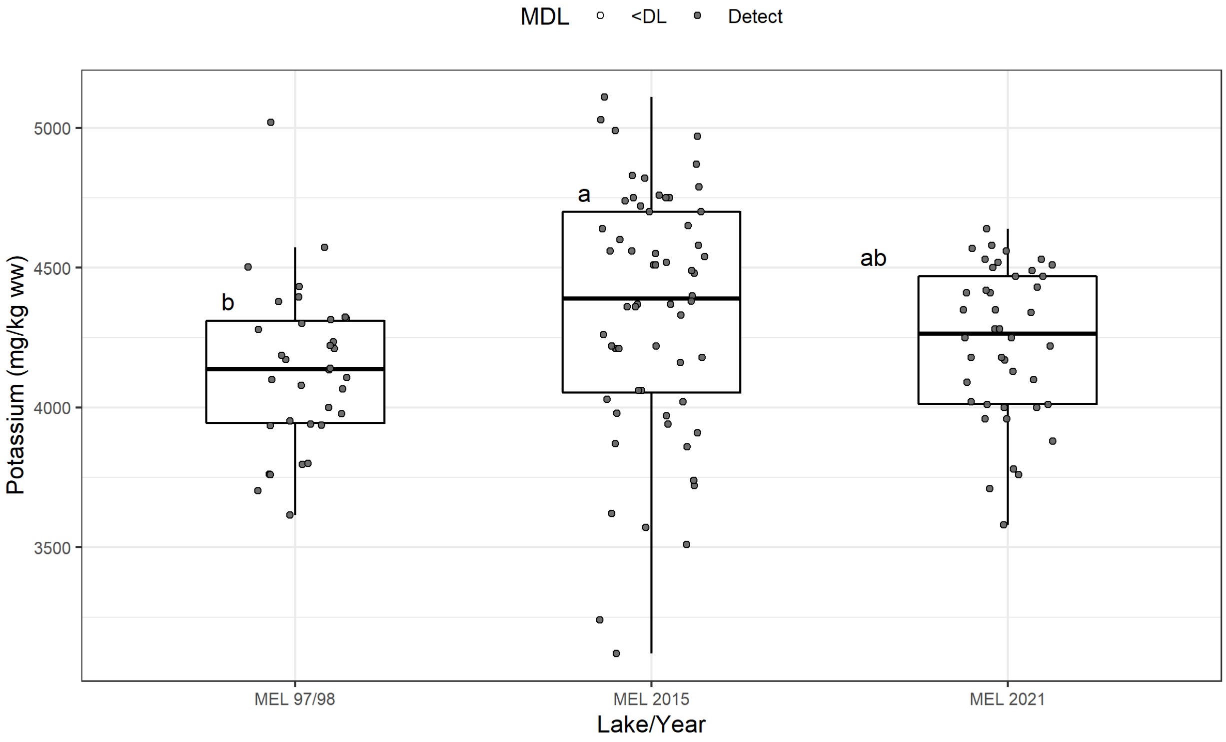


Figure I2-56. Sodium in Lake Trout muscle tissue

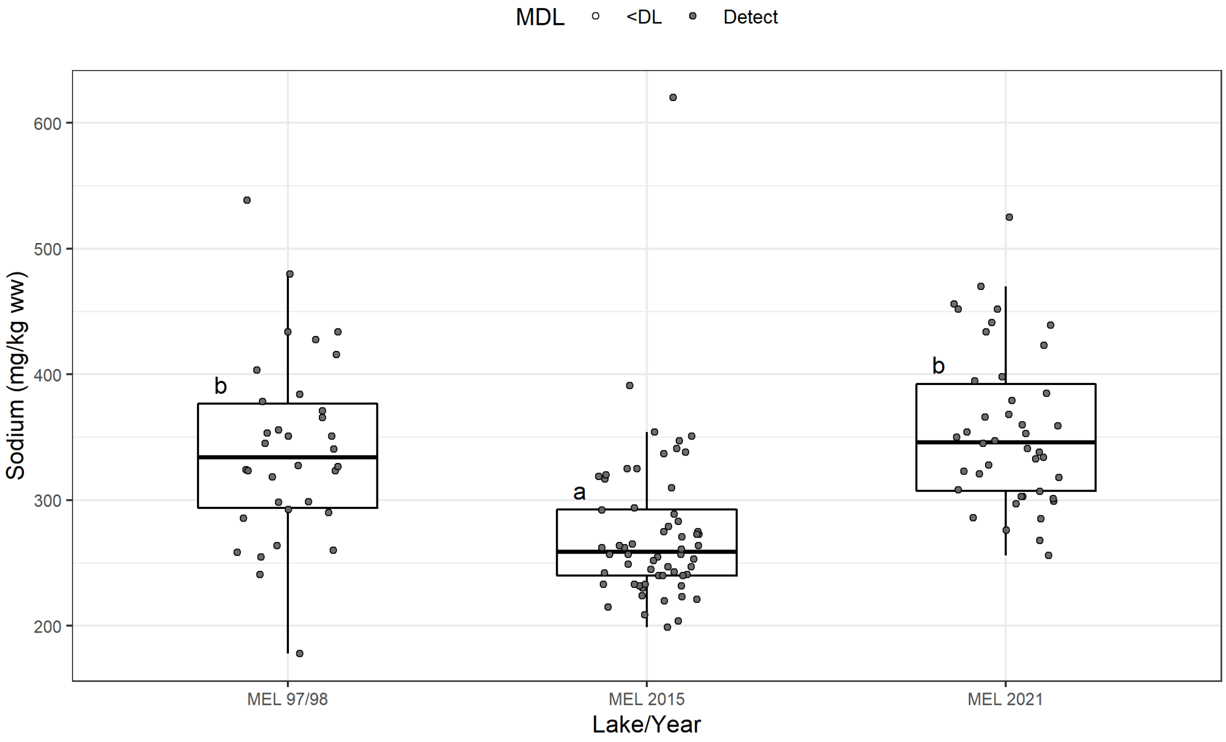


Figure I2-57. Strontium in Lake Trout muscle tissue

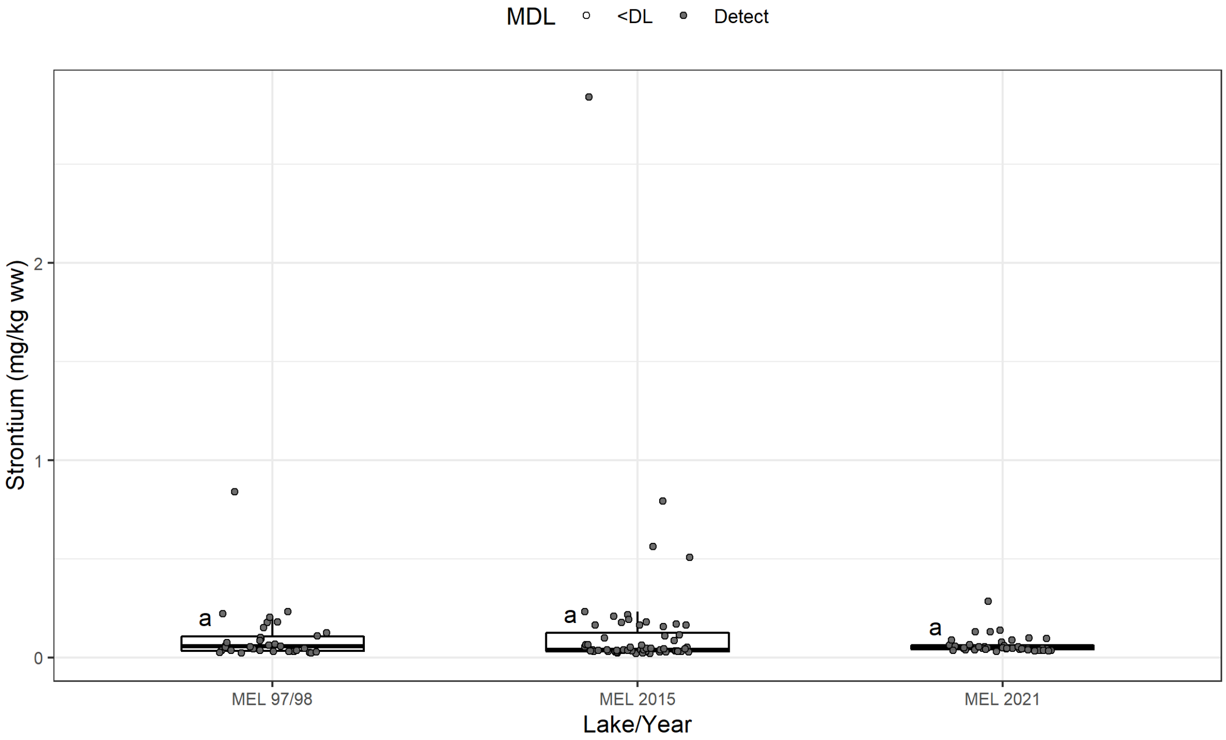
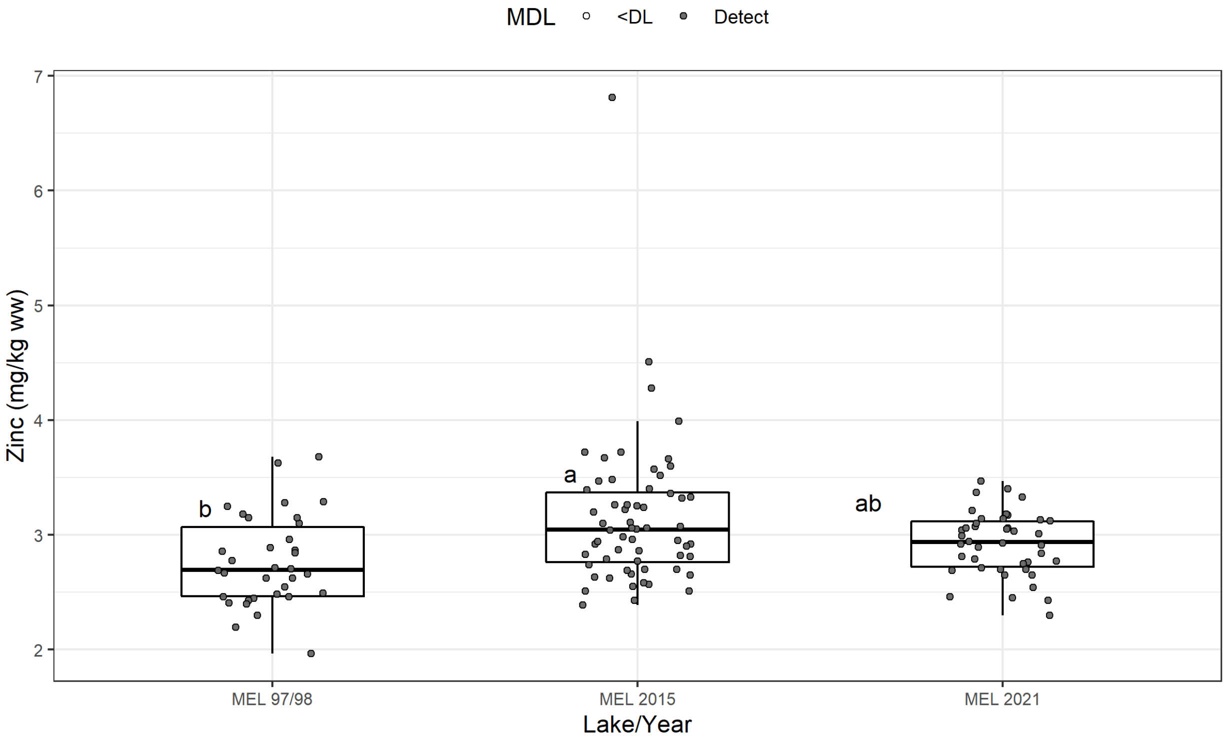


Figure I2-58. Zinc in Lake Trout muscle tissue



Appendix I-3

Lake Trout Chemistry Data

APPENDIX I3TABLES

Table I3-1. ANOVA/ANCOVA results for comparisons of Lake Trout tissue parameters during baseline (1997/1998 and 2015) and operational (2021) periods in Meliadine Lake. 1

Table I3-2. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Meliadine Lake in 2021. 1

Table I3-3. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Meliadine Lake in 2015. 2

Table I3-4. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Meliadine Lake in 1997/1998.. 3

Table I3-5. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Parallel Lake in 1997/1998.. 4

Table I3-1. **ANOVA/ANCOVA results for comparisons of Lake Trout tissue parameters during baseline (1997/1998 and 2015) and operational (2021) periods in Meliadine Lake.**

							Pairwise Significance		
Parameter	**Tissue**	**Residual**	**DF**	**MSE**	**F statistic**	**p value**	**97/98**	**2015**	**2021**
Moisture	Kidney	366	132	2.77	0.628	0.5353	a	a	a
	Liver	1450	133	10.9	42	<0.001	b	a	b
	Muscle	630	133	4.74	22.8	<0.001	b	a	b
Aluminum	Kidney	456	132	3.46	4.94	0.0085	b	a	ab
	Liver	4410	133	33.2	12.8	<0.001	b	a	a
Antimony	Kidney	0.00106	132	8.02E-06	240	<0.001	b	a	a
Arsenic	Kidney	6.77	132	0.0513	3.17	0.0451	b	a	ab
	Liver	0.404	133	0.00303	10.1	0.0001	b	a	a
	Muscle	1.42	133	0.0107	27.6	<0.001	b	a	a
Barium	Kidney	4.14	132	0.0314	17.3	<0.001	b	a	a
	Liver	1.48	133	0.0111	3.97	0.0212	b	a	ab
	Muscle	0.171	133	0.00129	16.6	<0.001	b	a	a
Cadmium	Kidney	85.7	132	0.65	8.63	0.0003	b	a	a
	Liver	73.6	133	0.554	2.28	0.1059	a	a	a
Calcium	Kidney	1250000	132	9430	0.291	0.7477	a	a	a
	Liver	272000	133	2040	20.9	<0.001	b	a	a
	Muscle	3860000	133	29000	288	<0.001	b	a	a
Chromium	Kidney	2.55	132	0.0193	131	<0.001	b	a	a
Cobalt	Kidney	0.771	132	0.00584	6.08	0.003	b	a	a
	Liver	2.58	133	0.0194	0.263	0.7693	a	a	a
Copper	Kidney	263	132	1.99	11.7	<0.001	b	a	a
	Liver	14700	133	110	1.65	0.1955	a	a	a
	Muscle	0.456	133	0.00343	6.74	0.0016	b	ab	a
Iron	Kidney	1020000	132	7690	11.5	<0.001	b	a	a
	Liver	17200000	133	129000	4.43	0.0137	b	ab	a
	Muscle	345	133	2.6	14	<0.001	b	a	a
Lead	Kidney	59.3	132	0.449	16.4	<0.001	b	a	a
Magnesium	Kidney	57500	132	435	1.1	0.336	a	a	a
	Liver	74500	133	560	78.6	<0.001	c	a	b
	Muscle	93500	133	703	12.3	<0.001	b	a	b
Manganese	Kidney	6.36	132	0.0482	9.24	0.0002	b	a	a
	Liver	63.7	133	0.479	8.06	0.0005	ab	a	b
	Muscle	0.183	133	0.00138	19.1	<0.001	b	a	a
* Mercury	Kidney	67	132	0.508	10.7	<0.001	b	a	a
	Liver	115	133	0.867	6.87	0.0014	b	a	a
	Muscle	12.6	133	0.0945	14.8	<0.001	b	a	a
Molybdenum	Kidney	0.108	132	8.20E-04	10.1	0.0001	b	a	b
	Liver	0.225	133	0.00169	65.3	<0.001	c	a	b
Nickel	Kidney	3.02	132	0.0229	3.04	0.0512	b	ab	a
Phosphorus	Kidney	8040000	132	60900	48.1	<0.001	b	a	a
	Liver	27500000	133	206000	127	<0.001	c	a	b
	Muscle	8470000	133	63700	2.92	0.0574	a	a	a
Potassium	Kidney	10400000	132	79100	13.9	<0.001	b	a	a
	Liver	34000000	133	256000	57.2	<0.001	c	a	b
	Muscle	17200000	133	129000	3.78	0.0253	b	a	ab
Silver	Kidney	0.0127	132	9.66E-05	2.74	0.0685	a	a	a
	Liver	3.98	133	0.0299	13.1	<0.001	b	a	a
Sodium	Kidney	7990000	132	60600	20.1	<0.001	c	a	b
	Liver	11700000	133	87700	30.3	<0.001	c	a	b
	Muscle	564000	133	4240	23.1	<0.001	b	a	b
Strontium	Kidney	5.31	132	0.0403	1.71	0.1854	a	a	a
	Liver	0.292	133	0.00219	8.85	0.0002	b	a	b
	Muscle	9.27	133	0.0697	1.2	0.3059	a	a	a
Titanium	Kidney	0.733	132	0.00556	21.8	<0.001	b	a	a
Vanadium	Liver	4.36	133	0.0328	25.4	<0.001	b	a	a
Zinc	Kidney	1630	132	12.4	2.99	0.0536	a	a	a
	Liver	4170	133	31.3	43.2	<0.001	c	a	b
	Muscle	33.5	133	0.252	6.71	0.0017	b	a	ab

Notes:
Grey shading represents significant differences between 2015 and 2021.
Only parameters with > 50% of samples >MDL are included.
*ANCOVA analysis performed for mercury incorporating a fork length covariate to account for bioaccumulative properties.

Table I3-2. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Meliadine Lake in 2021.

			Liver							Kidney							Muscle						
Parameter	DL	N	% <DL	Mean	Median	SD	SE	Min	Max	% <DL	Mean	Median	SD	SE	Min	Max	% <DL	Mean	Median	SD	SE	Min	Max
Moisture (%)	0.5	42	0	79.8	79.9	1.84	0.284	72.6	83.2	0	82.5	82.5	1.32	0.204	77.9	85.9	0	78.3	78.2	1.73	0.267	74.8	82.8
Aluminum	0.4	42	7	1.56	1.07	1.39	0.215	0.4	6.2	0	1.72	1.46	0.895	0.138	0.68	4.81	88	0.447	-	-	-	0.4	1.41
Antimony	0.002	42	88	0.00229	-	-	-	0.002	0.0097	7	0.0053	0.00425	0.00312	0.000481	0.002	0.0138	98	0.00201	-	-	-	0.002	0.0025
Arsenic	0.004	42	0	0.113	0.104	0.0416	0.00642	0.0552	0.211	0	0.332	0.26	0.271	0.0419	0.0905	1.36	0	0.13	0.0746	0.106	0.0163	0.0281	0.416
Barium	0.01	42	0	0.0211	0.017	0.0131	0.00203	0.011	0.071	0	0.108	0.0905	0.0587	0.00906	0.037	0.298	0	0.0234	0.022	0.00736	0.00114	0.013	0.046
Beryllium	0.002	42	100	0.002	-	-	-	-	-	100	0.002	-	-	-	-	-	100	0.002	-	-	-	-	-
Bismuth	0.002	42	90	0.00202	-	-	-	0.002	0.0025	40	0.00263	0.0023	0.000718	0.000111	0.002	0.0042	100	0.002	-	-	-	-	-
Boron	0.2	42	100	0.2	-	-	-	-	-	100	0.2	-	-	-	-	-	100	0.2	-	-	-	-	-
Cadmium	0.001	42	0	0.099	0.0896	0.0546	0.00842	0.0193	0.283	0	0.458	0.39	0.256	0.0395	0.0711	1.26	98	0.00101	-	-	-	0.001	0.0013
Calcium	4	42	0	77.5	74.6	16	2.47	51.2	117	0	177	154	114	17.7	85.2	838	0	93.6	81.4	43.3	6.68	59.6	297
Cesium	0.001	42	0	0.0324	0.0275	0.0136	0.0021	0.0143	0.0718	0	0.0368	0.0343	0.0152	0.00234	0.0192	0.11	0	0.0549	0.0474	0.023	0.00355	0.0299	0.16
Chromium	0.01	42	71	0.0115	-	-	-	0.01	0.033	10	0.0193	0.017	0.00837	0.00129	0.01	0.039	76	0.0197	-	-	-	0.01	0.245
Cobalt	0.004	42	0	0.184	0.148	0.124	0.0191	0.0307	0.514	0	0.126	0.12	0.064	0.00988	0.03	0.275	90	0.00425	-	-	-	0.004	0.0112
Copper	0.02	42	0	18.6	18.1	8.13	1.25	3.31	42.5	0	0.893	0.865	0.184	0.0284	0.442	1.56	0	0.21	0.212	0.0379	0.00585	0.132	0.307
Iron	0.6	42	0	205	164	163	25.1	37.9	630	0	152	138	59.8	9.22	70.9	319	0	2.97	2.58	1.32	0.204	1.57	8.65
Lead	0.004	42	69	0.00568	-	-	-	0.004	0.031	48	0.00537	0.0042	0.00266	0.000411	0.004	0.0172	100	0.004	-	-	-	-	-
Lithium	0.1	42	100	0.1	-	-	-	-	-	100	0.1	-	-	-	-	-	100	0.1	-	-	-	-	-
Magnesium	0.4	42	0	142	138	18	2.78	120	198	0	134	136	12.6	1.95	94.6	155	0	267	266	25.4	3.92	223	329
Manganese	0.01	42	0	1.22	1.16	0.301	0.0464	0.73	1.82	0	0.443	0.39	0.182	0.028	0.201	1.4	0	0.104	0.102	0.0218	0.00336	0.068	0.182
Mercury	0.001	42	0	1.09	1.04	0.429	0.0662	0.14	2.38	0	1.3	1.1	0.51	0.0787	0.193	2.4	0	0.652	0.656	0.17	0.0262	0.153	0.966
Molybdenum	0.004	42	0	0.134	0.132	0.0318	0.00491	0.0735	0.234	0	0.0753	0.0716	0.0291	0.0045	0.0139	0.167	100	0.004	-	-	-	-	-
Nickel	0.04	42	95	0.0405	-	-	-	0.04	0.053	0	0.196	0.196	0.0848	0.0131	0.079	0.54	100	0.04	-	-	-	-	-
Phosphorus	2	42	0	2990	2860	388	59.9	2470	4240	0	2460	2500	203	31.4	1830	2780	0	2520	2540	186	28.7	2130	2920
Potassium	4	42	0	2770	2680	356	54.9	2370	3940	0	2520	2490	186	28.7	2200	3040	0	4240	4260	270	41.6	3580	4640
Rubidium	0.01	42	0	5.71	5.35	2.14	0.331	2.82	11.7	0	4.95	4.78	1.29	0.199	2.92	9.93	0	6.22	5.94	1.74	0.269	3.16	13.9
Selenium	0.01	42	0	2.06	2.08	0.447	0.069	1.09	3.06	0	2.58	2.55	0.785	0.121	0.894	4.18	0	0.432	0.433	0.0562	0.00868	0.288	0.592
Silver	0.001	42	0	0.236	0.176	0.167	0.0258	0.0416	0.767	12	0.00236	0.00175	0.00167	0.000258	0.001	0.0082	100	0.001	-	-	-	-	-
Sodium	4	42	0	1710	1700	170	26.2	1170	2020	0	2160	2120	194	29.9	1880	2790	0	357	346	62.5	9.64	256	525
Strontium	0.01	42	0	0.102	0.0945	0.0275	0.00424	0.061	0.183	0	0.411	0.367	0.19	0.0293	0.168	1.18	0	0.0631	0.0475	0.0444	0.00685	0.032	0.286
Tellurium	0.004	42	100	0.004	-	-	-	-	-	10	0.011	0.0101	0.00525	0.00081	0.004	0.0235	100	0.004	-	-	-	-	-
Thallium	0.0004	42	0	0.0755	0.0668	0.0335	0.00517	0.0282	0.164	0	0.028	0.0279	0.00617	0.000952	0.0118	0.0419	0	0.0075	0.00719	0.002	0.000308	0.0032	0.0128
Tin	0.02	42	100	0.02	-	-	-	-	-	100	0.02	-	-	-	-	-	95	0.0207	-	-	-	0.02	0.048
Titanium	0.05	42	95	0.0512	-	-	-	0.05	0.081	7	0.105	0.09	0.0544	0.0084	0.05	0.32	98	0.051	-	-	-	0.05	0.094
Uranium	0.0004	42	33	0.00107	0.00067	0.000976	0.000151	0.0004	0.00422	0	0.00249	0.00177	0.00192	0.000296	0.00051	0.00794	100	0.0004	-	-	-	-	-
Vanadium	0.02	42	45	0.0304	0.022	0.0202	0.00312	0.02	0.1	71	0.0241	-	-	-	0.02	0.052	98	0.02	-	-	-	0.02	0.02
Zinc	0.1	42	0	29.8	29.5	4.56	0.703	21.4	44.1	0	19.3	19	2.58	0.397	13.2	26.6	0	2.92	2.94	0.275	0.0425	2.3	3.47
Zirconium	0.04	42	100	0.04	-	-	-	-	-	100	0.04	-	-	-	-	-	100	0.04	-	-	-	-	-

Notes:

Summary statistics were not calculated for parameters with more than 50% of the values as non-detect.

Table I3-3. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Meliadine Lake in 2015.

			Liver							Kidney							Muscle						
Parameter	**DL**	**N**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**	**% <DL**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**
Moisture (%)	0.5	60	0	75.5	75.6	2.31	0.299	69.9	80.6	0	82.4	82.1	1.77	0.229	78.1	87.3	0	75.9	75.4	2.33	0.301	71.5	82.1
Lipid content (%)	0.5 | 1.0	60	0	7.75	6.9	2.99	0.386	2.6	17	0	NA	NA	NA	NA	NA	NA	20	2.07	1.45	1.84	0.238	0.5	10.9
Aluminum	0.4 | 1.0	60	15	1.82	1.21	1.83	0.236	0.4	8.78	7	1.46	1.21	0.918	0.119	0.4	4.92	87	0.544	-	-	-	0.4	2.16
Antimony	0.002	60	82	0.00282	-	-	-	0.002	0.0343	8	0.0056	0.00465	0.00306	0.000395	0.002	0.0121	85	0.00245	-	-	-	0.002	0.0065
Arsenic	0.004	60	0	0.105	0.0956	0.0593	0.00765	0.0183	0.406	0	0.276	0.223	0.199	0.0257	0.0744	1.1	0	0.0959	0.0573	0.082	0.0106	0.0193	0.393
Barium	0.01	60	87	0.0134	-	-	-	0.01	0.146	0	0.0656	0.0425	0.0584	0.00754	0.016	0.265	68	0.0156	-	-	-	0.01	0.188
Beryllium	0.002	60	100	0.002	-	-	-	-	-	100	0.002	-	-	-	-	-	100	0.002	-	-	-	-	-
Bismuth	0.002	60	88	0.00218	-	-	-	0.002	0.0087	70	0.00226	-	-	-	0.002	0.0061	100	0.002	-	-	-	-	-
Boron	0.2	60	100	0.2	-	-	-	-	-	100	0.2	-	-	-	-	-	100	0.2	-	-	-	-	-
Cadmium	0.001	60	0	0.159	0.128	0.112	0.0144	0.0409	0.557	0	0.366	0.293	0.25	0.0323	0.0911	1.19	93	0.0012	-	-	-	0.001	0.0037
Calcium	4	60	0	76.1	63.9	42.8	5.52	37.1	269	0	163	145	90.1	11.6	94.7	781	0	143	65.8	242	31.2	39.2	1740
Cesium	0.001	60	0	0.0352	0.034	0.0141	0.00182	0.0183	0.0901	0	0.0297	0.0262	0.0121	0.00157	0.0131	0.0756	0	0.0583	0.0496	0.0319	0.00412	0.0197	0.192
Chromium	0.01	60	78	0.0129	-	-	-	0.01	0.076	43	0.0213	0.0135	0.0183	0.00236	0.01	0.084	70	0.019	-	-	-	0.01	0.132
Cobalt	0.004	60	0	0.195	0.144	0.149	0.0193	0.0271	0.895	0	0.12	0.112	0.0594	0.00767	0.0322	0.303	88	0.0041	-	-	-	0.004	0.0064
Copper	0.02	60	0	20.4	18.5	8.91	1.15	1.33	49.1	0	0.793	0.716	0.324	0.0418	0.54	2.84	0	0.236	0.228	0.0688	0.00889	0.096	0.422
Iron	0.6	60	0	264	208	212	27.3	17.2	795	0	138	122	62.5	8.07	56.3	383	0	2.87	2.27	1.47	0.19	1.23	10.2
Lead	0.004	60	80	0.00603	-	-	-	0.004	0.0627	73	0.00589	-	-	-	0.004	0.0287	92	0.0051	-	-	-	0.004	0.0188
Lithium	0.1	60	100	0.1	-	-	-	-	-	100	0.1	-	-	-	-	-	100	0.1	-	-	-	-	-
Magnesium	0.4	60	0	182	181	22.9	2.96	143	253	0	127	126	13.2	1.71	89.8	152	0	280	284	28.4	3.67	208	325
Manganese	0.01	60	0	1.78	1.8	0.336	0.0434	1.12	2.47	0	0.383	0.348	0.164	0.0212	0.177	1.25	0	0.0991	0.0845	0.0452	0.00583	0.047	0.317
Mercury	0.001	60	0	0.92	0.599	1.33	0.172	0.137	10.4	0	0.972	0.754	0.937	0.121	0.199	6.95	0	0.594	0.523	0.417	0.0538	0.161	3.23
Molybdenum	0.004	60	0	0.179	0.18	0.0499	0.00644	0.0605	0.295	0	0.0534	0.0491	0.018	0.00233	0.0247	0.098	88	0.00465	-	-	-	0.004	0.008
Nickel	0.04	60	85	0.0432	-	-	-	0.04	0.138	2	0.224	0.21	0.133	0.0172	0.07	0.71	90	0.0461	-	-	-	0.04	0.294
Phosphorus	2	60	0	3790	3760	387	50	2880	4830	0	2430	2440	253	32.7	1610	2950	0	2620	2630	313	40.4	1780	3280
Potassium	4	60	0	3370	3320	480	61.9	2130	4800	0	2540	2540	324	41.8	1560	3160	0	4350	4390	442	57	3120	5110
Rubidium	0.01	60	0	9.08	8.77	2.78	0.359	4.11	17.8	0	6.07	6.08	1.75	0.226	2.69	10.3	0	7.8	7.68	2.19	0.283	3.03	13.8
Selenium	0.01	60	0	3.14	3.1	1.13	0.145	0.804	7.96	0	2.21	2.01	0.849	0.11	1.11	5.96	0	0.468	0.444	0.102	0.0132	0.288	0.773
Silver	0.001	60	0	0.249	0.194	0.211	0.0272	0.0013	1.41	23	0.00195	0.0015	0.00143	0.000185	0.001	0.0072	100	0.001	-	-	-	-	-
Sodium	4	60	0	1240	1240	280	36.2	767	2030	0	1990	2000	288	37.2	1480	2740	0	274	259	62.3	8.04	199	620
Strontium	0.01	60	0	0.0795	0.07	0.0356	0.0046	0.033	0.205	0	0.34	0.319	0.185	0.0239	0.153	1.53	0	0.145	0.04	0.38	0.049	0.021	2.84
Tellurium	0.004	60	93	0.00433	-	-	-	0.004	0.0126	23	0.00798	0.0062	0.00494	0.000638	0.004	0.0245	87	0.00483	-	-	-	0.004	0.013
Thallium	0.0004	60	0	0.125	0.125	0.0515	0.00664	0.0468	0.269	0	0.0278	0.027	0.00776	0.001	0.0125	0.0453	0	0.00888	0.00896	0.00242	0.000312	0.00426	0.0144
Tin	0.02	60	13	0.0421	0.037	0.0239	0.00309	0.02	0.166	0	0.111	0.0725	0.108	0.0139	0.037	0.735	2	0.0561	0.052	0.0242	0.00312	0.02	0.132
Titanium	0.1 | 0.02	60	55	0.0315	-	-	-	0.02	0.112	12	0.108	0.1	0.071	0.00916	0.02	0.431	53	0.0385	-	-	-	0.02	0.162
Uranium	0.0004	60	37	0.00136	0.000595	0.00172	0.000222	0.0004	0.00784	5	0.00248	0.00166	0.00278	0.000359	0.0004	0.0152	100	0.0004	-	-	-	-	-
Vanadium	0.02	60	62	0.0342	-	-	-	0.02	0.152	77	0.0244	-	-	-	0.02	0.075	98	0.0204	-	-	-	0.02	0.045
Zinc	0.1	60	0	33.7	34	5.26	0.678	21.7	51.3	0	18.1	17.8	2.89	0.373	11.4	26	0	3.15	3.04	0.655	0.0845	2.39	6.81
Zirconium	0.04	60	100	0.04	-	-	-	-	-	98	0.0406	-	-	-	0.04	0.078	100	0.04	-	-	-	-	-

Notes

Summary statistics were not calculated for parameters with more than 50% of the values as non-detect.

Table I3-4. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Meliadine Lake in 1997/1998.

	Liver							Kidney							Muscle						
Parameter	N	Mean	Median	SD	SE	Min	Max	N	Mean	Median	SD	SE	Min	Max	N	Mean	Median	SD	SE	Min	Max
Moisture (%)	34	81.5	81.6	5.48	0.94	69.3	95.5	33	82.1	81.8	1.84	0.321	78.7	87	34	78.7	78.5	2.37	0.407	74.5	84.4
Aluminum	34	7.47	2.02	11.2	1.92	0.9	51.3	33	2.7	1.42	3.42	0.595	0.543	17.9	34	0.599	0.504	0.229	0.0393	0.2	1.16
Antimony	34	0.0185	-	-	-	-	-	33	0.0179	-	-	-	-	-	34	0.00213	-	-	-	0.00156	0.00255
Arsenic	34	0.157	0.136	0.0616	0.0106	0.0729	0.351	33	0.399	0.394	0.209	0.0365	0.103	0.885	34	0.258	0.256	0.131	0.0225	0.0494	0.473
Barium	34	0.075	0.0115	0.21	0.036	0.00114	1.18	33	0.288	0.101	0.345	0.06	0.02	1.13	34	0.059	0.0341	0.0643	0.011	0.00217	0.295
Beryllium	34	0.00926	-	-	-	-	-	33	0.00896	-	-	-	-	-	34	0.0107	-	-	-	-	-
Boron	34	0.101	-	-	-	0.0225	0.19	33	0.0896	-	-	-	-	-	34	0.107	-	-	-	-	-
Cadmium	34	0.444	0.0683	1.49	0.255	0.0305	8.75	33	1.07	0.448	1.57	0.274	0.041	8.64	34	0.00239	-	-	-	0.00156	0.0109
Calcium	34	135	128	68.2	11.7	47.7	387	33	173	149	84.7	14.7	50.8	513	34	930	913	99.9	17.1	818	1370
Chromium	34	0.51	0.482	0.223	0.0383	0.0765	1.07	33	0.471	0.398	0.281	0.0489	0.083	1.16	34	0.302	0.266	0.113	0.0194	0.134	0.638
Cobalt	34	0.174	0.125	0.138	0.0237	0.0207	0.545	33	0.175	0.157	0.111	0.0193	0.0601	0.581	34	0.0144	-	-	-	0.00905	0.0495
Copper	34	16.3	12.9	14.9	2.55	0.257	67.1	33	2.2	1.39	2.82	0.492	0.41	12.5	34	0.259	0.249	0.0598	0.0103	0.143	0.39
Iron	34	443	212	638	109	29.3	2630	33	227	185	141	24.6	38.4	655	34	4.6	4.59	2.11	0.361	1.12	9.9
Lead	34	0.0282	-	-	-	0.00225	0.206	33	0.774	0.0346	1.36	0.237	0.0155	4.75	34	0.0103	0.00681	0.0132	0.00227	0.00184	0.0708
Magnesium	34	122	120	30.3	5.2	34.1	180	33	129	122	35.6	6.2	60.1	228	34	252	250	24.3	4.16	211	303
Manganese	34	1.57	1.2	1.27	0.218	0.105	5.96	33	0.587	0.559	0.327	0.0569	0.122	1.79	34	0.146	0.143	0.0363	0.00622	0.084	0.235
Mercury	34	0.324	0.259	0.332	0.0569	0.0378	1.67	33	0.53	0.494	0.376	0.0655	0.156	1.82	34	0.291	0.28	0.186	0.0319	0.0462	0.933
Molybdenum	34	0.0786	0.0759	0.0331	0.00568	0.0069	0.16	33	0.0763	0.0748	0.0412	0.00717	0.0182	0.19	34	0.00278	-	-	-	0.00181	0.0102
Nickel	34	0.0478	0.0422	0.0249	0.00427	0.0114	0.11	33	0.282	0.206	0.229	0.0399	0.0205	0.958	34	0.0828	0.0753	0.0503	0.00863	0.0195	0.265
Phosphorus	34	2260	2190	614	105	482	3570	33	1960	1960	283	49.3	1360	2810	34	2510	2510	196	33.6	2180	3020
Potassium	34	2230	2190	680	117	558	3800	33	2230	2280	297	51.8	1570	2740	34	4140	4140	284	48.8	3620	5020
Silver	34	0.0685	0.0478	0.0791	0.0136	0.00045	0.419	33	0.00671	-	-	-	0.00154	0.1	34	0.0024	-	-	-	0.00156	0.00968
Sodium	34	1480	1620	421	72.2	575	2040	33	1800	1800	220	38.3	1410	2280	34	341	334	72.7	12.5	178	539
Strontium	34	0.121	0.106	0.0751	0.0129	0.0171	0.348	33	0.347	0.319	0.238	0.0414	0.0758	1.14	34	0.102	0.0561	0.144	0.0248	0.0222	0.842
Tin	34	0.0185	-	-	-	0.0045	0.0307	33	0.0227	-	-	-	0.013	0.109	34	0.00494	0.00235	0.00753	0.00129	0.00156	0.0331
Titanium	34	0.678	0.685	0.188	0.0322	0.135	1.23	33	0.206	0.178	0.0992	0.0173	0.0664	0.472	34	0.113	0.113	0.0156	0.00267	0.08	0.148
Vanadium	34	0.288	0.193	0.36	0.0618	0.0225	2.08	33	0.155	-	-	-	0.077	0.502	34	0.107	-	-	-	-	-
Zinc	34	22.6	22	7.15	1.23	3.64	39.6	33	19.9	19.2	5.2	0.905	5.75	29.2	34	2.77	2.7	0.394	0.0676	1.97	3.68

Notes

Summary statistics were not calculated for parameters with more than 50% of the values as non-detect.

Tissue chemistry in 1997/1998 was reported on a dry-weight basis (mg/kg dw), dry-weight to wet-weight conversion assumed 78% tissue moisture content.

Dry-weight detection limits are not reported.

Table I3-5. Summary statistics of tissue metal concentrations (mg/kg ww) in Lake Trout from Parallel Lake in 1997/1998.

	Liver							**Kidney**							**Muscle**						
Parameter	**N**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**	**N**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**	**N**	**Mean**	**Median**	**SD**	**SE**	**Min**	**Max**
Moisture (%)	25	82.7	85.5	6.03	1.21	73.4	93.8	23	83.2	84	2.15	0.448	79.5	87.2	23	77.1	77	1.63	0.339	73.9	80
Aluminum	25	5.96	2.7	8.81	1.76	0.486	41.8	23	2.81	2.2	1.89	0.395	1.2	10.3	23	0.257	-	-	-	0.2	0.636
Antimony	25	0.0173	-	-	-	-	-	23	0.0168	-	-	-	-	-	23	0.0229	-	-	-	-	-
Arsenic	25	0.054	0.0471	0.029	0.00579	0.0105	0.151	23	0.108	0.0875	0.0514	0.0107	0.0519	0.214	23	0.102	0.0755	0.0732	0.0153	0.014	0.232
Barium	25	0.0102	0.00798	0.0117	0.00234	0.00243	0.0646	23	0.169	0.0922	0.19	0.0396	0.0358	0.909	23	0.0108	0.00714	0.012	0.0025	0.002	0.0557
Beryllium	25	0.00863	-	-	-	-	-	23	0.0084	-	-	-	-	-	23	0.0115	-	-	-	-	-
Boron	25	0.0863	-	-	-	-	-	23	0.0892	-	-	-	0.064	0.162	23	0.115	-	-	-	-	-
Cadmium	25	0.342	0.266	0.252	0.0503	0.0837	1.21	23	1.57	1.46	0.847	0.177	0.543	3.74	23	0.0115	-	-	-	-	-
Calcium	25	62	44.7	59.6	11.9	14.7	255	23	120	110	38.9	8.11	76.3	227	23	163	145	61.9	12.9	88.6	330
Chromium	25	0.0918	-	-	-	0.0372	0.16	23	0.169	0.164	0.0406	0.00847	0.0948	0.26	23	0.283	0.284	0.0698	0.0145	0.178	0.425
Cobalt	25	0.162	0.14	0.0883	0.0177	0.0428	0.37	23	0.332	0.31	0.162	0.0337	0.129	0.735	23	0.0152	0.0129	0.00551	0.00115	0.01	0.0288
Copper	25	15.1	13.5	8.24	1.65	5.69	34.9	23	1.04	0.987	0.243	0.0508	0.725	1.88	23	0.491	0.511	0.184	0.0384	0.198	0.934
Iron	25	181	177	94.5	18.9	53.6	389	23	120	102	55.4	11.6	69.8	330	23	12	12.1	3.37	0.702	4.37	19.8
Lead	25	0.0127	0.0113	0.00694	0.00139	0.00496	0.0364	23	0.0123	0.0102	0.00478	0.000998	0.0064	0.0236	23	0.0115	-	-	-	0.01	0.013
Magnesium	25	110	106	33	6.59	36	161	23	124	125	20.4	4.25	78.7	164	23	315	312	46.3	9.66	246	446
Manganese	25	1.44	1.35	0.51	0.102	0.395	2.84	23	0.379	0.33	0.134	0.028	0.214	0.86	23	0.0567	0.0566	0.0339	0.00707	0.0115	0.172
Mercury	25	0.285	0.109	0.383	0.0766	0.0277	1.21	23	0.325	0.145	0.375	0.0782	0.06	1.27	23	0.136	0.0896	0.126	0.0263	0.0257	0.512
Molybdenum	25	0.104	0.0972	0.0423	0.00847	0.0372	0.215	23	0.05	0.0465	0.0208	0.00433	0.0256	0.0955	23	0.0229	-	-	-	-	-
Nickel	25	0.0447	0.0404	0.0321	0.00643	0.0116	0.133	23	0.626	0.525	0.284	0.0593	0.294	1.34	23	0.0459	0.0462	0.019	0.00396	0.0219	0.0783
Phosphorus	25	2300	2390	745	149	725	3590	23	2030	2020	296	61.8	1540	2900	23	2720	2670	481	100	2080	3900
Potassium	25	1940	1690	653	131	651	2990	23	2320	2320	418	87.2	1590	2990	23	3400	3350	336	70	2720	4080
Silver	25	0.137	0.0851	0.128	0.0256	0.0298	0.624	23	0.00196	0.00178	0.000647	0.000135	0.00146	0.004	23	0.00229	-	-	-	-	-
Sodium	25	811	758	378	75.5	164	1600	23	1630	1560	339	70.7	1090	2330	23	268	252	78.6	16.4	157	447
Strontium	25	0.122	0.0921	0.111	0.0222	0.0434	0.578	23	0.482	0.355	0.277	0.0578	0.219	1.19	23	0.173	0.136	0.124	0.0258	0.0555	0.52
Tin	25	0.0173	-	-	-	-	-	23	0.0168	-	-	-	-	-	23	0.0229	-	-	-	0.02	0.0261
Titanium	25	0.105	0.0916	0.0532	0.0106	0.0248	0.263	23	0.133	0.118	0.0423	0.00882	0.0896	0.23	23	0.399	0.409	0.0717	0.015	0.23	0.519
Vanadium	25	0.112	-	-	-	0.031	0.505	23	0.091	-	-	-	0.064	0.158	23	0.115	-	-	-	-	-
Zinc	25	18.8	17.2	5.95	1.19	7.38	32	23	18	17.9	3.23	0.673	10.4	23.5	23	2.49	2.45	0.295	0.0616	1.84	3.01

Notes

Summary statistics were not calculated for parameters with more than 50% of the values as non-detect.

Tissue chemistry in 1997/1998 was reported on a dry-weight basis (mg/kg dw), dry-weight to wet-weight conversion assumed 78% tissue moisture content.

Dry-weight detection limits are not reported.