5 PHYTOPLANKTON COMMUNITY

5.1 Introduction

This chapter presents findings of the August 2023 phytoplankton study in Meliadine Lake. Sampling areas and stations are collocated with the water quality monitoring stations shown in **Figure 3-1**.

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. During the open water period, when light levels and temperature are their highest, nutrient availability is likely the most important factor driving phytoplankton growth and populations (Wetzel, 2001). Chlorophyll-a, the primary pigment used by phytoplankton for photosynthesis, is often measured in water to estimate the primary productivity of lakes. However, the relationship between the concentration of chlorophyll-a and the total amount of phytoplankton is variable and can be influenced by factors such as trophic status, community composition, light availability, and water chemistry (Desortova, 1981; Felip and Catalan, 2000, Kasprzak et al., 2008). Therefore, 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 respond quickly to environmental fluctuations, making them useful indicators of lake ecosystem changes caused by various stressors (Filiz et al., 2020). Phytoplankton monitoring for the AEMP has provided 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.

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 common diversity indices (Simpson's diversity index, Simpson's evenness index, and Bray-Curtis dissimilarity) and multivariate analyses.
3. Nutrient-productivity relationships. These analyses involve 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.

5.2 Findings from the 2023 Phytoplankton Study

- Phosphorus concentrations continue to trend lower in 2023 compared to the pre-construction and construction phase.
- Chlorophyll-a concentrations at MEL-01 (near-field [NF] and MEL-02 (mid-field [MF]) continued the increasing trend seen since 2018. Chlorophyll-a concentrations at reference locations were approximately 1 µg/L and within the range observed in previous years. The increasing temporal trend for chlorophyll-a at the NF and MF areas was 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 was higher in 2023 than 2022 at the NF area but lower than 2015-2018 and below peak biomass observed in 2019 and 2021. Phytoplankton biomass in the NF area is typically higher than the MF and reference areas, indicating the East Basin of Meliadine Lake may be naturally more productive than the other areas of Meliadine Lake.
- Multivariate analysis indicated that the NF phytoplankton community was structurally different from the communities in the MF and reference areas, and that the community composition in all areas was slightly different than in 2022. The Bray-Curtis dissimilarity index calculations supported the interpretation that the phytoplankton community at the NF area is structurally different than the MF and reference areas. It is unclear whether the structural differences in the community were due to effluent (specifically nitrate) as was predicted in the FEIS (Agnico Eagle, 2014), or due to some other natural local or regional factor.
- Routine monitoring of phytoplankton community and chlorophyll-a is recommended in 2024 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. Phytoplankton community

monitoring will be supplemented by benthic invertebrate, fish, and sediment monitoring during the upcoming 2024 cycle of the AEMP which will aid in the evaluation of potential mining-related impacts to the aquatic environment.

5.3 Methods

Sample Collection

The 2023 phytoplankton sampling program was completed in August as per the methods outlined in the *AEMP Design Plan* (Azimuth, 2022). 2023 marks the nineth consecutive year of monitoring in Meliadine Lake. The phytoplankton study was conducted in parallel with the AEMP water chemistry sampling program and involved sampling water for taxonomy (biomass, richness, and density) and chlorophyll-a. Sampling areas and stations are shown in **Figure 3-1**. Coordinates are listed in **Table 3-1**.

Secchi depth was also recorded to provide another line of evidence when assessing relationships between nutrient concentrations and primary productivity endpoints. The annual mean and standard error of the Secchi depth readings in each area are provided in **Table 5-1**.

Table 5-1 Secchi depth from the open-water sampling events in 2023

Area	Secchi Depth (m)	
	Mean	Standard Error
MEL-01	5.8	0.3
MEL-02	6.1	0.1
MEL-03	7.6	0.2
MEL-04	7.8	0.3
MEL-05	8.1	0.0

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 fluorometric analysis (Shimadzu RF-1501 Spectrofluorophotometer). Chlorophyll-a concentrations were calculated based on 500 mL of water filtered for each sample.

5.4 Data Analysis

Summary statistics and data analyses were conducted using R version 4.2.1 (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, chlorophytes, and euglenophytes). 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

Potential differences in the phytoplankton community among areas in Meliadine Lake over time were evaluated using standard diversity indices (Simpson's diversity index, Simpson's evenness index, and Bray-Curtis dissimilarity) to compare the diversity of species, evenness of distribution of species, and species composition.

As in previous years, non-metric multidimensional scaling (nMDS) analysis was used to explore potential differences in the phytoplankton community among areas and over time. nMDS is an ordination method that takes multidimensional taxonomic data (e.g., biomass for each taxon for each phytoplankton sample) 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 EEM Technical Guidance Document (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. In the 2021 AEMP report, nMDS was performed using the biomass and richness of major taxa groups as the inputs. Starting in 2022, analysis was performed on using the biomass data for all commonly observed individual taxa.

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

- Step 1: Biomass data were compiled for all individual samples collected in August from 2013 to 2023. To limit the influence of rarely observed taxa, individual taxa that accounted for less than 2% of any individual sample were excluded from the analysis. Raw biomass values were log(x+1) transformed to reduce the influence of dominant taxa. This data set was turned into a Bray-Curtis distance matrix.
- Step 2: The nMDS was run on the Bray-Curtis 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 compared 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. The guidelines outlined in Clarke (1993) are

commonly used to evaluate stress values as follows: <0.05 = excellent, <0.10 = good, <0.20 = usable, >0.20 = not acceptable. Stress of nMDS ordinations tends to increase with increasing sample size and decrease with an increasing number of dimensions, independent of the structure of the underlying data (Dexter et al., 2018). Given the large number of phytoplankton samples collected over the course of monitoring at Meliadine Lake, it is expected that stress of a suitable nMDS may exceed the threshold of 0.20. Therefore, stress was considered alongside other factors such as ease of interpretation when evaluating the potential nMDS ordinations.

- Step 3: The nMDS results were visualized by first plotting 90^{th}, 95^{th} and 99^{th} 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 90^{th}, 95^{th} and 99^{th} 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 5-2**).
- CCME (2004) – A total phosphorus-specific scheme using trigger ranges (**Table 5-3**).
- Carlson (1977) – Independent index scores for TP, chlorophyll-a and Secchi depth (**Table 5-4**), 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 5-2. 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 5-3. 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 5-4. 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.

The trophic status index (TSI; Carlson, 1977) can be a helpful tool to describe the trophic status of a lake and is useful for monitoring potential spatial or temporal differences in trophic status across locations in Meliadine Lake and/or monitoring years in the AEMP program. TSI is commonly used as a surrogate for direct measurement of phytoplankton communities in studies where such data is not available such as in water quality monitoring programs. In the AEMP, phytoplankton community data is collected every year and therefore the TSI is best used as a supporting piece of information that aids in the interpretation of other measures of productivity such as phytoplankton density and biomass. The TSI calculations outlined in Carlson (1977; **Table 5-4**) were used in this report to support the interpretation of the other lines of evidence relevant to the phytoplankton community.

5.5 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.

- *Field Duplicates* – Three field duplicates were collected for phytoplankton taxonomy and chlorophyll-a in 2023, DUP-MEL-AUG-01 associated with MEL-03-03, DUP-MEL-AUG-02 associated with MEL-01-06 and DUP-MEL-AUG-03 associated with MEL-05-01. The data quality objective (DQO) for field duplicates is a relative percent difference (RPD) less than 50% between the sample and duplicate. The DQO was met for chlorophyll-a, total biomass, and total density in all sample-duplicate pairs.
- *Laboratory Duplicates* – Laboratory QC for phytoplankton samples included three randomly selected replicate subsamples (from MEL-01-07, MEL-03-01, MEL-04-02). The relative percent difference between each of the three sample and laboratory duplicate pairs was less than the RPD DDQ of 25%.
- *Field Blanks* – Three field blank samples were analyzed for chlorophyll-a and all three registered below detection limit of 0.04 µg/L (**Appendix E2**).

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.

The QA/QC results indicate the phytoplankton and chlorophyll-a data from 2023 are accurate and reliable for assessing changes in primary productivity in Meliadine Lake.

5.6 Results and Discussion

5.6.1 Background – Historical Data

The following section provides an overview of historical phytoplankton community data from the baseline period. 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.

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 5-5**).

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

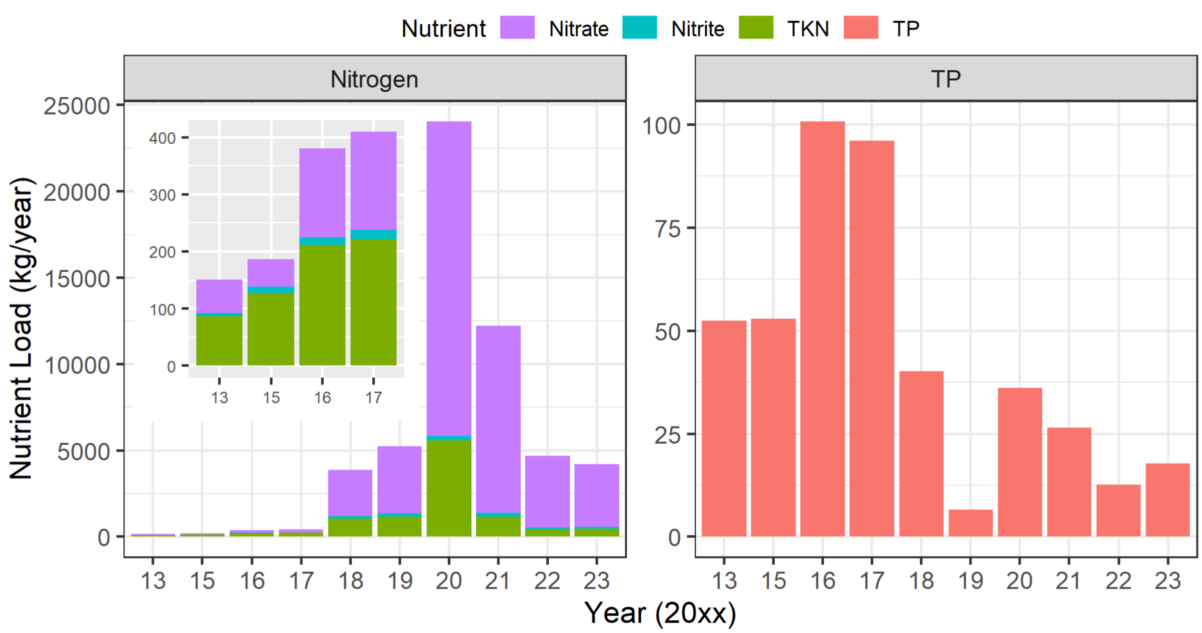
Site	AEMP Area	Date	Density (No. cells/L)	Biomass (mg/m^3)	Richness (No. taxa/site)
ML-E	MEL-01	19 Jul 97	2,008,000	529	56
		17 Aug 97	3,844,000	636	65
		17 Jul 98	2,593,000	1,887	75
		4 Sep 98	4,933,000	1,362	78
ML-S	MEL-05	20 Jul 97	1,863,000	627	73
		16 Aug 97	1,871,000	437	63
		25 Jul 98	3,736,000	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

5.6.2 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] [11], and total phosphorous) are presented in this section to help interpret the phytoplankton taxonomy and chlorophyll-a results. Monthly and cumulative loadings for other nutrients are provided in **Appendix B2**.

Annual loadings of nitrogen and phosphorus to Meliadine Lake in 2023 were similar to 2022 and roughly 80% less than the peak loadings observed in 2020 (for nitrogen) and 2016/2017 (for phosphorus) (**Figure 5-1**). Since the main camp sewage treatment plant started operating in 2018, phosphorus concentrations in effluent samples from MEL-14 have remained relatively stable (typically between 20 mg/L and 60 mg/L) (**Figure 2-7**). Phosphorus loadings vary from year to year based mainly on the volume of water discharged to Meliadine Lake. Nitrogen loadings to Meliadine Lake have decreased primarily because of lower concentrations in the effluent stream in 2022 and 2023 compared to 2020 and 2021.

Figure 5-1. Annual loadings (kg/year) of nitrogen and total phosphorus to Meliadine Lake.



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

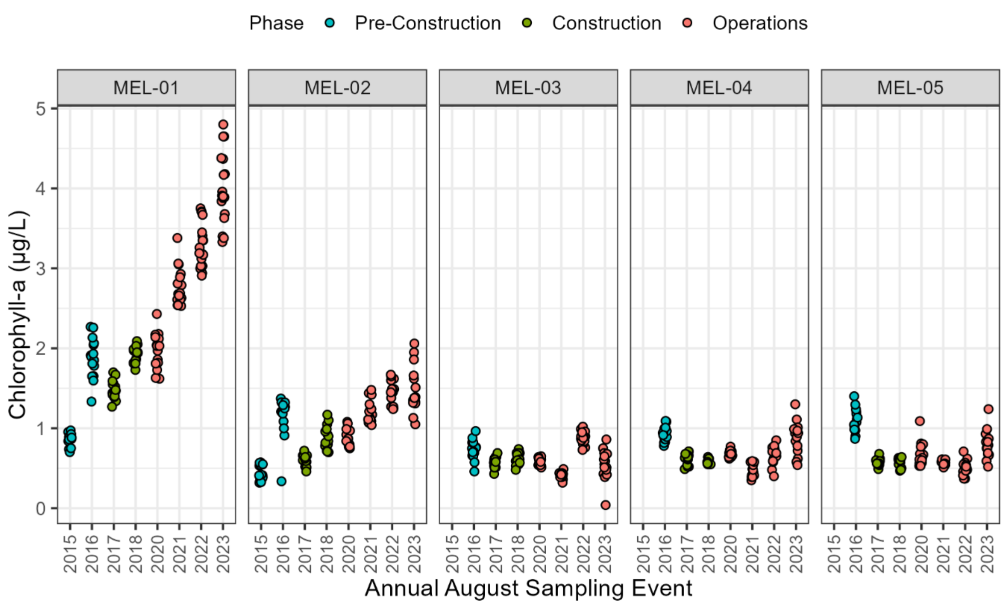
5.6.3 Chlorophyll-a

Chlorophyll-a concentrations from 2015 to 2023 are shown in **Figure 5-2**. The mean and standard deviation by area and year are provided in **Table 5-6**. Chlorophyll-a concentrations have showed the same general year-over-year pattern of increase at MEL-01 and MEL-02 since 2021. From 2016 to 2020, chlorophyll-a concentrations at MEL-01 averaged between 1.5 to 2.0 µg/L. Downstream at MEL-02, concentrations were typically less than 1 µg/L lower at MEL-02. Chlorophyll-a started to trend higher at MEL-01 in 2021, and on average concentrations have increased approximately 0.75 µg/L per year since then. In 2023, the average chlorophyll-a concentration at MEL-01 was 4.0 µg/L in 2023[12] (range = 3.3 to 4.8 µg/L). At the MF area (MEL-02), the average chlorophyll-a concentration was 1.5 µg/L in 2023, which is the same as observed in 2022. However, chlorophyll-a concentrations of up to 2.1 µg/L were measured in individual replicates collected from MEL-02 in 2023, which is higher than previously observed at this location.

Chlorophyll-a concentrations in the reference areas have remained stable since 2016 (**Table 5-6**; **Figure 5-2**). In 2023, the average chlorophyll-a concentration was 0.54 µg/L at MEL-03, 0.88 µg/L at MEL-04, and 0.79 µg/L at MEL-05.

Figure 5-2 Chlorophyll-a Concentrations (µg/L) in Meliadine Lake since 2015

Notes: Triplicate samples are collected at each area/station replicate in August.



---

[12] An AEMP Benchmark for chlorophyll-a of 4.5 µg/L was included in early AEMP reports based on an evaluation of chlorophyll-a and trophic status by DDMI (2013). The AEMP Benchmark was not carried forward in Version 2 of the *AEMP Design Plan* (Azimuth, 2022) because phytoplankton taxonomy is a more relevant endpoint for assessing nutrient enrichment.

Table 5-6. Chlorophyll-a (µg/L; mean ± 1SD) in Meliadine Lake since 2015

Area	2015	2016	2017	2018	2020	2021	2022	2023
MEL-01	0.86 ± 0.061	1.9 ± 0.17	1.5 ± 0.11	1.9 ± 0.076	2.0 ± 0.18	2.78 ± 0.26	3.3 ± 0.14	4.0 ± 0.22
MEL-02	0.45 ± 0.080	1.2 ± 0.17	0.61 ± 0.040	0.88 ± 0.11	0.89 ± 0.10	1.2 ± 0.15	1.5 ± 0.073	1.5 ± 0.086
MEL-03	-	0.73 ± 0.099	0.57 ± 0.061	0.61 ± 0.072	0.58 ± 0.042	0.42 ± 0.024	0.88 ± 0.050	0.54 ± 0.038
MEL-04	-	0.93 ± 0.086	0.61 ± 0.066	0.58 ± 0.035	0.69 ± 0.038	0.47 ± 0.078	0.66 ± 0.071	0.88 ± 0.16
MEL-05	-	1.1 ± 0.13	0.58 ± 0.036	0.58 ± 0.059	0.68 ± 0.091	0.57 ± 0.024	0.50 ± 0.022	0.79 ± 0.12

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

5.6.4 Phytoplankton Community

The primary metrics used to evaluate the health of the phytoplankton community 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. Phytoplankton community structure is used as supporting line of evidence to assess potential differences between areas within Meliadine Lake.

Results for the phytoplankton community are presented as follows:

- Mean phytoplankton biomass from 2013 to 2023 are presented in **Table 5-7**.
- Summary statistics for major taxa group biomass and density for samples collected in 2023 are presented in **Table 5-8**.
- Per-sample richness, biomass, and density are shown in **Figure 5-3**.
- Major taxa richness, biomass, and density are shown in **Figure 5-4** (absolute values) and **Figure 5-5** (percent).
- Simpson's diversity index, Simpson's evenness index, and Bray-Curtis dissimilarity index are shown in **Figure 5-6.**Results of the multivariate analyses of community structure using nMDS are shown in **Figure 5-7** and **Figure 5-8.**
- Summary statistics for richness, biomass, and density across all years are provided in **Appendix E1**.

Biomass

Phytoplankton biomass has been consistently higher at MEL-01 compared to MEL-02 and the reference areas since 2015 (**Table 5-7**). The same spatial pattern was evident in 2023, but there was no indication that biomass is trending higher year-over-year (**Figure 5-3**). Phytoplankton biomass has also been quite variable at MEL-01, especially since 2019. As mentioned in the introduction, phytoplankton productivity can respond quickly to natural and anthropogenic changes. Notable increases in August biomass measurements were observed between 2013 and 2015, 2018 and 2019, and 2020 and 2021 and the timing of the increase in each of these years coincided with unusually high rainfall in the region. Since 1981, cumulative rain ranked 1st in 2019, 2nd in 2015, 6th in 2021, and 7th in 2014. Increased precipitation associated with interannual climate variability and associated runoff can lead to higher concentrations of major ions, organic carbon, and micronutrients. These climate-related changes in water quality can remove certain constraints on phytoplankton productivity (Pokrovsky et al., 2021). Unless the inputs are ongoing, the effects on productivity would be temporary. This was the case in 2020, 2022, and 2023 which were much drier years, and biomass at MEL-01 was similar to MEL-02 and the reference areas (**Figure 5-3**). The factors driving this spatial pattern are discussed in **Section 5.6.5**.

Table 5-7. Phytoplankton biomass (mg/m^3; mean ± 1SD) in Meliadine Lake since 2015

Area	2013[a]	2015	2016	2017	2018	2019	2020	2021	2022	2023
MEL-01	153 ± 8	336 ± 29	350 ± 54	316 ± 39	339 ± 27	426 ± 24	211 ± 26	395 ± 46	248 ± 63	291 ± 46
MEL-02	-	220 ± 35	252 ± 44	222 ± 42	207 ± 88	260 ± 58	170 ± 28	205 ± 47	192 ± 31	116 ± 9
MEL-03	-	-	231 ± 17	206 ± 25	276 ± 26	229 ± 18	204 ± 39	185 ± 57	131 ± 18	145 ± 27
MEL-04	-	-	156 ± 65	201 ± 22	241 ± 15	214 ± 28	140 ± 29	157 ± 23	103 ± 34	147 ± 36
MEL-05	-	-	227 ± 71	216 ± 25	147 ± 14	204 ± 36	147 ± 18	156 ± 19	107 ± 29	150 ± 9

Notes:
"-" = the phytoplankton study was not completed in these areas.
[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 2015-2023 should be made with caution.

The mean biomass observed at MEL-02 in 2023 was the lowest observed since 2015. Mean biomass at the reference areas was higher in 2023 than in 2022, but within the range of values observed in the past few years. The divergent pattern in biomass among the NF, MF, and reference areas is discussed below.

Chrysophytes have generally been the dominant major taxa in terms of biomass throughout Meliadine Lake throughout the AEMP period (since 2015) and during baseline. In 2023, relative to total community biomass, chrysophytes comprised between 27% (MEL-05) to 61% (MEL-01) (**Table 5-8**, **Figure 5-5**). The next most common major taxa by biomass were cryptophytes, dinoflagellates, diatoms, and chlorophytes (green algae; **Figure 5-4, Figure 5-5**). Cryptophytes accounted for only 9% of the total biomass at MEL-01 but represented 21% of the biomass at MEL-02 and 17% to 29% of the biomass at the reference areas. Chlorophytes also accounted for a smaller proportion of the total biomass at MEL-01 (3%) compared to MEL-02 and the reference areas (6% to 15%; **Figure 5-5**). Overall, the relative proportion of total biomass in each major taxa group in 2023 was consistent with results observed in 2015 to 2022 and similar to other studies on phytoplankton community assemblages in northern latitude lakes (Bergström et al., 2021).

Since 2015, annual variability in total phytoplankton biomass in Meliadine Lake has primarily been driven by variability in chrysophyte biomass. However, in 2023, despite decreases in chrysophyte biomass in the reference areas, total biomass increased. The increased total biomass in the reference areas in 2023 relative to 2022 was primarily related to higher cryptophyte biomass, which was also observed at MEL-01 and MEL-02. In 2023, the cryptophyte species *Rhodomonas minuta* Skuja was the dominant species in terms of biomass in 8 of the 26 replicates collected (31%) and in the top five species in terms of biomass in 22 of 26 replicates (85%; **Table E1-2**). In contrast, *Rhodomonas minuta* Skuja was in the top five species in terms of biomass in only 1 of the 26 replicates collected in each of 2021 and 2022. The dominant taxa in most phytoplankton samples in 2021 and 2022 were chrysophytes in the genera *Dinobryon* and *Chrysochomulina* and the dinoflagellate genus *Peridinium* (**Table E1-2**). These taxa have flagella, which allows them to move throughout the water column. They are also capable of mixotrophy, which means they can derive energy from either photosynthesis or consumption of bacteria (Fee, 1976; Findlay et al., 2001; Ballen-Segura, 2016). Flagellated, mixotrophic algae are common in nutrient-limited oligotrophic systems due to their ability to exploit multiple sources of energy, avoid predation, and move to suitable microhabitats (Saad et al., 2016; Hazukova et al., 2021). Together, these attributes explain the dominance of these genera in terms of total phytoplankton biomass as shown in **Figure 5-4**.

Cyanobacteria comprised less than 1% of the total phytoplankton biomass at the study areas in 2023 (**Table 5-8**). This is worth highlighting because cyanobacteria are commonly associated with harmful algal blooms caused by anthropogenic nutrient enrichment (Codd, 2000). This phenomenon is well documented in temperate and boreal areas in Canada, and cyanobacteria biomass is one line of evidence that researchers are using to detect eutrophication in Arctic lakes (Ayala-Borda et al., 2021). Cyanophyte biomass has been low throughout Meliadine Lake since 2015. These data show that the combined effect of effluent discharge and interannual variability in the climate are not leading to the types of algal blooms commonly associated with nutrient enrichment.

Richness

Taxa richness is generally positively correlated with total biomass in the Meliadine AEMP dataset (**Figure 5-4**). For example, years with lower biomass at MEL-01 (i.e., 2013, 2020 and 2022) had fewer taxa than observed in the years with higher biomass (e.g., 2019 and 2021). In 2023 phytoplankton richness was higher in all areas of Meliadine Lake than in 2022, but was within the range of values previously observed at each area. The increase in richness in 2023 compared to 2022 accompanied a corresponding increase in biomass at all locations except MEL-02, where biomass decreased in 2023 despite the increase in richness.

Chrysophytes were the most diverse major taxa group at all locations except for reference area MEL-05 in 2023; the number of unique chrysophyte taxa ranged from 9 at MEL-04 and MEL-05 to 16 at MEL-01

(**Figure 5-4**). Chlorophytes and diatoms were also well represented in terms of the number of taxa; chlorophytes were the most diverse major taxa group at MEL-05. However, due to the comparatively small size of individual chlorophytes and diatoms relative to chrysophytes, they accounted for only a small proportion of the total biomass (**Figure 5-5**). 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 5-8 Phytoplankton biomass (mg/m^3) and density (cells/L) by major taxa in 2023

Notes: Chloro = chlorophytes; Chryso = chrysophytes; Crypto = cryptophytes; Dino = dinoflagellates; Cyano = cyanobacteria
Euglenophytes were also considered as a major taxa group, but accounted for <1% of the biomass and density in all samples and were therefore not included in this summary table.

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	11	256	41	26	37	1	372	288,760	3,117,488	175,880	99,792	6,400	29,136	3,717,456
	MEL-0106	9	182	16	34	56	0	296	324,280	2,983,176	166,496	157,264	10,000	800	3,642,016
	MEL-0107	5	190	21	9	40	3	268	188,784	2,183,368	179,096	37,920	6,000	87,008	2,682,176
	MEL-0108	4	119	51	36	52	1	261	138,296	1,740,944	1,381,976	184,400	10,600	1,000	3,457,216
	MEL-0109	7	146	17	19	51	1	241	245,456	1,943,896	221,384	84,024	9,400	43,704	2,547,864
	MEL-0110	9	183	13	40	60	0	307	195,368	2,77,2840	99,824	179,616	10,600	800	3,259,248
	Average	**3%**	**61%**	**9%**	**9%**	**17%**	**<1%**	**291**	**7%**	**76%**	**11%**	**4%**	**<1%**	**1%**	**3,217,663**
MEL-02	MEL-0202	15	28	17	26	27	0	113	577,120	518,248	189,032	139,296	4,400	200	1,428,296
	MEL-0203	16	32	13	22	18	0	102	561,352	611,040	112,408	92,008	3,600	600	1,381,008
	MEL-0205	14	47	14	11	31	2	119	732,768	840,928	199,400	52,288	5,600	30,936	1,861,920
	MEL-0206	17	40	16	32	20	0	125	1,157,824	978,224	113,008	176,816	3,800	400	2,430,072
	MEL-0208	15	22	18	31	35	1	121	826,760	338,848	122,176	155,864	6,400	1,600	145,1648
	Average	**13%**	**29%**	**13%**	**21%**	**23%**	**1%**	**116**	**45%**	**38%**	**9%**	**7%**	**<1%**	**<1%**	**1,710,588**
MEL-03	MEL-0301	9	91	6	25	29	0	160	331,864	1,107,136	31,152	146,280	6,600	0	1,623,032
	MEL-0302	10	61	11	24	47	0	152	618,024	783,256	22,368	105,576	9,800	0	1,539,024
	MEL-0303	12	57	9	31	17	0	126	380,952	985,208	99,192	188,784	3,800	0	1,657,936
	MEL-0304	9	99	17	28	23	0	176	403,704	1,056,248	202,568	160,648	5,200	0	1,828,368
	MEL-0305	10	49	14	13	22	0	109	482,128	797,624	105,376	40,720	5,200	200	1,431,248
	Average	**7%**	**49%**	**8%**	**17%**	**19%**	**<1%**	**145**	**28%**	**58%**	**6%**	**8%**	**<1%**	**<1%**	**1,615,922**
MEL-04	MEL-0401	11	65	14	24	31	0	145	496,496	862,080	148,880	126,728	6,400	0	1,640,584
	MEL-0402	6	43	8	25	16	0	98	438,624	926,736	127,528	120,544	3,800	0	1,617,232
	MEL-0403	11	81	15	24	8	0	139	719,200	775,872	139,112	119,544	1,800	0	1,755,528
	MEL-0404	5	112	13	53	15	0	199	330,864	1,602,232	99,192	261,440	3,200	0	2,296,928
	MEL-0405	6	61	8	64	15	0	154	331,264	1,107,136	33,536	365,600	3,400	400	1,841,336
	Average	**6%**	**49%**	**8%**	**26%**	**12%**	**<1%**	**147**	**26%**	**57%**	**6%**	**11%**	**<1%**	**<1%**	**1,830,322**
MEL-05	MEL-0501	22	40	16	51	24	0	152	1,236,248	711,216	128,728	293,760	5,600	0	2,375,552
	MEL-0502	35	22	11	47	24	0	140	776,872	431,040	104,176	232,704	5,200	600	1,550,592
	MEL-0503	28	27	28	27	29	5	144	1,387,112	452,792	60,104	101,992	5,600	57,672	2,065,272
	MEL-0504	12	52	11	56	29	0	160	532,616	933,920	97,992	304,144	6,000	0	1,874,672
	MEL-0505	14	62	26	38	17	0	157	705,032	625,008	98,392	175,232	3,400	200	1,607,264
	Average	**15%**	**27%**	**12%**	**29%**	**17%**	**1%**	**150**	**48%**	**34%**	**5%**	**12%**	**<1**	**1%**	**1,894,670**

Figure 5-3 Phytoplankton richness, biomass (mg/m³), and density (cells/L), 2013-2023

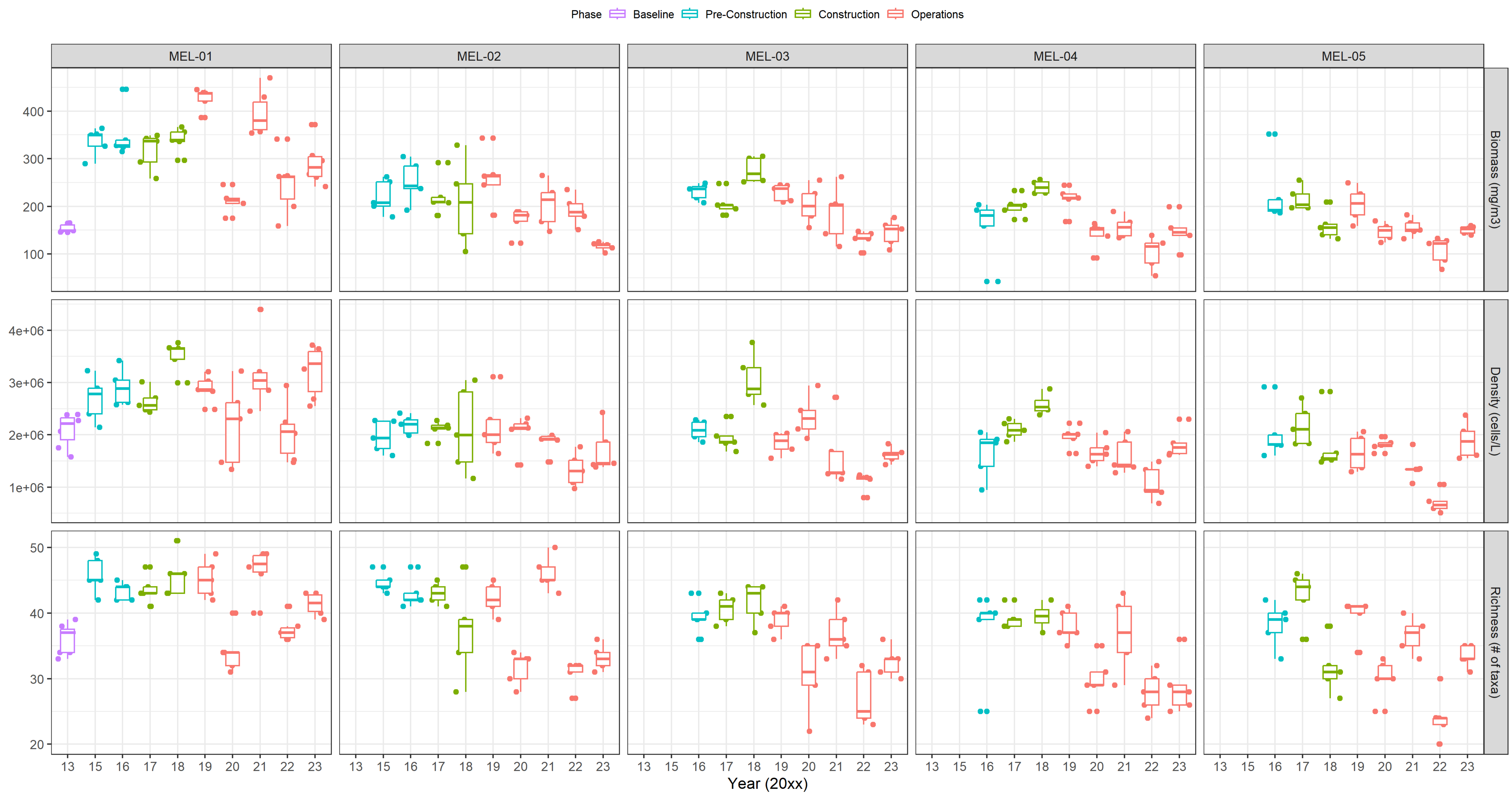


Figure 5-4. Mean phytoplankton richness, biomass (mg/m³), and density (cells/L) by major taxa, 2013-2023

Notes: Major taxa group endpoints (richness, biomass, and density) for each area-year are based on the average (arithmetic mean) of the individual replicates.
Euglenophytes were also considered as a major taxa group, but accounted for <1% of the biomass and density in all samples and were therefore not included in this summary figure

Figure 5-5. Relative richness, biomass (mg/m^3), and density (cells/L) by major taxa, 2013-2023

Notes: Major taxa richness, biomass, and density shown as the proportion of the total based on the average for each area/year.
Euglenophytes were also considered as a major taxa group, but accounted for <1% of the biomass and density in all samples and were therefore not included in this summary figure

Community Structure

Diversity Indices

Simpson's diversity index (SDI) has generally been high (≥0.85) and stable at all monitoring areas. The relatively high SDI results indicate that the phytoplankton communities in the NF area, MF area, and reference areas are each made up of a diverse assemblage of species. In 2023, mean SDI ranged from 0.86 at reference location MEL-04 to 0.93 at the NF location MEL-01 (**Figure 5-6**; middle panel). Given that the highest observed diversity was at the NF area MEL-01, the SDI data do not support effluent-related enrichment or toxicological impairment of the phytoplankton community.

Simpson's evenness index (SEI) at all monitoring locations within Meliadine Lake has been closer to 0 than 1 throughout the monitoring program, indicating that the phytoplankton communities are not evenly distributed among taxonomic groups. In 2023, mean SEI ranged from 0.26 at reference location MEL-03 to 0.36 at NF area MEL-01 and MF area MEL-02 (**Figure 5-6**; bottom panel). Given that the highest observed evenness was at the NF and MF areas, the SEI data do not support effluent-related enrichment or toxicological impairment of the phytoplankton community.

The Bray-Curtis dissimilarity index (BCI) was calculated by comparing the community in individual replicates to the median of the replicates collected at reference locations for a given year. Mean BCI has been variable over time in reference areas as well as the NF and MF area. However, since the start of operations in 2018, Mean BCI has tended to be highest in the NF area MEL-01. In 2023, mean BCI ranged from 0.24 at reference location MEL-03 to 0.53 at NF area MEL-01 (**Figure 5-6**; top panel). The higher BCI at MEL-01 relative to the reference areas indicates that the phytoplankton community composition in this area differs from the phytoplankton community composition typical of the reference areas. Differences in phytoplankton community composition between areas are discussed on more detail in the following section.

Multivariate Analyses

Finer patterns in community structure across sampling areas and years were explored using multivariate non-metric multidimensional scaling (nMDS) analysis[13]. Two nMDS dimensions were derived from the transformed phytoplankton community data. The two-dimensional ordination was selected to best represent the community. The stress value of that configuration (0.24) was slightly higher than the guideline of 0.2 outlined by Clarke (1993), but was considered acceptable for this application based on considerations of other factors such as sample size and ease of interpretation outlined in **Section 5.4**.

The ordination plot showing results for samples collected from *reference* areas or during baseline monitoring and their associated 90th, 95th and 99th percentile probability ellipses is presented in the left

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

panel of **Figure 5-7**. These probability ellipses represent the phytoplankton community at the reference areas across all sampling events. The reference area ellipse helps identify those samples or areas that diverge from the normal range of reference conditions in Meliadine Lake. 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 or 2015. For this reason, the probability ellipses may not fully represent the phytoplankton community on a lake-wide basis.

Results for samples collected from *exposure* areas relative to the reference area probability ellipses are presented in the right panel of **Figure 5-7**. The ordination results are also shown by year in **Figure 5-8** to illustrate the relative change for MEL-01, MEL-02, and the reference areas within and across years. Results from MEL-01 in 2013 and MEL-01 and MEL-02 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 right of **Figure 5-8** shows the correlation between the biomass and richness of each major taxa group and Axis 1 and 2 of the nMDS. The strongest correlations between each nMDS Axis and major phytoplankton taxa are as follows:

- **Axis 1** – Within most years, samples from different areas were generally not separated much along Axis 1. With the exception of 2023, more variation along Axis 1 was observed when comparing between years than within years and year to year variations along Axis 1 were generally consistent among the study areas (**Figure 5-8**). In 2023, the results from MEL-01 tended to have lower Axis 1 scores than samples from the other locations and therefore tended to be ordinated in the left half of the plot in the 2023 panel of **Figure 5-8**. No major taxa were significantly positively correlated with nMDS Axis 1[14]. Chrysophyte richness and biomass were most strongly negatively correlated with nMDS Axis 1. Chrysophyte biomass accounted for an average of 61% of the biomass at MEL-01 but only 27% to 49% of the biomass in the MF and reference areas.
- **Axis 2** – In 2023, 5 of 6 replicates collected from MEL-01 had positive Axis 2 scores and are therefore ordinated in the top half of the plot in the 2023 panel of **Figure 5-8**. Conversely, most replicates from MEL-02 and the reference areas in 2023 had negative Axis 2 scores and are ordinated in the bottom half. Dinoflagellate richness and biomass were the two metrics most strongly positively correlated with nMDS Axis 2. Dinoflagellates accounted for a similar proportion of the total biomass in each station, but total biomass was highest at MEL-01 and therefore dinoflagellate biomass was highest at MEL-01 (**Table 5-8**). Cryptophyte biomass and richness were the metrics most strongly negatively correlated with nMDS Axis 2. As previously mentioned, the

[14] The Spearman critical value at a significance level of $p = 0.05$ is 0.197.

cryptophyte *Rhodomonas minuta* Skuja was one of the most dominant taxa in terms of biomass at MEL-02 and the reference areas in 2023. Cryptophytes accounted for 21% of the biomass at MEL-02 and 17% to 29% of the biomass at the reference areas compared to 9% of the biomass at MEL-01. These differences are evident in the 2023 panel of **Figure 5-8**.

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 key messages from the nMDS analysis are as follows:

- Community composition is subject to influence from regional factors year to year. Over time, variability among the NF, MF, and reference areas has increased, as indicated by the increasing spread of the points in 2020 to 2023 shown in **Figure 5-8**.
- Although the community composition may shift lake-wide from year to year, the MF and reference areas tend to follow a similar pattern of change.
- In most years, the composition of the phytoplankton community at MEL-01 followed a similar pattern as the reference areas. The composition of the phytoplankton community at MEL-01 has diverged from MEL-02 and the reference areas in 2020, 2022, and 2023. This divergence is consistent with higher BCI at MEL-01 compared to MEL-02 and reference areas since operations began. In 2020, the MEL-01 samples had lower scores on nMDS Axis 2 than the MF and reference areas, and most fell outside of the ellipse representing the 99th percentile of the baseline and reference community. In 2022 and 2023, MEL-01 samples tended to have higher nMDS Axis 2 scores and lower Axis 1 scores than the MF and reference samples. However, the 2013 baseline results for MEL-01 (the only area sampled that year) also had low values on nMDS Axis 2 and were largely outside the 90th percentile ellipse, suggesting that differences in phytoplankton community composition in the East Basin may be due, at least in part, to factors unrelated to mining.

Discharge of effluent to the East Basin was predicted to cause a corresponding increase in nitrogen concentrations and a shift in the structure of the phytoplankton community to taxa that efficiently assimilate nitrogen (Agnico Eagle, 2014). The changes to the community observed since 2020 appear to fit with these predictions, but so far it is unclear whether the differences in the phytoplankton community observed at MEL-01 in 2020, 2022, and 2023 were caused primarily by effluent or interannual variability in precipitation patterns. 2020, 2022, and 2023 had variable effluent discharge and nutrient loadings (**Figure 5-1**), which implies that factor(s) other than effluent have contributed to the variability in the phytoplankton community at MEL-01 in recent years.

Figure 5-6. Bray-Curtis Dissimilarity, Simpson's Diversity, and Simpson's Evenness, 2013-2023

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

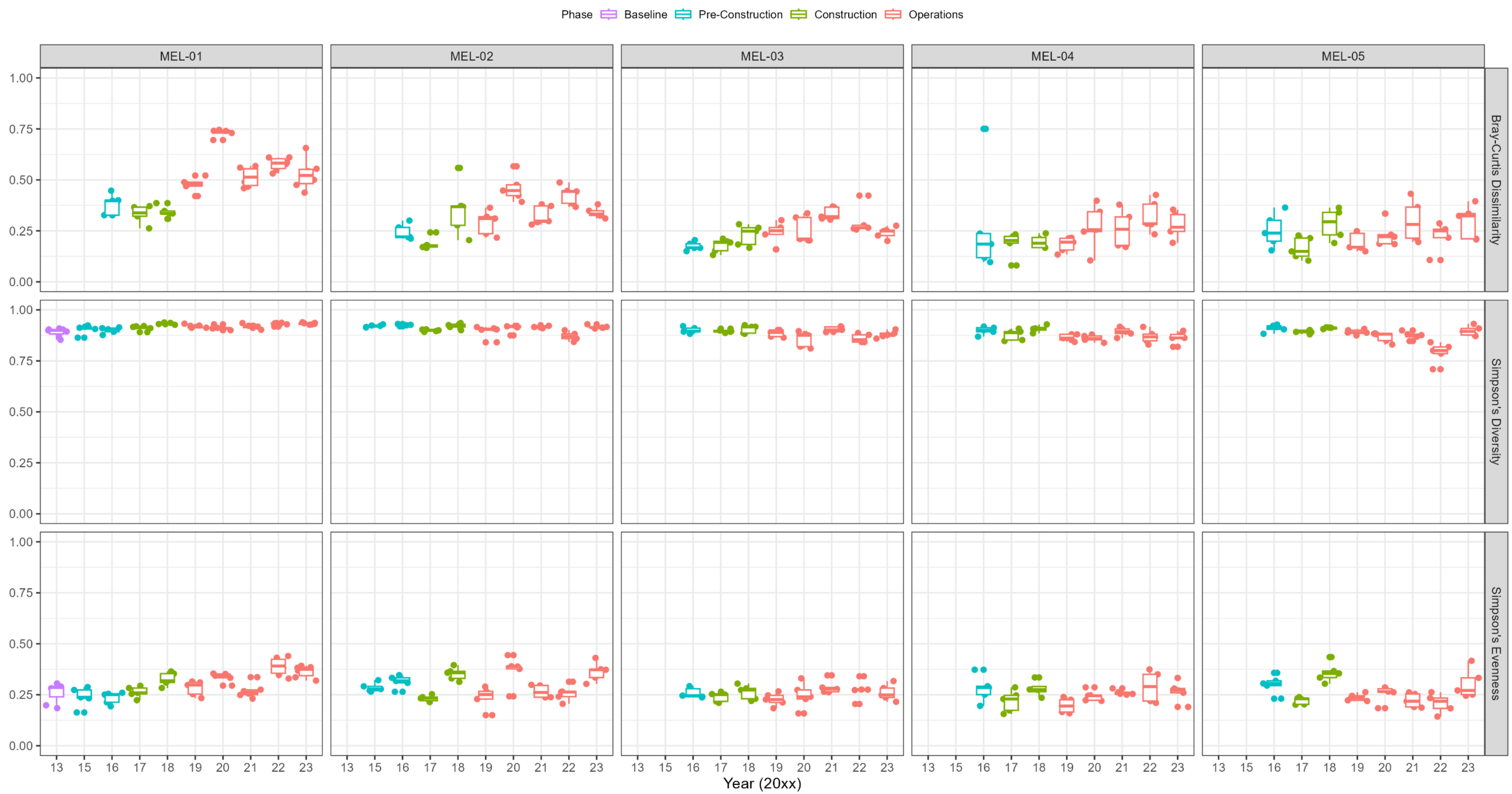


Figure 5-7. Ordination of the reference and exposure area phytoplankton results by phase and location for Meliadine Lake.

Notes: Left panel = results for reference and baseline samples and their associated probability ellipses.
Right panel = exposure samples shown relative to reference area probability ellipses.
Green, orange, and red ellipses = 90th, 95th, and 99th percentile of the baseline/reference phytoplankton community.
2023 data is plotted separately for ease of comparison but is part of the operations phase

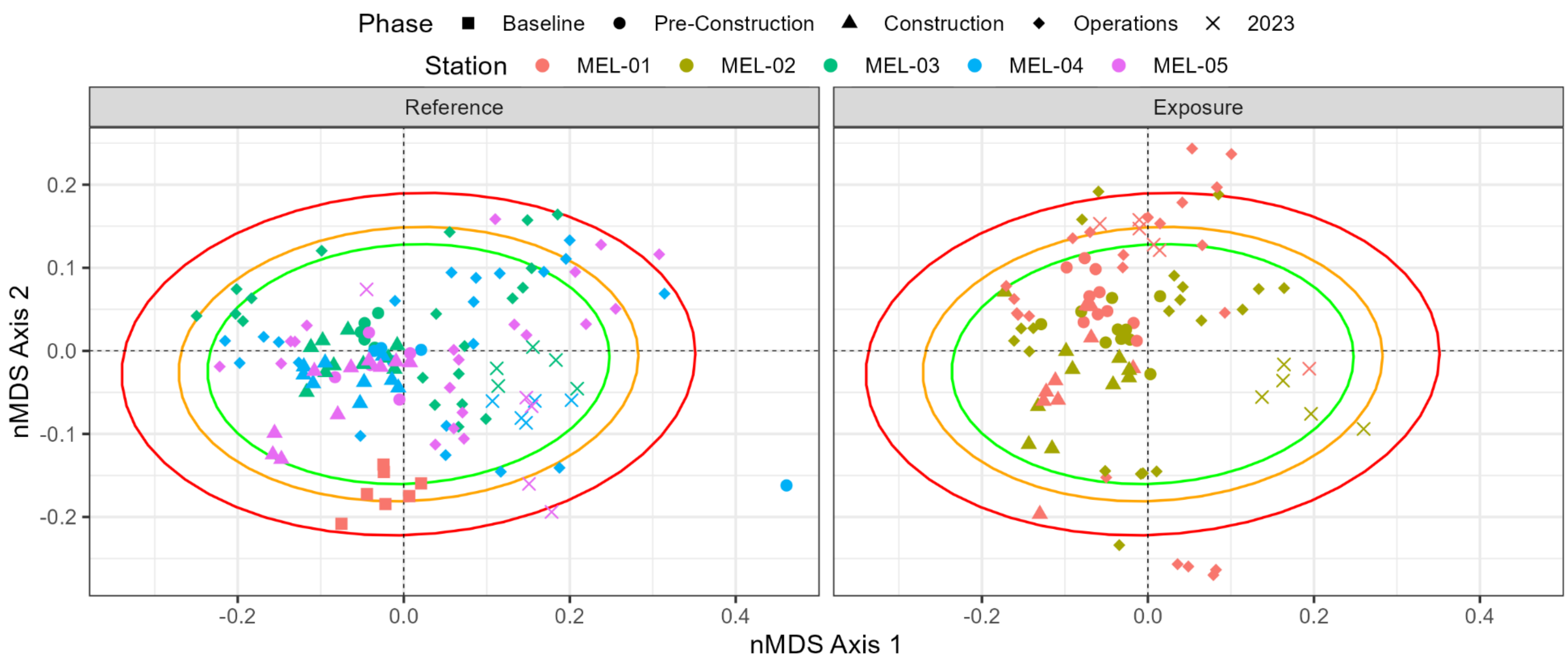
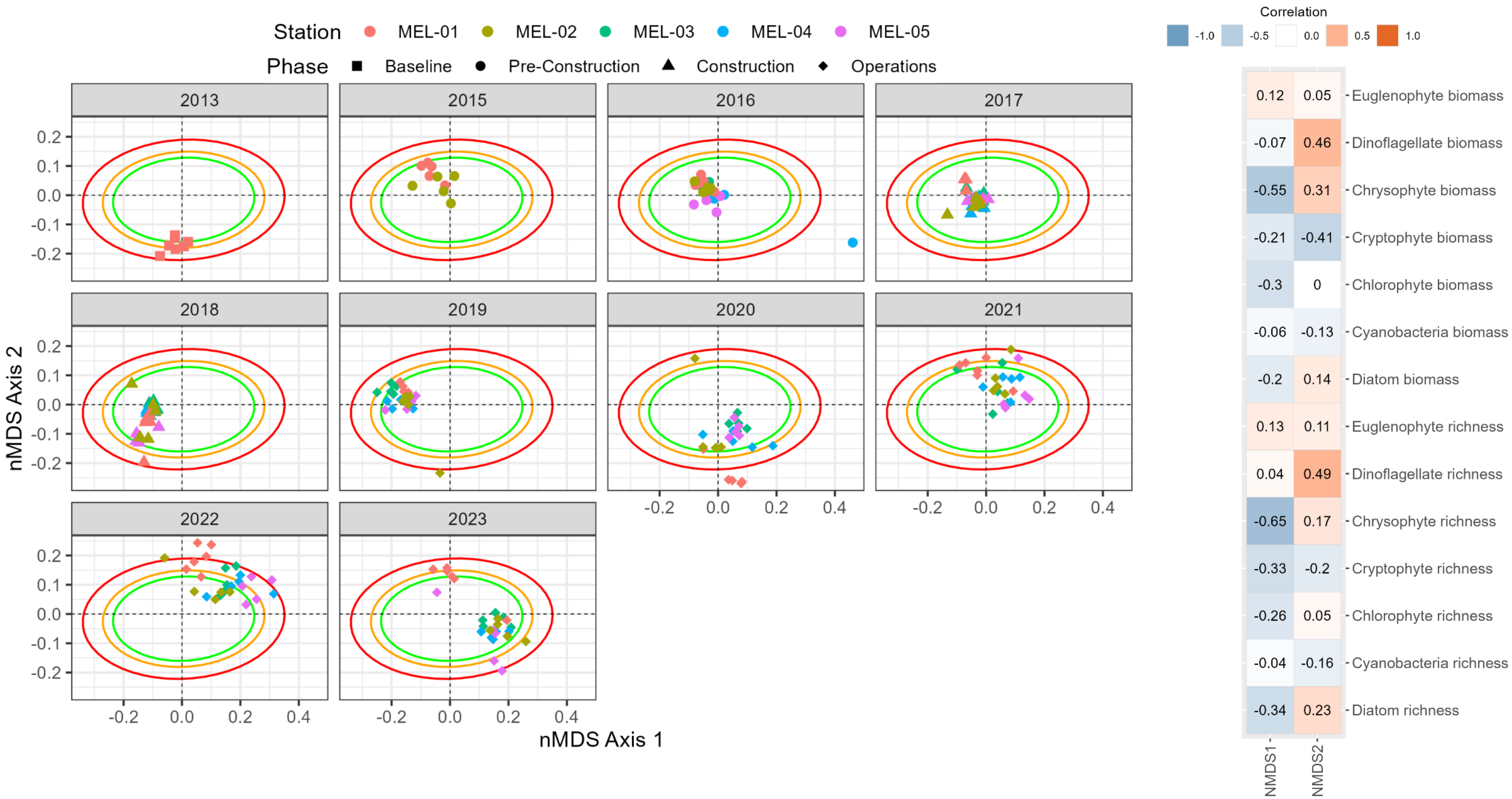


Figure 5-8. Non-metric multidimensional scaling (nMDS) results showing ordination of the phytoplankton results by year and location for Meliadine Lake.

Notes: Green, orange, and red ellipses = 90th, 95th, and 99th percentile of the baseline/reference phytoplankton community.
The correlation matrix displays correlations between the biomass and richness of each major taxa group and the nMDS scores for Axis 1 and 2. The Spearman critical value is 0.197 ($p < 0.05$).



5.6.5 Nutrient-Productivity Relationships

Nutrient-productivity relationships were explored using chlorophyll-a and total phytoplankton biomass as endpoints for primary productivity. 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 indicates that phytoplankton productivity is 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, so can also influence productivity (Fondriest, 2014).

The 2020 AEMP Report (Azimuth, 2021) 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 an explanatory variable in 2021 because of possible climate-related increases in DOC concentration associated with higher rainfall, runoff, and erosion of terrestrial soils (Rawlins et al. 2021).

Phytoplankton biomass is the most important metric for productivity and chlorophyll-a is used as a key indicator; the relationship between the two is shown by year in **Figure 5-9**. In general, there is a positive relationship within each year based primarily on the results from MEL-01. However, the increasing temporal trend for chlorophyll-a at MEL-01 in the last three years is not associated with progressively higher total biomass (**Figure 5-10**). Divergent patterns of change for biomass and chlorophyll-a were also evident at MEL-02 (lower biomass in 2023 and higher chlorophyll-a). These results imply that the relative amount of the photosynthetic pigment per unit biomass is increasing for the phytoplankton communities at MEL-01 and MEL-02 but not at the reference areas. As discussed in **Section 5.1**, the amount of chlorophyll-a content per phytoplankton is highly variable and can be influenced by various factors, including trophic status, community composition, light availability, and water chemistry (Desortova, 1981; Felip and Catalan, 2000; Kasprzak et al., 2008).

Felip and Catalan (2000) found that in an oligotrophic lake system, the seasonal chlorophyll-a maximum in the water column was associated with a phytoplankton community dominated by flagellated chrysophytes. As previously discussed, the phytoplankton community at MEL-01 contains a higher total amount and relative proportion of chrysophytes than MEL-02 and the reference areas. In addition, on average 3 of the 5 most dominant species by biomass in replicates from MEL-01 in 2023 were flagellated chrysophytes, compared to an average of 1 of 5 at MEL-02 and the reference areas. Therefore, one possible explanation for the increase in chlorophyll-a per unit of phytoplankton biomass is that the community has a higher proportion of flagellated chrysophytes. If a similar increase in chlorophyll-a without a corresponding increase in phytoplankton biomass is observed again in the 2024 sampling program, this explanation will be given further consideration.

To further investigate potential nutrient-productivity relationships, chlorophyll-a concentrations and total biomass were plotted against concentrations of nitrogen, DOC, and phosphorus for all locations (**Figure 5-11**) and for MEL-01 only (**Figure 5-12**). Nitrogen, DOC, and phosphorus do not appear to be strongly influencing phytoplankton biomass based on data collected at MEL-01, MEL-02, and the reference areas since 2013 (**Figure 5-11**). There is some evidence of a weak positive relationship between chlorophyll-a and both DOC and nitrogen when looking at data from all years and all areas in Meliadine Lake (**Figure 5-11**) and between chlorophyll-a and DOC when looking specifically at the results for MEL-01 (**Figure 5-12**). However, the lack of a relationship between the nutrient concentrations and total biomass suggests that the positive relationships between DOC and nitrogen and chlorophyll-a likely reflect a change in the relative amount of chlorophyll-a per mg of phytoplankton biomass rather than a change in total productivity.

Some species of chrysophytes can increase chlorophyll-a production in response to environmental factors such as light availability (Pick and Nalewajko, 1984). Light availability can be influenced by several factors, including the concentration of dissolved organic carbon (Fee et al., 1996). Therefore, it is possible that increasing DOC concentrations in MEL-01 over time are impacting light availability and phytoplankton are increasing their amount of chlorophyll-a per unit over time. However, in 2023 concentrations of DOC in reference areas MEL-04 and MEL-05 were comparable to those measured at MEL-01 and therefore the increase in DOC alone is likely not sufficient to explain the increase in chlorophyll-a at MEL-01. In the AEMP, light availability is primarily measured in the field using Secchi depth, which is discussed further in the following section.

Figure 5-9. Relationship between chlorophyll-a and phytoplankton biomass for Meliadine Lake by year, 2015 through 2023

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.

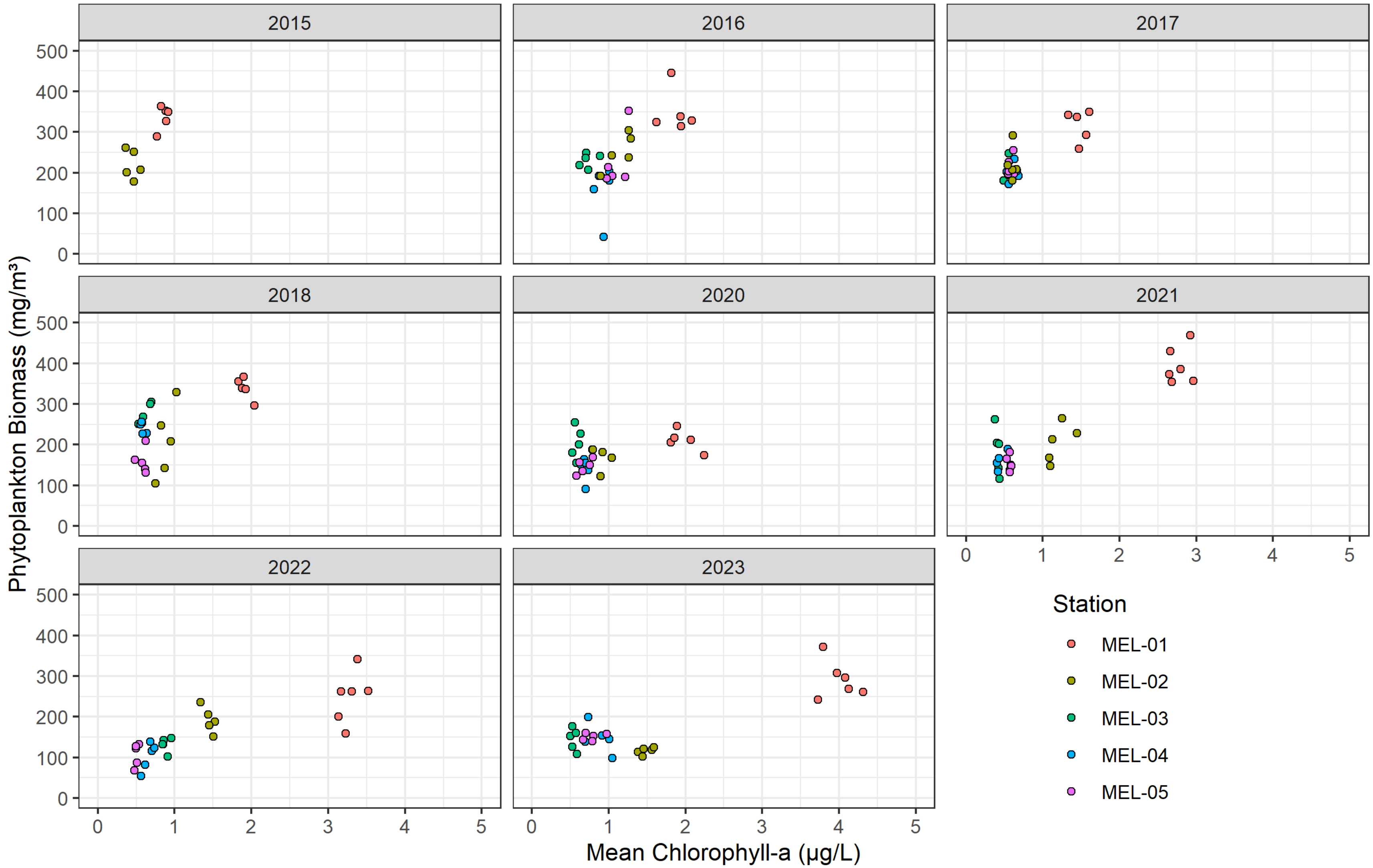


Figure 5-10. Relationship between chlorophyll-a and phytoplankton biomass for Meliadine Lake by monitoring location, 2015 through 2023

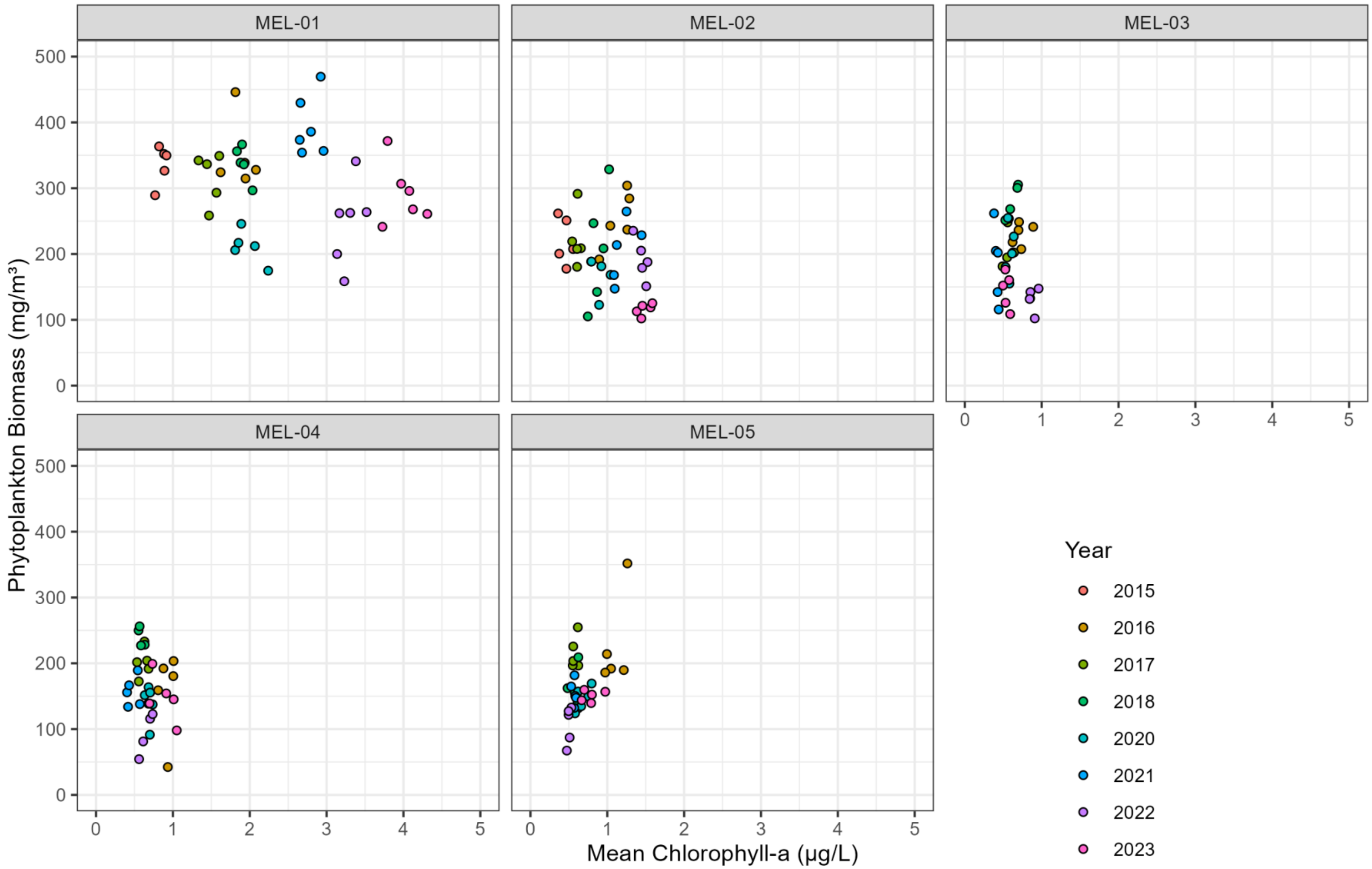


Figure 5-11. Relationship between nutrient concentrations (DOC, nitrogen, and phosphorus) and phytoplankton biomass and chlorophyll-a in Meliadine Lake, 2013-2023

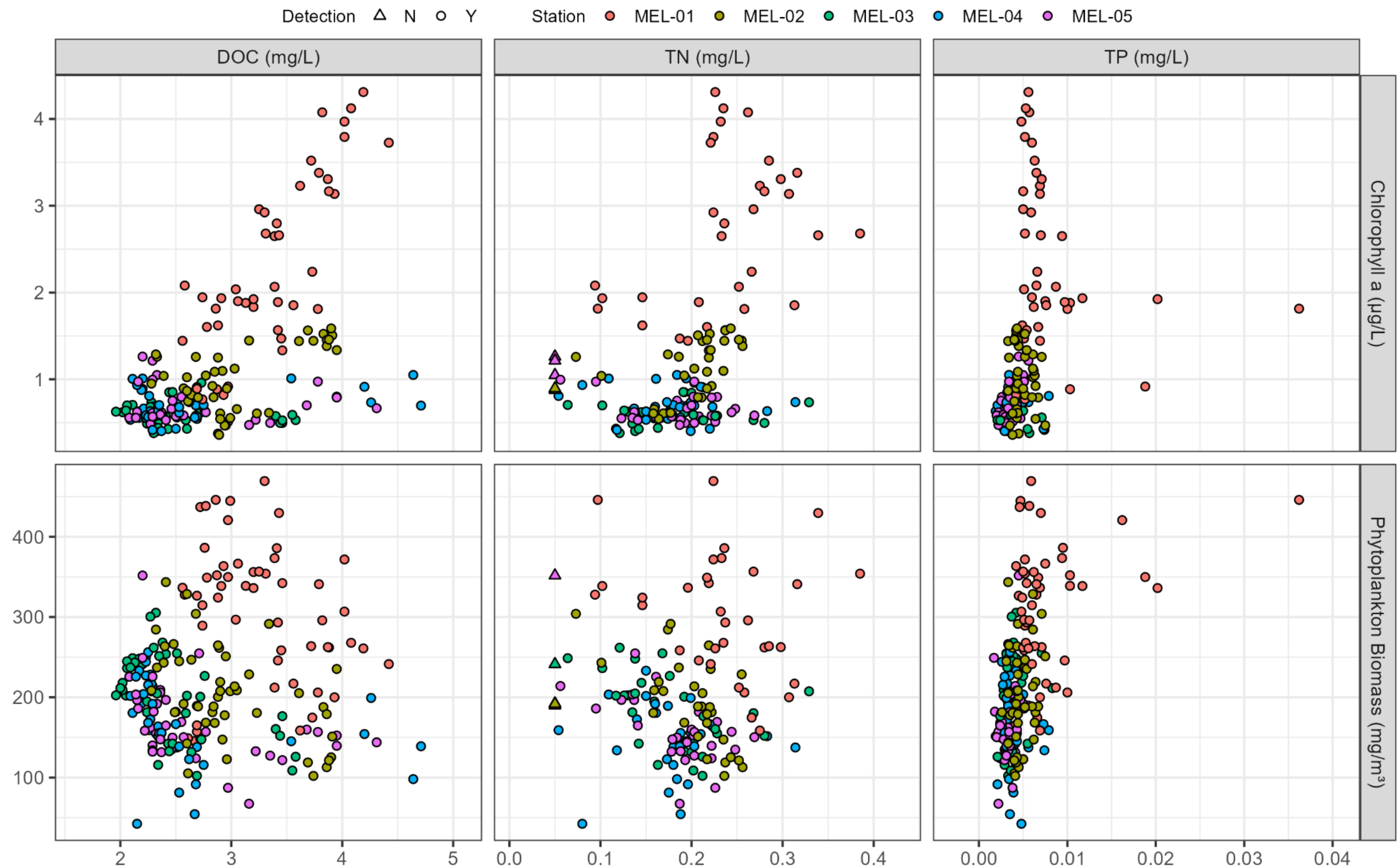
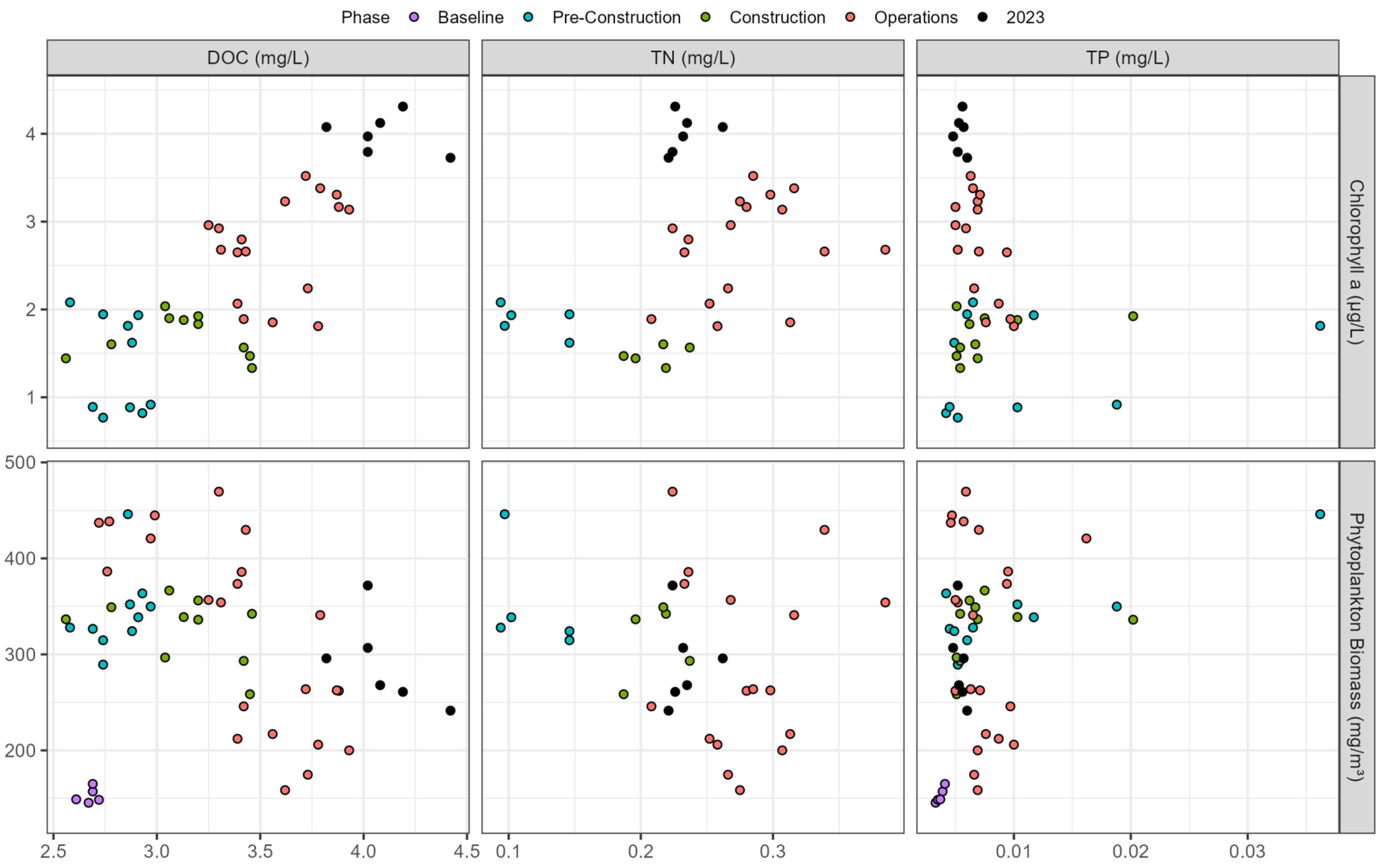


Figure 5-12. Relationship between nutrient concentrations (DOC, nitrogen, and phosphorus) and phytoplankton biomass and chlorophyll-a at the near-field area (MEL-01), 2013-2023

Notes: DOC = dissolved organic carbon; TN = total nitrogen; TP = total phosphorus

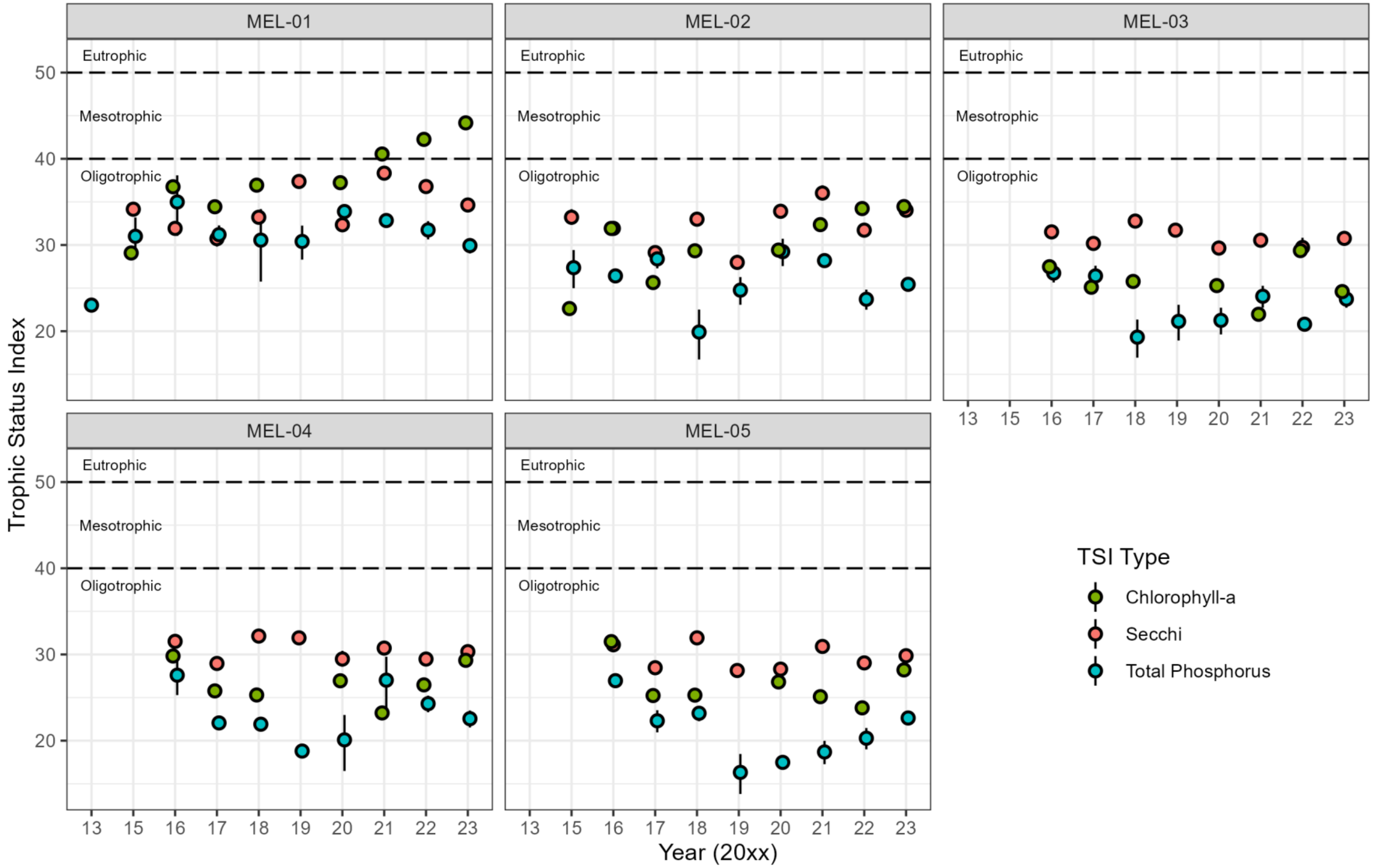


5.6.6 Trophic Status Index

Trophic status index (TSI) results (mean ± 1 standard error) for total phosphorus, chlorophyll-a and Secchi depth are presented for each sampling area in **Figure 5-13**. Similar to previous years, mean TSI values for all three parameters (i.e., Secchi depth, chlorophyll-a, and total phosphorus) were higher at MEL-01 compared to MEL-02 and the reference areas, which is consistent with the narrative that the East Basin of Meliadine Lake is more productive than the MF and reference areas. As expected, based on the trend of increasing chlorophyll-a in the last several years (see **Section 5.6.3**), the chlorophyll-a TSI increased again in 2023, remaining above the value of 40 which marks the transition from oligotrophic to mesotrophic (Carlson, 1977). However, the mean calculated TSIs for both Secchi depth and total phosphorus at MEL-01 in 2023 were less than 40 and have decreased for the past two years in a row. These results are consistent with the divergent patterns in biomass and chlorophyll-a as measures of productivity in the NF area and may reflect a community shift at MEL-01 towards species with higher chlorophyll-a content or an increase in chlorophyll-a per phytoplankton over time. Based on all three TSI endpoints, the trophic status of Meliadine Lake remains oligotrophic.

Figure 5-13. Trophic Status Index values for Meliadine Lake, 2013 through 2023

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



5.7 Conclusions

Conclusions for the 2023 phytoplankton study are summarized below in the context of the key question stated in **Section 5.1**. The phytoplankton results are incorporated into the Low Action Level assessment in **Section 6.1**.

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

There is some evidence that the phytoplankton community at MEL-01 has changed in recent years based on the results of the Bray-Curtis dissimilarity index and the multivariate analyses. The shift in the phytoplankton community aligns with predictions in the FEIS. However, it is uncertain if the underlying cause of the shift in the community is related to effluent or interannual climate variability.

Productivity

Phytoplankton biomass, the most direct measure of community productivity, has been variable across years but has not shown any consistent increasing or decreasing trends related to mining. In contrast, chlorophyll-a, which is used as an indicator of productivity, trended higher at MEL-01 and MEL-02 in 2023, showing a rise since 2020. The divergent trends for chlorophyll-a and total biomass suggests that the amount of chlorophyll-a per unit phytoplankton biomass may be increasing. Based on the available data, the underlying cause may be related to water clarity or a shift in the phytoplankton community composition. There is some evidence of a weak positive relationship between DOC and chlorophyll-a, which may influence the amount of light available and affect the amount of chlorophyll-a per unit of biomass. Overall, results from the 2023 phytoplankton study demonstrate that despite higher loadings of nitrogen coinciding with effluent discharge in 2018 (**Figure 5-1**), there is no evidence to suggest nutrient enrichment is occurring in the form of year-over-year increases in total phytoplankton biomass.

Community Structure

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 the structure of the phytoplankton community was predicted compared to baseline conditions and phytoplankton productivity was predicted to remain similar to baseline. The multivariate analysis of individual taxa biomass showed that the community at MEL-02 was similar to the reference areas in most years but that the community at MEL-01 differed in several years (2020, 2022, and 2023). However, these three years had variable effluent discharge and nutrient loadings characteristics suggesting that factor(s) other than mining effluent likely contributed to the differences in phytoplankton community.

6 RESPONSE FRAMEWORK AND LOW ACTION LEVEL ASSESSMENT

The AEMP Response Framework links monitoring results to management actions to ensure activities at the Mine do not adversely impact water quality for aquatic life, human consumption, and the useability of the fishery in Meliadine Lake. The goal is to identify changes and implement follow-up actions before adverse effects are observed. Follow-up actions may be as straightforward as routine monitoring as per the *AEMP Design Plan*, or targeted sampling or additional studies to understand the spatial extent or ecological significance of changes in water quality or effects on aquatic life. In rare circumstances, if the cause/source is linked to mining activities, the Mine may implement mitigation measures to address the source before completing verification sampling or targeted studies.

The Low Action Level assessment integrates results from the various monitoring components to determine if a change has occurred that warrants further investigation. The assessment criteria are specific to each monitoring component. For water chemistry, the assessment includes comparisons to baseline and/or reference data (e.g., normal range assessment), water quality guidelines (i.e., AEMP Benchmarks and Action Levels), and statistical comparisons. Potential effects on aquatic communities are evaluated by comparing results from the exposure and reference with a focus on the magnitude and direction of change within and between areas.

6.1 Low Action Level Assessment for Meliadine Lake

The Low Action Levels for Meliadine Lake were updated in Version 2 of the *AEMP Design Plan* (Azimuth, 2022). Discharge of effluent to Meliadine Lake is the most likely pathway for 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*. Results presented in **Section 2** (source characterization), **Section 3** (Meliadine Lake water quality), and **Section 5** (phytoplankton study) are summarized below according to the Low Action Level criteria in the *AEMP Design Plan*.

Toxicological Impairment

The Low Action Level assessment for toxicological impairment is summarized in **Table 6-1**.

The long-term water quality monitoring program in Meliadine Lake indicates some parameters have increased in the East Basin compared to baseline/reference conditions. However, the concentrations for all parameters of interest remain below guidelines for protection of aquatic life and the guidelines for drinking water quality. Furthermore, concentrations of TDS and chloride at MEL-01 are below predictions in the 2014 FEIS and in the hydrodynamic water quality model that was prepared for the Water Licence Amendment Application in 2020.

Taxonomic richness, biomass, and diversity indices at MEL-01 were within the range of baseline conditions. Furthermore, the results form the quarterly sublethal toxicity tests with *L. minor* (duckweed) and the water quality screening assessment corroborate that current conditions in Meliadine Lake support a functionally diverse phytoplankton community.

Based on the assessment criteria in **Table 6-1**, the Low Action Level for toxicological impairment was not exceeded in 2023.

Nutrient Enrichment

The Low Action Level assessment for nutrient enrichment is summarized in **Table 6-2**.

The results of the 2023 phytoplankton study confirmed that the East Basin is naturally more productive than other areas of Meliadine Lake. Phytoplankton biomass naturally varies year-to-year, but biomass estimates for MEL-01 in August 2023 were within the range observed in previous years. It is unclear what factor(s) are responsible for naturally-higher biomass is in the East Basin compared to other areas of Meliadine Lake. The morphology of the East Basin, timing of ice off, and/or differences in water quality (natural or climate-related) are some of the factors that may contribute to within-lake variability for phytoplankton biomass.

Chlorophyll-a (an indirect measure of primary productivity) has increased year-over-year at MEL-01. Since 2015, chlorophyll-a has increased by roughly 4-fold at MEL-01 (from 1 µg/L to 4 µg/L). The same increasing temporal trend for chlorophyll-a was apparent at MEL-02, but the magnitude of the increase was less. Chlorophyll-a concentrations at the reference areas have remained stable at just under 1 µg/L since 2016 (the first year of monitoring). Chlorophyll-a and biomass are not correlated. The factor(s) contributing to divergent trends for chlorophyll-a and biomass at MEL-01 are unknown. What is known, is that phosphorus concentrations have trended lower in recent years. In 2023, the average total phosphorus concentration during the open water season was nearly identical to the normal range for Meliadine Lake (0.006 mg/L) and below the AEMP Action Level of 0.0075 mg/L (75 % of the CCME water quality guideline for oligotrophic classification).

Based on all the assessment criteria in **Table 6-2**, the Low Action Level for nutrient enrichment was not exceeded in 2023.

Table 6-1. Meliadine Lake – Low Action Level Assessment for Toxicological Impairment (from the *AEMP Design Plan* [Azimuth, 2022])

Monitoring Component	Assessment	Criteria for Exceedance of the Low Action Level	Summary of Results from 2023
Water Quality	End of Pipe Toxicity	1) Confirmed sublethal toxic effects on test organisms other than fish in end-of-pipe samples[a]	• There were no acute effects to Rainbow Trout or *D. magna* in the weekly effluent toxicity tests in 2023. • There were no effects to *L. minor* frond yield or dry weight biomass in the quarterly sublethal tests in 2023. No effects were observed in the sublethal test conducted in 2022. • **The Low Action Level was not exceeded for end-of-pipe toxicity.**
	Aquatic Life	1) Near-field mean above the normal range, 2) Statistically significant higher concentrations at MEL-01 compared to reference, and 3) Near-field mean exceeds 75% of an AEMP Benchmark (aka the AEMP Action Level)	• Several parameters exceeded the normal range of baseline/reference conditions in 2023. • The concentrations of most parameters of interest are higher in the East Basin compared to the reference areas. • There were no mining-related exceedances of the AEMP Action Levels in 2023. Current concentrations for most parameters are less than 10 % of the AEMP Action Level (**Figure 3-4**). • **The Low Action Level was not exceeded for aquatic life.**
	Water is Safe for Human Consumption	1) Statistically significant higher concentrations at MEL-01 compared to reference, and 2) Drinking water parameters in exposure area above 75% of Health Canada's human health drinking water quality guideline (maximum acceptable concentration)	• There were no exceedances of Health Canada's drinking water guidelines in 2023 (see **Appendix C3**). • **The Low Action Level was not exceeded for human consumption.**
Phytoplankton Community	Aquatic Life	1) Phytoplankton community metrics MEL-01 outside the range of baseline/reference conditions, and 2) Change in direction and magnitude that is indicative of toxicological impairment (i.e., lower richness, diversity, biomass)	• There was no evidence of toxicological impairment to the phytoplankton community in 2023 based on biomass, richness, and diversity indices. This conclusion is supported by two lines of evidence (1) no effects to *L. minor* in the quarterly sublethal toxicity tests with full-strength effluent from MEL-14 and (2) no exceedances of water quality guidelines for the protection of aquatic life. • **The Low Action Level was not exceeded for toxicological effects to the phytoplankton community.**

Notes
[a] Under MDMER, the Mine is required to complete quarterly sublethal toxicity testing on the most sensitive test species. *Lemna minor* (duckweed) is the most sensitive test species based on sublethal toxicity tests.

Table 6-2. Meliadine Lake – Low Action Level Assessment for Nutrient Enrichment (from the *AEMP Design Plan* [Azimuth, 2022])

Monitoring Component	Assessment	Criteria for the Low Action Level Assessment	Summary of Results from 2023
Water Quality	Aquatic Life	1) Concentrations of total phosphorus (TP) at MEL-01 above the normal range, supported by temporal trends, 2) Statistically significant difference for TP between MEL-01 and reference areas, and 3) Average TP concentration at MEL-01 that exceeds 75 % of AEMP Benchmark	• The average concentration of TP at MEL-01 in 2023 was 0.006 mg/L, equal to the normal range of baseline and reference conditions (0.006 mg/L) and less than the AEMP Action Level (0.0075 mg/L). • TP concentrations at MEL-01 continued to trend downward in 2023, coinciding with lower annual loadings to Meliadine Lake. • **The Low Action Level was not exceeded based on total phosphorus concentrations in MEL-01.**
Phytoplankton	Aquatic Life	1) Near-field mean for total phytoplankton biomass above the upper bound of the normal range, and 2) Change in direction and magnitude indicative of nutrient enrichment (i.e., divergent trend for phytoplankton biomass)	• Phytoplankton biomass is naturally higher at MEL-01 compared to the other areas of Meliadine Lake, but results from 2023 were within the range of previous years. • Chlorophyll-a concentrations are trending higher at MEL-01 compared to other areas. The divergent temporal trend for chlorophyll-a at MEL-01 compared to MEL-02 and the reference areas may indicate a subtle shift in the structure of the phytoplankton community. • The results from the 2023 AEMP align with the following predictions in the 2014 FEIS: (1) subtle changes to the phytoplankton community could occur, but (2) biomass would remain within the range of baseline/background. • **The Low Action Level was not exceeded for nutrient enrichment based on the available lines of evidence from the phytoplankton community monitoring program.**

6.2 Peninsula Lakes Water Quality

Low Action Levels were not developed for the Peninsula Lakes. However, the results from the Peninsula Lakes water quality monitoring program are evaluated similarly to the Meliadine Lake water quality data to determine if follow-up studies or mitigation is required to address non-point source discharges.

Water quality in Lake A8 and Lake B7 has changed coinciding with the construction of the Mine, including the placement of tailings within the TSF and development of Tiriganiaq Pits 1 and 2. The fact that water quality has changed in both of these lakes is not surprising given their proximity to the Mine. The spatial extent of changes in water quality does not extend to Lake D7. Some parameters have increased in Lake D7 compared to baseline, for example DOC, but the gradual temporal trends point to interannual climate variability as the main cause.

Several parameters were detected above baseline in 2023, but sulphate and arsenic stand out as mining-related. The initial source for both parameters was likely dust that migrated off-site and accumulated in the snowpack in the winter of 2020. Metals and other parameters associated with particulates in the snowpack were likely transported to Lake A8 and Lake B7 during freshet.

Efforts to control off-site migration of dust have resulted in lower concentrations for all key parameters of interest at the snow chemistry monitoring station located at the north end of Lake A8. However, sulphate and arsenic concentrations have continued to trend higher in recent years. Sulphate concentrations are well below the aquatic life guideline in both lakes, but the three samples collected from Lake B7 in August 2023 exceeded the AEMP Action Level of 18.8 µg/L. The maximum concentration was 23.4 µg/L, marginally below the SSWQO of 25 µg/L. A third sampling event was completed in mid-October, and arsenic concentrations had decreased to approximately 10 µg/L. The 2-fold decrease in arsenic between August and October is consistent with co-precipitation with iron oxyhydroxides. These data suggest sediments in Lake B7 and Lake A8 may be an important sink and source of metals that originally migrated off-site in 2020.

The water quality monitoring data from Lake D7 demonstrates that the spatial extent of mining-related changes to water quality are localized to Lake A8 and Lake B7. Agnico Eagle will continue to implement best practices as per the Dust Management Plan to mitigate the potential effects of off-site migration of dust on the small lakes adjacent to the Mine.

6.3 Scope of the 2024 AEMP

The scope of the 2024 AEMP includes the following components:

- Water quality monitoring in Meliadine Lake (same as previous years)
- Phytoplankton community sampling (same as previous years)
- Benthic invertebrate community and sediment chemistry monitoring (repeat of the 2021 AEMP)
- Threespine Stickleback population study (lethal survey)
- Lake Trout population study (lethal survey)
- Fish tissue chemistry (Threespine Stickleback [carcass] and Lake Trout [muscle])

When the AEMP was designed in 2015, one of the objectives was to create a harmonized program that satisfied monitoring requirements for the Water Licence and MDMER. To meet this objective, the proposed fish population studies for the Cycle 3 EEM program will be adopted for the 2024 AEMP. The study design for the Cycle 3 EEM was submitted to ECCC in mid-February and is currently under review (Azimuth and Portt, 2024). The Threespine Stickleback study is a repeat of the 2021 AEMP, but the study will target parasitized fish instead of unparasitized fish. Conclusions about potential effluent-related effects to Threespine Stickleback were the same for the parasitized and unparasitized populations. The incidence of parasitism is between 60 and 80 %, so targeting parasitized fish will mean fewer fish are sacrificed to achieve the target sample size. The Lake Trout study is a repeat of the Cycle 2 EEM program. Lake Trout will be collected from MEL-01 and two external reference lakes: Peter Lake and Atulik Lake. Some of the Threespine Stickleback carcasses will be submitted for metals analysis. Lake Trout muscle samples will be also be submitted for metals analysis to determine if the Mine is affecting the useability of the fishery.

7 REFERENCES

Agnico Eagle (Agnico Eagle mines Ltd.) 2022. Meliadine Gold Mine – Adaptive Management Plan for Water Management. May 2022. Version 2.

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.

Ayala-Borda P, Kivejoy C, Power M, Rautio M. 2021. Evidence of eutrophication in Arctic lakes. Arctic Science. 7(4): 859-871.

Azimuth and Portt. 2024. Cycle 3 EEM Study Design. February 2024.

Azimuth Consulting Group Inc. 2023. Aquatic Effects Monitoring Program 2022 Annual Report – Meliadine Gold Mine. March 2023.

Azimuth Consulting Group Inc. 2022. Aquatic Effects Monitoring Program Design Plan. Version 2_NWB. December 1, 2022.

Azimuth. 2021. Aquatic Effects Monitoring Program 2020 Annual Report – Meliadine Gold Mine. March 2021.

Ballen-Segura M, Felip, M, Catalan J. 2016. Some mixotrophic flagellate species selectively graze on archaea. Applied and Environmental Microbiology 83(2).

Barrett, P.M., Hull, E.A., Burkart, K., Hargrave, O., McLean, J., Taylor, V.F., Jackson, B.P., Gawel, J.E. and Neumann, R.B., 2019. Contrasting arsenic cycling in strongly and weakly stratified contaminated lakes: Evidence for temperature control on sediment–water arsenic fluxes. Limnology and oceanography, 64(3), pp.1333-1346.

Bergström, A.K. and Karlsson, J., 2019. Light and nutrient control phytoplankton biomass responses to global change in northern lakes. Global change biology, 25(6), pp.2021-2029.

CCME. 2004. Phosphorus: Canadian Guidance Framework for the Management of Freshwater Systems.

Carlson RE. 1977. A trophic state index for lakes. Limnol. Oceanogr. 22: 361-369.

Clarke K. 1993. Non-parametric multivariate analyses of changes in community structure. Australian Journal of Ecology 18(1): 117-143.

Codd, G.A., 2000. Cyanobacterial toxins, the perception of water quality, and the prioritization of eutrophication control. Ecological engineering, 16(1), pp.51-60.

Diavik Diamond Mines Inc. (DDMI). 2013. Aquatic Effects Monitoring Program Study Design Version 3.5. Diavik Diamond Mines Inc., Yellowknife, Northwest Territories. May 2014.

Desortova B. 1981. Relationship between chlorophyll-a concentration and phytoplankton biomass in several reservoirs in Czechoslovakia. International Review of Hydrobiology 66(2), 153-169.

Dexter, E., Rollwagen-Bollens, G. and Bollens, S. 2018. The trouble with stress: a flexible method for the evaluation of nonmetric multidimensional scaling. Limnology and Oceanography: Methods 16: 434-443.

Dodds, W. and Whiles, M. 2010. Freshwater Ecology: Concepts and Environmental Applications of Limnology. 2nd Edition, Elsevier, Amsterdam, 330-333.

ECCC (Environment and Climate Change Canada). 2021. Canadian Environmental Protection Act, 1999 Federal Environmental Quality Guidelines – Copper. April 2021.

ECCC (Environment and Climate Change Canada). 2020. Canadian Environmental Protection Act, 1999 Federal Environmental Quality Guidelines – Strontium. July 2020.

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

Fee E., Hecky R., Kasian S., Cruikshank D. 1996. Physical and chemical responses of lakes and streams. Limnology and Oceanography 41(5), 912-920.

Fee, E.J., 1976. The vertical and seasonal distribution of chlorophyll in lakes of the Experimental Lakes Area, northwestern Ontario: Implications for primary production estimates. Limnology and oceanography, 21(6), pp.767-783.

Felip, M. and Catalan, J., 2000. The relationship between phytoplankton biovolume and chlorophyll in a deep oligotrophic lake: decoupling in their spatial and temporal maxima. Journal of Plankton Research, 22(1), pp.91-106.

Filiz, N., Işkın, U., Beklioğlu, M., Öğlü, B., Cao, Y., Davidson, T.A., Søndergaard, M., Lauridsen, T.L. and Jeppesen, E., 2020. Phytoplankton community response to nutrients, temperatures, and a heat wave in shallow lakes: An experimental approach. Water, 12(12), p.3394.

Findlay, D.L., Kasian, S.E.M., Stainton, M.P., Beaty, K. and Lyng, M., 2001. Climatic influences on algal populations of boreal forest lakes in the Experimental Lakes Area. Limnology and Oceanography, 46(7), pp.1784-1793.

Fondriest Environmental, Inc. 2014.Algae, Phytoplankton and Chlorophyll. Fundamentals of Environmental Measurements. 22 Oct. 2014.

Frey, K.E. and McClelland, J.W., 2009. Impacts of permafrost degradation on arctic river biogeochemistry. Hydrological Processes: An International Journal, 23(1), pp.169-182.

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 6513-REP-03 Version 1. Report Number: Doc 485-1405283 Ver. 1. Submitted to Agnico Eagle Mines Ltd. 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.

Hazukova V, Burpee B, McFarlane-Wilson I, Saros J. 2021. Under ice and early summer phytoplankton dynamics in two Arctic lakes with differing DOC. Journal of Geophysical Research: Biogeosciences 126(4).

Huser, B.J., Futter, M.N., Bogan, D., Brittain, J.E., Culp, J.M., Goedkoop, W., Gribovskaya, I., Karlsson, J., Lau, D.C., Rühland, K.M. and Schartau, A.K., 2022. Spatial and temporal variation in Arctic freshwater chemistry—Reflecting climate-induced landscape alterations and a changing template for biodiversity. Freshwater Biology, 67(1), pp.14-29.

Hussain, M.M., Bibi, I., Shahid, M., Shaheen, S.M., Shakoor, M.B., Bashir, S., Younas, F., Rinklebe, J. and Niazi, N.K., 2019. Biogeochemical cycling, speciation and transformation pathways of arsenic in aquatic environments with the emphasis on algae. In Comprehensive analytical chemistry (Vol. 85, pp. 15-51). Elsevier.

Kasprzak, P., Padisák, J., Koschel, R., Krienitz, L. and Gervais, F., 2008. Chlorophyll a concentration across a trophic gradient of lakes: An estimator of phytoplankton biomass?. Limnologica, 38(3-4), pp.327-338.

Miller, C.B., Parsons, M.B., Jamieson, H.E., Ardakani, O.H., Gregory, B.R. and Galloway, J.M., 2020. Influence of late-Holocene climate change on the solid-phase speciation and long-term stability of arsenic in sub-Arctic lake sediments. Science of the total environment, 709, p.136115.

NIRB (Nunavut Impact Review Board). 2022. Project Certificate [No.: 006]. Amendment No.2 March 2, 2022.

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

Palmer, M.J., Chételat, J., Jamieson, H.E., Richardson, M. and Amyot, M., 2021. Hydrologic control on winter dissolved oxygen mediates arsenic cycling in a small subarctic lake. Limnology and Oceanography, 66, pp.S30-S46.

Pernica, P., North, R.L. and Baulch, H.M., 2017. In the cold light of day: the potential importance of under-ice convective mixed layers to primary producers. Inland Waters 7: 138–150.

Pick F., Nalewajko C. 1984. The origina of a metalimnetic chrysophyte peak. Limnology and Oceanography 29(1), 125-134.

Pokrovsky, O.S., Manasypov, R.M., Pavlova, O.A., Shirokova, L.S. and Vorobyev, S.N., 2022. Carbon, nutrient and metal controls on phytoplankton concentration and biodiversity in thermokarst lakes of latitudinal gradient from isolated to continuous permafrost. Science of The Total Environment, 806, p.151250.

Prowse, T.D., Wrona, F.J., Reist, J.D., Gibson, J.J., Hobbie, J.E., Lévesque, L.M. and Vincent, W.F., 2006. Climate change effects on hydroecology of Arctic freshwater ecosystems. AMBIO: A Journal of the Human Environment, 35(7), pp.347-358.

R Core Team. 2022. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Rawlins, M.A., Connolly, C.T. and McClelland, J.W., 2021. Modeling terrestrial dissolved organic carbon loading to western Arctic rivers. Journal of Geophysical Research: Biogeosciences, 126(10), p.e2021JG006420.

Rott E. 1981. Some results from phytoplankton counting intercalibrations. Schweiz. Z. Hydrol., 43, 34–62.

Saad J, Unrein F, Tribelli P, Lopez N, Izaguirre I. 2016. Influence of lake trophic conditions on the dominant mixotrophic algal assemblages. Journal of Plankton Research 38(4), 818-829.

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

Vollenweider, R.A., 1968. Scientific fundamentals of the eutrophication of lakes and flowing waters, with particular reference to nitrogen and phosphorus as factors in eutrophication. Paris Rep, 192, p.14.

Wrona, F.J., Prowse, T.D., Reist, J.D., Hobbie, J.E., Lévesque, L.M. and Vincent, W.F., 2006. Climate change effects on aquatic biota, ecosystem structure and function. AMBIO: A Journal of the Human Environment, 35(7), pp.359-369.

Welschmeyer, N.A. 1994. Fluorometric Analysis of chlorophyll a in the presence of chlorophyll b and pheopigments. Limnol. Oceanogr., 39(8), 1994, 1985-1992. (Modified).

Wetzel, R.G., 2001. Limnology: lake and river ecosystems. gulf professional publishing.

APPENDIX A

QUALITY ASSURANCE / QUALITY CONTROL METHODS AND RESULTS

TABLE OF CONTENTS

LIST OF TABLES – APPENDIX A

A.1 INTRODUCTION

The objective of quality assurance and quality control (QA/QC) is to verify 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. *Quality Assurance* (QA) refers to the practices employed to collect scientifically defensible samples meeting pre-defined data quality objectives (DQOs). This includes the use of experienced field staff, standard operating procedures, field data sheets, and certified laboratories. *Quality Control* (QC) refers to the measures taken to verify that the specific DQOs are met.

An overview of the QA/QC methods for the water quality and phytoplankton community monitoring programs are provided herein. A more detailed overview of the QA/QC procedures for the water quality monitoring program are provided in the *AEMP Design Plan* (Azimuth, 2022).

A.2 WATER CHEMISTRY

A.2.1 Field Methods

Field Data and Sample Collection

Standard QA procedures for the water chemistry program include rinsing the sampling equipment (pump and tubing in the winter; Kemmerer in the summer) to prevent cross-contamination between areas. 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.

Field collected limnology data focused primarily on measurements using a multiprobe meter. The meter is calibrated before field measures according to manufacturer instructions. The Environment Department at the Mine maintains a calibration log for each field instrument.

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

Samples were shipped to the analytical laboratories with a chain-of-custody (CoC) form. 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. 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 unreliable.

The Meliadine Environment Department plans water sampling events to minimize the amount of time that samples are in transit between the Mine and the laboratory. ALS provides recommended hold-times for water quality parameters; hold-times range from less than one day for pH to six months for metals. Hold-times for water samples are always exceeded for pH (15 minutes) and nitrate, nitrite, orthophosphate, and turbidity (3-d). Total dissolved solids and total suspended solids often exceed the 7-d recommended hold-time. On occasion, parameters with 14-d recommended hold-times are exceeded (e.g., alkalinity, cyanides). ALS recommends using professional judgement when interpreting chemistry data for parameters that exceeded hold-times for analysis. Based on long-term monitoring programs at Meliadine and Meadowbank, exceeding the recommended hold-times does not appear to impact the reliability of the results.

Blanks

Blanks are samples that do not contain the variable to be analyzed. They are used to assess and control sample contamination (BC MOE, 2013). Blank samples are collected once per sample event, and are submitted *blind* to the laboratory. 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. Three different types of *blank* samples are included in the AEMP: travel blanks, field blanks and equipment blanks.

Travel blanks (TB) – Travel blanks are 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.

Field blanks (aka Deionized Water Blanks [DI]) – Field blanks are used to detect potential contamination during sample collection, handling, shipping and laboratory analysis. Field blanks are prepared by filling the sample bottles with DI water provided by ALS.

Equipment blanks (EB) – Equipment blanks are used to detect potential contamination from sampling equipment. To obtain an equipment blank, DI water is run through the equipment and then transferred to a sample bottle. Filtered analyses for the EB are collected in the same manner as the lake samples using the syringe and 0.45 µm filter.

Results from the field, equipment and travel blanks are examined for detectable concentrations of any of the parameters measured. If a parameter 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 concentration in the equipment blank are flagged to examine the potential for cross-contamination to affect the results. This threshold does not apply to pH measurements, as DLs are not available for the pH scale.

Field Duplicates

Field duplicates are used to identify the precision of field sampling methods and laboratory analysis and within-station variability. Field duplicates are submitted *blind* to the laboratory and analysed using the same methods and equipment as original samples. The target frequency of field duplicate sample collection is approximately 10% of the total number of samples collected.

The DQOs for water quality parameters are based on the magnitude of the concentrations in the samples. For parameters with concentrations > 5 time the DL, the field duplicates are assessed using the relative percent difference (RPD) between the duplicate samples:

$$RPD = \frac{(A - B)}{(\frac{A + B}{2})} x\ 100$$

where: A = analytical result; B = duplicate result.

The DQOs for these parameters are equal to 1.5 times the laboratory RPDs. The laboratory RPDs for water chemistry for most analytes is 20% and the DQOs for field duplicate water samples were ±30%. For parameters without a laboratory RPD DQO, the field duplicate DQO was set to ±40% by default. Use of a 1.5 times multiplier for field duplicates is based on guidance from the Canadian Council of Ministers for the Environment (CCME) that states that acceptance limits for field-based QC samples are broader than laboratory QC and are typically 1.5 to 2 times the laboratory QC limits (CCME, 2016).

The uncertainty in concentrations increases near to the detection limit and the acceptance criteria are relaxed for parameters measured < 5-times the DL. For parameters with concentrations measured at < 5-times the DL, the DQO is an absolute difference between duplicates < 2-times the DL (referred to in the tables as DIFF).

The RPD and DIFF values may be either positive or negative and ideally should provide a mix of the two, clustered around zero. RPDs and DIFF values 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 or DIFF value falls outside the field duplicate DQO it is flagged for review. The importance of reduced precision becomes more important when concentrations are near regulatory guidelines (CCME, 2016).

A.2.2 Laboratory Methods

ALS is 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 samples. There are four types of QC samples 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**. 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.2.3 Results and Discussion

Results of the QA/QC analysis are discussed below. Results are presented in the following tables:

- A summary for water chemistry QA/QC, including 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 is provided in **Table A-1**.
- Detection limits and blanks (including travel, de-ionized, and equipment blanks) are provided in **Table A-2**.
- Field duplicate results for April, July, August, and September are provided in **Table A-3** to **Table A-6**.

Sample Shipping and Handling

No sample integrity observations were identified for the water chemistry samples collected in April, July, August, and September. The temperatures measured inside the coolers were 13°C in April, 23°C in July, 20-22°C in August, and 16°C in September. The target temperature for samples arriving at ALS is between 5°C and 10°C. The list of parameters that exceeded the recommended hold-times were similar to previous years. In most cases, the samples arrived at the lab within 14-days of sampling.

Laboratory QC Results

ALS provides a thorough account of their QC assessment in each COA that is issued[1]. 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** – there were no exceedances of DQOs for the laboratory duplicate samples, except for dissolved organic carbon in August samples.
- **Method blanks (MB)** – A small number of parameters were detected the MB samples in 2023: alkalinity and conductivity in August and phosphorous (total and dissolved) in September. The MB exceedances are inconsequential for interpreting the water quality results.
- **Matrix Spike (MS)** – MS recovery is periodically flagged in the QC assessment due to high concentrations of some parameters in the sample. These instances are typically associated with parameters such as major cations (e.g., calcium, magnesium, etc.) or certain metals with detected results above the DL (i.e., strontium). Reactive silica (reactive as SiO_2) is another parameter that is prone to interferences in MS recovery. ALS does not flag MS recovery due to high background concentrations as DQO exceedances.
- **Laboratory Control Samples (LCS)** – there were no exceedances of DQOs for the laboratory control samples in 2023.

Blanks

The table below summarizes the number of parameters detected in each of the blanks that were submitted for analysis in 2023. Travel blanks were not available for the April but will be included in the next AEMP sampling. Full details of results for blank samples are provided in **Table A-2**.

Similar to previous years, there were parameters detected in the blanks in each sampling event. The TB and DI blanks had the fewest number of exceedances. For parameters that were detected, the concentrations were less than 10-times the DL. The EB samples had more detected parameters compared to the DI and TB samples. The EB sample in August had 16 parameters where the concentrations were greater than 10-times the DL.

[1] 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.

Prior to the first sampling event in April 2024, additional instruction will be provided to the technicians on how to properly collect the DI and EB samples to minimize the potential for cross-contamination between samples.

Summary of parameters detected in blank samples in 2023

Event and Blank	Count	Count <DL	Count >DL	Parameters > 10*DL
April				
FB	124	119	5	0
DI	122*	117	5	0
EB	122*	92	30	2
July				
DI	124	121	3	0
EB	124	106	18	0
TB	124	121	3	0
August				
DI	124	117	7	0
EB	124	72	52	16
TB	124	120	4	0
September				
DI	124	111	13	0
EB	124	107	17	5
TB	124	122	2	0

Notes:

Dissolved and total mercury were not collected in the DI and EB samples in April.

Field Duplicates

One field duplicate is collected for approximately every 10 samples. Ten duplicate samples were collected in 2023. Two duplicates were collected in April, three duplicates were collected in July, three duplicates were collected in August, and two duplicates were collected in September (**Table A-3** to **Table A-6**). There were 1,190 comparisons across the 10 duplicate samples in 2023, of which only 18 cases failed to pass data quality objectives. Of the 18 instances where the DQO was not met, only 6 occurred with the concentrations were greater than 5-times the DL.

The field duplicate results indicate high precision for most parameters. There is more uncertainty associated with concentrations measured close to the DL, however, the effect on interpretating data in the AEMP is negligible, as the AEMP Benchmarks and Action Level concentrations (i.e., water quality guidelines) are typically an order of magnitude or higher than the DLs.

Parameters that exceeded the DQOs for the field duplicates in 2023

Event	Sample ID	Duplicate	Parameters that exceeded DQOs	DQO based on[a]
April	MEL-01-10	DUP-01	TSS	DIFF
			Lead (Pb)-Total	DIFF
July	MEL-03-04	DUP-1	Copper (Cu)-Total	RPD
			Tin (Sn)-Total	DIFF
			Mercury, dissolved	DIFF
	MEL-01-09	DUP-2	Mercury, total	DIFF
	D7-01	DUP-3	TSS	DIFF
			Ammonia	DIFF
			Lead, total	RPD
			Titanium, total	RPD
			Tin, dissolved	DIFF
August	MEL-03-03	DUP-1	Phosphorus, total	DIFF
			Total Organic Carbon	RPD
			Lead, total	RPD
			Titanium (Ti)-Total	DIFF
			Zinc (Zn)-Total	DIFF
September	MEL-01-06	DUP-2	Turbidity	DIFF
			Silicate (as SiO2)	RPD

Notes:

[a] RPD DQO is <30% difference between duplicate samples (applicable when concentrations are > 5-times DL)
DIFF DQO is a difference between duplicate samples of < 2-times the DL

Anomalous Results Flagged as Outliers

As part of the QC assessment, results from each sampling event were compared to data collected at other replicate stations to determine if there were outliers than should be excluded from the dataset. Data flagged as outliers in Meliadine Lake are listed in **Table A-7**.

Two samples at MEL-03 in August accounted for 98 of the 124 data points that were omitted from the dataset for Meliadine Lake in 2023. The samples collected at MEL-03-01 and MEL-03-02 in August had unusually high concentrations of TSS (74 mg/L at MEL-03-01 and 92 mg/L at MEL-03-02). The detection limits for total metals at MEL-03-01 were increased because of high turbidity. The field notes did not indicate anything unusual about conditions in this area of Meliadine Lake in mid-August. The anomalously high TSS results suggest the metals bottles were contaminated with sediment during collection.

Because of uncertainty around the potential for cross-contamination, the total and dissolved metals data from MEL-03-01 were excluded from the dataset. TSS, turbidity, and phosphorus results were also flagged as outliers when compared to the other replicate samples collected at MEL-03 in August. A few parameters were also flagged as outliers for MEL-03-02, but the concentrations of most metals were within the range of the other three samples collected at MEL-03.

Summary of parameters identified as outliers in each sampling event

April		July		August		September	
Station	**Parameter**	**Station**	**Parameter**	**Station**	**Parameter**	**Station**	**Parameter**
MEL-01-01	Copper (t, d)	MEL-01-01	Thorium (t)	MEL-01-09	Tin (d)	MEL-01-07	Turbidity
MEL-01-07	Tin (d)	MEL-01-09	Thorium (t)	MEL-03-01	TSS, turbidity, phosphorus, metals (t, d)	MEL-03-02	Aluminum (t)
MEL-01-08	Cadmium (t, d), tungsten (t)	MEL-02-05	Tin (t)	MEL-03-02	TSS, turbidity, phosphorus, aluminum (t), cesium (t), chromium (t), cobalt (t), iron (t), lanthanum (t), titanium (t), and vanadium (t)	MEL-03-04	Aluminum (d)
MEL-02-05	Molybdenum (d)	MEL-02-06	Tungsten (d), vanadium (d), zirconium (d)	MEL-04-01	Chromium (d), cobalt (d), nickel (d), zinc (d)		
MEL-02-08	Silver (t, d)	MEL-02-08	Zirconium (t)				
MEL-03-01	Tin (d)	MEL-03-04	Tin (t)				
Total	**10**		**8**		**103**		**3**

There were some anomalous results for dissolved metals at B7-03 in the October sampling compared to B7-01 and B7-02 (**Table A-8**). For example, dissolved copper was 225 µg/L at B7-03 compared to 0.8 and 3.7 µg/L at B7-01 and B7-02. Extra water was collected for this sampling event. A second set of samples from B7-03 were submitted for analysis of total and dissolved metals to confirm the results. The second set of results confirmed that the total and dissolved metals results from the initial set of samples were contaminated. The metals results from the second batch of samples at B7-03 were retained in the database.

A.3 PHYTOPLANKTON

A.3.1 Field Methods

Water samples for phytoplankton and chlorophyll-a were collected during the August 2023 sampling event. Samples were collected as depth-integrated samples every 2 m from below the surface to within 1 m of the sediment. 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. Water samples were stored in a cooler with ice packs until returning to the camp. Water samples were processed back at camp within 6 hours of sampling. Processing involved filtering the water samples for chlorophyll-a and preserving 50 mL of water with Lugol's iodine solution for taxonomy. Chlorophyll-a filters were kept in a freezer until ready to ship. The phytoplankton taxonomy samples were stored in dark containers at room temperature.

Field Duplicates

Duplicate results from the phytoplankton and chlorophyll-a analyses are discussed below.

Phytoplankton - Three field duplicate phytoplankton samples were collected during the August sampling event: DUP-MEL-AUG-01 at MEL-03-03, DUP-MEL-AUG-02 at MEL-01-06 and DUP-MEL-AUG-03 at MEL-05-01. Duplicate samples were submitted *blind* to the laboratory to assess the precision of the sample collection process and to help determine the representativeness of the samples. RPDs were calculated 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. For field duplicates, an RPD of 50% for total density and biomass concentrations is considered acceptable.

Chlorophyll-a – Three field duplicate chlorophyll-a samples were collected in 2023 at the same locations as the phytoplankton taxonomy field duplicate samples. The DQO for chlorophyll-a duplicates is an RPD less than 50%.

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. The DQO for chlorophyll-a blanks is concentrations less than the detection limit (<0.04 µg/L).

A.3.2 Laboratory Methods

Chlorophyll-a is analyzed at the University of Alberta Biogeochemical Analytical Service Laboratory (BASL).

Taxonomic analysis of phytoplankton is completed by David Findlay at Plankton-R-Us Inc. Three samples were randomly selected as laboratory duplicates in 2023. 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. The DQO for the laboratory duplicates is an RPD of less than 25% for total density and biomass.

A.3.3 Results and Discussion

Sample Shipping and Handling

Samples collected for chlorophyll-a analysis arrived at the laboratory thawed and at room temperature, despite being shipped in coolers full of ice packs. Keeping 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. Based on previous conversations with the laboratory manager at the U of A, thawing is not expected to significantly affect the quality of the chlorophyll-a results (Mingsheng Ma, pers. comm. October 21, 2022).

The phytoplankton samples for taxonomy analysis arrived at Plankton R Us (Winnipeg) without any sample integrity concerns.

Field and Laboratory Duplicates and Blanks

Results of the RPD analysis for phytoplankton field and laboratory duplicates, as well as chlorophyll-a field duplicates are presented in **Table A-9**, **Table A-10** and **Table A-11** respectively. These results are discussed below:

Phytoplankton Duplicates – The DQOs were met for all three field duplicate samples for total biomass and density (**Table A-9**) and for the laboratory duplicates (**Table A-10**).

Chlorophyll-a Duplicates– All of the field duplicate RPDs for chlorophyll-a concentrations met the DQOs (RPD < 50%) (**Table A-11**).

Chlorophyll-a Blanks– Chlorophyll-a was less than the laboratory detection limits (<0.04 µg/L) for all field blanks three field blanks.

QA/QC TABLES

Table A-1. Laboratory QA/QC summary for water samples analyzed at ALS Environmental in 2023

Event	Lab Work Order Number	Samples	Date Sampled	Date Received	Sample Integrity Observations	Temperature (°C)	Hold-time Exceedances	Data Qualifiers for Water Samples			Adjusted Detection Limits (mg/L unless stated otherwise)			Laboratory QC Samples							
														Laboratory Duplicates		Method Blanks		Matrix Spike		Laboratory Control Samples	
								Qualifier	Sample ID	Parameters	Parameters	Target DL	Actual DL	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier	Parameters	Qualifier
April	WP2304940	MEL-01, MEL-02, MEL-03, Blanks and Duplicates	April 1-3, 2023	14-Apr	None	13.1		DTC	MEL-02-05 & -06	Mo (D)	NO3 + NO2	0.005	0.0224	None	-	None	-	None	-	None	-
July	WP2317105	MEL-02	July 15, 2023	27-Jul	None	23.0	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, CN, TOC, and DOC.	DTC	MEL-02-06	Cu (D), Mo (D), Ni (D), Sn (D), Ti (D), Zn (D), Zr (D)	NO3 + NO2 TN (D)	0.0050 0.020	0.0051 0.191	None	-	None	-	None	-	None	-
	WP2317108	Lakes A8 and D7	July 17, 2023	27-Jul	None	23.0	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, and CN.	DTC	A8-03	Zn (D)	NO3 + NO2 TN (D)	0.0050 0.020	0.0178 0.304	None	-	None	-	None	-	None	-
	WP2317112	Lake B7	July 16, 2023	27-Jul	None	23.0	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, and CN.	DTMF	B7-03	Ti (D)	NO3 + NO2 TN (D) Si	0.0050 0.020 0.010	0.0051 0.356-0.379 0.704-0.715	None	-	None	-	None	-	None	-
	WP2317114	Blanks and Duplicates	July 15-17, 2023	27-Jul	None	23.0	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, and CN.	None	-	-	NO3 + NO2 TN (D)	0.0050 0.020	0.0051-0.0202 0.050-0.231	None	-	None	-	None	-	None	-
	WP2317117	MEL-03	July 15, 2023	27-Jul	None	23.0	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, and CN.	None	-	-	NO3 + NO2 TN (D)	0.0050 0.020	0.0051-0.0247 0.168-0.190	None	-	None	-	None	-	None	-
	WP2317119	MEL-01	July 16, 2023	27-Jul	None	23.0	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, CN and THg (D).	None	-	-	NO3 + NO2 TN (D)	0.0050 0.020	0.0051-0.0384 0.225-0.323	None	-	None	-	None	-	None	-
August	WP2320729	MEL-02 and MEL-03	August 17-18, 2023	24-Aug	None	20.1	pH, Turb, NO3, NO2, and Diss O-PO4.	DTC DTMF	MEL-02-02 and -06. MEL-03-02, -03, and -04	Cr (D), Co (D), Ni (D), Sn (D), Zn (D)	NO3 + NO2 TN (D)	0.0050 0.020	<0.0051 0.198-0.235	None	-	Alka and Cond	B	None	-	None	-
	WP2320734	MEL-04 and MEL-05	August 18, 2023	24-Aug	None	20.0	pH, Turb, NO3, NO2, and Diss O-PO4.	DTC DTMF	MEL-04-01, -02, -03, -04 and -05. MEL-05-02, -03 and -05.	Cr (D), Co (D), Cu (D), Fe (D), PB (D), Ni (D), Sn (D), Zn (D)	NO3 + NO2 TN (D)	0.0050 0.020	<0.0051 0.139-0.219	None	-	Alka and Cond	B	None	-	None	-
	WP2320997	Blanks and Duplicates	August 18-22, 2023	28-Aug	None	22.1	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, and CN.	DTS	EB-AUG-01	Sn (D), Ti (D)	NO3 + NO2 TN (D) Si	0.0050 0.020 0.010	<0.0051 0.195-0.231 0.631-1.550	DOC	DUP	None	-	None	-	None	-
	WP2320999	MEL-01	August 22, 2023	28-Aug	None	22.1	pH, Turb, NO3, NO2, and Diss O-PO4.	DTS	MEL-01-01, -06, -08, -09 and -10	Pb (D), Ni (D), Sn (D), Zn (D), Zr (D)	NO3 + NO2 TN (D) Si	0.0050 0.020 0.010	<0.0051 0.050-0.371 0.606-0.627	DOC	DUP	None	-	None	-	None	-
	WP2321003	Lakes A8, B7, and D7	August 19-21, 2023	28-Aug	None	22.0	pH, Turb,TSS, TDS, Alk, NO3, NO2, Diss O-PO4, and CN.	DTS	A8-01, B7-02, D7-01	Zn (D), Al (D), Sn (D), Zr (D)	NO3 + NO2 TN (D) Si	0.0050 0.020 0.010	0.0051-0.0136 0.248-0.423 0.550-1.58	None	-	None	-	None	-	None	-
September	WP2323948	MEL-02 and MEL-03	September 15, 2023	21-Sep	None	16.0	pH, Turb, NO3, NO2, Diss O-PO4	DTS	MEL-03-04	Al (D)	NO3 + NO2 TN (D) Si	0.0050 0.020 0.010	0.007-0.0242 0.286-0.371 0.471	None	-	TP and TP (D)	B	None	-	None	-
	WP2323951	Blanks and Duplicates	September 15-21, 2023	21-Sep	None	16.0	pH, Turb, NO3, NO2, Diss O-PO4	DTS	DUP-MEL-SEP-02	Sn (D)	NO3 + NO2 TN (D) Si	0.0050 0.020 0.010	0.0051-0.0181 <0.050-0.342 0.300-0.654	None	-	TP and TP (D)	B	None	-	None	-
	WP2323956	MEL-01	September 15, 2023	21-Sep	None	16.0	pH, Turb, NO3, NO2, Diss O-PO4	DTS	MEL-01-08, -09, and -10	Pb (D), Sn (D), Zr (D)	NO3 + NO2 TN (D) Si	0.0050 0.020 0.010	<0.0051-0.0234 0.354-0.403 0.577	None	-	TP and TP (D)	B	None	-	None	-

Data and Laboratory QC qualifiers:

B = Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
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.
DLM = Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity)
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.
DUP-H = Duplicate results outside ALS DQO, due to sample heterogeneity.
DUP = Exceedance of the laboratory DQO for an unrelated submission.
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.

Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2023

	Month	April				July				August				September			
	Client Sample ID	April DLs	FB-WINTER-01	DI-WINTER-01	EB-WINTER-01	July DLs	DI-JUL-01	EB-JUL-01	TB-JUL-01	August DLs	DI-AUG-01	EB-AUG-01	TB-AUG-01	September DLs	DI-SEPT-01	EB-SEPT-01	TB-SEPT-01
	Date Sampled		01-Apr-2023	01-Apr-2023	01-Apr-2023		2023-07-17	2023-07-17	2023-07-17		2023-08-18	2023-08-18	2023-08-18		15-Sep-2023	15-Sep-2023	21-Sep-2023
	ALS Sample ID		WP2304940-020	WP2304940-021	WP2304940-019		WP2317114-004	WP2317114-005	WP2317114-006		WP2320997-005	WP2320997-006	WP2320997-007		WP2323951-003	WP2323951-004	WP2323951-005
Parameter	Units		Water	Water	Water		Water	Water	Water		Water	Water	Water		Water	Water	Water
Physical Tests (Water)																	
Conductivity	µS/cm	1	**1.5**	*<1.0*	**1.2**	1	*<1.0*	**1.1**	*<1.0*	1	*<1.0*	59.4	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*
Acidity (as CaCO3)	mg/L	2	*<2.0*	*<2.0*	*<2.0*	2	*<2.0*	*<2.0*	*<2.0*	2	*<2.0*	*<2.0*	*<2.0*	2	*<2.0*	*<2.0*	*<2.0*
Alkalinity, bicarbonate (as CaCO3)	mg/L	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	12.6	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*
Alkalinity, carbonate (as CO3)	mg/L	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*
Alkalinity, hydroxide (as CaCO3)	mg/L	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*
Alkalinity, total (as CaCO3)	mg/L	2	*<2.0*	*<2.0*	*<2.0*	2	*<1.0*	*<1.0*	*<1.0*	2	*<1.0*	**12.6**	*<1.0*	2	*<1.0*	*<1.0*	*<1.0*
Hardness (as CaCO3), dissolved	mg/L	0.5	*<0.50*	*<0.50*	*<0.50*	0.5	*<0.50*	*<0.50*	*<0.50*	0.5	*<0.50*	*<0.50*	*<0.50*	0.5	*<0.50*	*<0.50*	*<0.50*
Solids, total dissolved [TDS]	mg/L	3	**4.7**	*<3.0*	*<3.0*	3	*<3.0*	*<3.0*	*<3.0*	3	*<3.0*	45.4	*<3.0*	3	*<3.0*	*<3.0*	*<3.0*
Solids, total dissolved [TDS], calculated	mg/L	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	38.6	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*
Solids, total suspended [TSS]	mg/L	1	*<1.0*	*<1.0*	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*	1	**1.3**	**1**	*<1.0*	1	*<1.0*	*<1.0*	*<1.0*
Turbidity	NTU	0.1	*<0.10*	*<0.10*	**0.13**	0.1	*<0.10*	**0.15**	*<0.10*	0.1	*<0.10*	**0.25**	*<0.10*	0.1	*<0.10*	**0.14**	*<0.10*
pH	pH units	0.1	5.62	5.48	5.55	0.1	5.42	5.66	5.35	0.1	5.42	7.28	5.44	0.1	5.33	5.39	5.3
Anions and Nutrients (Water)																	
Ammonia, total (as N)	mg/L	0.005	*<0.0050*	**0.0064**	*<0.0050*	0.005	*<0.0050*	**0.0075**	**0.0138**	0.005	**0.0076**	*<0.0050*	**0.0118**	0.005	**0.0309**	**0.0218**	*<0.0050*
Bromide	mg/L	0.1	*<0.10*	*<0.10*	*<0.10*	0.1	*<0.10*	*<0.10*	*<0.10*	0.1	*<0.10*	*<0.10*	*<0.10*	0.1	*<0.10*	*<0.10*	*<0.10*
Chloride	mg/L	0.1	*<0.10*	*<0.10*	*<0.10*	0.1	*<0.10*	*<0.10*	*<0.10*	0.1	*<0.10*	7.64	*<0.10*	0.1	*<0.10*	*<0.10*	*<0.10*
Fluoride	mg/L	0.02	*<0.020*	*<0.020*	*<0.020*	0.02	*<0.020*	*<0.020*	*<0.020*	0.02	*<0.020*	*<0.020*	*<0.020*	0.02	*<0.020*	*<0.020*	*<0.020*
Kjeldahl nitrogen, dissolved [DKN]	mg/L	0.05	*<0.050*	*<0.050*	*<0.050*	0.05	*<0.050*	*<0.050*	*<0.050*	0.05	*<0.050*	**0.199**	*<0.050*	0.05	*<0.050*	*<0.050*	*<0.050*
Kjeldahl nitrogen, total [TKN]	mg/L	0.05	*<0.050*	*<0.050*	*<0.050*	0.05	*<0.050*	*<0.050*	*<0.050*	0.05	*<0.050*	*<0.050*	*<0.050*	0.05	*<0.050*	*<0.050*	*<0.050*
Nitrate (as N)	mg/L	0.005	*<0.0050*	*<0.0050*	**0.0056**	0.005	*<0.0050*	*<0.0050*	*<0.0050*	0.005	*<0.0050*	**0.0089**	*<0.0050*	0.005	*<0.0050*	**0.0116**	*<0.0050*
Nitrate + Nitrite (as N)	mg/L	0.005	*<0.0224*	*<0.0224*	*<0.0224*	0.005	*<0.0051*	*<0.0051*	*<0.0051*	0.005	*<0.0051*	**0.0089**	*<0.0051*	0.005	*<0.0051*	**0.0116**	*<0.0051*
Nitrite (as N)	mg/L	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*
Nitrogen, total	mg/L	0.05	*<0.055*	*<0.055*	*<0.055*	0.05	*<0.050*	*<0.050*	*<0.050*	0.05	*<0.050*	*<0.050*	*<0.050*	0.05	*<0.050*	*<0.050*	*<0.050*
Nitrogen, total dissolved	mg/L	0.02	*<0.055*	*<0.055*	*<0.055*	0.02	*<0.050*	*<0.050*	*<0.050*	0.02	*<0.050*	0.208	*<0.050*	0.02	*<0.050*	*<0.050*	*<0.050*
Phosphate, ortho-, dissolved (as P)	mg/L	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus, total	mg/L	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	**0.0031**	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*
Phosphorus, total dissolved	mg/L	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*	0.001	*<0.0010*	**0.002**	*<0.0010*	0.001	*<0.0010*	*<0.0010*	*<0.0010*
Silicate (as SiO2)		0.01	**0.03**	*<0.010*	*<0.010*	0.01	*<0.010*	*<0.010*	*<0.010*	0.01	*<0.010*	0.26	*<0.010*	0.01	*<0.010*	**0.044**	*<0.010*
Sulfate (as SO4)	mg/L	0.3	*<0.30*	*<0.30*	*<0.30*	0.3	*<0.30*	*<0.30*	*<0.30*	0.3	*<0.30*	3.09	*<0.30*	0.3	*<0.30*	*<0.30*	*<0.30*

Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2023

	Month	April				July				August				September			
	Client Sample ID	April DLs	FB-WINTER-01	DI-WINTER-01	EB-WINTER-01	July DLs	DI-JUL-01	EB-JUL-01	TB-JUL-01	August DLs	DI-AUG-01	EB-AUG-01	TB-AUG-01	September DLs	DI-SEPT-01	EB-SEPT-01	TB-SEPT-01
	Date Sampled		01-Apr-2023	01-Apr-2023	01-Apr-2023		2023-07-17	2023-07-17	2023-07-17		2023-08-18	2023-08-18	2023-08-18		15-Sep-2023	15-Sep-2023	21-Sep-2023
	ALS Sample ID		WP2304940-020	WP2304940-021	WP2304940-019		WP2317114-004	WP2317114-005	WP2317114-006		WP2320997-005	WP2320997-006	WP2320997-007		WP2323951-003	WP2323951-004	WP2323951-005
Parameter	Units		Water	Water	Water		Water	Water	Water		Water	Water	Water		Water	Water	Water
Cyanides																	
Cyanide, Weak Acid Diss	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Cyanide, Total	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Cyanide, Free	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Organic / Inorganic Carbon																	
Dissolved Organic Carbon	mg/L	0.5	**0.54**	**0.85**	**0.66**	0.5	<0.50	<0.50	<0.50	0.5	**1.23**	**3.49**	**1.73**	0.5	<0.50	<0.50	<0.50
Total Organic Carbon	mg/L	0.5	**0.51**	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	0.5	**1.33**	**3.59**	**1.31**	0.5	<0.50	<0.50	<0.50
Total Mercury																	
Mercury, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	-	-	-	0.000005	-	-	-	0.000005	-	-	-
Mercury, total	ng/L	0.1	<0.10	-	-	0.1	**0.17**	**0.14**	<0.10	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50
Total Metals																	
Aluminum, total	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	**0.0016**	<0.0010	0.001	**0.0015**	<0.0010	<0.0010
Antimony, total	mg/L	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020
Arsenic, total	mg/L	0.00002	<0.000020	<0.000020	**0.000033**	0.00002	<0.000020	**0.000073**	<0.000020	0.00002	<0.000020	**0.000026**	<0.000020	0.00002	<0.000020	<0.000020	<0.000020
Barium, total	mg/L	0.00002	<0.000020	**0.000045**	**0.000126**	0.00002	<0.000020	**0.000079**	<0.000020	0.00002	<0.000020	**0.000133**	<0.000020	0.00002	**0.000061**	0.00907	<0.000020
Beryllium, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Bismuth, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Boron, total	mg/L	0.005	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050
Cadmium, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Calcium, total	mg/L	0.01	<0.010	<0.010	**0.083**	0.01	<0.010	**0.013**	<0.010	0.01	<0.010	**0.087**	<0.010	0.01	**0.078**	9.85	<0.010
Cesium, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Chromium, total	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010
Cobalt, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	**0.0000066**	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Copper, total	mg/L	0.00005	<0.000050	<0.000050	0.00118	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	0.000519	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Gallium, total	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Iron, total	mg/L	0.001	<0.0010	<0.0010	**0.0017**	0.001	<0.0010	**0.002**	<0.0010	0.001	<0.0010	**0.0062**	<0.0010	0.001	**0.0026**	<0.0010	<0.0010
Lanthanum, total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Lead, total	mg/L	0.00001	<0.000010	<0.000010	**0.000018**	0.00001	<0.000010	**0.000012**	<0.000010	0.00001	<0.000010	**0.000094**	<0.000010	0.00001	**0.000017**	<0.000010	<0.000010
Lithium, total	mg/L	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050
Magnesium, total	mg/L	0.004	<0.0040	<0.0040	**0.0068**	0.004	<0.0040	<0.0040	<0.0040	0.004	<0.0040	**0.0095**	<0.0040	0.004	<0.0040	<0.0040	<0.0040
Manganese, total	mg/L	0.00005	<0.000050	<0.000050	**0.000112**	0.00005	<0.000050	**0.000087**	<0.000050	0.00005	<0.000050	**0.000316**	<0.000050	0.00005	**0.000051**	0.00663	<0.000050
Molybdenum, total	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Nickel, total	mg/L	0.00005	<0.000050	<0.000050	**0.000065**	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	0.00312	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Niobium, total	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010

Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2023

	Month	April				July				August				September			
	Client Sample ID	April DLs	FB-WINTER-01	DI-WINTER-01	EB-WINTER-01	July DLs	DI-JUL-01	EB-JUL-01	TB-JUL-01	August DLs	DI-AUG-01	EB-AUG-01	TB-AUG-01	September DLs	DI-SEPT-01	EB-SEPT-01	TB-SEPT-01
	Date Sampled		01-Apr-2023	01-Apr-2023	01-Apr-2023		2023-07-17	2023-07-17	2023-07-17		2023-08-18	2023-08-18	2023-08-18		15-Sep-2023	15-Sep-2023	21-Sep-2023
	ALS Sample ID		WP2304940-020	WP2304940-021	WP2304940-019		WP2317114-004	WP2317114-005	WP2317114-006		WP2320997-005	WP2320997-006	WP2320997-007		WP2323951-003	WP2323951-004	WP2323951-005
Parameter	Units		Water	Water	Water		Water	Water	Water		Water	Water	Water		Water	Water	Water
Phosphorus, total	mg/L	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050
Potassium, total	mg/L	0.02	<0.020	<0.020	<0.020	0.02	<0.020	<0.020	<0.020	0.02	<0.020	<0.020	<0.020	0.02	**0.055**	<0.020	<0.020
Rhenium, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Rubidium, total	mg/L	0.000005	<0.0000050	<0.0000050	**0.0000126**	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	**0.0000136**	<0.0000050	0.000005	**0.0000088**	0.00151	<0.0000050
Selenium, total	mg/L	0.00004	<0.000040	<0.000040	<0.000040	0.00004	<0.000040	<0.000040	<0.000040	0.00004	<0.000040	<0.000040	<0.000040	0.00004	<0.000040	<0.000040	<0.000040
Silicon, total	mg/L	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050
Silver, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Sulfur, total	mg/L	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50
Tantalum, total	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010
Tellurium, total	mg/L	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020
Thallium, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Thorium, total	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Tin, total	mg/L	0.00002	<0.000020	<0.000020	**0.000047**	0.00002	<0.000020	**0.000063**	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	**0.000127**	**0.000052**	<0.000020
Titanium, total	mg/L	0.00005	<0.000050	<0.000050	**0.000101**	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	**0.000097**	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Tungsten, total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Uranium, total	mg/L	0.000001	<0.0000010	<0.0000010	<0.0000010	0.000001	<0.0000010	<0.0000010	<0.0000010	0.000001	<0.0000010	**0.0000012**	<0.0000010	0.000001	<0.0000010	<0.0000010	<0.0000010
Vanadium, total	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Yttrium, total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	**0.000015**	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Zinc, total	mg/L	0.0005	<0.00050	<0.00050	**0.00115**	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	0.0185	<0.00050	0.0005	**0.00172**	<0.00050	<0.00050
Zirconium, total	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Dissolved Metals (Water)																	
Aluminum, dissolved	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	**0.0026**	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Antimony, dissolved	mg/L	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020
Arsenic, dissolved	mg/L	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020
Barium, dissolved	mg/L	0.00002	<0.000020	<0.000020	**0.000069**	0.00002	**0.000065**	**0.000041**	<0.000020	0.00002	<0.000020	**0.000171**	<0.000020	0.00002	<0.000020	**0.000034**	<0.000020
Beryllium, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Bismuth, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Boron, dissolved	mg/L	0.005	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050	0.005	<0.0050	<0.0050	<0.0050
Cadmium, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Calcium, dissolved	mg/L	0.01	<0.010	<0.010	**0.059**	0.01	<0.010	**0.022**	<0.010	0.01	<0.010	0.1	<0.010	0.01	**0.015**	**0.032**	<0.010
Cesium, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Chromium, dissolved	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010
Cobalt, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	**0.0000061**	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Copper, dissolved	mg/L	0.00005	<0.000050	<0.000050	**0.000443**	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	0.000571	<0.000050	0.00005	<0.000050	**0.00009**	<0.000050

Table A-2. Laboratory detection limits and blanks (travel, de-ionized, and equipment), Meliadine AEMP, 2023

	Month	April				July				August				September			
	Client Sample ID	April DLs	FB-WINTER-01	DI-WINTER-01	EB-WINTER-01	July DLs	DI-JUL-01	EB-JUL-01	TB-JUL-01	August DLs	DI-AUG-01	EB-AUG-01	TB-AUG-01	September DLs	DI-SEPT-01	EB-SEPT-01	TB-SEPT-01
	Date Sampled		01-Apr-2023	01-Apr-2023	01-Apr-2023		2023-07-17	2023-07-17	2023-07-17		2023-08-18	2023-08-18	2023-08-18		15-Sep-2023	15-Sep-2023	21-Sep-2023
	ALS Sample ID		WP2304940-020	WP2304940-021	WP2304940-019		WP2317114-004	WP2317114-005	WP2317114-006		WP2320997-005	WP2320997-006	WP2320997-007		WP2323951-003	WP2323951-004	WP2323951-005
Parameter	Units		Water	Water	Water		Water	Water	Water		Water	Water	Water		Water	Water	Water
Gallium, dissolved	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Iron, dissolved	mg/L	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.001	<0.0010	**0.0067**	<0.0010	0.001	<0.0010	<0.0010	**0.0016**
Lanthanum, dissolved	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Lead, dissolved	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	**0.000084**	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Lithium, dissolved	mg/L	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	<0.00050	<0.00050
Magnesium, dissolved	mg/L	0.004	<0.0040	<0.0040	**0.0068**	0.004	<0.0040	<0.0040	<0.0040	0.004	<0.0040	**0.0153**	<0.0040	0.004	<0.0040	<0.0040	<0.0040
Manganese, dissolved	mg/L	0.00005	<0.000050	<0.000050	**0.000058**	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	**0.000235**	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Mercury, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	-	-	-	0.000005	-	-	-	0.000005	-	-	-
Mercury, dissolved	ng/L	0.1	<0.10	-	-	0.1	<0.10	**0.16**	**0.10**	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50
Molybdenum, dissolved	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Nickel, dissolved	mg/L	0.00005	<0.000050	<0.000050	**0.000059**	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	0.00289	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Niobium, dissolved	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010
Phosphorus, dissolved	mg/L	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050
Potassium, dissolved	mg/L	0.02	<0.020	<0.020	<0.020	0.02	<0.020	<0.020	<0.020	0.02	<0.020	<0.020	<0.020	0.02	<0.020	<0.020	<0.020
Rhenium, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Rubidium, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	**0.0000102**	0.000005	<0.0000050	**0.0000054**	<0.0000050	0.000005	<0.0000050	**0.0000168**	<0.0000050	0.000005	<0.0000050	**0.0000072**	<0.0000050
Selenium, dissolved	mg/L	0.00004	<0.000040	<0.000040	<0.000040	0.00004	<0.000040	<0.000040	<0.000040	0.00004	<0.000040	<0.000040	<0.000040	0.00004	<0.000040	<0.000040	<0.000040
Silicon, dissolved	mg/L	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050
Silver, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Sodium, dissolved	mg/L	0.02	<0.020	<0.020	**0.039**	0.02	<0.020	<0.020	<0.020	0.02	<0.020	**0.035**	<0.020	0.02	<0.020	<0.020	<0.020
Strontium, dissolved	mg/L	0.00002	<0.000020	**0.000044**	0.000334	0.00002	<0.000020	**0.000076**	<0.000020	0.00002	**0.000041**	0.000547	<0.000020	0.00002	<0.000020	**0.000062**	<0.000020
Sulfur, dissolved	mg/L	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50	0.5	<0.50	<0.50	<0.50
Tantalum, dissolved	mg/L	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010	0.0001	<0.00010	<0.00010	<0.00010
Tellurium, dissolved	mg/L	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020	0.00002	<0.000020	<0.000020	<0.000020
Thallium, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Thorium, dissolved	mg/L	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050	0.000005	<0.0000050	<0.0000050	<0.0000050
Tin, dissolved	mg/L	0.00002	<0.000020	<0.000020	**0.000035**	0.00002	**0.00002**	**0.000027**	**0.000028**	0.00002	**0.000031**	**0.000044**	**0.00002**	0.00002	<0.000020	**0.000026**	**0.000023**
Titanium, dissolved	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	**0.000299**	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Tungsten, dissolved	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Uranium, dissolved	mg/L	0.000001	<0.0000010	<0.0000010	<0.0000010	0.000001	<0.0000010	<0.0000010	<0.0000010	0.000001	<0.0000010	<0.0000010	<0.0000010	0.000001	<0.0000010	<0.0000010	<0.0000010
Vanadium, dissolved	mg/L	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050	0.00005	<0.000050	<0.000050	<0.000050
Yttrium, dissolved	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010
Zinc, dissolved	mg/L	0.0005	<0.00050	<0.00050	**0.00087**	0.0005	<0.00050	<0.00050	<0.00050	0.0005	<0.00050	0.0165	<0.00050	0.0005	<0.00050	<0.00050	<0.00050
Zirconium, dissolved	mg/L	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010	0.00001	<0.000010	<0.000010	<0.000010

Notes

Shaded Travel, DI, or Equipment Blank concentration is > 10x DL.

Italicized numbers are below detection limits.

"-" analyte not measured

Table A-3. Water quality field duplicate results for Meliadine AEMP – April 2023

Month	Units	April DLs	Relative Percent Difference DQOs		April DUP-1 (MEL-01-10)					April DUP-2 (MEL-02-08)				
Station					MEL-01-10	DUP-01	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-02-08	DUP-02	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					01-Apr-2023	01-Apr-2023				02-Apr-2023	02-Apr-2023			
ALS Sample ID			Lab	Field	WP2304940-017	WP2304940-018				WP2304940-003	WP2304940-006			
Parameter					Water	Water				Water	Water			
Physical Tests														
Conductivity	µS/cm	1.0	10	15	183	183	RPD	0	Pass RPD	145	147	RPD	-1.4	Pass RPD
Acidity (as CaCO3)	mg/L	2.0		40	2.6	3.1	DIFF	-0.5	Pass Diff	2.9	*<2.0*	*<DL*	*<DL*	*<DL*
Alkalinity, bicarbonate (as CaCO3)	mg/L	1.0		40	32.7	33.1	RPD	-1.2	Pass RPD	28.7	29.4	RPD	-2.4	Pass RPD
Alkalinity, bicarbonate (as HCO3)	mg/L	1.0		40	39.9	40.4	RPD	-1.2	Pass RPD	35	35.9	RPD	-2.5	Pass RPD
Alkalinity, carbonate (as CO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, carbonate (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as OH)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, phenolphthalein (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, total (as CaCO3)	mg/L	2.0		40	32.7	33.1	RPD	-1.2	Pass RPD	28.7	29.4	RPD	-2.4	Pass RPD
Hardness (as CaCO3), dissolved	mg/L	0.50		40	52.4	53.5	RPD	-2.1	Pass RPD	37	38.2	RPD	-3.2	Pass RPD
Solids, total dissolved [TDS]	mg/L	3.0		40	94.7	86.3	RPD	9.3	Pass RPD	71.3	77.7	RPD	-8.6	Pass RPD
Solids, total dissolved [TDS], calculated	mg/L	1.0		40	119	119	RPD	0	Pass RPD	94.2	95.6	RPD	-1.5	Pass RPD
Solids, total suspended [TSS]	mg/L	1.0		40	1.5	5.6	DIFF	-4.1	Fail	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Turbidity	NTU	0.10	15	23	0.34	0.33	DIFF	0.01	Pass Diff	0.23	0.27	DIFF	-0.04	Pass Diff
pH	pH units	0.10		40	7.2	7.2	RPD	0	Pass RPD	7.4	7.4	RPD	0	Pass RPD
Anions and Nutrients (Water)														
Ammonia, total (as N)	mg/L	0.0050	20	30	0.027	0.026	RPD	3.8	Pass RPD	0.033	0.031	RPD	6.9	Pass RPD
Bromide	mg/L	0.10	20	30	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*
Chloride	mg/L	0.10	20	30	26.1	26	RPD	0.4	Pass RPD	18.7	18.9	RPD	-1.1	Pass RPD
Fluoride	mg/L	0.020	20	30	0.047	0.047	DIFF	0	Pass Diff	0.043	0.043	DIFF	0	Pass Diff
Kjeldahl nitrogen, dissolved [DKN]	mg/L	0.050	20	30	0.38	0.33	RPD	14.6	Pass RPD	0.29	0.27	RPD	6.4	Pass RPD
Kjeldahl nitrogen, total [TKN]	mg/L	0.050	20	30	0.40	0.36	RPD	10.6	Pass RPD	0.30	0.31	RPD	-2.9	Pass RPD
Nitrate (as N)	mg/L	0.0050	20	30	0.022	0.023	DIFF	-0.0004	Pass Diff	0.014	0.011	DIFF	0.0029	Pass Diff
Nitrate + Nitrite (as N)	mg/L	0.0050	20	30	*<0.0224*	0.023	*<DL*	*<DL*	*<DL*	*<0.0224*	*<0.0224*	*<DL*	*<DL*	*<DL*
Nitrite (as N)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Nitrogen, total	mg/L	0.050	20	30	0.42	0.38	RPD	9.7	Pass RPD	0.30	0.31	RPD	-2.9	Pass RPD
Nitrogen, total dissolved	mg/L	0.020	20	30	0.40	0.35	RPD	13.4	Pass RPD	0.29	0.27	RPD	6.4	Pass RPD
Phosphate, ortho-, dissolved (as P)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Phosphorus, total	mg/L	0.0010	20	30	0.0067	0.0069	RPD	-2.9	Pass RPD	0.0051	0.0047	DIFF	0.0004	Pass Diff
Phosphorus, total dissolved	mg/L	0.0010	20	30	0.0038	0.0041	DIFF	-0.0003	Pass Diff	0.0022	0.0025	DIFF	-0.0003	Pass Diff
Silicate (as SiO2)	mg/L	0.010	20	30	0.89	0.87	RPD	1.5	Pass RPD	0.63	0.61	RPD	4	Pass RPD
Sulfate (as SO4)	mg/L	0.30	20	30	11.1	11.1	RPD	0	Pass RPD	7.7	7.8	RPD	-1.5	Pass RPD
Cyanides														
Cyanide, Weak Acid Diss	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Total	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Free	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Organic / Inorganic Carbon														
Dissolved Organic Carbon	mg/L	0.50	20	30	5.6	5.8	RPD	-2.5	Pass RPD	4.4	4.2	RPD	4.4	Pass RPD
Total Organic Carbon	mg/L	0.50	20	30	6.2	5.9	RPD	4.6	Pass RPD	5.1	4.4	RPD	15.1	Pass RPD
Mercury, total														

Table A-3. Water quality field duplicate results for Meliadine AEMP – April 2023

Month	Units	April DLs	Relative Percent Difference DQOs		April DUP-1 (MEL-01-10)					April DUP-2 (MEL-02-08)				
Station					MEL-01-10	DUP-01	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-02-08	DUP-02	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					01-Apr-2023	01-Apr-2023				02-Apr-2023	02-Apr-2023			
ALS Sample ID			Lab	Field	WP2304940-017	WP2304940-018				WP2304940-003	WP2304940-006			
Parameter					Water	Water				Water	Water			
Mercury, total	mg/L	0.000005	20	30			DIFF	0	Pass Diff		<0.0000050	<DL	<DL	<DL
Mercury, total	ng/L	0.1	20	30	7.61	6.83	RPD	10.8	Pass RPD	4.25	<5.0	<DL	<DL	<DL
Total Metals														
Aluminum	mg/L	0.0010	20	30	0.0016	0.0015	DIFF	0.0001	Pass Diff	0.0016	0.0022	DIFF	-0.0006	Pass Diff
Antimony	mg/L	0.000020	20	30	0.000025	0.000025	DIFF	0	Pass Diff	0.000026	0.000024	DIFF	0.000002	Pass Diff
Arsenic	mg/L	0.000020	20	30	0.00079	0.00078	RPD	1.4	Pass RPD	0.00076	0.00083	RPD	-8.8	Pass RPD
Barium	mg/L	0.000020	20	30	0.015	0.015	RPD	-2	Pass RPD	0.014	0.014	RPD	1.5	Pass RPD
Beryllium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Bismuth	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Boron	mg/L	0.0050	20	30	0.012	0.012	DIFF	-0.0002	Pass Diff	0.0092	0.0093	DIFF	-1E-04	Pass Diff
Cadmium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Calcium	mg/L	0.010	20	30	16.7	16.5	RPD	1.2	Pass RPD	13.5	13.3	RPD	1.5	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000010	0.000010	DIFF	-3E-07	Pass Diff	0.000011	0.000011	DIFF	-0.0000004	Pass Diff
Chromium	mg/L	0.00010	20	30	0.00016	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Cobalt	mg/L	0.000005	20	30	0.000024	0.000025	DIFF	-9E-07	Pass Diff	0.000015	0.000017	DIFF	-0.0000019	Pass Diff
Copper	mg/L	0.000050	20	30	0.0014	0.0014	RPD	0	Pass RPD	0.0013	0.0013	RPD	-0.8	Pass RPD
Gallium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	<0.000050	<DL	<DL	<DL
Iron	mg/L	0.0010	20	30	0.0077	0.0073	RPD	5.3	Pass RPD	0.0066	0.0083	RPD	-22.8	Pass RPD
Lanthanum	mg/L	0.000010	20	30	0.000027	0.000027	DIFF	0	Pass Diff	0.000020	0.000021	DIFF	-1E-06	Pass Diff
Lead	mg/L	0.000010	20	30	0.00033	0.000037	DIFF	0.000289	Fail	0.000046	0.000061	DIFF	-0.000015	Pass Diff
Lithium	mg/L	0.00050	20	30	0.0018	0.0018	DIFF	-0.00001	Pass Diff	0.0015	0.0014	DIFF	4E-05	Pass Diff
Magnesium	mg/L	0.0040	20	30	3.1	3.1	RPD	-1.6	Pass RPD	2.4	2.4	RPD	0.4	Pass RPD
Manganese	mg/L	0.000050	20	30	0.0019	0.0019	RPD	1.6	Pass RPD	0.0011	0.0011	RPD	-2.8	Pass RPD
Molybdenum	mg/L	0.000050	20	30	0.00020	0.00020	DIFF	-4E-06	Pass Diff	0.00015	0.00022	DIFF	-0.000066	Pass Diff
Niobium	mg/L	0.000050	20	30	0.0012	0.0012	RPD	0.8	Pass RPD	0.00085	0.00082	RPD	3.5	Pass RPD
Nickel	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Phosphorus	mg/L	0.050	20	30	<0.050	<0.050	<DL	<DL	<DL	<0.050	<0.050	<DL	<DL	<DL
Potassium	mg/L	0.020	20	30	2.0	1.9	RPD	1	Pass RPD	1.7	1.6	RPD	1.2	Pass RPD
Rhenium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Rubidium	mg/L	0.000005	20	30	0.0024	0.0024	RPD	0.8	Pass RPD	0.0022	0.0021	RPD	1.9	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000063	0.000064	DIFF	-1E-06	Pass Diff	0.000058	0.000051	DIFF	0.000007	Pass Diff
Silicon	mg/L	0.050	20	30	0.39	0.39	RPD	-0.5	Pass RPD	0.28	0.28	RPD	-2.2	Pass RPD
Silver	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	0.000015	0.000016	DIFF	-0.0000004	Pass Diff
Sodium	mg/L	0.020	20	30	13.7	13.4	RPD	2.2	Pass RPD	9.9	9.6	RPD	2.5	Pass RPD
Strontium	mg/L	0.000020	20	30	0.095	0.094	RPD	0.4	Pass RPD	0.070	0.070	RPD	0.7	Pass RPD
Sulfur	mg/L	0.50	20	30	3.8	3.9	RPD	-1.6	Pass RPD	2.6	2.7	RPD	-3	Pass RPD
Tantalum	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Tellurium	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Thallium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Thorium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Tin	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Titanium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	0.000068	<DL	<DL	<DL
Tungsten	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	<0.000010	<0.000010	<DL	<DL	<DL
Uranium	mg/L	0.000001	20	30	0.000029	0.000030	RPD	-3.4	Pass RPD	0.000022	0.000024	RPD	-7.9	Pass RPD
Vanadium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	<0.000050	<DL	<DL	<DL
Yttrium	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	<0.000010	<0.000010	<DL	<DL	<DL

Table A-3. Water quality field duplicate results for Meliadine AEMP – April 2023

Month	Units	April DLs	Relative Percent Difference DQOs		April DUP-1 (MEL-01-10)					April DUP-2 (MEL-02-08)				
Station					MEL-01-10	DUP-01	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-02-08	DUP-02	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					01-Apr-2023	01-Apr-2023				02-Apr-2023	02-Apr-2023			
ALS Sample ID			Lab	Field	WP2304940-017	WP2304940-018				WP2304940-003	WP2304940-006			
Parameter					Water	Water				Water	Water			
Zinc	mg/L	0.00050	20	30	0.0019	0.0016	DIFF	0.00032	Pass Diff	0.0038	0.0036	RPD	5.7	Pass RPD
Zirconium	mg/L	0.000010	20	30	*<0.000010*	0.000010	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Dissolved Metals														
Aluminum	mg/L	0.0010	20	30	*<0.0010*	0.0012	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Antimony	mg/L	0.000020	20	30	0.000026	0.000025	DIFF	1E-06	Pass Diff	0.000021	0.000022	DIFF	-0.000001	Pass Diff
Arsenic	mg/L	0.000020	20	30	0.00073	0.00073	RPD	0.4	Pass RPD	0.00068	0.00071	RPD	-3.9	Pass RPD
Barium	mg/L	0.000020	20	30	0.015	0.015	RPD	0	Pass RPD	0.013	0.013	RPD	-1.6	Pass RPD
Beryllium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Bismuth	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Boron	mg/L	0.0050	20	30	0.012	0.012	DIFF	1E-04	Pass Diff	0.0084	0.0088	DIFF	-0.0004	Pass Diff
Cadmium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Calcium	mg/L	0.010	20	30	16	16.4	RPD	-2.5	Pass RPD	11.6	12	RPD	-3.4	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000011	0.000011	DIFF	-3E-07	Pass Diff	0.000011	0.000012	DIFF	-0.0000007	Pass Diff
Chromium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Cobalt	mg/L	0.000005	20	30	0.000021	0.000023	DIFF	-0.0000016	Pass Diff	0.000012	0.000012	DIFF	-8E-07	Pass Diff
Copper	mg/L	0.000050	20	30	0.0014	0.0014	RPD	-2.9	Pass RPD	0.0011	0.0011	RPD	-5.4	Pass RPD
Gallium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Iron	mg/L	0.0010	20	30	0.0033	0.0031	DIFF	0.0002	Pass Diff	0.0026	0.0025	DIFF	1E-04	Pass Diff
Lanthanum	mg/L	0.000010	20	30	0.000024	0.000024	DIFF	0	Pass Diff	0.000017	0.000018	DIFF	-0.000001	Pass Diff
Lead	mg/L	0.000010	20	30	0.000016	0.000016	DIFF	0	Pass Diff	0.000016	0.000016	DIFF	0	Pass Diff
Lithium	mg/L	0.00050	20	30	0.0018	0.0018	DIFF	0	Pass Diff	0.0013	0.0013	DIFF	-3E-05	Pass Diff
Magnesium	mg/L	0.0040	20	30	3.0	3.1	RPD	-1	Pass RPD	1.9	2.0	RPD	-3.5	Pass RPD
Manganese	mg/L	0.000050	20	30	0.00041	0.00041	RPD	0.7	Pass RPD	0.00024	0.00025	DIFF	-9E-06	Pass Diff
Mercury	mg/L	0.000005	20	30			DIFF	0	Pass Diff		*<0.0000050*	*<DL*	*<DL*	*<DL*
Mercury	ng/L	0.10	20	30	1.9	1.8	RPD	7.2	Pass RPD	3.2	na[c]	-	-	-
Molybdenum	mg/L	0.000050	20	30	0.00020	0.00020	DIFF	2E-06	Pass Diff	0.00013	0.00014	DIFF	-3E-06	Pass Diff
Nickel	mg/L	0.000050	20	30	0.0012	0.0012	RPD	-1.6	Pass RPD	0.00071	0.00075	RPD	-5.3	Pass RPD
Niobium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Phosphorus	mg/L	0.050	20	30	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*
Potassium	mg/L	0.020	20	30	1.9	1.9	RPD	-2.1	Pass RPD	1.5	1.5	RPD	-2.7	Pass RPD
Rhenium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Rubidium	mg/L	0.000005	20	30	0.0023	0.0024	RPD	-0.9	Pass RPD	0.0020	0.0020	RPD	-3	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000066	0.000060	DIFF	0.000006	Pass Diff	0.000067	0.000054	DIFF	0.000013	Pass Diff
Silicon	mg/L	0.050	20	30	0.39	0.39	RPD	-1.3	Pass RPD	0.26	0.29	RPD	-8	Pass RPD
Silver	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	0.000010	0.000011	DIFF	-5E-07	Pass Diff
Sodium	mg/L	0.020	20	30	12.8	13.3	RPD	-3.8	Pass RPD	8.0	8.3	RPD	-3.2	Pass RPD
Strontium	mg/L	0.000020	20	30	0.090	0.093	RPD	-2.8	Pass RPD	0.064	0.065	RPD	-1.6	Pass RPD
Sulfur	mg/L	0.50	20	30	3.8	3.8	RPD	0.3	Pass RPD	2.5	2.8	DIFF	-0.28	Pass Diff
Tantalum	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Tellurium	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Thallium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Thorium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Titanium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Tungsten	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Uranium	mg/L	0.000001	20	30	0.000030	0.000029	RPD	5.8	Pass RPD	0.000018	0.000022	RPD	-19.3	Pass RPD

Table A-3. Water quality field duplicate results for Meliadine AEMP – April 2023

Month	Units	April DLs	Relative Percent Difference DQOs		April DUP-1 (MEL-01-10)					April DUP-2 (MEL-02-08)				
Station					MEL-01-10	DUP-01	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-02-08	DUP-02	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					01-Apr-2023	01-Apr-2023				02-Apr-2023	02-Apr-2023			
ALS Sample ID			Lab	Field	WP2304940-017	WP2304940-018				WP2304940-003	WP2304940-006			
Parameter					Water	Water				Water	Water			
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	*<0.000010*	0.000013	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	0.0015	0.0015	DIFF	3E-05	Pass Diff	0.0032	0.0033	RPD	-2.1	Pass RPD
Zirconium	mg/L	0.000010		40	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*

Notes:

[a] Field Dup Methods are based on the concentrations:

RPD = relative percent difference is used to

DIFF = when concentrations < 5* DL

[b] Results refer to the RPD or absolute difference in concentration

DQO for RPDs is < Field RPD values

DQO for DIFF is < 2x the DL

Italicized numbers are below detection limits.

[c] na = not analyzed; dissolved mercury was not analyzed for some samples due to a shortage of bottles for low-level analysis.

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-1 (MEL-03-04)					July DUP-2 (MEL-01-09)				
Station					MEL-03-04	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-09	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-15	2023-07-15				2023-07-16	2023-07-16			
ALS Sample ID			Lab	Field	WP2317117-004	WP2317114-001				WP2317119-005	WP2317114-002			
Parameter					Water	Water				Water	Water			
Physical Tests														
Conductivity	µS/cm	1.0	10	15	86	85.2	RPD	0.9	Pass RPD	112	111	RPD	0.9	Pass RPD
Acidity (as CaCO3)	mg/L	2.0		40	*<2.0*	*<2.0*	*<DL*	*<DL*	*<DL*	*<2.0*	*<2.0*	*<DL*	*<DL*	*<DL*
Alkalinity, bicarbonate (as CaCO3)	mg/L	1.0		40	18.2	18	RPD	1.1	Pass RPD	19.1	19.1	RPD	0	Pass RPD
Alkalinity, bicarbonate (as HCO3)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, carbonate (as CO3)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, carbonate (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as OH)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, phenolphthalein (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, total (as CaCO3)	mg/L	2.0		40	18.2	18	RPD	1.1	Pass RPD	19.1	19.1	RPD	0	Pass RPD
Hardness (as CaCO3), dissolved	mg/L	0.50		40	25.4	25.9	RPD	-1.9	Pass RPD	32.9	31.4	RPD	4.7	Pass RPD
Solids, total dissolved [TDS]	mg/L	3.0		40	46.8	50.8	RPD	-8.2	Pass RPD	65.4	64.1	RPD	2	Pass RPD
Solids, total dissolved [TDS], calculated	mg/L	1.0		40	55.9	55.4	RPD	0.9	Pass RPD	72.8	72.2	RPD	0.8	Pass RPD
Solids, total suspended [TSS]	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	1.0	*<1.0*	*<DL*	*<DL*	*<DL*
Turbidity	NTU	0.10	15	23	0.27	0.26	DIFF	0.01	Pass Diff	0.46	0.34	DIFF	0.12	Pass Diff
pH	pH units	0.10		40	7.5	7.4	RPD	0.5	Pass RPD	7.5	7.4	RPD	0.9	Pass RPD
Anions and Nutrients (Water)														
Ammonia, total (as N)	mg/L	0.0050	20	30	0.0053	*<0.0050*	*<DL*	*<DL*	*<DL*	0.011	0.0056	DIFF	0.0055	Pass Diff
Bromide	mg/L	0.10	20	30	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*
Chloride	mg/L	0.10	20	30	10.9	10.7	RPD	1.9	Pass RPD	16	16	RPD	0	Pass RPD
Fluoride	mg/L	0.020	20	30	0.028	0.029	DIFF	-0.001	Pass Diff	0.029	0.029	DIFF	0	Pass Diff
Kjeldahl nitrogen, dissolved [DKN]	mg/L	0.050	20	30	0.17	0.18	DIFF	-0.006	Pass Diff	0.20	0.21	DIFF	-0.007	Pass Diff
Kjeldahl nitrogen, total [TKN]	mg/L	0.050	20	30	0.16	0.17	DIFF	-0.013	Pass Diff	0.21	0.23	DIFF	-0.016	Pass Diff
Nitrate (as N)	mg/L	0.0050	20	30	0.019	*<0.0050*	*<DL*	*<DL*	*<DL*	0.021	0.020	DIFF	0.001	Pass Diff
Nitrate + Nitrite (as N)	mg/L	0.0050	20	30	0.019	*<0.0051*	*<DL*	*<DL*	*<DL*	0.021	0.020	DIFF	0.001	Pass Diff
Nitrite (as N)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Nitrogen, total	mg/L	0.050	20	30	0.18	0.17	DIFF	0.006	Pass Diff	0.23	0.25	DIFF	-0.015	Pass Diff
Nitrogen, total dissolved	mg/L	0.020	20	30	0.19	0.18	RPD	7.2	Pass RPD	0.23	0.23	RPD	-2.6	Pass RPD
Phosphate, ortho-, dissolved (as P)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Phosphorus, total	mg/L	0.0010	20	30	0.0032	0.0035	DIFF	-0.0003	Pass Diff	0.0053	0.0040	DIFF	0.0013	Pass Diff
Phosphorus, total dissolved	mg/L	0.0010	20	30	0.0017	0.0017	DIFF	0	Pass Diff	0.0018	0.0016	DIFF	0.0002	Pass Diff
Silicate (as SiO2)	mg/L	0.010	20	30	0.31	0.32	RPD	-3.5	Pass RPD	0.48	0.48	RPD	-0.6	Pass RPD
Sulfate (as SO4)	mg/L	0.30	20	30	4.4	4.4	RPD	0.2	Pass RPD	7.0	7.1	RPD	-0.3	Pass RPD
Cyanides														
Cyanide, Weak Acid Diss	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Total	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Free	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Organic / Inorganic Carbon														
Dissolved Organic Carbon	mg/L	0.50	20	30	3.6	2.8	RPD	24.8	Pass RPD	4.5	3.8	RPD	15.7	Pass RPD
Total Organic Carbon	mg/L	0.50	20	30	3.3	2.9	RPD	12.8	Pass RPD	3.8	3.8	RPD	0.8	Pass RPD

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-1 (MEL-03-04)					July DUP-2 (MEL-01-09)				
Station					MEL-03-04	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-09	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-15	2023-07-15				2023-07-16	2023-07-16			
ALS Sample ID			Lab	Field	WP2317117-004	WP2317114-001				WP2317119-005	WP2317114-002			
Parameter					Water	Water				Water	Water			
Mercury, total														
Mercury, total	ng/L	0.1	20	30	0.44	0.52	DIFF	-0.08	Pass Diff		0.65	DIFF	-0.65	Fail
Total Metals														
Aluminum	mg/L	0.0010	20	30	0.0034	0.0024	DIFF	0.001	Pass Diff	0.0041	0.0037	DIFF	0.0004	Pass Diff
Antimony	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Arsenic	mg/L	0.000020	20	30	0.00039	0.00037	RPD	4.5	Pass RPD	0.00056	0.00055	RPD	0.2	Pass RPD
Barium	mg/L	0.000020	20	30	0.0092	0.0089	RPD	3.4	Pass RPD	0.0098	0.0095	RPD	2.7	Pass RPD
Beryllium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Bismuth	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Boron	mg/L	0.0050	20	30	<0.0050	0.0050	<DL	<DL	<DL	0.0072	0.0082	DIFF	-0.001	Pass Diff
Cadmium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Calcium	mg/L	0.010	20	30	8.1	8.3	RPD	-3.2	Pass RPD	9.9	9.8	RPD	1	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000009	0.000009	DIFF	-8E-07	Pass Diff	0.000008	0.000007	DIFF	0.0000002	Pass Diff
Chromium	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Cobalt	mg/L	0.000005	20	30	0.000016	0.000016	DIFF	3E-07	Pass Diff	0.000030	0.000027	RPD	8.8	Pass RPD
Copper	mg/L	0.000050	20	30	0.0012	0.00083	RPD	37	Fail	0.00096	0.00091	RPD	5	Pass RPD
Gallium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	<0.000050	<DL	<DL	<DL
Iron	mg/L	0.0010	20	30	0.013	0.013	RPD	3.9	Pass RPD	0.024	0.023	RPD	4.2	Pass RPD
Lanthanum	mg/L	0.000010	20	30	0.000022	0.000019	DIFF	0.000003	Pass Diff	0.000029	0.000031	DIFF	-0.000002	Pass Diff
Lead	mg/L	0.000010	20	30	0.000024	0.000013	DIFF	0.000011	Pass Diff	0.000013	<0.000010	<DL	<DL	<DL
Lithium	mg/L	0.00050	20	30	0.00083	0.00083	DIFF	0	Pass Diff	0.0010	0.0013	DIFF	-0.00023	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.3	1.3	RPD	0.8	Pass RPD	1.8	1.8	RPD	3.4	Pass RPD
Manganese	mg/L	0.000050	20	30	0.0043	0.0043	RPD	-0.7	Pass RPD	0.0058	0.0058	RPD	0.7	Pass RPD
Molybdenum	mg/L	0.000050	20	30	0.000085	0.000085	DIFF	0	Pass Diff	0.00012	0.00012	DIFF	0.000005	Pass Diff
Niobium	mg/L	0.000050	20	30	0.00052	0.00050	RPD	3.1	Pass RPD	0.00086	0.00085	RPD	1.3	Pass RPD
Nickel	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Phosphorus	mg/L	0.050	20	30	<0.050	<0.050	<DL	<DL	<DL	<0.050	<0.050	<DL	<DL	<DL
Potassium	mg/L	0.020	20	30	1.00	1.0	RPD	-0.1	Pass RPD	1.2	1.1	RPD	2.6	Pass RPD
Rhenium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Rubidium	mg/L	0.000005	20	30	0.0014	0.0014	RPD	-2.9	Pass RPD	0.0015	0.0015	RPD	-2.6	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000040	0.000046	DIFF	-0.000006	Pass Diff	0.000046	0.000047	DIFF	-1E-06	Pass Diff
Silicon	mg/L	0.050	20	30	0.15	0.16	DIFF	-0.008	Pass Diff	0.23	0.24	DIFF	-0.01	Pass Diff
Silver	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Sodium	mg/L	0.020	20	30	5.6	5.6	RPD	-0.2	Pass RPD	7.9	7.8	RPD	0.8	Pass RPD
Strontium	mg/L	0.000020	20	30	0.042	0.043	RPD	-0.9	Pass RPD	0.058	0.056	RPD	2.6	Pass RPD
Sulfur	mg/L	0.50	20	30	1.6	1.6	DIFF	-0.02	Pass Diff	2.6	2.6	RPD	1.9	Pass RPD
Tantalum	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Tellurium	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Thallium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Thorium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	0.000008	0.000009	DIFF	-0.0000018	Pass Diff
Tin	mg/L	0.000020	20	30	0.00010	0.000054	DIFF	0.000046	Fail	0.000032	0.000024	DIFF	0.000008	Pass Diff
Titanium	mg/L	0.000050	20	30	0.00012	0.000090	DIFF	0.000026	Pass Diff	0.00016	0.00016	DIFF	0.000009	Pass Diff
Tungsten	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	<0.000010	<0.000010	<DL	<DL	<DL

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-1 (MEL-03-04)					July DUP-2 (MEL-01-09)				
Station					MEL-03-04	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-09	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-15	2023-07-15				2023-07-16	2023-07-16			
ALS Sample ID			Lab	Field	WP2317117-004	WP2317114-001				WP2317119-005	WP2317114-002			
Parameter					Water	Water				Water	Water			
Uranium	mg/L	0.000001	20	30	0.000015	0.000017	RPD	-12.2	Pass RPD	0.000027	0.000025	RPD	10	Pass RPD
Vanadium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	<0.000050	<DL	<DL	<DL
Yttrium	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	0.000012	0.000011	DIFF	0.000001	Pass Diff
Zinc	mg/L	0.00050	20	30	0.0029	<0.00050	<DL	<DL	<DL	0.00063	<0.00050	<DL	<DL	<DL
Zirconium	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	<0.000010	<0.000010	<DL	<DL	<DL
Dissolved Metals														
Aluminum	mg/L	0.0010	20	30	<0.0010	0.0018	<DL	<DL	<DL	0.0020	0.0016	DIFF	0.0004	Pass Diff
Antimony	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Arsenic	mg/L	0.000020	20	30	0.00036	0.00037	RPD	-1.9	Pass RPD	0.00052	0.00053	RPD	-1	Pass RPD
Barium	mg/L	0.000020	20	30	0.0087	0.0088	RPD	-1.8	Pass RPD	0.0097	0.0096	RPD	1.8	Pass RPD
Beryllium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Bismuth	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Boron	mg/L	0.0050	20	30	<0.0050	<0.0050	<DL	<DL	<DL	0.0074	0.0073	DIFF	0.0001	Pass Diff
Cadmium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Calcium	mg/L	0.010	20	30	8.0	8.2	RPD	-2	Pass RPD	10.1	9.7	RPD	4.5	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000008	0.000009	DIFF	-0.0000005	Pass Diff	0.000008	0.000007	DIFF	0.0000003	Pass Diff
Chromium	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Cobalt	mg/L	0.000005	20	30	0.000006	0.000007	DIFF	-0.0000005	Pass Diff	0.000017	0.000016	DIFF	9E-07	Pass Diff
Copper	mg/L	0.000050	20	30	0.00091	0.00077	RPD	16.2	Pass RPD	0.00096	0.00096	RPD	-0.6	Pass RPD
Gallium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	<0.000050	<DL	<DL	<DL
Iron	mg/L	0.0010	20	30	0.0035	0.0041	DIFF	-0.0006	Pass Diff	0.0071	0.0069	RPD	2.9	Pass RPD
Lanthanum	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	0.000013	0.000012	DIFF	1E-06	Pass Diff
Lead	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	0.000012	<0.000010	<DL	<DL	<DL
Lithium	mg/L	0.00050	20	30	0.00083	0.00082	DIFF	0.00001	Pass Diff	0.0011	0.0011	DIFF	2E-05	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.3	1.3	RPD	-0.7	Pass RPD	1.9	1.8	RPD	4.9	Pass RPD
Manganese	mg/L	0.000050	20	30	0.00054	0.00059	RPD	-7.6	Pass RPD	0.00052	0.00052	RPD	-0.8	Pass RPD
Mercury	mg/L	0.000005	20	30			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Mercury	ng/L	0.10	20	30	0.25	0.49	DIFF	-0.24	Fail	<0.50	0.32	<DL	<DL	<DL
Molybdenum	mg/L	0.000050	20	30	0.000083	0.000084	DIFF	-1E-06	Pass Diff	0.00013	0.00012	DIFF	0.000006	Pass Diff
Nickel	mg/L	0.000050	20	30	0.00048	0.00048	RPD	-0.4	Pass RPD	0.00083	0.00081	RPD	2.6	Pass RPD
Niobium	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Phosphorus	mg/L	0.050	20	30	<0.050	<0.050	<DL	<DL	<DL	<0.050	<0.050	<DL	<DL	<DL
Potassium	mg/L	0.020	20	30	1.1	1.0	RPD	4.8	Pass RPD	1.2	1.2	RPD	1.7	Pass RPD
Rhenium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Rubidium	mg/L	0.000005	20	30	0.0014	0.0014	RPD	-2.9	Pass RPD	0.0016	0.0015	RPD	5.3	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000043	0.000043	DIFF	0	Pass Diff	0.000048	0.000045	DIFF	0.000003	Pass Diff
Silicon	mg/L	0.050	20	30	0.15	0.15	DIFF	0	Pass Diff	0.24	0.24	DIFF	0.003	Pass Diff
Silver	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Sodium	mg/L	0.020	20	30	5.4	5.5	RPD	-1.8	Pass RPD	8.2	7.9	RPD	3.8	Pass RPD
Strontium	mg/L	0.000020	20	30	0.041	0.042	RPD	-1	Pass RPD	0.059	0.056	RPD	5.4	Pass RPD
Sulfur	mg/L	0.50	20	30	1.6	1.6	DIFF	-0.01	Pass Diff	2.6	2.6	RPD	-0.8	Pass RPD
Tantalum	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Tellurium	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Thallium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-1 (MEL-03-04)					July DUP-2 (MEL-01-09)				
Station					MEL-03-04	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-09	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-15	2023-07-15				2023-07-16	2023-07-16			
ALS Sample ID			Lab	Field	WP2317117-004	WP2317114-001				WP2317119-005	WP2317114-002			
Parameter					Water	Water				Water	Water			
Thorium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	mg/L	0.000020	20	30	0.000035	0.000031	DIFF	0.000004	Pass Diff	0.000043	*<0.000020*	*<DL*	*<DL*	*<DL*
Titanium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Tungsten	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Uranium	mg/L	0.000001	20	30	0.000016	0.000016	RPD	5	Pass RPD	0.000023	0.000024	RPD	-1.7	Pass RPD
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	*<0.00050*	*<0.00050*	*<DL*	*<DL*	*<DL*	*<0.00050*	*<0.00050*	*<DL*	*<DL*	*<DL*
Zirconium	mg/L	0.000010		40	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*

Notes:

[a] Field Dup Methods are based on the concentrations:
RPD = relative percent difference is used to
DIFF = when concentrations < 5* DL

[b] Results refer to the RPD or absolute difference in concentration
DQO for RPDs is < Field RPD values
DQO for DIFF is < 2x the DL

Italicized numbers are below detection limits.

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-3 (D7-01)				
Station					D7-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-17	2023-07-17			
ALS Sample ID			Lab	Field	WP2317108-004	WP2317114-003			
Parameter					Water	Water			
Physical Tests									
Conductivity	µS/cm	1.0	10	15	135	134	RPD	0.7	Pass RPD
Acidity (as CaCO3)	mg/L	2.0		40	2.6	2.2	DIFF	0.4	Pass Diff
Alkalinity, bicarbonate (as CaCO3)	mg/L	1.0		40	46.5	45.5	RPD	2.2	Pass RPD
Alkalinity, bicarbonate (as HCO3)	mg/L	1.0		40			DIFF	0	Pass Diff
Alkalinity, carbonate (as CO3)	mg/L	1.0		40			DIFF	0	Pass Diff
Alkalinity, carbonate (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as OH)	mg/L	1.0		40			DIFF	0	Pass Diff
Alkalinity, phenolphthalein (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, total (as CaCO3)	mg/L	2.0		40	46.5	45.5	RPD	2.2	Pass RPD
Hardness (as CaCO3), dissolved	mg/L	0.50		40	52.6	50.2	RPD	4.7	Pass RPD
Solids, total dissolved [TDS]	mg/L	3.0		40	66.1	76.8	RPD	-15	Pass RPD
Solids, total dissolved [TDS], calculated	mg/L	1.0		40	87.8	87.1	RPD	0.8	Pass RPD
Solids, total suspended [TSS]	mg/L	1.0		40	1.6	5.8	DIFF	-4.2	Fail
Turbidity	NTU	0.10	15	23	0.67	0.67	RPD	0	Pass RPD
pH	pH units	0.10		40	7.8	7.8	RPD	-0.5	Pass RPD
Anions and Nutrients (Water)									
Ammonia, total (as N)	mg/L	0.0050	20	30	0.0092	0.027	DIFF	-0.0178	Fail
Bromide	mg/L	0.10	20	30	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*
Chloride	mg/L	0.10	20	30	9.5	9.4	RPD	1.1	Pass RPD
Fluoride	mg/L	0.020	20	30	0.045	0.045	DIFF	0	Pass Diff
Kjeldahl nitrogen, dissolved [DKN]	mg/L	0.050	20	30	0.27	0.29	RPD	-6.8	Pass RPD
Kjeldahl nitrogen, total [TKN]	mg/L	0.050	20	30	0.26	0.27	RPD	-2.3	Pass RPD
Nitrate (as N)	mg/L	0.0050	20	30	0.0071	*<0.0050*	*<DL*	*<DL*	*<DL*
Nitrate + Nitrite (as N)	mg/L	0.0050	20	30	0.0071	*<0.0051*	*<DL*	*<DL*	*<DL*
Nitrite (as N)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Nitrogen, total	mg/L	0.050	20	30	0.27	0.27	RPD	0.4	Pass RPD
Nitrogen, total dissolved	mg/L	0.020	20	30	0.28	0.29	RPD	-4.2	Pass RPD
Phosphate, ortho-, dissolved (as P)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Phosphorus, total	mg/L	0.0010	20	30	0.0079	0.011	RPD	-28.3	Pass RPD
Phosphorus, total dissolved	mg/L	0.0010	20	30	0.0029	0.0027	DIFF	0.0002	Pass Diff
Silicate (as SiO2)	mg/L	0.010	20	30	0.22	0.22	RPD	-1.4	Pass RPD
Sulfate (as SO4)	mg/L	0.30	20	30	5.1	5.1	RPD	0.4	Pass RPD
Cyanides									
Cyanide, Weak Acid Diss	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Total	mg/L	0.0010	20	30	*<0.0010*	0.0010	*<DL*	*<DL*	*<DL*
Cyanide, Free	mg/L	0.0010	20	30	*<0.0010*	0.0011	*<DL*	*<DL*	*<DL*
Organic / Inorganic Carbon									
Dissolved Organic Carbon	mg/L	0.50	20	30	4.9	4.2	RPD	15.9	Pass RPD
Total Organic Carbon	mg/L	0.50	20	30	4.3	4.3	RPD	1.6	Pass RPD

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-3 (D7-01)				
Station					D7-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-17	2023-07-17			
ALS Sample ID			Lab	Field	WP2317108-004	WP2317114-003			
Parameter					Water	Water			
Mercury, total									
Mercury, total	ng/L	0.1	20	30	*<0.50*	0.57	*<DL*	*<DL*	*<DL*
Total Metals									
Aluminum	mg/L	0.0010	20	30	0.013	0.012	RPD	7.2	Pass RPD
Antimony	mg/L	0.000020	20	30	0.000023	0.000024	DIFF	-0.000001	Pass Diff
Arsenic	mg/L	0.000020	20	30	0.0017	0.0016	RPD	4.3	Pass RPD
Barium	mg/L	0.000020	20	30	0.018	0.018	RPD	0	Pass RPD
Beryllium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Bismuth	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Boron	mg/L	0.0050	20	30	0.012	0.013	DIFF	-0.0003	Pass Diff
Cadmium	mg/L	0.000005	20	30	0.000007	0.000008	DIFF	-0.0000009	Pass Diff
Calcium	mg/L	0.010	20	30	15.4	15.7	RPD	-1.9	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000008	0.000008	DIFF	5E-07	Pass Diff
Chromium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Cobalt	mg/L	0.000005	20	30	0.000057	0.000054	RPD	4.7	Pass RPD
Copper	mg/L	0.000050	20	30	0.0011	0.0011	RPD	1.8	Pass RPD
Gallium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Iron	mg/L	0.0010	20	30	0.091	0.085	RPD	6.7	Pass RPD
Lanthanum	mg/L	0.000010	20	30	0.000044	0.000046	DIFF	-0.000002	Pass Diff
Lead	mg/L	0.000010	20	30	0.00013	0.000080	RPD	46.9	Fail
Lithium	mg/L	0.00050	20	30	0.0015	0.0015	DIFF	-6E-05	Pass Diff
Magnesium	mg/L	0.0040	20	30	2.8	2.8	RPD	-1.8	Pass RPD
Manganese	mg/L	0.000050	20	30	0.0095	0.0091	RPD	4.8	Pass RPD
Molybdenum	mg/L	0.000050	20	30	0.00052	0.00053	RPD	-2.5	Pass RPD
Niobium	mg/L	0.000050	20	30	0.00075	0.00075	RPD	-0.5	Pass RPD
Nickel	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Phosphorus	mg/L	0.050	20	30	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*
Potassium	mg/L	0.020	20	30	1.3	1.3	RPD	-2.3	Pass RPD
Rhenium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Rubidium	mg/L	0.000005	20	30	0.0012	0.0012	RPD	-0.9	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000048	0.000047	DIFF	0.000001	Pass Diff
Silicon	mg/L	0.050	20	30	0.12	0.12	DIFF	0.001	Pass Diff
Silver	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Sodium	mg/L	0.020	20	30	7.3	7.3	RPD	-1.1	Pass RPD
Strontium	mg/L	0.000020	20	30	0.075	0.075	RPD	-0.1	Pass RPD
Sulfur	mg/L	0.50	20	30	2.0	2.0	DIFF	0.01	Pass Diff
Tantalum	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Tellurium	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Thallium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Thorium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	mg/L	0.000020	20	30	0.000037	0.000063	DIFF	-0.000026	Pass Diff
Titanium	mg/L	0.000050	20	30	0.00070	0.00046	RPD	42.2	Fail
Tungsten	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-3 (D7-01)				
Station					D7-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-17	2023-07-17			
ALS Sample ID			Lab	Field	WP2317108-004	WP2317114-003			
Parameter					Water	Water			
Uranium	mg/L	0.000001	20	30	0.000087	0.000093	RPD	-6.4	Pass RPD
Vanadium	mg/L	0.000050	20	30	0.00010	0.000096	DIFF	0.000006	Pass Diff
Yttrium	mg/L	0.000010	20	30	0.000012	0.000013	DIFF	-1E-06	Pass Diff
Zinc	mg/L	0.00050	20	30	0.0055	0.0053	RPD	3.9	Pass RPD
Zirconium	mg/L	0.000010	20	30	0.000012	0.000012	DIFF	0	Pass Diff
Dissolved Metals									
Aluminum	mg/L	0.0010	20	30	0.0039	0.0045	DIFF	-0.0006	Pass Diff
Antimony	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Arsenic	mg/L	0.000020	20	30	0.0013	0.0012	RPD	0.8	Pass RPD
Barium	mg/L	0.000020	20	30	0.016	0.017	RPD	-5.5	Pass RPD
Beryllium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Bismuth	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Boron	mg/L	0.0050	20	30	0.014	0.013	DIFF	0.0009	Pass Diff
Cadmium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Calcium	mg/L	0.010	20	30	16.1	15.5	RPD	3.8	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000006	0.000006	DIFF	0.0000002	Pass Diff
Chromium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Cobalt	mg/L	0.000005	20	30	0.000023	0.000026	DIFF	-0.0000024	Pass Diff
Copper	mg/L	0.000050	20	30	0.00093	0.00099	RPD	-6.4	Pass RPD
Gallium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Iron	mg/L	0.0010	20	30	0.039	0.032	RPD	19.3	Pass RPD
Lanthanum	mg/L	0.000010	20	30	0.000014	0.000015	DIFF	-0.000001	Pass Diff
Lead	mg/L	0.000010	20	30	0.000014	0.000021	DIFF	-0.000007	Pass Diff
Lithium	mg/L	0.00050	20	30	0.0015	0.0015	DIFF	-3E-05	Pass Diff
Magnesium	mg/L	0.0040	20	30	3.0	2.8	RPD	8.3	Pass RPD
Manganese	mg/L	0.000050	20	30	0.0014	0.0015	RPD	-3.4	Pass RPD
Mercury	mg/L	0.000005	20	30			DIFF	0	Pass Diff
Mercury	ng/L	0.10	20	30	0.61	0.47	DIFF	0.14	Pass Diff
Molybdenum	mg/L	0.000050	20	30	0.00052	0.00051	RPD	2.3	Pass RPD
Nickel	mg/L	0.000050	20	30	0.00069	0.00068	RPD	1.3	Pass RPD
Niobium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Phosphorus	mg/L	0.050	20	30	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*
Potassium	mg/L	0.020	20	30	1.4	1.3	RPD	6.8	Pass RPD
Rhenium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Rubidium	mg/L	0.000005	20	30	0.0011	0.0011	RPD	0.9	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000042	*<0.000040*	*<DL*	*<DL*	*<DL*
Silicon	mg/L	0.050	20	30	0.13	0.12	DIFF	0.009	Pass Diff
Silver	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Sodium	mg/L	0.020	20	30	7.8	7.1	RPD	8.8	Pass RPD
Strontium	mg/L	0.000020	20	30	0.077	0.075	RPD	2.2	Pass RPD
Sulfur	mg/L	0.50	20	30	2.0	1.9	DIFF	0.08	Pass Diff
Tantalum	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Tellurium	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Thallium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*

Table A-4. Water quality field duplicate results for Meliadine AEMP – July 2023

Month	Units	July DLs	Relative Percent Difference DQOs		July DUP-3 (D7-01)				
Station					D7-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-07-17	2023-07-17			
ALS Sample ID			Lab	Field	WP2317108-004	WP2317114-003			
Parameter					Water	Water			
Thorium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	mg/L	0.000020	20	30	0.000026	0.000076	DIFF	-0.00005	Fail
Titanium	mg/L	0.000050	20	30	0.000056	0.000056	DIFF	0	Pass Diff
Tungsten	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Uranium	mg/L	0.000001	20	30	0.000091	0.000099	RPD	-8.8	Pass RPD
Vanadium	mg/L	0.000050	20	30	0.000060	0.000062	DIFF	-0.000002	Pass Diff
Yttrium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	0.00072	0.0014	DIFF	-0.00068	Pass Diff
Zirconium	mg/L	0.000010		40	0.000011	0.000010	DIFF	1E-06	Pass Diff

Notes:

[a] Field Dup Methods are based on the concentrations:
RPD = relative percent difference is used to
DIFF = when concentrations < 5* DL

[b] Results refer to the RPD or absolute difference in concentration
DQO for RPDs is < Field RPD values
DQO for DIFF is < 2x the DL

Italicized numbers are below detection limits.

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-1 (MEL-03-03)					August DUP-2 (MEL-01-06)				
Station					MEL-03-03	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-06	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18				2023-08-22	2023-08-22			
ALS Sample ID			Lab	Field	WP2320729-008	WP2320997-001				WP2320999-002	WP2320997-002			
Parameter					Water	Water				Water	Water			
Physical Tests														
Conductivity	µS/cm	1.0	10	15	82.2	84.3	RPD	-2.5	Pass RPD	109	108	RPD	0.9	Pass RPD
Acidity (as CaCO3)	mg/L	2.0		40	*<2.0*	*<2.0*	*<DL*	*<DL*	*<DL*	*<2.0*	*<2.0*	*<DL*	*<DL*	*<DL*
Alkalinity, bicarbonate (as CaCO3)	mg/L	1.0		40	20.8	20.5	RPD	1.5	Pass RPD	22.7	24.7	RPD	-8.4	Pass RPD
Alkalinity, bicarbonate (as HCO3)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, carbonate (as CO3)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, carbonate (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as OH)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, phenolphthalein (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, total (as CaCO3)	mg/L	2.0		40	20.8	20.5	RPD	1.5	Pass RPD	22.7	24.7	RPD	-8.4	Pass RPD
Hardness (as CaCO3), dissolved	mg/L	0.50		40	26.5	26.4	RPD	0.4	Pass RPD	33.6	32.4	RPD	3.6	Pass RPD
Solids, total dissolved [TDS]	mg/L	3.0		40	54.2	59.8	RPD	-9.8	Pass RPD	58.7	61.7	RPD	-5	Pass RPD
Solids, total dissolved [TDS], calculated	mg/L	1.0		40	53.4	54.8	RPD	-2.6	Pass RPD	70.8	70.2	RPD	0.9	Pass RPD
Solids, total suspended [TSS]	mg/L	1.0		40	8.7	*<1.0*	*<DL*	*<DL*	*<DL*	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Turbidity	NTU	0.10	15	23	0.30	0.36	DIFF	-0.06	Pass Diff	0.43	0.42	DIFF	0.01	Pass Diff
pH	pH units	0.10		40	7.5	7.5	RPD	-0.5	Pass RPD	7.4	7.5	RPD	-1.6	Pass RPD
Anions and Nutrients (Water)														
Ammonia, total (as N)	mg/L	0.0050	20	30	0.018	*<0.0050*	*<DL*	*<DL*	*<DL*	*<0.0050*	*<0.0050*	*<DL*	*<DL*	*<DL*
Bromide	mg/L	0.10	20	30	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*
Chloride	mg/L	0.10	20	30	11.2	10.9	RPD	2.7	Pass RPD	15.3	15.3	RPD	0	Pass RPD
Fluoride	mg/L	0.020	20	30	0.029	0.028	DIFF	0.001	Pass Diff	0.030	0.030	DIFF	0	Pass Diff
Kjeldahl nitrogen, dissolved [DKN]	mg/L	0.050	20	30	0.21	0.17	DIFF	0.037	Pass Diff	0.23	0.21	DIFF	0.025	Pass Diff
Kjeldahl nitrogen, total [TKN]	mg/L	0.050	20	30	0.21	0.17	DIFF	0.038	Pass Diff	0.26	0.22	DIFF	0.04	Pass Diff
Nitrate (as N)	mg/L	0.0050	20	30	*<0.0050*	*<0.0050*	*<DL*	*<DL*	*<DL*	*<0.0050*	*<0.0050*	*<DL*	*<DL*	*<DL*
Nitrate + Nitrite (as N)	mg/L	0.0050	20	30	*<0.0051*	*<0.0051*	*<DL*	*<DL*	*<DL*	*<0.0051*	*<0.0051*	*<DL*	*<DL*	*<DL*
Nitrite (as N)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Nitrogen, total	mg/L	0.050	20	30	0.21	0.17	DIFF	0.038	Pass Diff	0.26	0.22	DIFF	0.04	Pass Diff
Nitrogen, total dissolved	mg/L	0.020	20	30	0.21	0.17	RPD	19.3	Pass RPD	0.23	0.21	RPD	11.4	Pass RPD
Phosphate, ortho-, dissolved (as P)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Phosphorus, total	mg/L	0.0010	20	30	0.0021	0.0042	DIFF	-0.0021	Fail	0.0057	0.0054	RPD	5.4	Pass RPD
Phosphorus, total dissolved	mg/L	0.0010	20	30	*<0.0010*	0.0024	*<DL*	*<DL*	*<DL*	0.0023	0.0030	DIFF	-0.0007	Pass Diff
Silicate (as SiO2)	mg/L	0.010	20	30	0.37	0.37	RPD	1.1	Pass RPD	0.62	0.63	RPD	-1.9	Pass RPD
Sulfate (as SO4)	mg/L	0.30	20	30	4.5	4.4	RPD	1.6	Pass RPD	6.7	6.7	RPD	0.1	Pass RPD
Cyanides														
Cyanide, Weak Acid Diss	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Total	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Free	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Organic / Inorganic Carbon														
Dissolved Organic Carbon	mg/L	0.50	20	30	3.6	4.0	RPD	-11.8	Pass RPD	3.8	5.0	RPD	-26	Pass RPD
Total Organic Carbon	mg/L	0.50	20	30	3.2	4.4	RPD	-31.9	Fail	4.2	5.0	RPD	-18.1	Pass RPD

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-1 (MEL-03-03)					August DUP-2 (MEL-01-06)				
Station					MEL-03-03	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-06	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18				2023-08-22	2023-08-22			
ALS Sample ID			Lab	Field	WP2320729-008	WP2320997-001				WP2320999-002	WP2320997-002			
Parameter					Water	Water				Water	Water			
Mercury, total														
Mercury, total	ng/L	0.1	20	30	<0.50	<0.50	<DL	<DL	<DL	<0.50	<0.50	<DL	<DL	<DL
Total Metals														
Aluminum	mg/L	0.0010	20	30	0.0036	0.0027	DIFF	0.0009	Pass Diff	0.0030	0.0022	DIFF	0.0008	Pass Diff
Antimony	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Arsenic	mg/L	0.000020	20	30	0.00044	0.00044	RPD	0.2	Pass RPD	0.00070	0.00069	RPD	0.9	Pass RPD
Barium	mg/L	0.000020	20	30	0.0086	0.0088	RPD	-2.3	Pass RPD	0.0095	0.0093	RPD	2	Pass RPD
Beryllium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Bismuth	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Boron	mg/L	0.0050	20	30	<0.0050	0.0053	<DL	<DL	<DL	0.0073	0.0075	DIFF	-0.0002	Pass Diff
Cadmium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Calcium	mg/L	0.010	20	30	7.7	7.9	RPD	-3.5	Pass RPD	10.4	9.8	RPD	5.5	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000010	0.000010	DIFF	-1E-07	Pass Diff	0.000009	0.000008	DIFF	0.0000005	Pass Diff
Chromium	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Cobalt	mg/L	0.000005	20	30	0.000018	0.000016	DIFF	0.000002	Pass Diff	0.000031	0.000028	RPD	12.2	Pass RPD
Copper	mg/L	0.000050	20	30	0.00084	0.00084	RPD	-0.1	Pass RPD	0.0010	0.00095	RPD	9	Pass RPD
Gallium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	<0.000050	<DL	<DL	<DL
Iron	mg/L	0.0010	20	30	0.016	0.015	RPD	6.6	Pass RPD	0.032	0.024	RPD	26.6	Pass RPD
Lanthanum	mg/L	0.000010	20	30	0.000025	0.000023	DIFF	0.000002	Pass Diff	0.000024	0.000024	DIFF	0	Pass Diff
Lead	mg/L	0.000010	20	30	0.000078	0.00012	RPD	-40	Fail	<0.000010	<0.000010	<DL	<DL	<DL
Lithium	mg/L	0.00050	20	30	0.00079	0.00091	DIFF	-0.00012	Pass Diff	0.0010	0.0011	DIFF	-0.0001	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.3	1.3	RPD	-3.9	Pass RPD	1.9	1.8	RPD	4.9	Pass RPD
Manganese	mg/L	0.000050	20	30	0.0046	0.0051	RPD	-8.9	Pass RPD	0.016	0.015	RPD	7.9	Pass RPD
Molybdenum	mg/L	0.000050	20	30	0.000094	0.000089	DIFF	0.000005	Pass Diff	0.00015	0.00014	DIFF	0.000011	Pass Diff
Niobium	mg/L	0.000050	20	30	0.00056	0.00051	RPD	8	Pass RPD	0.00087	0.00083	RPD	4.1	Pass RPD
Nickel	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Phosphorus	mg/L	0.050	20	30	<0.050	<0.050	<DL	<DL	<DL	<0.050	<0.050	<DL	<DL	<DL
Potassium	mg/L	0.020	20	30	0.95	0.97	RPD	-1.7	Pass RPD	1.2	1.2	RPD	5.1	Pass RPD
Rhenium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Rubidium	mg/L	0.000005	20	30	0.0014	0.0014	RPD	-2.9	Pass RPD	0.0016	0.0015	RPD	3.8	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000047	0.000043	DIFF	0.000004	Pass Diff	0.000051	0.000047	DIFF	0.000004	Pass Diff
Silicon	mg/L	0.050	20	30	0.17	0.19	DIFF	-0.019	Pass Diff	0.36	0.31	RPD	13.4	Pass RPD
Silver	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Sodium	mg/L	0.020	20	30	5.1	5.4	RPD	-5.4	Pass RPD	8.0	7.6	RPD	5.9	Pass RPD
Strontium	mg/L	0.000020	20	30	0.041	0.041	RPD	-1.2	Pass RPD	0.060	0.056	RPD	6.9	Pass RPD
Sulfur	mg/L	0.50	20	30	1.6	1.6	DIFF	-0.08	Pass Diff	2.4	2.4	DIFF	-0.06	Pass Diff
Tantalum	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Tellurium	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Thallium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Thorium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Tin	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Titanium	mg/L	0.000050	20	30	0.00016	0.000050	DIFF	0.000112	Fail	0.00010	0.000062	DIFF	0.000038	Pass Diff
Tungsten	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	<0.000010	<0.000010	<DL	<DL	<DL
Uranium	mg/L	0.000001	20	30	0.000020	0.000022	RPD	-9.3	Pass RPD	0.000028	0.000024	RPD	15.3	Pass RPD

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-1 (MEL-03-03)				
Station					MEL-03-03	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18			
ALS Sample ID			Lab	Field	WP2320729-008	WP2320997-001			
Parameter					Water	Water			
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	0.000023	0.000040	DIFF	-0.000017	Pass Diff
Zinc	mg/L	0.00050	20	30	0.0023	0.0082	DIFF	-0.00583	Fail
Zirconium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Dissolved Metals									
Aluminum	mg/L	0.0010	20	30	0.0020	0.0018	DIFF	0.0002	Pass Diff
Antimony	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Arsenic	mg/L	0.000020	20	30	0.00043	0.00042	RPD	1.2	Pass RPD
Barium	mg/L	0.000020	20	30	0.0086	0.0088	RPD	-2	Pass RPD
Beryllium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Bismuth	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Boron	mg/L	0.0050	20	30	0.0053	*<0.0050*	*<DL*	*<DL*	*<DL*
Cadmium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Calcium	mg/L	0.010	20	30	8.4	8.3	RPD	1.2	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000010	0.000010	DIFF	-0.0000002	Pass Diff
Chromium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Cobalt	mg/L	0.000005	20	30	0.000009	0.000007	DIFF	0.0000018	Pass Diff
Copper	mg/L	0.000050	20	30	0.00090	0.00087	RPD	2.4	Pass RPD
Gallium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Iron	mg/L	0.0010	20	30	0.0068	0.0071	RPD	-4.3	Pass RPD
Lanthanum	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Lead	mg/L	0.000010	20	30	0.000060	0.000051	RPD	16.2	Pass RPD
Lithium	mg/L	0.00050	20	30	0.00085	0.00084	DIFF	1E-05	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.4	1.4	RPD	-1.4	Pass RPD
Manganese	mg/L	0.000050	20	30	0.00053	0.00046	RPD	14.2	Pass RPD
Mercury	mg/L	0.000005	20	30			DIFF	0	Pass Diff
Mercury	ng/L	0.10	20	30	*<0.50*	*<0.50*	*<DL*	*<DL*	*<DL*
Molybdenum	mg/L	0.000050	20	30	0.000095	0.000095	DIFF	0	Pass Diff
Nickel	mg/L	0.000050	20	30	0.00054	0.00050	RPD	6.5	Pass RPD
Niobium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Phosphorus	mg/L	0.050	20	30	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*
Potassium	mg/L	0.020	20	30	1.0	1.00	RPD	1.4	Pass RPD
Rhenium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Rubidium	mg/L	0.000005	20	30	0.0014	0.0014	RPD	1.4	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000046	0.000043	DIFF	0.000003	Pass Diff
Silicon	mg/L	0.050	20	30	0.18	0.18	DIFF	-0.002	Pass Diff
Silver	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Sodium	mg/L	0.020	20	30	5.7	5.6	RPD	1.6	Pass RPD
Strontium	mg/L	0.000020	20	30	0.042	0.043	RPD	-1.9	Pass RPD
Sulfur	mg/L	0.50	20	30	1.6	1.6	DIFF	0	Pass Diff
Tantalum	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Tellurium	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Thallium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Thorium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	mg/L	0.000020	20	30	0.000045	*<0.000020*	*<DL*	*<DL*	*<DL*

Month	August DUP-2 (MEL-01-06)				
Station	MEL-01-06	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled	2023-08-22	2023-08-22			
ALS Sample ID	WP2320999-002	WP2320997-002			
Parameter	Water	Water			
Vanadium	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	*<0.00050*	*<0.00050*	*<DL*	*<DL*	*<DL*
Zirconium	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Dissolved Metals					
Aluminum	0.0014	0.0015	DIFF	-0.0001	Pass Diff
Antimony	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Arsenic	0.00066	0.00064	RPD	2.9	Pass RPD
Barium	0.0092	0.0093	RPD	-1.1	Pass RPD
Beryllium	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Bismuth	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Boron	0.0070	0.0070	DIFF	0	Pass Diff
Cadmium	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Calcium	10.3	10.0	RPD	3.5	Pass RPD
Cesium	0.000008	0.000008	DIFF	0.0000004	Pass Diff
Chromium	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Cobalt	0.000014	0.000013	DIFF	0.0000013	Pass Diff
Copper	0.00099	0.00095	RPD	3.7	Pass RPD
Gallium	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Iron	0.0063	0.0058	RPD	8.3	Pass RPD
Lanthanum	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Lead	0.000084	*<0.000010*	*<DL*	*<DL*	*<DL*
Lithium	0.0010	0.0010	DIFF	2E-05	Pass Diff
Magnesium	1.9	1.8	RPD	4.3	Pass RPD
Manganese	0.00083	0.00080	RPD	3.2	Pass RPD
Mercury			DIFF	0	Pass Diff
Mercury	*<0.50*	*<0.50*	*<DL*	*<DL*	*<DL*
Molybdenum	0.00015	0.00015	DIFF	4E-06	Pass Diff
Nickel	0.00081	0.00078	RPD	3.7	Pass RPD
Niobium	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Phosphorus	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*
Potassium	1.2	1.2	RPD	4.3	Pass RPD
Rhenium	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Rubidium	0.0015	0.0015	RPD	4	Pass RPD
Selenium	0.000046	0.000049	DIFF	-0.000003	Pass Diff
Silicon	0.32	0.31	RPD	1.9	Pass RPD
Silver	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Sodium	7.9	7.6	RPD	3.4	Pass RPD
Strontium	0.059	0.057	RPD	4	Pass RPD
Sulfur	2.5	2.4	DIFF	0.02	Pass Diff
Tantalum	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Tellurium	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Thallium	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Thorium	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	0.000036	0.000024	DIFF	0.000012	Pass Diff

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-1 (MEL-03-03)					August DUP-2 (MEL-01-06)				
Station					MEL-03-03	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-06	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18				2023-08-22	2023-08-22			
ALS Sample ID			Lab	Field	WP2320729-008	WP2320997-001				WP2320999-002	WP2320997-002			
Parameter					Water	Water				Water	Water			
Titanium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Tungsten	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Uranium	mg/L	0.000001	20	30	0.000016	0.000020	RPD	-21.3	Pass RPD	0.000026	0.000028	RPD	-4.8	Pass RPD
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	0.0023	0.0020	DIFF	0.00032	Pass Diff	*<0.00050*	0.00055	*<DL*	*<DL*	*<DL*
Zirconium	mg/L	0.000010		40	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*

Notes:

[a] Field Dup Methods are based on the concentrations:
RPD = relative percent difference is used to
DIFF = when concentrations < 5* DL

[b] Results refer to the RPD or absolute difference in concentration
DQO for RPDs is < Field RPD values
DQO for DIFF is < 2x the DL

Italicized numbers are below detection limits.

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-3 (MEL-05-01)				
Station					MEL-05-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18			
ALS Sample ID			Lab	Field	WP2320734-006	WP2320997-003			
Parameter					Water	Water			
Physical Tests									
Conductivity	µS/cm	1.0	10	15	76.7	86.8	RPD	-12.4	Pass RPD
Acidity (as CaCO3)	mg/L	2.0		40	*<2.0*	*<2.0*	*<DL*	*<DL*	*<DL*
Alkalinity, bicarbonate (as CaCO3)	mg/L	1.0		40	23.3	21.9	RPD	6.2	Pass RPD
Alkalinity, bicarbonate (as HCO3)	mg/L	1.0		40			DIFF	0	Pass Diff
Alkalinity, carbonate (as CO3)	mg/L	1.0		40			DIFF	0	Pass Diff
Alkalinity, carbonate (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, hydroxide (as OH)	mg/L	1.0		40			DIFF	0	Pass Diff
Alkalinity, phenolphthalein (as CaCO3)	mg/L	1.0		40	*<1.0*	*<1.0*	*<DL*	*<DL*	*<DL*
Alkalinity, total (as CaCO3)	mg/L	2.0		40	23.3	21.9	RPD	6.2	Pass RPD
Hardness (as CaCO3), dissolved	mg/L	0.50		40	27	27.6	RPD	-2.2	Pass RPD
Solids, total dissolved [TDS]	mg/L	3.0		40	55.1	56.4	RPD	-2.3	Pass RPD
Solids, total dissolved [TDS], calculated	mg/L	1.0		40	49.8	56.4	RPD	-12.4	Pass RPD
Solids, total suspended [TSS]	mg/L	1.0		40	*<1.0*	1.1	*<DL*	*<DL*	*<DL*
Turbidity	NTU	0.10	15	23	0.29	0.24	DIFF	0.05	Pass Diff
pH	pH units	0.10		40	7.5	7.5	RPD	1.1	Pass RPD
Anions and Nutrients (Water)									
Ammonia, total (as N)	mg/L	0.0050	20	30	0.0098	*<0.0050*	*<DL*	*<DL*	*<DL*
Bromide	mg/L	0.10	20	30	*<0.10*	*<0.10*	*<DL*	*<DL*	*<DL*
Chloride	mg/L	0.10	20	30	11.1	10.9	RPD	1.8	Pass RPD
Fluoride	mg/L	0.020	20	30	0.030	0.028	DIFF	0.002	Pass Diff
Kjeldahl nitrogen, dissolved [DKN]	mg/L	0.050	20	30	0.21	0.16	DIFF	0.054	Pass Diff
Kjeldahl nitrogen, total [TKN]	mg/L	0.050	20	30	0.20	0.17	DIFF	0.035	Pass Diff
Nitrate (as N)	mg/L	0.0050	20	30	*<0.0050*	*<0.0050*	*<DL*	*<DL*	*<DL*
Nitrate + Nitrite (as N)	mg/L	0.0050	20	30	*<0.0051*	*<0.0051*	*<DL*	*<DL*	*<DL*
Nitrite (as N)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Nitrogen, total	mg/L	0.050	20	30	0.20	0.17	DIFF	0.035	Pass Diff
Nitrogen, total dissolved	mg/L	0.020	20	30	0.21	0.16	RPD	29.2	Pass RPD
Phosphate, ortho-, dissolved (as P)	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Phosphorus, total	mg/L	0.0010	20	30	0.0035	0.0040	DIFF	-0.0005	Pass Diff
Phosphorus, total dissolved	mg/L	0.0010	20	30	0.0020	0.0028	DIFF	-0.0008	Pass Diff
Silicate (as SiO2)	mg/L	0.010	20	30	0.42	0.41	RPD	3.4	Pass RPD
Sulfate (as SO4)	mg/L	0.30	20	30	4.5	4.4	RPD	3.2	Pass RPD
Cyanides									
Cyanide, Weak Acid Diss	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Total	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Cyanide, Free	mg/L	0.0010	20	30	*<0.0010*	*<0.0010*	*<DL*	*<DL*	*<DL*
Organic / Inorganic Carbon									
Dissolved Organic Carbon	mg/L	0.50	20	30	4.0	4.1	RPD	-4.5	Pass RPD
Total Organic Carbon	mg/L	0.50	20	30	3.9	4.2	RPD	-7.4	Pass RPD

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-3 (MEL-05-01)				
Station					MEL-05-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18			
ALS Sample ID			Lab	Field	WP2320734-006	WP2320997-003			
Parameter					Water	Water			
Mercury, total									
Mercury, total	ng/L	0.1	20	30	<0.50	<0.50	<DL	<DL	<DL
Total Metals									
Aluminum	mg/L	0.0010	20	30	0.0023	0.0021	DIFF	0.0002	Pass Diff
Antimony	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL
Arsenic	mg/L	0.000020	20	30	0.00049	0.00049	RPD	-0.2	Pass RPD
Barium	mg/L	0.000020	20	30	0.0088	0.0091	RPD	-2.9	Pass RPD
Beryllium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL
Bismuth	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL
Boron	mg/L	0.0050	20	30	0.0052	0.0055	DIFF	-0.0003	Pass Diff
Cadmium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL
Calcium	mg/L	0.010	20	30	8.3	8.4	RPD	-1.6	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000009	0.000010	DIFF	-4E-07	Pass Diff
Chromium	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL
Cobalt	mg/L	0.000005	20	30	0.000015	0.000016	DIFF	-0.0000012	Pass Diff
Copper	mg/L	0.000050	20	30	0.00089	0.00086	RPD	3.4	Pass RPD
Gallium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL
Iron	mg/L	0.0010	20	30	0.012	0.011	RPD	13.1	Pass RPD
Lanthanum	mg/L	0.000010	20	30	0.000012	0.000012	DIFF	0	Pass Diff
Lead	mg/L	0.000010	20	30	0.000077	0.000073	RPD	5.3	Pass RPD
Lithium	mg/L	0.00050	20	30	0.00084	0.00093	DIFF	-0.00009	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.3	1.4	RPD	-3.7	Pass RPD
Manganese	mg/L	0.000050	20	30	0.0048	0.0048	RPD	-0.8	Pass RPD
Molybdenum	mg/L	0.000050	20	30	0.000094	0.00010	DIFF	-6E-06	Pass Diff
Niobium	mg/L	0.000050	20	30	0.00048	0.00049	RPD	-1.2	Pass RPD
Nickel	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL
Phosphorus	mg/L	0.050	20	30	<0.050	<0.050	<DL	<DL	<DL
Potassium	mg/L	0.020	20	30	1.00	0.99	RPD	0.6	Pass RPD
Rhenium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL
Rubidium	mg/L	0.000005	20	30	0.0014	0.0014	RPD	-2.2	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000045	0.000040	DIFF	0.000005	Pass Diff
Silicon	mg/L	0.050	20	30	0.20	0.21	DIFF	-0.005	Pass Diff
Silver	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL
Sodium	mg/L	0.020	20	30	5.3	5.4	RPD	-1.7	Pass RPD
Strontium	mg/L	0.000020	20	30	0.042	0.042	RPD	-0.7	Pass RPD
Sulfur	mg/L	0.50	20	30	1.6	1.6	DIFF	-0.01	Pass Diff
Tantalum	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL
Tellurium	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL
Thallium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL
Thorium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL
Tin	mg/L	0.000020	20	30	0.000024	<0.000020	<DL	<DL	<DL
Titanium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL
Tungsten	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL
Uranium	mg/L	0.000001	20	30	0.000019	0.000018	RPD	7.7	Pass RPD

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-3 (MEL-05-01)				
Station					MEL-05-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18			
ALS Sample ID			Lab	Field	WP2320734-006	WP2320997-003			
Parameter					Water	Water			
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	0.0025	0.0019	DIFF	0.00058	Pass Diff
Zirconium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Dissolved Metals									
Aluminum	mg/L	0.0010	20	30	0.0013	0.0020	DIFF	-0.0007	Pass Diff
Antimony	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Arsenic	mg/L	0.000020	20	30	0.00047	0.00049	RPD	-4.1	Pass RPD
Barium	mg/L	0.000020	20	30	0.0088	0.0091	RPD	-3.3	Pass RPD
Beryllium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Bismuth	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Boron	mg/L	0.0050	20	30	0.0054	0.0050	DIFF	0.0004	Pass Diff
Cadmium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Calcium	mg/L	0.010	20	30	8.6	8.7	RPD	-2.1	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000009	0.000010	DIFF	-3E-07	Pass Diff
Chromium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Cobalt	mg/L	0.000005	20	30	0.000007	0.000008	DIFF	-0.0000006	Pass Diff
Copper	mg/L	0.000050	20	30	0.00088	0.00092	RPD	-4.3	Pass RPD
Gallium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Iron	mg/L	0.0010	20	30	0.0060	0.0065	RPD	-8	Pass RPD
Lanthanum	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Lead	mg/L	0.000010	20	30	0.000065	0.000065	RPD	0	Pass RPD
Lithium	mg/L	0.00050	20	30	0.00088	0.00086	DIFF	2E-05	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.4	1.4	RPD	-2.9	Pass RPD
Manganese	mg/L	0.000050	20	30	0.00047	0.00048	RPD	-1.7	Pass RPD
Mercury	mg/L	0.000005	20	30			DIFF	0	Pass Diff
Mercury	ng/L	0.10	20	30	*<0.50*	*<0.50*	*<DL*	*<DL*	*<DL*
Molybdenum	mg/L	0.000050	20	30	0.000098	0.00011	DIFF	-0.000008	Pass Diff
Nickel	mg/L	0.000050	20	30	0.00048	0.00047	RPD	2.3	Pass RPD
Niobium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Phosphorus	mg/L	0.050	20	30	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*
Potassium	mg/L	0.020	20	30	1.0	1.0	RPD	-1	Pass RPD
Rhenium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Rubidium	mg/L	0.000005	20	30	0.0014	0.0014	RPD	0.7	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000048	0.000044	DIFF	0.000004	Pass Diff
Silicon	mg/L	0.050	20	30	0.20	0.20	DIFF	-0.002	Pass Diff
Silver	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Sodium	mg/L	0.020	20	30	5.6	5.6	RPD	0.7	Pass RPD
Strontium	mg/L	0.000020	20	30	0.042	0.043	RPD	-3.5	Pass RPD
Sulfur	mg/L	0.50	20	30	1.6	1.6	DIFF	0.01	Pass Diff
Tantalum	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Tellurium	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Thallium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Thorium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*

Table A-5. Water quality field duplicate results for Meliadine AEMP – August 2023

Month	Units	August DLs	Relative Percent Difference DQOs		August DUP-3 (MEL-05-01)				
Station					MEL-05-01	DUP-3	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-08-18	2023-08-18			
ALS Sample ID			Lab	Field	WP2320734-006	WP2320997-003			
Parameter					Water	Water			
Titanium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Tungsten	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Uranium	mg/L	0.000001	20	30	0.000018	0.000019	RPD	-4.3	Pass RPD
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	0.0023	0.0023	DIFF	0	Pass Diff
Zirconium	mg/L	0.000010		40	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*

Notes:

[a] Field Dup Methods are based on the concentrations:
RPD = relative percent difference is used to
DIFF = when concentrations < 5* DL

[b] Results refer to the RPD or absolute difference in concentration
DQO for RPDs is < Field RPD values
DQO for DIFF is < 2x the DL

Italicized numbers are below detection limits.

Table A-6. Water quality field duplicate results for Meliadine AEMP – September 2023

Month	Units	September DLs	Relative Percent Difference DQOs		September DUP-1 (MEL-03-05)					September DUP-2 (MEL-01-06)				
Station					MEL-03-05	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-06	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-09-15	2023-09-15				2023-09-15	2023-09-15			
ALS Sample ID			Lab	Field	WP2323948-010	WP2323951-001				WP2323956-002	WP2323951-002			
Parameter					Water	Water				Water	Water			
Physical Tests														
Conductivity	µS/cm	1.0	10	15	88.6	88	RPD	0.7	Pass RPD	119	117	RPD	1.7	Pass RPD
Acidity (as CaCO3)	mg/L	2.0		40	<2.0	<2.0	<DL	<DL	<DL	<2.0	<2.0	<DL	<DL	<DL
Alkalinity, bicarbonate (as CaCO3)	mg/L	1.0		40	18.8	18.7	RPD	0.5	Pass RPD	20.8	20.4	RPD	1.9	Pass RPD
Alkalinity, bicarbonate (as HCO3)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, carbonate (as CO3)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, carbonate (as CaCO3)	mg/L	1.0		40	<1.0	<1.0	<DL	<DL	<DL	<1.0	<1.0	<DL	<DL	<DL
Alkalinity, hydroxide (as CaCO3)	mg/L	1.0		40	<1.0	<1.0	<DL	<DL	<DL	<1.0	<1.0	<DL	<DL	<DL
Alkalinity, hydroxide (as OH)	mg/L	1.0		40			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Alkalinity, phenolphthalein (as CaCO3)	mg/L	1.0		40	<1.0	<1.0	<DL	<DL	<DL	<1.0	<1.0	<DL	<DL	<DL
Alkalinity, total (as CaCO3)	mg/L	2.0		40	18.8	18.7	RPD	0.5	Pass RPD	20.8	20.4	RPD	1.9	Pass RPD
Hardness (as CaCO3), dissolved	mg/L	0.50		40	26.2	26.4	RPD	-0.8	Pass RPD	35.5	34	RPD	4.3	Pass RPD
Solids, total dissolved [TDS]	mg/L	3.0		40	43.9	47.2	RPD	-7.2	Pass RPD	67.2	66.9	RPD	0.4	Pass RPD
Solids, total dissolved [TDS], calculated	mg/L	1.0		40	57.6	57.2	RPD	0.7	Pass RPD	77.4	76	RPD	1.8	Pass RPD
Solids, total suspended [TSS]	mg/L	1.0		40	<1.0	<1.0	<DL	<DL	<DL	<1.0	<1.0	<DL	<DL	<DL
Turbidity	NTU	0.10	15	23	0.54	0.52	RPD	3.8	Pass RPD	0.41	0.78	DIFF	-0.37	Fail
pH	pH units	0.10		40	7.5	7.5	RPD	0.3	Pass RPD	7.5	7.5	RPD	0.3	Pass RPD
Anions and Nutrients (Water)														
Ammonia, total (as N)	mg/L	0.0050	20	30	<0.0050	0.016	<DL	<DL	<DL	0.013	<0.0050	<DL	<DL	<DL
Bromide	mg/L	0.10	20	30	<0.10	<0.10	<DL	<DL	<DL	<0.10	<0.10	<DL	<DL	<DL
Chloride	mg/L	0.10	20	30	11.2	11.3	RPD	-0.9	Pass RPD	16.8	16.8	RPD	0	Pass RPD
Fluoride	mg/L	0.020	20	30	0.029	0.029	DIFF	0	Pass Diff	0.032	0.031	DIFF	0.001	Pass Diff
Kjeldahl nitrogen, dissolved [DKN]	mg/L	0.050	20	30	0.33	0.26	RPD	25.4	Pass RPD	0.35	0.33	RPD	7.9	Pass RPD
Kjeldahl nitrogen, total [TKN]	mg/L	0.050	20	30	0.27	0.25	RPD	5	Pass RPD	0.35	0.32	RPD	6.9	Pass RPD
Nitrate (as N)	mg/L	0.0050	20	30	0.021	0.018	DIFF	0.0028	Pass Diff	<0.0050	0.015	<DL	<DL	<DL
Nitrate + Nitrite (as N)	mg/L	0.0050	20	30	0.021	0.018	DIFF	0.0028	Pass Diff	<0.0051	0.015	<DL	<DL	<DL
Nitrite (as N)	mg/L	0.0010	20	30	<0.0010	<0.0010	<DL	<DL	<DL	<0.0010	<0.0010	<DL	<DL	<DL
Nitrogen, total	mg/L	0.050	20	30	0.29	0.27	RPD	5.7	Pass RPD	0.35	0.34	RPD	2.3	Pass RPD
Nitrogen, total dissolved	mg/L	0.020	20	30	0.35	0.28	RPD	24.8	Pass RPD	0.35	0.34	RPD	3.4	Pass RPD
Phosphate, ortho-, dissolved (as P)	mg/L	0.0010	20	30	<0.0010	<0.0010	<DL	<DL	<DL	<0.0010	<0.0010	<DL	<DL	<DL
Phosphorus, total	mg/L	0.0010	20	30	0.0046	0.0038	DIFF	0.0008	Pass Diff	0.0067	0.0076	RPD	-12.6	Pass RPD
Phosphorus, total dissolved	mg/L	0.0010	20	30	0.0023	0.0025	DIFF	-0.0002	Pass Diff	0.0026	0.0036	DIFF	-0.001	Pass Diff
Silicate (as SiO2)	mg/L	0.010	20	30	0.34	0.34	RPD	2.1	Pass RPD	0.30	0.58	RPD	-63.2	Fail
Sulfate (as SO4)	mg/L	0.30	20	30	4.5	4.5	RPD	0	Pass RPD	7.1	7.1	RPD	-0.3	Pass RPD
Cyanides														
Cyanide, Weak Acid Diss	mg/L	0.0010	20	30	<0.0010	<0.0010	<DL	<DL	<DL	<0.0010	<0.0010	<DL	<DL	<DL
Cyanide, Total	mg/L	0.0010	20	30	<0.0010	<0.0010	<DL	<DL	<DL	<0.0010	<0.0010	<DL	<DL	<DL
Cyanide, Free	mg/L	0.0010	20	30	<0.0010	<0.0010	<DL	<DL	<DL	<0.0010	<0.0010	<DL	<DL	<DL
Organic / Inorganic Carbon														
Dissolved Organic Carbon	mg/L	0.50	20	30	3.0	4.1	RPD	-28.7	Pass RPD	4.0	4.2	RPD	-4.7	Pass RPD
Total Organic Carbon	mg/L	0.50	20	30	3.1	3.1	RPD	-1	Pass RPD	4.4	4.3	RPD	2.5	Pass RPD

Table A-6. Water quality field duplicate results for Meliadine AEMP – September 2023

Month	Units	September DLs	Relative Percent Difference DQOs		September DUP-1 (MEL-03-05)					September DUP-2 (MEL-01-06)				
Station					MEL-03-05	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-06	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-09-15	2023-09-15				2023-09-15	2023-09-15			
ALS Sample ID			Lab	Field	WP2323948-010	WP2323951-001				WP2323956-002	WP2323951-002			
Parameter					Water	Water				Water	Water			
Mercury, total														
Mercury, total	ng/L	0.1	20	30	<0.50	<0.50	<DL	<DL	<DL	<0.50	<0.50	<DL	<DL	<DL
Total Metals														
Aluminum	mg/L	0.0010	20	30	0.0022	0.0023	DIFF	-1E-04	Pass Diff	0.0022	0.0023	DIFF	-1E-04	Pass Diff
Antimony	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Arsenic	mg/L	0.000020	20	30	0.00038	0.00040	RPD	-4.1	Pass RPD	0.00068	0.00065	RPD	4.7	Pass RPD
Barium	mg/L	0.000020	20	30	0.0086	0.0085	RPD	1.2	Pass RPD	0.0091	0.0091	RPD	0.4	Pass RPD
Beryllium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Bismuth	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Boron	mg/L	0.0050	20	30	<0.0050	<0.0050	<DL	<DL	<DL	0.0078	0.0072	DIFF	0.0006	Pass Diff
Cadmium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Calcium	mg/L	0.010	20	30	8.7	8.8	RPD	-1.1	Pass RPD	10.2	10	RPD	2	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000010	0.000010	DIFF	0.0000002	Pass Diff	0.000008	0.000009	DIFF	-0.0000004	Pass Diff
Chromium	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Cobalt	mg/L	0.000005	20	30	0.000012	0.000012	DIFF	-3E-07	Pass Diff	0.000023	0.000022	DIFF	0.000001	Pass Diff
Copper	mg/L	0.000050	20	30	0.00078	0.00079	RPD	-0.9	Pass RPD	0.00092	0.00090	RPD	2.1	Pass RPD
Gallium	mg/L	0.000050	20	30	<0.000050	<0.000050	<DL	<DL	<DL	<0.000050	<0.000050	<DL	<DL	<DL
Iron	mg/L	0.0010	20	30	0.010	0.011	RPD	-1.9	Pass RPD	0.017	0.015	RPD	14.3	Pass RPD
Lanthanum	mg/L	0.000010	20	30	0.000016	0.000016	DIFF	0	Pass Diff	0.000019	0.000020	DIFF	-0.000001	Pass Diff
Lead	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	<0.000010	<0.000010	<DL	<DL	<DL
Lithium	mg/L	0.00050	20	30	0.00087	0.00089	DIFF	-2E-05	Pass Diff	0.0012	0.0010	DIFF	0.00012	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.4	1.5	RPD	-2.1	Pass RPD	1.9	1.9	RPD	2.6	Pass RPD
Manganese	mg/L	0.000050	20	30	0.0027	0.0028	RPD	-1.8	Pass RPD	0.0065	0.0062	RPD	4.5	Pass RPD
Molybdenum	mg/L	0.000050	20	30	0.00010	0.000098	DIFF	2E-06	Pass Diff	0.00015	0.00015	DIFF	-2E-06	Pass Diff
Niobium	mg/L	0.000050	20	30	0.00044	0.00045	RPD	-1.1	Pass RPD	0.00075	0.00073	RPD	2.8	Pass RPD
Nickel	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Phosphorus	mg/L	0.050	20	30	<0.050	<0.050	<DL	<DL	<DL	<0.050	<0.050	<DL	<DL	<DL
Potassium	mg/L	0.020	20	30	1.1	1.1	RPD	-0.9	Pass RPD	1.2	1.2	RPD	1.7	Pass RPD
Rhenium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Rubidium	mg/L	0.000005	20	30	0.0015	0.0015	RPD	0	Pass RPD	0.0016	0.0015	RPD	1.9	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000043	0.000045	DIFF	-0.000002	Pass Diff	0.000046	0.000045	DIFF	1E-06	Pass Diff
Silicon	mg/L	0.050	20	30	0.17	0.17	DIFF	-0.002	Pass Diff	0.32	0.31	RPD	3.5	Pass RPD
Silver	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Sodium	mg/L	0.020	20	30	5.8	6.0	RPD	-2	Pass RPD	8.3	8.1	RPD	2.4	Pass RPD
Strontium	mg/L	0.000020	20	30	0.044	0.044	RPD	-0.9	Pass RPD	0.059	0.058	RPD	2.1	Pass RPD
Sulfur	mg/L	0.50	20	30	1.7	1.7	DIFF	-0.01	Pass Diff	2.7	2.6	RPD	4.1	Pass RPD
Tantalum	mg/L	0.00010	20	30	<0.00010	<0.00010	<DL	<DL	<DL	<0.00010	<0.00010	<DL	<DL	<DL
Tellurium	mg/L	0.000020	20	30	<0.000020	<0.000020	<DL	<DL	<DL	<0.000020	<0.000020	<DL	<DL	<DL
Thallium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Thorium	mg/L	0.000005	20	30	<0.0000050	<0.0000050	<DL	<DL	<DL	<0.0000050	<0.0000050	<DL	<DL	<DL
Tin	mg/L	0.000020	20	30	<0.000020	0.000020	<DL	<DL	<DL	0.000029	<0.000020	<DL	<DL	<DL
Titanium	mg/L	0.000050	20	30	0.000054	0.000066	DIFF	-0.000012	Pass Diff	0.000054	0.000072	DIFF	-0.000018	Pass Diff
Tungsten	mg/L	0.000010	20	30	<0.000010	<0.000010	<DL	<DL	<DL	<0.000010	<0.000010	<DL	<DL	<DL

Table A-6. Water quality field duplicate results for Meliadine AEMP – September 2023

Month	Units	September DLs	Relative Percent Difference DQOs		September DUP-1 (MEL-03-05)					September DUP-2 (MEL-01-06)				
Station					MEL-03-05	DUP-1	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome	MEL-01-06	DUP-2	Field Dup Method [a]	Result [b] (RPD or Diff)	Outcome
Date Sampled					2023-09-15	2023-09-15				2023-09-15	2023-09-15			
ALS Sample ID			Lab	Field	WP2323948-010	WP2323951-001				WP2323956-002	WP2323951-002			
Parameter					Water	Water				Water	Water			
Uranium	mg/L	0.000001	20	30	0.000021	0.000020	RPD	5.3	Pass RPD	0.000029	0.000028	RPD	2.5	Pass RPD
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	*<0.00050*	*<0.00050*	*<DL*	*<DL*	*<DL*	*<0.00050*	*<0.00050*	*<DL*	*<DL*	*<DL*
Zirconium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Dissolved Metals														
Aluminum	mg/L	0.0010	20	30	0.0010	0.0012	DIFF	-0.0002	Pass Diff	0.0016	0.0010	DIFF	0.0006	Pass Diff
Antimony	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Arsenic	mg/L	0.000020	20	30	0.00035	0.00035	RPD	1.4	Pass RPD	0.00061	0.00060	RPD	0.5	Pass RPD
Barium	mg/L	0.000020	20	30	0.0084	0.0084	RPD	-0.2	Pass RPD	0.0090	0.0090	RPD	0.2	Pass RPD
Beryllium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Bismuth	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Boron	mg/L	0.0050	20	30	0.0052	0.0051	DIFF	1E-04	Pass Diff	0.0072	0.0081	DIFF	-0.0009	Pass Diff
Cadmium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Calcium	mg/L	0.010	20	30	8.3	8.3	RPD	-0.4	Pass RPD	11	10.5	RPD	4.7	Pass RPD
Cesium	mg/L	0.000005	20	30	0.000010	0.000010	DIFF	1E-07	Pass Diff	0.000008	0.000008	DIFF	1E-07	Pass Diff
Chromium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Cobalt	mg/L	0.000005	20	30	0.000007	0.000007	DIFF	-2E-07	Pass Diff	0.000015	0.000013	DIFF	0.0000016	Pass Diff
Copper	mg/L	0.000050	20	30	0.00076	0.00074	RPD	2.3	Pass RPD	0.00096	0.00093	RPD	2.7	Pass RPD
Gallium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Iron	mg/L	0.0010	20	30	0.0036	0.0037	DIFF	-0.0001	Pass Diff	0.0063	0.0045	DIFF	0.0018	Pass Diff
Lanthanum	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	0.000010	*<0.000010*	*<DL*	*<DL*	*<DL*
Lead	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	0.000012	*<0.000010*	*<DL*	*<DL*	*<DL*
Lithium	mg/L	0.00050	20	30	0.00086	0.00087	DIFF	-0.00001	Pass Diff	0.0011	0.0012	DIFF	-0.00011	Pass Diff
Magnesium	mg/L	0.0040	20	30	1.4	1.4	RPD	-1.5	Pass RPD	2.0	1.9	RPD	3.6	Pass RPD
Manganese	mg/L	0.000050	20	30	0.00036	0.00035	RPD	5.1	Pass RPD	0.00045	0.00043	RPD	5	Pass RPD
Mercury	mg/L	0.000005	20	30			DIFF	0	Pass Diff			DIFF	0	Pass Diff
Mercury	ng/L	0.10	20	30	*<0.50*	*<0.50*	*<DL*	*<DL*	*<DL*	*<0.50*	*<0.50*	*<DL*	*<DL*	*<DL*
Molybdenum	mg/L	0.000050	20	30	0.000094	0.000095	DIFF	-1E-06	Pass Diff	0.00017	0.00016	DIFF	0.000011	Pass Diff
Nickel	mg/L	0.000050	20	30	0.00043	0.00043	RPD	-0.2	Pass RPD	0.00079	0.00077	RPD	2.6	Pass RPD
Niobium	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Phosphorus	mg/L	0.050	20	30	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*	*<0.050*	*<0.050*	*<DL*	*<DL*	*<DL*
Potassium	mg/L	0.020	20	30	1.1	1.1	RPD	-2.8	Pass RPD	1.3	1.3	RPD	1.6	Pass RPD
Rhenium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Rubidium	mg/L	0.000005	20	30	0.0014	0.0015	RPD	-3.5	Pass RPD	0.0016	0.0016	RPD	1.8	Pass RPD
Selenium	mg/L	0.000040	20	30	0.000042	0.000048	DIFF	-0.000006	Pass Diff	0.000057	0.000059	DIFF	-2E-06	Pass Diff
Silicon	mg/L	0.050	20	30	0.17	0.17	DIFF	0.003	Pass Diff	0.30	0.30	RPD	-1	Pass RPD
Silver	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Sodium	mg/L	0.020	20	30	5.5	5.7	RPD	-3.2	Pass RPD	8.6	8.5	RPD	1.2	Pass RPD
Strontium	mg/L	0.000020	20	30	0.043	0.043	RPD	-0.2	Pass RPD	0.064	0.060	RPD	5.5	Pass RPD
Sulfur	mg/L	0.50	20	30	1.6	1.6	DIFF	0.01	Pass Diff	2.5	2.5	DIFF	-0.07	Pass Diff
Tantalum	mg/L	0.00010	20	30	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*	*<0.00010*	*<0.00010*	*<DL*	*<DL*	*<DL*
Tellurium	mg/L	0.000020	20	30	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*	*<0.000020*	*<0.000020*	*<DL*	*<DL*	*<DL*
Thallium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*

Table A-6. Water quality field duplicate results for Meliadine AEMP – September 2023

Month	**Units**	**September DLs**	**Relative Percent Difference DQOs**		**September DUP-1 (MEL-03-05)**					**September DUP-2 (MEL-01-06)**				
Station					MEL-03-05	DUP-1	**Field Dup Method [a]**	**Result [b] (RPD or Diff)**	**Outcome**	MEL-01-06	DUP-2	**Field Dup Method [a]**	**Result [b] (RPD or Diff)**	**Outcome**
Date Sampled					2023-09-15	2023-09-15				2023-09-15	2023-09-15			
ALS Sample ID			**Lab**	**Field**	WP2323948-010	WP2323951-001				WP2323956-002	WP2323951-002			
Parameter					Water	Water				Water	Water			
Thorium	mg/L	0.000005	20	30	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*	*<0.0000050*	*<0.0000050*	*<DL*	*<DL*	*<DL*
Tin	mg/L	0.000020	20	30	0.000022	0.000053	DIFF	-0.000031	Pass Diff	0.000066	0.000062	DIFF	0.000004	Pass Diff
Titanium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Tungsten	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Uranium	mg/L	0.000001	20	30	0.000019	0.000018	RPD	8.6	Pass RPD	0.000028	0.000027	RPD	1.1	Pass RPD
Vanadium	mg/L	0.000050	20	30	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*	*<0.000050*	*<0.000050*	*<DL*	*<DL*	*<DL*
Yttrium	mg/L	0.000010	20	30	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*
Zinc	mg/L	0.00050	20	30	*<0.00050*	0.00054	*<DL*	*<DL*	*<DL*	*<0.00050*	0.00051	*<DL*	*<DL*	*<DL*
Zirconium	mg/L	0.000010		40	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*	*<0.000010*	*<0.000010*	*<DL*	*<DL*	*<DL*

Notes:

[a] Field Dup Methods are based on the concentrations:

RPD = relative percent difference is used to

DIFF = when concentrations < 5* DL

[b] Results refer to the RPD or absolute difference in concentration

DQO for RPDs is < Field RPD values

DQO for DIFF is < 2x the DL

Italicized numbers are below detection limits.

Table A-7. Outliers from the Meliadine Lake water sampling program in 2023

Area	Sample ID	Date	Parameter Class	Parameter	Units	Result	Detected?	Detection Limit	Laboratory Flag
MEL-01	MEL-01-01	2023-04-01	Dissolved Metals	Copper (D)	ug/L	21.9	Y	0.05	-
MEL-01	MEL-01-01	2023-04-01	Total Metals	Copper (T)	ug/L	21.7	Y	0.05	-
MEL-01	MEL-01-07	2023-04-01	Dissolved Metals	Tin (D)	ug/L	0.234	Y	0.02	DTC
MEL-01	MEL-01-08	2023-04-01	Dissolved Metals	Cadmium (D)	ug/L	0.0114	Y	0.005	-
MEL-01	MEL-01-08	2023-04-01	Total Metals	Cadmium (T)	ug/L	0.0115	Y	0.005	-
MEL-01	MEL-01-08	2023-04-01	Total Metals	Tungsten (T)	ug/L	0.016	Y	0.01	-
MEL-02	MEL-02-05	2023-04-02	Dissolved Metals	Molybdenum (D)	ug/L	0.564	Y	0.05	DTC
MEL-02	MEL-02-08	2023-04-02	Dissolved Metals	Silver (D)	ug/L	0.0102	Y	0.005	-
MEL-02	MEL-02-08	2023-04-02	Total Metals	Silver (T)	ug/L	0.0154	Y	0.005	-
MEL-03	MEL-03-01	2023-04-03	Dissolved Metals	Tin (D)	ug/L	0.718	Y	0.02	DTC
MEL-01	MEL-01-01	2023-07-16	Total Metals	Thorium (T)	ug/L	0.0088	Y	0.005	-
MEL-01	MEL-01-09	2023-07-16	Total Metals	Thorium (T)	ug/L	0.0075	Y	0.005	-
MEL-02	MEL-02-05	2023-07-15	Total Metals	Tin (T)	ug/L	0.128	Y	0.02	-
MEL-02	MEL-02-06	2023-07-15	Dissolved Metals	Tungsten (D)	ug/L	0.017	Y	0.01	-
MEL-02	MEL-02-06	2023-07-15	Dissolved Metals	Vanadium (D)	ug/L	0.076	Y	0.05	-
MEL-02	MEL-02-06	2023-07-15	Dissolved Metals	Zirconium (D)	ug/L	0.33	Y	0.01	DTC
MEL-02	MEL-02-08	2023-07-15	Total Metals	Zirconium (T)	ug/L	0.097	Y	0.01	-
MEL-03	MEL-03-04	2023-07-15	Total Metals	Tin (T)	ug/L	0.1	Y	0.02	-
MEL-01	MEL-01-09	2023-08-22	Dissolved Metals	Tin (D)	ug/L	0.242	Y	0.02	DTC
MEL-03	MEL-03-01	2023-08-18	Conventional Parameters	Total Suspended Solids	mg/L	73.7	Y	1	-
MEL-03	MEL-03-01	2023-08-18	Conventional Parameters	Turbidity (lab)	NTU	11.4	Y	0.1	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Aluminum (D)	ug/L	26.2	Y	1	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Antimony (D)	ug/L	0.02	N	0.02	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Arsenic (D)	ug/L	0.519	Y	0.02	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Barium (D)	ug/L	8.62	Y	0.02	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Beryllium (D)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Bismuth (D)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Boron (D)	ug/L	6.4	Y	5	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Cadmium (D)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Cesium (D)	ug/L	0.01	Y	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Chromium (D)	ug/L	1.62	Y	0.1	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Cobalt (D)	ug/L	0.153	Y	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Copper (D)	ug/L	0.946	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Gallium (D)	ug/L	0.05	N	0.05	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Iron (D)	ug/L	91.1	Y	1	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Lanthanum (D)	ug/L	0.022	Y	0.01	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Lead (D)	ug/L	0.078	Y	0.01	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Lithium (D)	ug/L	1.11	Y	0.5	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Manganese (D)	ug/L	20.8	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Mercury (D)	ug/L	0.0005	N	0.5	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Molybdenum (D)	ug/L	0.291	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Nickel (D)	ug/L	4.02	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Niobium (D)	ug/L	0.1	N	0.1	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Phosphorus (D)	ug/L	50	N	50	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Rhenium (D)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Rubidium (D)	ug/L	1.51	Y	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Selenium (D)	ug/L	0.045	Y	0.04	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Silicon (D)	ug/L	261	Y	50	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Silver (D)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Strontium (D)	ug/L	42.6	Y	0.02	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Sulfur (D)	ug/L	1690	Y	500	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Tantalum (D)	ug/L	0.1	N	0.1	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Tellurium (D)	ug/L	0.02	N	0.02	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Thallium (D)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Thorium (D)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Tin (D)	ug/L	0.021	Y	0.02	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Titanium (D)	ug/L	0.322	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Tungsten (D)	ug/L	0.014	Y	0.01	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Uranium (D)	ug/L	0.0176	Y	0.001	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Vanadium (D)	ug/L	0.083	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Yttrium (D)	ug/L	0.01	N	0.01	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Zinc (D)	ug/L	4.76	Y	0.5	-
MEL-03	MEL-03-01	2023-08-18	Dissolved Metals	Zirconium (D)	ug/L	0.024	Y	0.01	-
MEL-03	MEL-03-01	2023-08-18	Nutrients	Total Phosphorus	mg/L	0.013	Y	0.001	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Aluminum (T)	ug/L	1400	Y	3	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Antimony (T)	ug/L	0.03	N	0.03	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Arsenic (T)	ug/L	1.33	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Barium (T)	ug/L	22.4	Y	0.1	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Beryllium (T)	ug/L	0.0305	Y	0.005	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Bismuth (T)	ug/L	0.05	N	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Boron (T)	ug/L	10	N	10	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Cadmium (T)	ug/L	0.0068	Y	0.005	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Cesium (T)	ug/L	0.12	Y	0.005	-

Table A-7. Outliers from the Meliadine Lake water sampling program in 2023

Area	Sample ID	Date	Parameter Class	Parameter	Units	Result	Detected?	Detection Limit	Laboratory Flag
MEL-03	MEL-03-01	2023-08-18	Total Metals	Chromium (T)	ug/L	143	Y	0.5	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Cobalt (T)	ug/L	2.5	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Copper (T)	ug/L	5.2	Y	0.5	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Gallium (T)	ug/L	0.41	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Iron (T)	ug/L	2440	Y	10	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Lanthanum (T)	ug/L	1.1	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Lead (T)	ug/L	0.721	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Lithium (T)	ug/L	2.94	Y	0.5	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Manganese (T)	ug/L	62	Y	0.2	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Mercury (T)	ug/L	0.0005	N	0.5	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Molybdenum (T)	ug/L	3.21	Y	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Nickel (T)	ug/L	69.1	Y	0.2	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Niobium (T)	ug/L	0.17	Y	0.1	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Phosphorus (T)	ug/L	54	Y	50	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Rhenium (T)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Rubidium (T)	ug/L	2.75	Y	0.02	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Selenium (T)	ug/L	0.2	N	0.2	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Silicon (T)	ug/L	2280	Y	100	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Silver (T)	ug/L	0.005	N	0.005	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Strontium (T)	ug/L	50.1	Y	0.2	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Sulfur (T)	ug/L	1660	Y	500	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Tantalum (T)	ug/L	0.1	N	0.1	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Tellurium (T)	ug/L	0.05	N	0.05	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Thallium (T)	ug/L	0.0116	Y	0.005	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Thorium (T)	ug/L	0.119	Y	0.005	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Tin (T)	ug/L	0.2	N	0.2	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Titanium (T)	ug/L	100	Y	0.2	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Tungsten (T)	ug/L	0.19	Y	0.01	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Uranium (T)	ug/L	0.0835	Y	0.002	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Vanadium (T)	ug/L	3.7	Y	0.2	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Yttrium (T)	ug/L	0.211	Y	0.01	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Zinc (T)	ug/L	10.7	Y	3	-
MEL-03	MEL-03-01	2023-08-18	Total Metals	Zirconium (T)	ug/L	0.052	Y	0.05	-
MEL-03	MEL-03-02	2023-08-18	Conventional Parameters	Total Suspended Solids	mg/L	92	Y	1	-
MEL-03	MEL-03-02	2023-08-18	Conventional Parameters	Turbidity (lab)	NTU	0.9	Y	0.1	-
MEL-03	MEL-03-02	2023-08-18	Nutrients	Total Phosphorus	mg/L	0.0204	Y	0.001	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Aluminum (T)	ug/L	48.8	Y	1	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Cesium (T)	ug/L	0.0187	Y	0.005	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Chromium (T)	ug/L	0.65	Y	0.1	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Cobalt (T)	ug/L	0.0808	Y	0.005	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Iron (T)	ug/L	98.8	Y	1	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Lanthanum (T)	ug/L	0.127	Y	0.01	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Titanium (T)	ug/L	7.77	Y	0.05	-
MEL-03	MEL-03-02	2023-08-18	Total Metals	Vanadium (T)	ug/L	0.245	Y	0.05	-
MEL-04	MEL-04-01	2023-08-18	Dissolved Metals	Chromium (D)	ug/L	0.62	Y	0.1	DTC
MEL-04	MEL-04-01	2023-08-18	Dissolved Metals	Cobalt (D)	ug/L	0.134	Y	0.005	DTC
MEL-04	MEL-04-01	2023-08-18	Dissolved Metals	Nickel (D)	ug/L	10.2	Y	0.05	DTC
MEL-04	MEL-04-01	2023-08-18	Dissolved Metals	Zinc (D)	ug/L	44.6	Y	0.5	DTC
MEL-01	MEL-01-07	2023-09-15	Conventional Parameters	Turbidity (lab)	NTU	0.73	Y	0.1	-
MEL-03	MEL-03-02	2023-09-15	Total Metals	Aluminum (T)	ug/L	15	Y	1	-
MEL-03	MEL-03-04	2023-09-15	Dissolved Metals	Aluminum (D)	ug/L	20.5	Y	1	DTC

Notes:

DTC = dissolved concentration exceeded total

Table A-8. Water chemistry results from Lake B7 in October 2023 (re-analysis of metals in the sample from B7-03)

Client Sample ID	Lowest Detection Limit	Units	B7-01	B7-02	B7-03	RPDs for the samples from B7-03	B7-03 (79881)
Date Sampled			14-Oct-2023	14-Oct-2023	14-Oct-2023		14-Oct-2023
Time Sampled			17:15	17:45	17:30		17:30
ALS Sample ID			WP2327045-001	WP2327045-002	WP2327045-003		VA23C9556-001
Total Metals							
Aluminum	0.001	mg/L	0.0012	0.0018	0.0024	*<DL*	*<0.0010*
Antimony	0.00002	mg/L	0.000042	0.000038	0.000041	-31%	0.000056
Arsenic	0.00002	mg/L	0.0102	0.00964	0.00991	31%	0.00725
Barium	0.00002	mg/L	0.0285	0.0282	0.0291	-2%	0.0297
Beryllium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Bismuth	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Boron	0.005	mg/L	0.0154	0.0155	0.0153	-8%	0.0165
Cadmium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Calcium	0.01	mg/L	38.3	37.7	38.5	2%	37.9
Cesium	0.000005	mg/L	0.0000205	0.0000204	0.0000221	26%	0.000017
Chromium	0.0001	mg/L	*<0.00010*	*<0.00010*	*<0.00010*	*<DL*	*<0.00010*
Cobalt	0.000005	mg/L	0.00004	0.0000381	0.0000395	20%	0.0000324
Copper	0.00005	mg/L	0.000817	0.000781	0.000766	-10%	0.000844
Gallium	0.00005	mg/L	*<0.000050*	*<0.000050*	*<0.000050*	*<DL*	*<0.000050*
Iron	0.001	mg/L	0.0391	0.0378	0.0399	174%	0.0028
Lanthanum	0.00001	mg/L	0.000016	0.000017	0.000019	*<DL*	*<0.000010*
Lead	0.00001	mg/L	0.000062	0.000069	0.000059	106%	0.000018
Lithium	0.0005	mg/L	0.0177	0.0174	0.018	0%	0.018
Magnesium	0.004	mg/L	4.15	4.08	4.31	6%	4.05
Manganese	0.00005	mg/L	0.00406	0.00328	0.00353	163%	0.000355
Molybdenum	0.00005	mg/L	0.000364	0.000365	0.000375	-3%	0.000387
Nickel	0.00005	mg/L	0.000899	0.000872	0.000882	-100%	0.00266
Niobium	0.0001	mg/L	*<0.00010*	*<0.00010*	*<0.00010*	*<DL*	*<0.00010*
Phosphorus	0.05	mg/L	*<0.050*	*<0.050*	*<0.050*	*<DL*	*<0.050*
Potassium	0.02	mg/L	2.21	2.18	2.27	-1%	2.29
Rhenium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Rubidium	0.000005	mg/L	0.00224	0.00218	0.00243	31%	0.00177
Selenium	0.00004	mg/L	0.000048	0.000046	0.000044	7%	0.000041
Silicon	0.05	mg/L	0.352	0.378	0.391	-74%	0.855
Silver	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Sodium	0.02	mg/L	10.1	9.96	10.5	5%	9.99
Strontium	0.00002	mg/L	0.316	0.31	0.312	3%	0.302
Sulfur	0.5	mg/L	4.77	4.76	4.98	6%	4.68
Tantalum	0.0001	mg/L	*<0.00010*	*<0.00010*	*<0.00010*	*<DL*	*<0.00010*
Tellurium	0.00002	mg/L	*<0.000020*	*<0.000020*	*<0.000020*	*<DL*	*<0.000020*
Thallium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Thorium	0.000005	mg/L	*<0.0000050*	0.0000102	*<0.0000050*	*<DL*	*<0.0000100*
Tin	0.00002	mg/L	0.000033	0.000021	*<0.000020*	*<DL*	0.000038
Titanium	0.00005	mg/L	*<0.000050*	*<0.000050*	0.000064	21%	0.000052
Tungsten	0.00001	mg/L	0.000026	0.000027	0.000025	8%	0.000023
Uranium	0.000001	mg/L	0.0000824	0.0000844	0.0000837	7%	0.0000777
Vanadium	0.00005	mg/L	*<0.000050*	*<0.000050*	*<0.000050*	*<DL*	*<0.000050*
Yttrium	0.00001	mg/L	*<0.000010*	*<0.000010*	*<0.000010*	*<DL*	*<0.000010*
Zinc	0.0005	mg/L	*<0.00050*	*<0.00050*	*<0.00050*	*<DL*	0.0015
Zirconium	0.00001	mg/L	*<0.000010*	*<0.000010*	*<0.000010*	*<DL*	0.000048
Dissolved Metals							
Aluminum	0.001	mg/L	*<0.0010*	0.0011	0.047	190%	0.0012
Antimony	0.00002	mg/L	0.00004	0.000042	0.000068	21%	0.000055
Arsenic	0.00002	mg/L	0.00981	0.00866	0.00861	11%	0.00772
Barium	0.00002	mg/L	0.0288	0.0288	0.0285	-1%	0.0288
Beryllium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	0.0000054	*<DL*	*<0.0000050*
Bismuth	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.000050*
Boron	0.005	mg/L	0.0169	0.0159	0.0168	1%	0.0167
Cadmium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Calcium	0.01	mg/L	40.1	38.9	36.8	1%	36.6
Cesium	0.000005	mg/L	0.000023	0.0000222	0.0000222	24%	0.0000174
Chromium	0.0001	mg/L	*<0.00010*	*<0.00010*	0.00223	*<DL*	*<0.00050*
Cobalt	0.000005	mg/L	0.0000298	0.0000303	0.0000467	*<DL*	*<0.000050*
Copper	0.00005	mg/L	0.0037	0.000786	0.225	199%	0.00082
Gallium	0.00005	mg/L	*<0.000050*	*<0.000050*	*<0.000050*	*<DL*	*<0.000050*
Iron	0.001	mg/L	0.0197	0.018	0.152	*<DL*	*<0.010*
Lanthanum	0.00001	mg/L	*<0.000010*	*<0.000010*	*<0.000010*	*<DL*	*<0.000050*
Lead	0.00001	mg/L	0.000029	0.000033	0.00015	*<DL*	*<0.000050*
Lithium	0.0005	mg/L	0.0166	0.0177	0.0184	2%	0.018
Magnesium	0.004	mg/L	4.36	4.26	4.07	-12%	4.58
Manganese	0.00005	mg/L	0.00124	0.00074	0.00245	*<DL*	*<0.00020*
Mercury	0.5	ng/L	*<0.50*	*<0.50*	*<0.50*	*<DL*	NA
Molybdenum	0.00005	mg/L	0.000451	0.000393	0.000727	44%	0.000466
Nickel	0.00005	mg/L	0.00092	0.000881	0.00349	110%	0.00102
Niobium	0.0001	mg/L	*<0.00010*	*<0.00010*	*<0.00010*	*<DL*	*<0.00010*
Phosphorus	0.05	mg/L	*<0.050*	*<0.050*	*<0.050*	*<DL*	*<0.050*

Table A-8. Water chemistry results from Lake B7 in October 2023 (re-analysis of metals in the sample from B7-03)

Client Sample ID	Lowest Detection Limit	Units	B7-01	B7-02	B7-03	RPDs for the samples from B7-03	B7-03 (79881)
Date Sampled			14-Oct-2023	14-Oct-2023	14-Oct-2023		14-Oct-2023
Time Sampled			17:15	17:45	17:30		17:30
ALS Sample ID			WP2327045-001	WP2327045-002	WP2327045-003		VA23C9556-001
Potassium	0.02	mg/L	2.32	2.25	2.19	-5%	2.31
Rhenium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Rubidium	0.000005	mg/L	0.00228	0.00224	0.00215	14%	0.00187
Selenium	0.00004	mg/L	0.000048	0.00005	*<0.000040*	*<DL*	*<0.00020*
Silicon	0.05	mg/L	0.379	0.387	0.384	-79%	0.882
Silver	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Sodium	0.02	mg/L	10.6	10.4	10.1	-11%	11.3
Strontium	0.00002	mg/L	0.323	0.317	0.298	-3%	0.307
Sulfur	0.5	mg/L	5.1	4.81	4.61	-5%	4.83
Tantalum	0.0001	mg/L	*<0.00010*	*<0.00010*	*<0.00010*	*<DL*	*<0.00010*
Tellurium	0.00002	mg/L	*<0.000020*	*<0.000020*	*<0.000020*	*<DL*	*<0.000050*
Thallium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Thorium	0.000005	mg/L	*<0.0000050*	*<0.0000050*	*<0.0000050*	*<DL*	*<0.0000050*
Tin	0.00002	mg/L	0.000024	0.000045	0.00341	*<DL*	*<0.00020*
Titanium	0.00005	mg/L	*<0.000050*	*<0.000050*	*<0.000050*	*<DL*	*<0.00020*
Tungsten	0.00001	mg/L	0.000028	0.000025	0.000038	38%	0.000026
Uranium	0.000001	mg/L	0.0000892	0.0000876	0.0000779	9%	0.0000714
Vanadium	0.00005	mg/L	*<0.000050*	*<0.000050*	*<0.000050*	*<DL*	*<0.000050*
Yttrium	0.00001	mg/L	*<0.000010*	*<0.000010*	*<0.000010*	*<DL*	*<0.000010*
Zinc	0.0005	mg/L	0.00057	*<0.00050*	0.00395	101%	0.0013
Zirconium	0.00001	mg/L	*<0.000010*	*<0.000010*	0.000019	*<DL*	*<0.000050*

Notes

Italicized numbers are below detection limits.

Table A-9. Field duplicate assessment for the phytoplankton taxonomy results in 2023

Field QA	Date	Sample	Phytoplankton Biomass (mg/m^3)						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL-03-03	18-Aug-23	Sample	0	12	57	9	31	17	126
		DUP-1	0.1	12	76	13	28	12	141
		RPD (%)	**NA**	2	-29	-31	11	30	-11
MEL-01-06	22-Aug-23	Sample	0	9	182	16	34	56	296
		DUP-2	0	8	184	28	36	88	344
		RPD (%)	-18	14	-1	**-58**	-5	-45	-15
MEL-05-01	18-Aug-23	Sample	0	22	40	16	51	24	153
		DUP-3	0	16	60	21	60	15	173
		RPD (%)	**NA**	33	-41	-32	-16	44	-12

Field QA	Date	Sample	Phytoplankton Density (cells/L)						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL-03-03	18-Aug-23	Sample	0	380,952	985,208	99,192	188,784	3,800	1,657,936
		DUP-1	200	467,160	984,808	68,656	175,016	2,800	1,698,640
		RPD (%)	**NA**	-20	0.0	36	8	30	-2
MEL-01-06	22-Aug-23	Sample	800	324,280	2,983,176	166,496	157,264	10,000	3,642,016
		DUP-2	800	288,360	2,337,816	253,088	144,696	12,800	3,037,560
		RPD (%)	0	12	24	-41	8.3	-24.6	18
MEL-05-01	18-Aug-23	Sample	0	1,236,248	711,216	128,728	293,760	5,600	2,375,552
		DUP-3	200	668,912	1,185,560	83,256	328,096	3,400	2,269,424
		RPD (%)	**NA**	**60**	**-50**	43	-11.0	48.9	5

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Bolded RPD values exceed 50%.

RPDs were not calculated if one or both of the samples is "0".

Table A-10. Laboratory duplicate assessment for the phytoplankton taxonomy results in 2023

Area-Replicate	Date	Sample	Phytoplankton Biomass (mg/m³)						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL -01-07	22-Aug-23	Sample	2.5	5.3	190	21	9.2	40	268
		Lab dup	4.4	3.3	175	79	17	40	318
		RPD (%)	**-55**	**48**	8	**-116**	**-58**	1	-17
MEL-03-01	18-Aug-23	Sample	0	9.5	91	5.9	26	29	161
		Lab dup	0	5.7	99	7.8	20	32	164
		RPD (%)		**49**	-8	**-28**	23	-9	-2
MEL-04-02	18-Aug-23	Sample	0	5.8	43	8.0	25	16	98
		Lab dup	0	8.8	42	8.4	26	17	102
		RPD (%)		**-41**	3	-5	-3	-6	-4

Area-Replicate	Date	Date	Phytoplankton Density (cells/L)						
			Cyanophyte	Chlorophyte	Chrysophyte	Diatom	Cryptophyte	Dinoflagellate	**TOTAL**
MEL -01-07	22-Aug-23	Sample	87,008	188,784	2,183,368	179,096	37,920	6,000	2,682,176
		Lab dup	172,816	151,864	2,273,160	271,472	68,256	5,200	2,942,768
		RPD (%)	**-66**	22	-4	**-41**	**-57**	14	-9.3
MEL-03-01	18-Aug-23	Sample	0	331,864	1,107,136	31,152	146,280	6,600	1,623,032
		Lab dup	0	252,040	1,121,704	48,320	116,744	6,800	1,545,608
		RPD (%)		**27**	-1.3	**-43**	22	-3	4.9
MEL-04-02	18-Aug-23	Sample	0	438,624	926,736	127,528	120,544	3,800	1,617,232
		Lab dup	0	439,024	991,392	137,312	88,624	3,000	1,659,352
		RPD (%)		0	-6.7	-7	**31**	24	-2.6

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

Bolded RPD values exceed 25%.

RPDs were not calculated if one or both of the samples is "0".

Table A-11. Field duplicate assessment for chlorophyll-a (µg/L) in 2023

Chlorophyll-a (µg/L)									
Replicate	Sample = MEL-03-03 Duplicate = AUG-DUP-01-PC			Sample = MEL-01-06 Duplicate = AUG-DUP-02-PC			Sample = MEL-05-01 Duplicate = AUG-DUP-03-PC		
	Sample	Duplicate	**RPD**	Sample	Duplicate	**RPD**	Sample	Duplicate	**RPD**
1	0.39	0.66		3.4	4.0		0.93	0.87	
2	0.69	0.90		4.7	3.1		0.79	0.83	
3	0.51	0.45		4.2	3.4		0.68	0.81	
Mean	0.53	0.67	-23	4.08	3.51	15	0.80	0.84	-4

Notes:

RPD = Relative Percent Difference (%) = ((original - duplicate) / (original + duplicate)/2) x 100.

The data quality objective (DQO) for field duplicates is an RPD of 50%.

Bolded RPD values exceed 50%.

Appendix B

Effluent Characterization – Supporting Information

Appendix B1
Effluent Quality – Supporting Data

APPENDIX B1 – TABLES

Table B1-1. Daily discharge (m^3) from the Effluent Water Treatment Plant in 2023

Total Volume (m^3) Discharged from CP1 to Meliadine Lake in 2023: 515,962							
June		July		August		September	
Date	Volume (m^3)	Date	Volume (m^3)	Date	Volume (m^3)	Date	Volume (m^3)
01-Jun		01-Jul	4,912	01-Aug	0	01-Sep	17,584
02-Jun		02-Jul	4,830	02-Aug	0	02-Sep	11,359
03-Jun		03-Jul	4,997	03-Aug	0	03-Sep	17,808
04-Jun		04-Jul	4,930	04-Aug	0	04-Sep	11,539
05-Jun		05-Jul	4,935	05-Aug	0	05-Sep	8,905
06-Jun		06-Jul	4,067	06-Aug	0	06-Sep	5,653
07-Jun		07-Jul	4,925	07-Aug	0	07-Sep	0
08-Jun		08-Jul	4,953	08-Aug	0	08-Sep	0
09-Jun		09-Jul	4,950	09-Aug	0	09-Sep	0
10-Jun	6,495	10-Jul	4,947	10-Aug	0	10-Sep	0
11-Jun	9,436	11-Jul	4,868	11-Aug	0	11-Sep	1,497
12-Jun	9,448	12-Jul	4,917	12-Aug	0	12-Sep	0
13-Jun	10,172	13-Jul	4,080	13-Aug	0	13-Sep	0
14-Jun	11,794	14-Jul	4,793	14-Aug	0	14-Sep	0
15-Jun	6,619	15-Jul	4,947	15-Aug	0	15-Sep	0
16-Jun	10,253	16-Jul	4,705	16-Aug	0	16-Sep	3,657
17-Jun	13,559	17-Jul	2,964	17-Aug	0	17-Sep	9,996
18-Jun	13,525	18-Jul	1,399	18-Aug	0	18-Sep	9,998
19-Jun	3,335	19-Jul	0	19-Aug	0	19-Sep	10,578
20-Jun	14,762	20-Jul	0	20-Aug	0	20-Sep	12,383
21-Jun	12,842	21-Jul	0	21-Aug	3,391	21-Sep	9,253
22-Jun	14,646	22-Jul	0	22-Aug	4,989	22-Sep	7,304
23-Jun	14,805	23-Jul	0	23-Aug	4,995	23-Sep	1,565
24-Jun	13,535	24-Jul	0	24-Aug	3,493	24-Sep	1,445
25-Jun	14,744	25-Jul	0	25-Aug	2,350	25-Sep	9,077
26-Jun	11,027	26-Jul	0	26-Aug	0	26-Sep	9,945
27-Jun	4,623	27-Jul	0	27-Aug	0	27-Sep	9,232
28-Jun	4,024	28-Jul	0	28-Aug	0	28-Sep	6,848
29-Jun	4,489	29-Jul	0	29-Aug	8,995	29-Sep	7,310
30-Jun	4,894	30-Jul	0	30-Aug	13,100	30-Sep	1,577
		31-Jul	0	31-Aug	13,583		
June	**209,024**	**July**	**81,119**	**August**	**41,312**	**September**	**184,508**

Table B1-2. Chemistry and toxicity test results for MEL-14 samples in 2023

		Limits (Grab Samples)		June				July			August	September				
Parameter	Units	WL	MDMER	2023-06-12	2023-06-21	2023-06-25	2023-06-28	2023-07-03	2023-07-10	2023-07-17	2023-08-21	2023-09-03	2023-09-11	2023-09-18	2023-09-25	2023-09-27
Field Measurements																
DO (%)	%	-	-	99.3	99.3	107.4	89.5	88.4	96.3	95.8	89.5	101.1	84.8	113.8	94.7	-
DO (mg/L)	mg/L	-	-	10.73	10.73	11.61	8.98	8.48	10.38	-	9.4	-	10.01	12.77	10.07	-
pH (field)	pH units	6 | 9.5	6 | 9.5	7.3	7.3	6.64	7.06	7.13	7.27	7.52	6.62	7.15	7.51	8.15	7.58	7.32
Sp. Conductivity (field)	uS/cm	-	-	1451	1608	1598	1666	1842	1937	2017	2566	3163	3252	3555	3787	3829
Temperature	C	-	-	11.7	11.7	11.6	15	17.1	12	18.1	12.8	4.1	7.7	9.7	12	7.0
Turbidity (field)	NTU	-	-	1.09	1.38	0.838	1.15	1.07	0.86	-	0.46	-	0.89	1.15	1.5	-
Conventional Parameters																
Conductivity (lab)	uS/cm	-	-	1400	1600	1600	1700	1800	2000	2100	2500	3000	3300	3500	3600	-
Hardness (D)	mg/L	-	-	290	315	338	362	396	413	418	465	574	640	699	734	809
Hardness (T)	mg/L	-	-	285	331	317	361	358	357	381	417	551	604	581	844	873
pH (lab)	pH units	-	-	7.31	7.6	7.52	7.44	7.51	7.69	7.8	7.3	7.42	7.86	8.15	7.61	7.59
Total Dissolved Solids	mg/L	4500	-	790	945	995	1050	1160	1230	1310	1440	1880	1810	1890	2140	2270
Total Dissolved Solids (Calculated)	mg/L	-	-	730	790	830	880	910	1000	1100	1300	1500	1700	1900	2100	2100
Total Suspended Solids	mg/L	30	30	2	3	3	2	3	2	3	3	9	4	3	3	5
Turbidity (lab)	NTU	-	-	0.5	0.4	0.4	0.4	0.4	0.4	0.6	0.3	0.4	0.4	0.4	0.5	0.7
Major Ions																
Alkalinity, Bicarbonate	mg/L	-	-	34	47	50	54	68	68	76	57	68	79	80	87	84
Alkalinity, Carbonate	mg/L	-	-	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*	*< 1*
Alkalinity, Total	mg/L	-	-	34	47	50	54	68	68	76	57	68	80	81	88	85
Calcium (D)	mg/L	-	-	78.4	87	92.8	99.7	110	115	117	122	147	171	187	197	208
Calcium (T)	mg/L	-	-	79.7	90.1	86.9	98.6	101	97.9	105	111	147	160	158	226	225
Chloride	mg/L	-	-	280	310	330	340	320	410	480	580	650	720	780	960	910
Fluoride	mg/L	-	-	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	*< 0.1*	0.11	*< 0.1*	*< 0.1*	*< 0.1*
Magnesium (D)	mg/L	-	-	22.9	23.6	25.8	27.6	29.4	30.4	34	38.7	50.4	51.8	56.6	58.8	70.5
Magnesium (T)	mg/L	-	-	20.9	25.7	24.3	28	25.6	27.3	28.7	34.1	44.6	50	45.2	68.1	75.4
Potassium (D)	mg/L	-	-	12.6	14.3	14.7	15.4	16.2	17.8	18.8	23.1	26.4	28.1	31	30.7	33.2
Potassium (T)	mg/L	-	-	12.1	14.2	13.8	15.1	15.1	16	16.7	20.9	26.7	26.9	24.6	35.1	35.4
Reactive Silica (SiO2)	mg/L	-	-	0.077	0.099	0.16	0.25	0.2	0.13	0.099	0.12	0.38	0.38	0.27	0.54	0.46
Sodium (D)	mg/L	-	-	139	147	158	167	182	193	212	281	322	364	396	402	427
Sodium (T)	mg/L	-	-	129	160	152	170	161	178	195	244	333	348	316	458	462
Sulphate	mg/L	-	-	150	150	160	170	180	180	190	210	250	300	310	340	330
Nutrients																
Ammonia (as N)	mg/L	18	-	0.33	0.16	0.14	0.23	0.41	0.24	0.19	0.16	0.68	0.65	0.43	0.28	0.23
Nitrate (as N)	mg/L	-	-	8.02	5.73	4.9	6.04	5.89	5.97	5.77	2.8	5.77	7.66	10.1	11.6	12
Nitrate + Nitrite (as N)	mg/L	-	-	8.29	5.92	5.05	6.18	6.07	6.12	6.02	2.9	6.24	7.91	10.4	11.8	12.2
Nitrite (as N)	mg/L	-	-	0.267	0.187	0.151	0.145	0.188	0.154	0.251	0.1	0.468	0.253	0.289	0.208	0.207
Orthophosphate (PO4-P)	mg/L	-	-	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	0.014	*< 0.01*	*< 0.01*	*< 0.01*	*< 0.01*	0.01	*< 0.01*	*< 0.01*	*< 0.01*

Table B1-2. Chemistry and toxicity test results for MEL-14 samples in 2023

		Limits (Grab Samples)		June				July			August	September				
Parameter	**Units**	**WL**	**MDMER**	**2023-06-12**	**2023-06-21**	**2023-06-25**	**2023-06-28**	**2023-07-03**	**2023-07-10**	**2023-07-17**	**2023-08-21**	**2023-09-03**	**2023-09-11**	**2023-09-18**	**2023-09-25**	**2023-09-27**
Total Kjeldahl Nitrogen	mg/L	-	-	0.75	0.57	0.36	0.67	0.79	0.78	1.2	0.97	1.6	1.4	0.67	0.9	0.86
Total Phosphorus	mg/L	4	-	0.051	0.027	*< 0.02*	0.038	0.033	0.055	0.045	*< 0.02*	0.028	0.034	0.024	0.035	0.04
Unionized Ammonia (calculated)	mg/L	-	1	0.0017	0.00063	*< 0.00061*	0.00089	0.0022	0.0012	0.0022	*< 0.00061*	0.0014	0.0039	0.013	0.0028	0.00087
Organic/Inorganic Carbon																
Dissolved Organic Carbon	mg/L	-	-	4.8	6.4	5.4	5.7	7.3	6.6	8.1	8.2	7.6	9.9	9.9	10	10
Total Organic Carbon	mg/L	-	-	5.3	5.6	5.8	6.2	8.1	7.1	8.3	8.6	8.8	10	10	11	11
Total Metals																
Aluminum (T)	mg/L	3	-	0.335	0.423	0.333	0.228	0.252	0.232	0.288	0.249	0.866	0.34	0.339	0.45	0.511
Antimony (T)	mg/L	-	-	0.00085	0.00085	0.00079	0.00085	0.00086	0.00083	8.70E-04	0.00069	0.00073	8.00E-04	*< 0.001*	*< 0.001*	*< 0.001*
Arsenic (T)	mg/L	0.6	0.6	0.00515	0.00498	0.00374	0.00383	0.00587	0.00398	0.00622	0.00467	0.00619	0.00536	0.00327	0.00582	0.00445
Barium (T)	mg/L	-	-	0.0273	0.0343	0.0342	0.0386	0.0412	0.0397	0.043	0.0486	0.0554	0.0601	0.0536	0.0827	0.0817
Beryllium (T)	mg/L	-	-	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*
Bismuth (T)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*
Boron (T)	mg/L	-	-	0.151	0.166	0.171	0.186	0.176	0.194	0.202	0.28	0.318	0.317	0.34	0.41	0.41
Cadmium (T)	mg/L	-	-	0.000013	0.000016	1.40E-05	1.40E-05	2.00E-05	1.50E-05	1.70E-05	*< 1e-05*	1.10E-05	1.20E-05	*< 2e-05*	*< 2e-05*	*< 2e-05*
Chromium (T)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*
Cobalt (T)	mg/L	-	-	0.00111	0.00115	0.00107	0.00113	0.00109	0.00099	0.00097	0.00075	0.00104	0.00104	0.00083	0.0011	0.00109
Copper (T)	mg/L	0.4	0.6	0.00217	0.00231	0.00226	0.00233	0.00284	0.00254	0.00304	0.00245	0.00199	0.00234	0.0022	0.0024	0.0021
Iron (T)	mg/L	-	-	0.027	0.024	0.018	0.016	0.019	0.019	0.017	0.02	0.092	0.02	*< 0.02*	0.024	0.051
Lead (T)	mg/L	0.2	2	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*
Lithium (T)	mg/L	-	-	0.017	0.0187	0.0187	0.0213	0.0211	0.0238	0.0259	0.0327	0.041	0.0387	0.0413	0.0516	0.0493
Manganese (T)	mg/L	-	-	0.0279	0.0287	0.0381	0.0416	0.0555	0.0503	0.0336	0.0235	0.0725	0.0563	0.034	0.0737	0.0981
Mercury (T)	mg/L	-	-	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*
Molybdenum (T)	mg/L	-	-	0.0044	0.0047	0.0049	0.0056	0.0048	0.0045	0.0051	0.0059	0.0062	0.0057	0.0046	0.0061	0.0065
Nickel (T)	mg/L	1	1	0.0037	0.0037	0.005	0.0038	0.0042	0.0037	0.0035	0.004	0.0055	0.0062	0.005	0.0065	0.006
Selenium (T)	mg/L	-	-	0.00064	0.00076	0.00071	0.00077	0.00074	0.00068	0.00069	0.00046	0.0006	0.00069	0.0007	0.00092	0.00096
Silicon (T)	mg/L	-	-	0.1	*< 0.1*	*< 0.1*	0.11	0.12	*< 0.1*	*< 0.1*	*< 0.1*	0.22	0.15	*< 0.2*	*< 0.2*	*< 0.2*
Silver (T)	mg/L	-	-	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 4e-05*	*< 4e-05*	*< 4e-05*
Strontium (T)	mg/L	-	-	0.963	1.06	1.03	1.17	1.14	1.18	1.29	1.53	1.99	1.98	1.74	2.75	2.82
Sulfur (T)	mg/L	-	-	44.3	51.5	49.1	55.2	54.9	55.2	59.8	63.4	88.9	94.8	90.3	131	132
Thallium (T)	mg/L	-	-	0.000016	0.00002	0.000019	0.000023	0.000024	0.000016	0.000023	0.000017	*< 1e-05*	0.000022	0.000021	0.000022	*< 2e-05*
Tin (T)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*
Titanium (T)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*
Uranium (T)	mg/L	-	-	0.00033	0.00044	0.00023	0.0002	8.00E-04	0.00045	0.00116	0.00048	0.00121	0.00317	0.00228	0.00385	0.00307
Vanadium (T)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*
Zinc (T)	mg/L	0.8	1	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*
Zirconium (T)	mg/L	-	-	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*
Dissolved Metals																

Table B1-2. Chemistry and toxicity test results for MEL-14 samples in 2023

		Limits (Grab Samples)		June				July			August	September				
Parameter	**Units**	**WL**	**MDMER**	**2023-06-12**	**2023-06-21**	**2023-06-25**	**2023-06-28**	**2023-07-03**	**2023-07-10**	**2023-07-17**	**2023-08-21**	**2023-09-03**	**2023-09-11**	**2023-09-18**	**2023-09-25**	**2023-09-27**
Aluminum (D)	mg/L	-	-	0.0749	0.0916	0.0641	0.0646	0.112	0.0734	0.161	0.0976	0.0724	0.141	0.122	0.117	0.0974
Antimony (D)	mg/L	-	-	0.00082	0.00089	0.00084	0.00086	0.001	9.60E-04	0.00094	0.00078	0.00071	0.00083	*< 0.001*	*< 0.001*	*< 0.001*
Arsenic (D)	mg/L	-	-	0.00379	0.00355	0.00296	0.00327	0.00546	0.00369	0.00481	0.00436	0.00259	0.00453	0.00317	0.00375	0.00289
Barium (D)	mg/L	-	-	0.0273	0.0347	0.0374	0.0394	0.0449	0.0476	0.0467	0.0545	0.0569	0.0623	0.0676	0.0724	0.0756
Beryllium (D)	mg/L	-	-	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*
Bismuth (D)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*
Boron (D)	mg/L	-	-	0.143	0.164	0.187	0.189	0.191	0.22	0.215	0.313	0.338	0.335	0.35	0.36	0.37
Cadmium (D)	mg/L	-	-	*< 1e-05*	0.000016	1.50E-05	1.60E-05	2.40E-05	1.80E-05	1.90E-05	1.30E-05	*< 1e-05*	*< 1e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*
Chromium (D)	mg/L	-	-	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.001*	*< 0.002*	*< 0.002*	*< 0.002*
Cobalt (D)	mg/L	-	-	0.0011	0.00119	0.00109	0.00113	0.00121	0.00109	0.00103	0.00083	0.00094	0.00107	0.00101	0.00098	0.00105
Copper (D)	mg/L	-	-	0.00199	0.00222	0.00216	0.00228	0.00296	0.00279	0.00321	0.00225	0.00541	0.00233	0.00222	0.00219	0.00192
Iron (D)	mg/L	-	-	0.0113	0.0054	0.0064	0.0083	0.0095	0.0071	0.0908	0.0092	0.0155	0.0138	*< 0.01*	*< 0.01*	*< 0.01*
Lead (D)	mg/L	-	-	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*
Lithium (D)	mg/L	-	-	0.017	0.0184	0.0206	0.0227	0.0214	0.0283	0.0268	0.0392	0.0401	0.0407	0.044	0.0444	0.046
Manganese (D)	mg/L	-	-	0.0226	0.0253	0.0372	0.0407	0.0601	0.0552	0.0341	0.0241	0.0666	0.0539	0.0376	0.0664	0.0927
Mercury (D)	mg/L	-	-	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*	*< 1e-05*
Molybdenum (D)	mg/L	-	-	0.0043	0.0047	0.0047	0.0048	0.0051	0.0053	0.0056	0.0066	0.0061	0.0061	0.006	0.0056	0.006
Nickel (D)	mg/L	-	-	0.0033	0.0034	0.0034	0.0037	0.0043	0.0039	0.0037	0.0042	0.0061	0.0066	0.0061	0.0056	0.0055
Selenium (D)	mg/L	-	-	0.00073	0.00076	0.00078	0.00077	0.00083	0.0008	0.00082	0.00055	0.00056	0.00071	0.00077	0.00085	0.00082
Silicon (D)	mg/L	-	-	*< 0.1*	*< 0.1*	*< 0.1*	0.1	0.11	*< 0.1*	*< 0.1*	*< 0.1*	0.15	0.15	*< 0.2*	*< 0.2*	*< 0.2*
Silver (D)	mg/L	-	-	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 2e-05*	*< 4e-05*	*< 4e-05*	*< 4e-05*
Strontium (D)	mg/L	-	-	0.96	1.07	1.13	1.22	1.28	1.37	1.49	1.68	2.11	2.08	2.28	2.38	2.52
Sulfur (D)	mg/L	-	-	47.5	52.1	52.2	54	57	60.8	63.8	74.8	84.9	97.8	111	113	120
Thallium (D)	mg/L	-	-	0.000015	0.000018	2.20E-05	2.10E-05	2.60E-05	2.00E-05	2.80E-05	1.90E-05	*< 1e-05*	2.00E-05	2.10E-05	*< 2e-05*	*< 2e-05*
Tin (D)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 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*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*
Uranium (D)	mg/L	-	-	0.00023	0.00035	1.70E-04	0.00017	0.00081	0.00047	0.0012	0.00049	0.00086	0.0033	0.00268	0.00335	0.00273
Vanadium (D)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.01*	*< 0.01*	*< 0.01*
Zinc (D)	mg/L	-	-	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	0.0053	*< 0.01*	*< 0.01*	*< 0.01*
Zirconium (D)	mg/L	-	-	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 1e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*
Cyanides																
Cyanide (free)	mg/L	-	-	0.0056	0.0081	0.0034	0.0026	*< 0.002*	0.0076	0.0073	*< 0.002*	*< 0.002*	0.0064	*< 0.002*	*< 0.002*	*< 0.002*
Cyanide (Total)	mg/L	1	1	0.00332	0.00175	0.00071	*< 5e-04*	0.00056	0.0007	0.00095	0.00137	0.00104	0.00082	0.00083	0.00092	0.00104
Cyanide (WAD)	mg/L	-	-	0.0019	0.001	*< 5e-04*	*< 5e-04*	*< 5e-04*	0.00081	*< 5e-04*	0.00065	0.00083	0.00085	0.00089	0.00099	0.0012
Radium																
Radium-226	Bq/L	-	1.11	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	*< 0.005*	0.007	*< 0.005*	*< 0.005*	0.006	*< 0.005*	0.027	0.007
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*

Table B1-2. Chemistry and toxicity test results for MEL-14 samples in 2023

		Limits (Grab Samples)		June				July			August	September				
Parameter	**Units**	**WL**	**MDMER**	**2023-06-12**	**2023-06-21**	**2023-06-25**	**2023-06-28**	**2023-07-03**	**2023-07-10**	**2023-07-17**	**2023-08-21**	**2023-09-03**	**2023-09-11**	**2023-09-18**	**2023-09-25**	**2023-09-27**
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*
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*
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*
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*
Volatile Organics																
Benzene	mg/L	-	-	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*
Ethylbenzene	mg/L	-	-	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*
m,p-Xylenes	mg/L	-	-	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*
o-Xylene	mg/L	-	-	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*
Toluene	mg/L	-	-	0.00041	0.00041	*< 2e-04*	0.00063	0.00028	*< 2e-04*	*< 2e-04*	*< 2e-04*	*< 2e-04*	0.0003	0.00024	0.00024	*< 2e-04*
Xylenes	mg/L	-	-	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*	*< 4e-04*

Notes

Italicized numbers are less than the analytical detection limit

Appendix B2
Effluent Quality – Supplemental Figures

APPENDIX B2 – FIGURES

The following notes apply to all the plots in this appendix.

1. The blue dot represents the monthly mean concentration at MEL-14. The blue vertical line represents the range of concentrations measured in each month.
2. Monthly loadings = monthly mean concentration (mg/L) x monthly discharge (m^3) /1,000.
3. Some parameters were not measured in June, July, and August 2018. Monthly loadings appear on the plot as 0 kg for those months (see cobalt, as an example).

Figure B2-1. Total suspended solids (TSS)

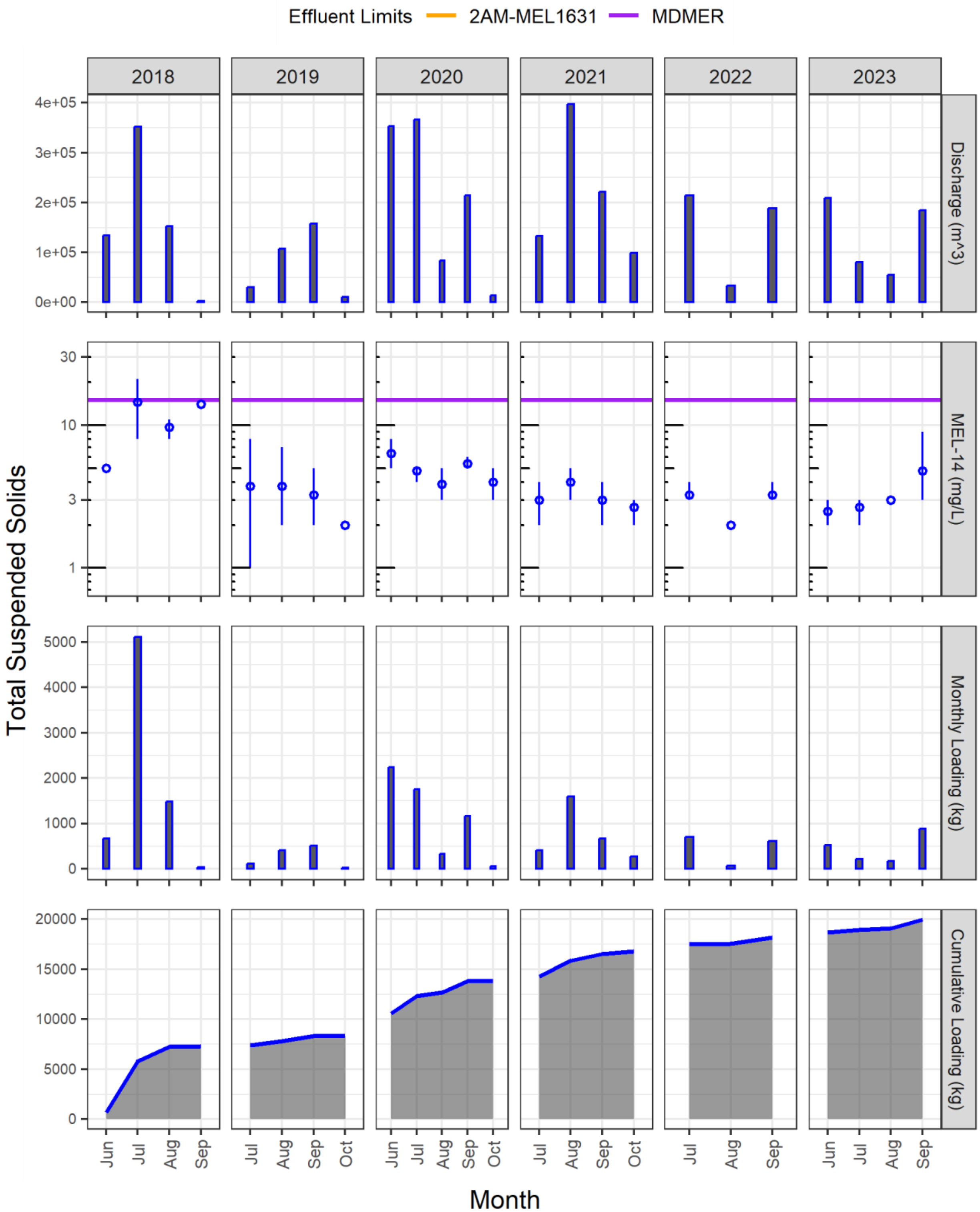


Figure B2-2. Total dissolved solids (TDS measured)

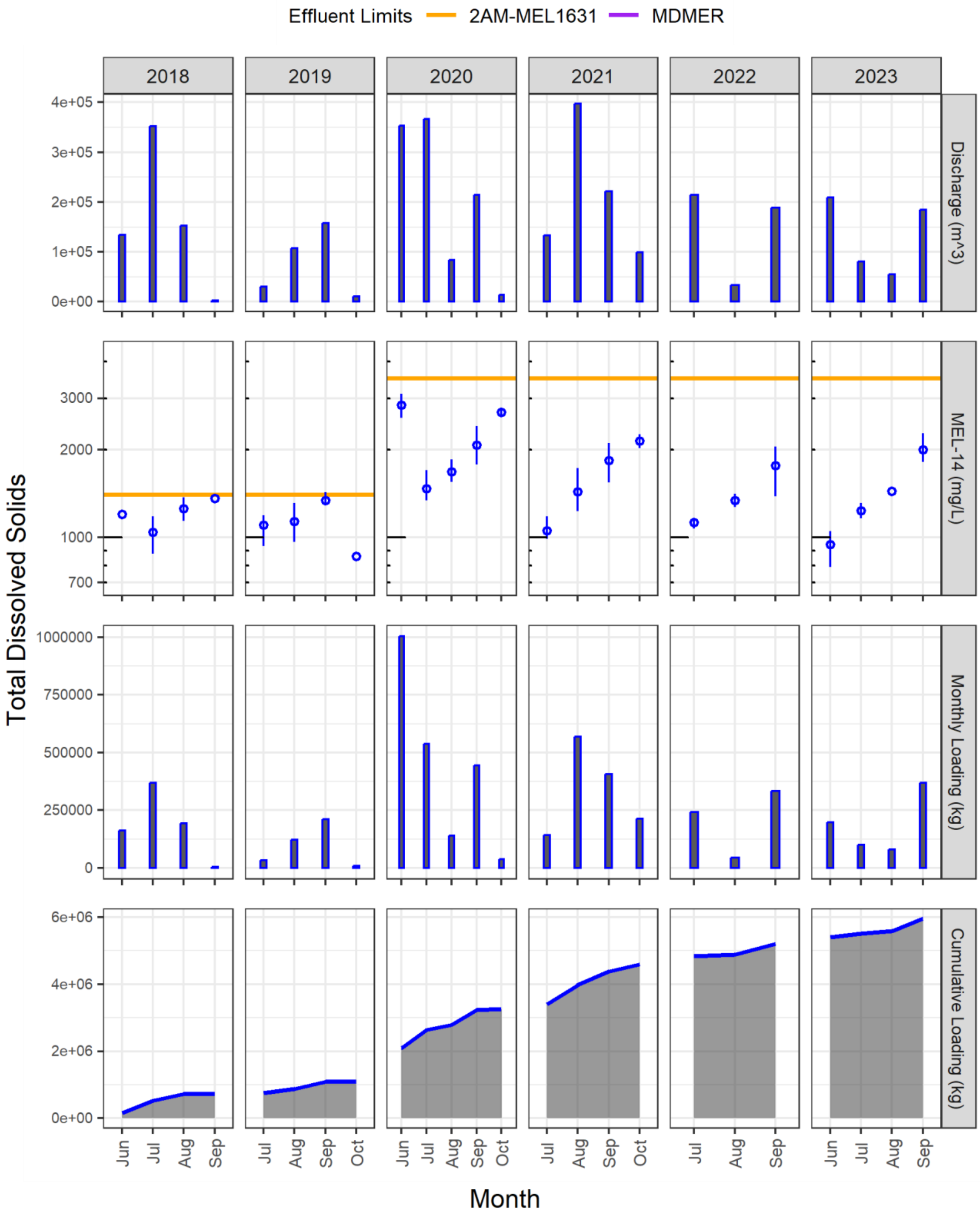


Figure B2-3. Chloride

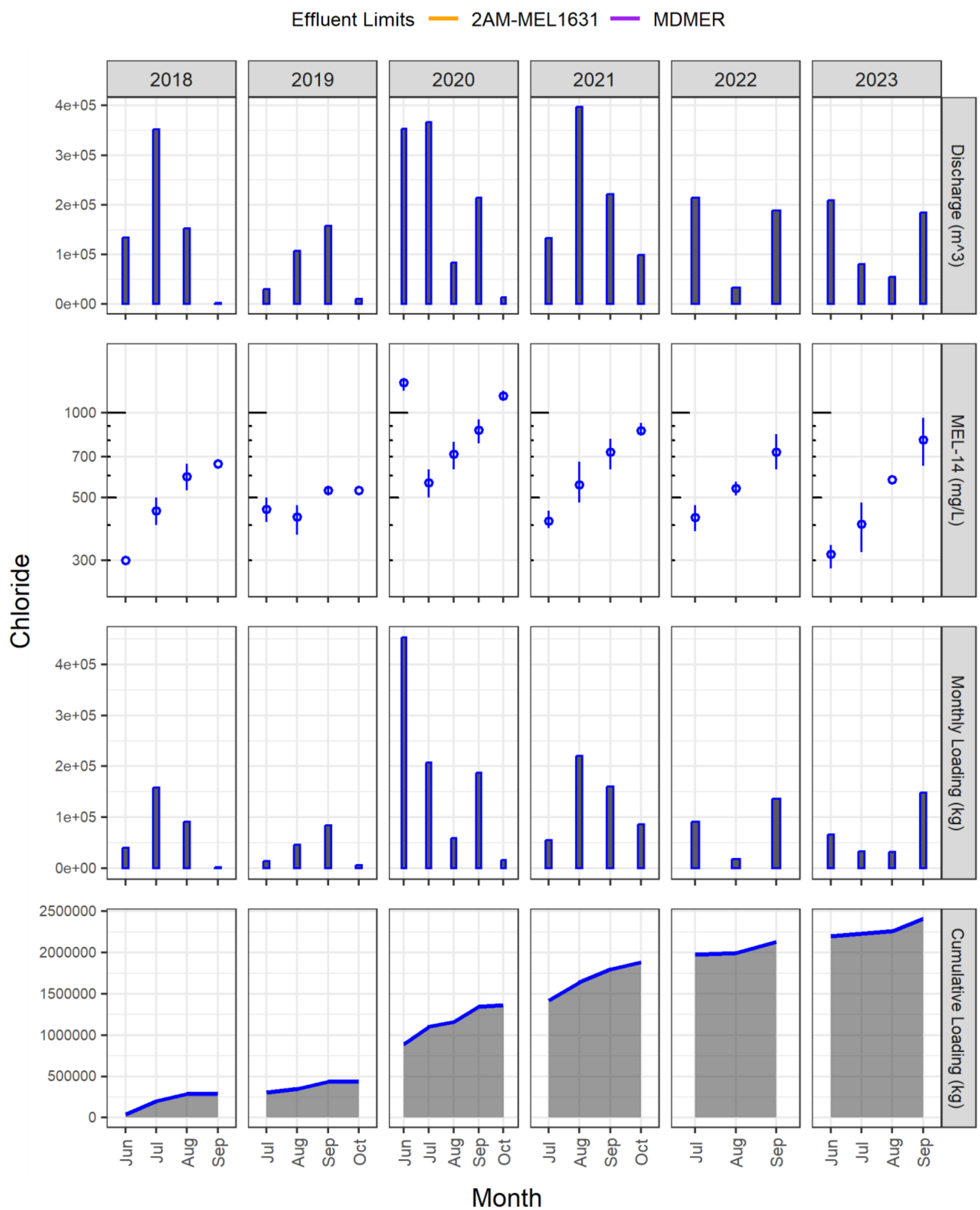


Figure B2-4. Sodium

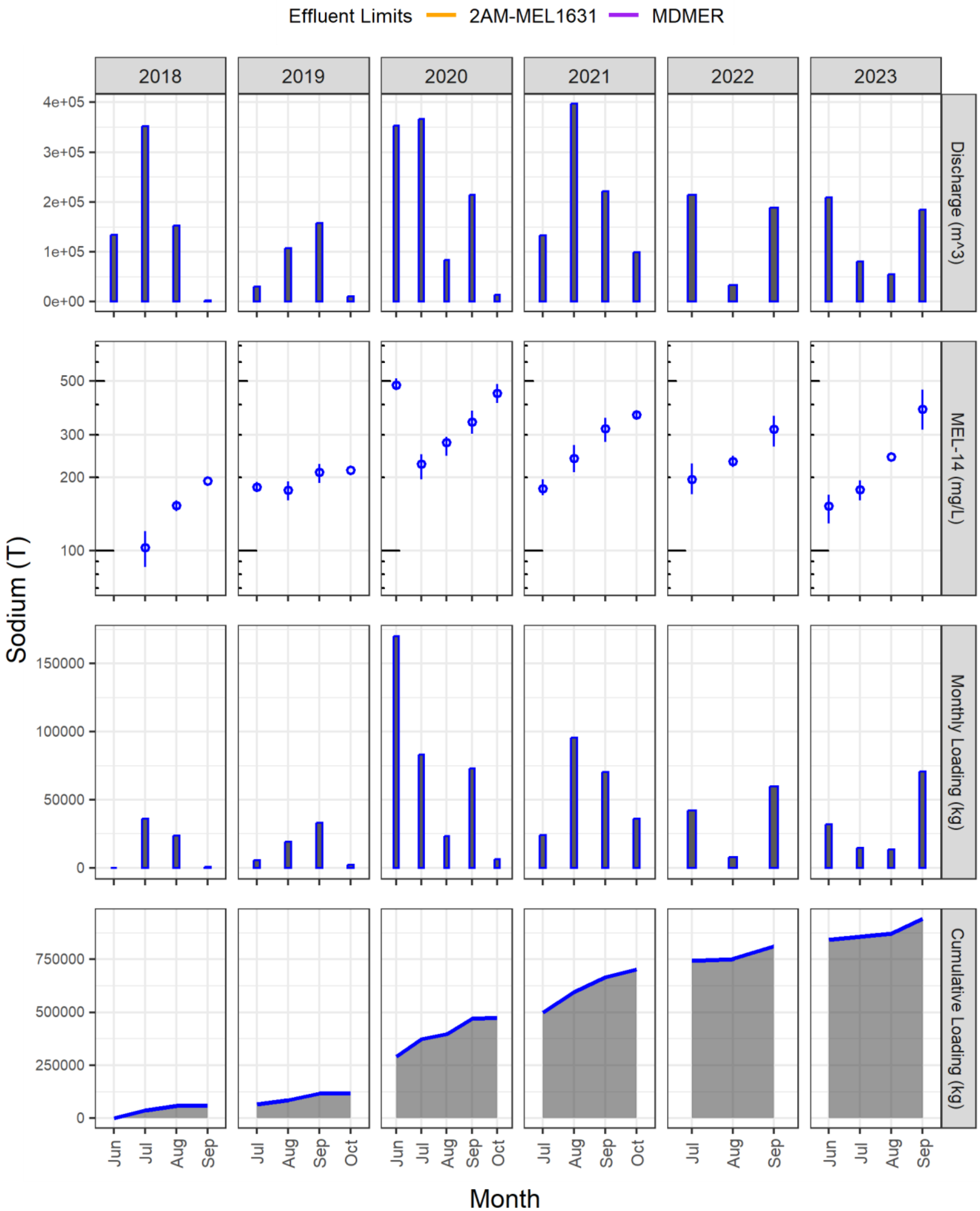


Figure B2-5. Calcium

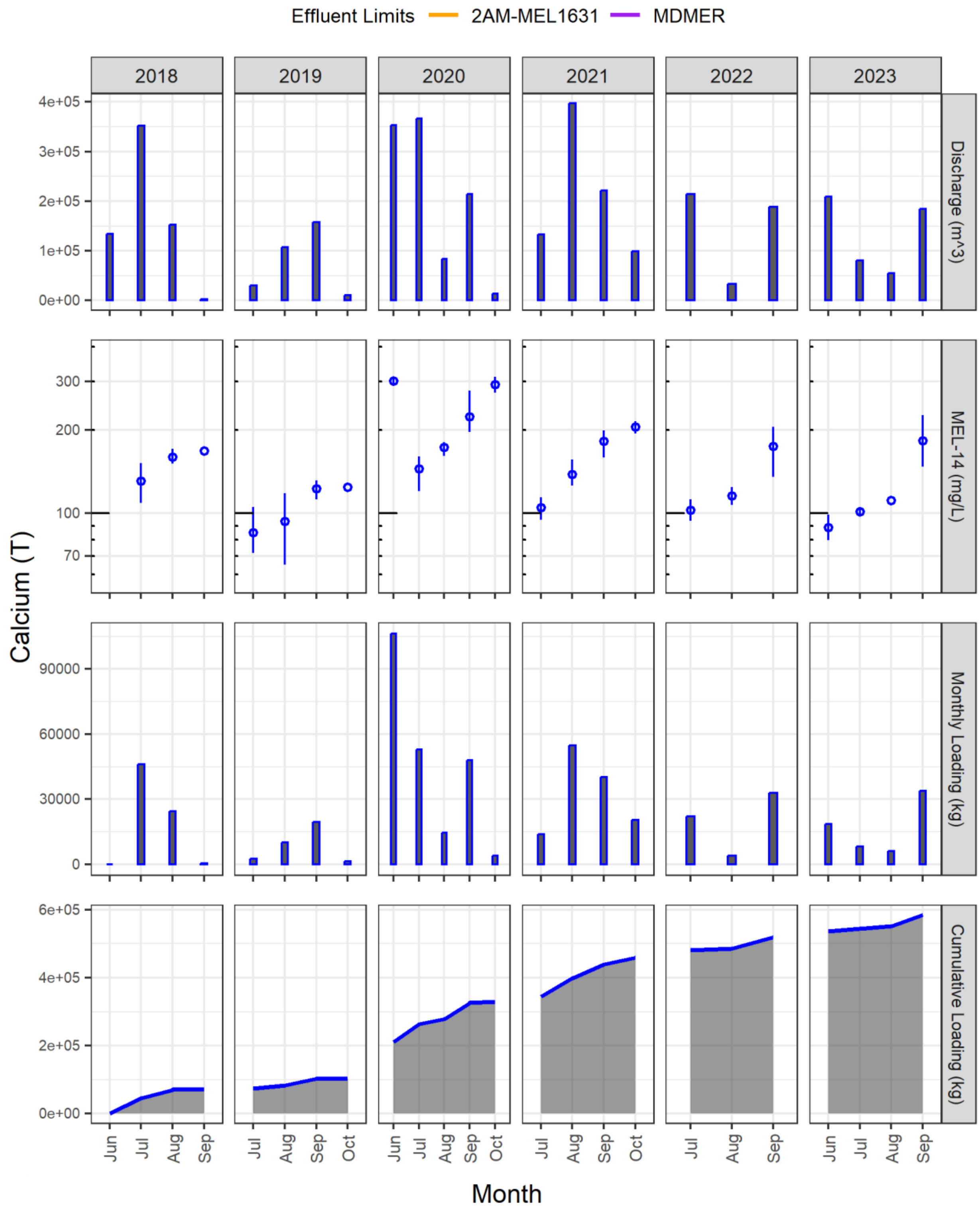


Figure B2-6. Magnesium

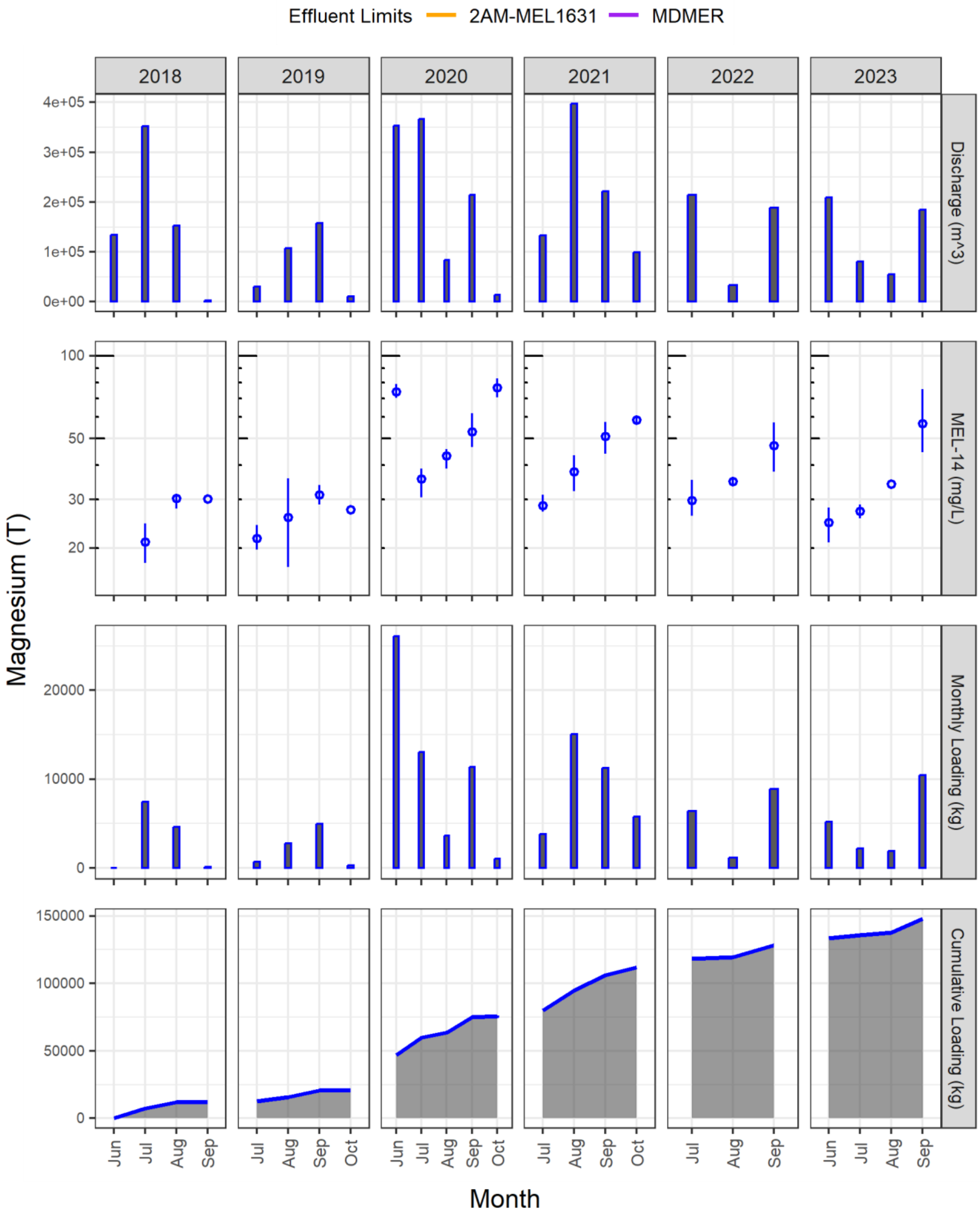


Figure B2-7. Potassium

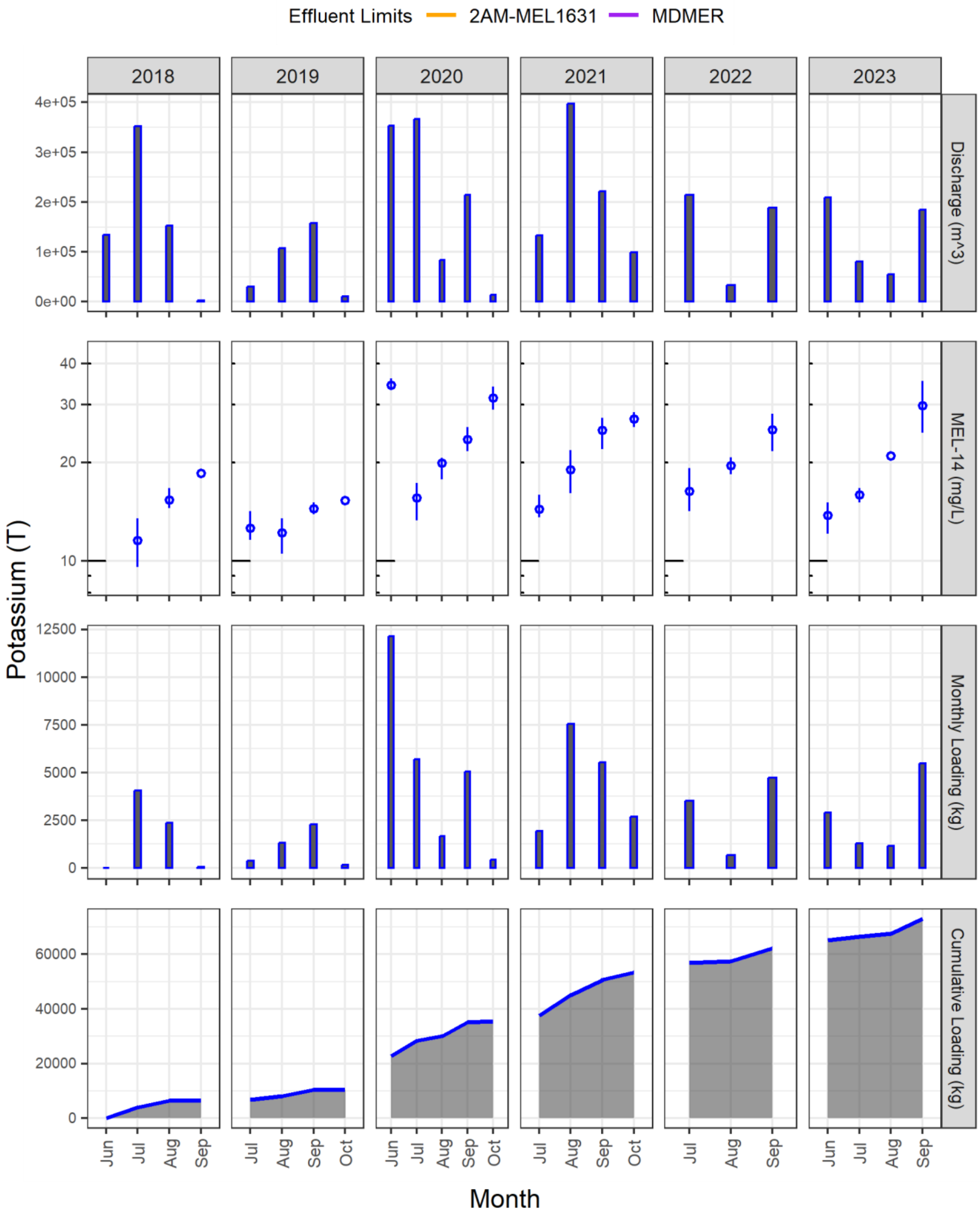


Figure B2-8. Sulphate

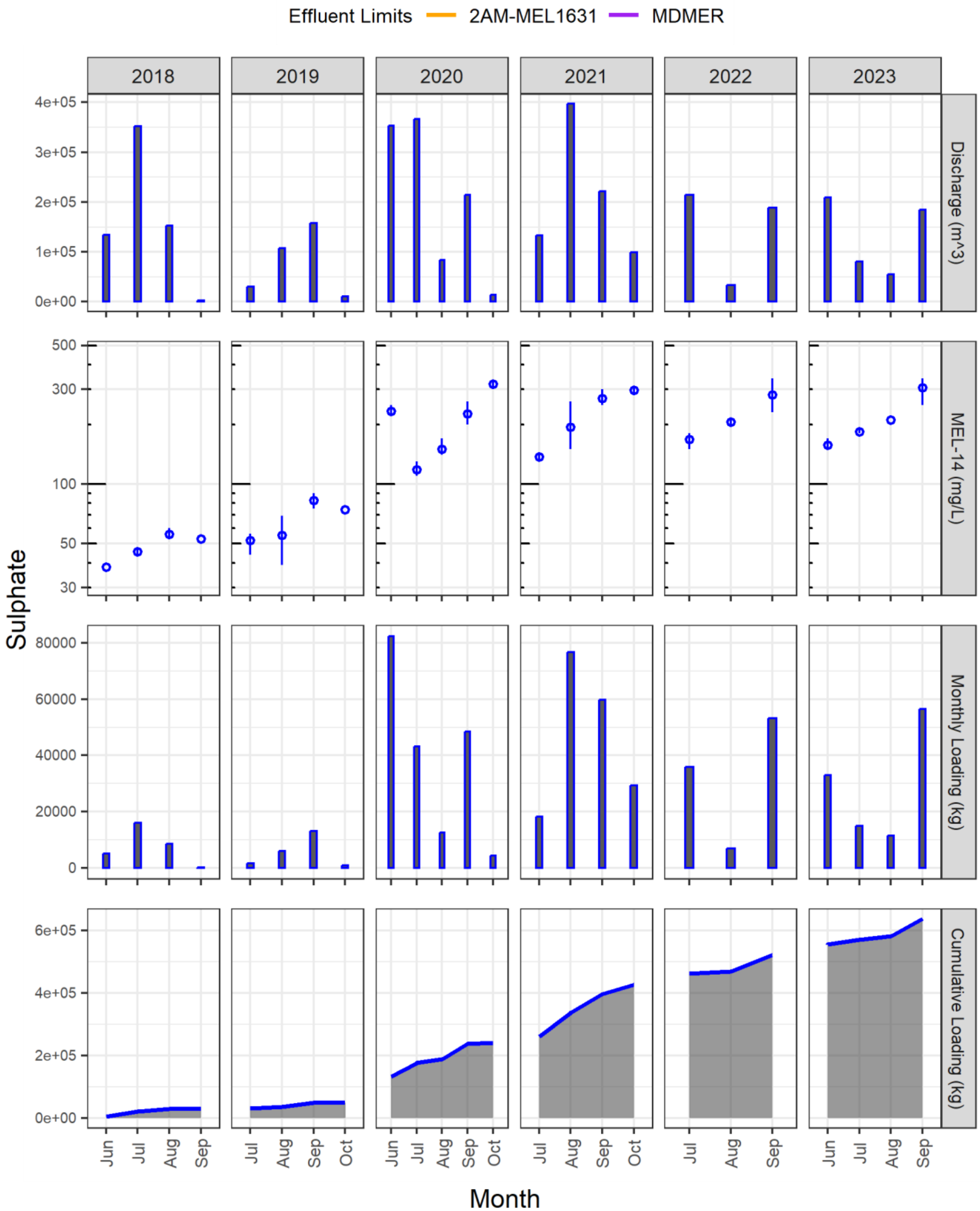


Figure B2-9. Alkalinity (Total)

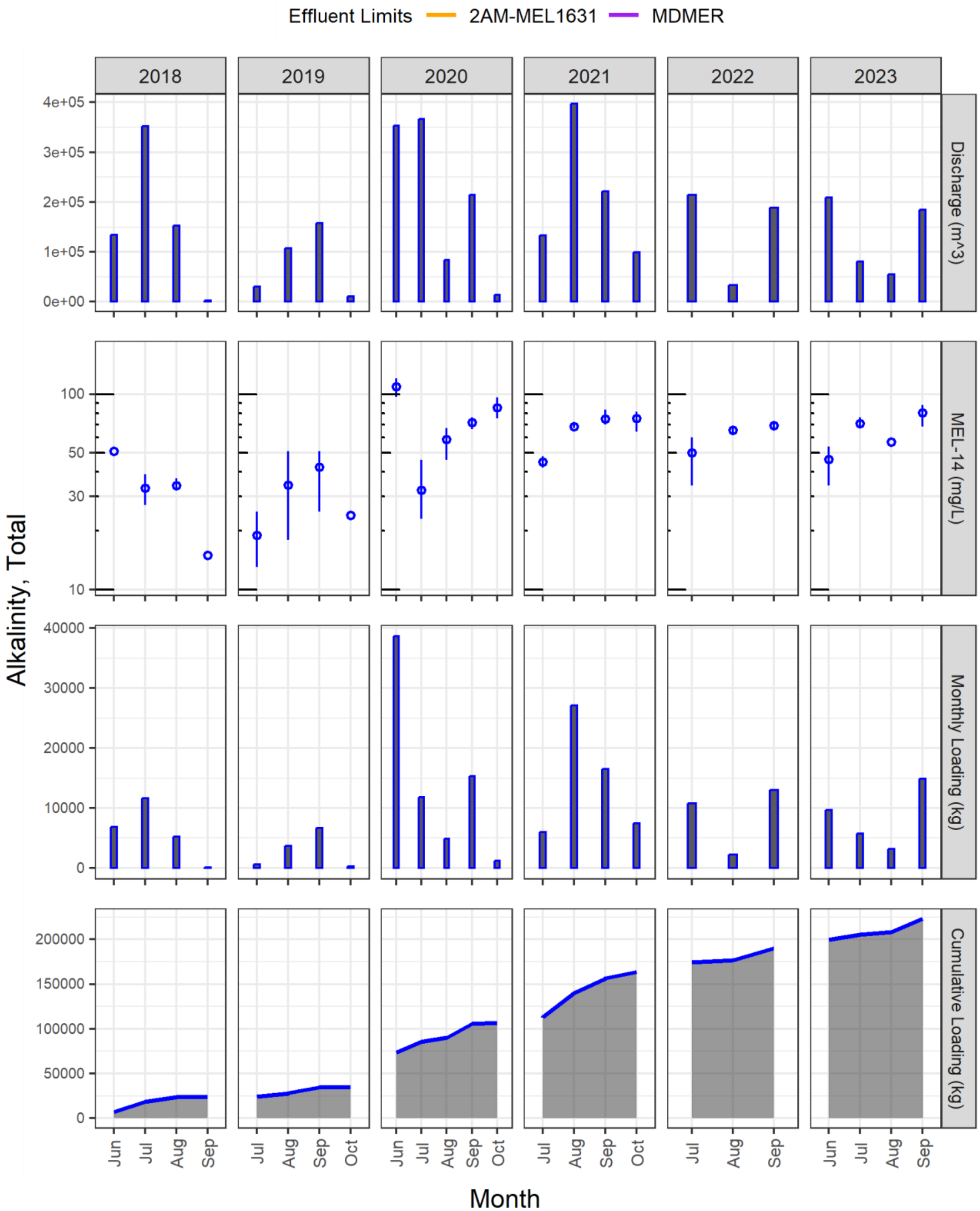


Figure B2-10. Reactive Silica

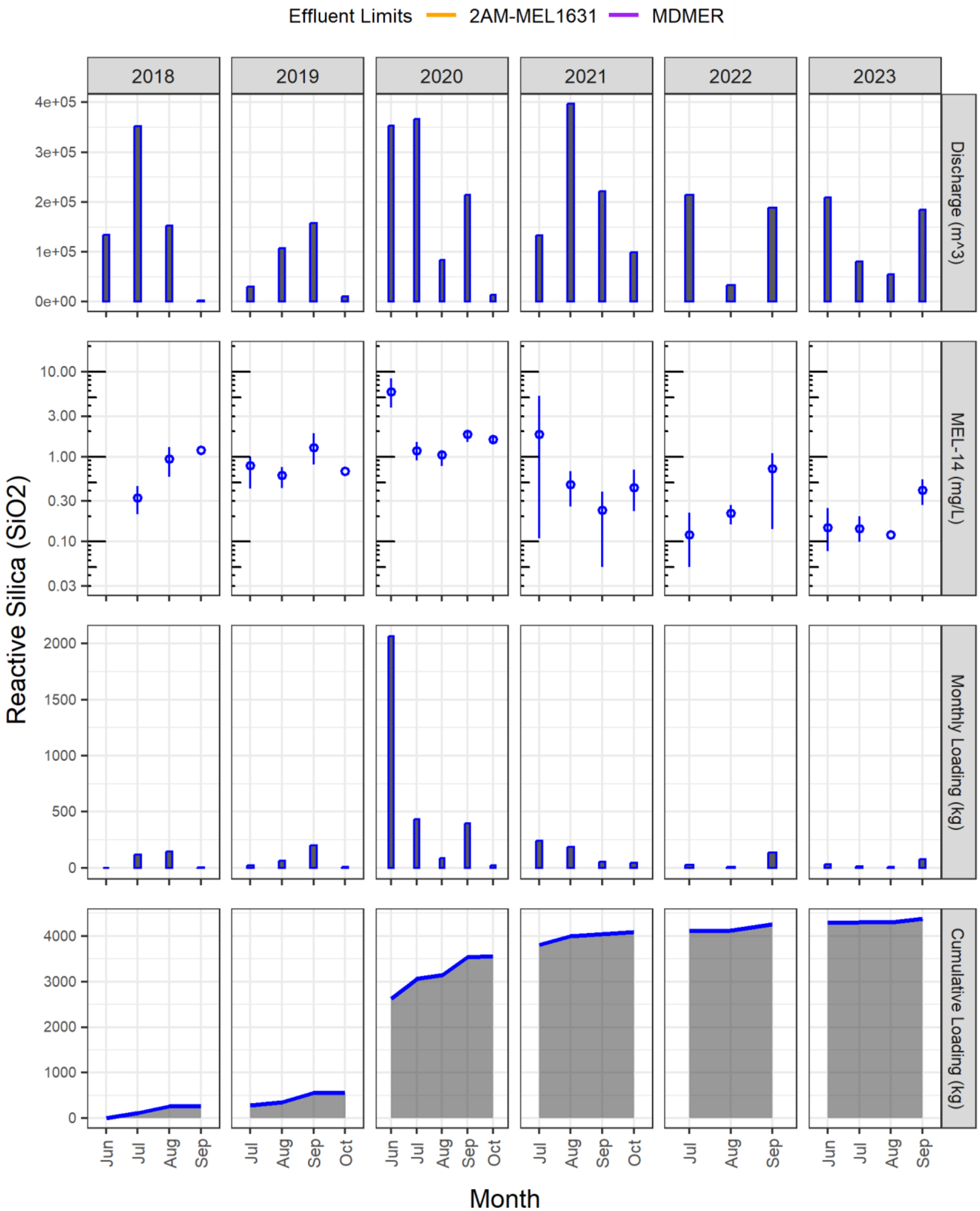


Figure B2-11. Nitrate (as N)

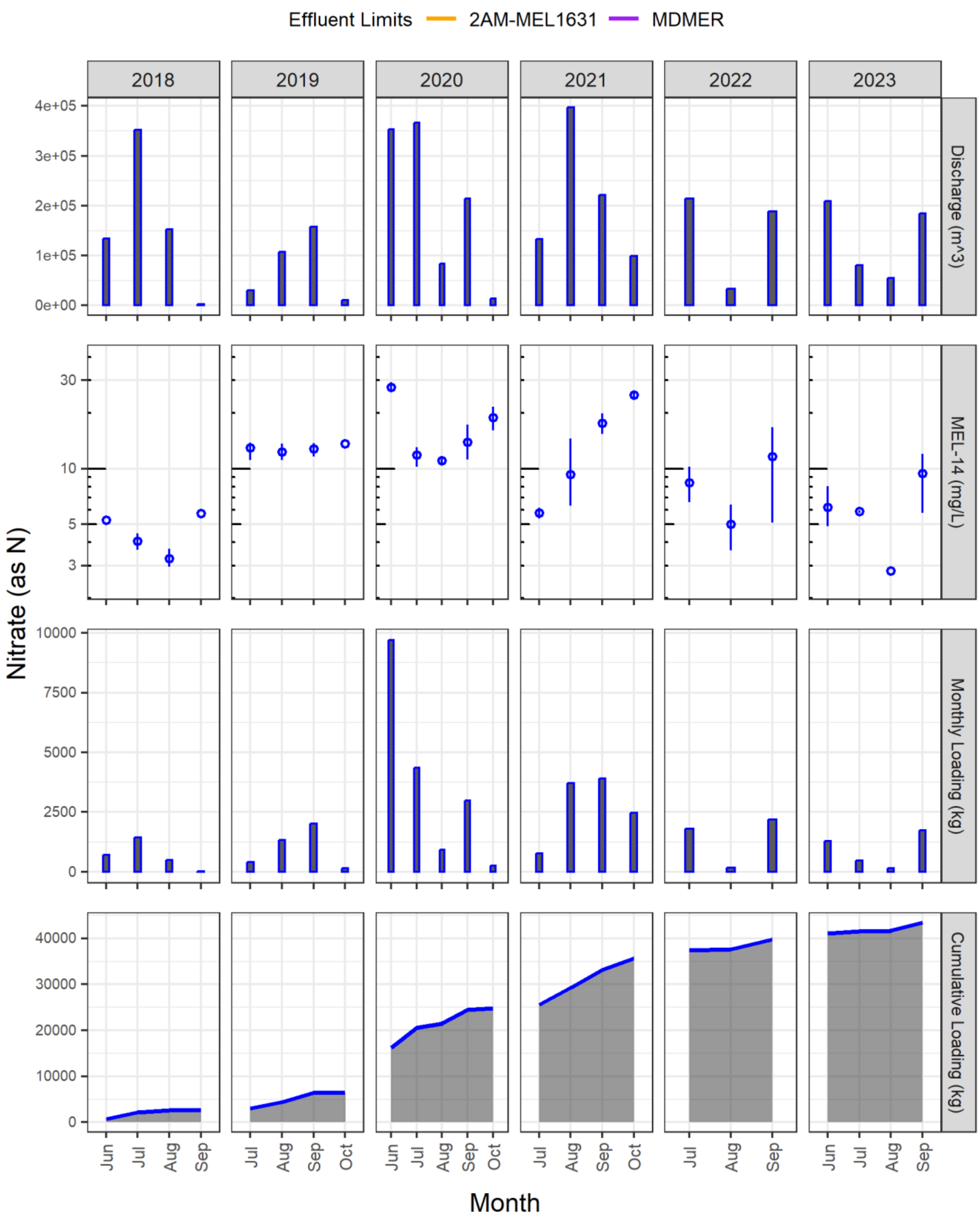


Figure B2-12. Nitrite (as N)

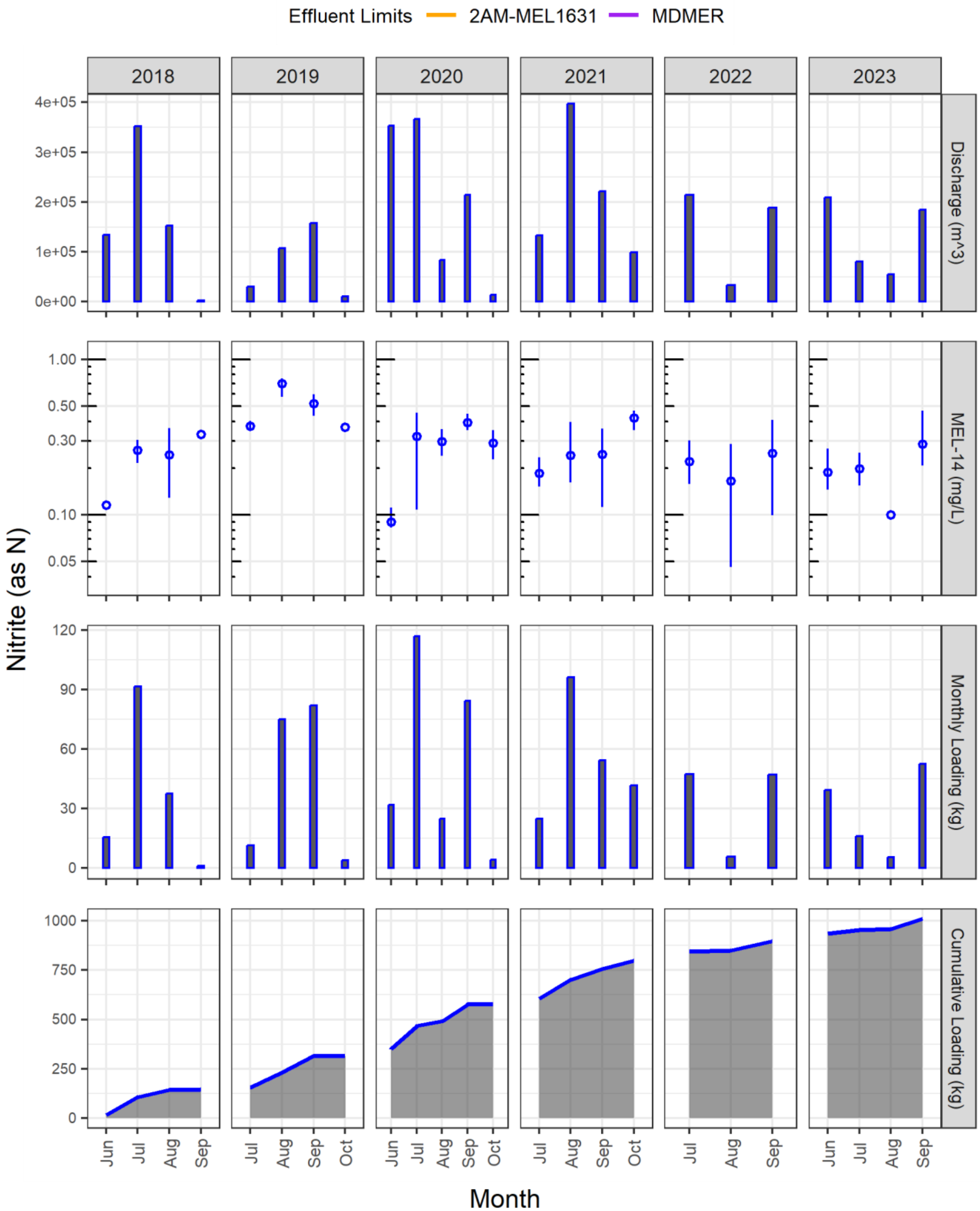


Figure B2-13. Nitrate + Nitrite (as N)

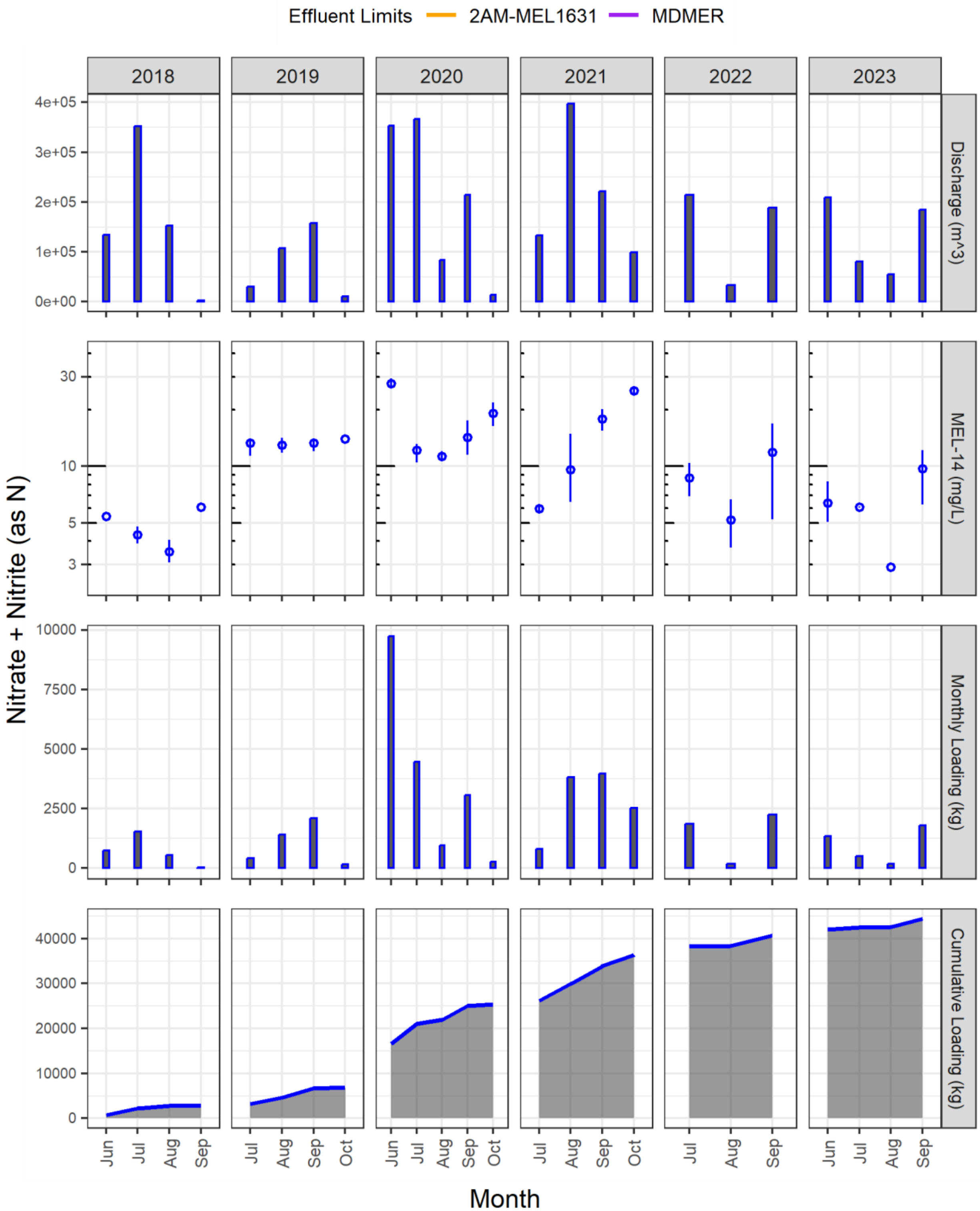


Figure B2-14.Total Kjeldahl nitrogen (TKN)

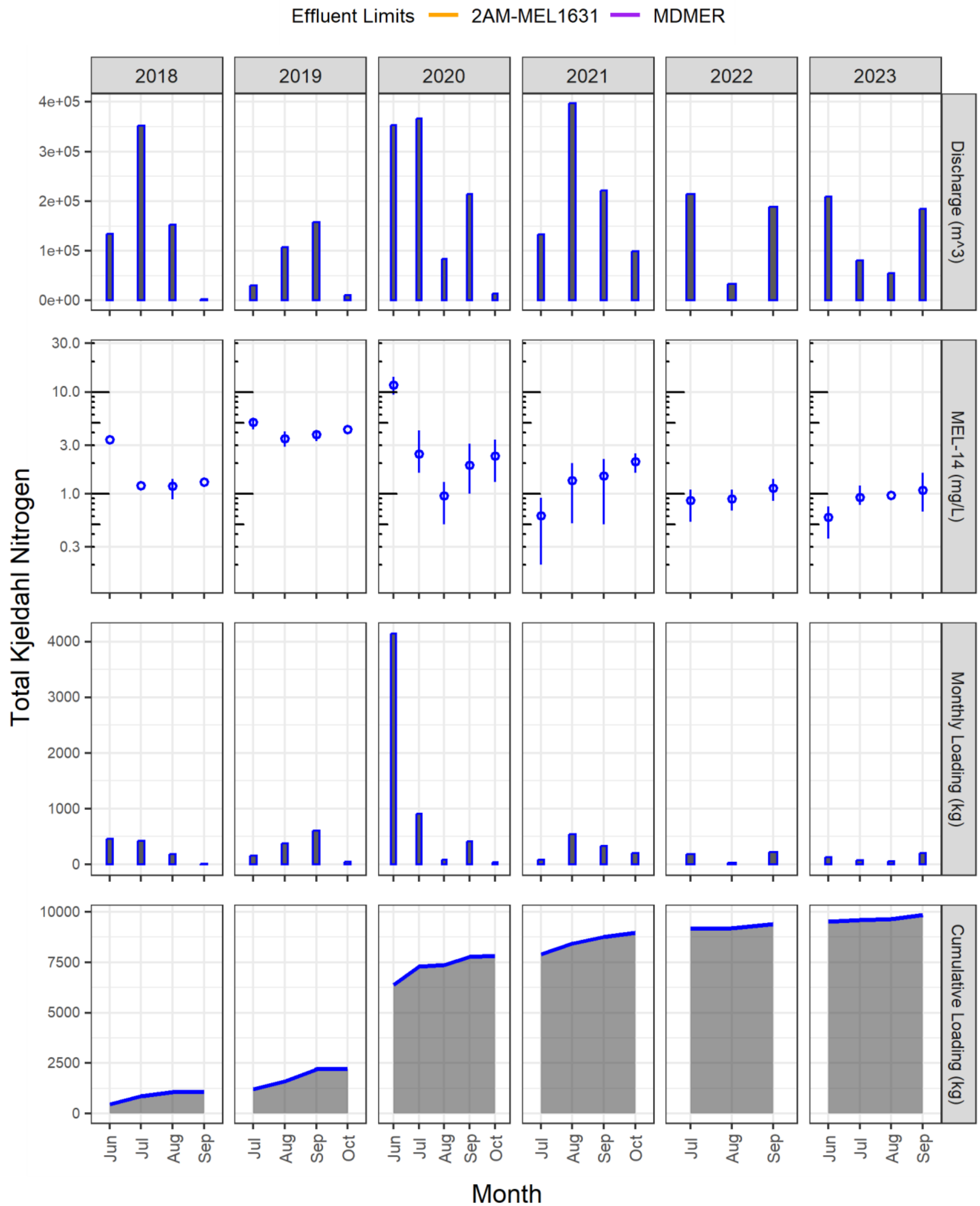


Figure B2-15. Ammonia (as N)

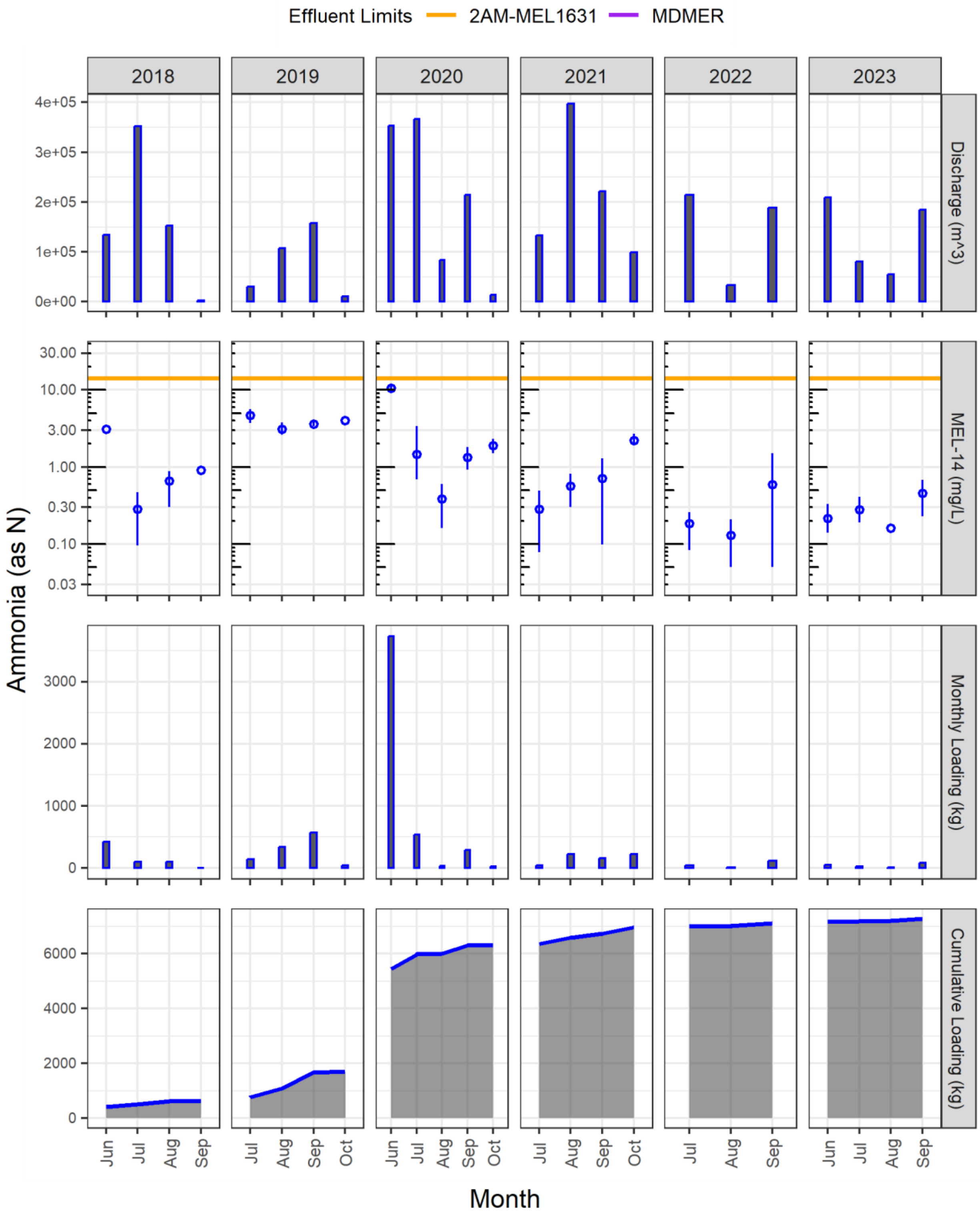


Figure B2-16. Total Phosphorus

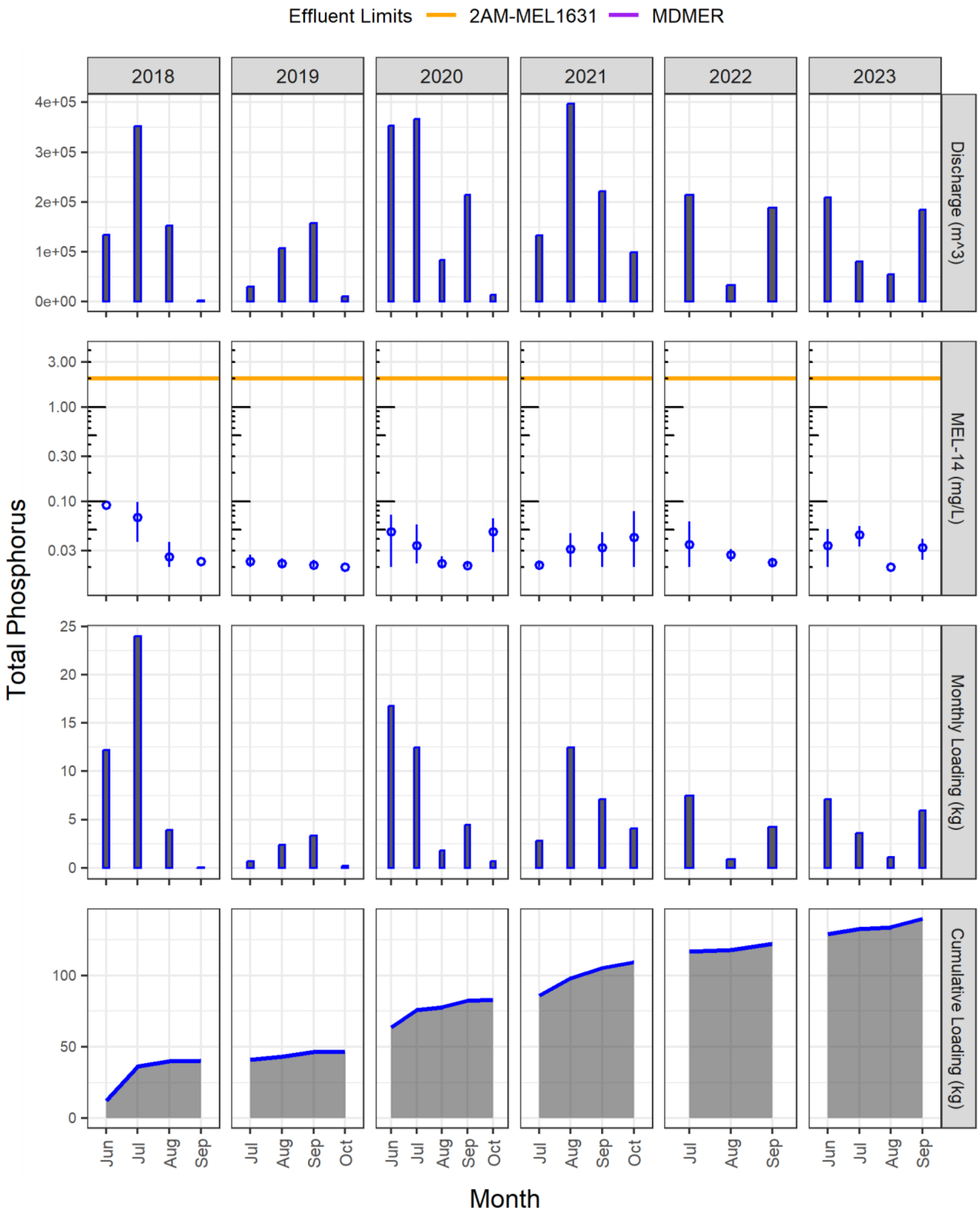


Figure B2-17. Orthophosphate

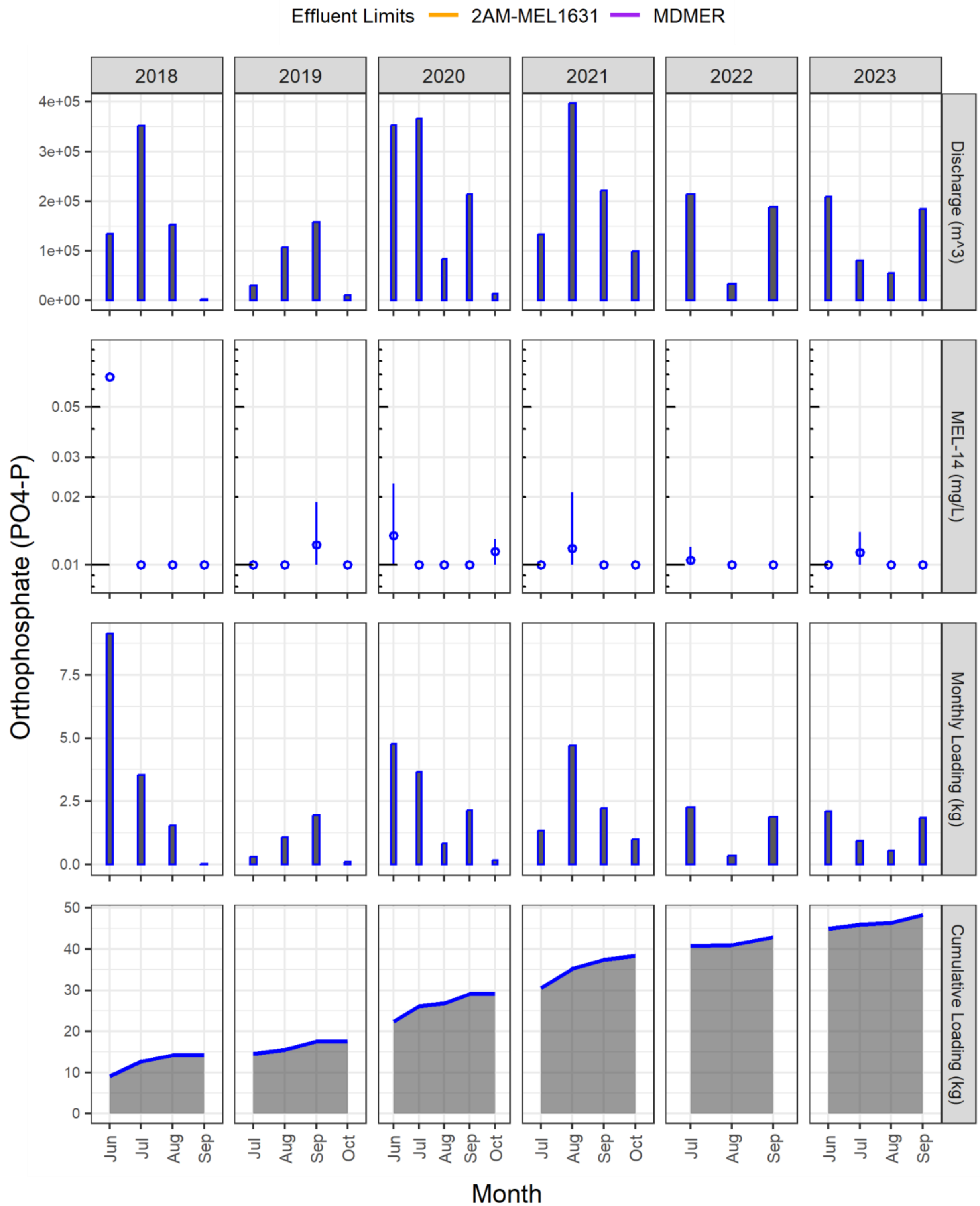


Figure B2-18. Total Organic Carbon (TOC)

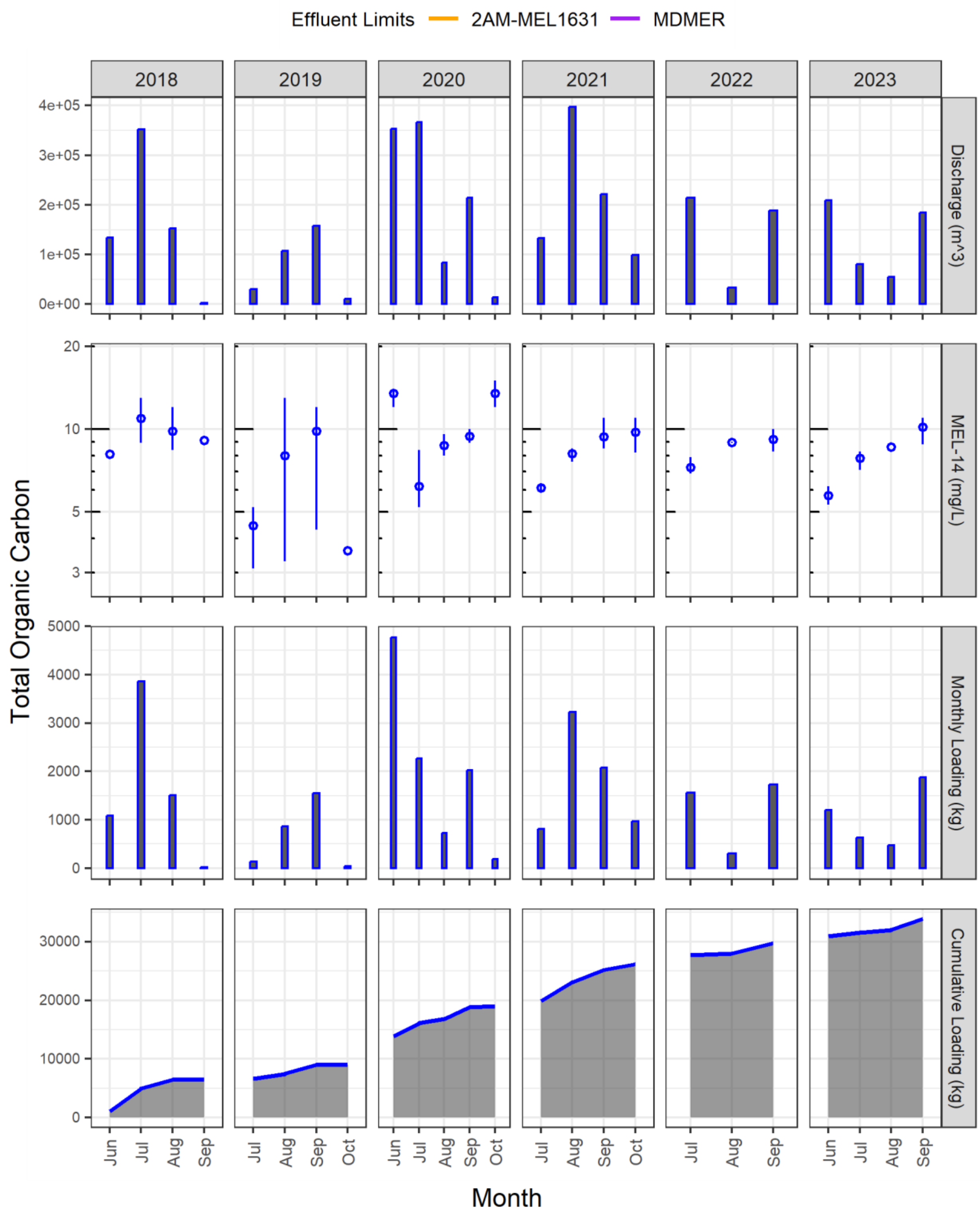


Figure B2-19. Aluminum

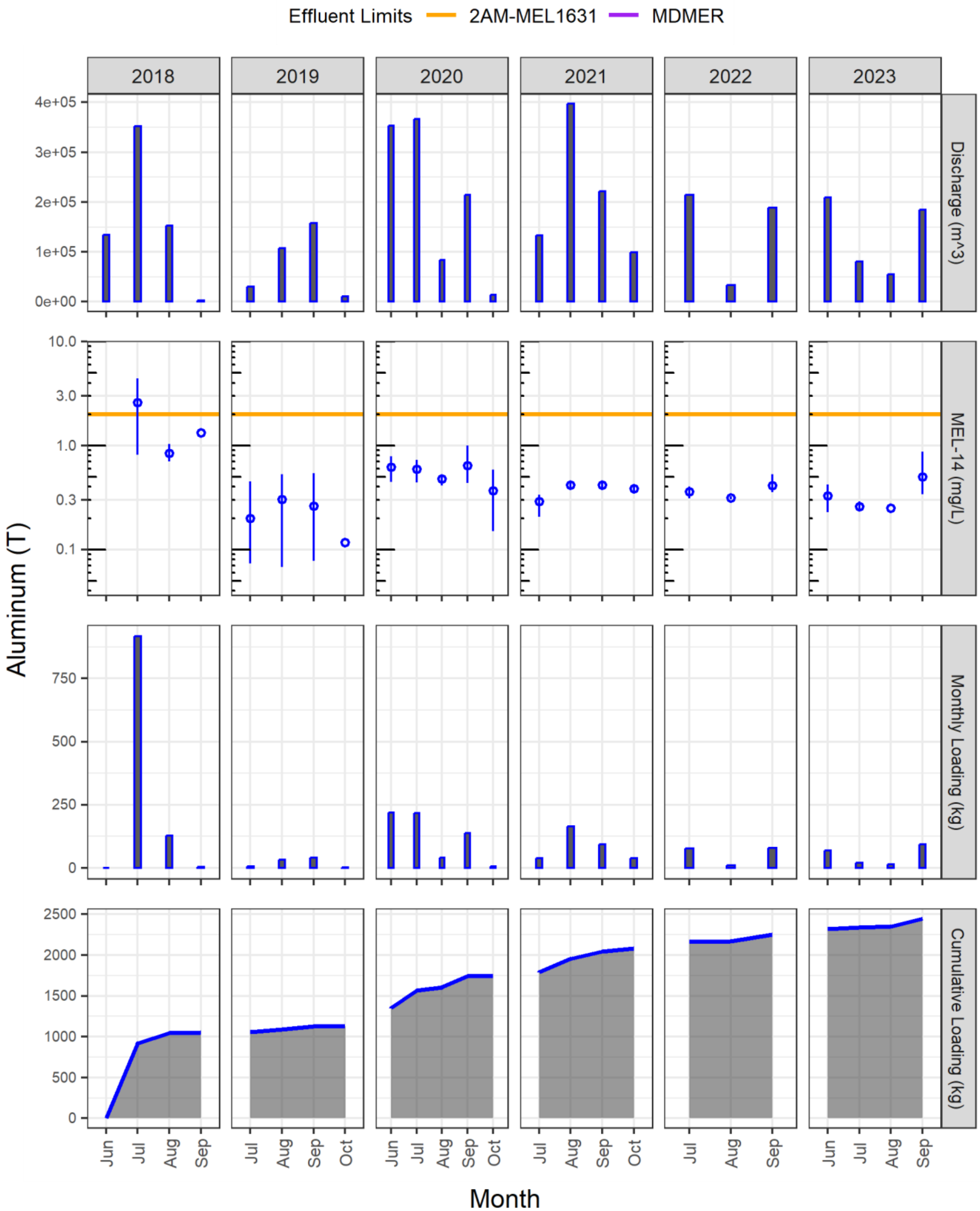


Figure B2-20. Arsenic

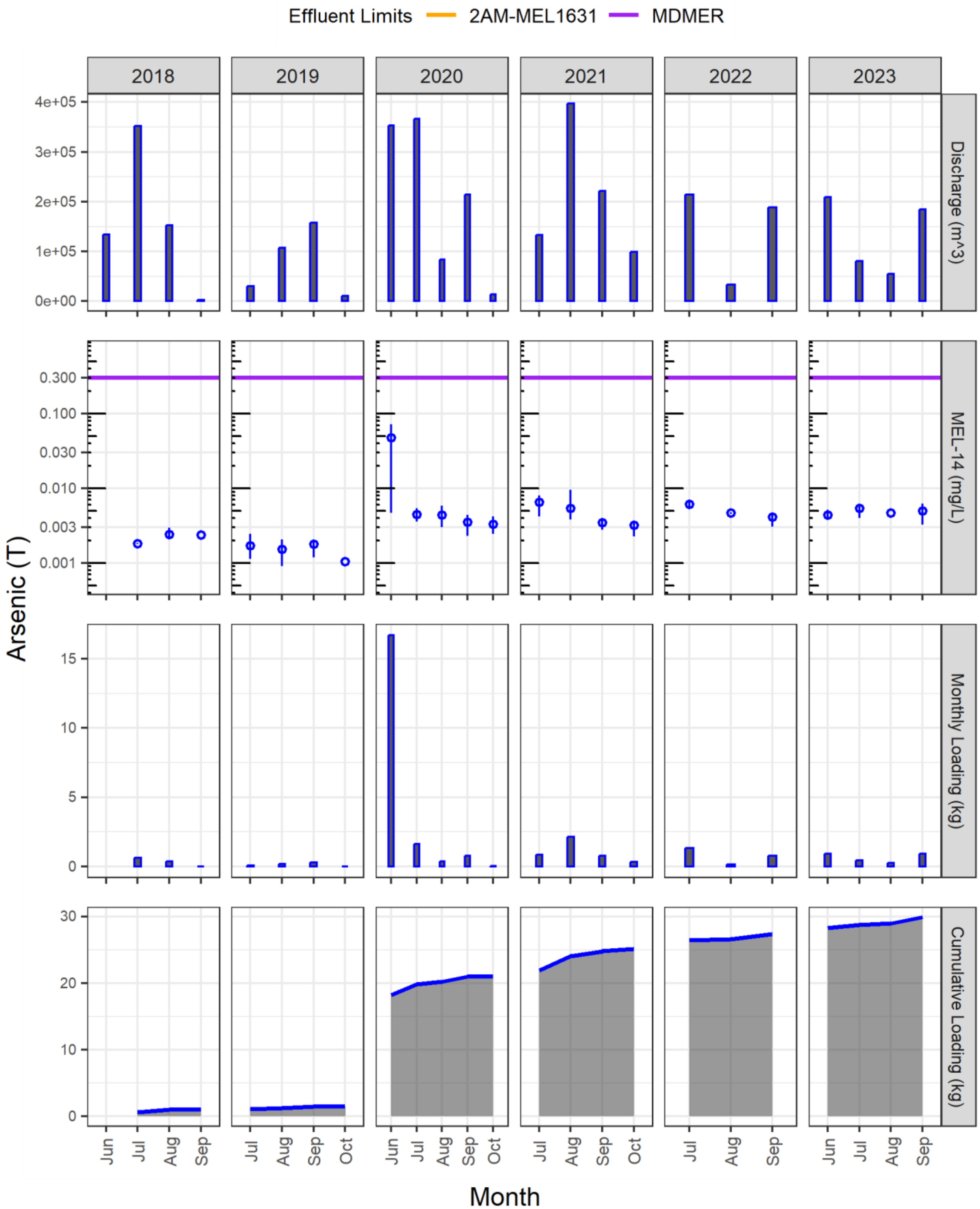


Figure B2-21. Barium

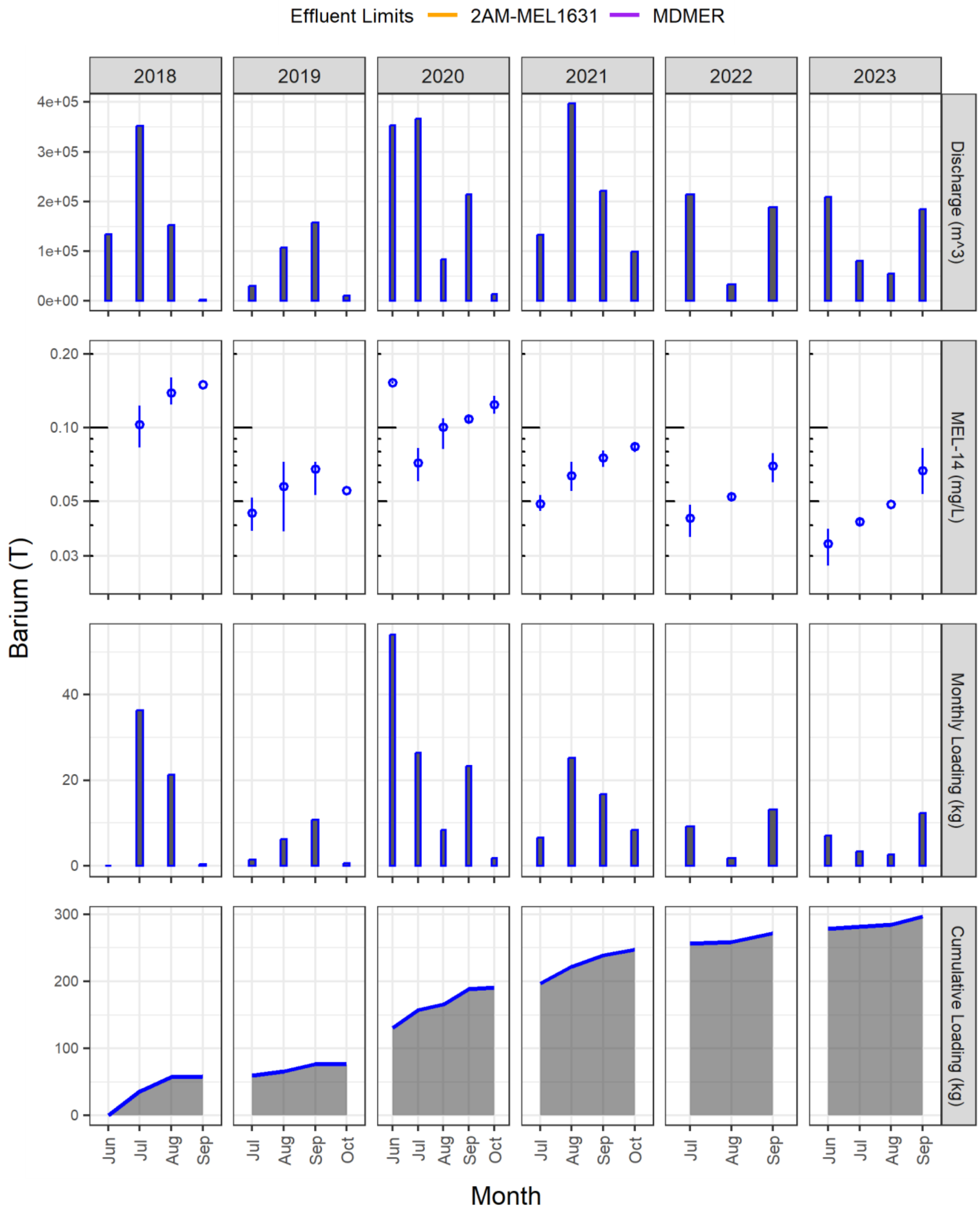


Figure B2-22. Beryllium

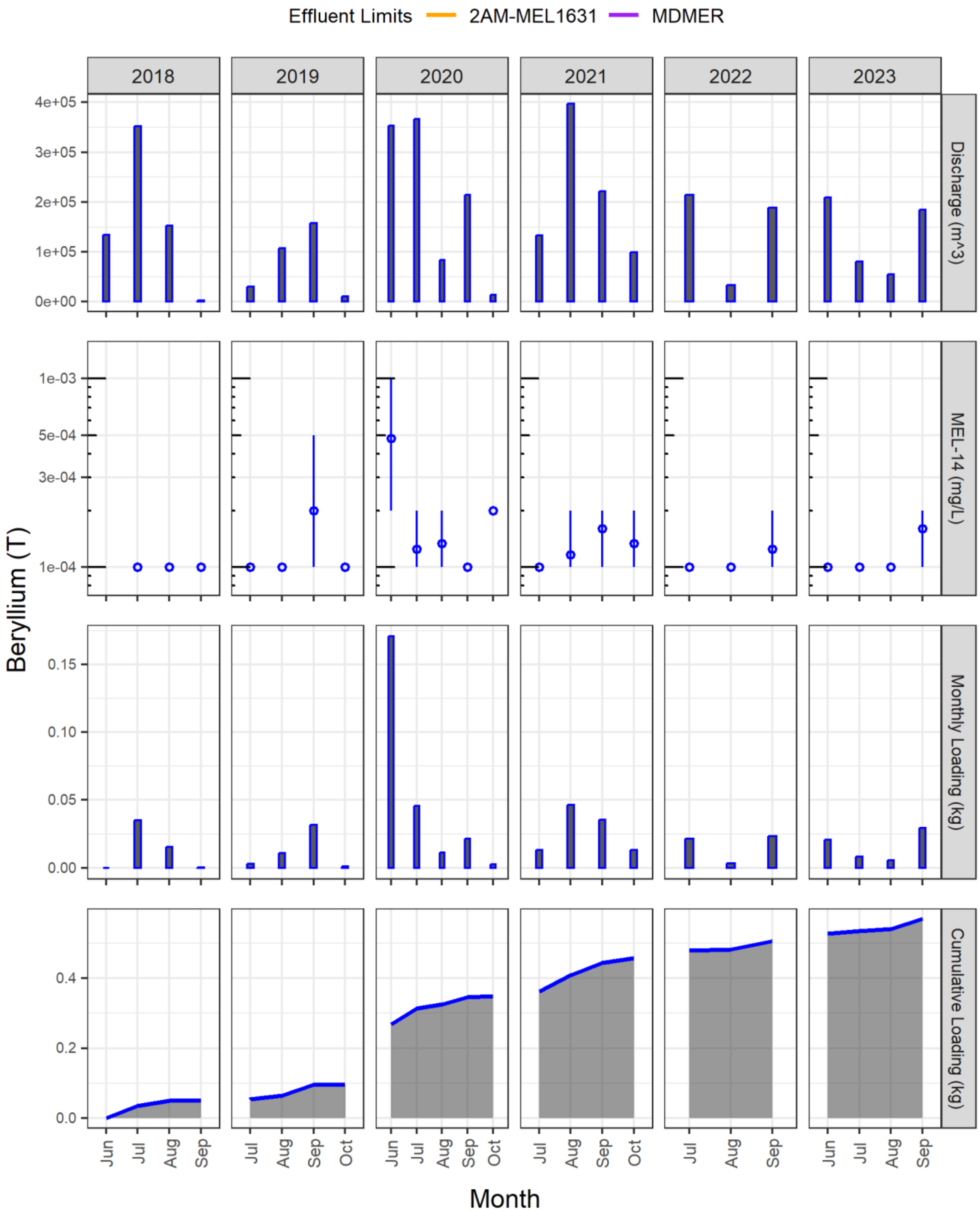


Figure B2-23. Bismuth

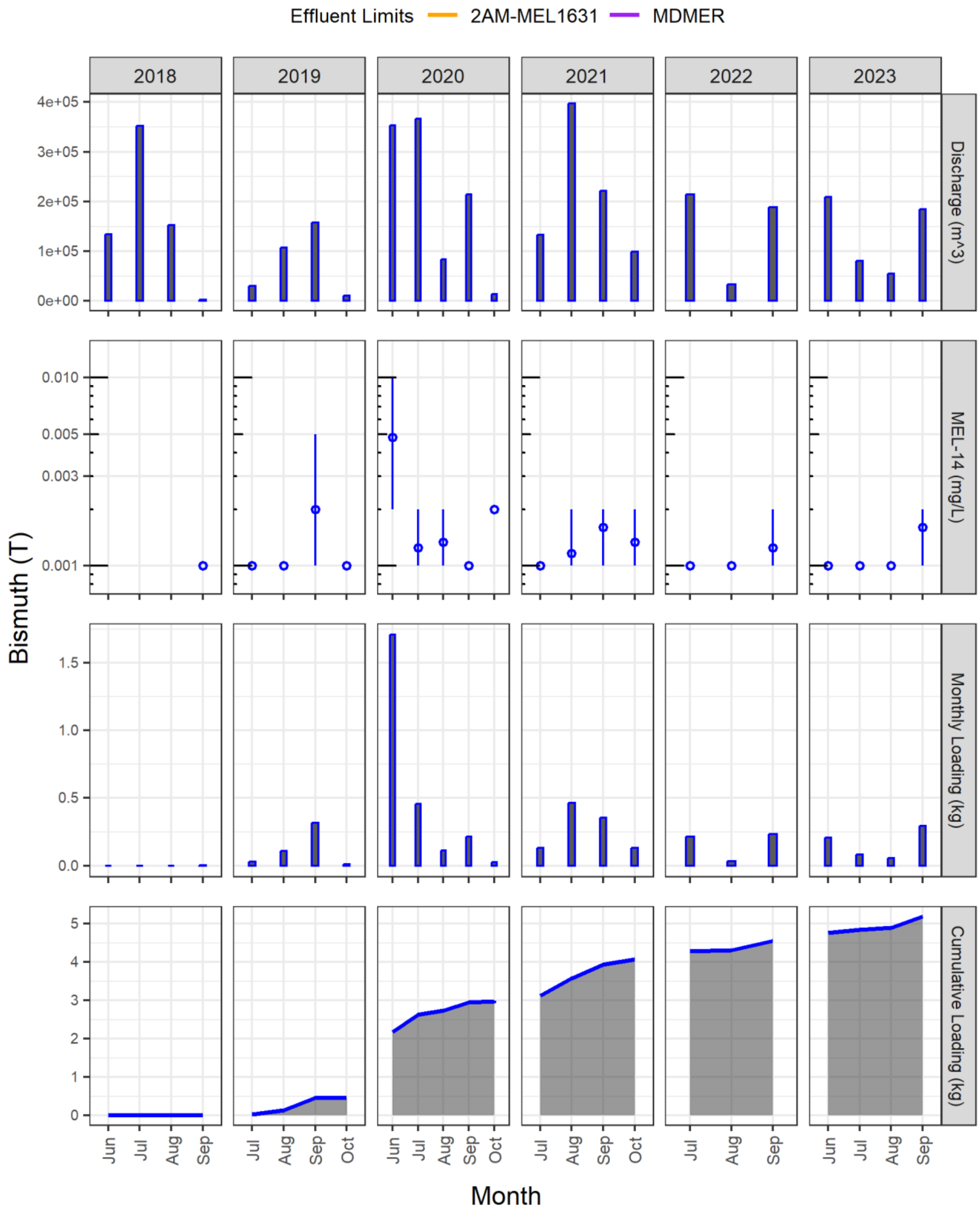


Figure B2-24. Boron

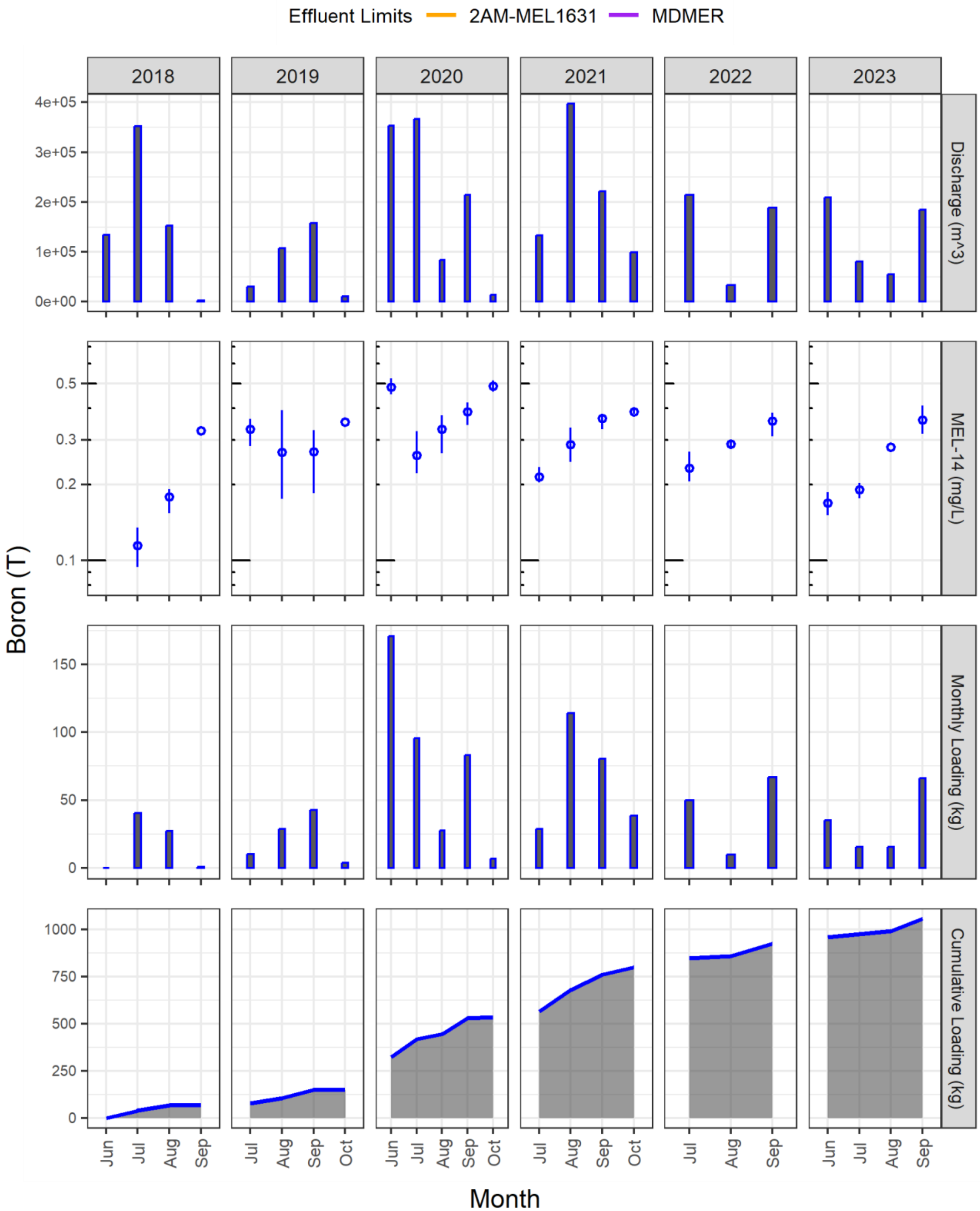


Figure B2-25. Cadmium

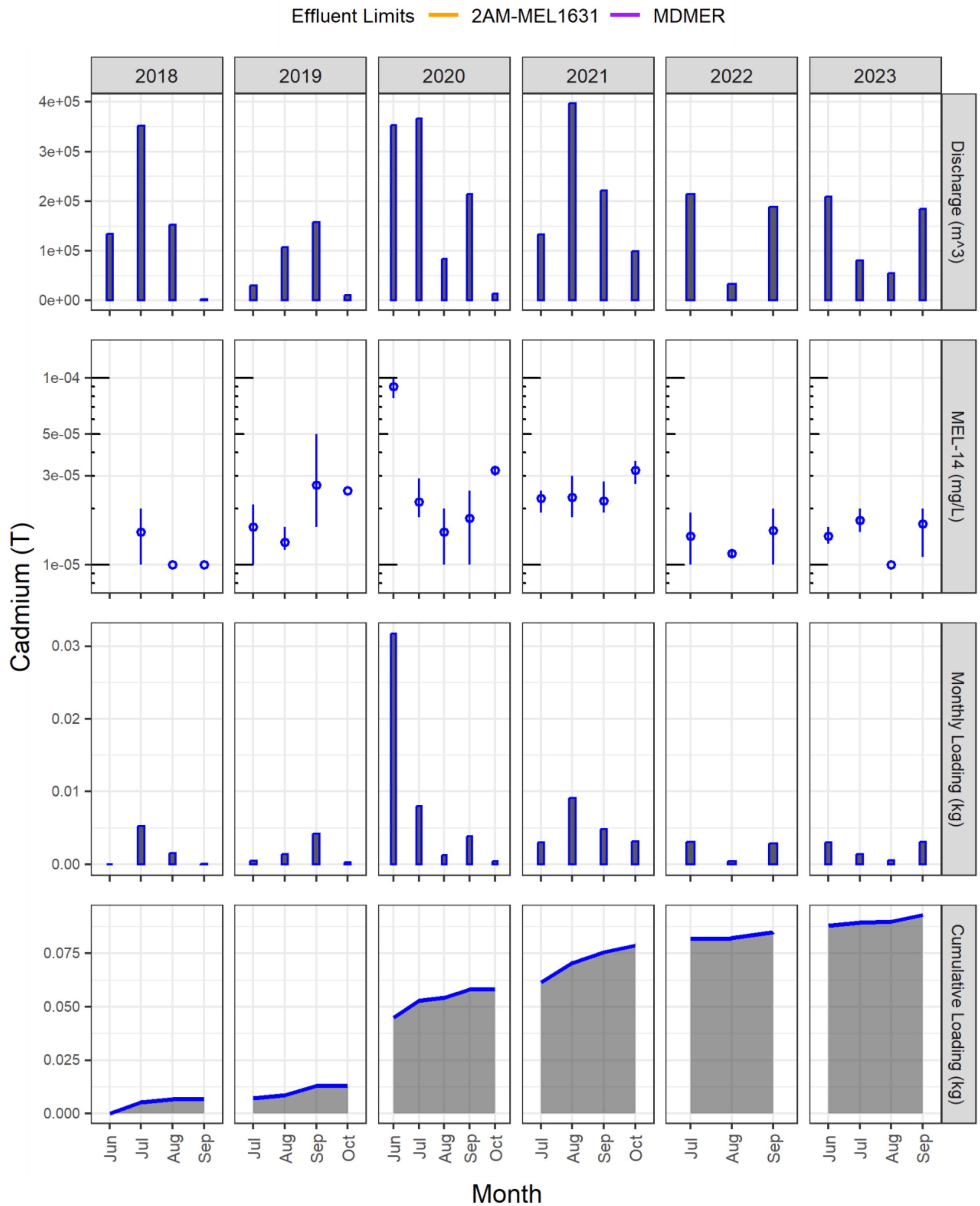


Figure B2-26. Chromium

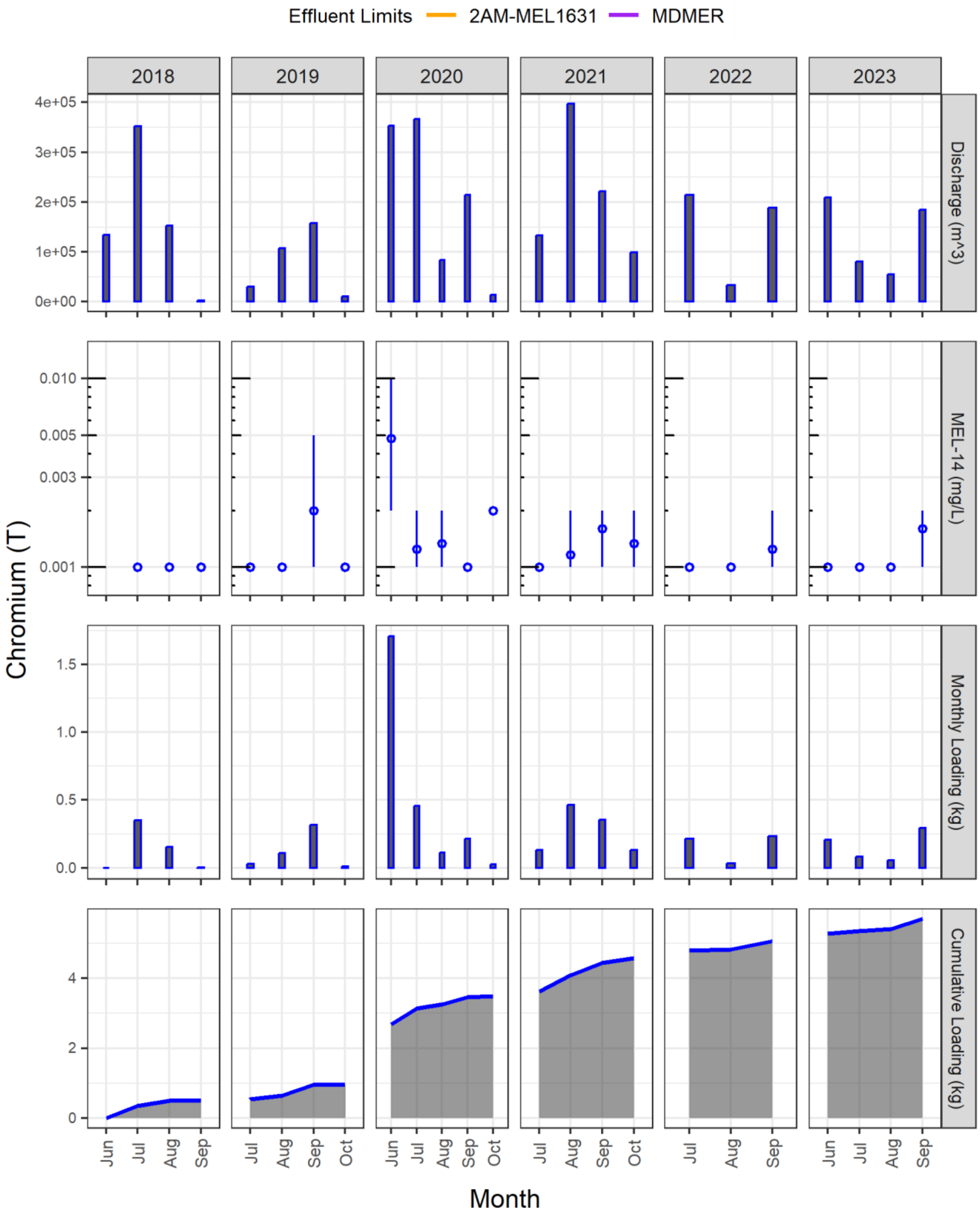


Figure B2-27. Cobalt

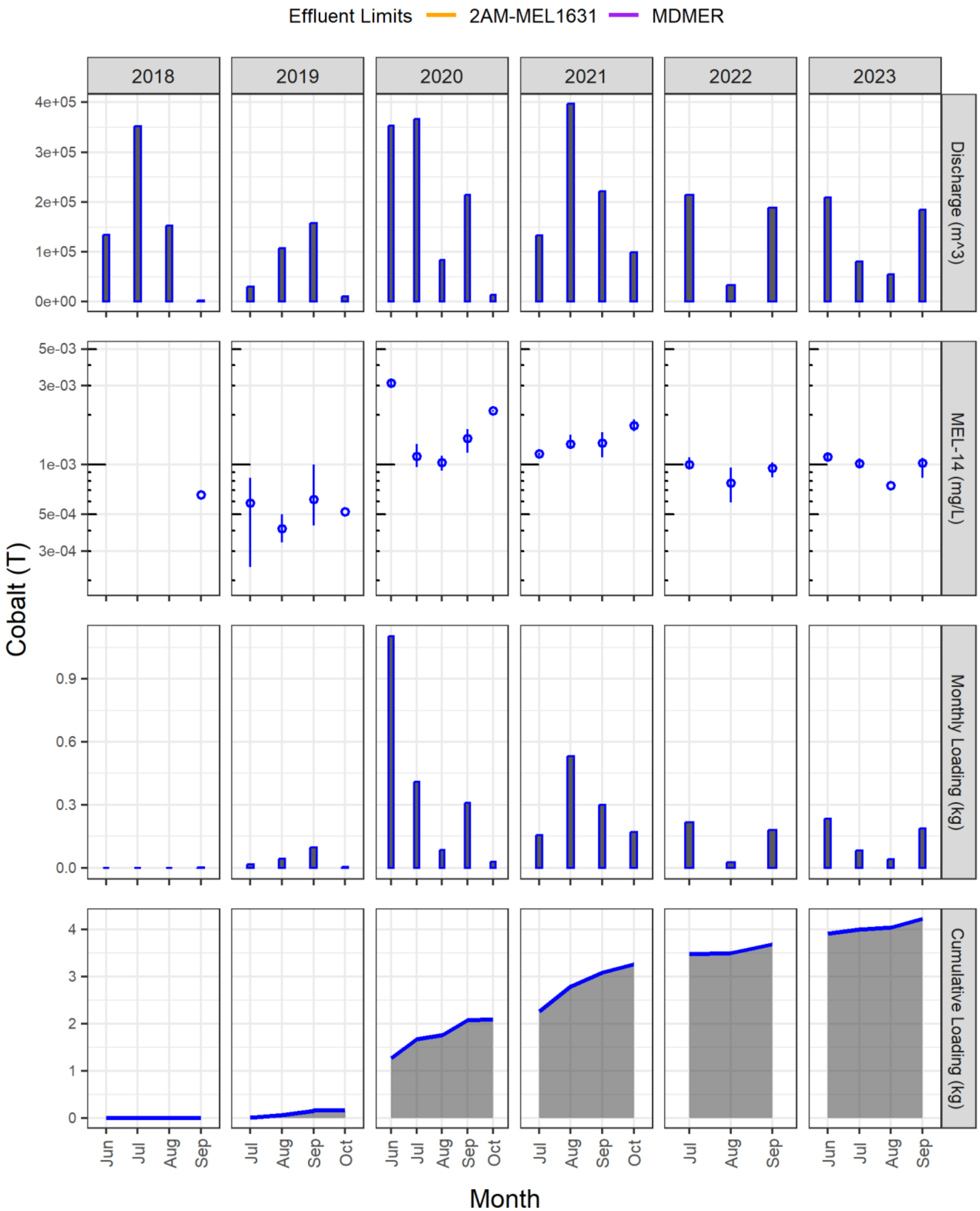


Figure B2-28. Copper

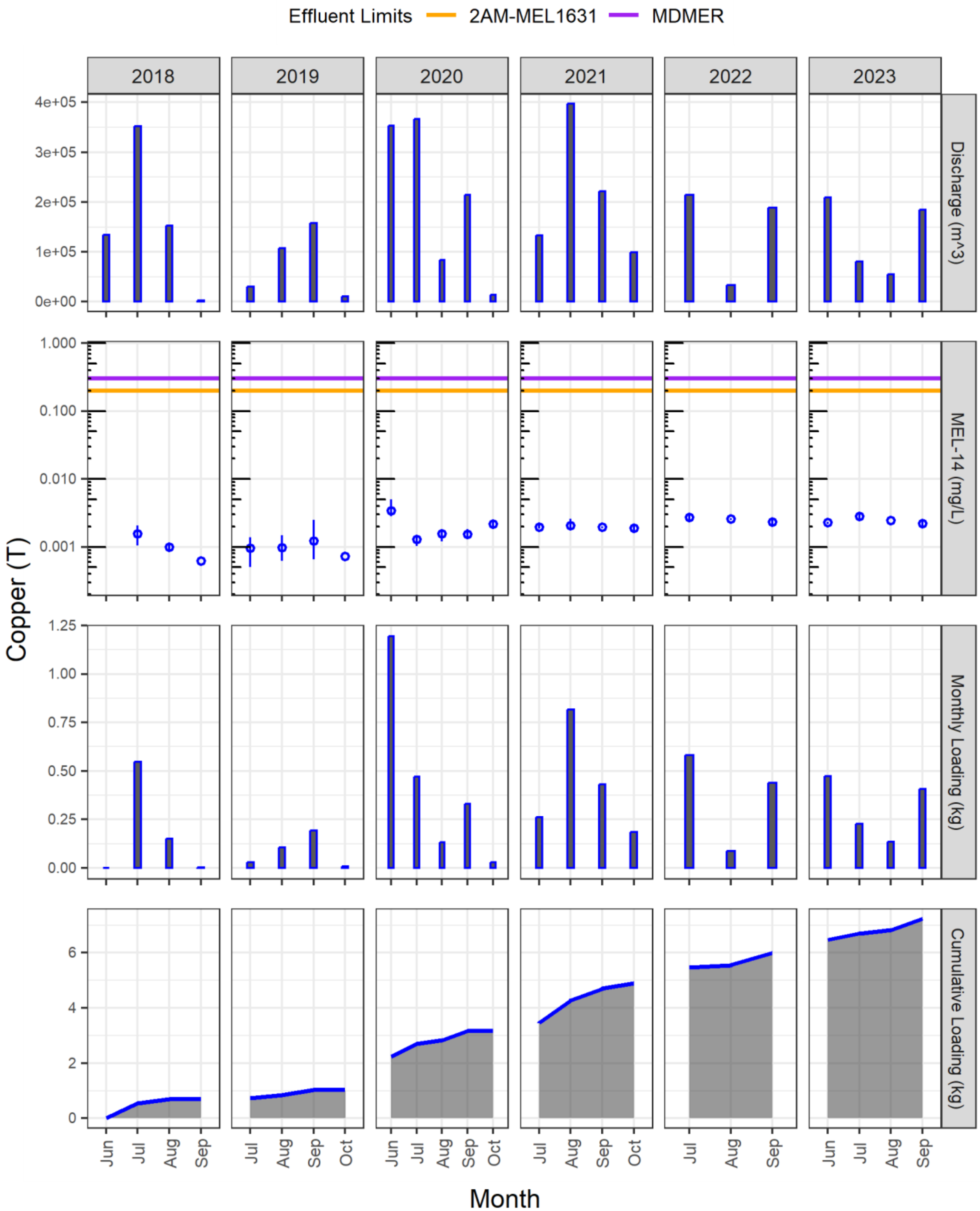


Figure B2-29. Iron

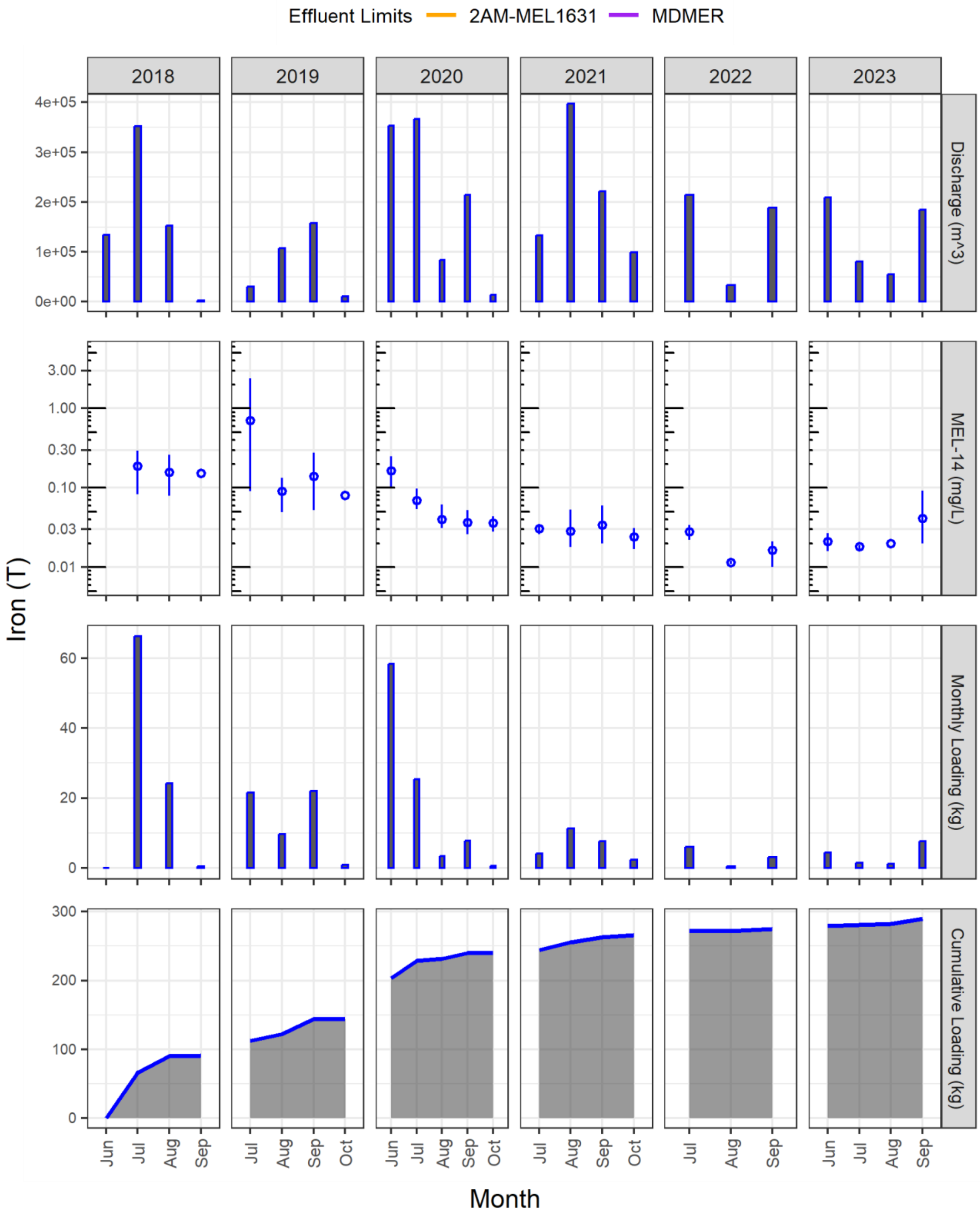


Figure B2-30. Lead

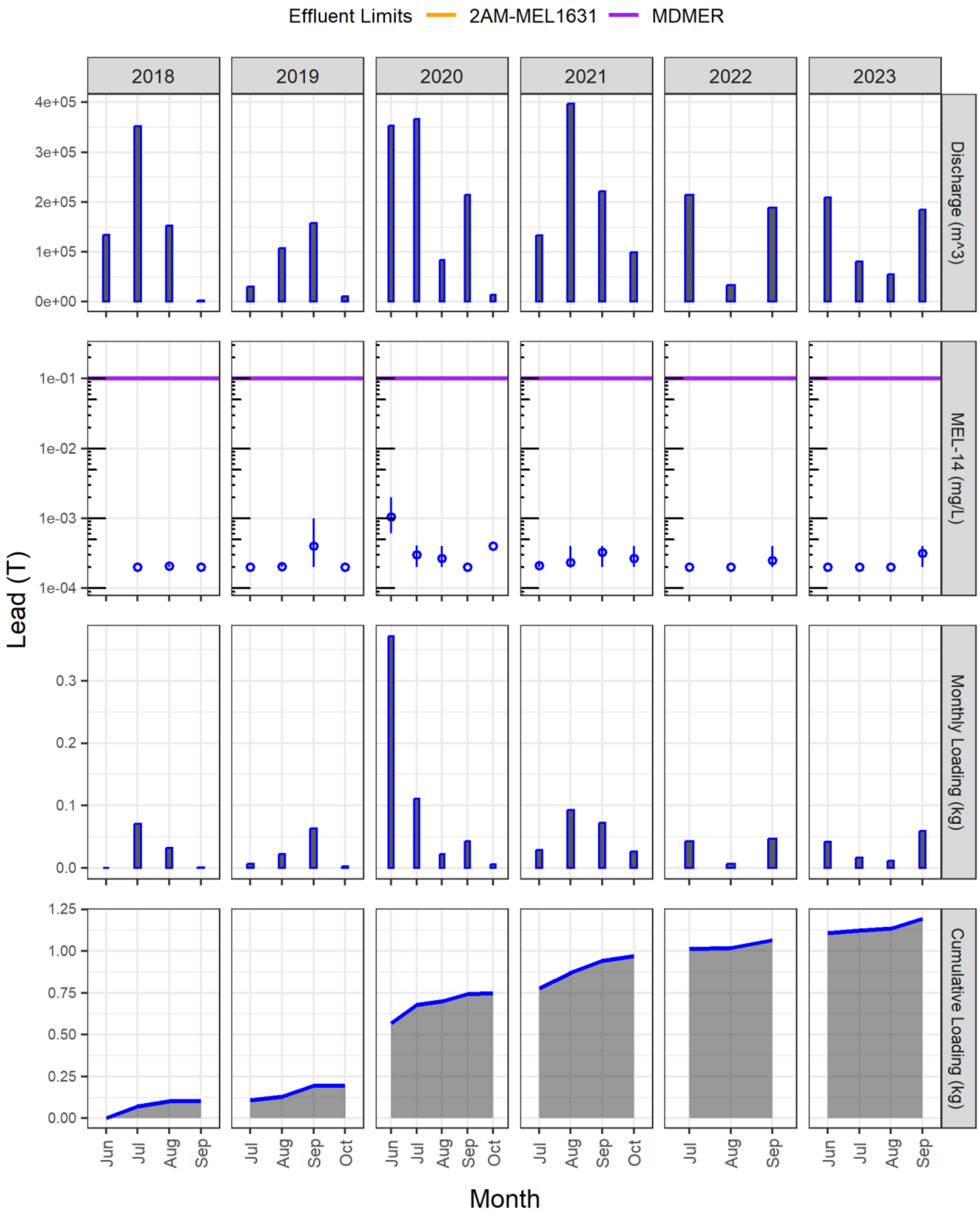


Figure B2-31. Lithium

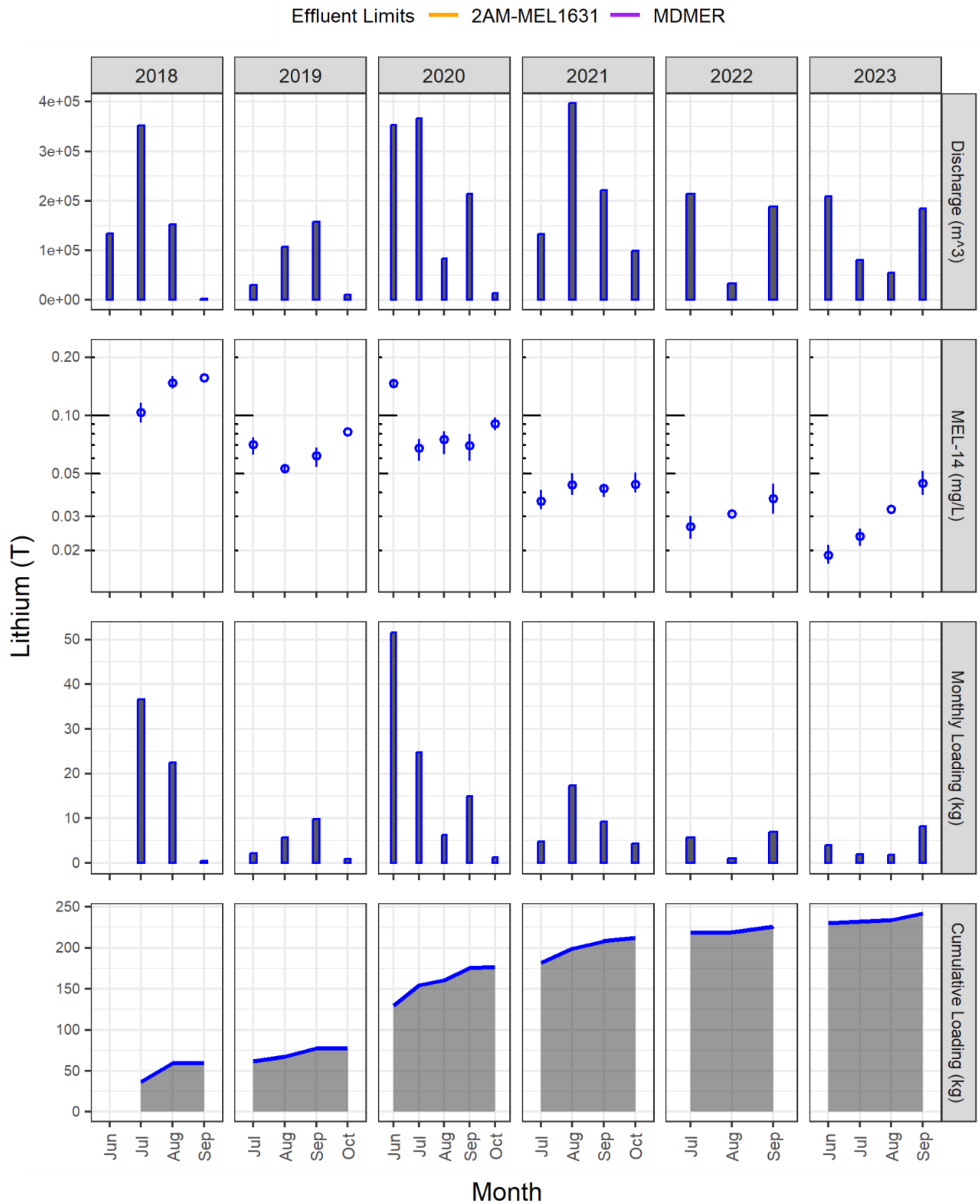


Figure B2-32. Manganese

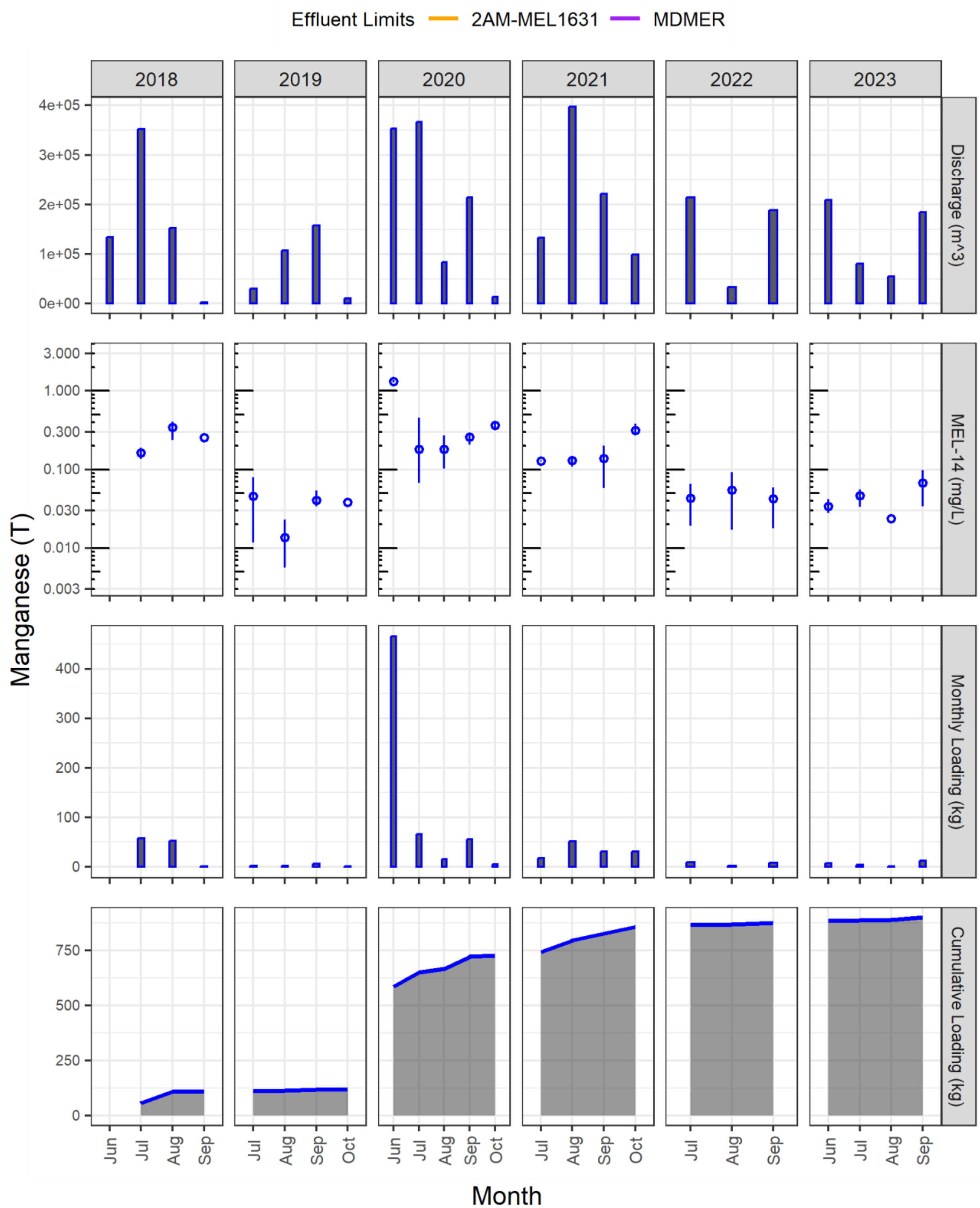


Figure B2-33. Mercury

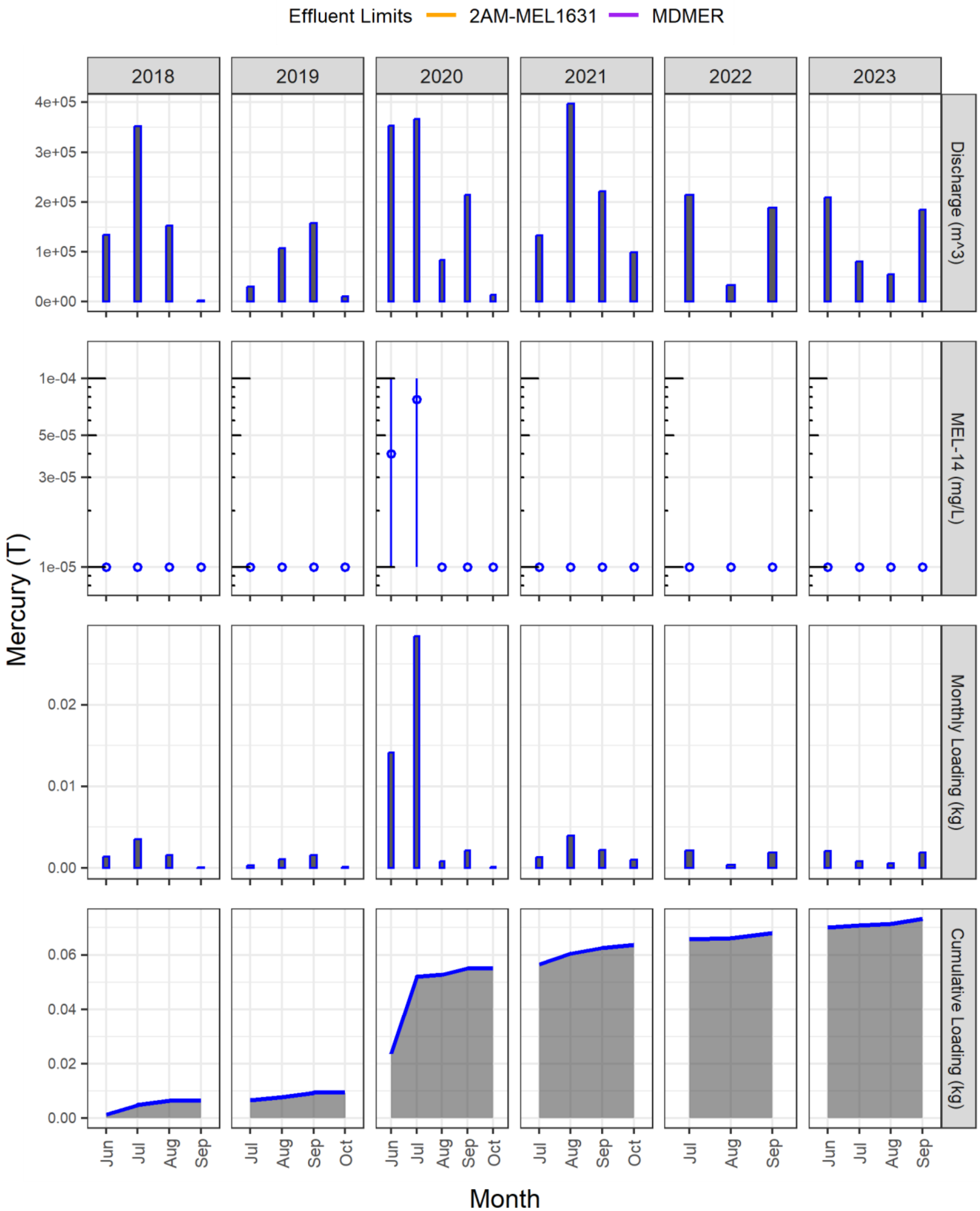


Figure B2-34. Molybdenum

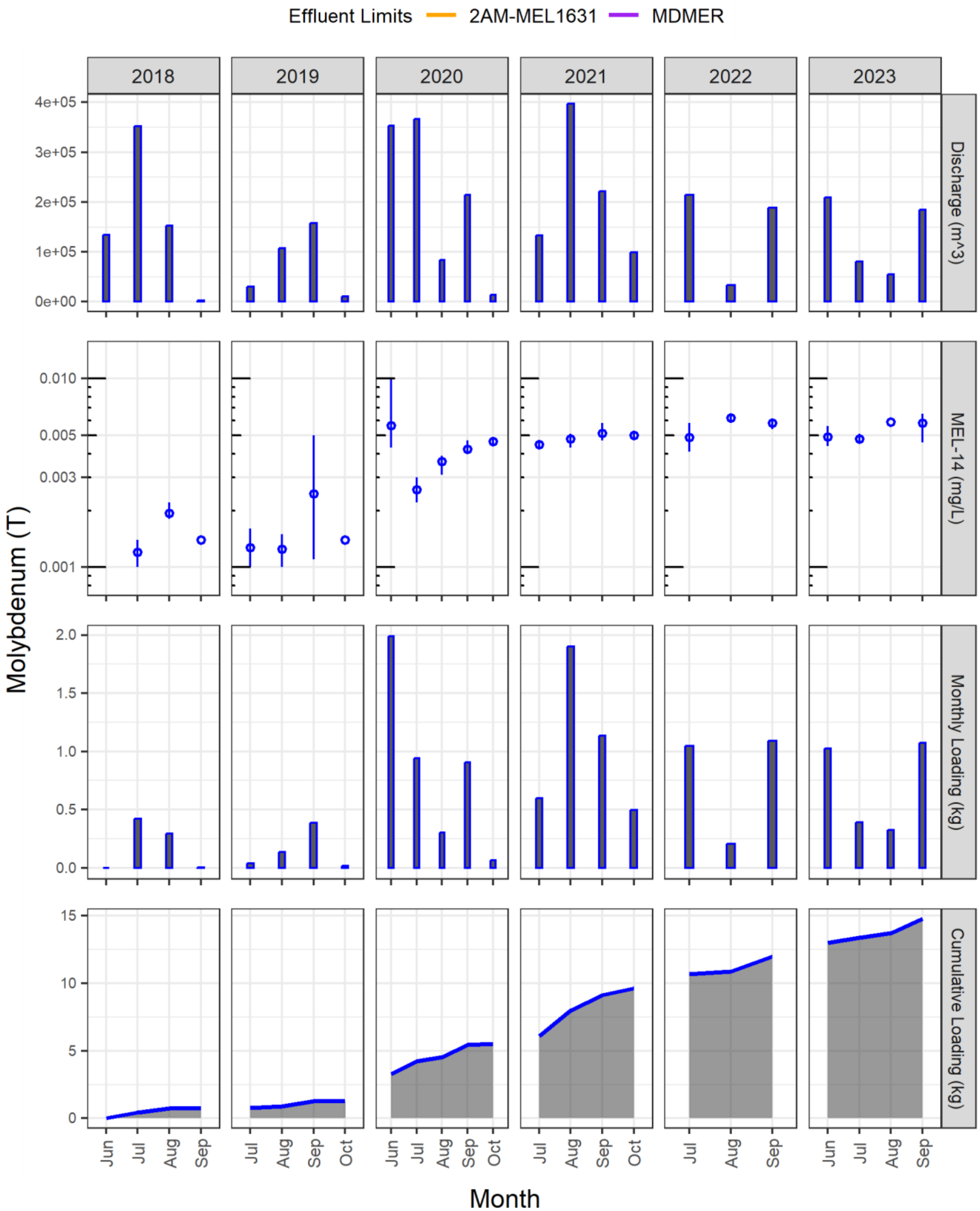


Figure B2-35. Nickel

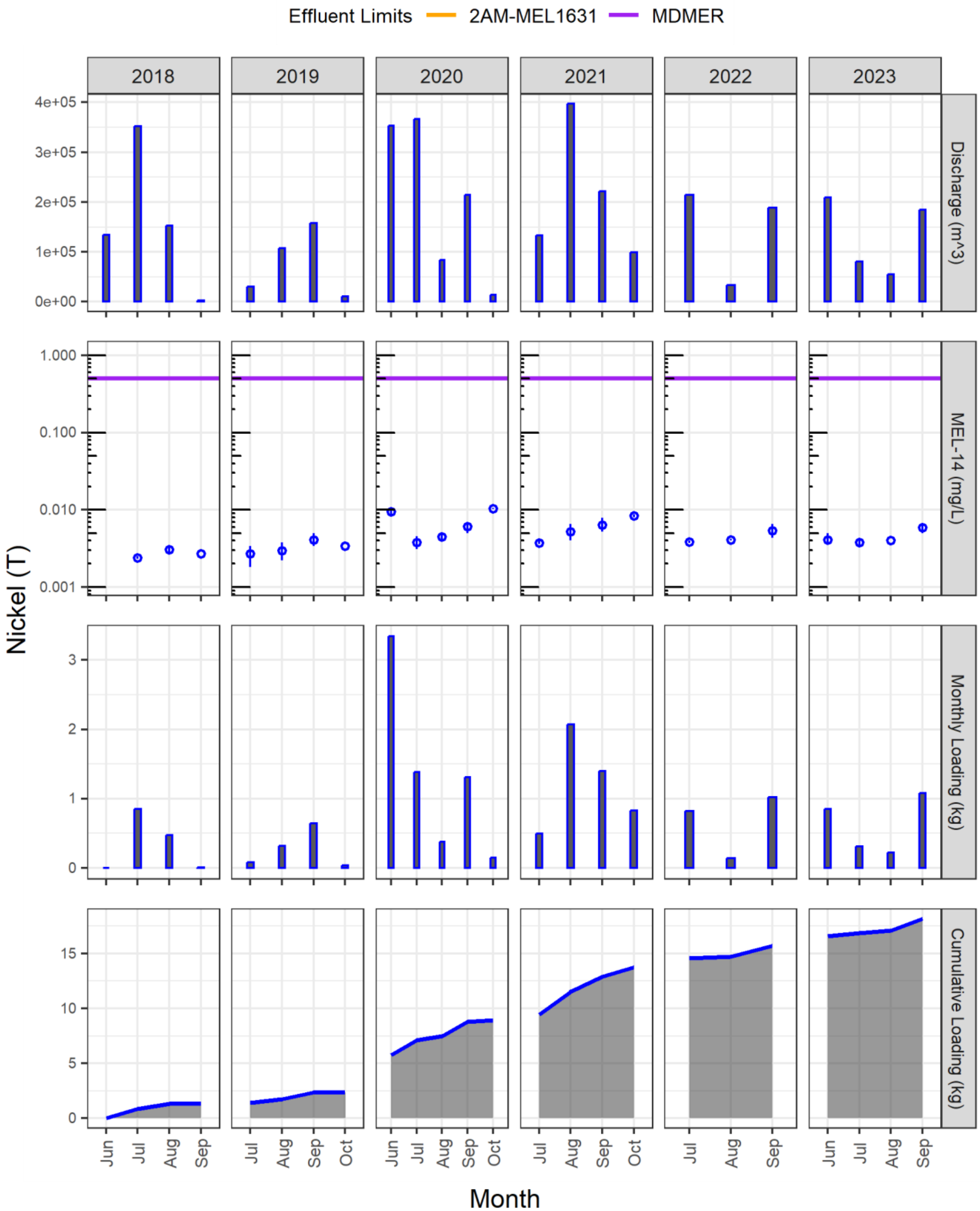


Figure B2-36. Selenium

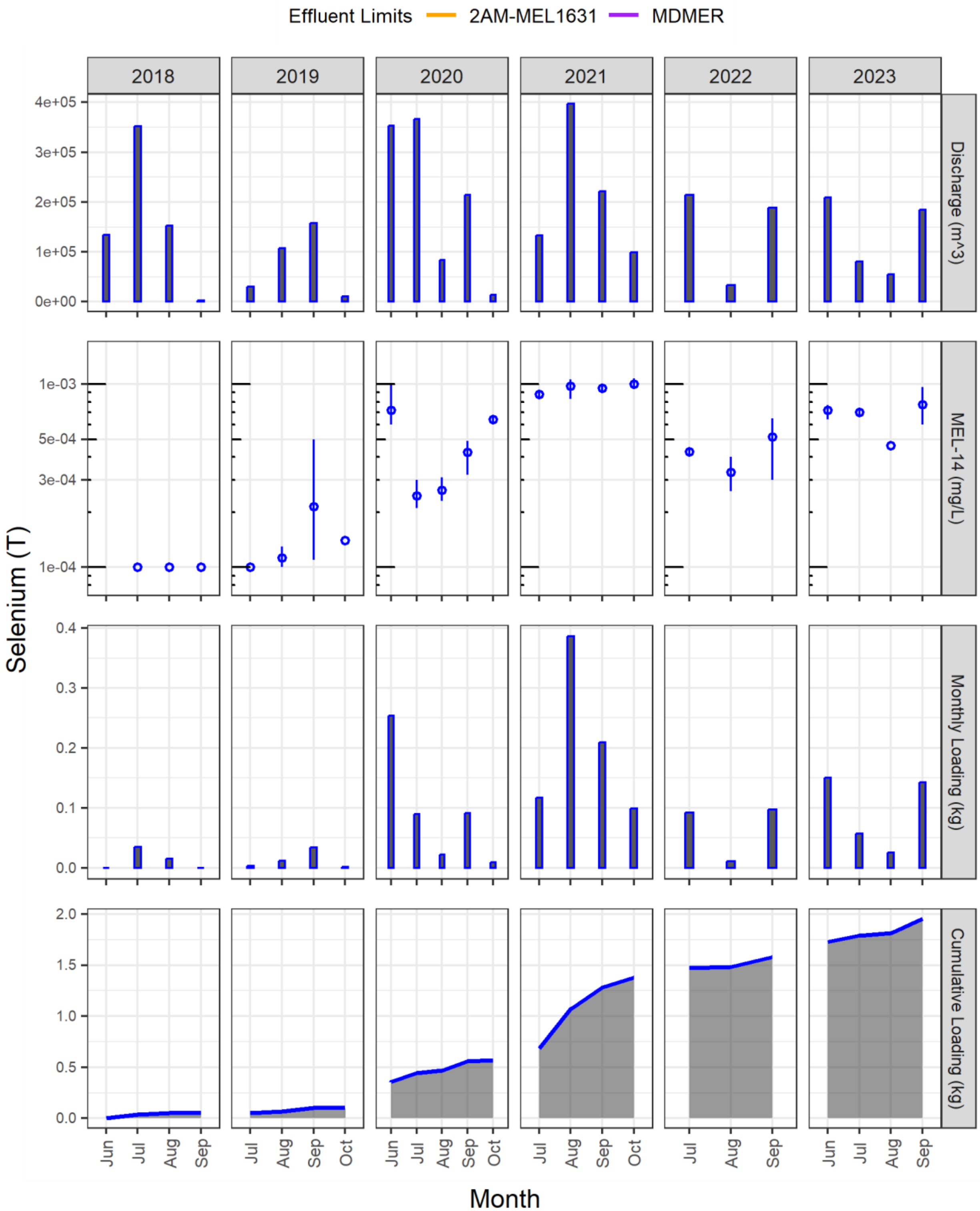


Figure B2-37. Silicon

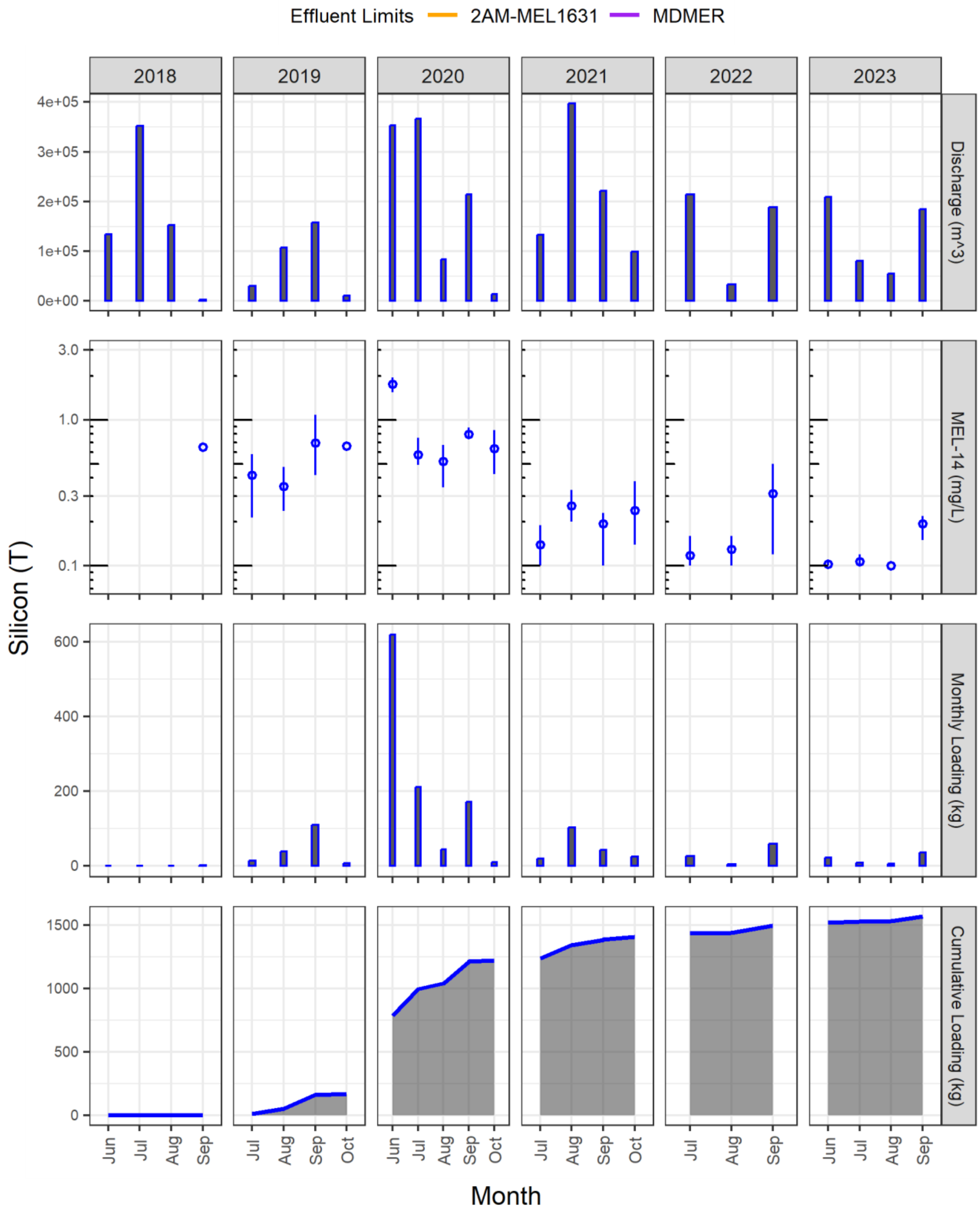


Figure B2-38. Silver

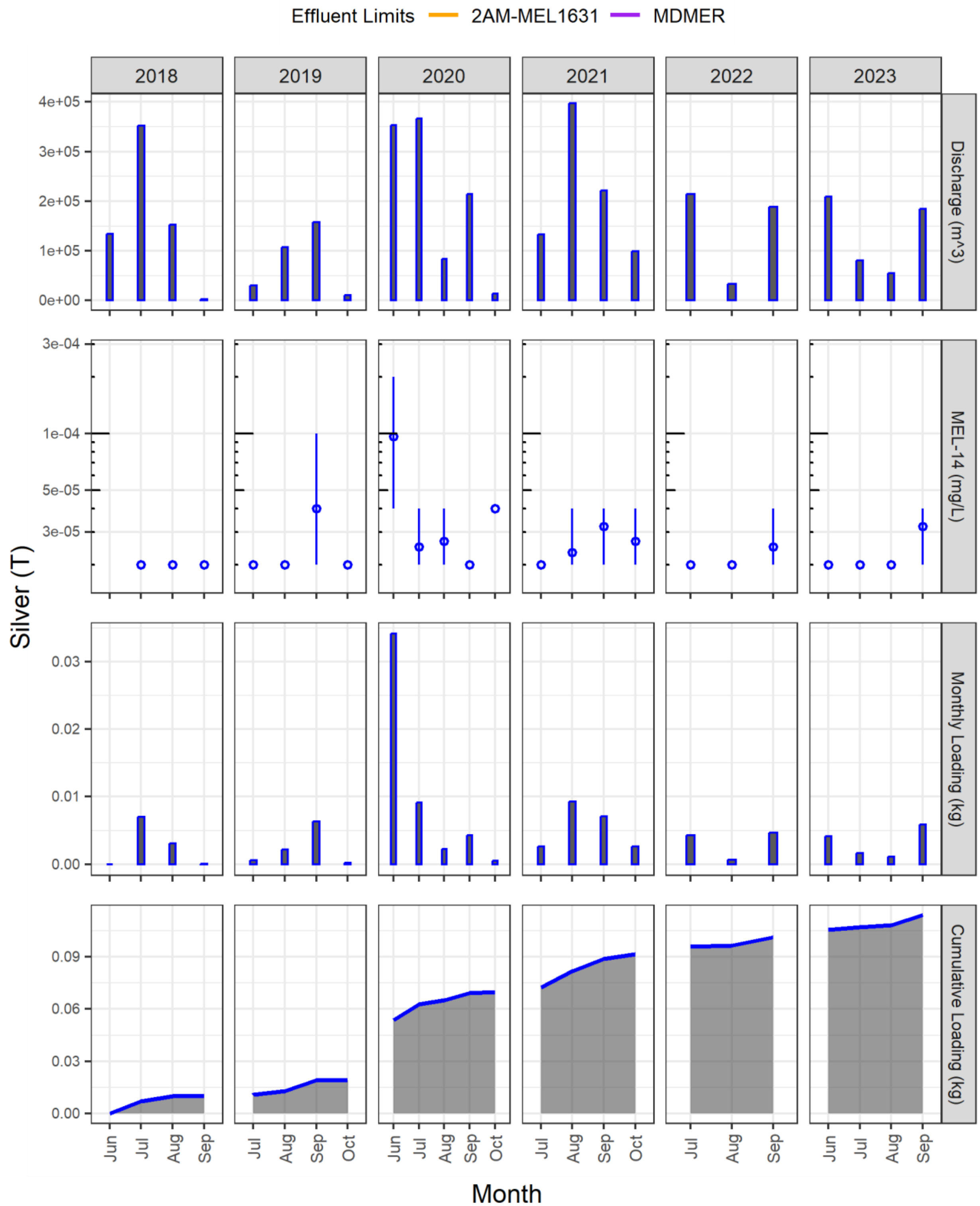


Figure B2-39. Strontium

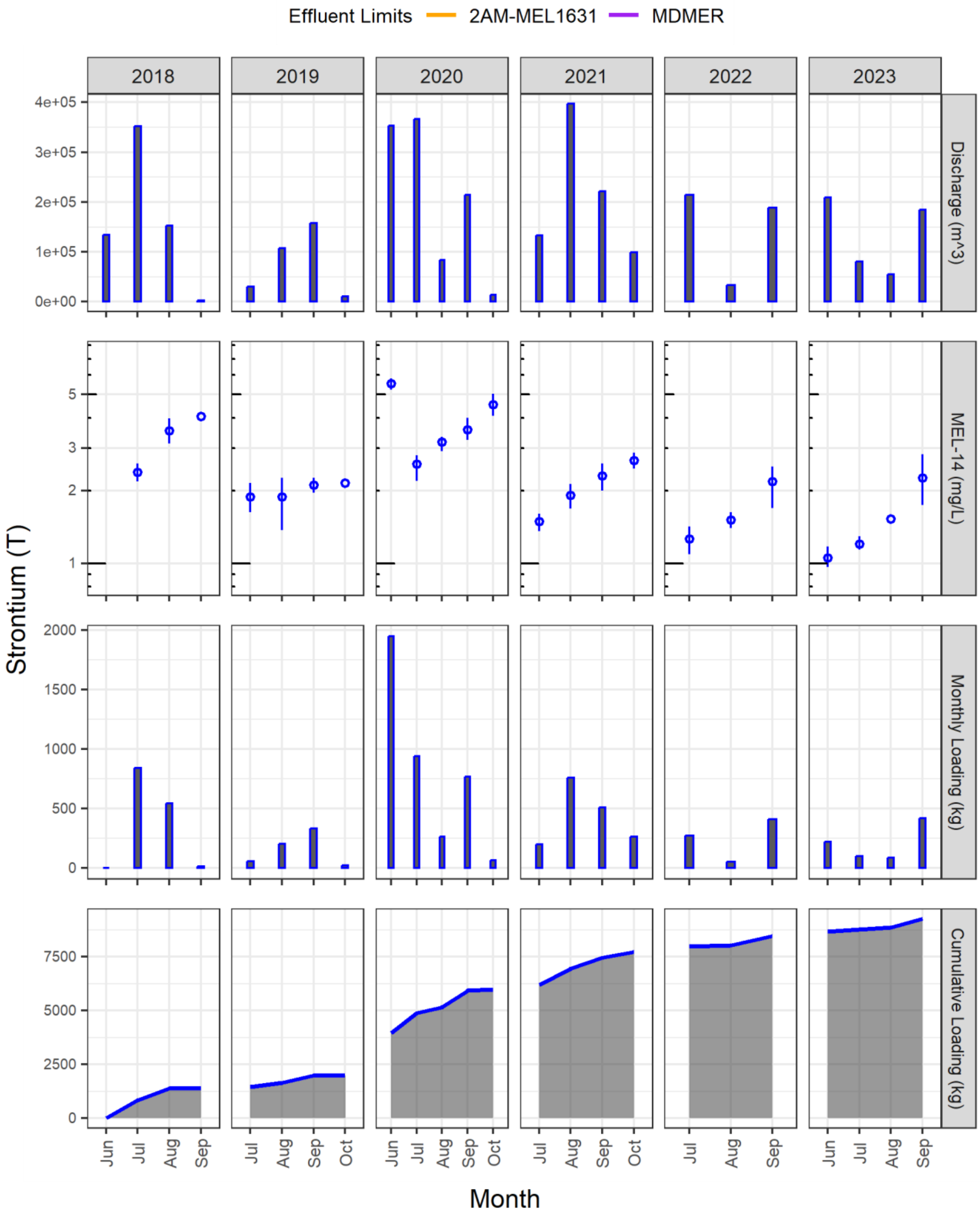


Figure B2-40. Thallium

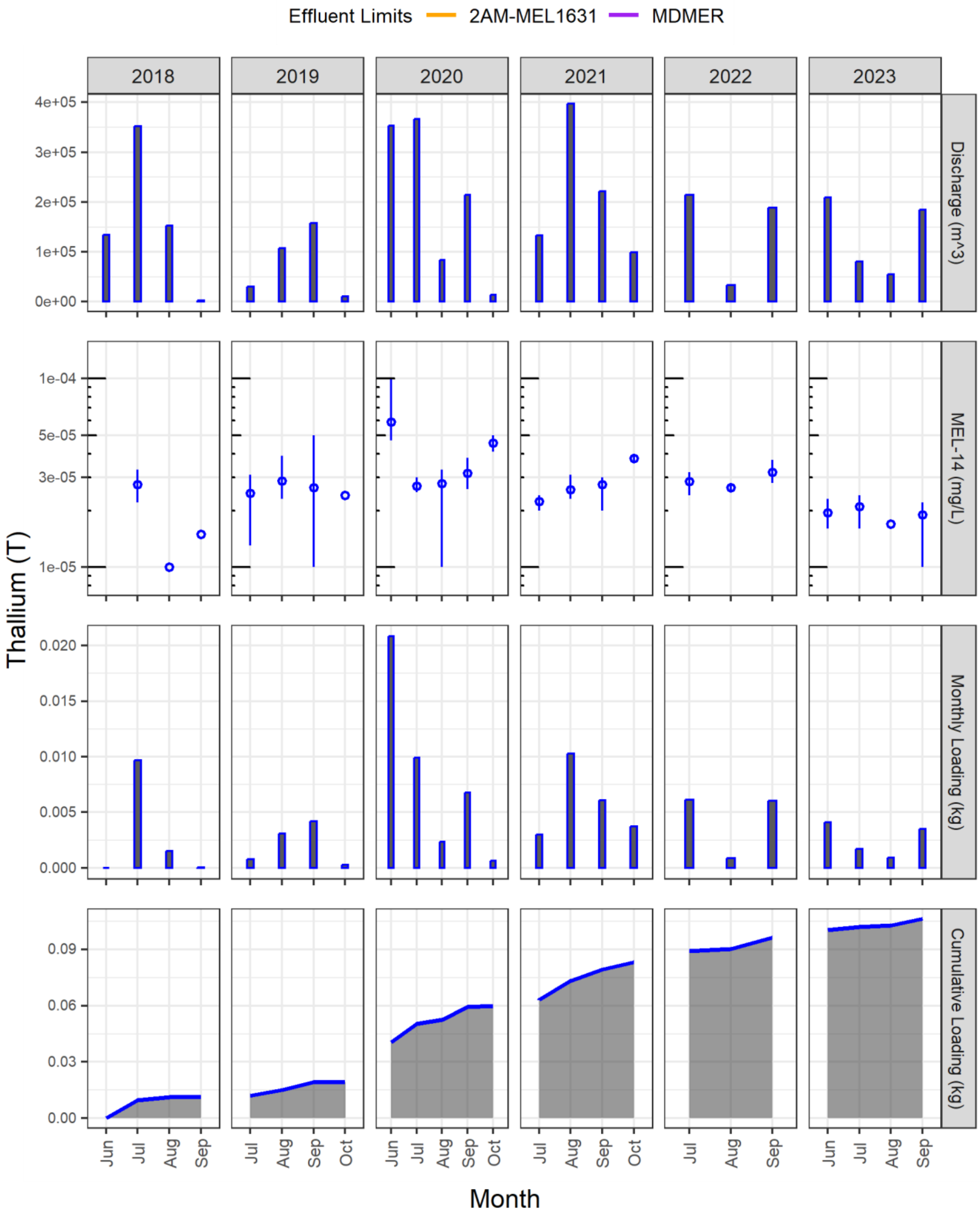


Figure B2-41. Tin

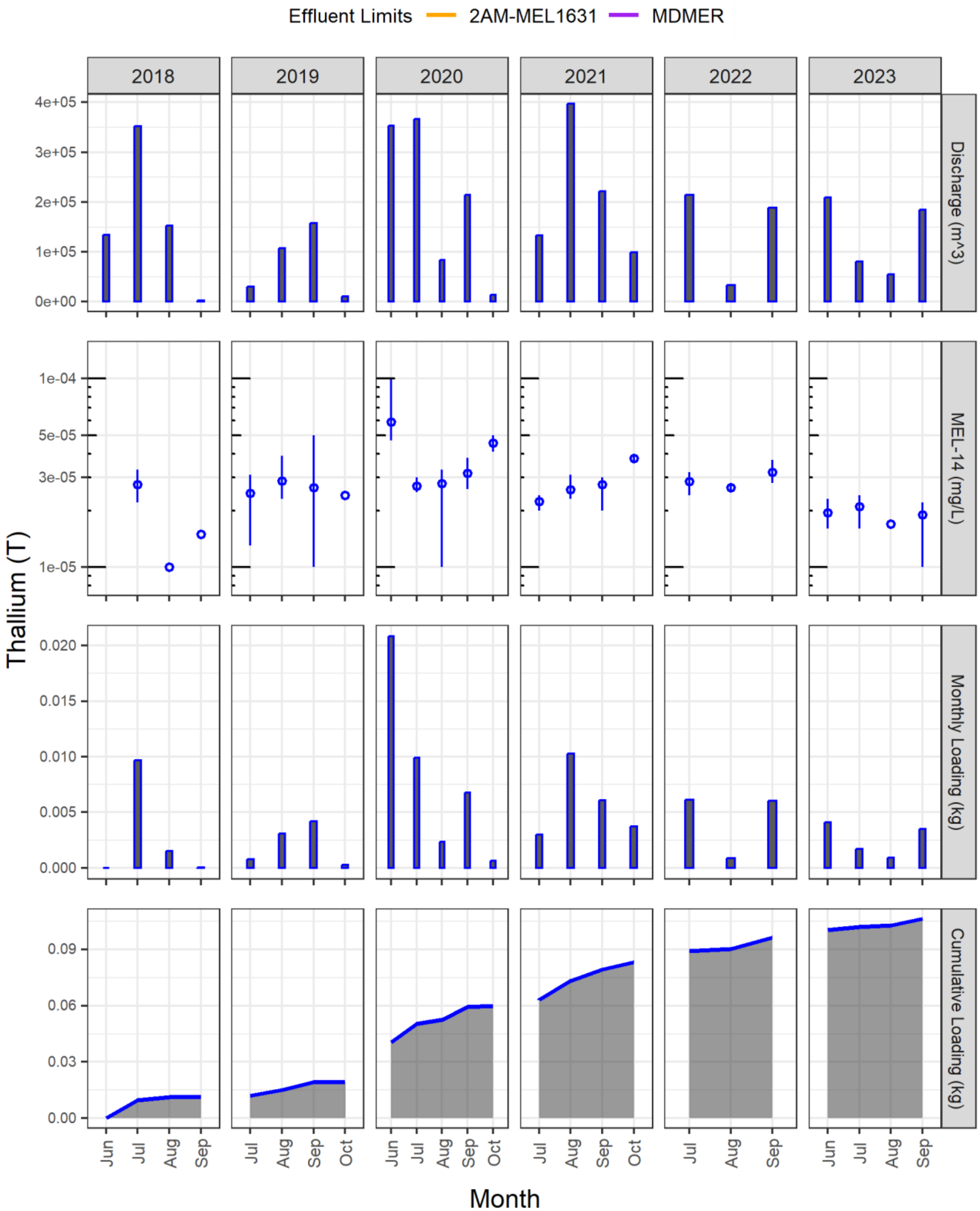


Figure B2-42. Titanium

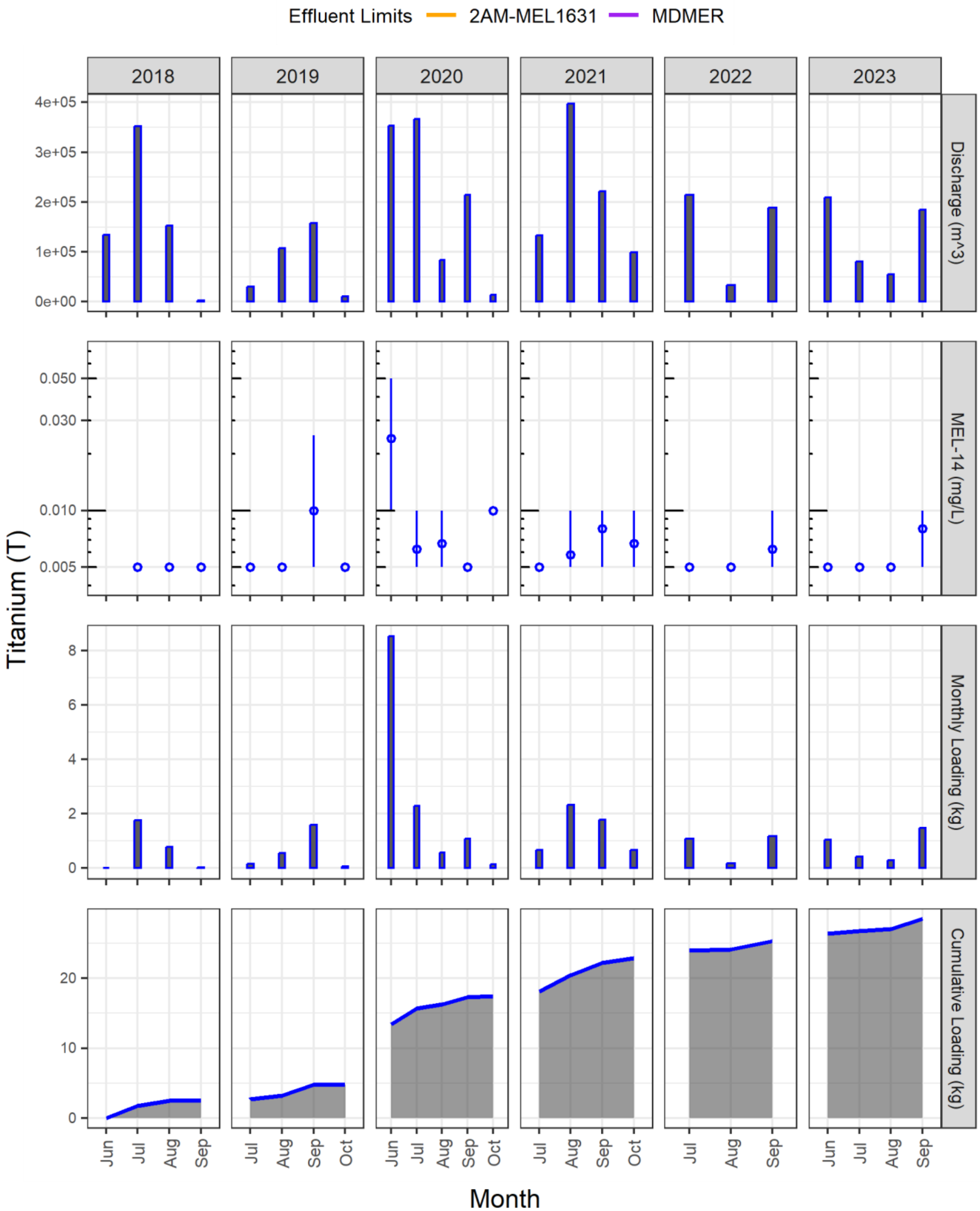


Figure B2-43. Uranium

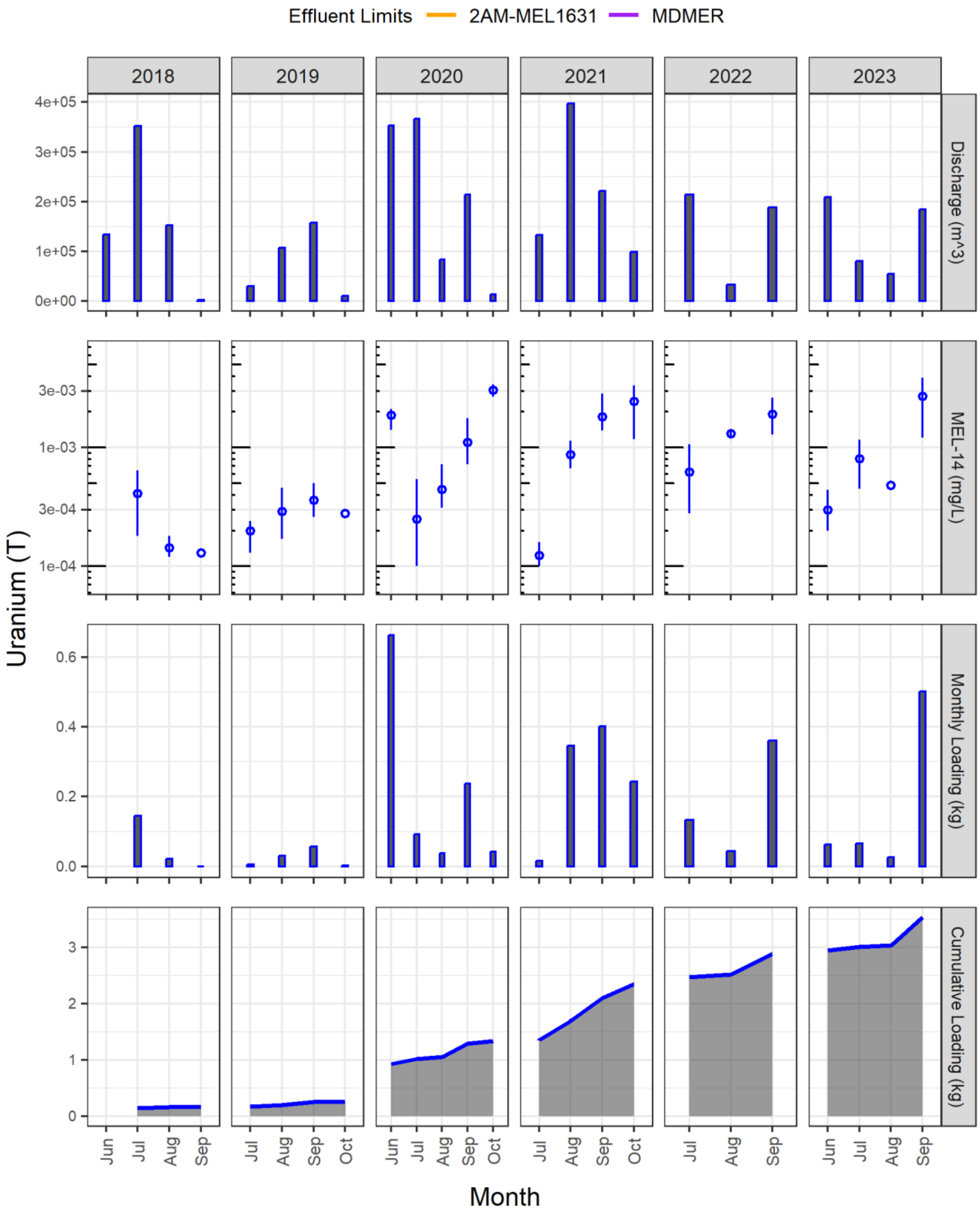


Figure B2-44. Vanadium

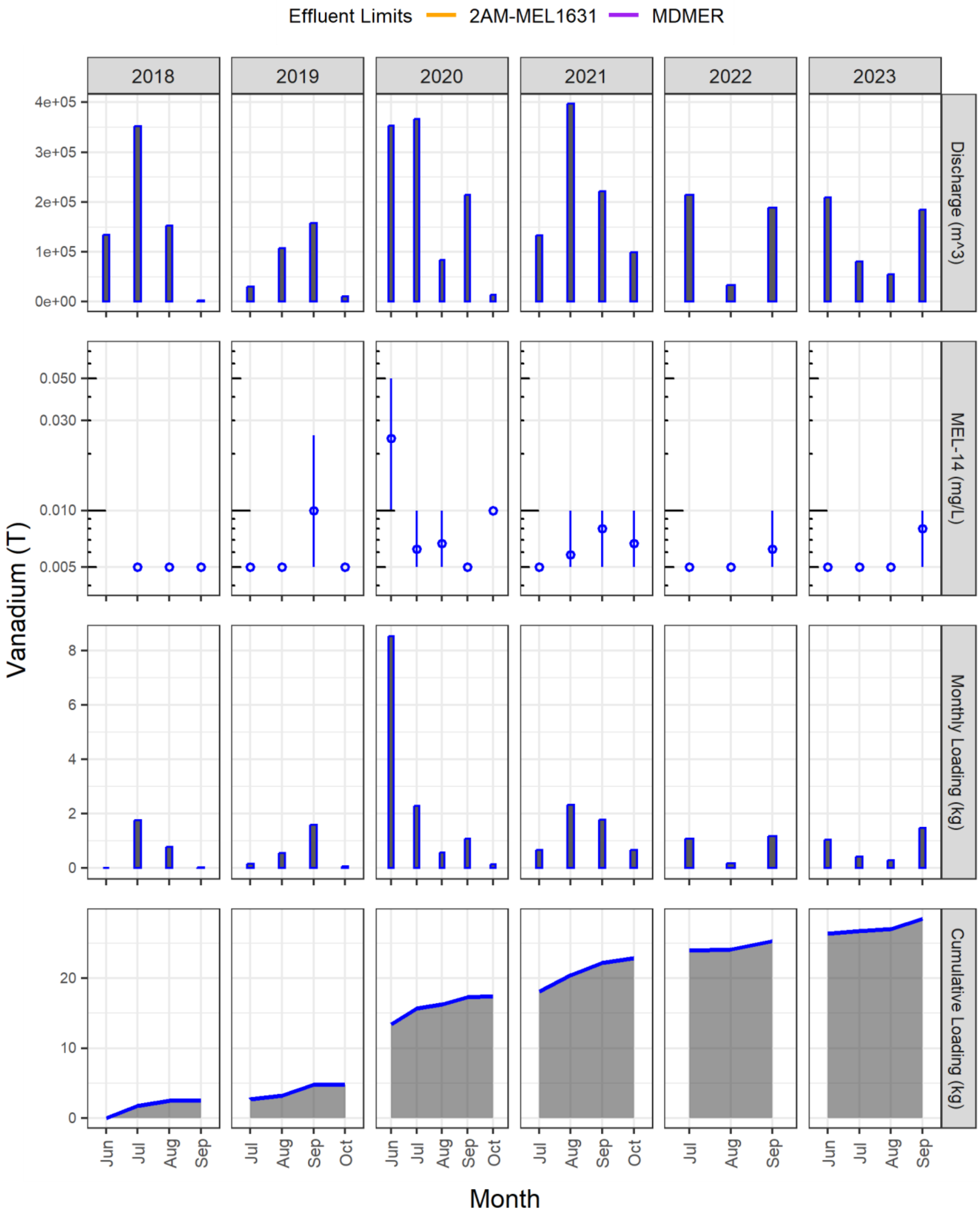


Figure B2-45. Zinc

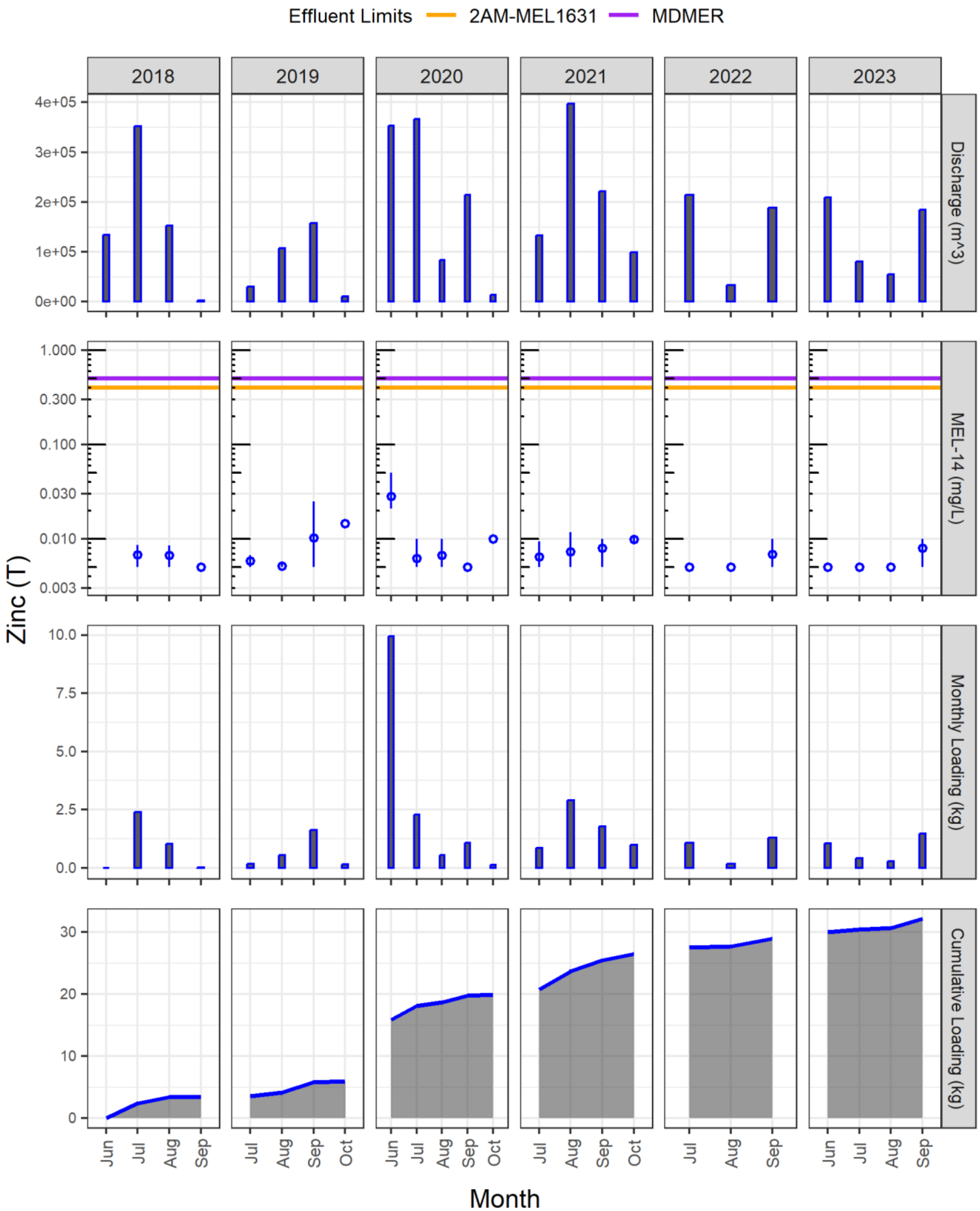


Figure B2-46. Zirconium

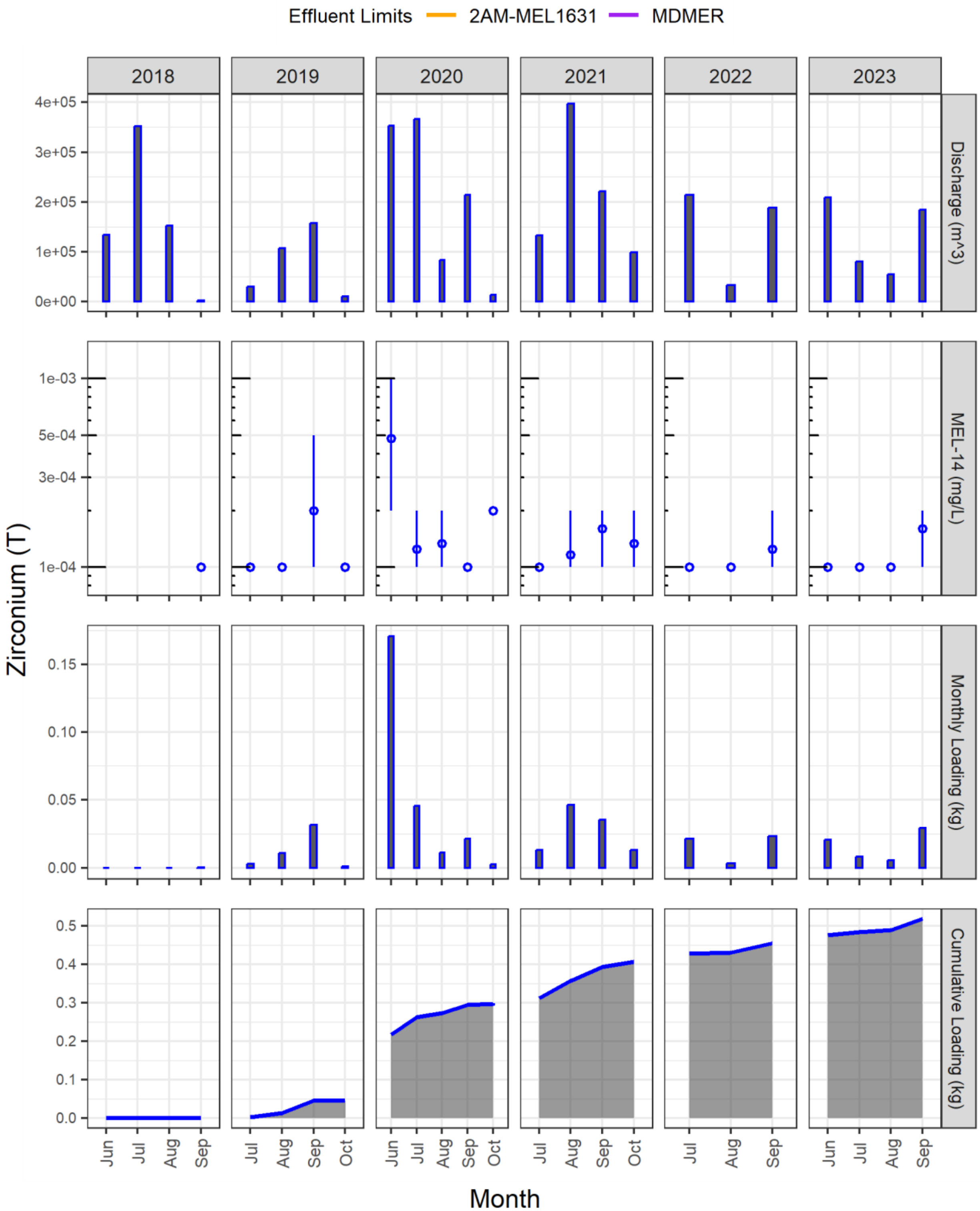


Figure B2-47. Cyanide (Free)

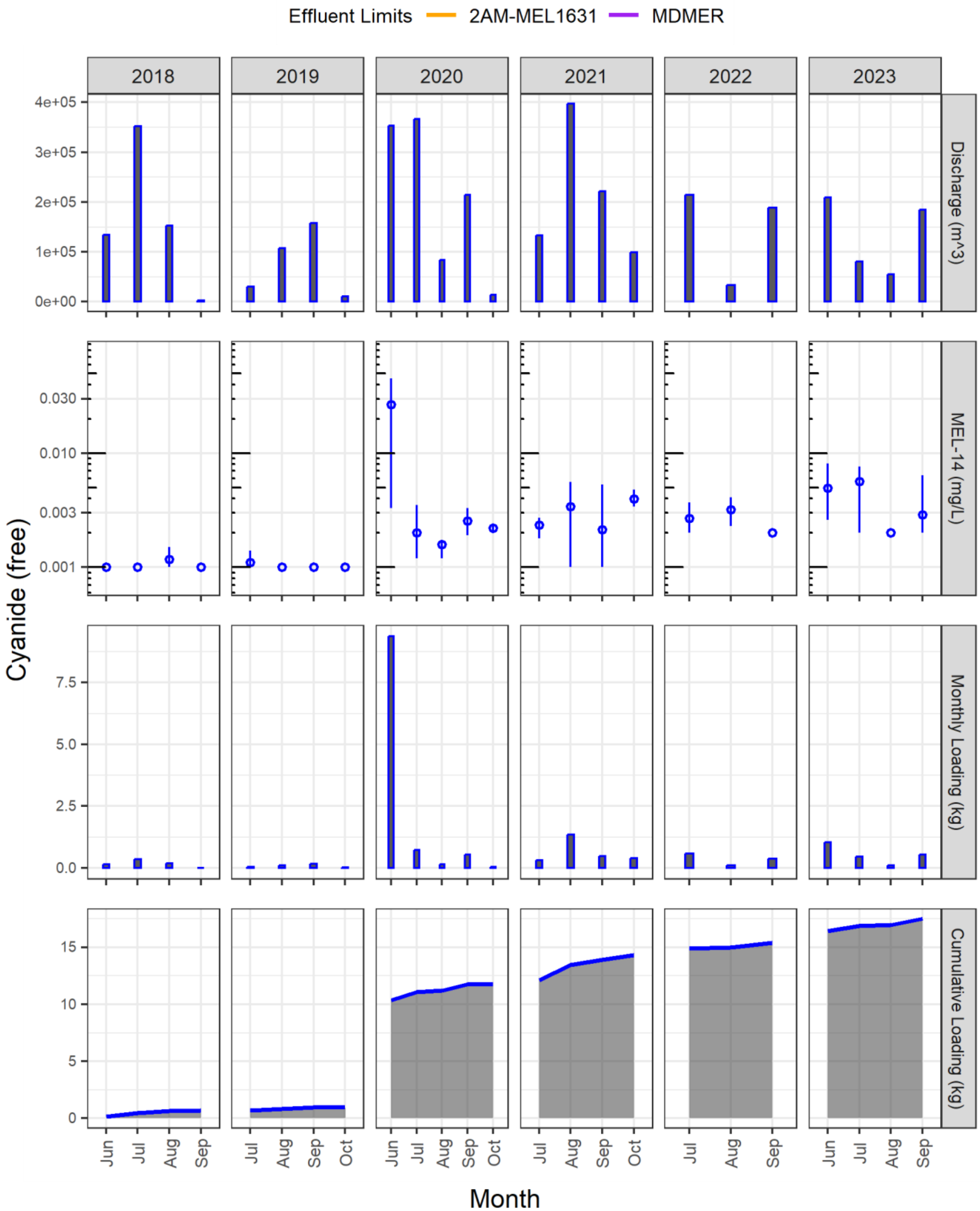


Figure B2-48. Cyanide (Total)

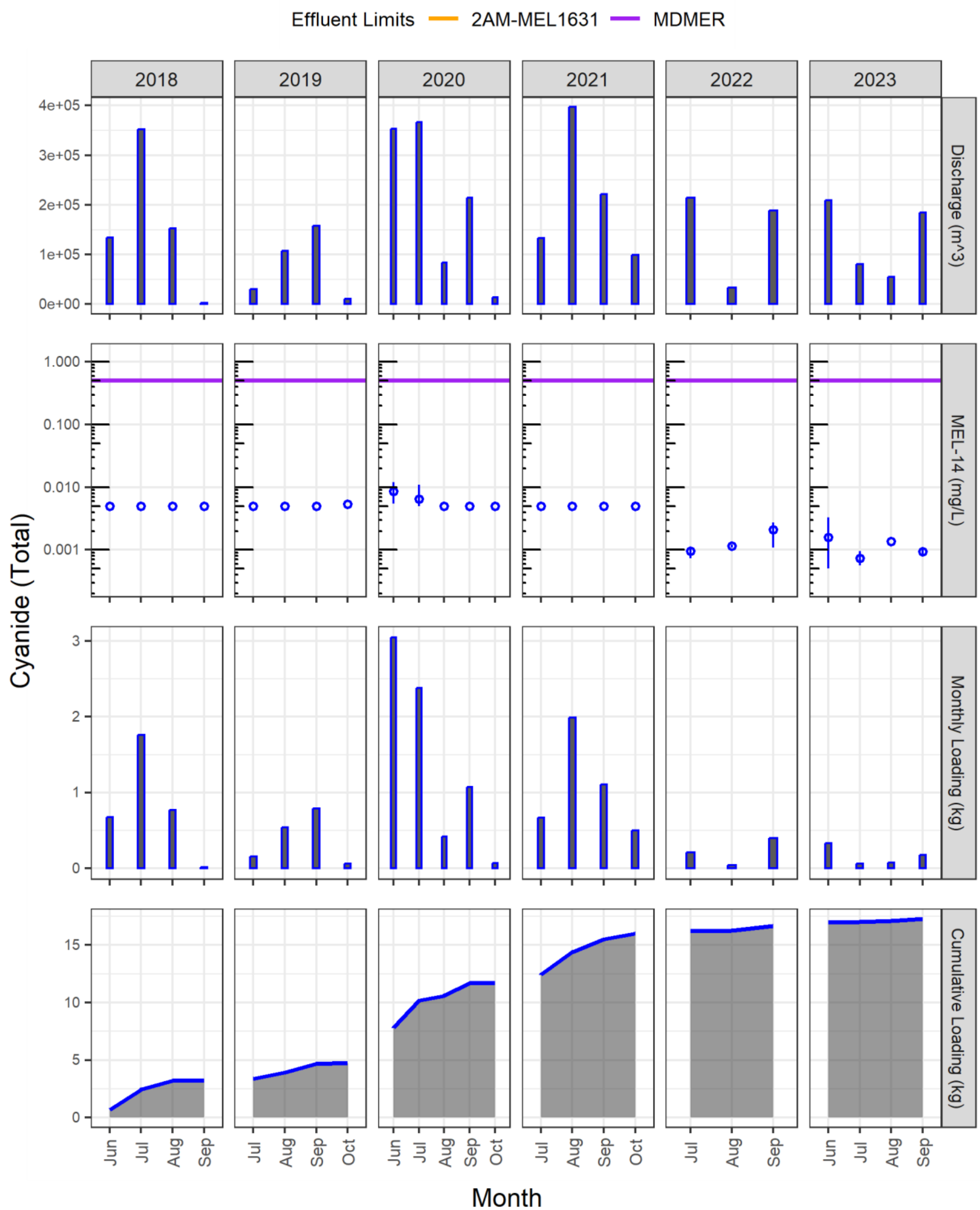


Figure B2-49. Radium-226