Oil Sands Monitoring – Technical Report

Accumulated State of Water Quality in Expanded Geographical Area

Tributaries: Birch, McIvor, Buckton, and Richardson rivers, 2011-2021

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OIL SANDS MONITORING PROGRAM

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Accumulated State of Water Quality in Expanded Geographical Area Tributaries

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Executive Summary

In 2011, the Governments of Canada and Alberta developed the Joint Oil Sands Monitoring (JOSM, now Oil Sands Monitoring (OSM) plan. The main goal was to generate information that would allow for the accurate description of both baseline physical and chemical environmental conditions, as well as ecosystem structure and function (Environment Canada and Alberta Environment, 2012). Prior to JOSM, there were only four long term monitoring sites in the major rivers of the Peace-Athabasca Delta (PAD): Athabasca (2), Slave (1), and Peace (1) Rivers. Through JOSM, seven water quality (WQ) sites were added, including five tributary sites the Birch River (BI1), Upper Buckton Creek (BU1), Lower Buckton Creek (BU2), the outlet of Richardson River (RI1), and the McIvor River (MI1). Several technical reports on various aspects of the oil sands and surrounding region were produced in 2018. One of the reports focused on the surface water quality of waterbodies in and near the oil sands mining region of the Lower Athabasca River (LAR), Slave River (SR), Peace River (PR), and the PAD (Glozier et al., 2018). Much of the focus of this report was placed on the mainstem sites in the region, due to the limited data available at the time for the 5 tributary sites. However, Glozier et al. reported significant differences observed in the mean concentrations of parameter groups between these PAD tributary sites. The report also noted extreme values that would require continued data collection to determine if they fell outside the range of natural variability. Since the 2018 reporting period, ongoing monitoring has produced more data for these new sites whereby more detailed analysis of the water quality conditions can now be undertaken. The objective of this report is to provide an update on the water quality conditions of the 5 Expanded Geographic Area (EGA) tributary sites and to evaluate the sampling program and results in terms of whether sufficient information is available to establish accumulated state as follows:

1. Inventory and review sampling frequency achieved at sites across years and seasons.
2. Compare WQ results from the previous reporting period (Glozier et al., 2018)
3. Provide updated summary statistics for all parameters (Appendix A)
4. For the subset of parameters reported previously in Glozier et al., (2018),
   a. Review patterns in seasonality (box plots) and data distribution (rain cloud plots)
   b. Review cumulative mean and median plots to assess if there is sufficient data to establish accumulated state against which future change can be assessed.
   c. Provide updated summary statistics for the subset of parameters as proposed accumulated state for open water period (Appendix B)
5. Determine statistical power for select parameters with the samples to date.

The 2012-2021 data set provides a greater number of samples (n=241) compared to the previous (n=72) analysis as well as an additional 6 years of sampling. Clear differences in mean concentrations observed between past and present timeframes highlights the importance of this increase in sample size and timeframe to characterizing the WQ at these sites. Summary of samples and allocation across years and seasons have been provided. Consistent open water sampling was achieved; however, winter sampling was a challenge for several sites. Except for the winter seasons at BI1 and MC1, all sites have within season sampling numbers that exceed the minimum values (8-10) suggested before any statistical test (USEPA, 2009). Summary statistics have been provided for all parameters (Appendix A), while investigation of other data characteristics was performed on a subset of representative parameters. Patterns in seasonality and data distribution characteristics are provided to better understand the natural variability inherent in these tributary basins which is important for the design of future monitoring programs. The power analysis revealed that, with a few exceptions, each parameter has sample numbers that allow for the detection of statistically significant results with 80% power. Finally, the cumulative mean and median graphs demonstrate that there have been sufficient samples collected across a range of 9 years, presumably with a range of water level conditions to establish current accumulated state. Several parameters appear to be showing increasing or decreasing trends, but this was not confirmed with statistical analyses.

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1. Introduction

In 2011, the Government of Canada and Alberta developed the Joint Oil Sands Monitoring (JOSM) plan. A primary goal was to generate information that would allow for the accurate description of current conditions of water quality, as well as ecosystem structure and function (Culp et al., 2018). Several technical reports on various aspects of the oil sands and surrounding region were produced in 2018. One of the reports focused on the surface water quality of waterbodies in and near the oil sands mining region of the Lower Athabasca River (LAR), Slave River (SR), Peace River (PR), and the Peace-Athabasca Delta (PAD) (Glozier et al., 2018). Glozier et al. (2018) focused on the spatial and temporal patterns of water quality (WQ), with much focus placed on the mainstem sites in the region as these sites had the most data available. Prior to JOSM, there were only four long term monitoring sites in the major rivers of the PAD, Athabasca (2), Peace (1) and Slave (1) rivers. Through JOSM (Environment Canada 2011a and 2011b) 7 WQ monitoring sites were added in the PAD area to augment our understanding of sources and loadings (5 tributary sites) and to evaluate conditions within the main interconnecting channels (2 sites). Since the 2018 reporting period ongoing monitoring has produced more data for these new sites whereby more detailed analysis of the water quality conditions can now be undertaken.

The focus of this report is to update understanding on the water quality conditions of the 5 tributary sites (Fig. 1, Fig. 2, and Table 1) in the Expanded Geographical Area (EGA) including the Birch River (BI1), Upper Buckton Creek (BU1), Lower Buckton Creek (BU2), the outlet of Richardson River (RI1), and the McIvor River (MI1). Sampling of these 5 sites was paused in 2022 in order to evaluate the knowledge to date and to provide recommendations on future monitoring approaches for these sites. The two interconnecting channels in the PAD, Quatre Fourche on the South Channel to Lake Mamawi (QU1), and Rivière des Rochers (M10), continue to be monitored as key channels transporting mainstem Athabasca River water through the PAD to the confluence with Peace River and are considered part of the mainstem network of sites.

The original rationale of these five EGA tributary sites were similar (Table 1): monitor intensively to characterize reference or accumulated state (Environment Canada 2011b) for these basins, and to provide estimates of loadings for parameters of concern to Lake Claire and the PAD. The sampling frequency was proposed to be monthly/bimonthly, and event based during the initial sampling years and then transition to seasonal, or response based, depending on monitoring results and new or emerging stressors. The two sites on Buckton Creek were also planned as Before-After-Control-Impact (BACI) locations because at the time a new operation was proposed for development within the basin. Although several different media were to be included in the implementation of these stations including water quality, sediment quality, passive sampling, new hydromet stations, along with fish and benthic macroinvertebrate, not all approaches were possible with resources available. The priority was establishing monthly water quality sampling. Fish and benthic macroinvertebrate sampling has been established in several locations including Alice Creek (a tributary to the Birch River) and the McIvor River but not at concurrent with the location of the established WQ stations.

While limited data was available for the five tributary sites at the time of the 2018 Glozier et al. report, there were some significant differences observed in the mean concentrations between these sites. Differences were observed among all parameter groups (i.e., major ions, nutrients, and metals) but varied between parameters. Principal component analysis also revealed that there were distinct ionic differences between sites and found more similarity in WQ at sites that were closer together. The report also noted that there were extreme values that may have been outliers, but to confirm if these outliers were within natural variability more data collection would be required. As indicated above, with limited number of samples collected reference/accumulated state could not be established. The United States Environmental Protection Agency recommends a minimum of 8 to 10 independent background observations within a grouping (e.g., season) before running any statistical tests (USEPA, 2009).

Finally, a note on terminology for this reporting. Although definitions of “baseline” remain under discussion within the OSM program, for consistency within this report we have chosen to refer to the current baseline or current environmental condition as the “Accumulated State”, as defined in the Water Quality Monitoring Plan (Environment Canada, 2011a). Additional terms included in the Environment Canada (2011a) include Reference State (i.e., current environmental condition in pre-defined reference sites) and Historical State (environmental condition under a predevelopment period).

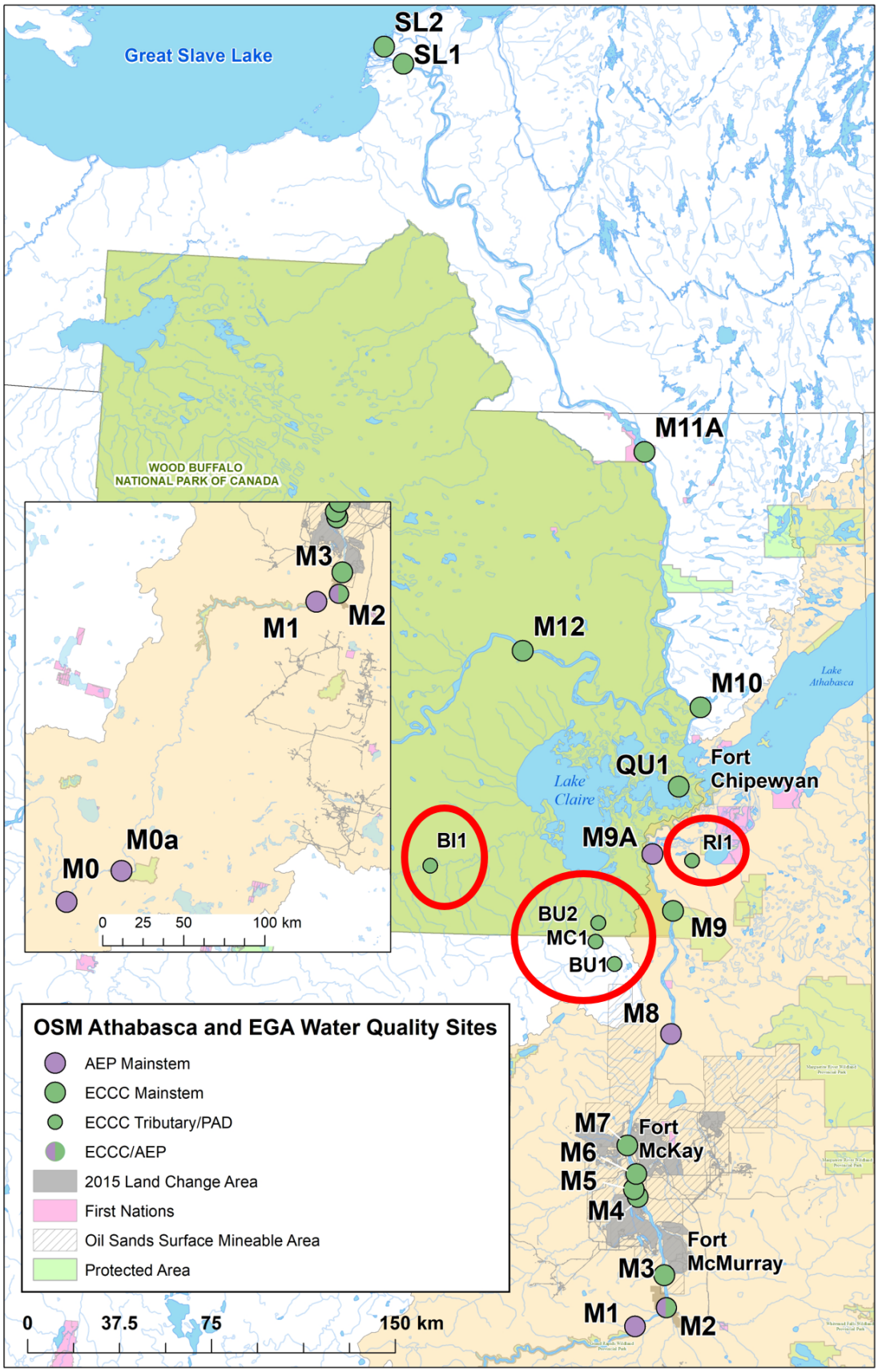


Figure 1. Map of OSM Water Quality sampling sites. The five EGA tributaries sites are within the red circles.

Figure 2. Aerial Pictures of the five OSM tributaries in the EGA flowing into Lake Claire and the PAD.

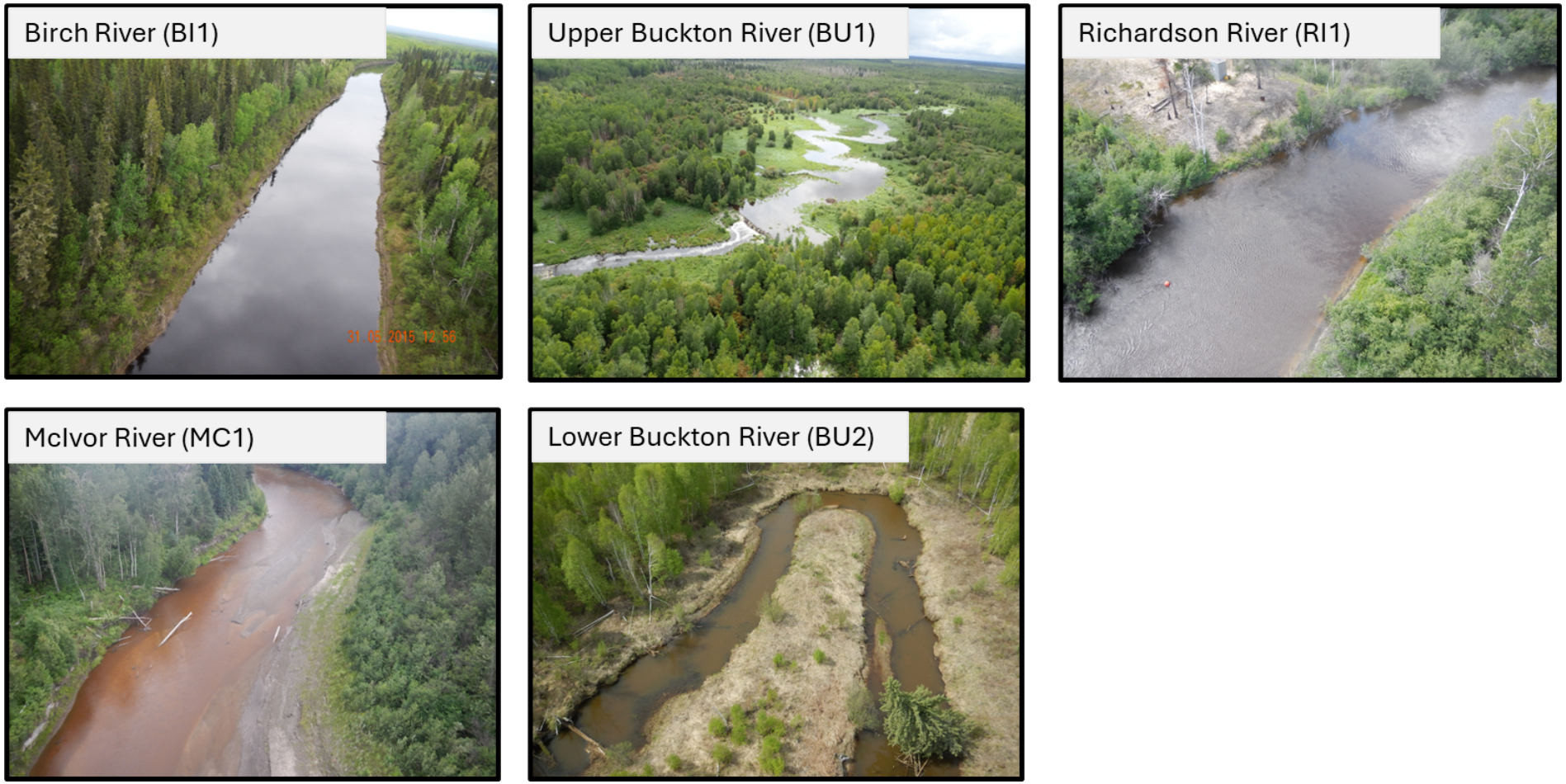


Table 1. Rational of Water Quality and Quantity Monitoring Sites in the Expanded Geographical Area -Phase 2. An excerpt is provided below of relevant information from Table 1, pg. 26 (Environment Canada 2011b) along with new information regarding updated Envirodat Station number and OSM Sampling achieved from 2012-2021 at the EGA Tributary sites**.**

Site	River	Source	Existing Site Linkages and Status in 2011	Sampling Status in 2011	2011 Rationale	2011 Proposed Samping Frequency		2011 Proposed Parameters/ Media		NEW WQ Environdat Station ID	OSM Sampling Achieved 2012 = 2021
						Near Term	Long Term				
BI 1	Birch River	Headwaters originate to the west of Wood Buffalo National Park, smaller tributaries arising in the Birch Mountains contribtue flows to this river	Active Hydrometric WSC 07KE001	1967-present, Seasonal Real time water quantity. Water quality 2 samples per year from 1969-1978	Reference; estimate loading to L. Claire, coordinated with fish sampling	Monthly/ Biweekly/ Event	Seasonal (archive/ response based)	WQ/Bottom Susp Sed/ Hydromet/ Passive/ Integrative samples		AL07KE0001	WQ Monthly as feasible from **2011-2021** (no samples in 2020); SPMD Passive sampling trial in 2014, July/Aug Deployments, fluctuating water levels precluded further deployments
MC 1	McIvor River	Originates in the Birch Mountains and flows into Lake Claire	NA	NA	Reference; estimate loading to L. Claire, coordinated with benthic sampling	Monthly/ Biweekly/ Event	Seasonal (archive/ response based)	WQ/Bottom Susp Sed/ Hydromet/ Passive/ Integrative samples		AL07KF0006	WQ Monthly as feasible from **2013-2021** (no samples in 2020). Over 10 Benthic Invertebrate sites established in basin upstream of WQ station, 3-6 sites sampleed on rotational basis each year
BU1	Upper Buckton Creek	Orginates in the lower relifed muskeg area east of the Birch Mountains.	NA	NA	Reference; estimate loading to L. Claire, Oil sands development expected downstream (BACI investigation); coordinated with fish/benthic samplng	Monthly/ Biweekly/ Event	Seasonal (archive/ response based)	WQ/Bottom Susp Sed/ Hydromet/ Passive/ Integrative samples		AL07KF0007	WQ Monthly as feasible from **2013-2021** (no samples in 2020)
BU2	Lower Buckton Creek	Orginates in the lower relifed muskeg area east of the Birch Mountains.	NA	NA	Reference; estimate loading to L. Claire, Oil sands development expected upstream (BACI investigation); coordinated with fish/benthic samplng	Monthly/ Biweekly/ Event	Seasonal (archive/ response based)	WQ/Bottom Susp Sed/ Hydromet/ Passive/ Integrative samples		AL07KF0005	WQ Monthly as feasible from **2013-2021** (no samples in 2020)
RI1	Richardson River	Originates on the Canadian Shield, drains into the southern channel of the Athbasca River in the PAD	Active Hydrometric WSC 07DD002	1970-present, Seasonal Real time water quantity	Reference; estimate loading to PAD, coordinated with fish/benthic sampling	Monthly/ Biweekly/ Event	Seasonal (archive/ response based)	WQ/Bottom Susp Sed/ Hydromet/ Passive/ Integrative samples		AL07DD0006	WQ Monthly as feasible from **2012-2021** (no samples in 2020); SPMD Passive sampling trial in 2014 and 2015, June/July/Aug / Sept Deployments, fluctuating water levels precluded further deployments

Objectives

The objective of this report is to provide an update on the water quality conditions of the five EGA tributary sites and to evaluate the sampling program and results in terms of whether sufficient information is available to establish accumulated state. In addition, we provide specific recommendations for ongoing sampling based on the updated statistical results and potential future monitoring objectives. Specifically, the approach taken was as follows:

1. Inventory and review sampling frequency achieved at sites across years and seasons.

2. Compare WQ results from the previous reporting period (Glozier et al., 2018)

3. Provide updated summary statistics for all parameters (Appendix A)

4. For the subset of parameters reported previously in Glozier et al., (2018),

   a. Review patterns in seasonality (box plots) and data distribution (rain cloud plot)

   b. Review cumulative mean and median plots to assess if there is sufficient data to establish accumulated state against which future change can be assessed.

   c. Provide updated summary statistics for the subset of parameters as proposed accumulated state for open water period (Appendix B)

5. Determine statistical power for select parameters

2. Methods

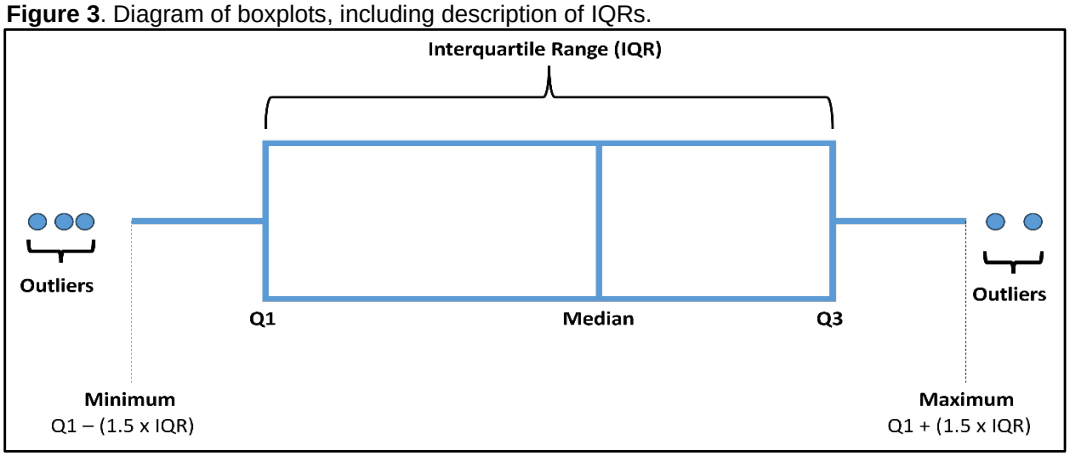
All samples for this report were collected from 5 tributary sites in the Peace-Athabasca Delta: Birch River (BI1), Upper (BU1) and Lower Buckton River (BU2), Richardson River (RI1), and McIvor River (MC1). During open water periods, samples were either collected from a boat with a depth integrated sampling device, or, where water was fully mixed and water depth was shallow, wading to a standard depth and collecting at mid-channel to a standard depth. During winter, holes were drilled in the ice and samples were collected using a depth integrated sampling device if water was deep enough (for more details on methods see Standard Operating Procedures for Water Quality Sampling - Datasets - Oil Sands Monitoring (alberta.ca)) For this report, a sampling event is defined as an single visit to a specific site to collect water quality samples. The total number of sampling events is the sum of all site visits over the entire period of sampling. For triplicate samples, the first sample collected that day was used in the statistical analyses.

All statistics and graphs were generated using R (v4.4.0; R Core Team, 2024) and RStudio (RStudio Team, 2024). Plotting of the graphs used the GGplot2 package available on the CRAN website in addition to the "ggdist" package (v3.2.1; Kay 2023). A total of 137 parameters were analyzed for this comparison. Parameters are grouped into major ions and physicals (38), nutrients (17), or metals (82). Statistics calculated include sample count, the percent below the method detection limit, sample mean, standard deviation and error, and the minimum and maximum values. No outliers were removed from the dataset.

Seasonal box plots were created with all samples available during the selected timeframe (2012-2021), splitting the results by hydrologic season and then plotting the concentration boxes for each season by site for selected parameters. Hydrologic seasons are defined as Spring/Summer (May - July), Fall (August – October), and Winter (November – April) (Glozier et al., 2018 and 2012). All boxplots display the median, IQR (25^{th} to 75^{th} percentile) and lower and upper whiskers of all samples collected in each season at each site (Fig. 3)

Raincloud plots, which include only open water quality data (Spring/Summer and Fall), are separated by site and consist of a scatterplot (coloured by year), a boxplot, and a half-density plot to show the distribution of concentration values. To visualize year to year variation, boxplots were created for a subset of selected parameters for the Birch and Richardson Rivers. Cumulative plots were used to demonstrate the stabilization of both mean and median as the sample size increases. These cumulative mean and median graphs were generated using open water data and calculating the mean/median for an individual year and then adding samples from any previous years to get an overall result. For example, the cumulative average for 2014 would include the samples collected from 2014 and all samples collected before this date. These were plotted as concentration versus total cumulative number of samples collected, with background colour highlighting the individual years.

Figure 3. Diagram of boxplots, including description of IQRs.



A power analysis was conducted using the "pwr'" package (Champely, 2020). The "lsr" package was used to calculate the Cohen's D (t-test) and the Eta Squared (ANOVA) respectively (Navarro, 2015). Cohen's D is a measurement of effect size that considers the mean difference of two sample means, divided by the standard deviation. Eta-squared is an index of the proportion of variance attributed to one or more effects (Faye and Boyd, 2010). Both Cohen's D and Eta-squared were used as the effect sizes to generate both the power and the ideal sample number for each selected parameter. All statistical analyses were completed with an $\alpha = 0.1$.

3. Results and Discussion

3.1. Sampling Summary and Descriptive Statistics

The sample counts from each of the EGA tributary sites are summarized (Table 2) by hydrological season (winter, spring/summer, fall). Initial sampling of these new sites was completed with a phased approach. Sampling at the Birch River (BI1) was initiated prior to JOSM with two samples in 2011. The site on the Richardson River (RI1) was first sampled in 2012, while the Buckton and McIver rivers were first sampled in summer of 2013. All sites have had at least 36 total sampling events with the maximum being 63 at the Richardson River. Seasonally, at least 17 sampling events occurred in the summer, and 16 in the fall, averaging 4.6 samples per year/site in the open water period (May-Oct). Open water monthly sampling was not completely achieved at all sites due to multiple logistical and site condition factors, such as heavy smoke, fires, low water levels, and helicopter availability.

Winter had the highest variability in recorded sampling events, ranging from 3-13 successful sampling events over the 9 years. This variability was the result of several difficulties that can arise due to winter conditions that can prevent safe access to landing at the site, as well as conditions that would prevent the collection of a sample. Frequently these smaller tributaries can freeze to the bottom by the end of the winter resulting in no water to sample. For these reasons, there were fewer sampling events during this seasonal period compared to the spring/summer and fall hydrological seasons. The highest number collected were from BU1, BU2 and RI1 with 12-13 winter sampling events. BI1 only had 7 while MC1 had the fewest total sampling events with 3, with no samples collected before 2014.

Calculated descriptive statistics for all parameters are provided in the Appendix (Tables A1-3). Parameters with fewer than five data points were not included in the analysis, as this is not sufficient for establishment of accumulated state statistics. As previously described, Glozier et al., (2018) presented the descriptive statistics for the EGA tributaries with the limited data available at the time and visualized a subset of relevant parameters as boxplots. These parameters included arsenic, boron, selenium, vanadium, phosphorus, nitrogen and mercury. In this report, we have examined the same parameters for comparison as an initial step in evaluating the impact these additional samples had on overall concentration means. Not surprisingly, with an additional seven years of sampling, parameter concentration means did differ (Table 3), suggesting the limited data collected prior to 2015 was not sufficient to establish accumulated state. The percent differences in concentration means between the two timelines was highly variable (Table 4). The largest difference was a 131% increase in mean concentration between total

Table 2. The total count of sampling events at each of the EGA tributary sites. Sampling events are presented as seasonal (winter, summer, fall) and total count. Cells with a dash represent years with no collected samples.

BI1		BU1		BU2		MC1		QU1		RI1	
Winter	**7**	**Winter**	**13**	**Winter**	**12**	**Winter**	**3**	**Winter**	**14**	**Winter**	**13**
2011	1	2011	-	2011	-	2011	-	2011	-	2011	-
2012	1	2012	-	2012	-	2012	-	2012	1	2012	1
2013	1	2013	1	2013	1	2013	-	2013	1	2013	1
2014	1	2014	1	2014	1	2014	1	2014	1	2014	1
2015	-	2015	1	2015	-	2015	-	2015	1	2015	-
2016	1	2016	1	2016	1	2016	-	2016	2	2016	1
2017	-	2017	3	2017	3	2017	-	2017	2	2017	3
2018	1	2018	3	2018	3	2018	-	2018	3	2018	3
2019	1	2019	3	2019	3	2019	1	2019	1	2019	1
2020	-	2020	-	2020	-	2020	1	2020	-	2020	-
2021	-	2021	-	2021	-	2021	-	2021	2	2021	2
Summer	**20**	**Summer**	**17**	**Summer**	**17**	**Summer**	**17**	**Summer**	**23**	**Summer**	**23**
2011	-	2011	-	2011	-	2011	-	2011	-	2011	-
2012	3	2012	-	2012	-	2012	-	2012	2	2012	3
2013	1	2013	2	2013	2	2013	3	2013	3	2013	3
2014	2	2014	3	2014	3	2014	2	2014	3	2014	3
2015	2	2015	2	2015	2	2015	2	2015	3	2015	2
2016	3	2016	3	2016	3	2016	3	2016	3	2016	3
2017	3	2017	3	2017	3	2017	3	2017	3	2017	3
2018	3	2018	2	2018	2	2018	2	2018	3	2018	3
2019	3	2019	2	2019	2	2019	2	2019	3	2019	3
2020	-	2020	-	2020	-	2020	-	2020	-	2020	-
2021	-	2021	-	2021	-	2021	-	2021	-	2021	-
Fall	**23**	**Fall**	**17**	**Fall**	**17**	**Fall**	**16**	**Fall**	**25**	**Fall**	**26**
2011	1	2011	-	2011	-	2011	-	2011	-	2011	-
2012	2	2012	-	2012	-	2012	-	2012	2	2012	3
2013	1	2013	3	2013	3	2013	2	2013	3	2013	3
2014	3	2014	2	2014	2	2014	2	2014	3	2014	3
2015	3	2015	2	2015	2	2015	2	2015	2	2015	3
2016	3	2016	1	2016	1	2016	1	2016	3	2016	3
2017	1	2017	1	2017	1	2017	2	2017	2	2017	1
2018	3	2018	3	2018	3	2018	3	2018	3	2018	3
2019	2	2019	2	2019	2	2019	1	2019	3	2019	3
2020	-	2020	-	2020	-	2020	-	2020	-	2020	-
2021	4	2021	3	2021	3	2021	3	2021	4	2021	4
Total	**50**	**Total**	**47**	**Total**	**46**	**Total**	**36**	**Total**	**62**	**Total**	**62**

Table 3. Comparison of water quality concentrations sampled between 2012-2014, and 2012-2021. Data is presented as the mean concentrations of all samples collected over the respective timeframes. See Appendix A for detailed summary statistics.

2012-2014					
	BU1	BU2	BI1	RI1	MC1
P Total (mg/L)	0.18	0.13	0.19	0.03	0.30
P Dissolved (mg/L)	0.18	0.03	0.05	0.03	0.04
N Total (mg/L)	0.93	0.85	1.40	0.41	1.09
N Dissolved (mg/L)	0.90	0.77	1.25	0.23	0.81
AS Total (µg/L)	1.39	1.07	2.86	0.59	3.06
AS Dissolved (µg/L)	0.67	0.65	1.59	0.45	1.29
BO Total (µg/L)	85.30	77.30	220.30	9.30	54.50
BO Dissolved (µg/L)	85.40	76.40	212.10	9.80	50.30
SE Total (µg/L)	0.15	0.11	0.45	0.04	0.36
SE Dissolved (µg/L)	0.12	0.08	0.66	0.05	0.20
VA Total (µg/L)	0.91	0.84	5.02	0.70	10.75
VA Dissolved (µg/L)	0.21	0.22	0.86	0.38	0.99
HG Total (µg/L)	1.59	1.36	9.09	1.52	14.24
MeHG (µg/L)	1.39	1.07	2.86	0.59	3.06

2012-2021					
	BU1	BU2	BI1	RI1	MC1
P Total (mg/L)	0.27	0.13	0.16	0.07	0.33
P Dissolved (mg/L)	0.04	0.03	0.06	0.03	0.05
N Total (mg/L)	1.22	0.95	1.21	0.41	1.18
N Dissolved (mg/L)	1.02	0.85	1.04	0.24	0.67
AS Total (µg/L)	1.49	1.42	2.40	0.53	3.18
AS Dissolved (µg/L)	0.70	0.68	1.45	0.41	1.22
BO Total (µg/L)	85.16	78.56	130.21	10.11	55.67
BO Dissolved (µg/L)	90.30	83.02	126.79	10.32	55.97
SE Total (µg/L)	0.15	0.15	0.33	0.03	0.36
SE Dissolved (µg/L)	0.13	0.11	0.38	0.04	0.21
VA Total (µg/L)	1.05	0.70	3.65	0.58	9.24
VA Dissolved (µg/L)	0.21	0.16	0.79	0.31	0.94
HG Total (µg/L)	1.34	1.26	7.22	1.17	11.30
MeHG (µg/L)	0.29	0.12	0.59	0.10	0.57

phosphorus from the previous RI1 (0.03 µg/L) and current RI1 (0.07 µg/L) (Table 4). The concentration for these samples is very low and may be sensitive to large outliers in the dataset. Phosphorus also had the greatest discrepancy in changes between the dissolved and total components, where there are increases in one component accompanied by decreases in the other. An example is RI1, which had a large increase in total phosphorus but small decreases in dissolved phosphorus (Table 4). The largest decrease (-89%) was observed in methyl mercury concentration measured at BU2 between past (1.07 µg/L) and present (0.12 µg/L). In fact, all methyl mercury concentrations demonstrated large reductions in concentration (>79%) at all sites between the current dataset and the shorter dataset. The sites with the largest differences were BU2 and BI1 which both had more than six parameters with a larger than 20% difference (Table 4). MC1 had the fewest parameters with large percent differences with only two but also had the fewest overall samples (Table 2). Further discussion regarding whether sufficient data is available to establish accumulated state is provided with the cumulative means analysis below.

3.2. Seasonality

To examine seasonality, samples were separated into three hydrological sampling seasons: Spring/Summer, Fall, and Winter. Due to differing conditions during seasons (i.e. flow), there are often differences in parameter concentration observed among seasons (Glozier et al., 2018). For this updated analysis, the samples collected in the winter season are most often observed to have the greatest difference in median compared to either the Spring/Summer or the Fall samples (Fig. 4). Winter samples also display greater variability. This may, in part, be due to the limited number of samples collected in the winter, and the large variations of water flow between years in the winter. There were higher concentrations observed for the major ions (calcium and chloride) during winter low-flow conditions, but this was not consistent among sites for the other dissolved parameters examined (arsenic and phosphorus). Among all tributary EGA sites, samples collected from the Birch River had the greatest differences in concentration between seasons. Conversely, the seasonal variance in concentrations observed at Richardson River appears to be minimal when compared to the other sites. For total and dissolved phosphorus and arsenic, patterns during the open water

Table 4. Percent difference of means concentration between EGA samples collected between 2012-2014 and samples collected between 2012-2021. Cells highlighted in green had percent differences greater than 20%, while highlighted red cells had differences greater than -20%.

Percent Difference in Mean Concentrations					
	BU1	BU2	BI1	RI1	MC1
P Total (mg/L)	-9.10	-3.49	-13.89	131.10	9.59
P Dissolved (mg/L)	-69.32	23.12	11.67	-3.92	5.54
N Total (mg/L)	30.00	11.27	-13.64	-0.45	8.64
N Dissolved (mg/L)	15.32	10.24	-16.97	4.06	-16.99
AS Total (µg/L)	7.10	33.08	-16.24	-9.48	3.91
AS Dissolved (µg/L)	3.93	4.50	-9.08	-9.94	-5.67
BO Total (µg/L)	-0.16	1.63	-40.89	8.69	2.15
BO Dissolved (µg/L)	5.74	8.66	-40.22	5.29	11.28
SE Total (µg/L)	0.87	34.55	-26.02	-19.28	-1.19
SE Dissolved (µg/L)	10.14	35.69	-43.02	-26.78	3.14
VA Total (µg/L)	16.50	-15.86	-27.37	-17.21	-14.03
VA Dissolved (µg/L)	-0.33	-27.76	-7.67	-17.47	-4.82
HG Total (µg/L)	-15.46	-7.24	-20.60	-22.76	-20.64
MeHG (µg/L)	-79.41	-88.82	-79.39	-83.53	-81.46

months varied among sites. Some sites had higher concentrations in the fall and other sites in the spring/summer months. Thus, unlike similar analyses in larger rivers (Glozier et al., 2009, 2018), there is less consistency in seasonal patterns for the same parameter; differences observed were site and parameter specific. The seasonality information is important for understanding the natural variability inherent in these tributary basins, not only to establish accumulated state, but more critically during the design of monitoring programs to determine the appropriate frequency and timing of sampling needed to meet future monitoring objectives.

Due to the relatively small and inconsistent sample numbers, winter data has been excluded from the subsequent analyses, both the raincloud and cumulative mean/median plots and Spring/Summer and Fall samples were combined to examine conditions during the entire open water period.

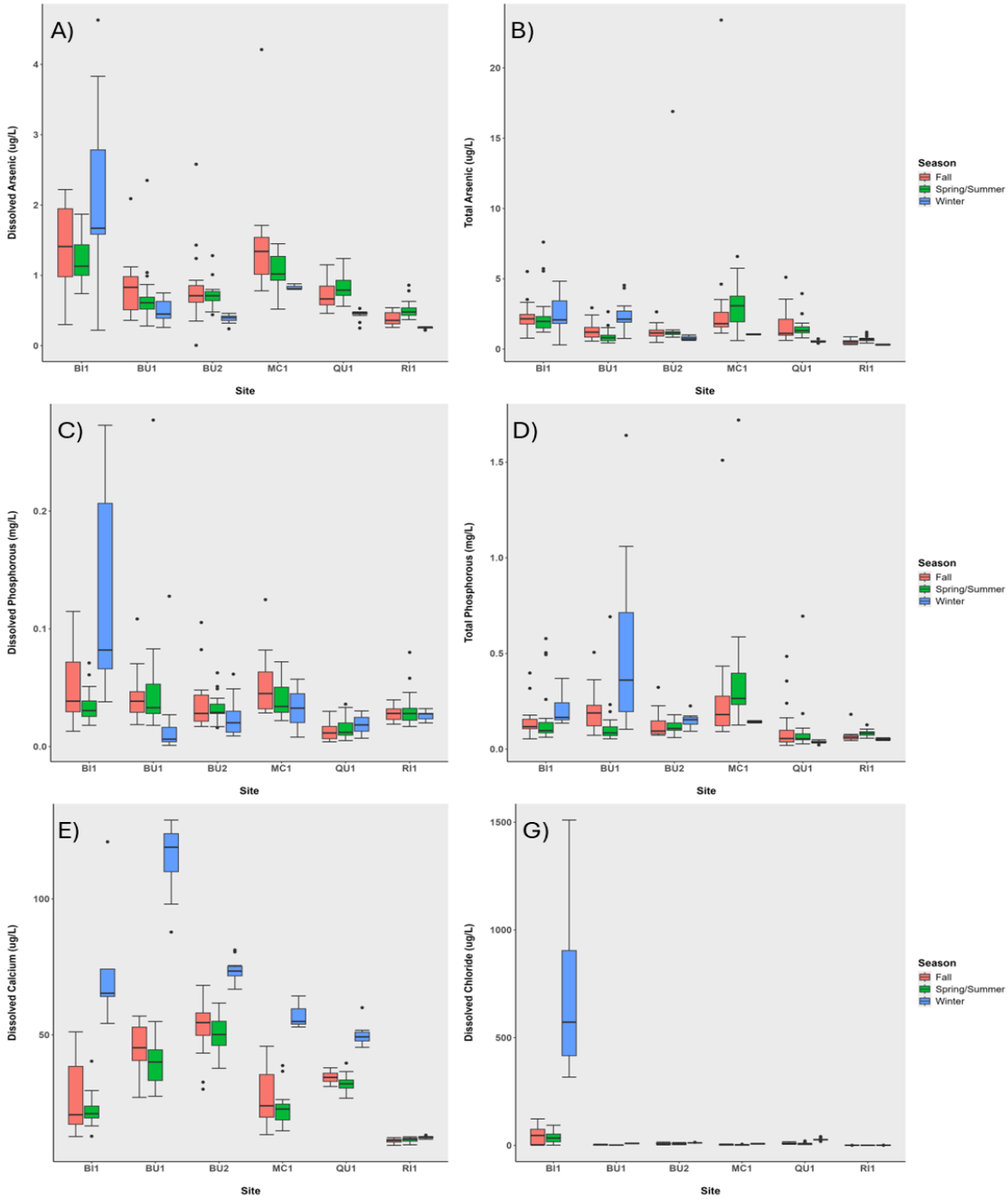


Figure 4. Seasonal medians of A) Dissolved arsenic, B) Total arsenic, C) Dissolved phosphorus, D) Total phosphorus, E) Dissolved Calcium, and F) Dissolved Chloride from samples collected from the EGA sites, Boxplots represent median of all samples collected over the entire sampling period (2012-2021).

3.3. Site Differences

Although not necessarily a requirement for establishing accumulated state for a particular site, the overall site-to-site concentration differences and variability can also be an important consideration for future monitoring. To demonstrate site specific concentrations and variability, raincloud plots were chosen with select parameters (Fig. 5). Each plot has a yearly scatterplot, boxplot, and half-density plot displayed for each site. The advantage of the raincloud is that we can observe the density of certain values and observe if there are groups within the data. Most parameters displayed a left skewed distribution with high values being less frequent, however several parameters had bimodal (2 peaks) or very confined distributions. From the density plot there did not appear to be any particular years that were different, but this is discussed in more detail below.

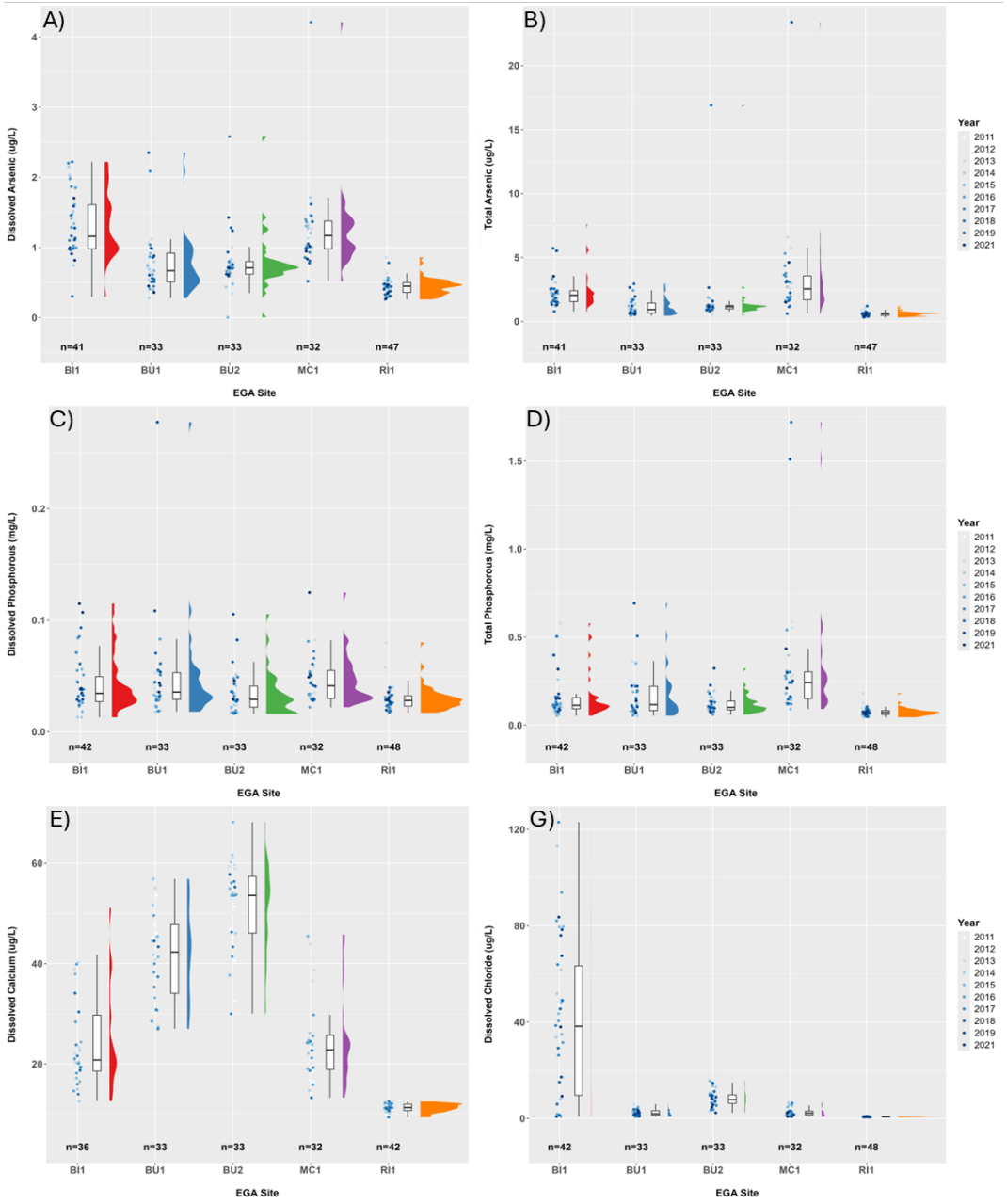


Figure 5. Raincloud plot of open water samples collected from the Birch River representing: A) Dissolved Arsenic, B) Total arsenic, C) Dissolved phosphorus, D) Total phosphorus, E) Dissolved Calcium, and F) Dissolved chloride. Each point is a sample collected from its associated site, and seperated by year. Boxplots represent the values for each EGA site. The color coded rainclouds beside the boxplot is a density plot of the sample concentrations.

For total and dissolved arsenic, ranges were most similar between the two Buckton River sites, whereas the Birch and McIvor rivers generally displayed higher concentrations. The Richardson River generally had lower concentrations and the tightest distributions. For dissolved and total phosphorus, the data was tightly grouped and relatively consistent among the sites, with the Richardson River again having the least variable distribution. The two major ions examined, calcium and chloride, displayed very different among site distributions. High variability in calcium concentration was observed among the four sites arising in the Birch Mountains (BI1, BU1, BU2, MC1). Both Buckton sites appear to have similar variability and measured concentrations, and while lower in concentration a similar resemblance is observed between BI1 and MC1 (Fig. 5E). Calcium in the Richardson River shared little resemblance to the other four sites as data was much lower in both concentration and variability.

Finally, the raincloud plots show that chloride results were highly site specific, with the greatest variability in the Birch River, while differences were evident between the upstream and downstream Buckton sites. Similar to other parameters (e.g. arsenic, calcium), low concentration and variability was observed in chloride samples collected from the Richarson River, similar to other parameters for this site, chloride displayed lower concentrations and variability. Similar patterns in water quality among the five EGA tributary sites were reported, by Glozier et al., (2018), however with a 2-3X increase in sampling effort spanning an additional 6 years, the distributions and ranges can be better evaluated and demonstrates the need to collect data over a longer period, as short-term (<4 years) sampling did not capture the natural variability

3.4. Cumulative means

To examine natural range and variability over the period of record, a final exploration of the open water data was completed. Specifically, to evaluate if sufficient data has been collected to establish accumulated state, we examined the annual concentration of open water data with representative parameters in two ways: 1) annual medians and percentiles as box plots, and 2) cumulative mean and medians plotted against the cumulative

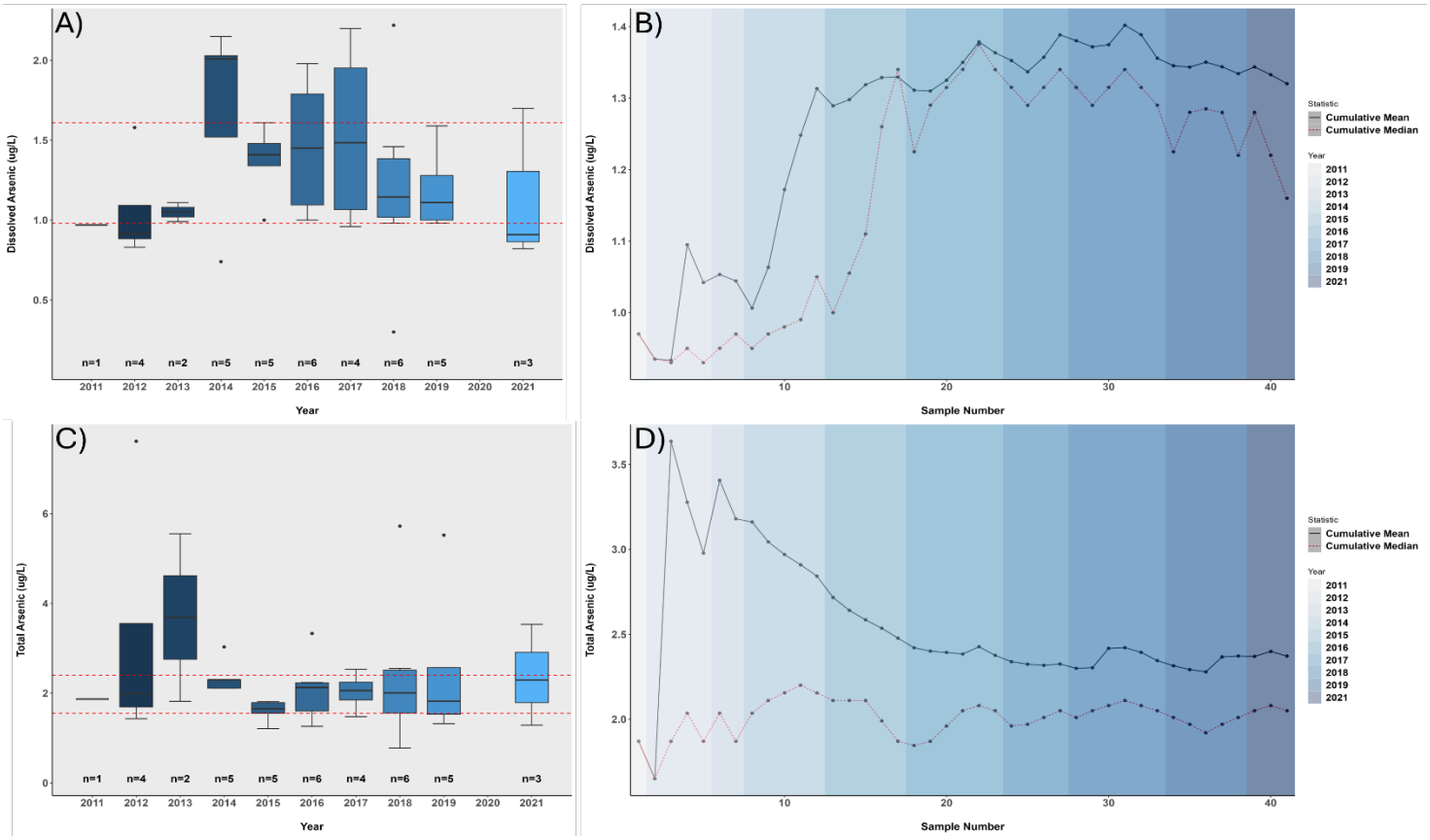


Figure 6. Boxplots and cumulative graphs of all open water samples from the Birch River for dissolved (A&B) and total (C&D) phosphorus. Dashed red lines on box plots represent the 25th and 75th percentiles over the entire period.

number of samples collected, in sequential order. For all sites and the six parameters depicted (Fig. 6-11), the year-to-year median and range had considerable annual variability and no single year represented the range in concentration observed over the 10-year sampling period; many annual medians and means fell well outside the 25th and 75th percentile of all data collected to date (red dashed lines, Fig. 6-11). As well, annual patterns differ depending on site and parameter. In general, the Birch River displayed more year-to-year variability for all parameters than the Richardson River, but annual patterns were site specific and with no general patterns existing even between dissolved and total components. Although the purpose of this report is not to provide a detailed interpretation of WQ at these sites, clearly these analyses suggest that future investigation of WQ status and trends will need to examine annual characteristics in each basin, particularly correlations with annual changes in discharge.

However, the corresponding cumulative graphs do provide evidence that at least in the open water period, with 9 years of relatively consistent sampling (4-5 samples), median and mean values for the dataset tend to stabilize (Fig. 6-11). For example, total arsenic concentration in both rivers from 2011-2014 had annual values that were considerably different (Fig. 6 and 7 A&C). As a result, the cumulative values during this earlier sampling period have large variation (Fig. 6 and 7 B&D). This variation continues until sampling effort reached between 25 – 30 samples, over a 6-year period, after which the cumulative median and means begin to stabilize (i.e. asymptote). Looking across all parameters, this stabilizing pattern after 6 years is evident for five other parameters/sites (67%). In the Birch River, total and dissolved phosphorus, calcium, and chloride also show this stabilizing pattern, and in the Richardson River, total and dissolved phosphorus.

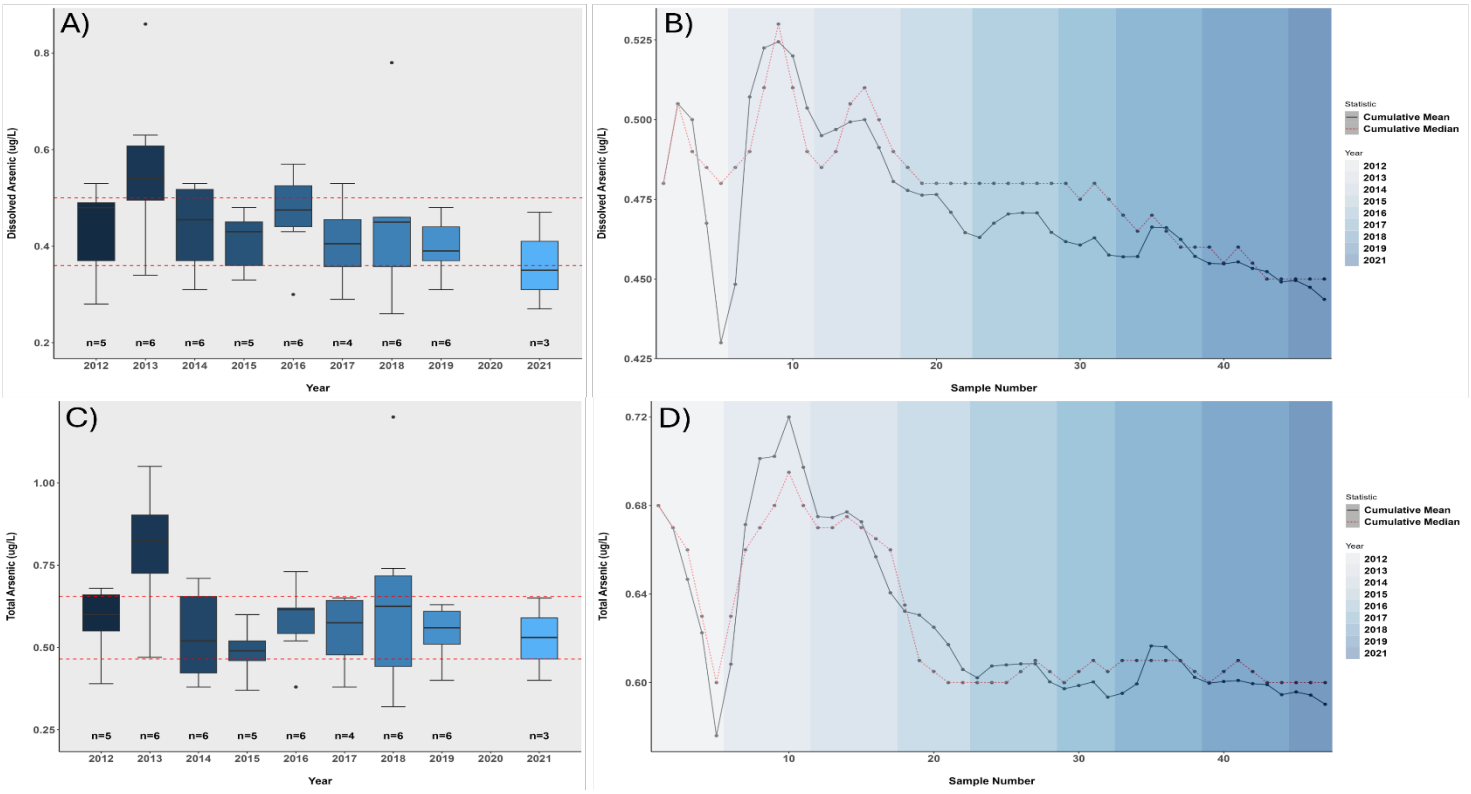


Figure 7. Boxplots and cumulative graphs of all open water samples from the Richardson River for dissolved (A&B) and total (C&D) arsenic. Dashed red lines on box plots represent the 25th and 75th percentiles over the entire period.

For the other parameters examined, variability in the annual cumulative means and median do appear to be reducing, indicating stabilization in central tendencies, but in several cases a potential upward or downward trend is observed. For example, a potential increasing trend is observed for dissolved phosphorus in the Birch River (Fig. 8B), as both the cumulative mean and median values are increasing even as the sample size grows during the period. In both the Birch and Richardson rivers, dissolved arsenic concentration appears to have stabilized by 2017, but subsequently begins to decrease (Fig. 6 and 7 B). Finally, potential increasing trends in both dissolved chloride and calcium concentration in Richardson River (Fig. 11 B&D) appear later in the sampling period. Although these temporal patterns may represent changes in concentration, temporal trend analyses have yet to be conducted on these data sets and are outside of the objectives of this report. However, without longer term monitoring these potential changes would have gone unnoticed.

For the purposes of this report, the combination of the annual box plots in relation to the 25th/75th percentile of the entire data set and the reduced variability and asymptotic pattern of the cumulative means and medians for many parameters, suggests that 25-30 samples with six year of sampling is sufficient to establish the accumulated state against which future change can be assessed. Although these analyses were conducted at only two sites, the sites were selected as the most (BI1) and least (RI1) variable and the 6 parameters to represent the range of patterns in WQ that are typical in these river systems. This analysis could be expanded to include other sites/parameters and more detailed statistical approaches, however, for the purposes of addressing the main objective of the report, and to not further delay the reporting of these results, this investigation of cumulative means and medians did not proceed to additional parameters or sites.

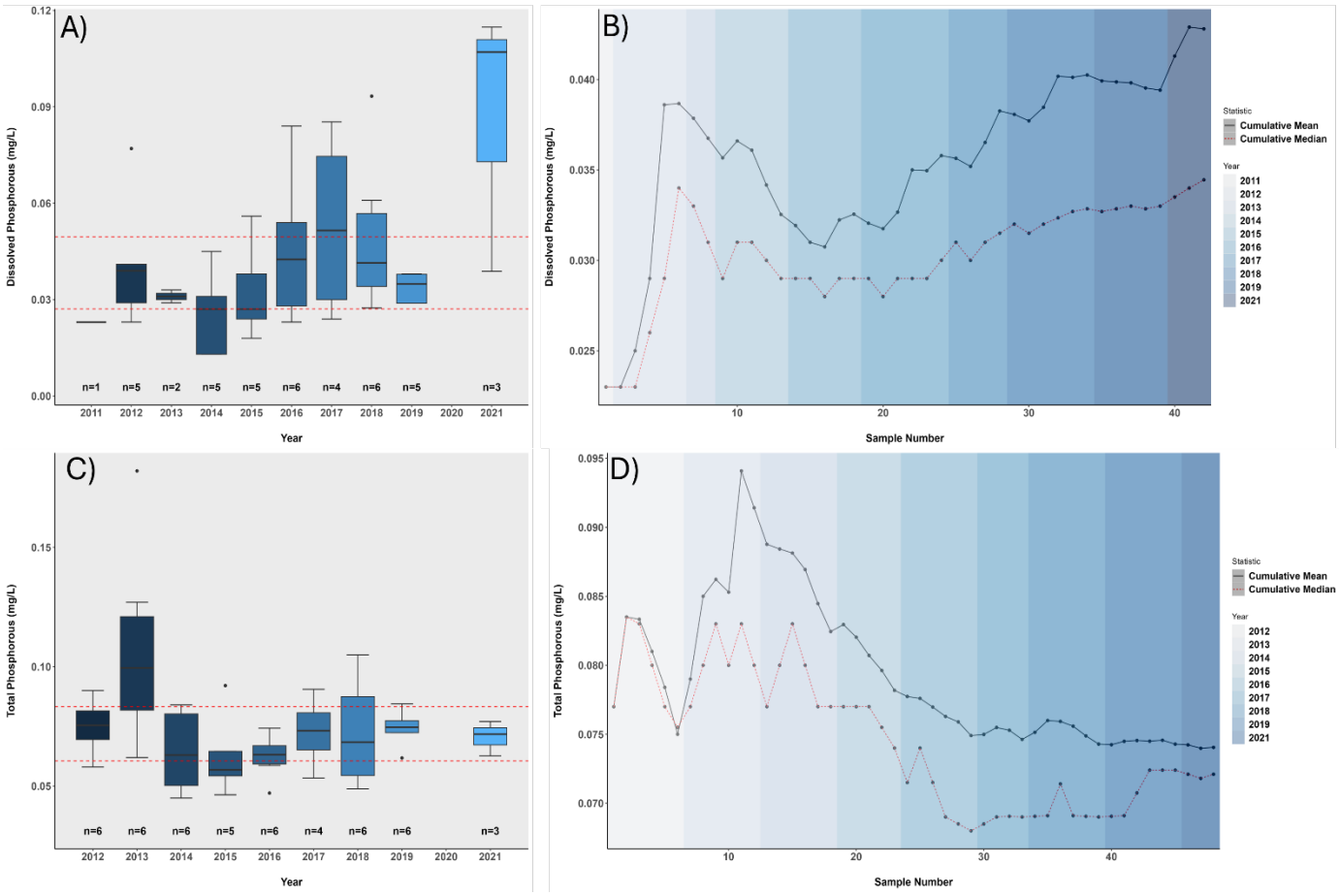


Figure 8. Boxplots and cumulative graphs of all open water samples from the Birch River for dissolved (A&B) and total (C&D) phosphorus. Dashed red lines on box plots represent the 25th and 75th percentiles over the entire period.

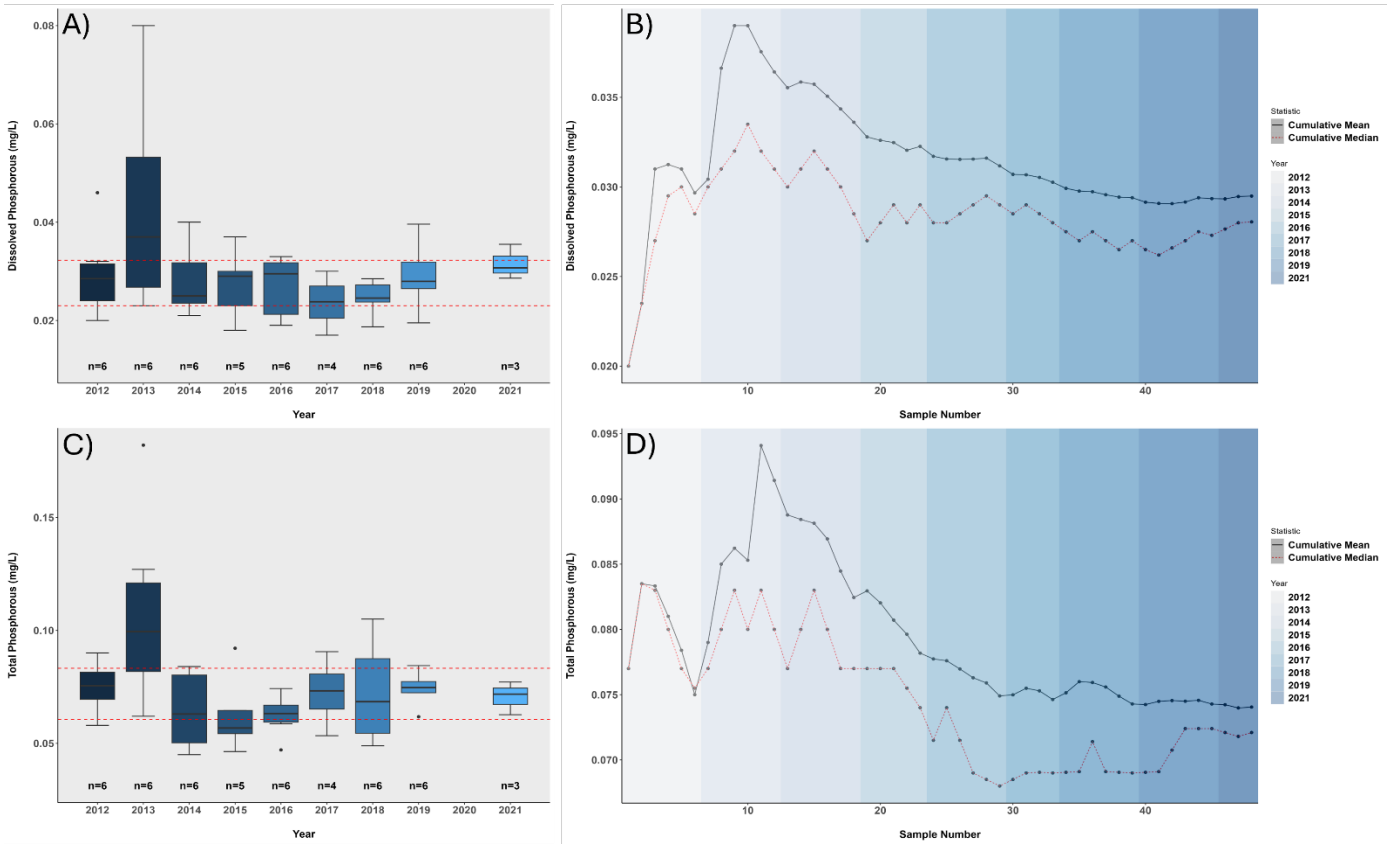


Figure 10. Boxplots and cumulative graphs of all open water samples from the Richardson River for River for dissolved (A&B) and total (C&D) phosphorus. Dashed red lines on box plots represent the 25th and 75th percentiles over the entire period.

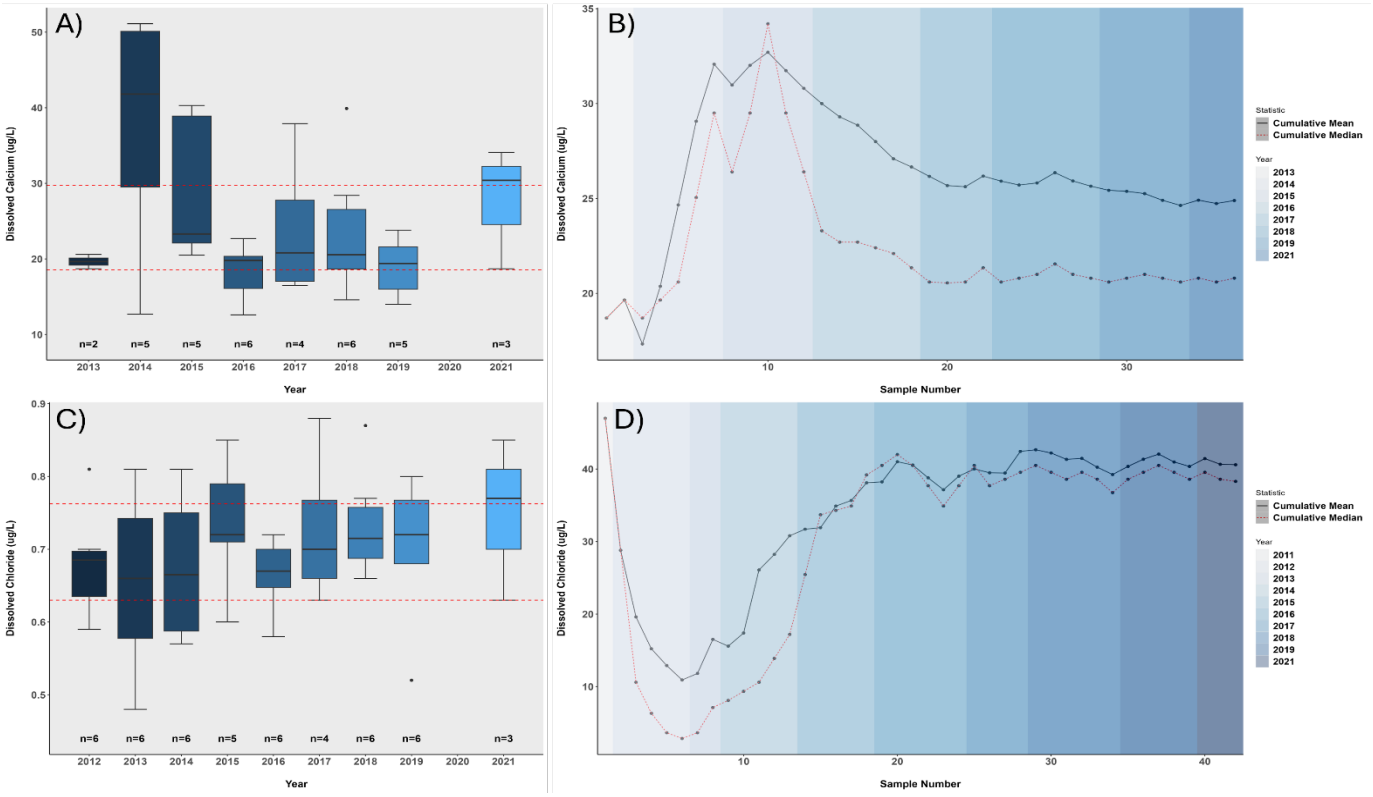


Figure 9. Boxplots and cumulative graphs of all open water samples from the Birch River for dissolved calcium (A&B) and chloride (C&D). Dashed red lines on box plots represent the 25th and 75th percentiles over the entire period.

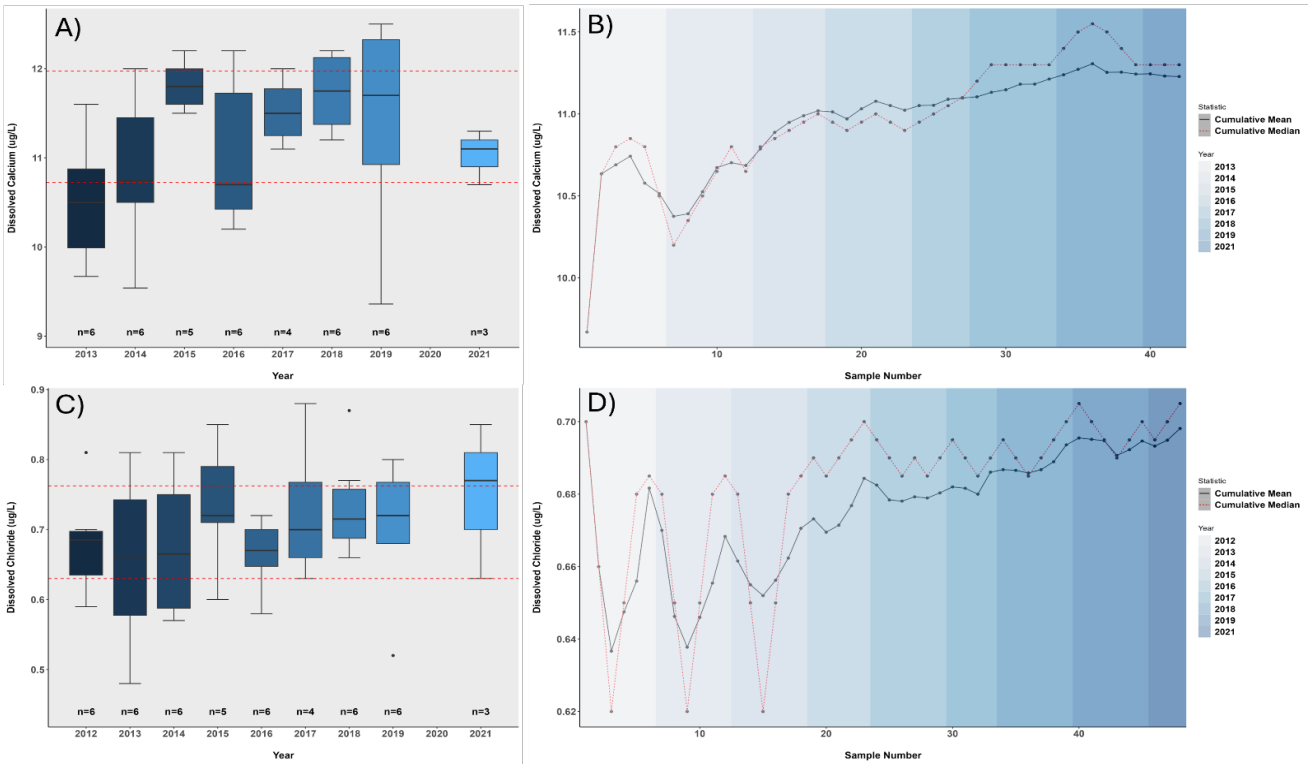


Figure 11. Boxplots and cumulative graphs of all open water samples from the Richardson River for River for dissolved calcium (A&B) and chloridel (C&D). Dashed red lines on box plots represent the 25th and 75th percentiles over the entire period.

3.5. Power Analysis

A power analysis was conducted to determine the statistical power that exists with the current sample numbers. A subsample of 20 parameters selected from the Birch and Richardson sites were used to determine effect sizes. As each site has a different number of samples, an unbalanced t-test power analysis was done between the sites and parameters that represent the greatest disparity in sampling, McIvor (30) and Richardson (48). With these sampling numbers, t-tests were able to detect effect sizes of 0.58 with 0.8 power at $\alpha = 0.1$. For the Birch and Richardson sites, power analysis revealed all but two of the parameters (Table 5) meets the effect size threshold. For ANOVA analysis the group with the smallest sample size (Total Mercury, McIvor = 30) was chosen for the sample number to give a conservative estimate for power. With this number, ANOVA will be able to detect effect sizes of 0.26 with 0.8 power at $\alpha = 0.1$. Of the selected parameters, 14 of the 20 meet this threshold (Table 5).

4. Summary and Recommendations

The 2012-2021 data set provides a greater number of samples (n=241) compared to the previous (n=72) analysis as well as an additional 6 years of sampling. Clear differences in mean concentrations observed between past and present timeframes highlights the importance of this increase in sample size and timeframe to characterizing the WQ at these sites. Summary of samples and allocation across years and season have been provided. Consistent open water sampling was achieved; however, winter sampling was a challenge for several sites. Except for the winter seasons at BI1 and MC1, all sites have sampling numbers within a season that exceed the minimum values (8-10) suggested before any statistical test (USEPA, 2009). Summary statistics have been provided for all parameters (Appendix A), while investigation of other data characteristics was performed on a subset of representative parameters. Summary statistics for open water period for the subset of parameters are also provided (Appendix B). Patterns in seasonality and data distribution characteristics were provided to better understanding of the natural variability inherent in these tributary basins which is important for

Table 5. Summary of effect sizes for samples collected in the EGA.

Parameter	Effect Size (Cohen's D)	Effect Size (η2)
Dissolved Arsenic	2.71	0.41
Dissolved Boron	2.52	0.36
Dissolved Calcium	1.94	0.76
Dissolved Chloride	1.8	0.51
Dissolved Nitrogen	3.87	0.63
Dissolved Phosphorous	0.72	0.07
Dissolved Selenium	4.03	0.57
Dissolved Sodium	2.35	0.58
Dissolved Vanadium	1.46	0.29
Methyl Mercury	1.92	0.44
Non-Filtrable Residue	0.57	0.14
Non-Filtrable Residue (Fixed)	0.59	0.14
Total Arsenic	1.87	0.18
Total Boron	2.78	0.69
Total Dissolved Solids	1.94	0.61
Total Mercury	1.47	0.44
Total Nitrogen	2.20	0.28
Total Phosphorous	0.96	0.21
Total Selenium	3.22	0.31
Total Vanadium	0.90	0.24

the design of future monitoring programs. The power analysis revealed that, with a few exceptions, each parameter has sample numbers that allow for the detection of statistically significant results with 80% power. Finally, the cumulative mean and median graphs demonstrate that there have been sufficient samples collected across a range of 9 years, presumably with a range of water level conditions to establish current accumulated state. Several parameters appear to be showing increasing or decreasing trends, but this was not confirmed with statistical analyses.

Compared to the original JOSM rationale and objectives for the five EGA tributary sites (Table 1), the program has largely achieved the water quality objectives for these sites as feasibility allowed. Open water monthly sampling was not completely achieved at all sites (average 4.6 samples out of 6 possible samples) due to multiple logistical and site condition factors, such as heavy smoke, fires, low water levels, and helicopter availability. Winter sampling at 2 (BI and MC1) of the 5 sites was largely not feasible and very few samples were obtained despite attempts each winter to collect at all sites. Limited passive sampling using semi-permeable membrane devices (SPMDs), which measure dissolved PACs, was piloted in 2014 and 2015 at two sites (Birch and Richardson rivers) but was paused as the approach for deployment of the passive samplers in the larger rivers proved to be ineffective in these small rivers with highly variable water levels. Benthic and fish monitoring was conducted at several tributaries within the Birch Mountains which flow into Lake Claire, (e.g., Alice Creek, McIvor River) but habitat availability at the WQ Stations precluded these media to be co-located. Finally, bottom and suspended sediment sampling was not approved or funded for these sites.

Recommendations:

1. Options for establishing Accumulated State for WQ conditions in EGA tributaries:

    - The simplest approach would be to use the descriptive statistics provided in the Appendix A or B, selecting the appropriate IQR (25-75% or 10-90%) and central tendency measures against which to compare future sampling results.

    - Alternatively, due to the high annual variation observed, establishing accumulated state could be completed using regression approaches to predict the concentration of a given parameter using an annual driver, such as water discharge. This would highlight if the concentration measured in each parameter at that time fell within the predicted range based on these drivers and could provide more biological relevance than an IQR. However, at this time, this approach can only be applied at the Birch and Richardson rivers where active hydromet stations exist (Table 1).

2. Further Statistical Analyses

    - Temporal Trend analysis, both seasonal and flow-adjusted (where discharge is available) trend tests should be performed. Although with only 8 years of continuous data, there may not be sufficient power to detect small trends, significant trends have been detected with similar data restrictions (Glozier et al., 2019. Steeves and Glozier 2025). Trend tests would provide insight into any significant increase or decreases at EGA tributary sites. This is recommended as a near-term, subsequent step with the available data as the cumulative mean and median results suggest that there are at least some parameters that appear to have increasing/decreasing values over time. If trends are occurring, it will be more difficult to establish accumulated state for these parameters if values are shifting upwards or downwards over time but understanding if WQ in these EGA tributary sites have been changing is important for future monitoring considerations.

    - Annual and seasonal patterns in discharge for the Birch and Richardson rivers should be examined and plotted against the annual box plots, to help elucidate if the variability is linked to discharge. As well examining if sufficient information is available to estimate open water loadings to the PAD from these two sites should be assessed.

3. Future Monitoring Approaches for the five EGA tributary sites

    I) Original monitoring objectives (Table 1) for the sites should be reviewed and updated based on current stressors and pressures in the basins.

    Sites priorities:

    - As identified above, the program has largely achieved the original JOSM water quality objectives (Table 1) for the EGA tributary sites as feasibility allowed during the initial sampling years. The subsequent objectives for these sites were to depend on monitoring results and new or emerging stressors and were proposed to be transitioned to seasonal or response-based

monitoring. Rather than recommending a list of site priorities at this point, the recommended next step would be to review the results and recommendations herein, through the OSM work planning process and upcoming water quality rationalization exercises to determine if, when and how these sites should be sampled in future years.

II) Based on results presented the following monitoring design options are recommended for any future monitoring:

WQ Status and Trend reporting

- Open water sampling (May-Oct): recommend that 4 samples per open water period (e.g., May, July, Aug, Oct) could be consistently achieved and provide sufficient power for statistical analyses.

- Winter sampling (Jan-Mar): recommend that winter sampling be reduced to 1 sample/ winter (e.g., Feb-Mar) which has been consistently achievable in the Buckton and Richardson rivers. Winter sampling is not recommended for the Birch or McIvor rivers as limited success was achieved.

Loading estimates

- For Birch and Richardson rivers where there are active hydromet stations, sampling as recommended above would be sufficient for status and trend reporting. However, to achieve more accurate loading estimates, increased sampling or event sampling (with in situ automonitors) would be recommended.

- For McIvor and Buckton rivers, although spot discharge could be potentially measured at the time of sampling, installation of hydromet stations would be required to be installed to be able to calculate useful loadings estimates.

Passive sampling:

- Deploying passive sampling devices at the Birch and Richardson Rivers will require a different sampling approach than that used previously. Passive samplers in tributaries to the Athabasca are currently deployed using a design in which the sampler is mounted on a weight and deployed on the riverbed. This design may be more effective in these smaller rivers with variable water levels.

Biomonitoring (fish and BMI):

- Biomonitoring has been established in several tributaries to the PAD although not co-located at the 5 EGA tributary WQ sites. Because the habitat is less suitable for these media, it is not recommended that biomonitoring be extended to these five tributary sites at this time. If further objectives and rationale is provided, indicating the need to establish biomonitoring at these sites, alternative sampling approaches would need to be explored.

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APPENDIX A

Statistical summaries for all parameters all data over the period of record.

Table A1: Statistical Summaries – Metals 45. Highly censored (> 40% < detection limit) parameters are highlighted in red).

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BI1								
ALUMINUM DISSOLVED	48	0	0.00	120.03	99.45	72.87	21.20	381.00
ALUMINUM TOTAL	48	0	0.00	1072.40	382.50	1686.45	72.20	6830.00
ANTIMONY DISSOLVED	48	0	0.00	0.11	0.10	0.04	0.04	0.24
ANTIMONY TOTAL	48	0	0.00	0.13	0.11	0.05	0.06	0.29
ARSENIC DISSOLVED	48	0	0.00	1.45	1.32	0.75	0.22	4.63
ARSENIC TOTAL	48	0	0.00	2.40	2.07	1.39	0.30	7.61
BARIUM DISSOLVED	48	0	0.00	115.63	52.70	197.81	27.60	1150.00
BARIUM TOTAL	48	0	0.00	130.79	71.75	184.32	37.60	1060.00
BERYLLIUM DISSOLVED	48	0	0.00	0.03	0.04	0.01	0.00	0.06
BERYLLIUM TOTAL	48	0	0.00	0.09	0.05	0.10	0.01	0.46
BISMUTH DISSOLVED	48	4	8.33	0.01	0.01	0.00	0.00	0.02
BISMUTH TOTAL	48	1	2.08	0.02	0.01	0.03	0.00	0.13
BORON DISSOLVED	48	0	0.00	126.79	70.45	186.27	6.30	950.00
BORON TOTAL	48	0	0.00	130.21	70.40	200.38	6.50	1090.00
CADMIUM DISSOLVED	48	0	0.00	0.02	0.03	0.01	0.01	0.05
CADMIUM TOTAL	47	0	0.00	0.05	0.03	0.03	0.01	0.17
CERIUM DISSOLVED	48	0	0.00	0.90	0.91	0.41	0.04	2.40
CERIUM TOTAL	48	0	0.00	3.16	1.61	4.22	0.27	19.70
CESIUM DISSOLVED	48	0	0.00	0.01	0.01	0.01	0.00	0.07
CESIUM TOTAL	48	0	0.00	0.25	0.07	0.41	0.01	1.62
CHROMIUM DISSOLVED	48	0	0.00	0.39	0.40	0.12	0.09	0.77
CHROMIUM TOTAL	48	0	0.00	1.89	0.87	2.61	0.24	11.20
COBALT DISSOLVED	48	0	0.00	0.58	0.28	0.85	0.03	3.55
COBALT TOTAL	48	0	0.00	1.38	0.72	1.38	0.13	5.43
COPPER DISSOLVED	48	0	0.00	1.94	2.03	0.75	0.17	3.70
COPPER TOTAL	48	0	0.00	3.18	2.35	2.92	0.37	14.50
GALLIUM DISSOLVED	48	0	0.00	0.04	0.03	0.02	0.01	0.13
GALLIUM TOTAL	48	2	4.17	0.34	0.12	0.56	0.00	2.35
GERMANIUM DISSOLVED	48	2	4.17	0.07	0.03	0.14	0.00	0.74
GERMANIUM TOTAL	48	0	0.00	0.10	0.06	0.14	0.01	0.82
INDIUM DISSOLVED	48	30	62.50	0.00	0.00	0.00	0.00	0.00
INDIUM TOTAL	48	12	25.00	0.00	0.00	0.00	0.00	0.02
IRON DISSOLVED	48	0	0.00	2150.70	1845.00	1529.92	43.70	9320.00
IRON TOTAL	48	0	0.00	4447.23	3470.00	3074.81	237.00	14600.00
LANTHANUM DISSOLVED	48	0	0.00	0.42	0.43	0.18	0.02	1.00
LANTHANUM TOTAL	48	0	0.00	1.48	0.76	1.96	0.12	9.21
LEAD DISSOLVED	48	0	0.00	0.30	0.28	0.13	0.03	0.65
LEAD TOTAL	48	0	0.00	1.21	0.65	1.65	0.08	7.84
LITHIUM DISSOLVED	48	0	0.00	41.83	20.15	69.41	2.25	359.00
LITHIUM TOTAL	48	0	0.00	43.19	20.70	71.32	2.27	382.00
MANGANESE DISSOLVED	48	0	0.00	249.59	25.20	681.69	1.17	3340.00
MANGANESE TOTAL	48	0	0.00	313.21	85.05	688.16	7.21	3650.00
MOLYBDENUM DISSOLVED	48	0	0.00	0.56	0.51	0.29	0.20	1.54
MOLYBDENUM TOTAL	48	0	0.00	0.63	0.56	0.27	0.29	1.56
NICKEL DISSOLVED	48	0	0.00	3.58	3.73	0.85	0.72	5.48
NICKEL TOTAL	48	0	0.00	5.22	4.16	3.29	0.99	17.40
NIOBIUM DISSOLVED	48	3	6.25	0.01	0.01	0.01	0.00	0.03
NIOBIUM TOTAL	48	0	0.00	0.04	0.02	0.05	0.01	0.24
PALLADIUM DISSOLVED	21	13	61.90	0.01	0.00	0.02	0.00	0.07
PALLADIUM TOTAL	21	20	95.24	0.00	0.00	0.00	0.00	0.01
PLATINUM DISSOLVED	48	39	81.25	0.00	0.00	0.00	0.00	0.00
PLATINUM TOTAL	48	33	68.75	0.00	0.00	0.00	0.00	0.00
RUBIDIUM DISSOLVED	48	0	0.00	1.64	1.22	1.46	0.27	8.21
RUBIDIUM TOTAL	48	0	0.00	4.00	2.30	4.15	0.58	18.70
SCANDIUM DISSOLVED	48	7	14.58	0.08	0.08	0.06	0.01	0.31
SCANDIUM TOTAL	48	7	14.58	0.37	0.19	0.51	0.01	2.19
SELENIUM DISSOLVED	48	0	0.00	0.38	0.23	0.96	0.08	6.89
SELENIUM TOTAL	48	0	0.00	0.33	0.28	0.27	0.09	1.98
SILVER DISSOLVED	48	2	4.17	0.01	0.01	0.00	0.00	0.01
SILVER TOTAL	48	0	0.00	0.02	0.01	0.02	0.00	0.11
STRONTIUM DISSOLVED	48	0	0.00	411.77	189.00	746.10	50.80	4200.00
STRONTIUM TOTAL	48	0	0.00	407.08	188.50	713.59	55.80	4000.00
TELLURIUM DISSOLVED	48	25	52.08	0.03	0.01	0.05	0.01	0.24
TELLURIUM TOTAL	48	25	52.08	0.02	0.01	0.02	0.01	0.09
THALLIUM DISSOLVED	48	1	2.08	0.01	0.01	0.00	0.00	0.02
THALLIUM TOTAL	48	1	2.08	0.03	0.02	0.04	0.00	0.15
TIN DISSOLVED	48	14	29.17	0.02	0.01	0.03	0.00	0.15
TIN TOTAL	48	5	10.42	0.07	0.03	0.12	0.00	0.77
TITANIUM DISSOLVED	48	0	0.00	2.00	1.71	1.26	0.26	9.00
TITANIUM TOTAL	48	0	0.00	13.88	5.85	19.20	1.60	96.00
TUNGSTEN DISSOLVED	48	10	20.83	0.00	0.00	0.00	0.00	0.01
TUNGSTEN TOTAL	48	2	4.17	0.00	0.00	0.00	0.00	0.02
URANIUM DISSOLVED	48	0	0.00	0.38	0.28	0.21	0.19	1.08
URANIUM TOTAL	48	0	0.00	0.46	0.37	0.22	0.20	1.06
VANADIUM DISSOLVED	48	6	12.50	0.79	0.80	0.43	0.01	1.83
VANADIUM TOTAL	48	3	6.25	3.65	1.83	5.23	0.01	22.50
YTTRIUM DISSOLVED	48	0	0.00	0.90	0.93	0.35	0.04	1.99
YTTRIUM TOTAL	48	0	0.00	1.78	1.20	1.68	0.17	8.22
ZINC DISSOLVED	48	0	0.00	2.37	2.20	1.04	0.30	4.80
ZINC TOTAL	48	0	0.00	8.51	4.45	10.24	1.30	45.30
ZIRCONIUM DISSOLVED	48	1	2.08	0.87	0.90	0.29	0.04	1.50
ZIRCONIUM TOTAL	48	0	0.00	1.70	1.30	1.31	0.07	6.70

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BU1								
ALUMINUM DISSOLVED	46	1	2.17	33.40	7.35	105.03	0.25	548.00
ALUMINUM TOTAL	46	0	0.00	194.23	57.70	384.92	0.60	2050.00
ANTIMONY DISSOLVED	46	0	0.00	0.08	0.07	0.06	0.02	0.30
ANTIMONY TOTAL	46	1	2.17	0.08	0.07	0.04	0.00	0.24
ARSENIC DISSOLVED	46	0	0.00	0.70	0.61	0.40	0.26	2.35
ARSENIC TOTAL	46	0	0.00	1.49	1.28	0.96	0.44	4.54
BARIUM DISSOLVED	46	0	0.00	33.85	31.15	13.77	18.10	112.00
BARIUM TOTAL	46	0	0.00	44.36	41.90	15.53	19.80	93.50
BERYLLIUM DISSOLVED	46	1	2.17	0.01	0.01	0.01	0.00	0.05
BERYLLIUM TOTAL	46	0	0.00	0.02	0.02	0.02	0.00	0.14
BISMUTH DISSOLVED	46	32	69.57	0.00	0.00	0.00	0.00	0.01
BISMUTH TOTAL	46	12	26.09	0.00	0.00	0.01	0.00	0.04
BORON DISSOLVED	46	0	0.00	90.30	73.65	49.64	14.40	310.00
BORON TOTAL	46	0	0.00	85.16	73.05	36.56	17.10	176.00
CADMIUM DISSOLVED	46	6	13.04	0.01	0.00	0.01	0.00	0.07
CADMIUM TOTAL	45	0	0.00	0.01	0.01	0.02	0.00	0.08
CERIUM DISSOLVED	46	0	0.00	0.13	0.08	0.22	0.01	1.49
CERIUM TOTAL	46	0	0.00	0.62	0.31	0.90	0.03	5.15
CESIUM DISSOLVED	46	2	4.35	0.01	0.00	0.02	0.00	0.13
CESIUM TOTAL	46	0	0.00	0.05	0.01	0.10	0.00	0.53
CHROMIUM DISSOLVED	46	1	2.17	0.17	0.15	0.14	0.01	0.96
CHROMIUM TOTAL	46	0	0.00	0.49	0.32	0.58	0.09	3.23
COBALT DISSOLVED	46	0	0.00	0.39	0.17	0.42	0.02	1.57
COBALT TOTAL	46	0	0.00	0.70	0.50	0.54	0.12	2.03
COPPER DISSOLVED	46	2	4.35	0.52	0.34	0.75	0.01	4.67
COPPER TOTAL	46	2	4.35	0.68	0.41	0.81	0.03	4.50
GALLIUM DISSOLVED	46	0	0.00	0.02	0.01	0.05	0.00	0.20
GALLIUM TOTAL	46	2	4.35	0.08	0.03	0.13	0.00	0.70
GERMANIUM DISSOLVED	46	5	10.87	0.02	0.02	0.02	0.01	0.12
GERMANIUM TOTAL	46	5	10.87	0.03	0.02	0.02	0.01	0.08
INDIUM DISSOLVED	46	42	91.30	0.00	0.00	0.00	0.00	0.00
INDIUM TOTAL	46	30	65.22	0.00	0.00	0.00	0.00	0.03
IRON DISSOLVED	46	0	0.00	1716.58	1024.00	2199.57	86.60	9800.00
IRON TOTAL	45	0	0.00	9522.00	5090.00	11153.02	1040.00	47900.00
LANTHANUM DISSOLVED	46	0	0.00	0.06	0.04	0.11	0.00	0.77
LANTHANUM TOTAL	46	0	0.00	0.29	0.14	0.45	0.01	2.62
LEAD DISSOLVED	46	9	19.57	0.04	0.02	0.09	0.00	0.59
LEAD TOTAL	46	2	4.35	0.22	0.08	0.42	0.00	2.36
LITHIUM DISSOLVED	46	0	0.00	43.51	30.35	27.63	5.26	153.00
LITHIUM TOTAL	46	0	0.00	40.48	30.05	21.59	7.01	87.30
MANGANESE DISSOLVED	46	0	0.00	548.84	32.80	808.34	1.24	2490.00
MANGANESE TOTAL	46	0	0.00	680.09	199.00	827.05	13.30	2610.00
MOLYBDENUM DISSOLVED	46	0	0.00	0.45	0.44	0.23	0.15	1.31
MOLYBDENUM TOTAL	46	0	0.00	0.46	0.46	0.21	0.17	1.06
NICKEL DISSOLVED	46	0	0.00	2.65	2.16	2.02	0.85	12.20
NICKEL TOTAL	46	0	0.00	2.66	2.24	1.14	0.71	5.48
NIOBIUM DISSOLVED	46	11	23.91	0.00	0.00	0.00	0.00	0.02
NIOBIUM TOTAL	46	3	6.52	0.01	0.01	0.01	0.00	0.07
PALLADIUM DISSOLVED	16	16	100.00	0.00	0.00	0.00	0.00	0.00
PALLADIUM TOTAL	16	13	81.25	0.00	0.00	0.00	0.00	0.01
PLATINUM DISSOLVED	46	39	84.78	0.00	0.00	0.00	0.00	0.01
PLATINUM TOTAL	46	36	78.26	0.00	0.00	0.00	0.00	0.00
RUBIDIUM DISSOLVED	46	0	0.00	1.55	1.41	1.05	0.46	7.90
RUBIDIUM TOTAL	46	0	0.00	1.85	1.68	1.03	0.54	6.80
SCANDIUM DISSOLVED	46	6	13.04	0.05	0.03	0.06	0.01	0.27
SCANDIUM TOTAL	46	6	13.04	0.12	0.07	0.14	0.01	0.76
SELENIUM DISSOLVED	46	0	0.00	0.13	0.12	0.06	0.06	0.39
SELENIUM TOTAL	46	0	0.00	0.15	0.15	0.07	0.07	0.46
SILVER DISSOLVED	46	15	32.61	0.00	0.00	0.00	0.00	0.01
SILVER TOTAL	46	7	15.22	0.00	0.00	0.00	0.00	0.03
STRONTIUM DISSOLVED	46	0	0.00	225.48	189.00	115.52	106.00	761.00
STRONTIUM TOTAL	46	0	0.00	217.04	190.50	87.03	111.00	402.00
TELLURIUM DISSOLVED	46	30	65.22	0.01	0.01	0.01	0.01	0.05
TELLURIUM TOTAL	46	31	67.39	0.01	0.01	0.01	0.01	0.06
THALLIUM DISSOLVED	46	15	32.61	0.00	0.00	0.00	0.00	0.01
THALLIUM TOTAL	46	10	21.74	0.01	0.00	0.01	0.00	0.05
TIN DISSOLVED	46	19	41.30	0.02	0.01	0.03	0.00	0.15
TIN TOTAL	46	7	15.22	0.04	0.02	0.10	0.00	0.68
TITANIUM DISSOLVED	46	5	10.87	0.45	0.28	0.90	0.05	6.13
TITANIUM TOTAL	46	0	0.00	3.05	1.40	4.76	0.10	22.20
TUNGSTEN DISSOLVED	46	34	73.91	0.00	0.00	0.00	0.00	0.01
TUNGSTEN TOTAL	46	13	28.26	0.00	0.00	0.00	0.00	0.01
URANIUM DISSOLVED	46	0	0.00	0.14	0.12	0.10	0.02	0.57
URANIUM TOTAL	46	0	0.00	0.15	0.13	0.11	0.03	0.66
VANADIUM DISSOLVED	46	7	15.22	0.21	0.14	0.35	0.01	2.36
VANADIUM TOTAL	46	2	4.35	1.05	0.59	1.33	0.01	8.00
YTTRIUM DISSOLVED	46	0	0.00	0.20	0.16	0.15	0.06	0.76
YTTRIUM TOTAL	46	0	0.00	0.47	0.32	0.39	0.10	1.71
ZINC DISSOLVED	46	3	6.52	7.77	0.70	46.46	0.10	316.00
ZINC TOTAL	46	1	2.17	2.38	1.50	2.32	0.10	10.80
ZIRCONIUM DISSOLVED	46	2	4.35	0.35	0.30	0.25	0.05	1.44
ZIRCONIUM TOTAL	46	0	0.00	0.74	0.60	0.54	0.10	2.61

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BU2								
ALUMINUM DISSOLVED	45	2	4.44	27.56	7.20	125.68	0.25	851.00
ALUMINUM TOTAL	45	0	0.00	543.40	91.70	2755.97	16.60	18600.00
ANTIMONY DISSOLVED	45	1	2.22	0.06	0.06	0.04	0.00	0.25
ANTIMONY TOTAL	45	0	0.00	0.07	0.06	0.04	0.02	0.30
ARSENIC DISSOLVED	45	1	2.22	0.68	0.66	0.40	0.01	2.58
ARSENIC TOTAL	45	0	0.00	1.42	1.04	2.39	0.48	16.90
BARIUM DISSOLVED	45	0	0.00	63.14	58.30	31.87	0.09	241.00
BARIUM TOTAL	45	0	0.00	74.98	69.70	41.86	29.70	331.00
BERYLLIUM DISSOLVED	45	1	2.22	0.01	0.01	0.02	0.00	0.12
BERYLLIUM TOTAL	45	0	0.00	0.05	0.01	0.22	0.01	1.46
BISMUTH DISSOLVED	45	36	80.00	0.00	0.00	0.01	0.00	0.04
BISMUTH TOTAL	45	7	15.56	0.01	0.00	0.07	0.00	0.50
BORON DISSOLVED	45	0	0.00	83.02	80.90	46.98	0.50	372.00
BORON TOTAL	45	0	0.00	78.56	80.30	10.28	46.60	95.50
CADMIUM DISSOLVED	45	3	6.67	0.01	0.00	0.02	0.00	0.16
CADMIUM TOTAL	44	0	0.00	0.03	0.01	0.11	0.00	0.73
CERIUM DISSOLVED	45	0	0.00	0.20	0.07	0.74	0.00	5.04
CERIUM TOTAL	45	0	0.00	1.75	0.38	8.73	0.13	59.00
CESIUM DISSOLVED	45	4	8.89	0.01	0.00	0.04	0.00	0.25
CESIUM TOTAL	45	0	0.00	0.15	0.02	0.81	0.01	5.44
CHROMIUM DISSOLVED	45	1	2.22	0.13	0.09	0.21	0.01	1.45
CHROMIUM TOTAL	45	0	0.00	1.05	0.26	4.83	0.10	32.70
COBALT DISSOLVED	45	1	2.22	0.26	0.16	0.38	0.00	2.64
COBALT TOTAL	45	0	0.00	0.72	0.31	2.47	0.15	16.90
COPPER DISSOLVED	45	2	4.44	0.62	0.48	0.91	0.01	6.24
COPPER TOTAL	45	1	2.22	1.66	0.64	6.87	0.03	46.70
GALLIUM DISSOLVED	45	1	2.22	0.02	0.01	0.05	0.00	0.34
GALLIUM TOTAL	45	2	4.44	0.22	0.04	1.10	0.00	7.42
GERMANIUM DISSOLVED	45	12	26.67	0.02	0.01	0.01	0.01	0.07
GERMANIUM TOTAL	45	5	11.11	0.03	0.02	0.06	0.00	0.44
INDIUM DISSOLVED	45	42	93.33	0.00	0.00	0.00	0.00	0.00
INDIUM TOTAL	45	35	77.78	0.00	0.00	0.01	0.00	0.07
IRON DISSOLVED	45	0	0.00	977.72	807.00	821.84	1.30	4060.00
IRON TOTAL	45	0	0.00	3701.13	2600.00	5384.52	651.00	37700.00
LANTHANUM DISSOLVED	45	0	0.00	0.09	0.04	0.28	0.00	1.93
LANTHANUM TOTAL	45	0	0.00	0.83	0.18	4.05	0.07	27.40
LEAD DISSOLVED	45	5	11.11	0.05	0.02	0.16	0.00	1.10
LEAD TOTAL	45	0	0.00	0.75	0.14	3.90	0.04	26.30
LITHIUM DISSOLVED	45	0	0.00	30.57	28.40	18.56	0.06	145.00
LITHIUM TOTAL	45	0	0.00	28.91	29.30	4.76	19.90	45.60
MANGANESE DISSOLVED	45	0	0.00	152.52	83.90	169.82	0.41	682.00
MANGANESE TOTAL	45	0	0.00	272.60	214.00	182.16	40.30	758.00
MOLYBDENUM DISSOLVED	45	0	0.00	0.63	0.53	0.59	0.01	3.98
MOLYBDENUM TOTAL	45	0	0.00	0.63	0.60	0.39	0.22	2.40
NICKEL DISSOLVED	45	1	2.22	3.44	2.09	8.05	0.01	54.00
NICKEL TOTAL	45	0	0.00	3.49	2.26	8.30	1.03	57.80
NIOBIUM DISSOLVED	45	22	48.89	0.00	0.00	0.00	0.00	0.03
NIOBIUM TOTAL	45	2	4.44	0.02	0.01	0.06	0.00	0.38
PALLADIUM DISSOLVED	16	14	87.50	0.00	0.00	0.00	0.00	0.01
PALLADIUM TOTAL	16	16	100.00	0.00	0.00	0.00	0.00	0.00
PLATINUM DISSOLVED	45	43	95.56	0.00	0.00	0.00	0.00	0.00
PLATINUM TOTAL	45	40	88.89	0.00	0.00	0.00	0.00	0.00
RUBIDIUM DISSOLVED	45	0	0.00	1.90	1.75	1.31	0.00	9.92
RUBIDIUM TOTAL	45	0	0.00	3.21	1.87	8.21	1.30	57.00
SCANDIUM DISSOLVED	45	3	6.67	0.05	0.03	0.08	0.01	0.51
SCANDIUM TOTAL	45	6	13.33	0.24	0.06	1.17	0.01	7.91
SELENIUM DISSOLVED	45	1	2.22	0.11	0.10	0.08	0.01	0.56
SELENIUM TOTAL	45	0	0.00	0.15	0.11	0.25	0.06	1.78
SILVER DISSOLVED	45	24	53.33	0.00	0.00	0.00	0.00	0.03
SILVER TOTAL	45	5	11.11	0.01	0.00	0.03	0.00	0.23
STRONTIUM DISSOLVED	45	0	0.00	236.03	220.00	169.92	0.42	1290.00
STRONTIUM TOTAL	45	0	0.00	221.44	221.00	39.67	114.00	284.00
TELLURIUM DISSOLVED	45	32	71.11	0.01	0.01	0.01	0.01	0.04
TELLURIUM TOTAL	45	32	71.11	0.01	0.01	0.01	0.01	0.09
THALLIUM DISSOLVED	45	12	26.67	0.00	0.00	0.00	0.00	0.03
THALLIUM TOTAL	45	3	6.67	0.02	0.00	0.08	0.00	0.53
TIN DISSOLVED	45	24	53.33	0.01	0.00	0.03	0.00	0.19
TIN TOTAL	45	7	15.56	0.04	0.01	0.12	0.00	0.81
TITANIUM DISSOLVED	45	6	13.33	0.42	0.20	0.97	0.05	6.60
TITANIUM TOTAL	45	0	0.00	4.24	1.60	12.57	0.40	85.20
TUNGSTEN DISSOLVED	45	26	57.78	0.00	0.00	0.00	0.00	0.02
TUNGSTEN TOTAL	45	9	20.00	0.00	0.00	0.00	0.00	0.02
URANIUM DISSOLVED	45	0	0.00	0.21	0.17	0.20	0.00	1.35
URANIUM TOTAL	45	0	0.00	0.27	0.17	0.53	0.05	3.66
VANADIUM DISSOLVED	45	7	15.56	0.16	0.13	0.12	0.01	0.58
VANADIUM TOTAL	45	2	4.44	0.70	0.63	0.54	0.01	2.46
YTTRIUM DISSOLVED	45	0	0.00	0.24	0.11	0.76	0.00	5.23
YTTRIUM TOTAL	45	0	0.00	0.89	0.28	3.88	0.15	26.30
ZINC DISSOLVED	45	3	6.67	0.96	0.60	1.38	0.10	9.40
ZINC TOTAL	45	0	0.00	5.42	1.90	23.90	0.20	162.00
ZIRCONIUM DISSOLVED	45	1	2.22	0.25	0.20	0.25	0.05	1.80
ZIRCONIUM TOTAL	45	0	0.00	0.61	0.30	1.64	0.20	11.30

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
M10								
ALUMINUM DISSOLVED	61	0	0.00	66.38	32.70	122.29	3.50	882.00
ALUMINUM TOTAL	61	0	0.00	1273.56	816.00	1480.41	27.60	8650.00
ANTIMONY DISSOLVED	61	0	0.00	0.08	0.06	0.04	0.02	0.24
ANTIMONY TOTAL	61	0	0.00	0.10	0.08	0.12	0.00	0.89
ARSENIC DISSOLVED	61	0	0.00	0.47	0.42	0.20	0.20	1.12
ARSENIC TOTAL	61	0	0.00	1.24	0.99	1.02	0.24	6.35
BARIUM DISSOLVED	61	0	0.00	37.91	37.10	12.65	18.30	78.70
BARIUM TOTAL	61	0	0.00	59.50	49.30	39.29	22.30	275.00
BERYLLIUM DISSOLVED	61	1	1.64	0.01	0.01	0.01	0.00	0.03
BERYLLIUM TOTAL	61	0	0.00	0.08	0.05	0.08	0.00	0.49
BISMUTH DISSOLVED	61	27	44.26	0.00	0.00	0.00	0.00	0.01
BISMUTH TOTAL	61	6	9.84	0.02	0.01	0.02	0.00	0.13
BORON DISSOLVED	61	0	0.00	20.31	17.70	16.69	12.10	146.00
BORON TOTAL	61	0	0.00	21.76	19.70	16.46	13.70	145.00
CADMIUM DISSOLVED	61	0	0.00	0.01	0.01	0.01	0.00	0.03
CADMIUM TOTAL	61	0	0.00	0.04	0.03	0.04	0.00	0.25
CERIUM DISSOLVED	61	0	0.00	0.19	0.10	0.23	0.02	1.20
CERIUM TOTAL	61	0	0.00	2.43	1.56	2.52	0.07	13.70
CESIUM DISSOLVED	61	0	0.00	0.01	0.01	0.02	0.00	0.11
CESIUM TOTAL	61	0	0.00	0.29	0.17	0.32	0.01	1.78
CHROMIUM DISSOLVED	61	1	1.64	0.15	0.09	0.18	0.01	1.26
CHROMIUM TOTAL	61	0	0.00	1.91	1.22	2.25	0.08	13.80
COBALT DISSOLVED	61	0	0.00	0.06	0.04	0.07	0.01	0.44
COBALT TOTAL	61	0	0.00	0.83	0.52	0.94	0.03	5.65
COPPER DISSOLVED	61	0	0.00	1.39	1.20	0.82	0.23	4.05
COPPER TOTAL	61	0	0.00	2.88	2.11	2.72	0.12	16.30
GALLIUM DISSOLVED	61	0	0.00	0.03	0.02	0.04	0.00	0.25
GALLIUM TOTAL	61	0	0.00	0.41	0.26	0.47	0.01	2.61
GERMANIUM DISSOLVED	61	19	31.15	0.02	0.01	0.05	0.00	0.39
GERMANIUM TOTAL	61	8	13.11	0.04	0.04	0.03	0.00	0.16
INDIUM DISSOLVED	61	57	93.44	0.00	0.00	0.00	0.00	0.00
INDIUM TOTAL	61	21	34.43	0.00	0.00	0.01	0.00	0.04
IRON DISSOLVED	61	0	0.00	224.83	132.00	370.69	12.10	2770.00
IRON TOTAL	61	0	0.00	2208.98	1430.00	2379.12	114.00	13800.00
LANTHANUM DISSOLVED	61	0	0.00	0.10	0.06	0.11	0.01	0.61
LANTHANUM TOTAL	61	0	0.00	1.16	0.73	1.20	0.04	6.54
LEAD DISSOLVED	61	1	1.64	0.13	0.09	0.13	0.00	0.57
LEAD TOTAL	61	1	1.64	1.16	0.74	1.32	0.00	7.82
LITHIUM DISSOLVED	61	0	0.00	5.34	4.71	6.29	2.70	53.20
LITHIUM TOTAL	61	0	0.00	6.60	5.40	6.28	3.34	52.50
MANGANESE DISSOLVED	61	0	0.00	3.98	2.00	10.29	0.27	81.30
MANGANESE TOTAL	61	0	0.00	48.72	35.90	39.39	4.87	196.00
MOLYBDENUM DISSOLVED	61	0	0.00	0.50	0.47	0.21	0.23	1.41
MOLYBDENUM TOTAL	61	0	0.00	0.57	0.51	0.27	0.25	1.85
NICKEL DISSOLVED	61	0	0.00	1.08	0.88	0.70	0.38	3.60
NICKEL TOTAL	61	0	0.00	3.19	2.27	3.18	0.48	20.00
NIOBIUM DISSOLVED	61	32	52.46	0.00	0.00	0.02	0.00	0.12
NIOBIUM TOTAL	61	5	8.20	0.04	0.03	0.04	0.00	0.21
PALLADIUM DISSOLVED	20	20	100.00	0.00	0.00	0.00	0.00	0.00
PALLADIUM TOTAL	20	19	95.00	0.00	0.00	0.00	0.00	0.01
PLATINUM DISSOLVED	61	57	93.44	0.00	0.00	0.00	0.00	0.00
PLATINUM TOTAL	61	48	78.69	0.00	0.00	0.00	0.00	0.00
RUBIDIUM DISSOLVED	61	0	0.00	1.03	1.00	0.21	0.71	2.20
RUBIDIUM TOTAL	61	0	0.00	3.79	2.71	3.26	1.03	19.30
SCANDIUM DISSOLVED	61	21	34.43	0.03	0.02	0.04	0.01	0.26
SCANDIUM TOTAL	61	4	6.56	0.38	0.21	0.52	0.01	3.08
SELENIUM DISSOLVED	61	0	0.00	0.12	0.11	0.07	0.05	0.47
SELENIUM TOTAL	61	0	0.00	0.16	0.13	0.12	0.04	0.84
SILVER DISSOLVED	61	17	27.87	0.00	0.00	0.00	0.00	0.03
SILVER TOTAL	61	3	4.92	0.02	0.01	0.02	0.00	0.11
STRONTIUM DISSOLVED	61	0	0.00	128.47	124.00	49.76	57.80	409.00
STRONTIUM TOTAL	61	0	0.00	133.63	128.00	49.80	60.60	403.00
TELLURIUM DISSOLVED	61	48	78.69	0.01	0.01	0.00	0.01	0.02
TELLURIUM TOTAL	61	41	67.21	0.01	0.01	0.01	0.01	0.11
THALLIUM DISSOLVED	61	2	3.28	0.01	0.01	0.00	0.00	0.02
THALLIUM TOTAL	61	0	0.00	0.03	0.02	0.03	0.00	0.18
TIN DISSOLVED	61	23	37.70	0.01	0.01	0.02	0.00	0.15
TIN TOTAL	61	6	9.84	0.05	0.04	0.06	0.00	0.27
TITANIUM DISSOLVED	61	3	4.92	1.35	0.70	3.34	0.05	25.80
TITANIUM TOTAL	61	0	0.00	17.00	12.70	15.31	0.50	67.20
TUNGSTEN DISSOLVED	61	14	22.95	0.00	0.00	0.00	0.00	0.01
TUNGSTEN TOTAL	61	4	6.56	0.01	0.01	0.00	0.00	0.02
URANIUM DISSOLVED	61	0	0.00	0.25	0.23	0.13	0.04	0.73
URANIUM TOTAL	61	0	0.00	0.33	0.28	0.20	0.09	1.22
VANADIUM DISSOLVED	61	6	9.84	0.39	0.32	0.49	0.01	3.51
VANADIUM TOTAL	61	3	4.92	3.60	2.35	4.76	0.01	30.70
YTTRIUM DISSOLVED	61	0	0.00	0.14	0.09	0.15	0.02	0.85
YTTRIUM TOTAL	61	0	0.00	1.03	0.70	1.10	0.04	6.38
ZINC DISSOLVED	61	6	9.84	0.70	0.50	0.68	0.10	3.10
ZINC TOTAL	61	0	0.00	7.68	4.60	9.34	0.30	59.20
ZIRCONIUM DISSOLVED	61	17	27.87	0.17	0.10	0.21	0.01	1.20
ZIRCONIUM TOTAL	61	7	11.48	0.84	0.60	0.78	0.04	3.40

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
MC1								
ALUMINUM DISSOLVED	35	0	0.00	212.91	159.00	231.01	17.10	1280.00
ALUMINUM TOTAL	35	0	0.00	2492.45	1170.00	3510.03	34.00	18000.00
ANTIMONY DISSOLVED	35	0	0.00	0.15	0.09	0.30	0.02	1.85
ANTIMONY TOTAL	35	1	2.86	0.16	0.12	0.13	0.00	0.71
ARSENIC DISSOLVED	35	0	0.00	1.22	1.05	0.59	0.52	4.21
ARSENIC TOTAL	35	0	0.00	3.18	2.25	3.79	0.61	23.40
BARIUM DISSOLVED	35	0	0.00	27.86	25.20	13.11	16.60	93.20
BARIUM TOTAL	35	0	0.00	68.03	47.30	73.65	25.70	454.00
BERYLLIUM DISSOLVED	35	0	0.00	0.05	0.05	0.03	0.01	0.17
BERYLLIUM TOTAL	35	0	0.00	0.21	0.11	0.27	0.01	1.47
BISMUTH DISSOLVED	35	5	14.29	0.01	0.01	0.01	0.00	0.04
BISMUTH TOTAL	35	0	0.00	0.06	0.03	0.11	0.00	0.63
BORON DISSOLVED	35	0	0.00	55.97	47.20	31.46	29.60	206.00
BORON TOTAL	35	0	0.00	55.67	51.20	16.65	28.80	87.90
CADMIUM DISSOLVED	35	0	0.00	0.06	0.05	0.03	0.00	0.19
CADMIUM TOTAL	34	0	0.00	0.13	0.08	0.17	0.01	1.04
CERIUM DISSOLVED	35	0	0.00	1.43	1.24	1.03	0.11	5.53
CERIUM TOTAL	35	0	0.00	7.42	3.61	12.98	0.23	76.50
CESIUM DISSOLVED	35	0	0.00	0.04	0.02	0.06	0.00	0.36
CESIUM TOTAL	35	0	0.00	0.77	0.42	1.04	0.01	5.22
CHROMIUM DISSOLVED	35	0	0.00	0.48	0.41	0.42	0.03	2.42
CHROMIUM TOTAL	35	0	0.00	4.43	2.14	6.33	0.07	33.10
COBALT DISSOLVED	35	0	0.00	0.51	0.33	0.50	0.08	2.75
COBALT TOTAL	35	0	0.00	2.50	1.33	3.74	0.30	22.40
COPPER DISSOLVED	35	0	0.00	2.28	1.90	1.32	0.24	6.74
COPPER TOTAL	35	0	0.00	6.37	3.43	10.30	0.31	61.00
GALLIUM DISSOLVED	35	0	0.00	0.07	0.05	0.09	0.01	0.48
GALLIUM TOTAL	35	0	0.00	0.88	0.41	1.39	0.01	7.58
GERMANIUM DISSOLVED	35	2	5.71	0.03	0.03	0.02	0.01	0.08
GERMANIUM TOTAL	35	0	0.00	0.10	0.06	0.11	0.02	0.56
INDIUM DISSOLVED	35	19	54.29	0.00	0.00	0.00	0.00	0.00
INDIUM TOTAL	35	7	20.00	0.01	0.00	0.02	0.00	0.11
IRON DISSOLVED	35	0	0.00	2150.69	2080.00	1380.58	734.00	9210.00
IRON TOTAL	35	0	0.00	6692.57	4900.00	7848.70	1350.00	48300.00
LANTHANUM DISSOLVED	35	0	0.00	0.62	0.57	0.41	0.06	2.21
LANTHANUM TOTAL	35	0	0.00	3.38	1.68	5.58	0.10	32.60
LEAD DISSOLVED	35	0	0.00	0.38	0.30	0.27	0.01	1.37
LEAD TOTAL	35	0	0.00	3.19	1.39	5.98	0.04	35.10
LITHIUM DISSOLVED	35	0	0.00	16.29	13.60	9.89	7.21	65.50
LITHIUM TOTAL	35	0	0.00	18.03	15.50	6.33	9.66	43.90
MANGANESE DISSOLVED	35	0	0.00	49.99	12.80	108.32	4.24	549.00
MANGANESE TOTAL	35	0	0.00	115.76	74.70	119.84	39.70	544.00
MOLYBDENUM DISSOLVED	35	0	0.00	0.78	0.69	0.43	0.21	2.68
MOLYBDENUM TOTAL	35	0	0.00	0.92	0.84	0.43	0.21	2.84
NICKEL DISSOLVED	35	0	0.00	7.31	6.04	3.84	3.91	24.10
NICKEL TOTAL	35	0	0.00	11.70	7.77	11.70	4.15	71.20
NIOBIUM DISSOLVED	35	3	8.57	0.01	0.01	0.01	0.00	0.04
NIOBIUM TOTAL	35	0	0.00	0.07	0.05	0.08	0.00	0.33
PALLADIUM DISSOLVED	14	14	100.00	0.00	0.00	0.00	0.00	0.00
PALLADIUM TOTAL	14	12	85.71	0.00	0.00	0.01	0.00	0.03
PLATINUM DISSOLVED	35	29	82.86	0.00	0.00	0.00	0.00	0.00
PLATINUM TOTAL	35	25	71.43	0.00	0.00	0.00	0.00	0.01
RUBIDIUM DISSOLVED	35	0	0.00	1.57	1.38	0.90	0.76	5.00
RUBIDIUM TOTAL	35	0	0.00	8.74	4.45	11.28	1.16	61.20
SCANDIUM DISSOLVED	35	2	5.71	0.12	0.10	0.13	0.01	0.71
SCANDIUM TOTAL	35	3	8.57	0.96	0.47	1.53	0.01	8.50
SELENIUM DISSOLVED	35	0	0.00	0.21	0.20	0.07	0.12	0.54
SELENIUM TOTAL	35	0	0.00	0.36	0.29	0.29	0.12	1.83
SILVER DISSOLVED	35	0	0.00	0.00	0.00	0.00	0.00	0.02
SILVER TOTAL	35	1	2.86	0.03	0.02	0.06	0.00	0.32
STRONTIUM DISSOLVED	35	0	0.00	119.07	91.90	74.48	57.80	454.00
STRONTIUM TOTAL	35	0	0.00	121.86	107.00	46.77	63.80	243.00
TELLURIUM DISSOLVED	35	28	80.00	0.01	0.01	0.01	0.01	0.05
TELLURIUM TOTAL	35	14	40.00	0.02	0.01	0.03	0.01	0.13
THALLIUM DISSOLVED	35	2	5.71	0.01	0.01	0.01	0.00	0.04
THALLIUM TOTAL	35	1	2.86	0.08	0.04	0.12	0.00	0.68
TIN DISSOLVED	35	11	31.43	0.02	0.01	0.03	0.00	0.15
TIN TOTAL	35	1	2.86	0.10	0.08	0.09	0.00	0.43
TITANIUM DISSOLVED	35	0	0.00	2.50	1.90	2.14	0.20	9.82
TITANIUM TOTAL	35	0	0.00	22.95	13.70	26.02	0.60	115.00
TUNGSTEN DISSOLVED	35	15	42.86	0.00	0.00	0.00	0.00	0.02
TUNGSTEN TOTAL	35	1	2.86	0.01	0.01	0.01	0.00	0.04
URANIUM DISSOLVED	35	0	0.00	0.46	0.36	0.26	0.02	1.35
URANIUM TOTAL	35	0	0.00	0.75	0.63	0.80	0.03	5.12
VANADIUM DISSOLVED	35	5	14.29	0.94	0.85	0.97	0.01	5.67
VANADIUM TOTAL	35	2	5.71	9.24	4.25	13.01	0.01	67.80
YTTRIUM DISSOLVED	35	0	0.00	1.73	1.52	1.16	0.21	5.42
YTTRIUM TOTAL	35	0	0.00	4.19	2.48	6.20	0.26	37.20
ZINC DISSOLVED	35	1	2.86	4.44	3.90	2.90	0.10	15.80
ZINC TOTAL	35	0	0.00	23.81	12.00	36.92	1.30	215.00
ZIRCONIUM DISSOLVED	35	0	0.00	0.71	0.60	0.39	0.30	2.23
ZIRCONIUM TOTAL	35	0	0.00	2.26	1.80	1.92	0.30	8.77

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
QU1								
ALUMINUM DISSOLVED	60	0	0.00	25.91	18.05	23.54	2.70	112.00
ALUMINUM TOTAL	60	0	0.00	829.92	378.50	1324.49	42.20	7840.00
ANTIMONY DISSOLVED	60	0	0.00	0.10	0.08	0.10	0.04	0.84
ANTIMONY TOTAL	60	0	0.00	0.09	0.08	0.04	0.03	0.19
ARSENIC DISSOLVED	60	0	0.00	0.70	0.70	0.23	0.25	1.24
ARSENIC TOTAL	60	0	0.00	1.35	1.13	0.90	0.42	5.11
BARIUM DISSOLVED	60	0	0.00	57.13	53.50	10.58	46.40	96.80
BARIUM TOTAL	60	0	0.00	73.26	65.55	26.69	49.60	194.00
BERYLLIUM DISSOLVED	60	0	0.00	0.01	0.01	0.00	0.00	0.02
BERYLLIUM TOTAL	60	0	0.00	0.06	0.03	0.08	0.00	0.45
BISMUTH DISSOLVED	60	27	45.00	0.00	0.00	0.00	0.00	0.01
BISMUTH TOTAL	60	3	5.00	0.02	0.01	0.02	0.00	0.12
BORON DISSOLVED	60	0	0.00	27.24	25.10	7.10	17.70	49.30
BORON TOTAL	60	0	0.00	27.98	26.90	6.50	17.20	47.70
CADMIUM DISSOLVED	60	1	1.67	0.01	0.01	0.01	0.00	0.05
CADMIUM TOTAL	59	0	0.00	0.03	0.02	0.04	0.01	0.23
CERIUM DISSOLVED	60	0	0.00	0.14	0.10	0.10	0.02	0.42
CERIUM TOTAL	60	0	0.00	2.05	0.86	3.37	0.16	18.00
CESIUM DISSOLVED	60	0	0.00	0.01	0.00	0.00	0.00	0.03
CESIUM TOTAL	60	0	0.00	0.18	0.09	0.28	0.01	1.57
CHROMIUM DISSOLVED	60	1	1.67	0.09	0.08	0.07	0.01	0.42
CHROMIUM TOTAL	60	0	0.00	1.25	0.57	1.91	0.07	11.30
COBALT DISSOLVED	60	0	0.00	0.08	0.08	0.02	0.05	0.13
COBALT TOTAL	60	0	0.00	0.71	0.34	1.05	0.11	5.71
COPPER DISSOLVED	60	0	0.00	1.34	1.29	0.54	0.39	3.32
COPPER TOTAL	60	0	0.00	2.60	1.80	2.36	0.47	12.10
GALLIUM DISSOLVED	60	0	0.00	0.02	0.01	0.02	0.00	0.07
GALLIUM TOTAL	60	0	0.00	0.28	0.13	0.45	0.02	2.63
GERMANIUM DISSOLVED	60	18	30.00	0.01	0.01	0.01	0.00	0.02
GERMANIUM TOTAL	60	5	8.33	0.04	0.02	0.04	0.00	0.23
INDIUM DISSOLVED	60	57	95.00	0.00	0.00	0.00	0.00	0.00
INDIUM TOTAL	60	28	46.67	0.00	0.00	0.01	0.00	0.03
IRON DISSOLVED	60	0	0.00	238.02	236.50	144.36	16.80	641.00
IRON TOTAL	60	0	0.00	1831.27	905.50	2484.64	214.00	14300.00
LANTHANUM DISSOLVED	60	0	0.00	0.07	0.06	0.05	0.01	0.22
LANTHANUM TOTAL	60	0	0.00	0.96	0.43	1.53	0.09	8.30
LEAD DISSOLVED	60	1	1.67	0.10	0.08	0.07	0.00	0.29
LEAD TOTAL	60	1	1.67	0.92	0.46	1.37	0.00	6.72
LITHIUM DISSOLVED	60	0	0.00	7.46	6.78	1.71	4.98	12.00
LITHIUM TOTAL	60	0	0.00	8.33	7.69	2.18	5.32	16.20
MANGANESE DISSOLVED	60	0	0.00	7.26	3.71	9.00	0.68	48.80
MANGANESE TOTAL	60	0	0.00	73.94	46.05	86.24	14.90	466.00
MOLYBDENUM DISSOLVED	60	0	0.00	0.75	0.74	0.12	0.42	1.16
MOLYBDENUM TOTAL	60	0	0.00	0.78	0.75	0.10	0.60	1.15
NICKEL DISSOLVED	60	0	0.00	1.42	1.33	0.40	0.82	2.73
NICKEL TOTAL	60	0	0.00	2.89	1.94	2.53	1.02	14.80
NIOBIUM DISSOLVED	60	32	53.33	0.00	0.00	0.00	0.00	0.01
NIOBIUM TOTAL	60	2	3.33	0.03	0.02	0.04	0.00	0.19
PALLADIUM DISSOLVED	24	24	100.00	0.00	0.00	0.00	0.00	0.00
PALLADIUM TOTAL	24	23	95.83	0.00	0.00	0.00	0.00	0.01
PLATINUM DISSOLVED	60	55	91.67	0.00	0.00	0.00	0.00	0.00
PLATINUM TOTAL	60	50	83.33	0.00	0.00	0.00	0.00	0.00
RUBIDIUM DISSOLVED	60	0	0.00	1.02	1.01	0.24	0.63	1.47
RUBIDIUM TOTAL	60	0	0.00	2.79	1.73	2.65	0.96	15.60
SCANDIUM DISSOLVED	60	17	28.33	0.02	0.02	0.02	0.01	0.10
SCANDIUM TOTAL	60	9	15.00	0.26	0.11	0.44	0.01	2.55
SELENIUM DISSOLVED	60	0	0.00	0.15	0.15	0.03	0.08	0.25
SELENIUM TOTAL	60	0	0.00	0.19	0.17	0.05	0.13	0.43
SILVER DISSOLVED	60	23	38.33	0.00	0.00	0.01	0.00	0.07
SILVER TOTAL	60	3	5.00	0.01	0.01	0.01	0.00	0.08
STRONTIUM DISSOLVED	60	0	0.00	230.77	212.50	56.49	148.00	450.00
STRONTIUM TOTAL	60	0	0.00	235.93	218.50	54.71	153.00	437.00
TELLURIUM DISSOLVED	60	43	71.67	0.01	0.01	0.01	0.01	0.04
TELLURIUM TOTAL	60	32	53.33	0.01	0.01	0.01	0.01	0.04
THALLIUM DISSOLVED	60	1	1.67	0.00	0.01	0.00	0.00	0.01
THALLIUM TOTAL	60	0	0.00	0.02	0.01	0.03	0.00	0.16
TIN DISSOLVED	60	25	41.67	0.02	0.01	0.06	0.00	0.49
TIN TOTAL	60	10	16.67	0.05	0.03	0.07	0.00	0.51
TITANIUM DISSOLVED	60	1	1.67	0.62	0.44	0.54	0.05	2.40
TITANIUM TOTAL	60	0	0.00	11.95	6.20	16.21	0.76	91.30
TUNGSTEN DISSOLVED	60	7	11.67	0.00	0.00	0.00	0.00	0.01
TUNGSTEN TOTAL	60	4	6.67	0.01	0.01	0.00	0.00	0.03
URANIUM DISSOLVED	60	0	0.00	0.40	0.40	0.07	0.21	0.58
URANIUM TOTAL	60	0	0.00	0.45	0.43	0.13	0.23	0.98
VANADIUM DISSOLVED	60	7	11.67	0.38	0.42	0.20	0.01	0.71
VANADIUM TOTAL	60	3	5.00	2.47	1.51	3.55	0.01	21.10
YTTRIUM DISSOLVED	60	0	0.00	0.13	0.10	0.07	0.04	0.31
YTTRIUM TOTAL	60	0	0.00	0.88	0.40	1.36	0.12	6.68
ZINC DISSOLVED	60	6	10.00	0.65	0.60	0.50	0.10	2.70
ZINC TOTAL	60	0	0.00	5.59	2.40	8.26	0.60	44.40
ZIRCONIUM DISSOLVED	60	6	10.00	0.18	0.20	0.10	0.04	0.40
ZIRCONIUM TOTAL	60	0	0.00	0.69	0.50	0.68	0.10	3.66

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
RI1								
ALUMINUM DISSOLVED	59	0	0.00	9.67	8.50	5.95	3.10	42.60
ALUMINUM TOTAL	59	0	0.00	73.82	59.50	84.60	15.20	582.00
ANTIMONY DISSOLVED	59	3	5.08	0.02	0.01	0.04	0.00	0.28
ANTIMONY TOTAL	59	6	10.17	0.02	0.01	0.08	0.00	0.60
ARSENIC DISSOLVED	59	0	0.00	0.41	0.40	0.13	0.22	0.86
ARSENIC TOTAL	59	0	0.00	0.53	0.52	0.19	0.27	1.20
BARIUM DISSOLVED	59	0	0.00	10.01	8.77	5.19	7.39	47.10
BARIUM TOTAL	59	0	0.00	11.84	10.90	6.31	8.40	57.80
BERYLLIUM DISSOLVED	59	2	3.39	0.00	0.00	0.00	0.00	0.01
BERYLLIUM TOTAL	59	0	0.00	0.01	0.01	0.01	0.00	0.04
BISMUTH DISSOLVED	59	51	86.44	0.00	0.00	0.00	0.00	0.02
BISMUTH TOTAL	59	30	50.85	0.00	0.00	0.00	0.00	0.01
BORON DISSOLVED	59	0	0.00	10.32	9.90	1.69	7.80	20.30
BORON TOTAL	59	0	0.00	10.11	10.00	2.06	4.00	22.00
CADMIUM DISSOLVED	59	29	49.15	0.00	0.00	0.00	0.00	0.01
CADMIUM TOTAL	58	6	10.34	0.00	0.00	0.00	0.00	0.02
CERIUM DISSOLVED	59	0	0.00	0.05	0.05	0.03	0.03	0.20
CERIUM TOTAL	59	0	0.00	0.27	0.22	0.24	0.06	1.35
CESIUM DISSOLVED	59	29	49.15	0.00	0.00	0.00	0.00	0.01
CESIUM TOTAL	59	0	0.00	0.01	0.01	0.02	0.00	0.14
CHROMIUM DISSOLVED	59	1	1.69	0.10	0.09	0.04	0.01	0.26
CHROMIUM TOTAL	59	0	0.00	0.24	0.20	0.15	0.08	0.92
COBALT DISSOLVED	59	0	0.00	0.02	0.02	0.01	0.01	0.07
COBALT TOTAL	59	0	0.00	0.08	0.07	0.07	0.04	0.48
COPPER DISSOLVED	59	6	10.17	0.17	0.11	0.26	0.01	1.55
COPPER TOTAL	59	6	10.17	0.25	0.16	0.40	0.01	2.41
GALLIUM DISSOLVED	59	1	1.69	0.01	0.00	0.01	0.00	0.03
GALLIUM TOTAL	59	6	10.17	0.03	0.02	0.03	0.00	0.20
GERMANIUM DISSOLVED	59	33	55.93	0.01	0.01	0.00	0.00	0.02
GERMANIUM TOTAL	59	20	33.90	0.01	0.01	0.01	0.00	0.04
INDIUM DISSOLVED	59	57	96.61	0.00	0.00	0.00	0.00	0.00
INDIUM TOTAL	59	52	88.14	0.00	0.00	0.01	0.00	0.06
IRON DISSOLVED	59	0	0.00	339.64	329.00	116.63	157.00	808.00
IRON TOTAL	59	0	0.00	723.58	651.00	230.27	453.00	1850.00
LANTHANUM DISSOLVED	59	0	0.00	0.03	0.02	0.02	0.01	0.11
LANTHANUM TOTAL	59	0	0.00	0.13	0.10	0.12	0.03	0.64
LEAD DISSOLVED	59	8	13.56	0.02	0.01	0.02	0.00	0.14
LEAD TOTAL	59	2	3.39	0.06	0.05	0.09	0.00	0.69
LITHIUM DISSOLVED	59	0	0.00	2.90	2.89	0.50	2.16	6.04
LITHIUM TOTAL	59	0	0.00	2.90	2.88	0.55	2.22	6.65
MANGANESE DISSOLVED	59	0	0.00	4.50	2.14	5.94	0.71	34.50
MANGANESE TOTAL	59	0	0.00	38.19	35.40	14.56	15.30	100.00
MOLYBDENUM DISSOLVED	59	0	0.00	0.22	0.20	0.08	0.15	0.71
MOLYBDENUM TOTAL	59	0	0.00	0.23	0.20	0.08	0.13	0.72
NICKEL DISSOLVED	59	0	0.00	0.15	0.13	0.19	0.07	1.57
NICKEL TOTAL	59	0	0.00	0.25	0.20	0.31	0.09	2.50
NIOBIUM DISSOLVED	59	45	76.27	0.00	0.00	0.00	0.00	0.00
NIOBIUM TOTAL	59	8	13.56	0.00	0.00	0.00	0.00	0.02
PALLADIUM DISSOLVED	25	24	96.00	0.00	0.00	0.00	0.00	0.01
PALLADIUM TOTAL	25	22	88.00	0.00	0.00	0.00	0.00	0.01
PLATINUM DISSOLVED	59	55	93.22	0.00	0.00	0.00	0.00	0.00
PLATINUM TOTAL	59	55	93.22	0.00	0.00	0.00	0.00	0.00
RUBIDIUM DISSOLVED	59	0	0.00	0.47	0.46	0.09	0.37	0.96
RUBIDIUM TOTAL	59	0	0.00	0.58	0.53	0.25	0.40	2.25
SCANDIUM DISSOLVED	59	40	67.80	0.02	0.01	0.03	0.01	0.17
SCANDIUM TOTAL	59	14	23.73	0.04	0.02	0.06	0.01	0.27
SELENIUM DISSOLVED	59	2	3.39	0.04	0.03	0.06	0.01	0.41
SELENIUM TOTAL	59	1	1.69	0.03	0.03	0.02	0.01	0.19
SILVER DISSOLVED	59	46	77.97	0.00	0.00	0.00	0.00	0.00
SILVER TOTAL	59	38	64.41	0.00	0.00	0.00	0.00	0.01
STRONTIUM DISSOLVED	59	0	0.00	52.09	50.30	17.71	37.90	181.00
STRONTIUM TOTAL	59	0	0.00	52.27	50.50	18.49	38.10	188.00
TELLURIUM DISSOLVED	59	51	86.44	0.01	0.01	0.00	0.01	0.02
TELLURIUM TOTAL	59	50	84.75	0.01	0.01	0.00	0.01	0.02
THALLIUM DISSOLVED	59	39	66.10	0.00	0.00	0.00	0.00	0.01
THALLIUM TOTAL	59	14	23.73	0.00	0.00	0.00	0.00	0.02
TIN DISSOLVED	59	33	55.93	0.01	0.00	0.02	0.00	0.14
TIN TOTAL	59	25	42.37	0.02	0.01	0.03	0.00	0.16
TITANIUM DISSOLVED	59	0	0.00	0.36	0.30	0.13	0.20	0.80
TITANIUM TOTAL	59	0	0.00	1.98	1.70	1.61	0.40	10.00
TUNGSTEN DISSOLVED	59	0	0.00	0.02	0.02	0.01	0.00	0.04
TUNGSTEN TOTAL	59	0	0.00	0.02	0.02	0.01	0.00	0.04
URANIUM DISSOLVED	59	0	0.00	0.05	0.04	0.04	0.02	0.38
URANIUM TOTAL	59	0	0.00	0.06	0.06	0.05	0.03	0.40
VANADIUM DISSOLVED	59	7	11.86	0.31	0.33	0.15	0.01	0.64
VANADIUM TOTAL	59	3	5.08	0.58	0.56	0.29	0.01	1.91
YTTRIUM DISSOLVED	59	0	0.00	0.04	0.03	0.02	0.02	0.18
YTTRIUM TOTAL	59	0	0.00	0.11	0.09	0.09	0.03	0.61
ZINC DISSOLVED	59	20	33.90	0.42	0.20	0.66	0.10	3.60
ZINC TOTAL	59	3	5.08	0.71	0.50	0.76	0.10	4.80
ZIRCONIUM DISSOLVED	59	28	47.46	0.07	0.05	0.05	0.02	0.30
ZIRCONIUM TOTAL	59	26	44.07	0.09	0.05	0.09	0.04	0.70

Table A-2: Statistical Summaries – Major Ions. Highly censored (> 40% < detection limit) parameters are highlighted in red).

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BI1								
ALKALINITY PHENOLPHTHALEIN CACO3	2	2	100	0.05	0.05	0.00	0.05	0.05
ALKALINITY TOTAL CACO3 1	49	0	0	86.66	56.90	72.43	22.60	380.00
BICARBONATE (CALCD.)	49	0	0	105.63	69.36	88.27	27.55	462.98
CALCIUM DISSOLVED FILTERED	41	0	0	31.10	22.10	21.13	12.60	121.00
CARBONATE (CALCD.)	49	0	0	0.00	0.00	0.02	0.00	0.12
CHLORIDE DISSOLVED	49	0	0	137.67	45.50	285.16	0.77	1510.00
FLUORIDE DISSOLVED	49	0	0	0.12	0.10	0.06	0.06	0.39
FREE CO2 (CALCD.)	49	0	0	4.96	2.76	7.43	1.07	42.34
HARDNESS NON CARB (CALCD.)	49	0	0	32.90	24.87	26.97	9.71	153.10
HARDNESS TOTAL (CALCD.) CACO3	49	0	0	119.56	80.20	93.37	37.66	515.40
HYDROXIDE (CALCD.)	49	0	0	0.00	0.00	0.00	0.00	0.00
MAGNESIUM DISSOLVED FILTERED	41	0	0	9.80	6.44	8.86	3.11	51.80
OXYGEN DISSOLVED	47	0	0	7.99	8.09	3.37	0.05	13.36
PH	49	0	0	7.60	7.60	0.31	6.67	8.25
PH 1	49	0	0	7.37	7.37	0.37	6.60	8.08
POTASSIUM DISSOLVED FILTERED	41	0	0	2.00	1.43	2.11	0.47	13.00
SATURATION INDEX (CALCD.)	48	0	0	-0.92	-0.96	0.68	-2.27	0.27
SIO2	41	0	0	6.96	6.85	2.65	1.60	13.10
SODIUM ADSORPTION RATIO (CALCD.)	48	0	0	2.96	1.62	4.10	0.34	19.50
SODIUM DISSOLVED FILTERED	41	0	0	85.69	38.20	169.05	5.36	1020.00
SODIUM PERCENTAGE (CALCD.)	49	0	0	45.98	44.96	17.66	18.54	81.45
SPECIFIC CONDUCTANCE	48	0	0	599.15	329.50	967.84	85.90	5440.00
SPECIFIC CONDUCTANCE 1	49	0	0	618.19	355.00	911.03	88.00	5464.00
STABILITY INDEX (CALCD.)	48	0	0	9.45	9.53	1.15	6.97	11.57
SULPHATE DISSOLVED	49	0	0	31.98	27.60	17.19	11.30	70.80
TEMPERATURE WATER	49	0	0	12.45	15.55	8.00	-0.14	24.89
TOTAL DISSOLVED SOLIDS (CALCD.)	48	0	0	374.72	186.19	566.42	56.58	3023.34
TURBIDITY	44	0	0	28.06	15.00	35.58	4.50	189.00
TURBIDITY 1	42	0	0	31.58	15.60	40.26	5.55	163.10
TURBIDITY 2	4	0	0	79.55	19.50	126.52	10.20	269.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BU1								
ALKALINITY PHENOLPHTHALEIN CACO3	1	0	0	0.00	0.00	NA	0.00	0.00
ALKALINITY TOTAL CACO3 1	2	2	100	0.05	0.05	0.00	0.05	0.05
BICARBONATE (CALCD.)	43	0	0	157.19	151.00	81.65	40.40	336.00
CALCIUM DISSOLVED FILTERED	43	0	0	191.61	184.07	99.52	49.25	409.58
CARBONATE (CALCD.)	46	0	0	62.59	45.70	34.59	27.00	129.00
CHLORIDE DISSOLVED	43	0	0	0.01	0.00	0.03	0.00	0.12
FLUORIDE DISSOLVED	46	0	0	4.32	2.74	3.58	0.76	11.10
FREE CO2 (CALCD.)	46	0	0	0.50	0.43	0.23	0.23	1.13
HARDNESS NON CARB (CALCD.)	42	0	0	14.32	7.97	15.42	1.20	57.76
HARDNESS TOTAL (CALCD.) CACO3	43	0	0	54.90	41.21	46.87	0.00	184.40
HYDROXIDE (CALCD.)	46	0	0	224.83	170.10	117.12	102.51	440.27
MAGNESIUM DISSOLVED FILTERED	43	0	0	0.00	0.00	0.00	0.00	0.00
OXYGEN DISSOLVED	46	0	0	16.65	13.60	7.51	8.28	31.30
PH	47	0	0	4.85	5.32	2.92	0.00	11.50
PH 1	45	0	0	7.42	7.43	0.28	6.98	8.20
POTASSIUM DISSOLVED FILTERED	47	0	0	6.98	6.92	0.37	6.28	8.03
SATURATION INDEX (CALCD.)	46	0	0	2.50	2.36	1.11	0.51	4.80
SIO2	42	0	0	-0.73	-0.60	1.15	-7.60	0.14
SODIUM ADSORPTION RATIO (CALCD.)	46	0	0	12.86	11.10	7.63	1.48	27.90
SODIUM DISSOLVED FILTERED	46	0	0	0.53	0.50	0.11	0.37	0.78
SODIUM PERCENTAGE (CALCD.)	46	0	0	18.34	14.40	8.28	8.72	37.50
SPECIFIC CONDUCTANCE	46	0	0	15.30	15.36	1.46	12.26	18.63
SPECIFIC CONDUCTANCE 1	45	0	0	466.64	372.00	217.29	237.00	874.00
STABILITY INDEX (CALCD.)	47	0	0	476.57	367.50	254.29	88.50	977.00
SULPHATE DISSOLVED	42	0	0	8.72	8.44	1.21	7.56	15.19
TEMPERATURE WATER	46	0	0	74.38	60.30	49.05	5.62	181.00
TOTAL DISSOLVED SOLIDS (CALCD.)	47	0	0	9.79	12.60	7.13	-0.10	20.03
TURBIDITY	42	0	0	277.74	214.72	142.04	143.09	589.81
TURBIDITY 1	45	0	0	78.27	19.60	105.71	4.64	470.00
TURBIDITY 2	46	0	0	26.37	16.20	41.84	0.00	265.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BU2								
ALKALINITY PHENOLPHTHALEIN CACO3	2	2	100	0.05	0.05	0.00	0.05	0.05
ALKALINITY TOTAL CACO3 1	45	0	0	166.39	167.00	55.30	22.00	361.00
BICARBONATE (CALCD.)	45	0	0	202.82	203.57	67.41	26.82	440.06
CALCIUM DISSOLVED FILTERED	45	0	0	57.16	56.10	12.85	30.00	81.20
CARBONATE (CALCD.)	45	0	0	0.01	0.00	0.03	0.00	0.12
CHLORIDE DISSOLVED	45	0	0	9.27	9.61	3.44	2.35	15.60
FLUORIDE DISSOLVED	45	0	0	0.38	0.37	0.05	0.27	0.47
FREE CO2 (CALCD.)	45	0	0	7.48	2.99	9.02	1.29	45.14
HARDNESS NON CARB (CALCD.)	45	0	0	39.49	38.82	20.74	0.00	127.08
HARDNESS TOTAL (CALCD.) CACO3	45	0	0	203.58	198.88	43.76	110.40	281.39
HYDROXIDE (CALCD.)	45	0	0	0.00	0.00	0.00	0.00	0.00
MAGNESIUM DISSOLVED FILTERED	45	0	0	14.78	14.30	2.89	8.62	19.50
OXYGEN DISSOLVED	45	0	0	8.38	8.40	1.63	5.52	12.70
PH	45	0	0	7.82	7.91	0.33	7.13	8.29
PH 1	46	0	0	7.51	7.63	0.37	6.58	7.98
POTASSIUM DISSOLVED FILTERED	45	0	0	2.64	2.78	0.56	1.29	3.48
SATURATION INDEX (CALCD.)	44	0	0	-0.09	0.08	0.50	-1.56	0.74
SIO2	45	0	0	10.16	10.10	4.75	1.69	17.90
SODIUM ADSORPTION RATIO (CALCD.)	45	0	0	0.49	0.49	0.04	0.40	0.57
SODIUM DISSOLVED FILTERED	45	0	0	15.96	15.90	2.53	11.20	21.10
SODIUM PERCENTAGE (CALCD.)	45	0	0	14.56	14.41	1.42	12.21	18.27
SPECIFIC CONDUCTANCE	44	0	0	440.41	424.00	106.94	191.00	847.00
SPECIFIC CONDUCTANCE 1	46	0	0	439.03	420.05	90.03	245.80	680.00
STABILITY INDEX (CALCD.)	44	0	0	8.00	7.86	0.72	6.80	10.24
SULPHATE DISSOLVED	45	0	0	48.72	50.20	16.44	19.00	96.30
TEMPERATURE WATER	46	0	0	10.72	13.87	8.23	-0.31	21.80
TOTAL DISSOLVED SOLIDS (CALCD.)	44	0	0	259.46	249.73	58.67	139.96	414.86
TURBIDITY	44	0	0	22.56	19.30	10.93	7.50	43.10
TURBIDITY 1	45	0	0	25.78	18.60	37.88	5.50	265.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
MC1								
ALKALINITY PHENOLPHTHALEIN CACO3	2	2	100	0.05	0.05	0.00	0.05	0.05
ALKALINITY TOTAL CACO3 1	34	0	0	66.52	53.25	39.87	22.30	182.00
BICARBONATE (CALCD.)	34	0	0	81.07	64.91	48.58	27.18	221.61
CALCIUM DISSOLVED FILTERED	35	0	0	27.71	23.90	12.81	13.30	64.30
CARBONATE (CALCD.)	34	0	0	0.01	0.00	0.03	0.00	0.12
CHLORIDE DISSOLVED	35	0	0	3.04	2.36	2.25	0.74	9.88
FLUORIDE DISSOLVED	35	0	0	0.17	0.16	0.06	0.08	0.38
FREE CO2 (CALCD.)	34	0	0	2.92	2.35	1.74	1.32	9.91
HARDNESS NON CARB (CALCD.)	34	0	0	33.71	33.53	10.13	10.66	50.94
HARDNESS TOTAL (CALCD.) CACO3	35	0	0	98.70	85.41	46.20	46.71	230.96
HYDROXIDE (CALCD.)	34	0	0	0.00	0.00	0.00	0.00	0.00
MAGNESIUM DISSOLVED FILTERED	35	0	0	7.17	6.19	3.45	3.28	17.10
OXYGEN DISSOLVED	35	0	0	10.00	9.49	1.54	8.30	13.46
PH	35	0	0	7.61	7.65	0.26	7.00	8.01
PH 1	36	0	0	7.49	7.52	0.33	6.70	8.08
POTASSIUM DISSOLVED FILTERED	35	0	0	1.08	0.97	0.44	0.46	2.18
SATURATION INDEX (CALCD.)	32	0	0	-0.93	-0.96	0.58	-2.09	0.19
SIO2	35	0	0	8.33	7.38	3.06	5.51	16.20
SODIUM ADSORPTION RATIO (CALCD.)	35	0	0	0.55	0.52	0.11	0.40	0.74
SODIUM DISSOLVED FILTERED	35	0	0	12.70	11.30	5.36	6.21	25.80
SODIUM PERCENTAGE (CALCD.)	35	0	0	21.86	21.96	1.10	19.37	23.65
SPECIFIC CONDUCTANCE	34	0	0	238.53	207.50	105.65	104.00	514.00
SPECIFIC CONDUCTANCE 1	36	0	0	232.18	206.00	101.99	98.00	521.00
STABILITY INDEX (CALCD.)	32	0	0	9.49	9.68	0.95	7.57	11.33
SULPHATE DISSOLVED	35	0	0	44.61	40.40	18.02	14.90	81.20
TEMPERATURE WATER	36	0	0	13.02	15.29	7.01	-0.40	22.47
TOTAL DISSOLVED SOLIDS (CALCD.)	32	0	0	143.02	127.21	62.77	63.87	317.33
TURBIDITY	32	0	0	230.27	68.50	525.59	11.10	2260.00
TURBIDITY 1	35	0	0	122.12	54.70	170.64	6.60	750.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
M10								
ALKALINITY PHENOLPHTHALEIN CACO3	2	2	100	0.05	0.05	0.00	0.05	0.05
ALKALINITY TOTAL CACO3 1	61	0	0	66.46	66.90	18.79	28.70	99.90
BICARBONATE (CALCD.)	61	0	0	81.00	81.55	22.91	34.99	121.78
CALCIUM DISSOLVED FILTERED	56	0	0	20.18	20.25	6.37	8.11	34.20
CARBONATE (CALCD.)	61	0	0	0.00	0.00	0.02	0.00	0.12
CHLORIDE DISSOLVED	61	0	0	8.64	5.11	22.14	3.23	178.00
FLUORIDE DISSOLVED	61	0	0	0.08	0.07	0.01	0.05	0.11
FREE CO2 (CALCD.)	61	0	0	1.74	1.39	1.17	0.73	8.11
HARDNESS NON CARB (CALCD.)	61	0	0	7.30	6.20	6.96	0.00	49.83
HARDNESS TOTAL (CALCD.) CACO3	61	0	0	73.68	73.25	22.69	30.09	132.33
HYDROXIDE (CALCD.)	61	0	0	0.00	0.00	0.00	0.00	0.00
MAGNESIUM DISSOLVED FILTERED	56	0	0	5.43	5.30	1.70	2.39	11.40
OXYGEN DISSOLVED	62	0	0	11.54	9.84	9.18	7.07	81.30
PH	61	0	0	7.90	8.00	0.25	7.13	8.25
PH 1	62	0	0	7.81	7.91	0.45	6.30	8.97
POTASSIUM DISSOLVED FILTERED	56	0	0	1.18	1.12	0.25	0.87	2.02
SATURATION INDEX (CALCD.)	60	0	0	-0.77	-0.69	0.58	-2.05	0.17
SIO2	56	0	0	5.38	4.97	1.16	3.78	8.52
SODIUM ADSORPTION RATIO (CALCD.)	61	0	0	0.43	0.37	0.57	0.22	4.78
SODIUM DISSOLVED FILTERED	56	0	0	9.29	7.23	16.04	2.76	126.00
SODIUM PERCENTAGE (CALCD.)	61	0	0	18.17	16.87	6.91	11.37	67.03
SPECIFIC CONDUCTANCE	60	0	0	182.25	175.00	94.99	77.10	821.00
SPECIFIC CONDUCTANCE 1	62	0	0	171.37	171.55	47.65	63.00	255.00
STABILITY INDEX (CALCD.)	60	0	0	9.45	9.41	0.95	7.78	11.27
SULPHATE DISSOLVED	61	0	0	13.20	12.60	5.53	4.04	37.30
TEMPERATURE WATER	62	0	0	11.70	14.25	7.81	-0.07	22.98
TOTAL DISSOLVED SOLIDS (CALCD.)	60	0	0	103.58	101.16	52.18	43.98	446.70
TURBIDITY	54	0	0	50.78	26.85	75.64	2.12	490.00
TURBIDITY 1	58	0	0	46.39	23.21	71.09	-3.00	421.80
TURBIDITY 2	4	0	0	40.45	39.30	11.84	28.50	54.70

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
QU1								
ALKALINITY PHENOLPHTHALEIN CACO3	9	2	22.2	4.16	5.20	3.61	0.05	9.19
ALKALINITY TOTAL CACO3 1	60	0	0	116.56	110.00	27.66	49.50	193.00
BICARBONATE (CALCD.)	60	0	0	140.56	131.66	34.95	60.34	235.27
CALCIUM DISSOLVED FILTERED	55	0	0	36.84	34.40	7.64	26.70	60.00
CARBONATE (CALCD.)	60	0	0	0.75	0.00	2.40	0.00	11.03
CHLORIDE DISSOLVED	60	0	0	12.81	9.22	8.87	3.72	41.10
FLUORIDE DISSOLVED	60	0	0	0.10	0.10	0.01	0.07	0.16
FREE CO2 (CALCD.)	60	0	0	2.28	1.56	1.96	0.48	10.51
HARDNESS NON CARB (CALCD.)	60	0	0	14.77	13.42	7.62	0.46	57.80
HARDNESS TOTAL (CALCD.) CACO3	60	0	0	131.32	121.10	27.47	93.36	214.46
HYDROXIDE (CALCD.)	60	0	0	0.00	0.00	0.00	0.00	0.00
MAGNESIUM DISSOLVED FILTERED	55	0	0	9.81	9.14	2.10	6.12	15.70
OXYGEN DISSOLVED	61	0	0	9.49	9.40	1.66	5.53	14.08
PH	60	0	0	8.09	8.13	0.23	7.55	8.60
PH 1	62	0	0	7.97	7.99	0.47	6.74	8.77
POTASSIUM DISSOLVED FILTERED	55	0	0	1.48	1.35	0.41	0.89	2.44
SATURATION INDEX (CALCD.)	59	0	0	-0.10	-0.10	0.33	-0.77	0.51
SIO2	55	0	0	6.10	5.48	2.58	1.61	10.90
SODIUM ADSORPTION RATIO (CALCD.)	59	0	0	0.62	0.53	0.25	0.34	1.25
SODIUM DISSOLVED FILTERED	55	0	0	16.87	13.10	8.57	8.79	42.00
SODIUM PERCENTAGE (CALCD.)	60	0	0	20.25	19.31	4.62	12.93	29.77
SPECIFIC CONDUCTANCE	59	0	0	313.58	278.00	90.43	216.00	617.00
SPECIFIC CONDUCTANCE 1	62	0	0	311.92	281.75	93.11	86.00	625.00
STABILITY INDEX (CALCD.)	59	0	0	8.28	8.26	0.48	7.46	9.39
SULPHATE DISSOLVED	60	0	0	26.61	24.50	8.43	14.60	56.30
TEMPERATURE WATER	62	0	0	11.53	13.97	8.56	-0.30	24.29
TOTAL DISSOLVED SOLIDS (CALCD.)	59	0	0	179.96	156.11	53.38	116.77	344.31
TURBIDITY	55	0	0	31.70	15.00	52.57	3.61	282.00
TURBIDITY 1	58	0	0	32.24	13.20	56.01	-1.30	278.80
TURBIDITY 2	4	0	0	31.13	12.83	41.54	6.06	92.80

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
RI1								
ALKALINITY GRAN CACO3	2	0	0	43	43	0.565685	42.6	43.4
ALKALINITY PHENOLPHTHALEIN CACO3	2	2	1	0.05	0.05	0	0.05	0.05
ALKALINITY TOTAL CACO3 1	58	0	0	43.59828	42.95	7.614817	33.3	93.8
BICARBONATE (CALCD.)	58	0	0	53.1379	52.356	9.279432	40.593	114.342
CALCIUM DISSOLVED FILTERED	53	0	0	11.44321	11.6	0.858728	9.36	13.1
CARBONATE (CALCD.)	58	0	0	0.004138	0	0.022087	0	0.12
CHLORIDE DISSOLVED	60	0	0	0.721833	0.72	0.098729	0.48	0.95
FLUORIDE DISSOLVED	60	2	3.33	0.053167	0.05	0.010615	0.005	0.07
FREE CO2 (CALCD.)	58	0	0	2.514707	1.819	1.605147	0.867	7.422
HARDNESS NON CARB (CALCD.)	58	0	0	1.113534	0.6405	1.280578	0	4.651
HARDNESS TOTAL (CALCD.) CACO3	60	0	0	43.29433	43.5765	3.375428	35.929	49.755
HYDROXIDE (CALCD.)	58	0	0	0	0	0	0	0
MAGNESIUM DISSOLVED FILTERED	53	0	0	3.679245	3.74	0.261944	3.04	4.14
OXYGEN DISSOLVED	60	0	0	9.2405	9.005	1.730831	5.83	13.18
PH	60	0	0	7.567167	7.645	0.266955	6.91	8.2
PH 1	61	0	0	7.323279	7.42	0.477587	6.12	8.25
POTASSIUM DISSOLVED FILTERED	53	0	0	0.70283	0.73	0.100334	0.44	0.85
SATURATION INDEX (CALCD.)	57	0	0	-1.46882	-1.444	0.443782	-2.341	-0.367
SIO2	53	0	0	12.68491	12.6	2.589251	8.74	17.3
SODIUM ADSORPTION RATIO (CALCD.)	59	0	0	0.12	0.12	0.006695	0.1	0.13
SODIUM DISSOLVED FILTERED	53	0	0	1.815849	1.84	0.145885	1.46	2.06
SODIUM PERCENTAGE (CALCD.)	60	0	0	8.183533	8.2005	0.358806	6.723	9.115
SPECIFIC CONDUCTANCE	60	0	0	93.84667	92.1	20.91436	73.2	243
SPECIFIC CONDUCTANCE 1	62	0	0	91.0129	92	8.470808	66	107
STABILITY INDEX (CALCD.)	57	0	0	10.53382	10.476	0.689482	8.934	11.782
SULPHATE DISSOLVED	60	0	0	3.518	3.62	0.606534	1.71	4.7
TEMPERATURE WATER	62	0	0	11.19165	13.985	8.058722	-0.08	23.165
TOTAL DISSOLVED SOLIDS (CALCD.)	57	0	0	60.58535	59.699	6.461409	48.774	88.618
TURBIDITY	54	0	0	4.033704	3.98	1.189083	2.38	8.6
TURBIDITY 1	54	0	0	4.82537	4.8	4.006873	-2.2	26.4
TURBIDITY 2	5	0	0	4.732	4.96	0.928181	3.29	5.75

Table A-3: Statistical Summaries – Nutrients. Highly censored (>40% < detection limit) parameters are highlighted in red).

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BI1								
AMMONIA DISSOLVED COMBINED	48	2	4.17	0.17	0.02	0.41	0.00	2.13
AMMONIA UN IONIZED CALCD	47	0	0.00	0.00	0.00	0.00	0.00	0.01
CARBON DISSOLVED ORGANIC	49	0	0.00	35.83	34.90	6.63	23.70	50.80
CARBON PARTICULATE ORGANIC	45	0	0.00	1.80	0.83	2.28	0.07	9.46
CARBON PARTICULATE ORGANIC	3	0	0.00	3.84	0.89	5.87	0.02	10.60
CARBON PARTICULATE ORGANIC COMBINED	48	0	0.00	1.92	0.84	2.57	0.02	10.60
CARBON TOTAL ORGANIC CALCD	48	0	0.00	37.82	35.90	7.71	24.28	53.15
NITROGEN DISSOLVED NO3 NO2	49	10	20.41	0.03	0.02	0.03	0.01	0.13
NITROGEN PARTICULATE	45	2	4.44	0.18	0.10	0.23	0.01	0.94
NITROGEN PARTICULATE 007902	3	1	33.33	0.29	0.13	0.39	0.00	0.74
NITROGEN TOTAL CALCD	48	0	0.00	1.21	1.12	0.52	0.60	3.12
NITROGEN TOTAL DISSOLVED	12	0	0.00	1.25	0.96	0.55	0.67	2.15
NITROGEN TOTAL DISSOLVED 1	37	0	0.00	0.97	0.88	0.44	0.54	3.08
NITROGEN TOTAL DISSOLVED COMBINED	49	0	0.00	1.04	0.91	0.48	0.54	3.08
PHOSPHOROUS PARTICULATE CALCD	45	0	0.00	0.11	0.07	0.12	0.03	0.55
PHOSPHOROUS TOTAL	49	0	0.00	0.16	0.12	0.12	0.05	0.58
PHOSPHOROUS TOTAL DISSOLVED	49	0	0.00	0.06	0.04	0.05	0.01	0.27
RESIDUE FIXED NONFILTRABLE	49	4	8.16	56.94	10.00	107.91	0.50	402.00
RESIDUE NONFILTRABLE	49	1	2.04	64.16	14.00	117.35	2.00	444.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BU1								
AMMONIA DISSOLVED COMBINED	45	1	2.22	0.30	0.04	0.46	0.01	1.33
AMMONIA UN IONIZED CALCD	42	0	0.00	0.00	0.00	0.00	0.00	0.00
CARBON DISSOLVED ORGANIC	46	0	0.00	20.06	19.45	5.71	11.30	37.50
CARBON PARTICULATE ORGANIC	46	0	0.00	2.68	1.19	3.08	0.12	13.70
CARBON PARTICULATE ORGANIC COMBINED	46	0	0.00	2.68	1.19	3.08	0.12	13.70
CARBON TOTAL ORGANIC CALCD	45	0	0.00	22.79	21.58	6.89	11.81	39.03
NITROGEN DISSOLVED NO3 NO2	46	39	84.78	0.01	0.01	0.01	0.01	0.09
NITROGEN PARTICULATE	46	3	6.52	0.21	0.13	0.20	0.01	0.77
NITROGEN TOTAL CALCD	45	0	0.00	1.22	0.96	0.62	0.41	2.55
NITROGEN TOTAL DISSOLVED	8	0	0.00	0.90	0.75	0.60	0.42	2.35
NITROGEN TOTAL DISSOLVED 1	38	0	0.00	1.04	0.89	0.48	0.37	1.85
NITROGEN TOTAL DISSOLVED COMBINED	46	0	0.00	1.02	0.82	0.50	0.37	2.35
PHOSPHOROUS PARTICULATE CALCD	40	0	0.00	0.21	0.11	0.30	0.02	1.51
PHOSPHOROUS TOTAL	46	0	0.00	0.27	0.17	0.30	0.05	1.64
PHOSPHOROUS TOTAL DISSOLVED	46	3	6.52	0.04	0.03	0.04	0.00	0.28
RESIDUE FIXED NONFILTRABLE	46	3	6.52	23.17	10.60	25.92	0.50	98.00
RESIDUE NONFILTRABLE	46	0	0.00	32.81	19.00	34.22	2.40	140.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
BU2								
AMMONIA DISSOLVED COMBINED	45	0	0.00	0.11	0.03	0.16	0.01	0.87
AMMONIA UN IONIZED CALCD	44	0	0.00	0.00	0.00	0.00	0.00	0.00
CARBON DISSOLVED ORGANIC	45	0	0.00	16.41	15.90	3.11	11.90	25.60
CARBON PARTICULATE ORGANIC	45	0	0.00	0.90	0.82	0.60	0.07	3.66
CARBON PARTICULATE ORGANIC COMBINED	45	0	0.00	0.90	0.82	0.60	0.07	3.66
CARBON TOTAL ORGANIC CALCD	45	0	0.00	17.31	16.72	3.21	13.02	27.06
NITROGEN DISSOLVED NO3 NO2	45	18	40.00	0.12	0.01	0.18	0.01	0.62
NITROGEN PARTICULATE	45	1	2.22	0.10	0.09	0.06	0.01	0.32
NITROGEN TOTAL CALCD	45	0	0.00	0.95	0.85	0.29	0.56	1.58
NITROGEN TOTAL DISSOLVED	8	0	0.00	0.77	0.71	0.33	0.50	1.56
NITROGEN TOTAL DISSOLVED 1	37	0	0.00	0.87	0.80	0.28	0.50	1.38
NITROGEN TOTAL DISSOLVED COMBINED	45	0	0.00	0.85	0.76	0.28	0.50	1.56
PHOSPHOROUS PARTICULATE CALCD	40	0	0.00	0.09	0.08	0.05	0.03	0.24
PHOSPHOROUS TOTAL	45	0	0.00	0.13	0.12	0.05	0.06	0.32
PHOSPHOROUS TOTAL DISSOLVED	45	0	0.00	0.03	0.03	0.02	0.01	0.11
RESIDUE FIXED NONFILTRABLE	45	1	2.22	7.38	6.00	5.60	0.50	26.00
RESIDUE NONFILTRABLE	45	0	0.00	10.91	10.00	6.97	2.00	34.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
M10								
AMMONIA DISSOLVED COMBINED	62	7	11.29	0.01	0.01	0.01	0.00	0.06
AMMONIA UN IONIZED CALCD	61	0	0.00	0.00	0.00	0.00	0.00	0.00
CARBON DISSOLVED ORGANIC	61	0	0.00	6.57	5.34	3.12	2.34	15.50
CARBON PARTICULATE ORGANIC	58	0	0.00	1.36	1.03	1.21	0.06	5.01
CARBON PARTICULATE ORGANIC	4	0	0.00	1.45	1.44	0.28	1.14	1.79
CARBON PARTICULATE ORGANIC COMBINED	62	0	0.00	1.37	1.08	1.17	0.06	5.01
CARBON TOTAL ORGANIC CALCD	59	0	0.00	7.91	6.42	3.85	2.75	18.61
NITROGEN DISSOLVED NO3 NO2	61	27	44.26	0.03	0.01	0.04	0.01	0.22
NITROGEN PARTICULATE	58	4	6.90	0.16	0.12	0.15	0.01	0.72
NITROGEN PARTICULATE 007902	4	0	0.00	0.15	0.15	0.01	0.14	0.16
NITROGEN TOTAL	1	0	0.00	0.39	0.39	NA	0.39	0.39
NITROGEN TOTAL CALCD	60	0	0.00	0.43	0.37	0.21	0.17	1.11
NITROGEN TOTAL DISSOLVED	12	0	0.00	0.30	0.29	0.11	0.17	0.50
NITROGEN TOTAL DISSOLVED 1	49	0	0.00	0.26	0.25	0.11	0.10	0.57
NITROGEN TOTAL DISSOLVED COMBINED	61	0	0.00	0.27	0.25	0.11	0.10	0.57
PHOSPHOROUS PARTICULATE CALCD	50	0	0.00	0.08	0.06	0.07	0.01	0.36
PHOSPHOROUS TOTAL	62	0	0.00	0.08	0.07	0.07	0.01	0.37
PHOSPHOROUS TOTAL DISSOLVED	61	0	0.00	0.01	0.01	0.01	0.00	0.03
RESIDUE FIXED NONFILTRABLE	60	1	1.67	51.53	32.50	52.27	0.50	220.00
RESIDUE NONFILTRABLE	60	0	0.00	58.04	37.50	59.10	1.00	270.00
RESIDUE NONFILTRABLE 107251	2	0	0.00	24.15	24.15	4.88	20.70	27.60

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
MC1								
AMMONIA DISSOLVED COMBINED	34	1	2.94	0.02	0.01	0.02	0.00	0.10
AMMONIA UN IONIZED CALCD	33	0	0.00	0.00	0.00	0.00	0.00	0.00
CARBON DISSOLVED ORGANIC	34	0	0.00	28.39	27.65	9.04	11.50	54.10
CARBON PARTICULATE ORGANIC	34	0	0.00	5.40	2.13	9.54	0.32	42.80
CARBON PARTICULATE ORGANIC COMBINED	34	0	0.00	5.40	2.13	9.54	0.32	42.80
CARBON TOTAL ORGANIC CALCD	34	0	0.00	33.79	31.62	14.20	12.06	74.10
NITROGEN DISSOLVED NO3 NO2	34	16	47.06	0.03	0.01	0.08	0.01	0.34
NITROGEN PARTICULATE	34	0	0.00	0.51	0.24	0.84	0.02	3.72
NITROGEN TOTAL CALCD	34	0	0.00	1.18	0.96	0.91	0.44	4.58
NITROGEN TOTAL DISSOLVED	6	0	0.00	0.81	0.74	0.15	0.69	1.02
NITROGEN TOTAL DISSOLVED 1	28	0	0.00	0.64	0.63	0.17	0.41	0.99
NITROGEN TOTAL DISSOLVED COMBINED	34	0	0.00	0.67	0.67	0.18	0.41	1.02
PHOSPHOROUS PARTICULATE CALCD	31	0	0.00	0.29	0.19	0.37	0.05	1.69
PHOSPHOROUS TOTAL	34	0	0.00	0.33	0.24	0.35	0.09	1.72
PHOSPHOROUS TOTAL DISSOLVED	34	0	0.00	0.05	0.04	0.02	0.01	0.12
RESIDUE FIXED NONFILTRABLE	34	0	0.00	225.49	74.00	472.10	2.00	2110.00
RESIDUE NONFILTRABLE	34	0	0.00	248.49	83.50	512.13	4.00	2300.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
QU1								
AMMONIA DISSOLVED COMBINED	61	1	1.64	0.02	0.02	0.02	0.00	0.07
AMMONIA UN IONIZED CALCD	59	0	0.00	0.00	0.00	0.00	0.00	0.00
CARBON DISSOLVED ORGANIC	61	0	0.00	9.97	8.97	3.48	4.46	19.20
CARBON PARTICULATE ORGANIC	57	0	0.00	1.71	0.66	3.37	0.17	18.90
CARBON PARTICULATE ORGANIC	3	0	0.00	1.39	0.86	1.35	0.39	2.92
CARBON PARTICULATE ORGANIC COMBINED	60	0	0.00	1.69	0.67	3.29	0.17	18.90
CARBON TOTAL ORGANIC CALCD	59	0	0.00	11.72	10.37	4.79	5.38	29.50
NITROGEN DISSOLVED NO3 NO2	61	36	59.02	0.06	0.01	0.11	0.01	0.32
NITROGEN PARTICULATE	57	3	5.26	0.18	0.10	0.31	0.01	1.68
NITROGEN PARTICULATE 007902	3	0	0.00	0.29	0.27	0.24	0.06	0.54
NITROGEN TOTAL CALCD	59	0	0.00	0.60	0.53	0.32	0.20	2.05
NITROGEN TOTAL DISSOLVED	14	0	0.00	0.44	0.43	0.11	0.29	0.62
NITROGEN TOTAL DISSOLVED 1	47	0	0.00	0.40	0.37	0.15	0.17	0.79
NITROGEN TOTAL DISSOLVED COMBINED	61	0	0.00	0.41	0.41	0.15	0.17	0.79
PHOSPHOROUS PARTICULATE CALCD	55	0	0.00	0.07	0.04	0.12	0.01	0.67
PHOSPHOROUS TOTAL	61	0	0.00	0.08	0.05	0.11	0.02	0.70
PHOSPHOROUS TOTAL DISSOLVED	61	0	0.00	0.02	0.01	0.01	0.00	0.04
RESIDUE FIXED NONFILTRABLE	61	6	9.84	43.78	12.00	105.75	0.50	634.00
RESIDUE NONFILTRABLE	61	1	1.64	50.01	15.00	116.47	2.00	698.00

Parameter	Count	< MDL	% < MDL	Mean	Median	St.Dev.	Min	Max
RI1								
AMMONIA DISSOLVED COMBINED	61	9	14.75	0.02	0.01	0.02	0.00	0.08
AMMONIA UN IONIZED CALCD	59	0	0.00	0.00	0.00	0.00	0.00	0.00
CARBON DISSOLVED ORGANIC	61	0	0.00	4.92	4.33	2.61	2.08	19.00
CARBON PARTICULATE ORGANIC	56	0	0.00	1.71	1.27	1.79	0.21	10.10
CARBON PARTICULATE ORGANIC	4	0	0.00	1.44	1.34	0.27	1.23	1.83
CARBON PARTICULATE ORGANIC COMBINED	60	0	0.00	1.70	1.33	1.73	0.21	10.10
CARBON TOTAL ORGANIC CALCD	60	0	0.00	6.64	5.97	3.16	2.49	19.68
NITROGEN DISSOLVED NO3 NO2	61	23	37.70	0.03	0.01	0.04	0.01	0.12
NITROGEN PARTICULATE	56	1	1.79	0.17	0.12	0.20	0.01	1.23
NITROGEN PARTICULATE 007902	4	0	0.00	0.15	0.14	0.05	0.11	0.23
NITROGEN TOTAL CALCD	60	0	0.00	0.41	0.35	0.19	0.18	1.36
NITROGEN TOTAL DISSOLVED	16	0	0.00	0.28	0.25	0.08	0.19	0.49
NITROGEN TOTAL DISSOLVED 1	45	0	0.00	0.23	0.21	0.08	0.13	0.45
NITROGEN TOTAL DISSOLVED COMBINED	61	0	0.00	0.24	0.23	0.08	0.13	0.49
PHOSPHOROUS PARTICULATE CALCD	55	0	0.00	0.04	0.04	0.02	0.01	0.16
PHOSPHOROUS TOTAL	61	0	0.00	0.07	0.06	0.02	0.05	0.18
PHOSPHOROUS TOTAL DISSOLVED	61	0	0.00	0.03	0.03	0.01	0.02	0.08
RESIDUE FIXED NONFILTRABLE	61	5	8.20	15.80	11.00	16.80	0.50	112.00
RESIDUE NONFILTRABLE	61	0	0.00	20.92	16.40	19.67	3.00	133.00

APPENDIX B

Statistical summaries for the subset of parameters for the open water period for all sites.

Table B1. Summary stats of open water samples collected at the Birch River EGA site.

Birch River (BI1)								
Parameter	**Count**	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Q1**	**Q3**
Dissolved Arsenic	41	1.32	1.16	0.46	0.30	2.22	0.98	1.61
Dissolved Boron	41	67.12	68.80	32.91	16.80	141.00	37.40	87.50
Dissolved Calcium	36	24.89	20.80	10.34	12.60	51.10	18.58	29.73
Dissolved Chloride	42	40.60	38.30	33.07	0.77	123.00	9.59	63.35
Dissolved Nitrogen	42	0.88	0.86	0.23	0.54	1.70	0.72	1.00
Dissolved Phosphorous	42	0.04	0.03	0.02	0.01	0.11	0.03	0.05
Dissolved Selenium	41	0.23	0.23	0.07	0.08	0.36	0.19	0.28
Dissolved Sodium	36	37.65	36.45	22.48	5.36	91.00	18.73	55.95
Methyl Mercury	36	0.51	0.46	0.29	0.15	1.70	0.36	0.59
Non-Filtrable Residue	42	73.95	21.50	124.23	2.00	444.00	7.25	61.70
Non-Filtrable Residue (Fixed)	42	66.02	16.50	114.20	1.00	402.00	5.00	55.10
Total Arsenic	41	2.37	2.05	1.39	0.78	7.61	1.55	2.40
Total Boron	41	67.92	68.70	30.39	18.10	136.00	39.80	89.00
Total Dissolved Solids	41	177.62	178.60	89.64	56.58	377.15	98.23	230.35
Total Mercury	37	7.88	6.15	6.45	3.00	34.40	4.63	7.84
Total Nitrogen	42	1.09	0.98	0.38	0.60	2.04	0.79	1.26
Total Phoshorous	42	0.16	0.11	0.12	0.05	0.58	0.09	0.16
Total Selenium	41	0.30	0.29	0.12	0.09	0.71	0.22	0.33
Vanadium Dissolved	41	0.77	0.79	0.41	0.01	1.52	0.61	1.04
Vanadium Total	41	4.06	1.98	5.55	0.01	22.50	1.54	3.02

Table B2. Summary stats of open water samples collected at the Upper Buckton Creek EGA site.

Upper Buckton Creek (BU1)								
Parameter	**Count**	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Q1**	**Q3**
Dissolved Arsenic	33	0.78	0.67	0.44	0.28	2.35	0.51	0.92
Dissolved Boron	33	72.81	67.50	44.83	14.40	310.00	58.70	75.50
Dissolved Calcium	33	42.01	42.30	8.97	27.00	56.90	34.10	47.80
Dissolved Chloride	33	2.23	1.92	1.28	0.76	5.91	1.25	3.23
Dissolved Nitrogen	33	0.74	0.73	0.24	0.37	1.52	0.57	0.85
Dissolved Phosphorous	33	0.05	0.04	0.05	0.02	0.28	0.03	0.05
Dissolved Selenium	33	0.14	0.13	0.07	0.06	0.39	0.09	0.15
Dissolved Sodium	33	13.53	13.60	2.81	8.72	20.60	11.30	14.70
Methyl Mercury	30	0.30	0.21	0.25	0.06	1.25	0.16	0.42
Non-Filtrable Residue	33	18.43	9.00	24.45	2.40	106.00	4.00	19.20
Non-Filtrable Residue (Fixed)	33	12.64	7.00	19.48	1.00	81.00	2.00	13.00
Total Arsenic	33	1.14	0.92	0.64	0.44	2.94	0.66	1.44
Total Boron	33	66.23	64.80	14.55	17.10	97.50	59.70	78.30
Total Dissolved Solids	32	202.95	209.82	36.31	143.09	266.32	169.59	228.45
Total Mercury	30	1.43	1.31	0.54	0.61	2.62	1.09	1.70
Total Nitrogen	33	0.90	0.86	0.33	0.41	1.62	0.64	1.06
Total Phoshorous	33	0.17	0.12	0.14	0.05	0.69	0.08	0.22
Total Selenium	33	0.15	0.13	0.08	0.07	0.46	0.09	0.17
Vanadium Dissolved	33	0.25	0.17	0.41	0.01	2.36	0.10	0.25
Vanadium Total	33	0.98	0.49	1.49	0.01	8.00	0.32	0.92

Table B3: Summary stats of open water samples collected at the Lower Buckton Creek EGA site.

Lower Buckton Creek (BU2)								
Parameter	**Count**	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Q1**	**Q3**
Dissolved Arsenic	33	0.79	0.71	0.41	0.01	2.58	0.62	0.80
Dissolved Boron	33	82.58	76.10	54.99	0.50	372.00	70.20	87.60
Dissolved Calcium	33	51.08	53.60	8.86	30.00	68.20	46.10	57.40
Dissolved Chloride	33	8.25	7.79	3.45	2.35	15.60	6.25	9.79
Dissolved Nitrogen	33	0.71	0.67	0.18	0.50	1.16	0.57	0.79
Dissolved Phosphorous	33	0.03	0.03	0.02	0.02	0.11	0.02	0.04
Dissolved Selenium	33	0.12	0.11	0.09	0.01	0.56	0.09	0.13
Dissolved Sodium	33	14.88	14.90	1.97	11.20	19.30	13.90	16.40
Methyl Mercury	30	0.12	0.11	0.07	0.04	0.38	0.07	0.15
Non-Filtrable Residue	33	10.69	9.00	7.98	2.00	34.00	5.00	11.60
Non-Filtrable Residue (Fixed)	33	7.28	5.00	6.43	1.00	26.00	3.00	8.80
Total Arsenic	33	1.66	1.15	2.76	0.48	16.90	0.98	1.25
Total Boron	33	77.15	79.50	11.22	46.60	95.50	70.80	84.70
Total Dissolved Solids	32	230.13	236.09	35.11	139.96	282.32	213.96	254.02
Total Mercury	30	1.40	1.33	0.43	0.81	2.84	1.05	1.64
Total Nitrogen	33	0.81	0.76	0.19	0.56	1.40	0.69	0.86
Total Phoshorous	33	0.12	0.10	0.05	0.06	0.32	0.09	0.14
Total Selenium	33	0.17	0.12	0.29	0.09	1.78	0.11	0.15
Vanadium Dissolved	33	0.18	0.15	0.13	0.01	0.58	0.09	0.27
Vanadium Total	33	0.83	0.73	0.58	0.01	2.46	0.49	0.94

Table B4: Summary stats of open water samples collected at the McIvor River EGA site.

McIvor River (MC1)								
Parameter	**Count**	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Q1**	**Q3**
Dissolved Arsenic	32	1.25	1.17	0.61	0.52	4.21	0.98	1.38
Dissolved Boron	32	53.51	44.60	31.74	29.60	206.00	37.85	56.05
Dissolved Calcium	32	24.93	22.80	9.20	13.30	45.80	18.93	25.75
Dissolved Chloride	32	2.59	2.20	1.70	0.74	6.51	1.36	3.07
Dissolved Nitrogen	32	0.67	0.67	0.18	0.41	1.02	0.52	0.79
Dissolved Phosphorous	32	0.05	0.04	0.02	0.02	0.12	0.03	0.06
Dissolved Selenium	32	0.21	0.21	0.07	0.12	0.54	0.19	0.23
Dissolved Sodium	32	11.65	10.70	4.23	6.21	20.50	8.85	12.53
Methyl Mercury	30	0.58	0.46	0.32	0.23	1.34	0.34	0.84
Non-Filtrable Residue	32	263.64	90.00	524.57	6.00	2300.00	32.50	229.50
Non-Filtrable Residue (Fixed)	32	239.39	78.50	483.59	4.00	2110.00	28.50	203.50
Total Arsenic	32	3.38	2.55	3.91	0.61	23.40	1.69	3.56
Total Boron	32	53.35	49.80	15.35	28.80	82.80	42.38	62.18
Total Dissolved Solids	30	132.47	124.72	48.51	63.87	230.28	98.99	144.11
Total Mercury	30	11.63	9.05	8.57	3.05	36.50	4.91	15.10
Total Nitrogen	32	1.21	0.99	0.93	0.44	4.58	0.80	1.22
Total Phoshorous	32	0.34	0.24	0.36	0.09	1.72	0.15	0.30
Total Selenium	32	0.38	0.30	0.30	0.12	1.83	0.24	0.42
Vanadium Dissolved	32	1.00	0.87	0.99	0.01	5.67	0.61	1.09
Vanadium Total	32	10.05	6.39	13.33	0.01	67.80	1.85	12.48

Table B5: Summary stats of open water samples collected at the Richardson River EGA site.

Richardson River (RI1)								
Parameter	**Count**	**Mean**	**Median**	**St. Dev.**	**Min**	**Max**	**Q1**	**Q3**
Dissolved Arsenic	47	0.44	0.45	0.12	0.26	0.86	0.36	0.50
Dissolved Boron	47	10.47	10.30	1.83	7.80	20.30	9.65	11.20
Dissolved Calcium	42	11.23	11.30	0.82	9.36	12.50	10.73	11.98
Dissolved Chloride	48	0.70	0.71	0.09	0.48	0.88	0.63	0.76
Dissolved Nitrogen	48	0.23	0.21	0.08	0.13	0.49	0.17	0.25
Dissolved Phosphorous	48	0.03	0.03	0.01	0.02	0.08	0.02	0.03
Dissolved Selenium	47	0.03	0.03	0.03	0.01	0.19	0.02	0.03
Dissolved Sodium	42	1.78	1.82	0.14	1.46	2.06	1.71	1.87
Methyl Mercury	41	0.11	0.09	0.10	0.03	0.63	0.06	0.12
Non-Filtrable Residue	48	24.85	18.50	20.37	6.00	133.00	13.15	30.20
Non-Filtrable Residue (Fixed)	48	19.28	14.00	17.36	4.00	112.00	9.45	22.50
Total Arsenic	47	0.59	0.60	0.18	0.32	1.20	0.47	0.66
Total Boron	47	10.17	10.10	2.30	4.00	22.00	9.45	10.70
Total Dissolved Solids	47	58.89	58.32	5.78	48.77	88.62	56.24	61.17
Total Mercury	42	1.35	1.21	0.72	0.61	4.93	0.89	1.58
Total Nitrogen	48	0.43	0.38	0.21	0.18	1.36	0.32	0.46
Total Phoshorous	48	0.07	0.07	0.02	0.05	0.18	0.06	0.08
Total Selenium	47	0.04	0.03	0.03	0.01	0.19	0.03	0.04
Vanadium Dissolved	47	0.33	0.36	0.14	0.01	0.54	0.29	0.42
Vanadium Total	47	0.64	0.62	0.29	0.01	1.91	0.50	0.78