Region of Durham - Investigative Upstream Monitoring Report for Blackstock Creek and East Cross Creek

2025

KAWARTHA CONSERVATION

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About Kawartha Conservation

Who we are

We are a watershed-based organization that uses planning, stewardship, science, and conservation lands management to protect and sustain outstanding water quality and quantity supported by healthy landscapes.

Why is watershed management important?

Abundant, clean water is the lifeblood of the Kawarthas. It is essential for our quality of life, health, and continued prosperity. It supplies our drinking water, maintains property values, sustains an agricultural industry, and contributes to a tourism-based economy that relies on recreational boating, fishing, and swimming. Our programs and services promote an integrated watershed approach that balance human, environmental, and economic needs.

The community we support

We focus our programs and services within the natural boundaries of the Kawartha watershed, which extend from Lake Scugog in the southwest and Pigeon Lake in the east, to Balsam Lake in the northwest and Crystal Lake in the northeast – a total of 2,563 square kilometers.

Our history and governance

In 1979, we were established by our municipal partners under the *Ontario Conservation Authorities Act*.

The natural boundaries of our watershed overlap the six municipalities that govern Kawartha Conservation through representation on our Board of Directors. Our municipal partners include the City of Kawartha Lakes, Region of Durham, Township of Scugog, Township of Brock, Municipality of Clarington, Municipality of Trent Lakes, and Township of Cavan Monaghan.

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Acknowledgements

We would like to acknowledge that many Indigenous Nations have longstanding relationships, both historic and modern, with the territories upon which we are located.

Today, this area is home to many Indigenous peoples from across Turtle Island. We acknowledge that our watershed forms a part of the treaty and traditional territory of the south-eastern Anishinaabeg.

It is on these ancestral and Treaty lands that we live and work. To honour this legacy, we commit to being stewards of the natural environment and undertake to have a relationship of respect with our Treaty partners.

The region of Kawartha Lakes was referred to as Gau-wautae-gummauh, a glistening body of water, in anishinaabemowin. We are thankful to have an opportunity to work with Indigenous Peoples in the continued stewardship and care of this beautiful region.

This plan was written by Tanner Liang, Water Quality Specialist. Hydrology results were obtained through the Oak Ridges Morain Groundwater Monitoring Program. Others that have contributed to this project include:

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Executive Summary

From 2022 to 2024, Kawartha Conservation staff monitored twelve sites across Blackstock and (Upper) East Cross Creek for water quality for the Region of Durham Investigative Upstream Program. Other datasets of water quality, climate, hydrology, and landcover were used to provide a comprehensive water quality assessment of the Blackstock and East Cross Creek watersheds. Both watersheds are characterized as rural dominated with natural features and are a part of the geologically unique Oaks Ridges Moraine. Water flow was observed to be the highest during March and April, and lowest during August and September. Higher water levels can be found during the summer months due to storm events and their flows generally return to normal levels within 2-4 days. These water flow patterns are associated with higher loads of chloride and nitrate during the spring melt, higher loads of phosphorus during the spring melt and summer storms, and higher suspended solids during the summer storms. Water quality results indicate elevated nutrient concerns (nitrogen and phosphorus) in both watersheds. Urban pressures (chloride) were found in the lower reaches of the Blackstock Creek watershed. Long-term water quality monitoring at BSC1 indicates statistically significant increases in chloride and nitrate while no statistical trends were found for phosphorus, aluminum, and iron. Habitat fragmentation and development are of concern for both watersheds but it is most concerning for Blackstock Creek, as its upper regions are facing agricultural intensification and reduced water levels, and its lower reaches are dominated by urban pressures such as salt application and imperviousness. Further constrictions due to both pressures will negatively impact known populations of Brook trout (Salvelinus fontinalis) and Mottled sculpin (Cottus bairdii), as the increased salt and fertilizer application, reduction in natural cover in these watersheds will disrupt spawning behaviour, reduce water quality, and impact drinking water of livestock. Candidates for water quality improvement projects can be found in both watersheds specifically BSC4, BSC2, BSC5 and UEC2. Whereas UEC5 was found to be an ideal candidate for long-term water quality monitoring of a background or reference site as it has enough depth, its catchment is relatively undisturbed and is located within the East Cross Forest Conservation Area.

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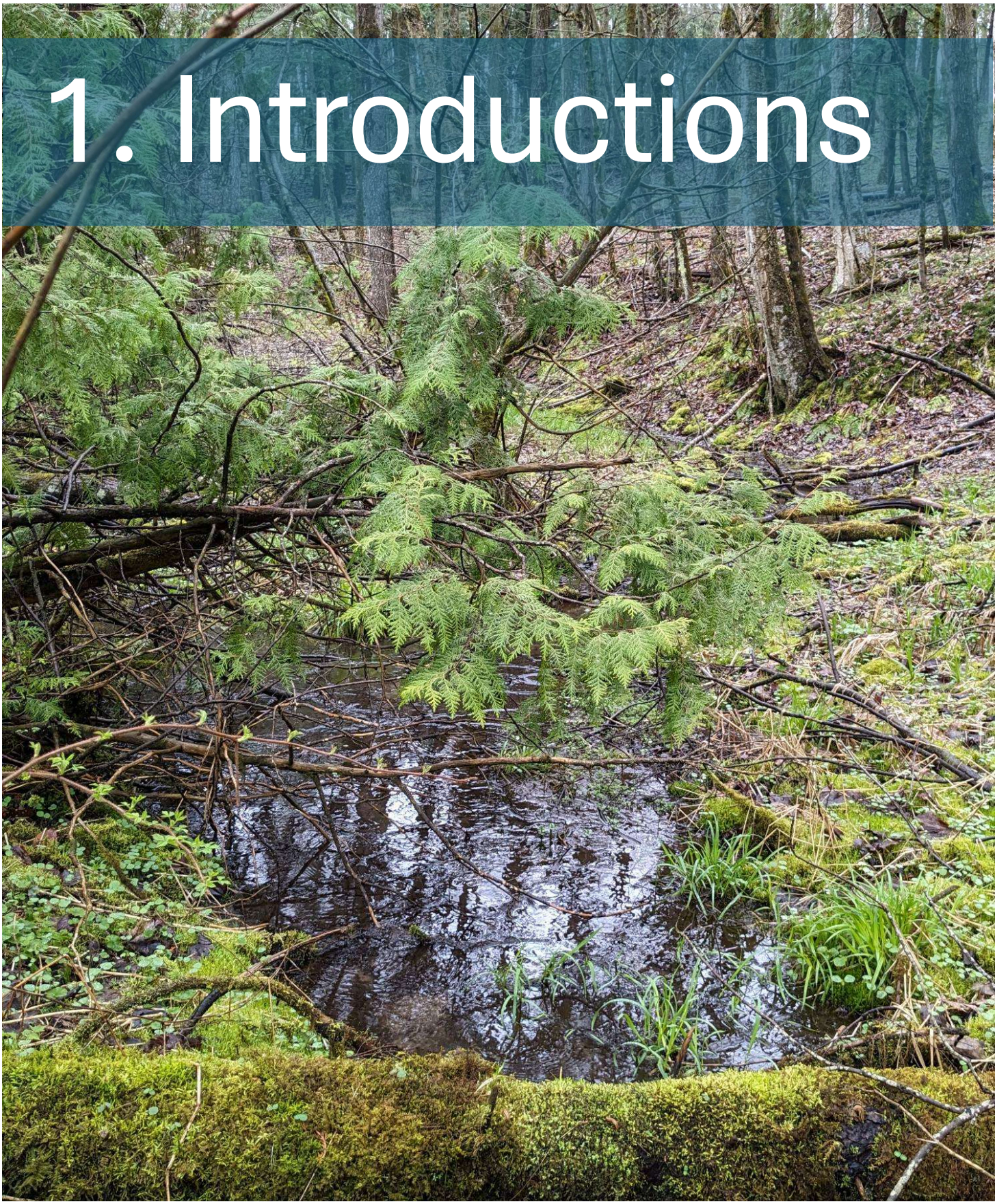
Abbreviations

%	Percentage
%CV	Percent coefficient of variation
*	Asterisk
:	Ratio
~	Approximate
<	Less-than
=	Equal
>	Greater-than
°C	Degree Celsius
µS/cm	Microsiemens per centimeter
Al	Aluminum
BSC	Blackstock Creek
Ca	Calcium
Cl	Chloride
Cond	Conductivity
CV%	Coefficient of variation
df	Degrees of freedom
DO	Dissolved oxygen
et al.	And others
Fe	Iron
Kg	Kilogram
LSEMP	Lake Scugog Environmental Management Plan
m	Meter
m^3/s	Cubic metre per second
Med	Median
Mg	Magnesium
mg/L	Milligrams per liter
n	Sample size
Na	Sodium
nd	Second
NH_3-N	Ammonia-Nitrogen
NO_2-N	Nitrate-Nitrogen
NTU	Nephelometric Turbidity unit
p	p-value
PWQO	Provincial water quality objectives
rd	Third
st	First
Temp	Temperature
TKN	Total kjeldahl nitrogen
TP	Total phosphorus
TSS	Total suspended solids
UEC	Upper East Cross Creek
ρ	Spearman's rho

1. Introductions



1.1. Project Background

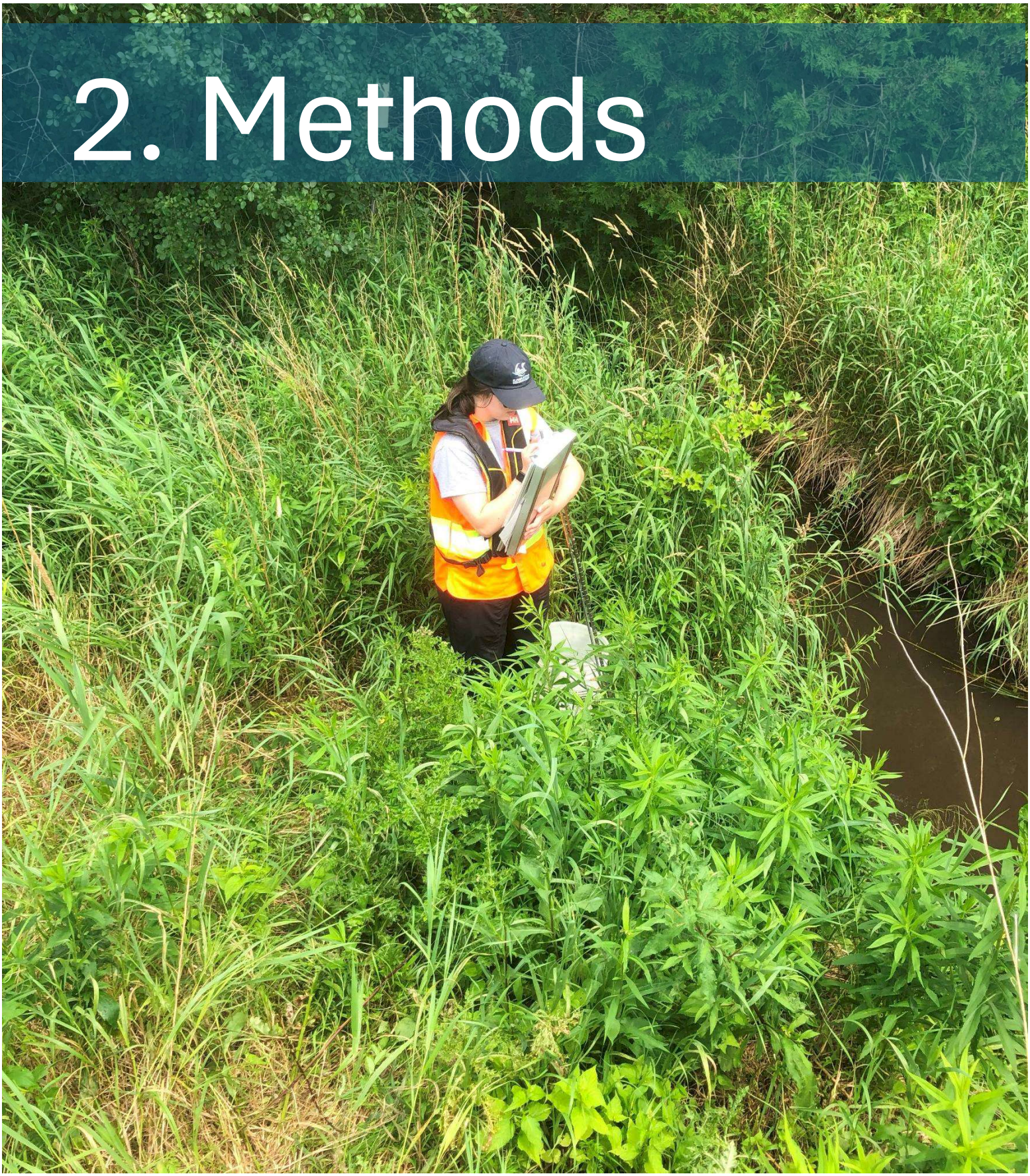
Kawartha Conservation (2010) developed the Lake Scugog Environmental Management Plan (LSEMP) to 1) characterize the Lake Scugog watershed, 2) identify any water quality issues, and 3) propose both short-term and long-term solutions that support the preservation and enhancement of ecosystem services. Complementing the LSEMP program, Kawartha Conservation also underwent comprehensive monitoring to characterize both watersheds through the Blackstock Creek Watershed Characterization Report (Kawartha Conservation, 2012a) and East Cross Creek Subwatershed Characterization Report (Kawartha Conservation, 2012b).

In the LSEMP report, the streams of concern were outlined: Cawkers Creek, Layton River, Nonquon River, and Blackstock Creek (Kawartha Conservation, 2010). These streams had provincial objective exceedances for phosphorus and thus needed additional monitoring to identify hotspots of elevated contaminant levels. In addition, both watershed characterization reports (Kawartha Conservation, 2012a,b) indicated higher exceedances throughout each watershed.

Kawartha Conservation (2023a) published the Cawkers and Williams Creek Water Quality Report which highlighted hotspots in those streams and the Layton River (Kawartha Conservation, 2024). To continue the program, Kawartha Conservation continued on to monitor Blackstock Creek (BSC) and the upper reaches of East Cross Creek (UEC).

This report aims to provide an update on the water quality of Blackstock Creek and East Cross Creek watersheds from the LSEMP and characterization reports, and to identify hotspots of elevated contaminant input. Additionally, this report aims to assess temporal trends and special trends in water quality through comparison to historical monitoring work outlined in the Blackstock Creek Characterization Plan (Kawartha Conservation, 2012a) and East Cross Creek Characterization Plan (Kawartha Conservation, 2012b), and in current work through the Provincial Water Quality Monitoring Network (PWQMN).

2. Methods



2.1. Study Area

Both Blackstock Creek and East Cross Creek watersheds are located in south central Ontario residing in the Municipalities of Durham Region and City of Kawartha Lakes (Lower reach). All monitoring efforts were conducted within Durham Region and during the ice-free period of April to November. Both watersheds exist on the Oak Ridges Moraine, an important ecological and agricultural landform.

Table 1. Site location (latitude and longitude), identification code, and site description of the twelve monitoring sites. In addition, site code from the Characterization Plans (Kawartha Conservation a, b) are also shown.

Waterbody	Site ID	Characterization Plan Site ID	Description	Latitude	Longitude
Blackstock Cr.	BSC1	BR4	PWQMN site	44.13186	-78.82870
	BSC2		Hwy 57, btw Crestview Ave and Edgerton Rd	44.11072	-78.81540
	BSC3		Hwy 57, North of Bradburn Rd/McKee Rd	44.09953	-78.81000
	BSC4	BR2A**	Bradburn Rd/McKee Rd, West of Hwy 57	44.09553	-78.81170
	BSC5		Hwy 57, North of Devitts Rd	44.08527	-78.80310
	BSC6		Old Scugog Rd. btw Byers Rd and Devitts Rd	44.07677	-78.80640
	BSC7	BR1	Byers Rd, West of Old Scugog Rd.	44.06928	-78.80640
East Cross Cr.	UEC1		Cartwright E Quarter ln. south of Parkwag	44.12149	-78.76930
	UEC2	ECC1A	Cartwright E Quarter ln. and McKee	44.10655	-78.76210
	UEC3		Devitts Rd. east of Cartwright East Quarter Ln.	44.08990	-78.77700
	UEC4		Devitts Rd. Cartwright East Quarter Ln.	44.09487	-78.75550
	UEC3	ECF3	Devitts Rd. west of East Cross Forest driveway	44.09880	-78.73920
	UEC5		Cartwright E Quarter and Mountjoy Rd.	44.08250	-78.75110
	UEC6	ECF1	In East Cross Forest CA	44.09030	-78.72890

** BR2A had only 4 observations and thus was not used for water quality comparison.

2.2. Water Quality

Monitoring efforts occurred from 2022 to 2024 during the ice free period. At each site, the grab method was used to collect surface water samples by triple-rinsing the sampling container with the targeted water. Preservatives were then used to preserve surface water samples for nutrients (sulphuric acid) and metals (nitric acid). The surface water samples were obtained from a depth of 0.15 to 0.3 m below the water's surface.

Field parameters such as Water Temperature (Temp., °C), pH, Conductivity (Cond., µS/cm), Dissolved Oxygen (DO, mg/L), and Turbidity (Turb, NTU) were all directly measured in the field using a water quality meter (YSI ProDSS). The water samples were stored at temperatures below 4°C during transport and storage. The samples were then sent to Caduceon Environmental Laboratories for chemical analysis, including Chloride (Cl mg/L), Nitrite-N (NO_2-N mg/L), Ammonia-Nitrogen (NH_3-N mg/L), Total Kjeldahl Nitrogen (TKN), Total Phosphorus (TP mg/L), Total

Suspended Solids (TSS mg/L), and Metals [Aluminum (Al mg/L), Calcium (Ca mg/L), Iron (Fe mg/L), Magnesium (Mg mg/L), and Sodium (Na mg/L)].

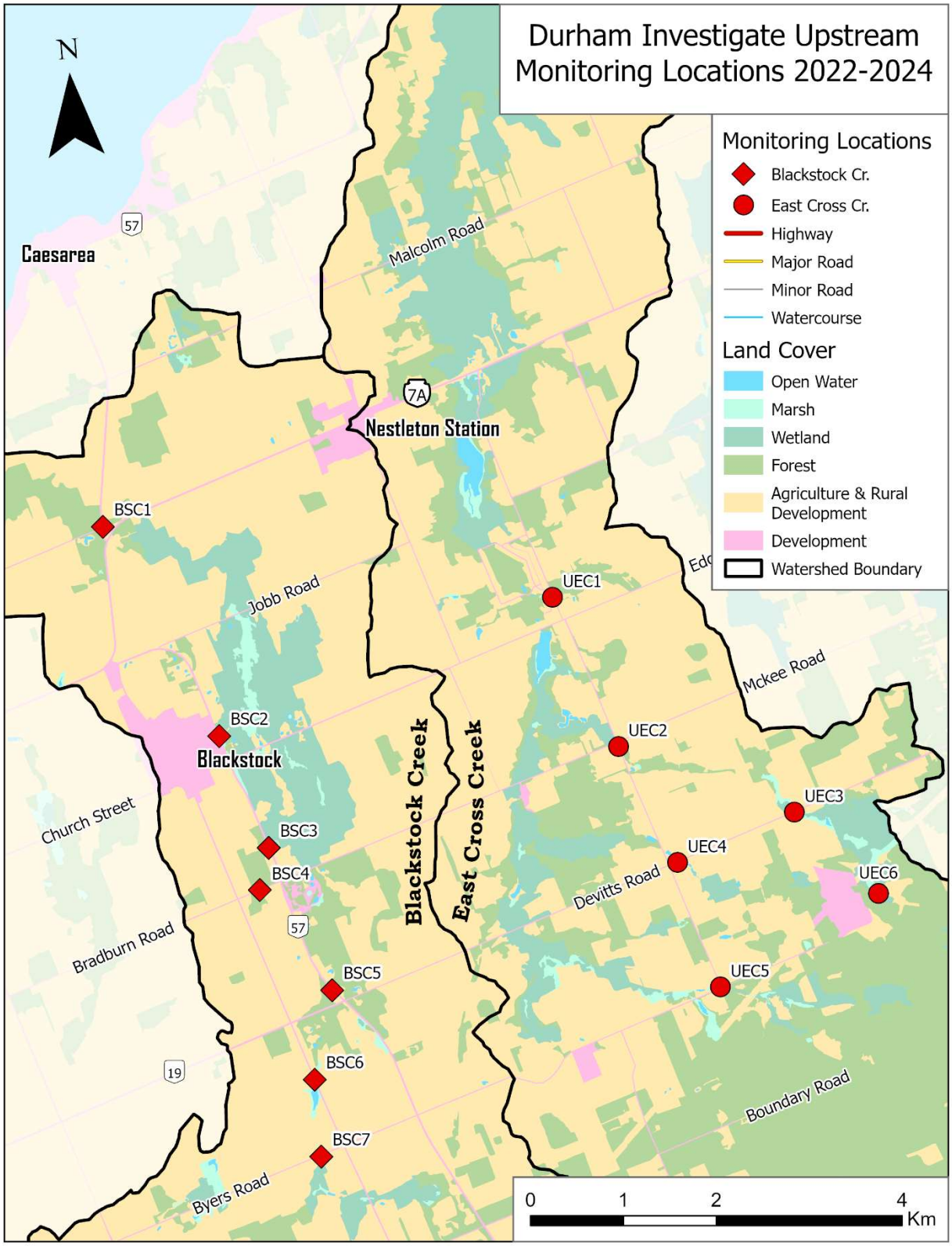


Figure 1. Map of the Blackstock and East Cross Creek watershed and their monitoring sites. General land use is also shown.

2.3. Data Analysis

Additional data sources were integrated into this project, encompassing:

- Water quality data for BSC1 was obtained through the Ministry of the Environment, Conservation and Park's Provincial Water Quality Monitoring Network.
- Historical water quality data was obtained through the Blackstock Creek Watershed Characterization Report (Kawartha Conservation, 2012a) and the East Cross Creek Subwatershed Characterization Report (Kawartha Conservation, 2012b).
- Continuous water level and physical water quality data was obtained through the Water Survey of Canada Blackstock Station (02HG003).
- Additional hydrology analysis from Oak Ridges Moraine Groundwater Program (Oak Ridges Moraine Groundwater Program, 2022).
- Climatic Data was obtained through Kawartha Conservation's precipitation network (Port Perry, Blackstock, and East Cross Forest CA – North).
- Catchment characteristics, obtained through the Southern Ontario Land Resource Information System (SOLRIS) via the Ontario Watershed Information Tool (OWIT) (Government of Ontario, 2015).
- Landcover was determined through satellite imagery (2023) digitization following the Ecological Land Classification for Southern Ontario (Lee *et al.*, 1998).
- Fisheries related data obtained through Kawartha Conservation's Biomonitoring Program (Kawartha Conservation, 2025).

All data analysis was conducted utilizing the statistical software R (R Core Team, 2021). The calculation of the Percent Coefficient of Variation (%CV) for pH adhered to the methodology outlined by Canchola *et al.*, (2017). In instances where observations were absent, values were marked as NA, while those falling below detection limits were addressed using the R package NADA (Lopaka, 2020).

It is important to note that the majority of parameters deviated significantly from a normal distribution and did not conform to linearity assumptions.

The relationships between parameters were assessed through a spearman's correlation matrix and principal component analysis. Visual representations of individual datasets are presented in the form of boxplots. Water quality results were compared to the following objectives and guidelines.

Parameter	Value
Dissolved Oxygen	9.5 mg/L for early life stages during the sensitive window of October 1 to May 31 (DFO, 2013; MNR, 2013) 6.5 mg/L for other life stages (CCME, 1999) Temperature dependent (PWQO, MOEE, 1994)

pH	< 6.5 and > 8.5 (PWQO, MOEE, 1994)
Turbidity	8 NTU increase background (CCME, 2002)
Phosphorus	0.03 mg/L for rivers and stream (PWQO, MOEE, 1994)
Ammonia	0.019 mg/L as un-ionized ammonia (CCME, 2010) 0.02 mg/L as un-ionized ammonia (PWQO, MOEE, 1994)
Nitrate	3.0 mg/L as Nitrate-nitrogen (CCME, 2012)
Total Kjeldahl Nitrogen	0.5 mg/L natural range (McNeely *et al.*, 1979)
Chloride	120 mg/L long-term (CCME, 2011)
Total Suspended Solids	25 mg/L increase from background (CCME, 2002)
Aluminum	0.075 mg/L (pH >6.5-9.0) (PWQO, MOEE, 1994)
Iron	0.3 mg/L (PWQO, MOEE, 1994)

The CCME Water Quality Index (WQI) (CCME, 2017) program was used to provide a convenient mean to summarize all water quality results. The WQI assesses the overall health of the site based on the number of parameters (such as those outlined above) that fail to meet guidelines, the frequency of the failure, and the total number of observations that fail to meet the guideline. The WQI digested the results and is able to assign the site to different categories based on the final score.

By combining the concentrations of water quality parameters obtained on the same day, considering the area of the upstream catchment, and incorporating discharge values, we can precisely calculate loadings using the following formula: *Loading = (Concentration X Discharge) / Area*. Annual loading values are derived from the summation of daily discharge values throughout the year and are expressed in kilograms per hectare per year (kg/ha/yr).

Total Nitrogen (TN) was calculated through the sum of nitrate, nitrite, and TKN. Prior to TN calculation, both nitrate-n and nitrite-n were converted to their nitrate and nitrite forms, respectively. The TN to TP (Total Phosphorus) ratios, were computed as TN / TP (by weight). Raw data can be found in **Appendix A** (Landcover) and **B** (Water Quality)**.**

3. Results and Discussion

3.1. Land use

Both watersheds can be characterized as rural dominated areas with agricultural fields containing natural features (**Figure 1**, **Table 2**). Urban development is generally low (<10%; Table 2) apart from BSC2 that has the village of Blackstock, population 786 (Statistics Canada, 2023).

Table 2. General land use information, as a percentage (%) of the watershed, and watershed size (km^2) for each monitoring location.

		(km^2)	Landcover (%)		
Watershed	**Site**	**Watershed Area**	**Natural**	**Agriculture**	**Development**
Blackstock Creek	BSC1	35.085	28.9	60	11.2
	BSC2	1.51	5.9	50.9	43.2
	BSC3	1.572	13.7	80.4	5.9
	BSC4	1.303	13.6	80.5	6
	BSC5	13.096	36.7	52.8	10.5
	BSC6	10.916	41.6	48.4	10
	BSC7	6	52.2	32.5	15.4
East Cross Creek	UEC1	2.05	17.6	78.1	4.3
	UEC2	7.01	67.3	29.2	3.5
	UEC3	4.181	90.2	6.2	3.7
	UEC4	1.508	28.8	48.2	23
	UEC5	5.671	88.7	9	2.3
	UEC6	2.905	96.5	1	2.5

Between monitoring locations, Blackstock sites have more agricultural (~60% vs. 41%) while those within the East Cross Creek watershed had more natural features (57% vs. 21%), i.e., Kawartha Conservation's Durham East Cross Forest Conservation Area.

3.2. Hydrology

It is assumed that East Cross Creek within the study area behaves similarly to Blackstock Creek as both study areas are adjacent to one another. Both watersheds share dominate similar mean elevation, slope of main channel, agriculture land cover. Thus this hydrology section will utilize field data collected and data obtained through the Water Survey of Canada network (presented via Oak Ridges Moraine Groundwater Program, 2022**)**.

During the monitoring years of 2022-2024, discharge was characterized to be lower in 2022 and 2023, and higher in 2024 than the long-term (2006-2024) averages. Higher discharge in 2024 can be attributed to frequent precipitation events from the spring to mid-summer (**Figure 2**).

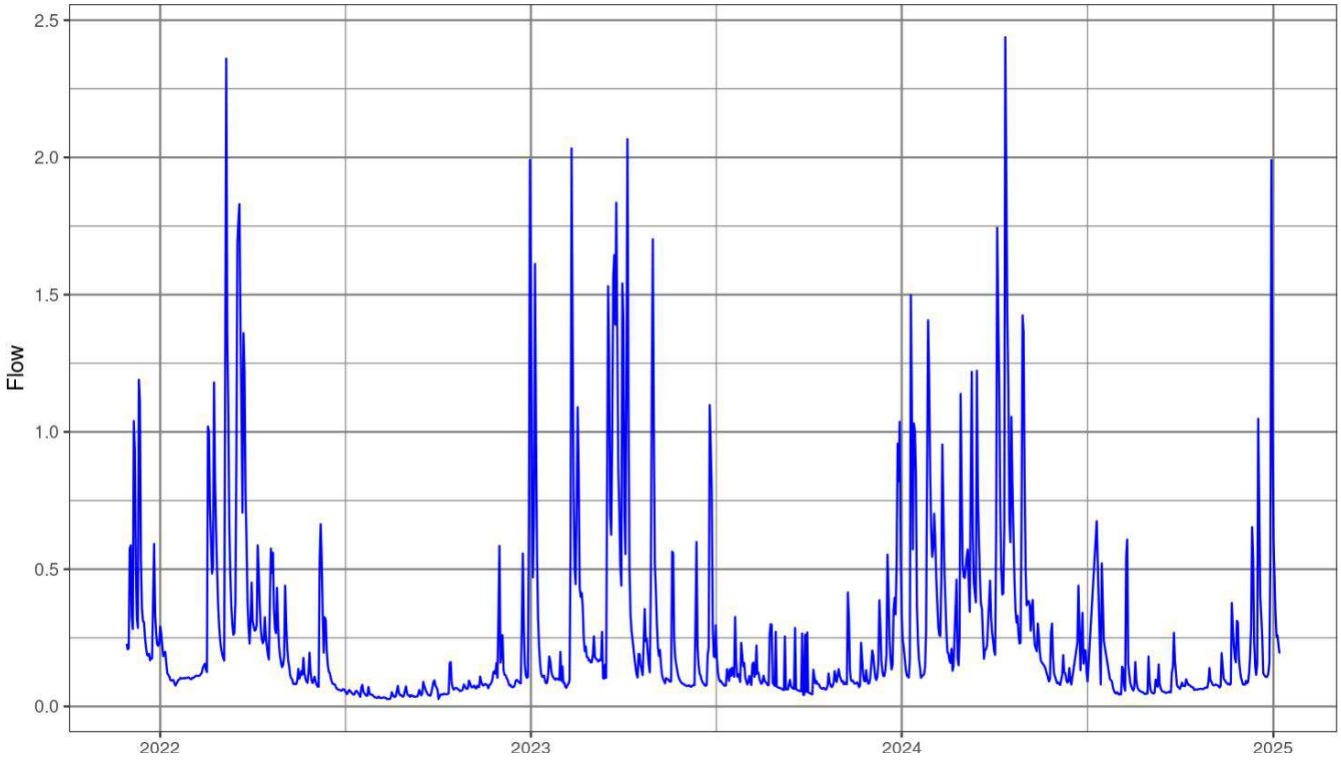


Figure 2. Flow pattern (m^3/s) at BSC1 for the three monitoring years (2022, 2023, and 2024). Graph obtained through Oak Ridges Moraine Groundwater Program (2022).

During the monitoring period, the mean and median discharge rate was 0.25 and 1.15 m^3/s. When comparing monthly discharge, the month of March (spring melt) had the highest mean and median discharge at 0.63 and 0.45 m^3/s (**Figure 2**). During this month, the 95th percentile was calculated to be 1.67 m^3/s, over twice the monthly mean and three times the monthly median discharge value, suggesting that flows are extremely variable during the spring melt (**Figure 3, 4**). Other variable periods are January (mid-winter thaw) and April (continuation of the spring melt), as well as intense summer storms (**Figure 2**, **3, 4**).

Baseflow is a period where there is a lack of precipitation, which results in much of the flows becoming dominated by groundwater input. For the monitoring area, this period usually occurs during the month of August and September, where discharge can be approximately 0.06 (median)-0.07 m^3/s (mean). During the spring melt, groundwater input (baseflow) is also increased (**Figure 3, 4**).

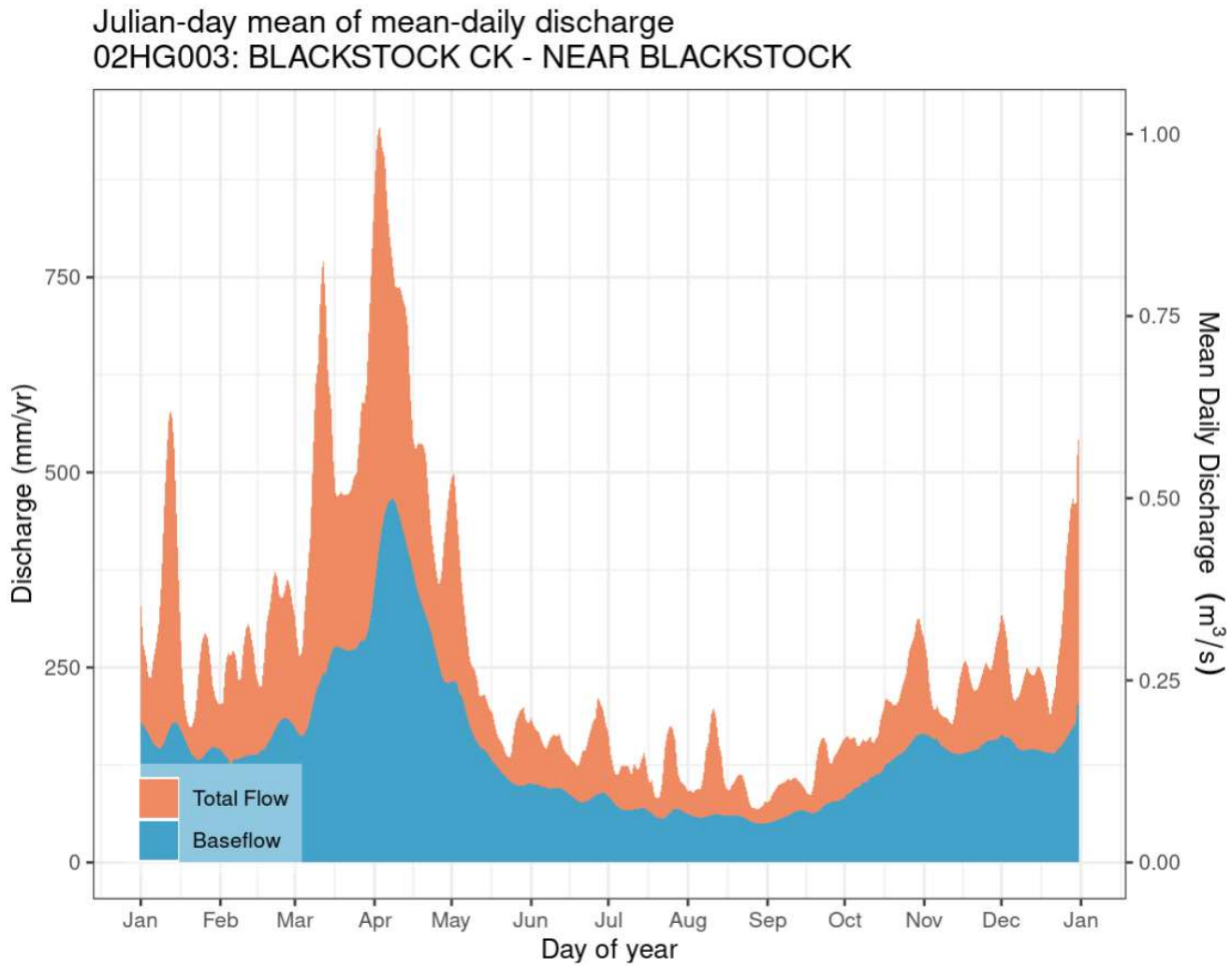


Figure 3. Discharge (m^3/s) split between total flow and baseflow at BSC1 during the year. Graph obtained through Oak Ridges Moraine Groundwater Program (2022).

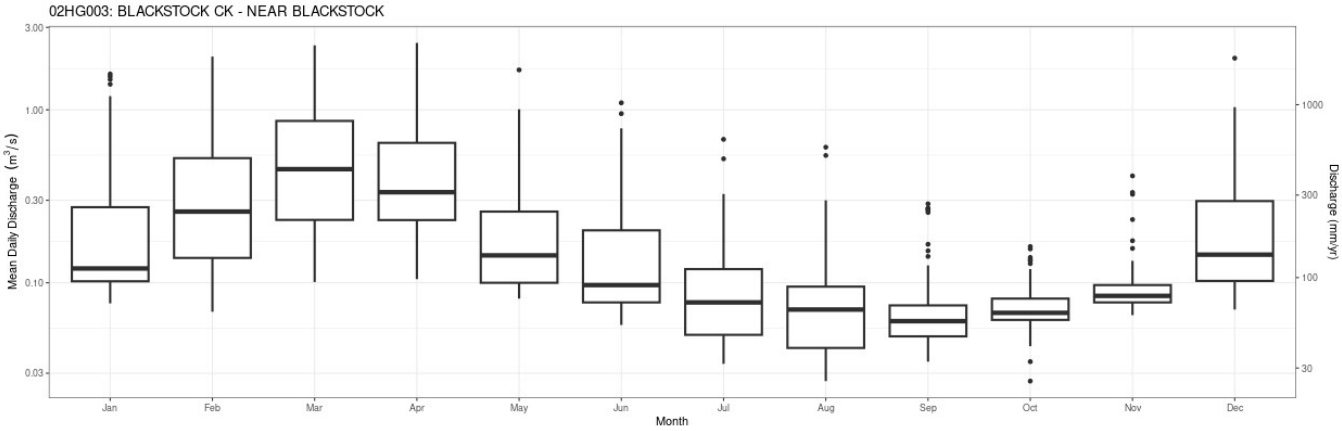


Figure 4. Discharge variation, shown as boxplots, per month at BSC1 from 2022 to 2024. Graph obtained through Oak Ridges Moraine Groundwater Program (2022).

Other notable months of low discharge are November and December. Between higher and normal flows, it is estimated that recovery from high flows (mean daily discharge > 1.0 m^3/s) to normal levels is about 2-4 days.

3.3. Water Quality

A total of 12 sites were selected for this iteration of Durham Region Investigative Upstream Monitoring. With the addition of the Provincial Water Quality Monitoring Network site, the total monitored is 13, with 7 on Blackstock Creek and 6 on East Cross Creek. Between this program and the Characterization Plans (Kawartha Conservation, 2012a, b) only 7 sites were co-located (3 on Blackstock Creek and 4 on East Cross Creek) (**Table 1**), meaning that these sites were sampled during the Characterization Plans (Kawartha Conservation, 2012a, b) and during the monitoring for this report.

3.3.1. Water Temperature and Dissolved Oxygen

Both Blackstock Creek and East Cross Creek are classified as coolwater/coldwater streams (Kawartha Conservation, 2017) and harbor endemic cool/cold water species, i.e., Brook trout (*Salvelinus fontinalis*) and Mottled sculpin (*Cottus bairdii*) (Kawartha Conservation, 2025). These sensitive species, and those within the cool/coldwater thermal regime, require higher amounts of dissolved oxygen in the water. This requirement of higher dissolved oxygen commonly occurs in cool or cold water. Higher amounts of dissolved oxygen are also needed for egg incubation and early life stages of these sensitive fish species. It is common that the sensitive window for cool/coldwater waterbodies occurs between October 1st and May 31st, (spawning months of April-May; Eakins, 2024), for this comparison, the sensitive window was extended to July 15th to accommodate the life history of Mottled sculpin. Thus, in addition to the Provincial Water Quality Objectives, we compared dissolved oxygen levels against the Canadian Water Quality Guideline for early life stages for sampling dates between October 1st and July 15th and for other life stages for period outside of that sensitive window.

When comparing the two creeks, Blackstock Creek tended to have more sites at lower dissolved oxygen levels, while East Cross Creek tended to have higher dissolved oxygen levels in its sites and throughout the year (**Figure 7**).

One observation seen in Blackstock Creek was observed lower dissolved oxygen levels found in the headwaters (**Figure 1**) at BSC6 (mean = 8.5, median = 5.6 mg/L) and BSC7 (mean = 6.6, median =5.6 mg/L) (**Figure 7**, **Table 3**). This is generally unusual as the headwater streams often are well oxygenated (Maude and Di Maio, 1996), suggesting that these head water sites have been disturbed and are not longer the typical “natural” headwater stream.

Reduction of dissolved oxygen and increase in water temperature at those sites will restrict suitable habitat for coldwater fish and their movements across the watershed. The most

consistent high oxygenated waters within Blackstock Creek were BSC3 (mean = 10.4, median = 10.2 mg/), and BSC4 (mean and median = 10.1 mg/L), marking excellent oxygenated waters for coldwater fish species (**Figure 7**, **Table 3**). An interesting note is that both Brook Trout and Mottled Sculpin were found downstream of this site (Kawartha Conservation, 2025) and thus this site should be managed properly as a coldwater stream to not cause impact downstream to existing downstream population.

During the sensitive periods of Oct 1st to July 15th when Trout spawning and egg incubation, we see that most of the dissolved oxygen levels within June and July are outside of the Canadian Water Quality Guideline of 9.5 mg/L. This may not favor the egg incubation of the mottle sculpin which requires higher dissolved oxygen later in the year.

Table 3. Summary statistics: count, mean, medium (med), and coefficient of variation percentage (CV%) of selective water quality parameters for sites on Blackstock Creek. Values for site BSC1 are only from 2021 to 2024. NA = Not Available.

		°C		µS/cm	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Site	**Stat**	**Temp.**	**pH**	**Conductivity**	**Dissolved Oxygen**	**Turbidity**	**Chloride**	**Nitrate**	**Total Kjeldahl Nitrogen**	**Total Phosphorus**	**Total Suspended Solids**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Sodium**
BSC1	Count	7	35	35	8	5	30	30	NA	29	29	19	19	19	19	19
	Mean	18.5	8.3	610	8.6	3.5	45.7	2.3	NA	0.04	2.9	34.15	155.39	232.82	38.62	26.17
	Med	17.8	8.3	606	8.6	3.5	45.9	1.9	NA	0.03	2.2	15.25	153	168.4	32	25.65
	CV%	14.5	2	6	9.3	62.3	12	54.7	NA	55.1	94.6	135.7	8.1	88.8	55.3	13.4
BSC2	Count	30	30	30	30	22	30	30	30	30	30	25	25	25	25	25
	Mean	14.7	7.9	1216	8.9	3.5	168.5	1.3	0.64	0.08	5.2	0.08	117.74	0.58	16.68	85.58
	Med	15.8	7.9	1185	9	1.6	172.5	1.2	0.7	0.08	3	0.08	120	0.42	17.2	93.9
	CV%	30.5	1.7	24	21.4	167.9	42	63.7	35.8	44.2	132.5	70.6	24.9	110.7	22	44.2
BSC3	Count	30	30	30	30	20	30	30	30	30	30	25	25	25	25	25
	Mean	11	8.2	632	10.4	1.4	25.8	7.7	0.28	0.01	4.3	0.07	93.2	0.07	16.09	9.88
	Med	11.6	8.2	619	10.2	0.3	26.5	8	0.25	0.01	3	0.06	97	0.06	16.4	10.5
	CV%	24.8	1.4	24	11.1	353.1	15.8	20.4	46.3	70.5	82.7	45.3	22	64.3	10.1	28
BSC4	Count	29	29	29	29	19	28	28	28	28	28	25	25	25	25	25
	Mean	10	7.8	658	10.1	1.6	23.8	8.2	0.21	0.01	5.6	0.07	93.52	0.06	15.88	8.48
	Med	10.3	7.7	627	10.1	0.4	24.6	8.4	0.2	0.01	3	0.07	98.4	0.04	16.4	9.2
	CV%	15.1	1.4	22	6.9	248.2	20	22.5	53.5	72.5	107.2	29.5	22.8	73.3	13.4	29
BSC5	Count	30	30	30	30	25	32	32	32	32	32	25	25	25	25	25
	Mean	12.9	8	638	9.7	2.3	53.9	3.1	0.48	0.03	4.8	0.07	81.97	0.15	14.48	26.96
	Med	13.8	8	634	9.5	1.2	54	3.2	0.45	0.03	4	0.07	84.2	0.11	14.9	26.3
	CV%	29.4	1.4	22	13.5	131.8	47.9	30	50.2	67.9	61.6	36.9	24.2	67.7	24.3	66.1
BSC6	Count	23	23	23	23	19	23	23	23	23	23	20	20	20	20	20
	Mean	14.7	7.8	566	8.5	4.2	26	0.7	0.97	0.06	11.7	0.08	87.76	0.72	8.22	12.18
	Med	16	7.7	545	7.6	1.8	27.2	0.5	0.9	0.04	7	0.07	90.5	0.7	8.06	11.9
	CV%	36.3	4.5	27	27	192.6	41.5	72.1	41	134.5	141.2	37.8	32.4	50.1	17.8	43.1
BSC7	Count	25	25	25	25	18	26	26	26	26	26	22	22	22	22	22
	Mean	15.6	7.6	519	6.6	3.5	16.5	0.4	0.9	0.08	5.7	0.05	80.77	1.29	7.53	8.15

	Med	16.5	7.6	493	5.6	0.9	16.8	0.1	0.85	0.05	2.5	0.05	83.5	0.24	7.64	8.5
	CV%	37.3	4.7	29	35.6	221.1	30.7	157.4	40.1	169.9	170	28.7	30.7	271.4	22.6	28.2

Table 4. Summary statistics: count, mean, medium (med), and coefficient of variation percentage (CV%) of selective water quality parameters for sites on East Cross Creek.

		°C		µS/cm	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Site	**Stat**	**Temp.**	**pH**	**Conductivity**	**Dissolved Oxygen**	**Turbidity**	**Chloride**	**Nitrate**	**Total Kjeldahl Nitrogen**	**Total Phosphorus**	**Total Suspended Solids**	**Aluminum**	**Calcium**	**Iron**	**Magnesium**	**Sodium**
UEC2	Count	27	27	27	27	18	27	27	27	27	27	25	25	25	25	25
	Mean	10.4	8	506	10.3	1.1	14	6.2	0.31	0.02	5.2	0.06	81.96	0.08	11.72	4.55
	Med	10.7	8	496	10.2	0.4	13.7	6.6	0.22	0.01	3	0.06	83.95	0.06	11.9	4.45
	CV%	21.3	1.5	21	10.5	184.7	24.8	30.6	73.6	117.8	101.4	36.6	23.3	86.5	17.3	36.9
UEC3	Count	28	29	29	29	22	29	29	29	29	29	24	24	24	24	24
	Mean	15.4	7.9	397	9.6	4.7	5	0.8	0.37	0.02	8.8	0.05	71.94	0.22	8.6	3.41
	Med	15.7	8	382	9.6	2.1	3.6	0.3	0.3	0.02	5	0.05	73.5	0.19	7.98	3.1
	CV%	34.9	2.8	21	22.1	152.7	106.8	255.2	83.4	115.2	124.5	34.4	24.9	58.4	28.6	54.3
UEC4	Count	31	31	31	31	25	31	31	31	31	31	25	25	25	25	25
	Mean	18.2	8	327	10.2	0.6	5.5	0.2	0.61	0.02	3.8	0.05	56.14	0.23	6.36	3.94
	Med	20	8	319	10.2	0.1	3.1	0.1	0.6	0.02	2	0.04	58.05	0.18	6.06	2.95
	CV%	34.1	3.3	29	22.4	220.9	194.2	303.4	30.7	97.4	174.7	127.8	28.5	114.6	36.9	133.5
UEC5	Count	27	27	27	27	14	28	28	28	28	28	24	24	24	24	24
	Mean	13.7	8	356	9.7	2	4.7	0.2	0.28	0.03	10.3	0.08	64	0.35	6.98	3.62
	Med	14.1	8	349	9.7	1.1	1.8	0.1	0.2	0.03	6.5	0.06	63.9	0.35	6.81	2.3
	CV%	36.1	1.5	18	14.8	130	238.2	321.4	55.8	52.5	97.9	76.1	23.9	44.8	30.6	152.4
UEC6	Count	31	31	31	31	21	30	30	30	30	30	25	25	25	25	25
	Mean	10.4	7.8	341	9.4	7.4	2.3	0.3	7.48	0.08	18.8	0.2	66.63	0.9	5.06	1.94
	Med	10.9	7.8	338	9.2	3.4	1.1	0.3	0.3	0.05	15.5	0.13	66.3	0.53	4.63	1.35
	CV%	24.6	3.4	25	13.9	148.2	187.7	24.1	537.8	84.6	81.7	80.6	25.9	122.6	25.3	112.1

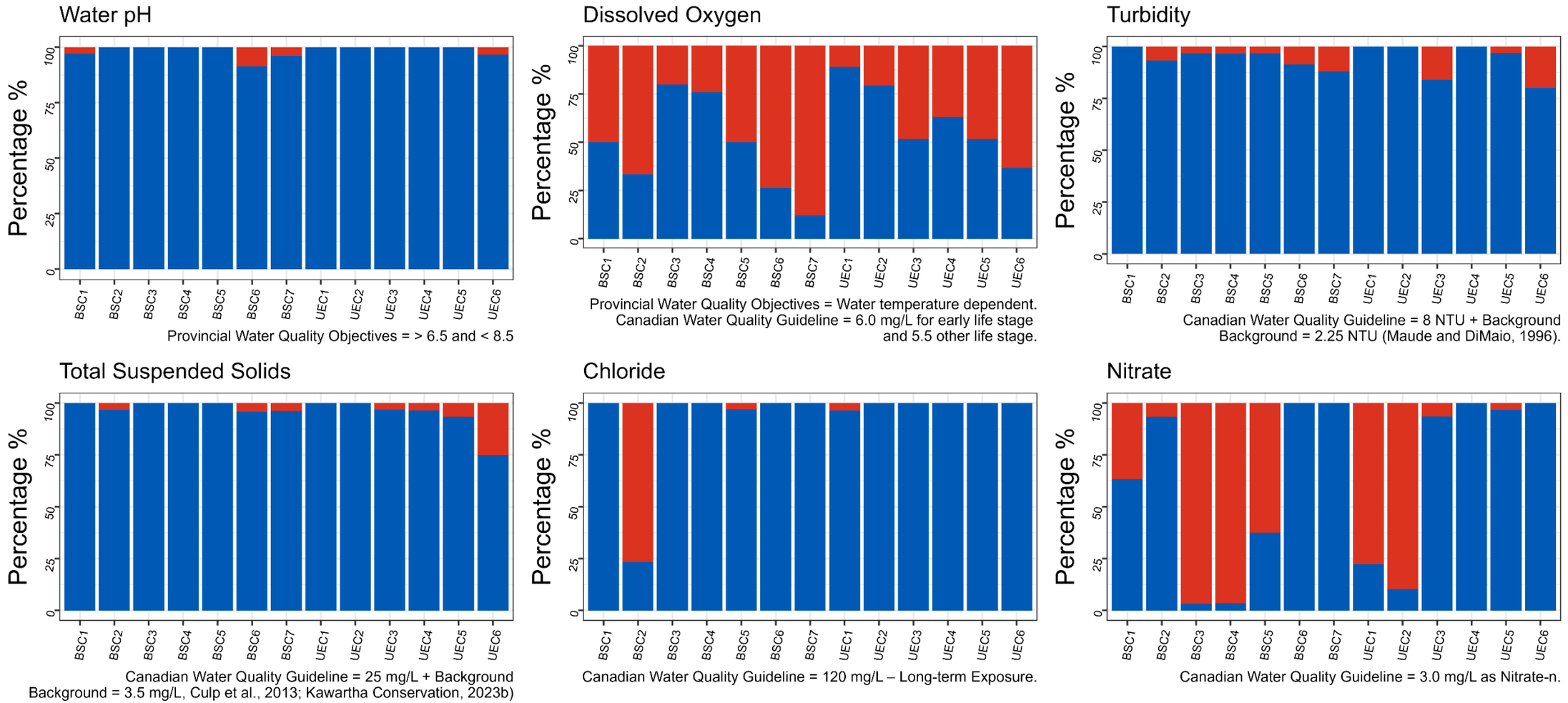


Figure 5. Exceedance percentage (%) for water pH, dissolved oxygen, turbidity, total suspended solids, chloride, and nitrate for each monitoring site. Threshold values are shown at the bottom of each graph.

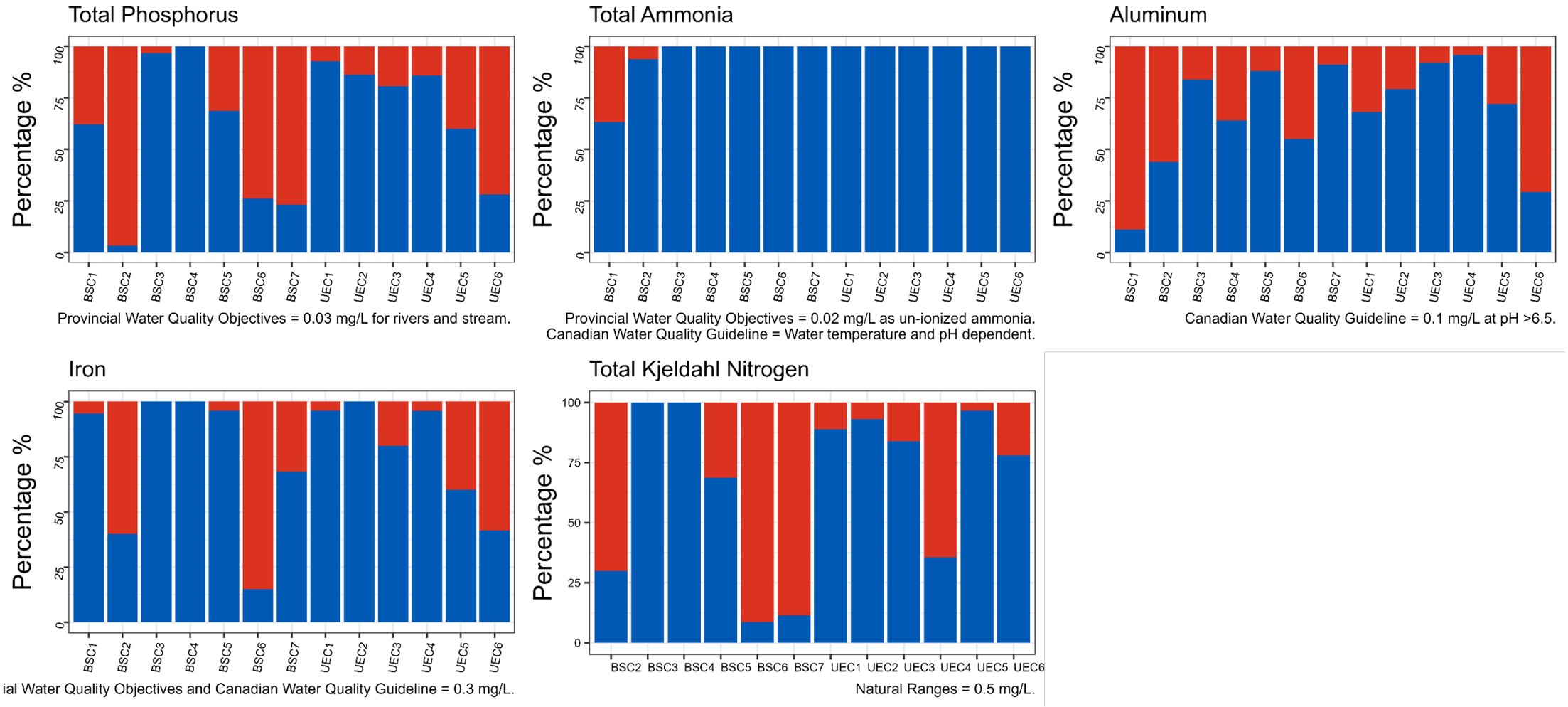


Figure 6. Exceedance percentage (%) for total phosphorus, total ammonia, aluminum, iron and total kjeldahl nitrogen for each monitoring site. Threshold values are shown at the bottom of each graph.

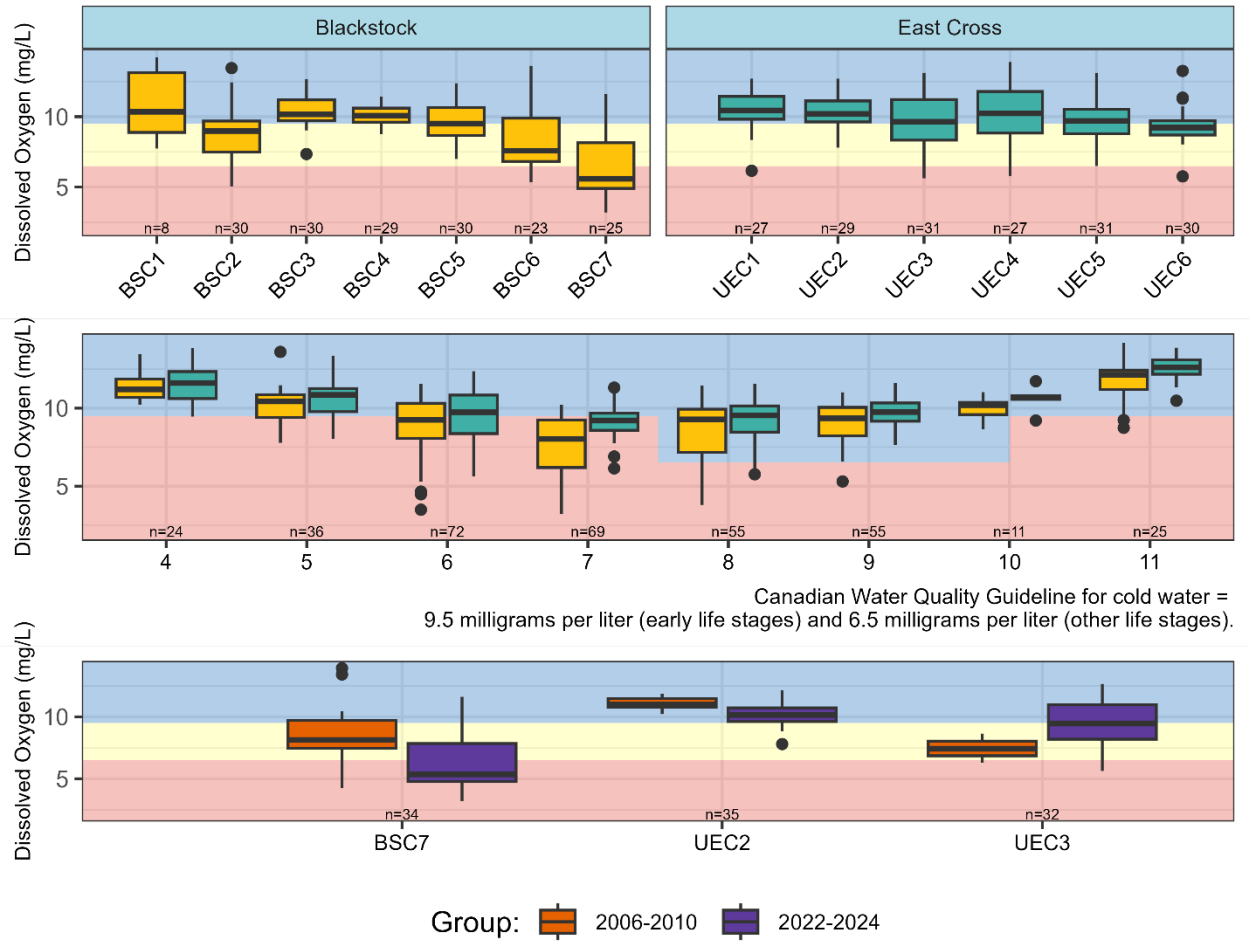


Figure 7. Variation of dissolved oxygen per site (top), month (middle) for the entire monitoring period (2022-2024). Comparison of variation for the two Kawartha Conservation monitoring periods are also shown (bottom).

Comparing dissolved oxygen levels between years (Summer period only), we see that levels of dissolved oxygen (median) have decreased at 2 sites (BSC7 and UEC2) (**Figure 7**). This is the result of changes in landuse to more intensive agriculture and reduced natural cover. Changes to climate (warmer waters) and land use (less natural cover) are two factors that will decrease dissolved oxygen in streams (Dove-Thompson, *et al.*, 2011) which will/has change fish species composition (Chu *et al.*, 2008) and limiting habitat (space) for important species Brook trout (*Salvelinus fontinalis*) and Mottled sculpin (*Cottus bairdii*).

Long-term data (2004-2024) at BSC1 does not allow trend analysis as water temperature and dissolved oxygen vary daily and are dependent of stream flow, water temperature, overnight water temperature, and landuse (Dove-Thompson, *et al.*, 2011). However, the use of water temperature loggers has been used at BSC1 as a proxy for consistent dissolved oxygen readings but is not presented in this report.

3.3.2. pH

Water pH is the acidity of the water, and it can affect the water's ability to buffer (deal with) input of acidity and can affect the movement of metals within the water. In this report, we used 377 observations of pH across the study area and found that the Provincial Water Quality Objective states that water pH is acceptable between 6.5 and 8.5 (OMEE, 1994). Through our monitoring, we have found that five measurements did not meet these criteria and had pH greater than 8.5 (exceedance pH range = 8.53-9.03) representing a very small number of failed readings (1.3% of all readings; **Figure 5**). We have no significant concern regarding these higher values. Across both tributaries, pH increases from the headwaters and between the two time periods represents constant influence from the limestone geology which produces more alkaline waters.

3.3.3. Conductivity and Chloride

Water conductivity is a measurement of the number of dissolved salts. Salts such as chlorides are common signals of human activities, i.e., dust suppression and winter salt usage. Although humans have used salt for many decades, freshwater organisms such as freshwater fish, amphibians, and insects have not evolved to withstand high amounts of salt.

Chloride levels across both creeks were generally below the long-term threshold of 120 mg/L (CCME) except for site BSC2 (mean = 168.5 mg/L, median = 172.5 mg/L, **Table 3**) where chloride levels regularly (76%, **Figure 5**) exceeded the threshold. Without BSC2, both creeks exhibit extremely low levels of chloride; Blackstock Creek: mean =33.4 mg/L, median = 27.2 mg/L; East Cross: mean = 8.3 mg/L, median = 15.1 mg/L, and are within the natural ranges found across Canada i.e., 10-30 mg/L (McNeely *et al.*, 1979; Evans and Frick, 2001). Although BSC2 has higher chloride level, it was not observed downstream at BSC1 where chloride levels remain around 172 mg/L (**Figure 8**, **Table 3**). Between sites, statistical difference (Kruskal-Wallis chi-squared = 311.37, df = 12, $p < 0.001$) were found between BSC2 with BSC3 ($p < 0.05$), BSC4 ($p < 0.005$), BSC6 ($p < 0.05$), and 7 ($p < 0.001$) indicating that chloride levels found at BSC2 are much different than many of the sites upstream, pin-pointing that there is a chloride hotspot at BSC2. Within East Cross Creek, site UEC6 was found to be different from UEC1 and UEC2 ($p < 0.001$). No significant increases in chloride were observed between 2006-2010 and 2022-2024 and represents the continued lack of urbanization within the watershed.

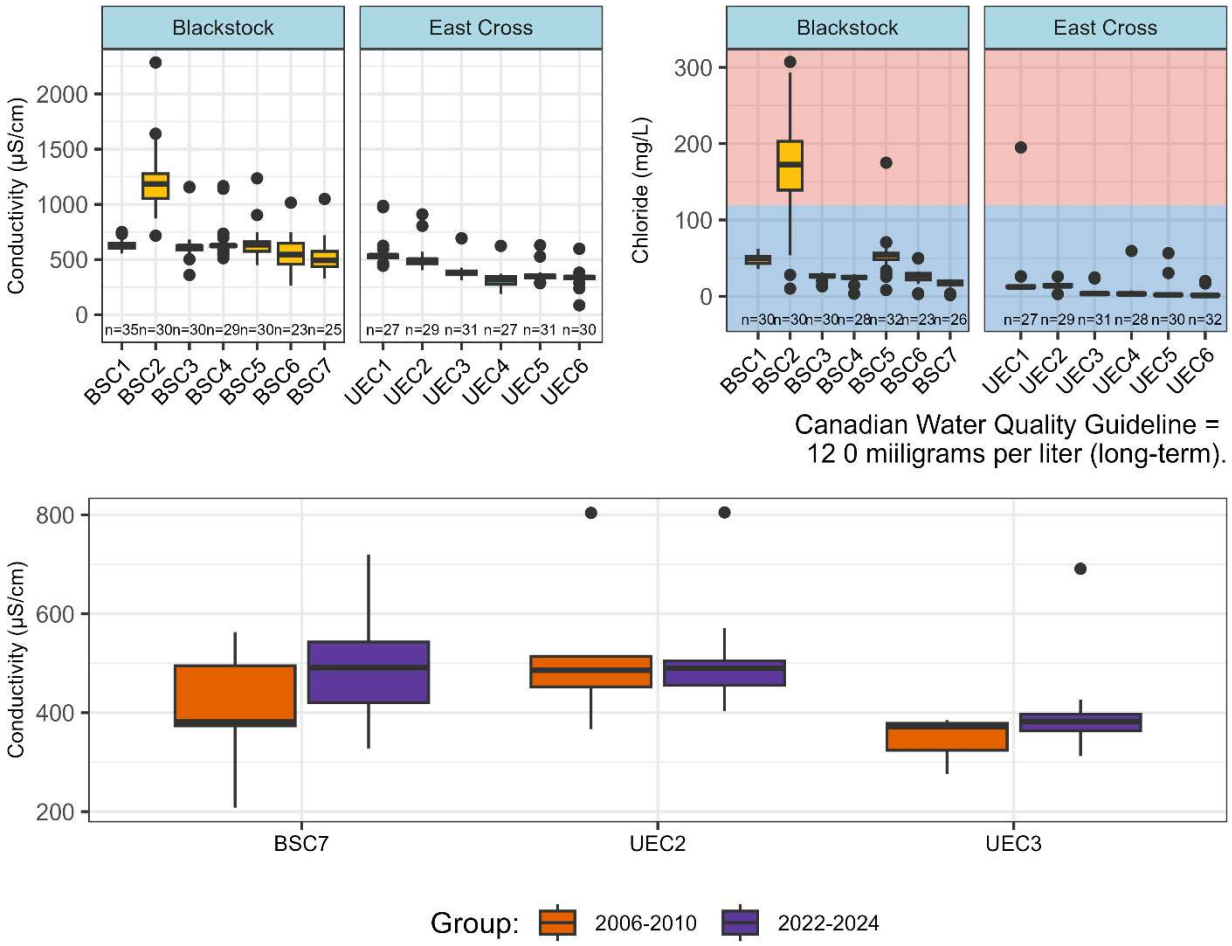


Figure 8. Variation of conductivity measurements and chloride concentrations across the monitoring sites (top). Comparison between the two Kawartha conservation monitoring periods is also shown (bottom).

Because salt can easily dissolve in water, conductivity measurement paired well with chloride levels (**Figure 9**). Statistically, both parameters are found to be highly correlated with one another (ρ = 0.8, p <0.05; **Figure 19**). Other parameters that correlated well are sodium-chloride (ρ = 0.9, p <0.05), calcium-chloride (ρ =0.73), calcium-conductivity (ρ =0.76), magnesium-chloride (ρ =0.67), magnesium-conductivity (ρ =0.76) (**Figure 19**). The strong correlation between calcium and magnesium with conductivity represents the geological setting of the creek, i.e., limestone bedrock, and suggest background levels of conductivity around the 350 uS/cm range (**Figure 9, Table 4**).

Figure 8 and **Figure 9** shows Site BSC2, as having higher levels of conductivity and chloride (and better correlation as seen as a straighter diagonal grouping) indicate that much chloride inputs are a strong influence on the amount of dissolved salts. Similarly, site BSC1 does follow this pattern with its grouping, indicating that salt application on Regional Road 57 and Hwy 7A is driving higher

levels of chloride and conductivity. Oppositely, groupings of UEC4, UEC5, and UEC6, indicate that these sites are unimpacted by salt application, <10 mg/L (**Table 4**) which is similar to that found by Evans and Drick, 2001).

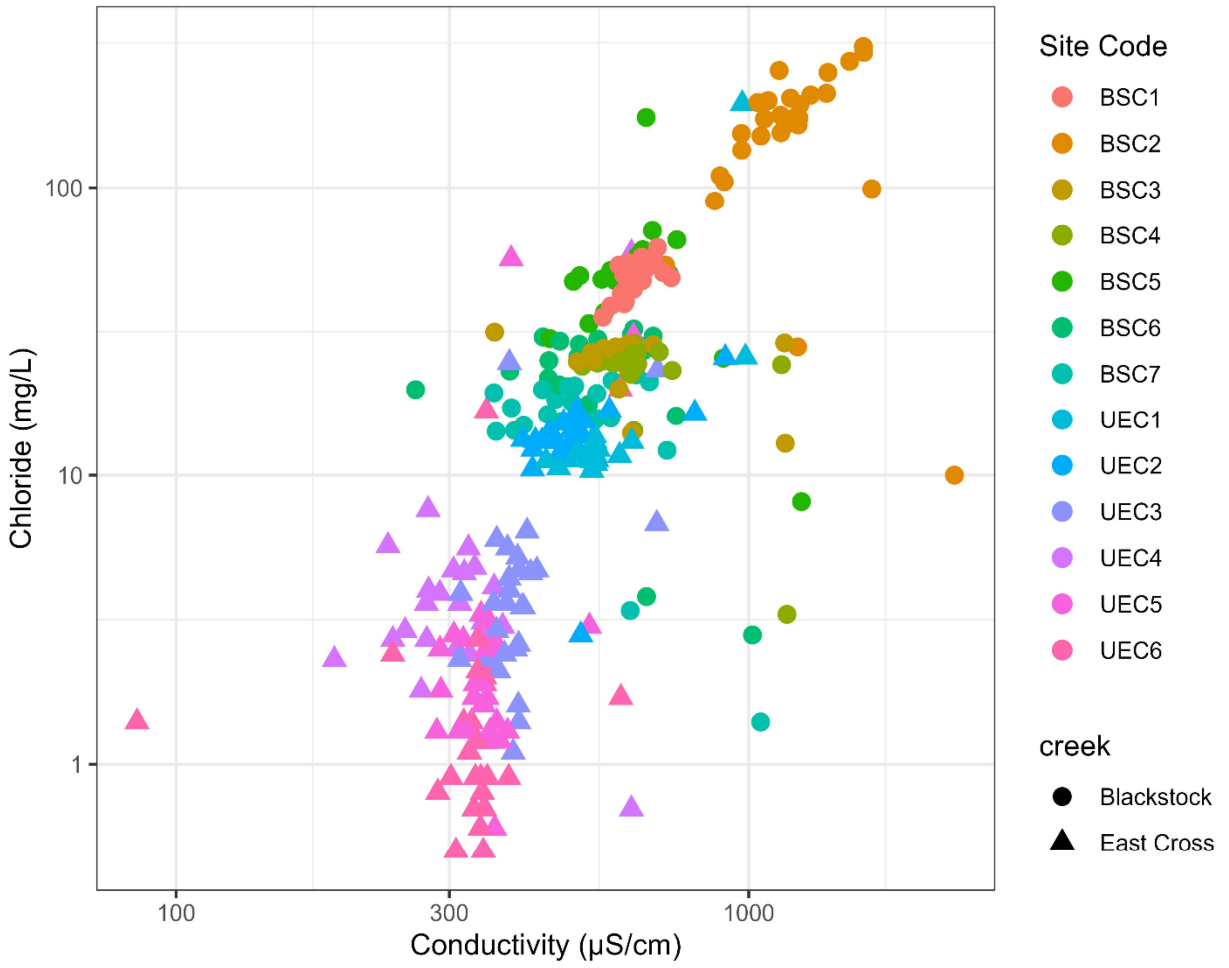


Figure 9. Relationship between conductivity and chloride levels at the monitoring sites (Blackstock = circles and East Cross Creek = triangles) from 2022-2024.

Long-term trend at BSC1 (2004-2024) indicates that both chloride and conductivity levels have significantly increased since 2009/2010, with consistent higher levels in the last 5 years (**Figure 10**). Both trends were consistent since the start of monitoring in 2004 and were consistent until 2009/2010 which is suggested to start increasing in concentrations (**Figure 10**). Now, there is a statistical significance difference between the early years (2004-2008) and the most recent years (2020-2024). Although chloride levels have not exceeded the Canadian Water Quality Guideline of 120 mg/L, it is expected that continued human pressures (without mitigation) will drive chloride levels to reach the threshold as this has already happened to much of south and central Ontario (Sorichetti *et al.*, 2022).

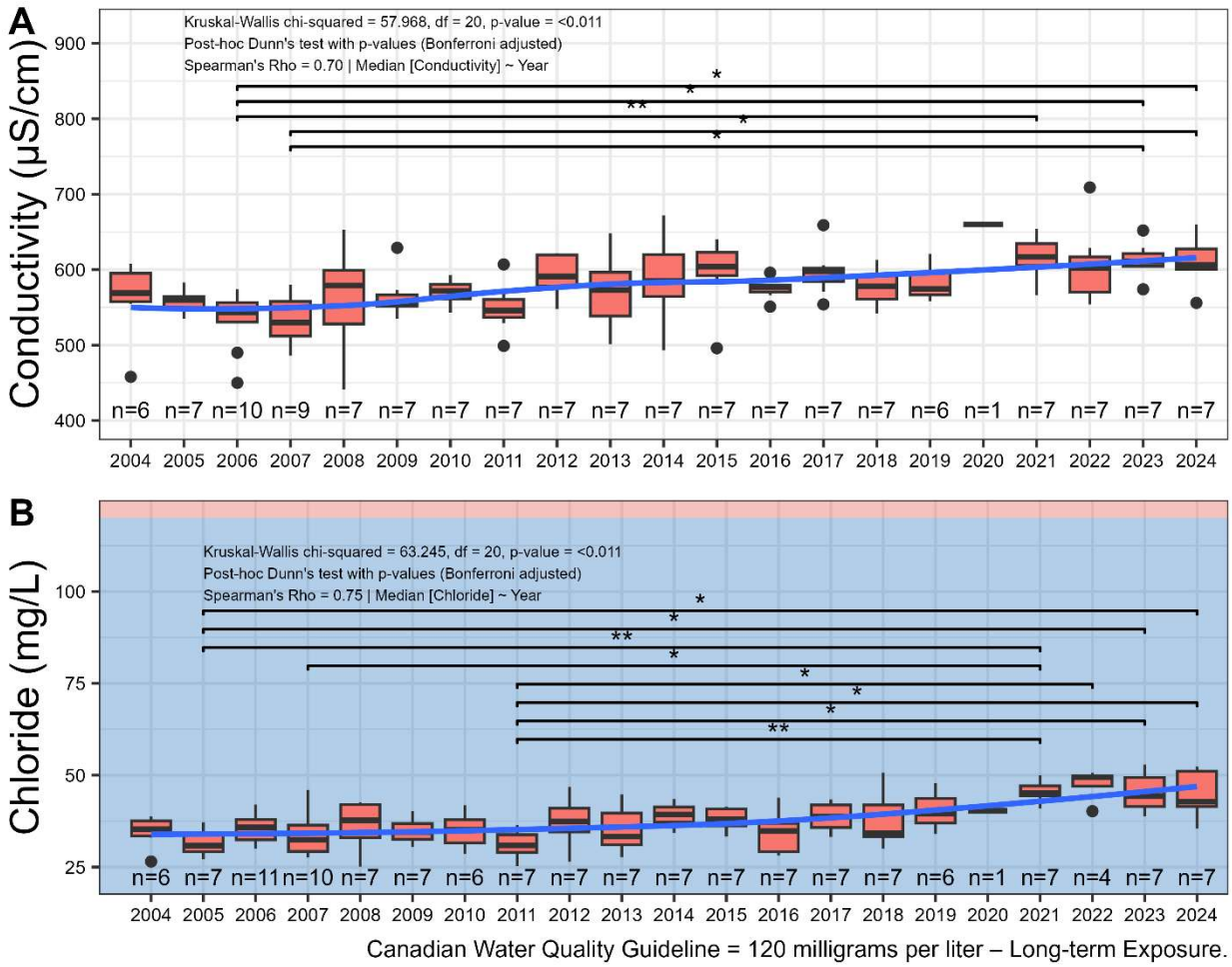


Figure 10. Long-term variation of conductivity (top- A) and chloride (bottom - B) at BSC1 from 2004 to 2024 (summer only). Statistical test results and differences (between years) are shown for each parameter. Spearman's rho (calculated between median concentration and year) is shown.

3.3.4. Phosphorus

Phosphorus is an essential nutrient (and primary limiting nutrient) for plant growth which in turn supports the animals who graze upon it, and those that pray on other animals. However, when too much phosphorus is put into the ecosystem, it can cause an imbalance through the process of rapid eutrophication where algae rapidly expands. This can lead to a loss of fish, habitat, and drinking water. To control the rapid expansion of algae, the PWQO is set at 0.03 mg/L for streams and rivers (MOEE, 1992).

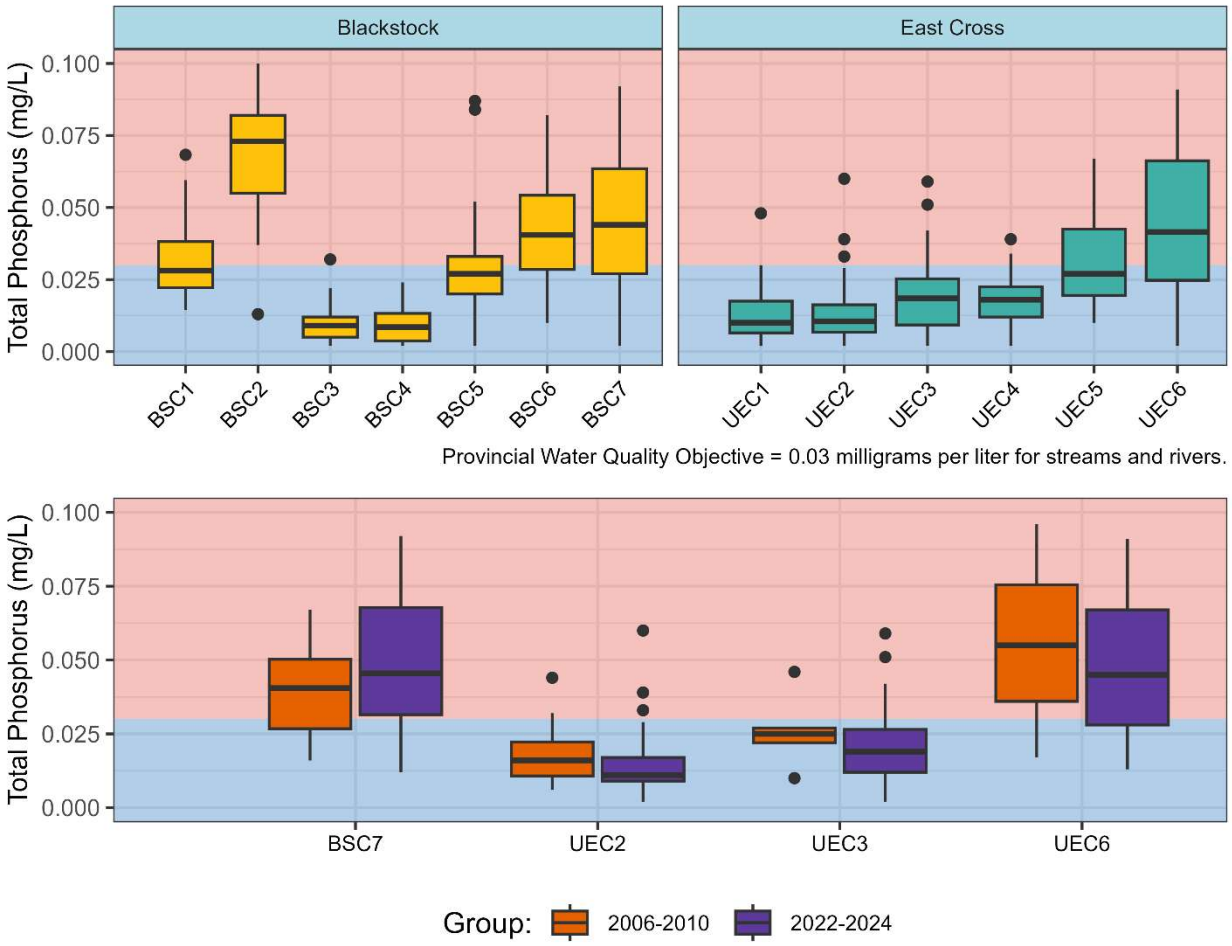


Figure 11. Variation of total phosphorus concentrations across the monitoring sites (top). Comparison between the two Kawartha conservation monitoring periods is also shown (bottom).

Phosphorus levels across both creeks show a decreasing trend from upstream to downstream (**Figure 11**). Within East Cross creek, higher phosphorus was found at UEC6 (mean = 0.08 mg/L, median = 0.05 mg/L; **Table 4**), followed by UEC5 (mean and median = 0.03 mg/L) and further decreased with downstream sites. Although these sites on East Cross Creek have higher levels of phosphorus, the dominate natural cover, unlike that of Blackstock Creek (BSC7: mean = 0.08 mg/L, median = 0.05 mg/L) which is dominated by agricultural land use (**Table 2, 3, 4**). Consistent high phosphorus levels at BSC7 and UEC6 were also found between 2006-2010 (**Figure 11**). No statistically significant differences were found between the two monitoring periods (**Figure 11** bottom).

Long-term data at BSC1 indicates that there is a generally small and weak downward trend from 2004 to 2024, with many observations above the Provincial Water Quality Objectives. (**Figure 12).** No significant and statistical differences were observed between the years (Kruskal-Wallis chi-squared = 22.374, df = 20, p = 0.3206). Factors such as stream flow and precipitation and land use

tiled drainage and urbanization; Chan *et al.*, 2024; are linked to changes of total phosphorus level in streams.

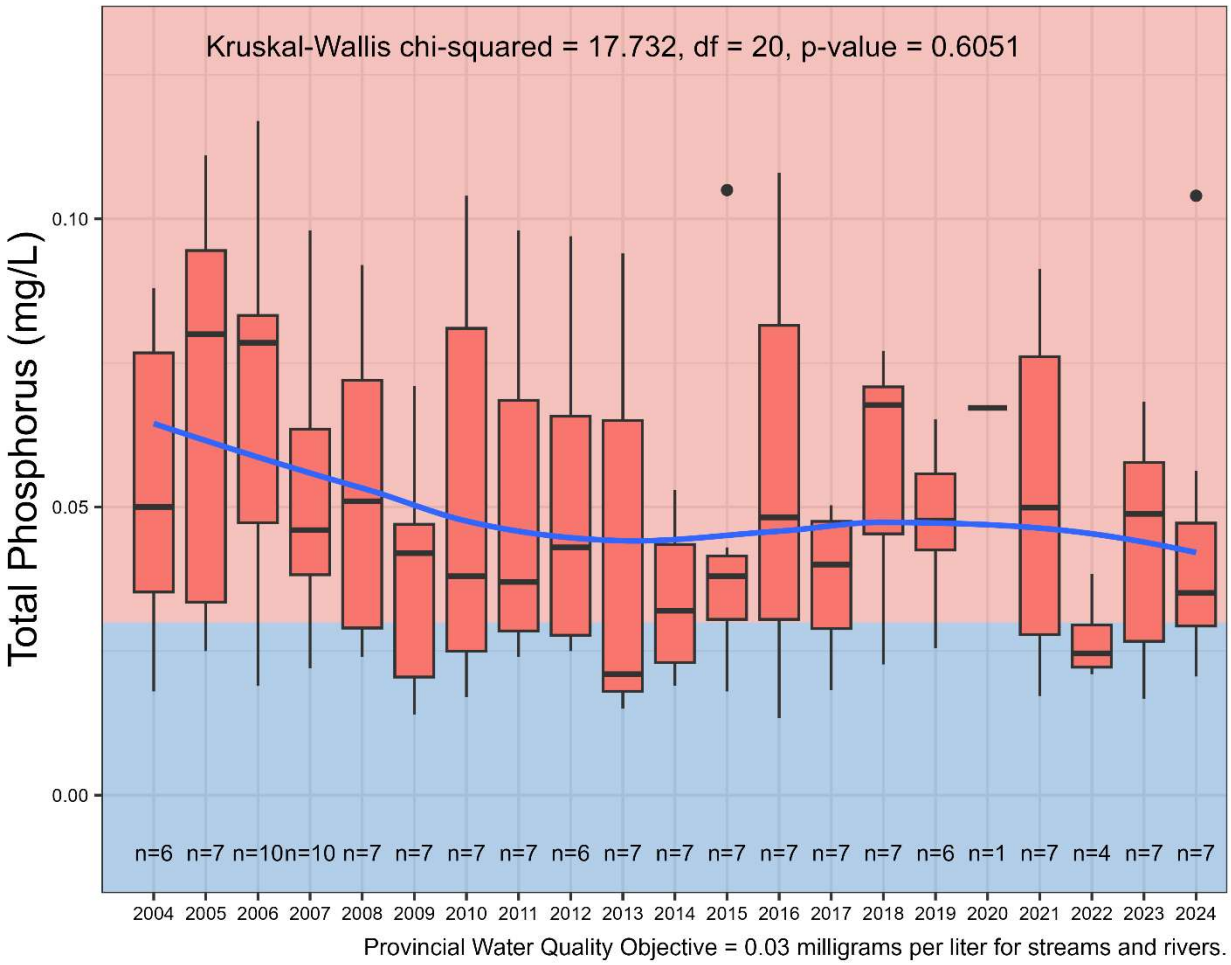


Figure 12. Long-term variation of total phosphorus concentrations at BSC1 from 2004 to 2024 (summer only). Statistical tests are shown.

3.3.5. Nitrate

Following phosphorus, nitrogen is the secondary limiting nutrient for algae in aquatic system and can contribute to rapid eutrophication. Although there is no PWQO and/or CWQG for nitrogen there are set objectives and guidelines for ammonia and nitrate. Ammonia is formed naturally through the decomposition of organic matter. It can also be put into the environment through artificial fertilizers and effluent from industry. Enrichment of ammonia in water can cause toxins to build up in aquatic animals, potentially leading to death. Elevated levels of nitrate in water can cause low levels of dissolved oxygen and can be toxic to humans and animals. For the protection of aquatic life, the guideline is set at 3.0 mg/L.

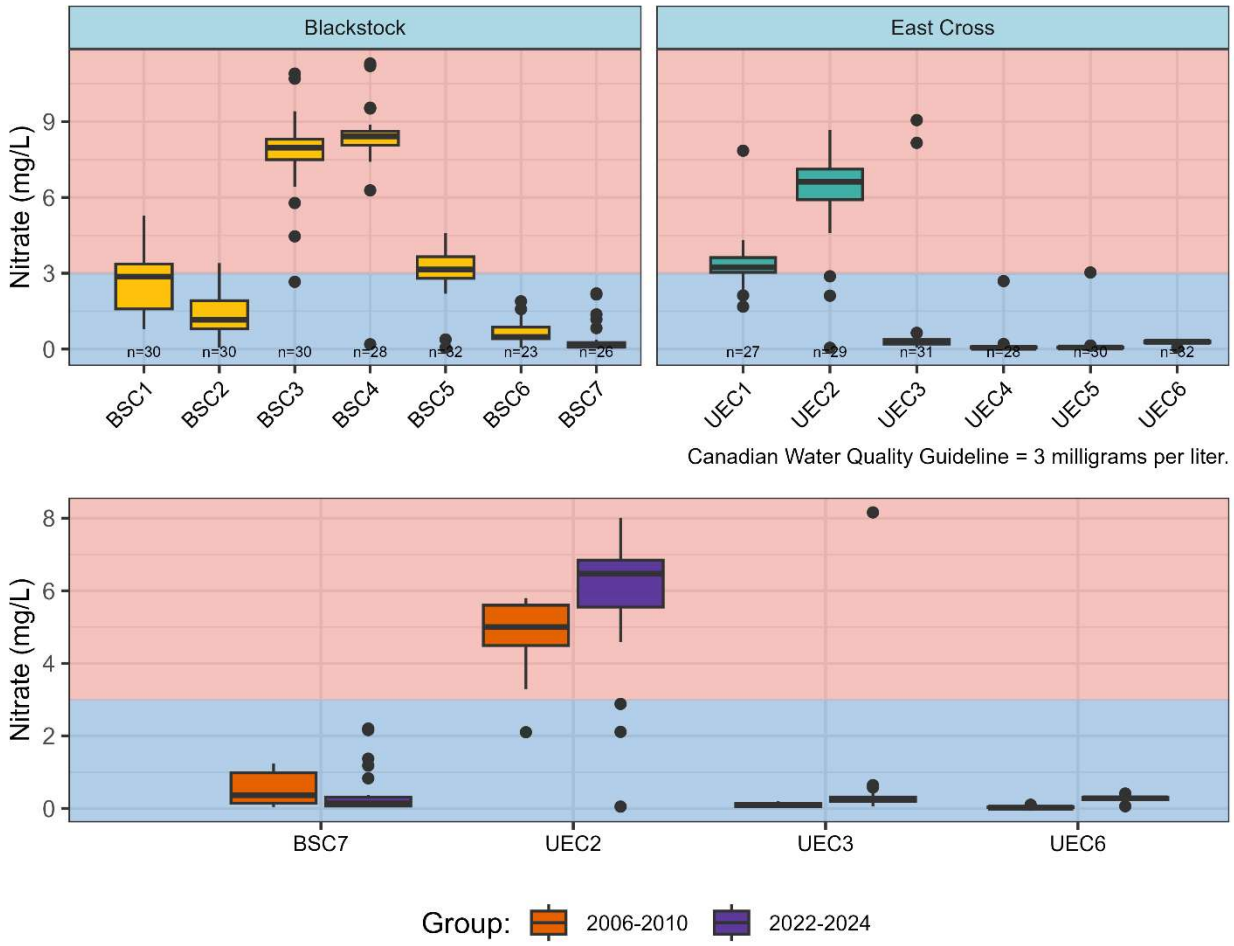


Figure 13. Variation of nitrate concentrations across the monitoring sites (top). Comparison between the two Kawartha conservation monitoring periods is also shown (bottom).

Nitrate levels across both creeks were lowest in the headwaters (<0.4 mg/L; **Table 3, 4**) and are higher among streams downstream. Within Blackstock Creek, nitrate levels increase at BSC5 and are highest in BSC4 (mean = 8.2 mg/L, median = 8.4 mg/L; **Table 3**), which represents 62.5% for BSC5 and 96.4% for BSC4 (**Figure 5, 13**). This site, BSC4, was found to be statistically significant (Kruskal-Wallis chi-squared = 305.98, df = 12, p <0.05) than those upstream from it (BSC5, BSC56, and BSC57) indicating that water quality anomaly has occurred at this site and is a hotspot for nitrate. Higher nitrate levels in BSC3 may be driven by high levels observed upstream at BSC4 (~approximately 500 m downstream, **Figure 1**).

Among East Cross Creek sites, we observed site UEC2 was consistently high in nitrate levels (mean = 6.2 mg/L and median = 6.6 mg/L; **Table 4**) and represents an exceedance rate of 89.7% of all samples. Site UEC2 was also found to be statistically significant (Kruskal-Wallis chi-squared = 305.98, df = 12, p <0.05) than its upstream sites (UEC3 to UEC6), indicating that this site is a hotspot for nitrate. Results also show that these sites (BSC3, BSC4, and UEC2) are consistently at

higher levels throughout the ice-free period (**Figure 13)**. Site BSC4 and UEC2 are known groundwater dominated streams (Kawartha Conservation 2012a, b, 2020) where higher nitrate levels may reflect nitrogen rich fertilizer use that has infiltrated the groundwater (Stempvoort *et al.*, 2022). Nitrate levels of the nearby Provincial Groundwater Monitoring Program (Durham East Cross Forest North) have a mean of 1.8 mg/L (2010-2017), much lower than what is found which suggest shallow contamination from surface sources.

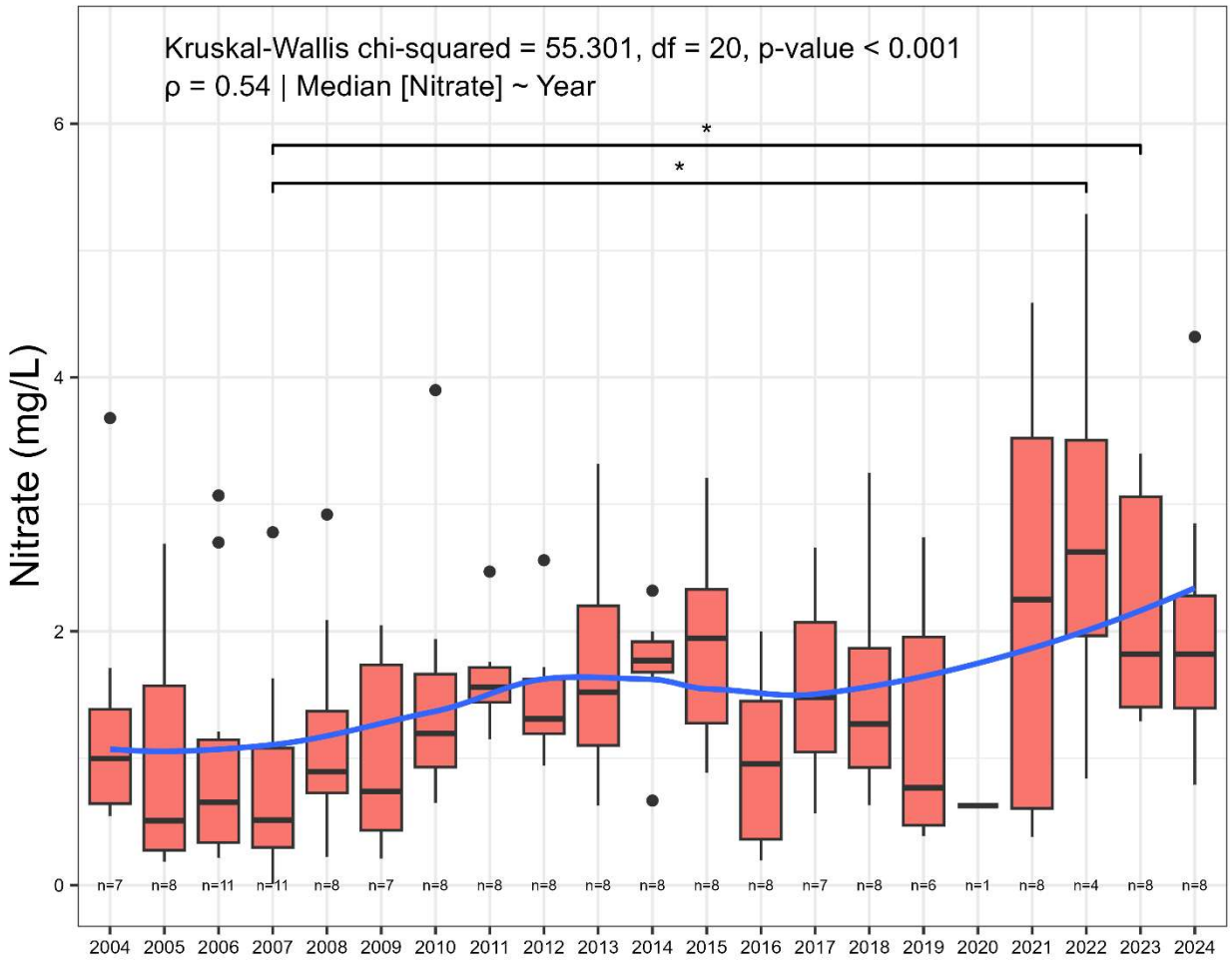


Figure 14. Long-term variation of nitrate concentrations at BSC1 from 2004 to 2024 (summer only). Statistical test results and differences (between years) are shown for each parameter. Spearman's rho (calculated between median concentration and year) is shown.

When looking at the two time periods, we see that there is an increase in nitrate levels at the downstream sites (BSC1 and UEC2). There are no significant changes among headwater sites (BSC7, UEC3, and UEC6). Interestingly, Maude and Maio (1996) had mean nitrate level around 4.5 mg/L at their East Cross Creek site which is located similarly to UEC2, suggesting that high nitrate levels have occurred in the vicinity since 1992 and possibly, beyond.

Assessing the long-term data at BSC1, nitrate levels had a weak but positive (ρ = 0.54) trend upwards (opposite to phosphorus) when comparing earlier years (2004-2008) to the most recent period (2021-2024). We found that there were statistical differences between 2008 (low nitrate year) to 2022 and 2023 (p <0.05). Although the correlation is weak (ρ = 0.54) we expect that as agricultural activity intensifies for row crops (high nitrogen fertilizer) that nitrate levels are expected to increase as found by Liu *et al.* (2022) and Chan *et al.*, (2024) across many southern Ontario tributaries.

Total ammonia was measured through this program but >59% of results were below detection limits. The highest concentration was found at 0.81 mg/L which when converted, was below both the Provincial Water Quality Objectives and Canadian Water Quality Guidelines. Raw water quality results can be found in **Appendix B**.

3.3.6. Water Clarity

Water clarity refers to how much light can enter the water and can be driven by suspended solids/floating algae, and small particles that deflect light. Generally, poorer water quality is associated with high suspended solids and high murkiness as they are associated with eroded banks, effluent discharge, rapid eutrophication, and other environmental disasters.

For the monitoring sites, water clarity thresholds are determined through the Canadian Water Quality Guideline for the Protection of Aquatic Life (CCME, 2002) and is set at 8 NTU plus background for turbidity, and 25 mg/L plus background for total suspended solids. Background levels of turbidity and total suspended solids were set at 2.25 NTU (Maude and Maio, 1996) and 3.5 mg/L (Culp *et al.*, 2013; Kawartha Conservation, 2023), thus setting the threshold of turbidity at 10.25 NTUs and 28.5 mg/L for total suspended solids.

Generally, observations and turbidity and total suspended solids from this period and historically, were found to be within the Canadian Water Quality Guideline for the Protection of Aquatic Life (**Figure 15**), indicating clear water across the monitoring area and since 2006. Small exceedances of both turbidity and totals suspended solids were found but represented a small portion <8% of all samples (**Figure 6).**

Higher levels of turbidity and total suspended solids at UEC6 (most natural site; **Table 4, Figure 15**) are driven by which is a characteristic of a more natural and less impacted watershed. The site itself is dominated with organic substrates with establishment of Marsh Marigold (Caltha palustris) and monitoring efforts may have indirectly introduced organic matter into the stream. Thus, this site is not recommended to be used for stewardship projects (already natural) nor for the establishment of background turbidity and total suspended solids. Instead, site UEC5 should be used instead as it is also located within a naturalized watershed (within Durham East Cross

Forest Conservation Area), has a more established morphology for ease of sampling and a reduction in sampling impact.

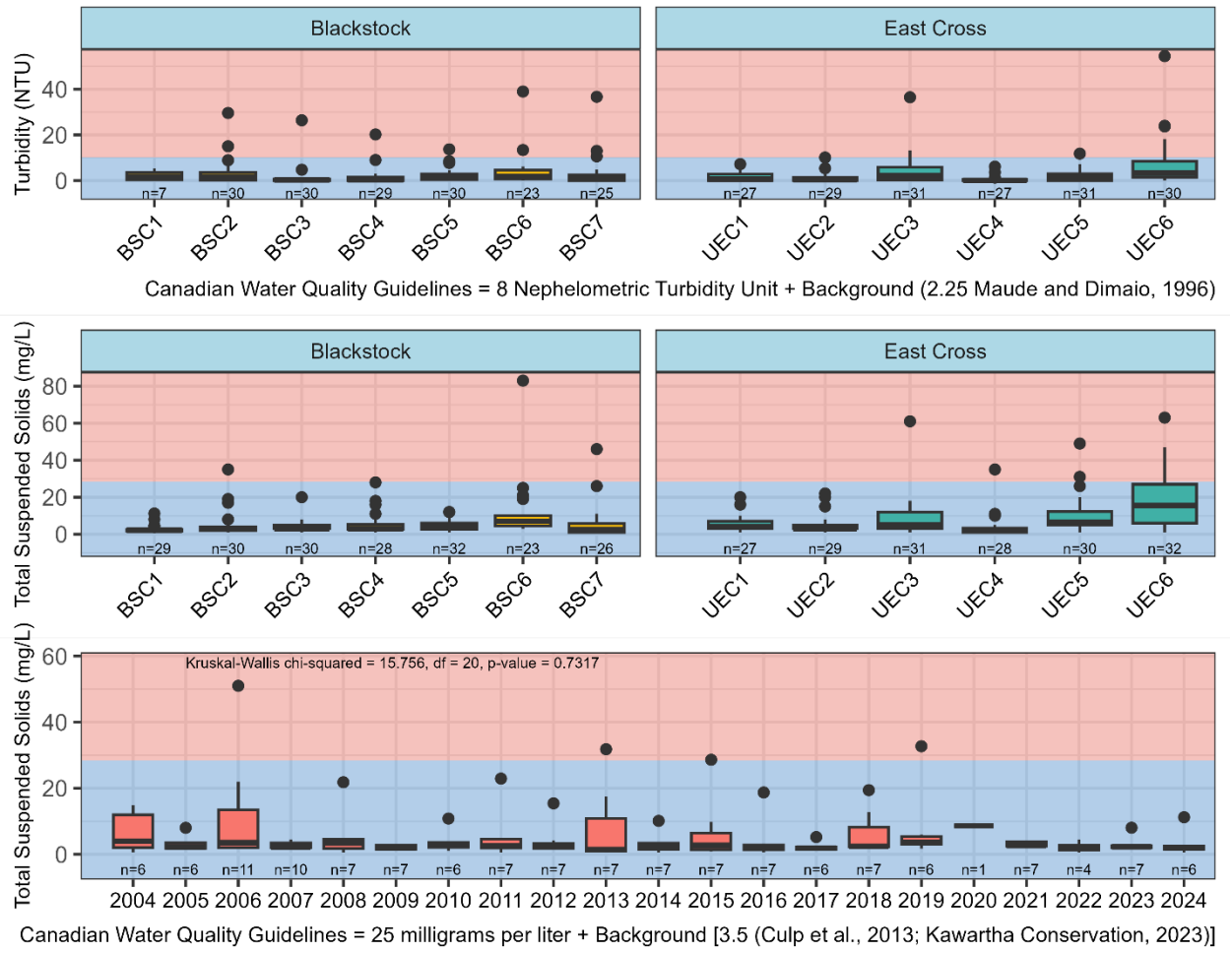


Figure 15. Variation of water clarity parameters (Turbidity – top, total suspended solids – middle) are shown per site. Long-term variation of total suspended solids concentrations at BSC1 from 2004 to 2024 (summer only). Statistical tests are shown.

Long-term data at BSC1 for suspended solids indicate no significant trends (either upwards or downwards) and have generally remain below the Canadian Water Quality Guidelines indicating good water clarity.

3.3.7. Metals

Metal analyses were limited to aluminum, calcium, iron, magnesium, and sodium for our monitoring sites. More metal analytes were analyzed through the Provincial Water Quality Monitoring Network, but were limited to a single site, BSC1 (**Figure 1**). Most metal results at BSC1 were below detection limit (>50% below detection limit): Beryllium, Chromium, Lead, Nickle,

Bismuth, Lithium, Silver, Tin, Zirconium. Other metal analytes had more than 30% results below detection limit: cadmium, cobalt, molybdenum, lithium, and uranium. Thus, this section will focus on a selective few metals.

Aluminum and iron are commonly associated with the input of soils as they are both one of the most common elements found on earth's crust (McNeely *et al.*, 1979). In our dataset, it was found that a weak, but significant (rho<0.05) correlation was found between these two metals and the amount of agriculture (**Figure 19**). This does not suggest that agricultural landscapes are the cause of exceedances of aluminum and/or iron guidelines but does suggest that with increasing agricultural cover that increases aluminum and iron levels in the stream. Other sources of aluminum and iron may originate from stormwater running off from roadways (either from the unpaved roads or from vehicles (McNeely *et al.*, 1979). No correlation between total suspended solids and these metals may suggest the following 1) suspended solids found in the creek may not be of soil origin (algae or woody sources), 2) much of the aluminum and/or iron that exist in the stream is of the dissolved form.

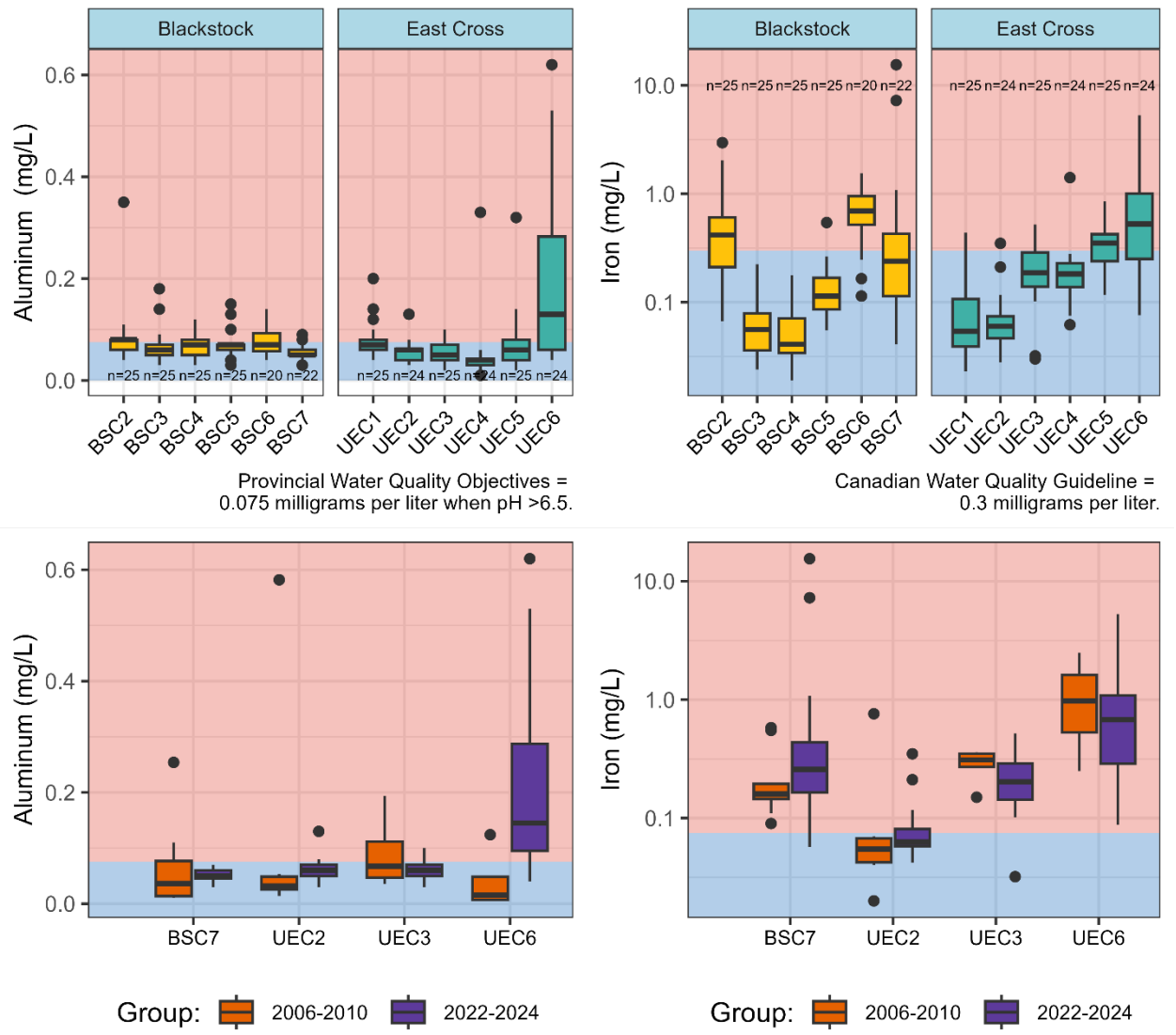


Figure 16. Variation of metal parameters (iron – top, aluminum – middle) are shown per site. Comparison between the two Kawartha conservation monitoring periods is also shown (bottom).

The two metals were measured at all sites for this report (**Figure 6** and **17).** Exceedances of aluminum and/or iron were found across all sites and ranged from 8-70% for aluminum and 0-58.3% for iron (**Figure 6**). The highest exceedances for both are associated with UEC6 and UEC5, the most upstream site and found within a Conservation Area where there are no disturbances. Higher levels of both metals at UEC6 may not reflect human disturbances in the catchment and may reflect the localized natural sources as groundwater results are <0.005 mg/L (Provincial Groundwater Monitoring Network). Since the surrounding areas are not influenced by negative

human activities, site UEC6 and UEC5 are not a hotspot for elevated aluminum and iron and may reflect naturally elevated levels.

However, both BSC2 and BSC6 have slightly elevated iron levels and exceedances (56% and 45%) (**Figure 6** and **16**), which are both downstream from urban development (BSC2) and intensive agriculture (BSC6) which may drive higher levels during storm events. This site can be considered areas of elevated iron input with remedial action should focus on capturing and infiltrating stormwater.

Comparison between the two monitoring periods indicate similar results across sites with the exception to UEC6. This suggests that field method may have disturb the site enough to cause higher levels of aluminum to be released from the stream sediment. UEC6 is not a hot spot for elevated aluminum. Long-term data at BSC1 indicate no significant increases or decreases in both aluminum and iron from 2004 to 2024. Currently, there are no significant water quality concerns at BSC1 for aluminum and iron.

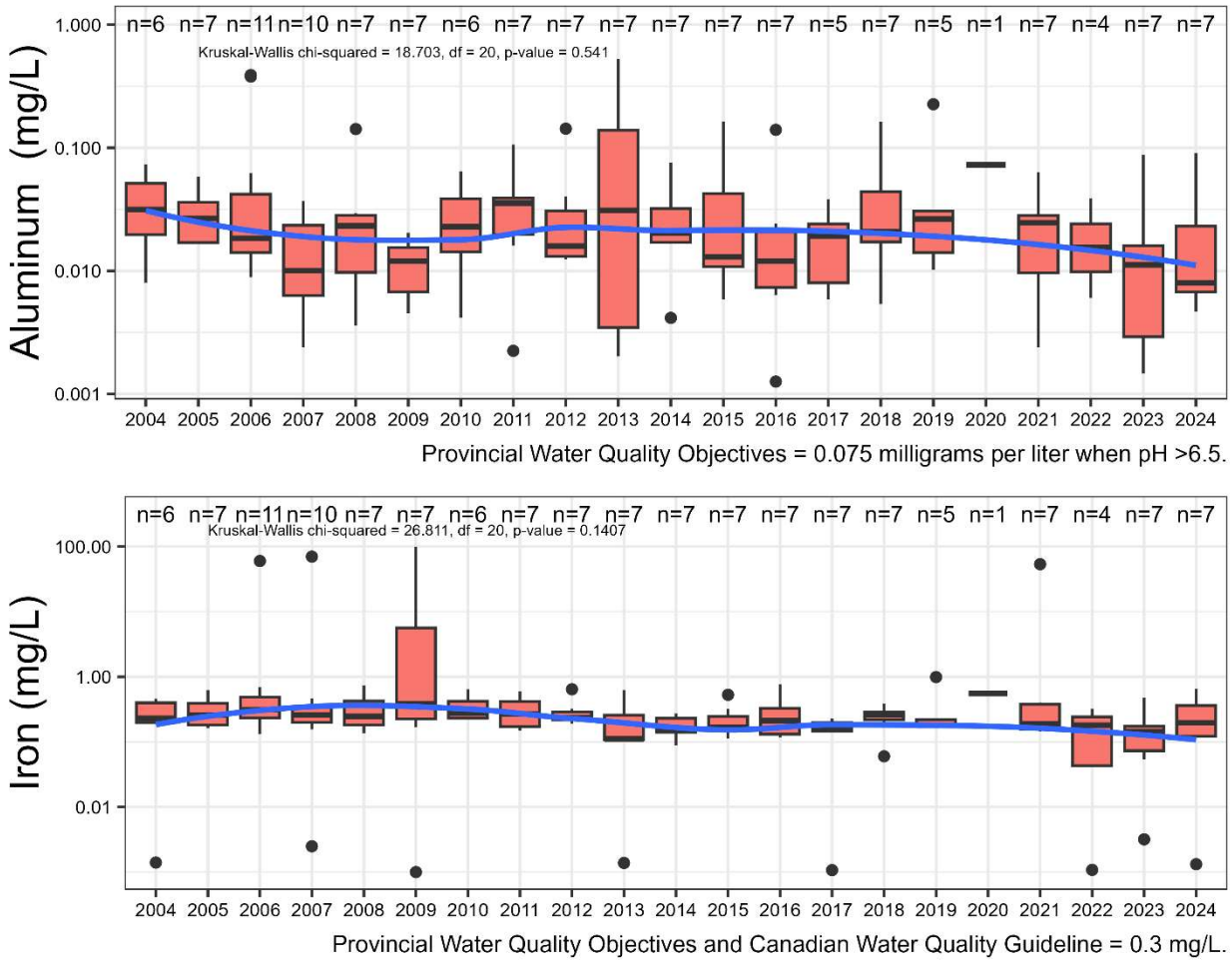


Figure 17. Long-term variation of aluminum (top) and iron (bottom) concentrations at BSC1 from 2004 to 2024 (summer only). Statistical tests are shown.

3.4. Nutrient Limitation

Since both nitrogen and phosphorus are essential nutrients for the growth of plants and animals, it is important to understand which is limiting to better manage nutrient input into the streams. For example, if water quality results indicate that phosphorus is limiting, then nutrient management should focus on limiting the introduction of phosphorus to prevent rapid eutrophication. Generally, TN:TP ratios below 20 suggest the system is nitrogen limited while ratios greater than 50 suggest phosphorus limitation (Guildford and Hecky, 2000).

In our calculations, we found both Blackstock and East Cross Creek are limited by phosphorus and remedial and stewardship should generally focus on improving phosphorus sources while at site specific areas focus on nitrate (BSC4 and UEC2) and phosphorus sources.

3.5. Water Quality Index

Using the Canadian Water Quality Guideline's Water Quality Index (WQI, CCME **2017)** and the following parameters: dissolved oxygen, nitrate, ammonia, total kjeldahl nitrogen, total suspended solids, turbidity, pH, total phosphorus, chloride, aluminum, and iron (from 2021 to 2024), the following WQI scores are given for each site (**Table 5**).

Table 5. Water quality index scores and associated category per site are shown along with percentage of failed test against threshold from the Provincial Water Quality Objectives or Canadian Water Quality Guidelines.

Station	CCME WQI	WQI Category	pH	Dissolved Oxygen	Turbidity	Chloride	Nitrate	Ammonia	Total Kjeldahl Nitrogen	Phosphorus	Suspended Solids	Aluminum	Iron
BSC1	70	Fair	2.1	0	0	0	41	0	N/A	44	0	7.4	16
BSC2	44	Poor	0	6.7	6.7	77	6.7	3.3	70	97	3.3	8	3.7
BSC3	72	Fair	0	0	3.3	0	97	0	0	3.3	0	8	4.3
BSC4	77	Fair	0	0	3.4	0	96	0	0	0	0	4	8.7
BSC5	62.3	Marginal	0	0	3.3	3.1	62.5	0	31.2	28.1	0	8	13
BSC6	55.2	Marginal	8.7	17.4	8.7	0	0	0	91.3	69.6	4.3	15	9.1

BSC7	58.9	Marginal	4	52	12	0	0	0	88.5	73.1	3.8	0	4.8
UEC1	62.5	Marginal	0	3.7	0	3.7	77.8	0	11.1	3.7	0	16	27.3
UEC2	72	Fair	0	0	0	0	90	0	6.9	14	0	4.2	30
UEC3	62.6	Marginal	0	12.9	16.1	0	6.5	0	16.1	16.1	3.2	0	31.8
UEC4	66	Fair	0	7.4	0	0	0	0	64	14	3.6	4.2	61
UEC5	62.5	Marginal	0	0	3.2	0	3.3	0	3.3	36.7	6.7	8	63.2
UEC6	43	Poor	3.3	3.3	20	0	0	0	22	72	25	63	67

The CCME WQI suggests that many of the sites are in between Fair and Marginal which indicate that water quality is frequently impaired and conditions frequently depart from natural levels (CCME, 2017). Water quality parameters of concern were nutrient based (Nitrate > Phosphorus > Total kjeldahl nitrogen) and iron (**Table 5)**. Nutrient input across both watersheds is of concern, especially in Blackstock Creek, where higher exceedances are found (**Figure 5, 6, 11** and **13**). Exceedances of iron is limited to upper reaches of East Cross Creek and suggest naturally higher levels of iron as the surrounding area is within an environmental protection area with very limited historical disturbance. Thus, WQI grades for UEC5 and UEC6 are misrepresented (should have higher scores representing better water quality), readers are advised to use **Table 5** with caution.

3.6. Drivers of Water Quality

In the previous sections of this report, we assess water quality on a parameter and site basis. However, water quality assessments are complex as it involves multiple parameters along with external information such as landcover and weather. Through a Principal Component Analysis Biplot (PCA Biplot) we can look at general trends across sites and parameters (and their contribution factor) (**Figure 18**). Paired with a spearman's correlation matrix (**Figure 19**), we can quantify relationship between water quality parameters, landcover, and weather conditions.

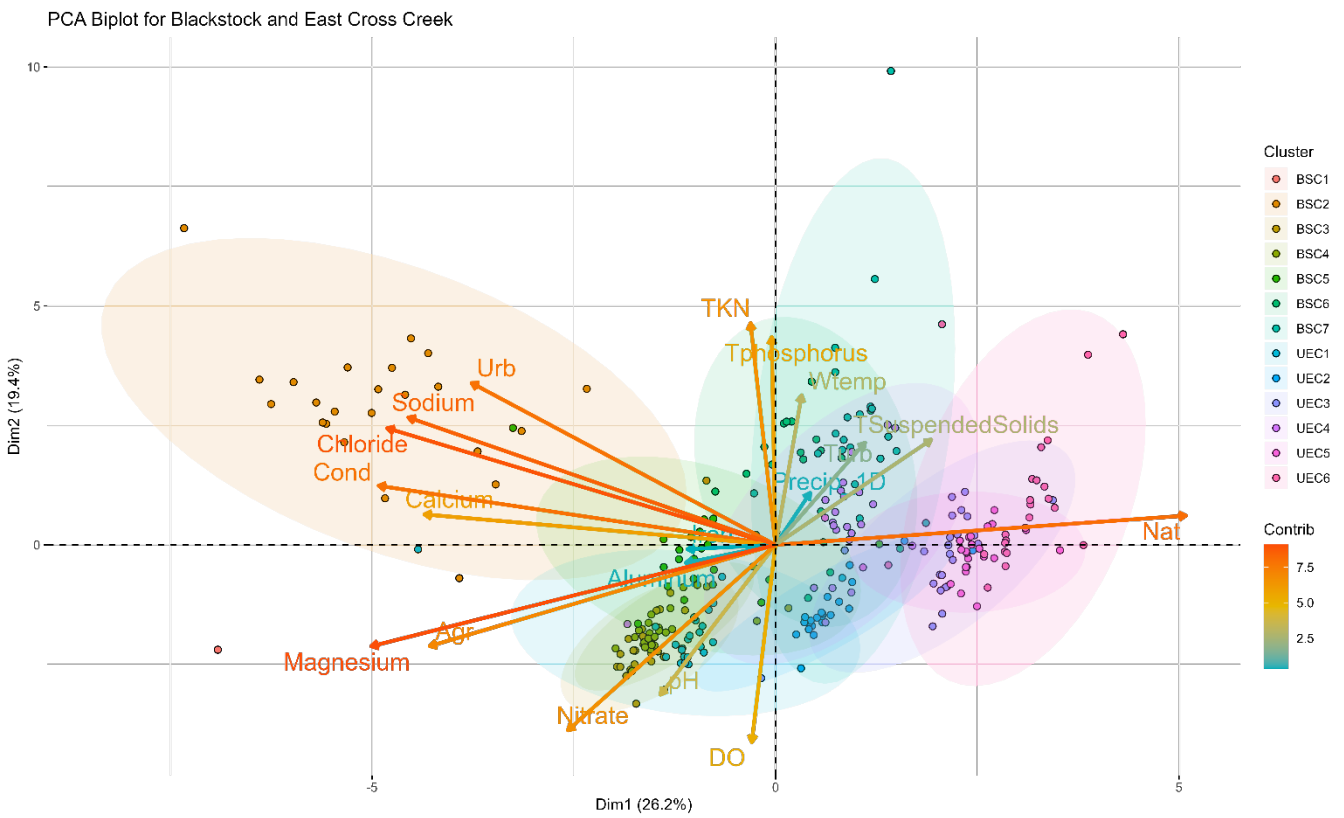


Figure 18. Principal Component Analysis Biplot of selective water quality, land use, and precipitation parameters and monitoring sites. Depicted ellipses are 95% confidence level.

The biplot was able to explain 45.6% of the variation within the dataset, with dimension 1 having 26.2% variation (eiganvalue of 4.97) and dimension 2 having 19.4% variation (eiganvalue of 3.69). Dimension 1 was dominated with salt gradient of magnesium, calcium and conductivity, and turbidity gradient, while dimension 2 was dominated with a nutrient gradient with development landcover, total phosphorus, and total kjeldahl nitrogen.

The following are patterns and trends out of the dataset:

- Salt applications (sodium chloride, calcium chloride, and/or magnesium chloride) are associated with one another and greatly influence BSC2, and is unique to this site.
- Unique to BSC4 and UEC2, a nitrate signal can be detected.
- The grouping of UEC6 and UEC5 suggest unique water quality for those sites and are by far has the most natural area.

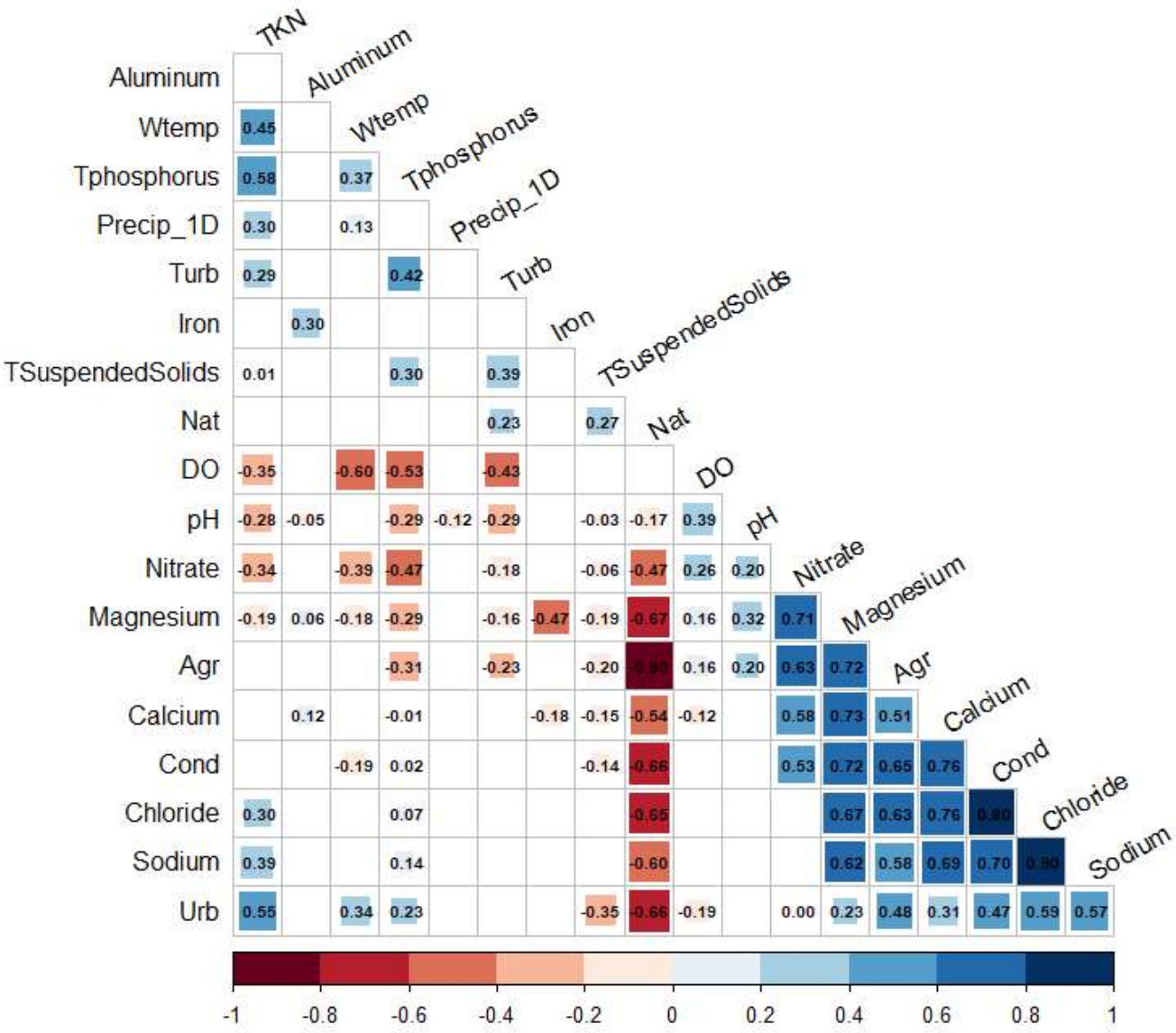


Figure 19. Spearman's rank correlation matrix for selective water quality, landuse, and precipitation parameters. Values (*ρ)* presented are significant at a 0.05 significance level with strong relationship ≥ 0.7, moderate relationship = between 0.5 and 0.69, and weak relationship = between 0.4 and 0.49. No relationship is when $\rho < 0.4$.

3.7. Loadings

Loadings are the amount of substance (nutrients, salts, sediment or pollutants) that moves through the stream over time. This is driven by the amount of water moving through and the amount of substance that is in the water (concentration). For example, higher loadings can be achieved through higher discharge and smaller concentrations, or lower discharge and higher concentrations.

At BSC1, we see that higher loads of chloride and nitrate are found during the winter months and especially true during the month of March (**Figure 20**) where we would expect spring melt and higher water levels and movement to occur (**Figure 3** and **4**). Phosphorus is also higher during the month of March but is comparable during the summer months (Jul, Aug, Sept) (**Figure 20**). During these summer months, water levels and discharge are often at its lowest (**Figure 3** and **4**).) which suggest that this period is when concentrations of phosphorus are highest. Two noticeable years were found to have higher suspended solid loads, but this does not seem to be consistent with other years. Higher loads in October suggest fall storms are driving higher loads as this is when more water is moving through the watershed and when plants are dormant leading to soil loss, and the release of nutrients from decomposition.

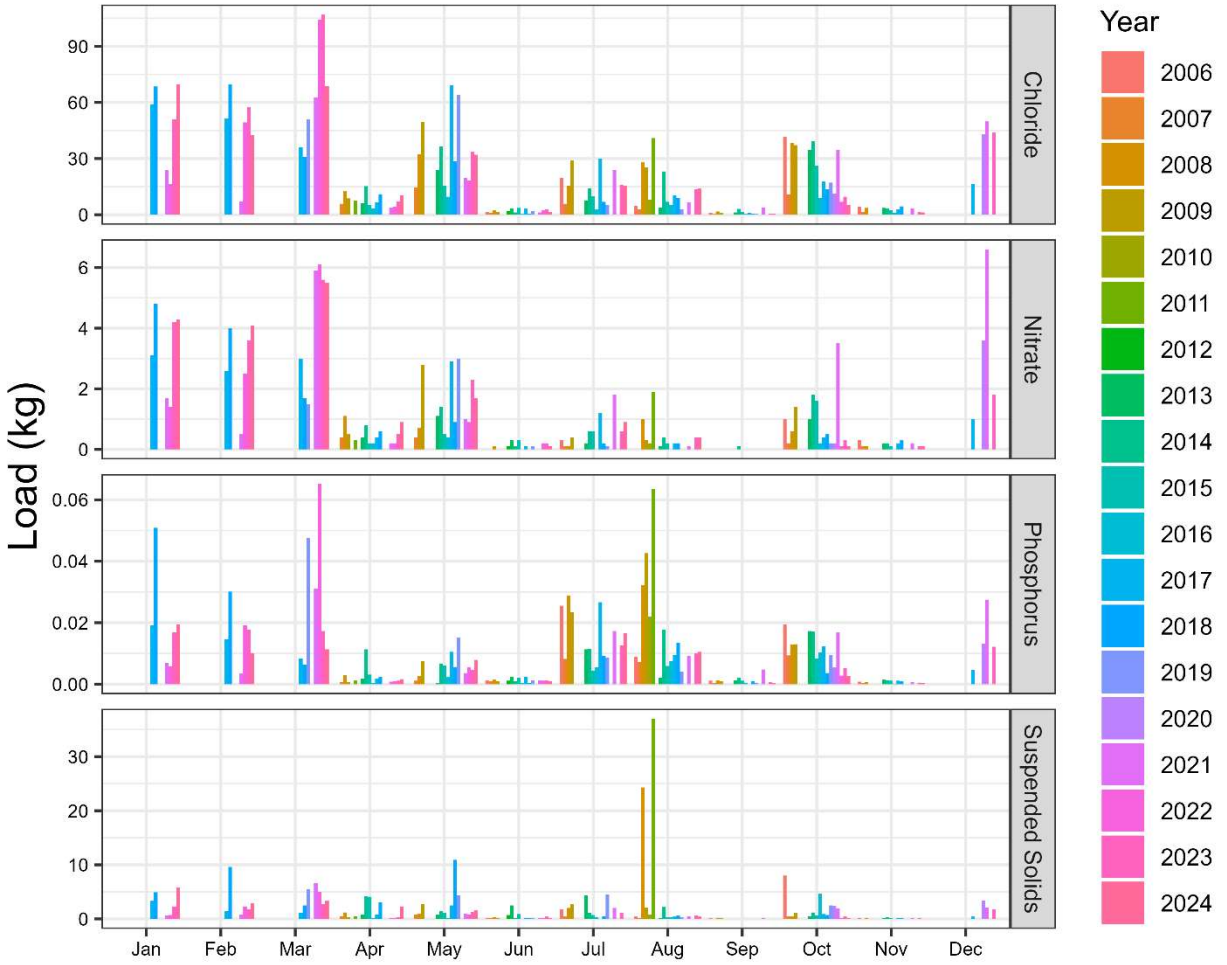
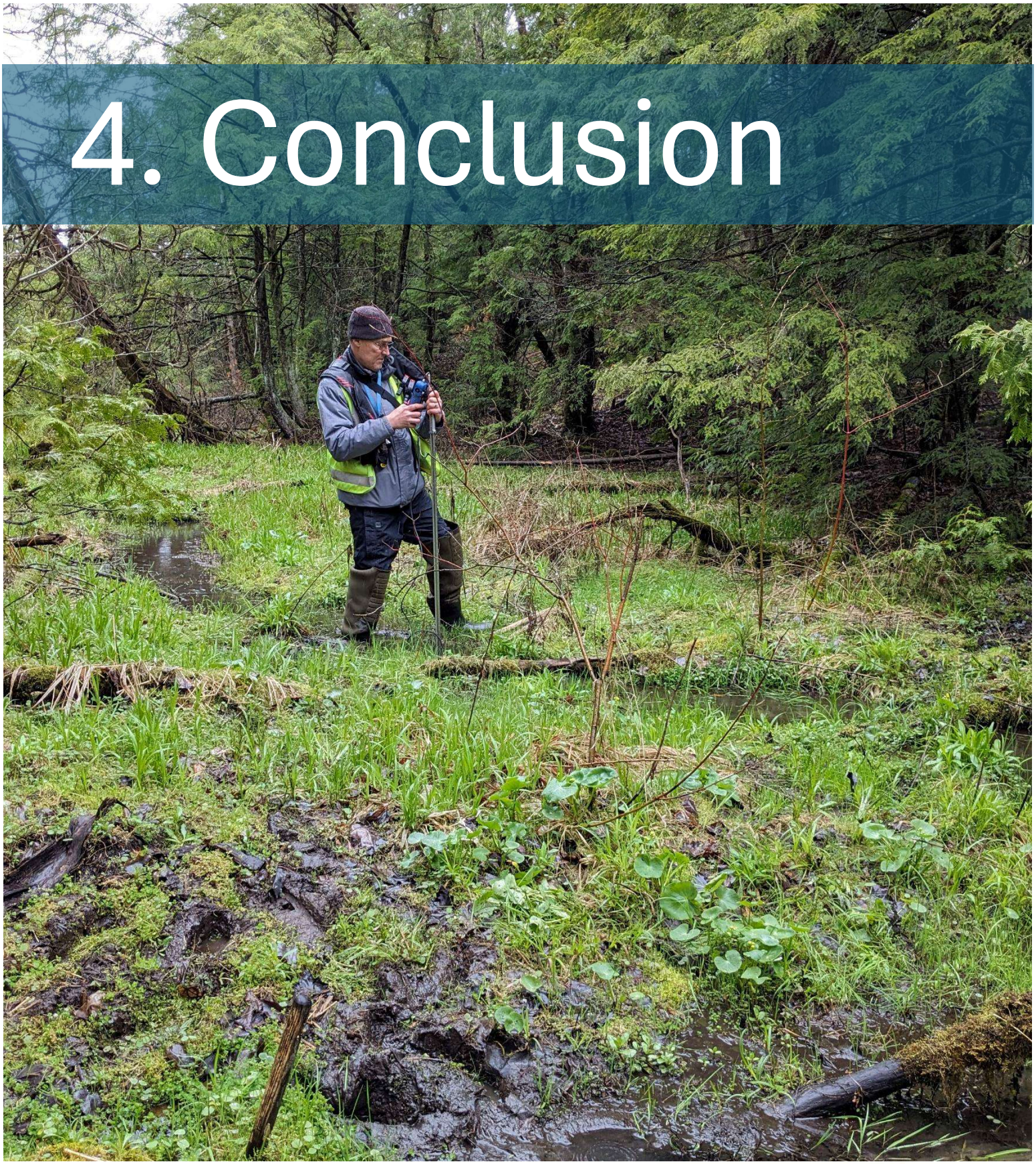


Figure 20. Loadings (kg per month) of chloride, nitrate, phosphorus, and suspended solids at BSC1 between the years of 2006 and 2024.

4. Conclusion



In between 2022 to 2024, the Region of Durham – Investigative Upstream Monitoring program monitored twelve sites across Blackstock and (Upper) East Cross Creek. These sites represent headwater streams on the Oak Ridges Moraine, a unique environmental, geological, and recreational feature in Southcentral Ontario. We included other datasets from the Ontario's Provincial Water Quality Monitoring Network, Water Survey of Canada's Hydrometric Network, Agriculture and Agri-Food Canada Annual Crop Inventory, and other Kawartha Conservation's initiatives to provide a comprehensive assessment of water quality with the goal of looking at patterns, hotspots, trends across time and space.

Water flow patterns are represented as high flow (>0.5 m^3/s) during the spring melt (March and April), followed by low (base) flow (~0.03 m^3/s) during the later summer months of August and September. Summer and fall storms are drivers of higher flows during low flow conditions. Generally, higher flows return back to normal around 2-4 days. Higher flows during the spring melt drive higher loads of chloride, nitrate, and to a degree, phosphorus, while higher flows during the summer (storm events) are drivers of higher loads of phosphorus and suspended solids.

We noted that in certain regions, land activities have caused concerns of elevated levels of nitrate (BSC4 and UEC2), chloride (BSC2), and phosphorus (BSC5). These sites and their watersheds are key candidates for water quality enhancement projects. Other regions showed impressive background sites (UEC5 and UEC6) though there are some exceedances, some due to monitoring efforts. Site UEC5 found within the Durham East Cross Forest Conservation Area was observed to be an ideal site for long-term monitoring of a background/reference site. Long-term monitoring at the lowest reach of Blackstock Creek indicates significant increase of chloride and nitrate since 2004 and stable levels of phosphorus, aluminum, and iron, which reflect urban expansion and agricultural intensification.

Within Blackstock Creek, the upper most region was observed to have degraded water quality and seasonally unavailable water. Paired with urban development at the lower reaches of the watershed, there is a concern that the existing sensitive and important habitat will be further constricted in the central watershed. Stewardship activities in these watersheds should also be open to 1) enhance connectivity for passage for sensitive species by removing barriers and 2) providing habitat (cover) to maintain cold water stream characteristics.

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Region of Durham - Investigative Upstream Monitoring Report for Blackstock Creek and East Cross Creek

Appendix A – Land use

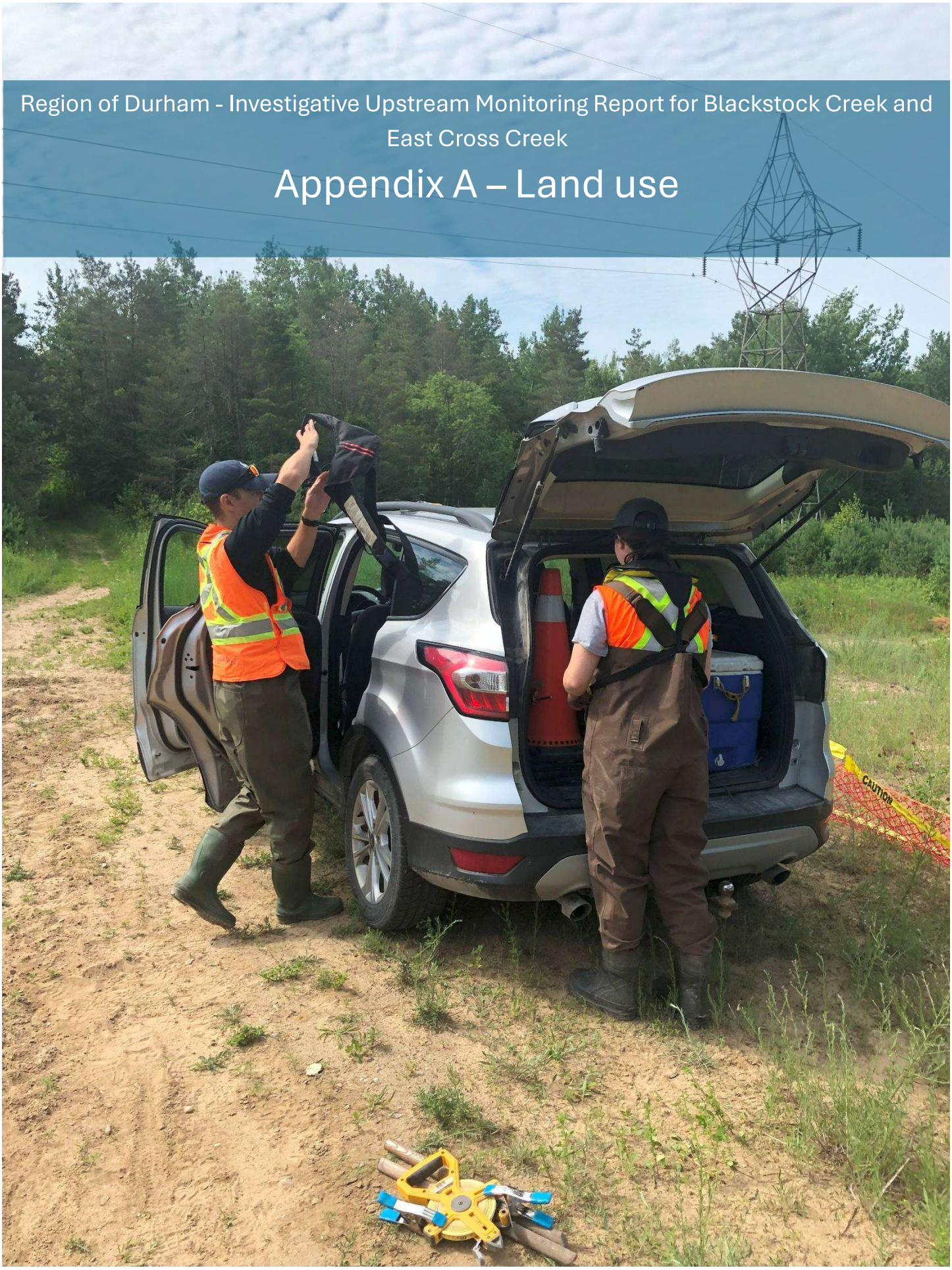

Table A1. Watershed characteristics of the monitoring sites from the Ontario Watershed Information Tool (Government of Ontario, 2015).

Site Code	BSC7	BSC6	BSC5	BSC4	BSC3	BSC2	BSC1	UEC6	UEC5	UEC4	UEC3	UEC2	UEC1
Drainage Area (km^2)	6	10.916	13.096	1.303	1.572	1.51	35.085	2.905	5.671	1.508	4.181	7.01	2.05
Shape Factor ()	3.032	3.088	3.678	5.187	6.01	7.405	6.31	5.273	9.433	5.734	7.19	9.436	5.887
Length of Main Channel (km)	4.265	5.806	6.94	2.6	3.074	3.344	14.879	3.914	7.314	2.94	5.483	8.133	3.474
Maximum Channel Elevation (m)	340.15	338.32	338.32	314.76	314.76	311.46	338.32	338.24	375.04	338.84	338.24	338.24	321.32
Minimum Channel Elevation (m)	297.84	290.02	281.18	284.81	276.61	276.58	257.99	307.98	294.31	292.64	299.45	281.9	264.74
Slope of Main Channel (m/km)	9.92	8.32	8.23	11.52	12.41	10.43	5.4	7.73	11.04	15.71	7.07	6.93	16.29
Slope of Main Channel (%)	0.992	0.832	0.823	1.152	1.241	1.043	0.54	0.773	1.104	1.571	0.707	0.693	1.629
Area Lakes/Wetlands (km^2)	0.364	0.499	0.54	0.001	0.001	0.004	3.572	0.003	0.057	0.081	0.116	0.188	0.027
Area - Lakes (km^2)	0.009	0.03	0.033	0.001	0.001	0.004	0.08	0	0.005	0.004	0.006	0.01	0.001
Area - Wetlands (km^2)	0.355	0.469	0.507	0	0	0	3.492	0.003	0.051	0.076	0.11	0.178	0.026
Mean Elevation (m)	316.535	316.066	313.354	305.176	302.692	294.306	298.073	331.915	329.204	309.78	325.714	318.057	303.536
Maximum Elevation (m)	343.813	346.583	346.583	315.53	315.53	311.462	346.583	341.64	375.381	342.01	341.64	341.64	333.479
Mean Slope (%)	4.937	4.471	4.352	3.189	3.617	3.132	3.857	5.556	4.487	4.76	5.508	5.176	5.692
Annual Mean Temperature (°C)	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.6	6.6	6.8	6.6	6.8	6.8
Annual Precipitation (mm)	904	904	904	899	899	899	899	911	911	899	911	899	899

Table A2. Ecological Lands Classification for each monitored watershed and their area in hectares.

Classification	BSC1	BSC2	BSC3	BSC4	BSC5	BSC6	BSC7	UEC1	UEC2	UEC3	UEC4	UEC5	UEC6
Active Aggregate	3.8	0	0	0	3.8	3.8	3.8	0	0.9	0.9	27.1	2.1	0.6
Coniferous Forest	211.9	0	4.1	4.1	134.1	123.5	120.6	18.5	183.3	151.6	12	100.3	144.1
Coniferous Swamp	60.7	0	0	0	12.9	12.9	7.5	0	2.8	2.8	1.8	10.8	0
Cultural Meadow	11.8	3.1	0	0	4.9	4.3	2.8	0	21.9	11.9	1.9	22.6	0
Cultural Plantation	29.7	0	0	0	28.2	28.2	0	0	7.4	6.8	1.7	22.2	6.5
Cultural Thicket	1.5	0	0	0	1.5	0	0	5.7	2.6	0	0	4.4	0
Cultural Woodland	58	0	0	0	54.4	54.4	38.1	5.8	9	0.2	0	70.6	0.2
Deciduous Forest	123.8	5.6	5.7	5.7	75.1	66.5	23	6	108.3	76.5	5.9	119.5	66.6
Deciduous Swamp	7.6	0	0	0	6.5	6.5	5.1	0	0	0	1.8	9.9	0
Floating Submerged Aquatic	1.2	0	0	0	1.2	1.2	0	0	0	0	0	0	0
Intensive Agriculture	1920.3	74.8	126.3	122.9	582.7	422.1	143.6	158.8	181.1	18.9	62.1	45.1	3
Manicured Open Space	10.1	0	0.9	0.9	0	0	0	0	0	0	0	0	0
Meadow Marsh	27.3	0	0	0	4.9	4.9	1.2	0	9.6	9.3	0	2.3	0
Mixed Forest	188.3	0	11.8	11	107	99.6	68.3	0	61.5	58.1	9.8	128.7	44.6
Mixed Swamp	228.9	0	0	0	17	17	17	0	44.5	44.3	3	7.2	6.3
Non-Intensive Agriculture	147.2	2	0	0	76.4	76.4	34.1	1.1	23.4	6.8	11.4	5.6	0
Open Sand Barren	0.6	0	0	0	0	0	0	0	13.2	13.2	0.3	0.7	11.8
Open Water	8.3	0.1	0	0	2.8	2.3	0.3	0.1	0.4	0.3	0.9	0	0
Road	70.2	8.1	5	4.9	24.5	17.1	10.4	2.4	5.9	3.4	1.5	3.9	1.8
Rural Development	208.6	13.1	3.3	3.3	71.1	51.1	39.1	6.4	17.8	11	6.4	7	4.8
Shallow Marsh	11.6	0	0	0	6.9	6.3	0.4	0	2.4	0	0	0.7	0
Submerged Shallow Aquatic	0.3	0	0	0	0.1	0.1	0	0	0	0	0	0	0
Treed Swamp	21.6	0	0	0	1.2	1.2	1.2	0	2	0.3	4.9	0.4	0
Urban Development	91.5	44	0	0	31	31	31	0	0	0	0	0	0
Cultural Savannah	0	0	0	0	0	0	0	0	1.4	0.9	0	1.5	0

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Appendix B – Water Quality

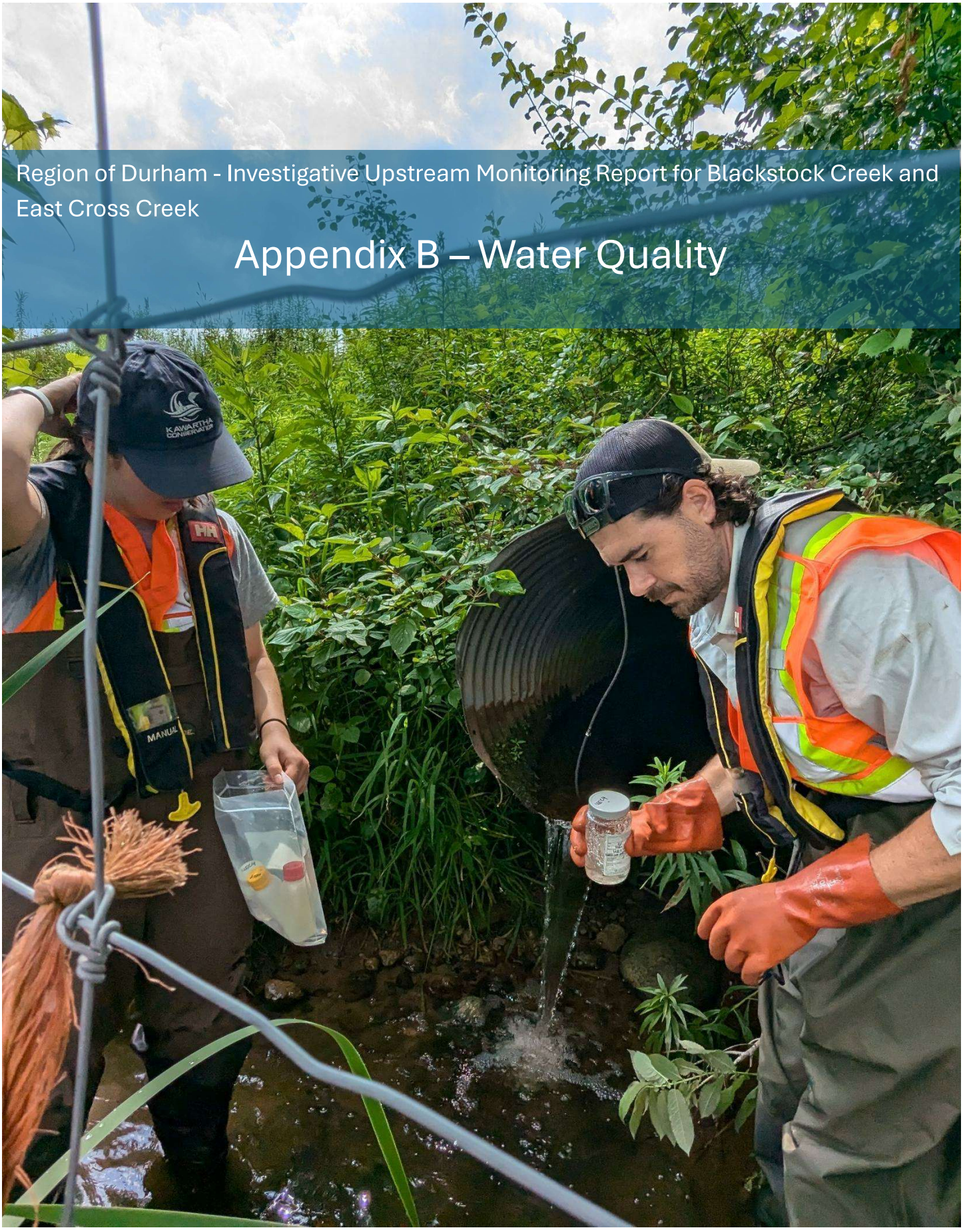

Table B1. Raw water quality results from the 2022 to 2024 monitoring period. Results from BSC1 are not included.

Site ID	Sampling Date	°C Water Temperature	pH	µS/cm Conductivity	mg/L Dissolved Oxygen	NTU Turbidity	mg/L Chloride	mg/L Nitrate	mg/L Total Ammonia	mg/L Total Kjeldahl Nitrogen
BSC2	2022-04-19	4.86	8.29	1265	13.5	0				
BSC3	2022-04-19	4.35	8.22	630	12.7	0				
BSC4	2022-04-19	6.15	8	626	10.2	3				
BSC5	2022-04-19	3.38	8.25	501	12.2	13.7				
BSC6	2022-04-19	4.14	8.37	417	11.8	0				
BSC7	2022-04-19	4.33	9.03	328	11.6	0				
UEC1	2022-04-19	4.01	8.2	487	12.7	7.2				
UEC2	2022-04-19	5.21	8.2	445	12.2	0				
UEC3	2022-04-19	4.71	8.14	384	12.2	13.2				
UEC4	2022-04-19	6.1	8.36	326	13.9	0				
UEC5	2022-04-19	5.22	8.11	336	12.2	0				
UEC6	2022-04-19	2.89	8.2	313	13.3	24				
UEC6	2022-04-26									
BSC2	2022-06-08	15.27	8.22	1640	7.25	3.6	99.2	1.7	0.14	1
BSC3	2022-06-08	11.27	8.35	1155	9.33	1	28.9	6.42	0.01	0.5
BSC4	2022-06-08	10.34	7.99	1141	9.22	1.7	24.3	7.85	< 0.01	0.4
BSC5	2022-06-08	14.7	8.25	903	8.59	8.5	25.6	2.76	0.05	1.2
BSC5	2022-06-08						25.7	2.75	0.04	1.2
BSC6	2022-06-08	18.1	8.5	747	10.5	5.8	16.1	1.47	0.05	1.2
BSC7	2022-06-08	17.16	7.52	720	4.48	3.5	12.2	1.18	0.07	1.4
UEC4	2022-06-08	17.31	8.05	624	7.8	1.3	0.7	< 0.05	0.02	0.6
UEC5	2022-06-08	17.26	8.12	527	8.37	7.1	3	< 0.05	0.01	0.5
UEC6	2022-06-08	11.97	8.06	598	8.64	1	1.7	0.24	0.02	0.2
UEC1	2022-06-09	11.04	8.24	987	8.35	5.9	25.8	2.12	< 0.01	0.5
UEC2	2022-06-09	12.94	8.26	805	9.12	10.1	16.5	2.88	0.01	0.6
UEC3	2022-06-09	18.51	7.74	691	5.63	11.8	6.8	0.64	0.06	0.9
BSC2	2022-06-21	16.1	8.05	1183	6.85	29.6	204	< 0.05	0.03	0.8
BSC3	2022-06-21	11.45	8.29	531	9.22	0.7	26.8	7.74	< 0.01	0.3
BSC4	2022-06-21	10.48	7.75	544	8.75	9	24.6	8.04	< 0.01	0.3
BSC5	2022-06-21	14.63	7.98	494	7.97	3	47.2	2.57	0.02	0.6

BSC6	2022-06-21	19.69	7.86	262	7.43	1	19.9	0.26	0.03	1
BSC7	2022-06-21	20.84	7.47	390	3.49	0.9	14.3	0.14	0.05	1.2
UEC2	2022-06-21	12.82	8.03	424	8.84	1.9	13.2	6.14	< 0.01	0.2
UEC4	2022-06-21	20.42	7.9	313	5.8	6.1	3.6	< 0.05	0.03	0.7
UEC5	2022-06-21	20.85	8.05	289	7.23	3.5	2.5	0.06	< 0.01	0.5
UEC1	2022-06-24	13.1	8.28	462	6.16	3.8	11.4	2.95	< 0.01	0.4
UEC3	2022-06-24	24.57	7.75	314	6.1	6.3	3.9	0.3	0.07	0.5
UEC3	2022-06-24	24.57	7.75	314	6.1	6.3	3.9	0.31	0.06	0.5
UEC6	2022-06-24	13.01	8.02	239	8.24	11	2.4	0.32	0.02	0.4
BSC2	2022-07-19	18.19	7.83	1081	7.46	8.9	200	0.34	0.05	0.8
BSC3	2022-07-19	12.46	8.12	560	9.12	26.4	27.4	7.63	< 0.01	0.3
BSC5	2022-07-19	15.92	7.96	574	8.24	7.7	50.6	2.19	0.04	0.5
BSC6	2022-07-19	17.37	7.67	525	6.2	39	17.7	1.07	0.23	2.4
BSC7	2022-07-19						13.8	0.08	0.08	1.1
BSC7	2022-07-19	19.25	7.56	494	5.59	2.5	14.4	0.08	0.07	1.2
UEC2	2022-07-19		7.95	420	9.39	2.5	12.3	5.43	0.02	1.3
UEC3	2022-07-19	19.45	7.64	354	6.9	36.5	2.7	0.2	0.06	1.6
UEC4	2022-07-19						2.3	< 0.05	0.03	1.1
UEC4	2022-07-19	22.36	8.04	189	6.14	3.6	2.3	< 0.05	0.03	0.7
UEC5	2022-07-19	20.16	8.13	290	8.2	4.5	1.8	< 0.05	0.02	0.4
UEC6	2022-07-19	11.65	7.79	328	8.27	4.8	1.4	0.3	0.02	0.3
BSC2	2022-08-17	16.91	7.65	1500	5.06	3.1	273	0.19	< 0.01	0.69
BSC3	2022-08-17	12.01	8.1	582	7.35	0.9	27.3	7.76	< 0.01	0.19
BSC5	2022-08-17	14.46	7.87	615	7	3	54	3.1	< 0.01	0.31
BSC5	2022-08-17						54	3.13	< 0.01	0.29
UEC2	2022-08-17	11.32	7.93	490	7.8	2.1	14.3	6.62	< 0.01	0.22
UEC3	2022-08-17	20.16	7.54	351	6.07	11.4	2.7	0.06	< 0.01	0.6
UEC5	2022-08-17	16.71	8.11	333	6.5	4.5	1.9	< 0.05	< 0.01	0.35
UEC6	2022-08-17	11.5	7.91	318	5.76	10	1.4	0.28	< 0.01	0.57
UEC6	2022-08-17						1.4	0.29	< 0.01	0.43
UEC6	2022-08-17						1.4	0.29	< 0.01	0.43
BSC2	2022-09-21	16.49	7.89	1130	7.01	5.7	254	< 0.5	0.12	0.7
BSC3	2022-09-21	12.21	8.23	627	9.77	1.2	28.5	8.32	< 0.01	0.2
BSC4	2022-09-21	10.5	7.87	639	8.96	1.5	26.6	8.59	< 0.01	0.1
BSC5	2022-09-21	14.14	8.06	640	8.35	3.5	57.9	3.14	< 0.01	0.3

UEC2	2022-09-21	11.3	8.2	475	9.42	1.4	15.3	7.12	< 0.01	0.2
UEC3	2022-09-21	16.95	7.98	378	7.65	5.5	3.6	0.1	< 0.01	0.4
UEC5	2022-09-21	14.44	8.12	351	8.68	2.4	2.5	< 0.05	< 0.01	0.2
UEC6	2022-09-21	11.31	8.84	355	8.33	2.7	2.2	0.33	< 0.01	228
BSC2	2023-05-08	13.7	8.23	906	10.8	0	105	3.3	<0.05	0.7
BSC3	2023-05-08	9.9	8.26	613	11.3	0	25.6	6.43	<0.05	0.3
BSC4	2023-05-08	9.6	7.84	631	10.7	0	24.2	8.45	<0.05	0.2
BSC5	2023-05-08	11.4	8.18	526	10.7	0	33.7	3.84	<0.05	0.6
BSC6	2023-05-08	14.1	8.53	437.4	13.6	0	30.3	1.89	<0.05	0.7
BSC7	2023-05-08	14.9	7.73	436.2	10.2	0	19.9	2.16	<0.05	0.7
UEC1	2023-05-08	8.4	8.21	625	11.1	0	13.1	2.41	<0.05	0.2
UEC2	2023-05-08	9.3	8.08	471.7	10.8	0.02	12.2	4.58	<0.05	0.3
UEC3	2023-05-08	11.7	7.85	379.2	11.1	12.98	5.6	0.42	<0.05	0.3
UEC4	2023-05-08	12.5	8.19	343.5	13.4	0	3.1	0.09	<0.05	0.4
UEC5	2023-05-08	10.3	8	317.3	10.7	0	2.7	0.14	<0.05	0.3
UEC6	2023-05-08	10	8.06	331.2	11.3	0	0.7	0.21	<0.05	0.2
BSC2	2023-05-17	10	8.08	1367	10.3	0	212	2.24	<0.05	0.8
BSC3	2023-05-17	7.6	8.36	629	11.5	0	26.9	8.06	<0.05	0.3
BSC4	2023-05-17	8.1	7.85	640	10.9	0	24.4	8.43	<0.05	0.2
BSC5	2023-05-17	10.1	8.18	584	11	0.41	47.5	3.16	<0.05	0.5
BSC6	2023-05-17	16.3	8.53	382.8	10.5	0	23.1	0.13	<0.05	0.9
BSC7	2023-05-17	14.2	7.66	484.1	7.78	0	20.4	0.17	<0.05	0.6
UEC1	2023-05-17	6.5	8.29	540	11.7	0	11.7	3.06	<0.05	0.2
UEC2	2023-05-17	7.6	8.11	497.7	11.2	1.47	12.7	6.08	<0.05	0.3
UEC3	2023-05-17	11.5	8.32	363.2	12.7	0	2.9	0.2	<0.05	0.2
UEC4	2023-05-17	14.9	8.5	339.2	12.6	0	2.8	0.1	<0.05	0.5
UEC5	2023-05-17	9.3	8.09	331.3	10.9	0	1.7	0.07	<0.05	0.4
UEC6	2023-05-17	7.9	8.04	339.5	8.04	2.69	0.6	0.26	<0.05	0.2
BSC2	2023-06-06	13.9	7.94	1229	8.95	0	194	1.07	<0.05	0.5
BSC3	2023-06-06	11.2	8.19	606	10.9	0	24.4	8.01	<0.05	0.2
BSC4	2023-06-06	10.2	7.66	617	10.3	0	22.8	8.15	<0.05	0.2
BSC5	2023-06-06	12.4	8.04	638	10.4	0	54.1	4.08	<0.05	0.4
BSC7	2023-06-06	15	7.65	574	8.15	0	15.8	0.09	0.07	1
UEC1	2023-06-06	9.9	8.12	532	10.8	0	10.4	3.11	<0.05	0.2
UEC2	2023-06-06	10	7.99	497.5	10.6	0	12.6	6.29	<0.05	0.2

UEC3	2023-06-06	14.6	8.21	366.2	11	0	2.1	0.14	<0.05	0.2
UEC4	2023-06-06	20	7.92	308.7	11.9	0	2.5	0.12	<0.05	0.6
UEC5	2023-06-06	13.2	8.07	333.2	10.1	0	1.2	0.1	<0.05	0.2
UEC6	2023-06-06	10.1	7.57	342.6	9.74	0.8	0.8	0.27	<0.05	0.3
BSC2	2023-06-20	16.2	8.01	1037	8.29	0	197	1.02	<0.05	0.6
BSC3	2023-06-20	13.5	8.33	502	9.77	0	24.9	8	<0.05	0.1
BSC4	2023-06-20	11.2	7.9	512	9.41	0	24	8.4	<0.05	0.2
BSC5	2023-06-20	15.3	8.12	507	9.28	0.44	49.4	3.64	<0.05	0.3
BSC7	2023-06-20	20.6	7.7	362.2	7	0	14.2	0.25	<0.05	0.7
UEC1	2023-06-20	12.2	8.37	442.9	9.88	0	11.2	3.23	<0.05	0.1
UEC2	2023-06-20	11.9	8.2	403.3	9.69	5.38	13.3	6.52	<0.05	0.4
UEC3	2023-06-20	20.3	8.17	312.6	9.17	0.72	2.3	0.23	<0.05	0.3
UEC4	2023-06-20	21.8	8.33	251.2	10.7	0	2.9	0.1	<0.05	0.6
UEC5	2023-06-20	18.1	8.32	285.4	8.91	0	1.3	0.08	<0.05	0.2
UEC6	2023-06-20	12.6	7.91	286.5	9.04	8.2	0.8	0.28	<0.05	0.2
BSC2	2023-07-04	20.4	8.01	972	7.47	0	135	1.28	<0.05	0.6
BSC3	2023-07-04	14.2	8.24	535	9.03	0	25.2	7.45	<0.05	0.2
BSC4	2023-07-04	11.7	7.8	735	9.2	0	23.2	8.07	<0.05	0.1
BSC5	2023-07-04	16.8	8.06	554	8.66	1.13	48	4.1	<0.05	0.4
BSC7	2023-07-04	22.2	7.55	404.6	5.3	13	15	0.18	0.05	0.7
UEC1	2023-07-04	12.8	8.24	465.8	9.69	0	10.6	3.24	<0.05	0.2
UEC2	2023-07-04	12.3	8.12	435.5	9.38	0	13.1	6.42	<0.05	0.2
UEC3	2023-07-04	21.4	8.13	349.2	8.92	4.99	2.3	0.31	<0.05	0.2
UEC4	2023-07-04	24.7	8.24	239.1	10.2	0	2.7	0.08	<0.05	0.5
UEC5	2023-07-04	19	8.14	311.9	9.42	0	1.3	0.08	<0.05	0.2
UEC6	2023-07-04	12.5	7.7	302	8.65	54.5	0.9	0.29	<0.05	0.6
BSC2	2023-07-18	18.4	7.92	971	7.99	0.54	154	1.84	<0.05	0.7
BSC3	2023-07-18	12.3	8.2	558	10.2	0.31	27.7	7.7	<0.05	0.4
BSC4	2023-07-18	10.8	7.78	555	9.81	0.26	25	8.5	<0.05	0.3
BSC5	2023-07-18	15.4	8.07	574	9.29	0.81	51.5	3.41	<0.05	0.4
BSC6	2023-07-18	10.9	7.75	447.8	6.7	2.2	25.1	0.43	0.08	1.1
BSC7	2023-07-18	20	7.55	385.2	4.91	2	17.2	0.17	<0.05	0.9
UEC1	2023-07-18	12	8.19	481.6	10.4	1.21	11.3	3.25	<0.05	0.3
UEC2	2023-07-18	11.8	8.03	449.1	10.2	0.38	14.2	6.64	<0.05	0.3
UEC3	2023-07-18	17.5	8.14	358.7	11.3	0.43	3.6	0.58	<0.05	0.3

UEC4	2023-07-18	23.2	7.85	273.6	9.22	0.39	3.6	0.06	<0.05	0.7
UEC5	2023-07-18	16.8	8.05	322.9	9.14	1.34	1.3	0.13	<0.05	0.2
UEC6	2023-07-18	11.9	7.77	308.2	9.31	3.23	0.5	0.3	<0.05	0.3
BSC2	2023-08-09	17.6	7.86	1050	5.27	0.74	151	1.14	0.06	0.7
BSC3	2023-08-09	12.9	8.16	586	10.1	0.37	28	7.73	<0.05	0.3
BSC4	2023-08-09	11.1	7.76	580	9.78	0.13	24.6	8.36	<0.05	0.2
BSC5	2023-08-09	16	8.01	616	9.14	0.69	54.1	3.04	<0.05	0.5
BSC6	2023-08-09	19.8	7.63	503	7.58	0.98	25.9	0.27	0.09	0.9
BSC7	2023-08-09	17.9	7.53	492.9	6.6	2.28	20.1	0.83	0.05	0.9
UEC1	2023-08-09	12.6	8.21	501	10.1	0.86	11.9	3.33	<0.05	0.2
UEC2	2023-08-09	12.7	8.07	461.8	9.86	0.44	13.1	5.91	<0.05	0.4
UEC3	2023-08-09	17.1	7.58	397.5	8.19	0.5	4.7	0.41	<0.05	0.3
UEC4	2023-08-09	22	7.57	305.2	6.96	0.4	4.7	0.08	<0.05	0.7
UEC5	2023-08-09	16.4	7.94	348.2	9.03	0.76	2.5	0.09	<0.05	0.2
UEC6	2023-08-09	12.2	7.63	85.5	9.18	1.7	1.4	0.37	<0.05	0.2
BSC2	2023-08-22	16.8	7.94	1375	9.44	2.91	250	2.17	0.1	0.4
BSC3	2023-08-22	12.1	8.27	590	9.99	0.4	26	8.39	<0.05	0.2
BSC4	2023-08-22	10.5	7.88	598	9.88	0.15	25	8.76	<0.05	0.1
BSC5	2023-08-22	13.8	8.06	645	9.43	0.42	58.7	3.54	<0.05	0.3
BSC6	2023-08-22	16	7.76	630	7.76	4.03	32.3	0.62	0.15	0.9
UEC1	2023-08-22	11.9	8.29	523	10.1	0.65	11.3	3.6	<0.05	0.2
UEC2	2023-08-22	10.9	8.08	485.9	10.1	0.33	15.2	7.06	<0.05	0.2
UEC3	2023-08-22	15.1	8.17	374.8	10.5	0.22	2.4	0.13	<0.05	0.1
UEC4	2023-08-22	21.3	8.03	332.4	10.3	0.07	4.8	0.1	<0.05	0.6
UEC5	2023-08-22	14.9	8.09	342.7	9.35	0.74	1.6	0.06	<0.05	<0.1
UEC6	2023-08-22	11.1	7.85	325.6	9.43	18.2	1.1	0.32	<0.05	<0.1
BSC2	2023-09-05	18.1	7.86	1585	8.09	15	307	1.94	0.07	0.9
BSC3	2023-09-05	13.5	8.18	619	9.62	4.74	25.8	8.42	<0.05	0.5
BSC4	2023-09-05	11.3	7.67	628	9.35	2.35	24.7	8.68	<0.05	0.4
BSC5	2023-09-05	16.2	7.97	665	8.56	0.41	59	3.44	<0.05	0.3
BSC6	2023-09-05	11.8	7.79	681	6.57	2.51	30.5	0.88	0.14	0.7
UEC1	2023-09-05	13	8.2	540	9.74	0.63	11	3.64	<0.05	0.3
UEC2	2023-09-05	11.8	8.01	515	9.77	0.72	15.4	7.44	<0.05	0.1
UEC3	2023-09-05	17.9	8.05	396	8.72	0.23	1.6	0.12	<0.05	0.2
UEC4	2023-09-05	23.5	8.12	276.1	10	0.27	4	0.09	<0.05	0.5

UEC5	2023-09-05	16.8	8	353.5	8.59	1	1.3	0.08	<0.05	<0.1
UEC6	2023-09-05	11.8	7.69	340.7	8.84	1.38	0.9	0.41	<0.05	0.1
BSC4	2023-09-19	9.6	7.63	634	10.2	0.56				
UEC5	2023-09-19	12.4	7.92	348.6	9.91	1.62				
BSC2	2023-09-26	13.5	7.87	1587	9.01	5.82	293	1.63	<0.05	0.4
BSC3	2023-09-26	11.1	8.08	681	10.6	0.23	28.5	9.41	<0.05	<0.1
BSC4	2023-09-26	10	7.59	698	10.1	0.56	26.9	9.52	<0.05	0.1
BSC5	2023-09-26	12	7.93	749	10	0.87	65.8	4.59	<0.05	0.2
UEC1	2023-09-26	11	8.16	595	10.6	0.52	11.7	3.96	<0.05	<0.1
UEC2	2023-09-26	10.3	7.9	571	10.5	0.62	16.9	8.01	<0.05	<0.1
UEC3	2023-09-26	13.1	8.01	426.6	9.93	1.2	4.7	0.18	<0.05	<0.1
UEC5	2023-09-26	11.8	7.92	379.3	10.1	11.8	1.3	0.1	<0.05	<0.1
UEC6	2023-09-26	10.2	7.35	381	9.61	0.91	0.9	0.33	<0.05	<0.1
BSC2	2023-10-17	10	7.77	1136	9.59	0	178	0.92	0.06	0.4
BSC3	2023-10-17	8	8.01	621	11	0	28.5	9.25	<0.05	0.1
BSC4	2023-10-17	8.6	7.62	627	10.4	0	26.5	9.55	<0.05	0.1
BSC5	2023-10-17	9.1	7.85	653	10.2	0	60.8	2.79	<0.05	0.2
BSC7	2023-10-17	9.2	7.67	671	8.66	0	21.2	0.11	<0.05	0.7
UEC1	2023-10-17	9.1	8.11	531.1	10.9	0	12.2	3.78	<0.05	0.1
UEC2	2023-10-17	9.1	7.83	503	10.7	0	16.1	7.54	<0.05	0.2
UEC3	2023-10-17	10.1	7.93	382	10.5	0	4	0.21	<0.05	0.1
UEC4	2023-10-17	11.5	8.27	234.5	11.7	0	5.7	<0.05	<0.05	0.4
UEC5	2023-10-17	9	7.94	341.6	10.7	0	1.9	<0.05	<0.05	<0.1
UEC6	2023-10-17	9.3	7.62	336.3	9.21	0	1.2	0.28	<0.05	<0.1
BSC2	2023-11-08	4.6	7.76	1065	12.2	0	173	1.06	0.09	0.3
BSC2	2023-11-08						172	1.06	0.1	0.3
BSC3	2023-11-08	4.7	8.03	360	12.5	0	31.5	10.9	<0.05	0.2
BSC3	2023-11-08						30.9	10.7	<0.05	<0.1
BSC4	2023-11-08	6.9	7.69	630	11.2	0	28.8	11.2	<0.05	0.1
BSC4	2023-11-08						28.9	11.3	0.05	0.1
BSC5	2023-11-08	4.5	7.89	679	12.4	0	70.8	4.15	<0.05	0.3
BSC5	2023-11-08						70.6	4.13	0.06	0.2
BSC6	2023-11-08	2.9	7.38	727	9.24	0.52	50	0.85	0.44	0.9
BSC6	2023-11-08						49.5	0.8	0.44	0.9
BSC7	2023-11-08	5	7.43	636	9.48	0	22.4	0.07	<0.05	0.4

BSC7	2023-11-08						22.5	0.09	<0.05	0.4
UEC1	2023-11-08						12.8	4.29	<0.05	<0.1
UEC1	2023-11-08	4.9	8.05	534	12.1	0	12.8	4.31	<0.05	0.1
UEC2	2023-11-08						16.9	8.5	<0.05	0.3
UEC2	2023-11-08	5.7	7.9	501	12.4	0	16.9	8.5	<0.05	0.1
UEC3	2023-11-08						4.5	0.44	<0.05	0.1
UEC3	2023-11-08	4.2	7.89	381.5	12.5	0	4.4	0.46	<0.05	<0.1
UEC4	2023-11-08	5.5	8.23	275.5	13.3	0	7.6	<0.05	<0.05	0.4
UEC4	2023-11-08						7.6	0.05	<0.05	0.4
UEC5	2023-11-08	2.9	7.86	349.2	12.8	0	1.7	0.11	<0.05	0.1
UEC5	2023-11-08						1.7	0.07	<0.05	0.2
UEC6	2023-11-08	5.3	7.65	333.2	10.5	6.5	0.9	0.4	<0.05	<0.1
UEC6	2023-11-08						<0.5	0.4	0.25	0.3
BSC2	2023-11-21	2.6	7.89	2286	12.4	1.95	10	3.4	<0.05	0.2
BSC3	2023-11-21	4.6	8.08	1158	12.2	0	12.9	6.54	<0.05	0.2
BSC4	2023-11-21	6.5	7.78	1166	11.4	20.2	3.3	0.19	<0.05	0.2
BSC5	2023-11-21	3.1	7.91	1236	12.4	0.69	8.1	<0.05	<0.05	0.3
BSC6	2023-11-21	2.6	7.72	1015	12.6	0	2.8	<0.05	<0.05	0.2
BSC7	2023-11-21	0.9	7.28	1049	8.74	36.7	1.4	0.26	<0.05	0.2
UEC1	2023-11-21	4.4	8.11	974	12.2	0	195	2.18	0.16	0.8
UEC2	2023-11-21	5.2	7.9	910	12.7	0	25.7	8.67	<0.05	0.2
UEC3	2023-11-21	2.7	7.96	693	13.1	0	23.3	9.06	<0.05	0.1
UEC4	2023-11-21	3.9	8.2	624	13.9	0	59.3	2.69	<0.05	0.4
UEC5	2023-11-21	0.1	7.83	629	13.1	0	30.5	0.06	0.13	0.8
UEC6	2023-11-21	4.1	7.88	597	11.4	4.12	20	0.39	<0.05	0.5
BSC2	2024-04-30	12.3	7.93	716	10.7	1.42	53.7	2	0.19	0.7
BSC3	2024-04-30	9.3	7.83	593	10.9	0.75	20	4.46	0.18	0.5
BSC4	2024-04-30	9.5	7.65	620	10.6	1.01	23.2	7.41	0.09	0.4
BSC5	2024-04-30	10.4	7.8	449.7	10.9	3.92	29.9	3.76	0.13	0.7
BSC6	2024-04-30	11.7	7.81	466.1	11.5	1.9	20.7	1.58	0.09	0.7
BSC7	2024-04-30	10.8	7.54	445.6	10.4	0.59	16.3	2.2	0.15	0.7
UEC1	2024-04-30	8.5	7.92	506	11.1	3.72	13.8	1.68	<0.05	0.5
UEC2	2024-04-30	9.6	7.76	419.2	9.6	2.7	10.5	2.11	0.1	0.5
UEC3	2024-04-30	9.4	7.39	363.1	9.46	4.2	6	0.24	0.1	0.6
UEC4	2024-04-30	10.8	7.63	346.5	10.7	0.9	2.8	<0.05	0.16	0.4

UEC5	2024-04-30	9.4	7.65	305.7	10.4	3.5	2.8	0.07	<0.05	0.3
UEC6	2024-04-30	8.4	7.67	325	10.7	1.45	1.1	0.23	0.14	0.3
BSC2	2024-05-14	13.1	7.95	872	8.85	1.28	89.9	1.18	0.1	0.7
BSC3	2024-05-14	10	8.03	623	9.73	0.55	22.5	5.78	<0.05	0.5
BSC4	2024-05-14	9.5	7.72	628	9.62	1.28	23.3	7.82	<0.05	<0.1
BSC5	2024-05-14	12	7.96	560	9.34	2.26	36.9	2.8	0.1	0.6
BSC6	2024-05-14	15.1	7.42	446.7	9.12	0.98	21.8	0.39	0.06	1.2
BSC7	2024-05-14	13.5	7.12	496.7	7.91	0.26	20.5	1.37	0.12	0.8
UEC1	2024-05-14	9.4	8.06	538	9.76	4.8	13.7	2.16	<0.05	0.6
UEC2	2024-05-14	10.2	8.02	483.6	9.83	0.5	11.9	4.82	<0.05	0.3
UEC3	2024-05-14	12.5	7.94	410.2	9.69	5.32	6.4	0.34	<0.05	0.9
UEC4	2024-05-14	15.8	7.95	371.8	9.9	0.47	3	<0.05	<0.05	1
UEC5	2024-05-14	12.1	8.02	341	9.37	5.2	3.3	0.05	<0.05	0.4
UEC6	2024-05-14	10	7.95	336.4	9.59	3.51	2.1	0.22	0.36	0.1
BSC2	2024-06-03	15	7.99	1283	9.61	3.68	209	2	0.13	0.9
BSC3	2024-06-03	11.3	8.19	621	11.6	0.06	28.1	8.49	0.08	0.4
BSC4	2024-06-03	10.3	7.72	624	11.1	0	26.5	8.88	0.08	0.3
BSC5	2024-06-03	13.4	8.05	616	10.7	2.51	55.2	3.23	0.2	0.7
BSC6	2024-06-03	17.4	7.73	468	9.16	0.41	29.3	0.46	0.27	0.5
BSC7	2024-06-03	17.3	7.47	359	4.65	1.25	19.4	0.17	0.17	1
UEC1	2024-06-03	10.9	8.21	539	11.9	6.85	13.1	3.22	0.16	0.6
UEC2	2024-06-03	10.6	7.93	497.5	11.4	0.04	14.5	6.69	<0.05	0.4
UEC3	2024-06-03	15	8.12	396.5	12.1	2.1	2.6	0.32	0.35	0.5
UEC4	2024-06-03	19.5	7.81	346	12.4	0.19	1.2	<0.05	0.1	0.7
UEC5	2024-06-03	14.1	8.04	351	10.7	3.6	1.2	<0.05	0.13	0.4
UEC6	2024-06-03	10.4	7.81	340.2	9.23	1.75	0.6	0.31	0.1	0.8
BSC2	2024-06-11	13.3	7.99	1220	9.72	0.55	165	2.04	<0.05	0.7
BSC3	2024-06-11	10.3	8.15	623	11.4	0.22	26.5	7.94	<0.05	0.2
BSC4	2024-06-11	9.7	7.64	625	10.9	0	25	8.07	<0.05	<0.1
BSC5	2024-06-11	12.1	8.04	601	10.7	2.62	51.8	3.7	0.06	0.6
BSC6	2024-06-11	15.3	7.66	506	9.25	1.09	28.6	0.56	0.26	1.3
BSC7	2024-06-11	15	7.44	460	5.28	1.08	18.4	0.37	0.14	0.8
UEC1	2024-06-11	9.8	8.22	538	11.7	0.63	12.5	3.17	<0.05	0.2
UEC2	2024-06-11	9.8	7.97	495.6	11.4	0.18	13.7	6.19	0.09	0.2
UEC3	2024-06-11	14.6	8.07	391.6	12	3.51	2.5	0.27	0.1	0.4

UEC4	2024-06-11	16.8	7.67	345.1	10.1	0.74	1.6	<0.05	<0.05	1
UEC5	2024-06-11	12.9	8.02	349.3	10	1.55	1.2	<0.05	0.06	0.2
UEC6	2024-06-11	9.5	7.72	344.7	10.2	6.24	0.7	0.25	<0.05	0.7
BSC2	2024-07-03	18.9	7.97	1159	8.03	3.16	165	1.28	<0.05	0.6
BSC3	2024-07-03	14.1	8.24	615	9.39	0.65	28.6	8.24	<0.05	0.2
BSC4	2024-07-03	11.5	7.72	623	9.41	0.44	26.6	8.51	<0.05	0.2
BSC5	2024-07-03	16.5	8.04	630	8.66	1.92	54.6	3.27	<0.05	0.5
BSC6	2024-07-03	21.3	7.71	545	5.83	1.76	29.8	0.48	0.22	0.8
BSC7	2024-07-03	22.4	7.56	491.1	5.05	0.87	18	0.08	0.07	0.8
UEC1	2024-07-03	13.9	8.26	538	9.33	1.47	13	3.32	<0.05	0.3
UEC3	2024-07-03	20.1	8.06	387.9	8.91	4.4	1.1	0.25	<0.05	0.4
UEC4	2024-07-03	22.5	8.02	325.7	10.7	0	2.4	0.07	<0.05	0.6
UEC5	2024-07-03	18.5	8.13	360.1	8.56	1.6	0.6	0.07	<0.05	0.2
UEC6	2024-07-03	12.3	7.8	344	9.03	11.58	<0.5	0.27	<0.05	0.3
BSC2	2024-07-09	19	7.91	1210	7.53	1.19	176	1.01	0.07	0.6
BSC3	2024-07-09	13.9	8.17	610	9.97	1.22	26.5	8.15	0.06	0.3
BSC4	2024-07-09	12.1	7.68	616	9.61	0.35	25.3	8.43	<0.05	0.2
BSC5	2024-07-09	16.8	8.01	640	9.11	2.22	56.1	2.83	0.11	0.5
BSC6	2024-07-09	20.4	7.7	624	6.18	3.8	30.9	0.49	0.39	1
BSC7	2024-07-09	22.6	7.63	543	4.2	0.05	19.3	<0.05	0.23	1.2
UEC1	2024-07-09	12.9	8.19	535	10.3	5.75	11.8	3.31	<0.05	0.3
UEC2	2024-07-09	12	7.94	502	10.2	0.05	13.9	6.86	<0.05	0.2
UEC3	2024-07-09	18.8	8.02	397	8.48	3.28	1.4	0.14	<0.05	0.3
UEC4	2024-07-09	25.4	7.76	274.1	11.3	0	2.7	<0.05	<0.05	0.6
UEC5	2024-07-09	18.1	8.02	368.3	9.05	2.08	1.2	<0.05	<0.05	0.2
UEC6	2024-07-09	12.4	7.73	349.7	9.2	1.62	0.9	0.26	<0.05	0.5
BSC2	2024-07-31	20.1	7.93	1217	7.45	1.85	28	0.4	0.65	1.3
BSC3	2024-07-31	14	8.2	624	9.7	0.15	14	2.66	0.05	0.3
BSC4	2024-07-31	11.9	7.69	630	9.61	1.49	14.3	6.28	<0.05	0.5
BSC5	2024-07-31	17.3	7.98	662	8.62	1.49	175	0.38	0.11	0.7
BSC6	2024-07-31	20	7.65	663	5.35	5.09	3.8	0.14	0.13	0.8
BSC7	2024-07-31	22	7.95	621	3.2	4.7	3.4	<0.05	0.09	0.6
UEC1	2024-07-31	14.3	8.16	536	9.53	2.02	26.2	7.85	0.09	0.3
UEC2	2024-07-31	12.8	7.96	509	9.63	1.11	2.8	<0.05	<0.05	0.3
UEC3	2024-07-31	19.5	7.82	382	7.76	9.5	24.7	8.16	0.06	0.2

UEC4	2024-07-31	26.2	7.82	268	8.84	0	1.8	0.2	<0.05	0.4
UEC5	2024-07-31	19	7.95	384.7	8.38	2.4	56.5	3.03	0.09	0.4
UEC6	2024-07-31	14	7.69	348.3	8.3	8.5	16.8	0.06	0.81	1.9
BSC2	2024-08-09	18.4	7.84	1138	9.5	8	155	0.76	0.17	0.8
BSC3	2024-08-09	12.5	8.03	627	11.5	0.31	26.4	7.22	0.1	0.5
BSC4	2024-08-09	10.9	7.85	623	10.3	0.14	24.8	7.96	0.06	0.3
BSC5	2024-08-09	16	7.91	646	10.3	1.26	53.6	2.62	0.1	0.5
BSC6	2024-08-09	17.8	7.52	640	7.44	6.17	28.5	1.04	0.36	1.2
BSC7	2024-08-09	18.9	7.37	577	5.35	1.14	21.4	<0.05	0.25	1.3
UEC1	2024-08-09	12.5	8.11	545	11.6	0.1	12.3	3.01	<0.05	0.2
UEC2	2024-08-09	13	7.86	483.2	11.2	0.71	11.8	5.03	<0.05	0.5
UEC3	2024-08-09	18	7.6	416	9.64	0.7	4.6	0.3	0.19	0.5
UEC4	2024-08-09	24.2	7.46	288.8	6.76	0.46	3.9	<0.05	<0.05	0.7
UEC5	2024-08-09	17.3	7.84	367	10.1	0.78	2.5	<0.05	<0.05	0.2
UEC6	2024-08-09	12	7.54	345.7	10.4	6.05	1.9	0.22	<0.05	0.8
BSC2	2024-08-21	15.4	7.9	1186	9.28	3.4	168	1.63	<0.05	0.5
BSC3	2024-08-21	11.7	8.11	626	10.2	0.42	26.3	8.18	<0.05	0.2
BSC4	2024-08-21	10.5	7.66	630	10.2	1.9	24.5	8.51	<0.05	0.3
BSC5	2024-08-21	13.4	7.93	657	9.71	0.65	54.2	3.43	<0.05	0.4
BSC6	2024-08-21	15.8	7.49	608	6.95	5.45	26.8	0.46	0.28	1.1
BSC7	2024-08-21	15.5	7.2	543	3.8	4.8	15.8	<0.05	0.24	1.2
UEC1	2024-08-21	11.6	8.19	546	10.4	0.21	12.3	3.21	<0.05	0.1
UEC2	2024-08-21	10.6	7.9	507	10.4	0.18	13.6	6.65	<0.05	0.2
UEC3	2024-08-21	13.9	7.75	404.3	9.44	1.13	3.5	0.3	<0.05	0.2
UEC4	2024-08-21	19	7.73	359.3	8.56	1.1	4.1	<0.05	<0.05	0.7
UEC5	2024-08-21	13.2	7.95	363.2	9.81	1.1	1.4	<0.05	<0.05	0.4
UEC6	2024-08-21	10.5	7.69	346	9.19	1.8	0.7	0.23	<0.05	0.1
BSC2	2024-09-03	15	7.97	1224	9.74	2.5	174	<0.05	<0.05	0.6
BSC3	2024-09-03	11.3	8.14	626	11	0.29	25.2	8.1	<0.05	0.3
BSC4	2024-09-03	10.2	7.65	630	10.8	0.5	23.4	8.35	<0.05	0.2
BSC5	2024-09-03	12.1	7.99	673	10.6	4.5	55.2	2.98	<0.05	0.6
BSC6	2024-09-03	14.3	7.43	629	7.19	13.4	28.1	0.48	0.27	0.9
BSC7	2024-09-03	14.6	7.56	469	7.3	0.35	15.4	<0.05	0.12	0.9
UEC1	2024-09-03	10.5	8.18	543	11.3	0.35	11.3	3.3	<0.05	0.2
UEC2	2024-09-03	10	7.94	511	11.1	0.05	13.6	6.8	<0.05	0.3

UEC3	2024-09-03	13.5	7.78	402	9.99	0.49	3.5	0.29	<0.05	0.3
UEC4	2024-09-03	19.9	7.74	318.7	8.83	0.2	4.6	<0.05	<0.05	0.6
UEC5	2024-09-03	11.5	8.01	359.7	10.8	0.7	2.5	<0.05	<0.05	0.2
UEC6	2024-09-03	9.8	7.59	346.3	9.6	23.7	2	0.3	<0.05	0.2
BSC2	2024-09-18	16.7	8.02	891	9.27	1.2	110	0.59	<0.05	0.4
BSC3	2024-09-18	12	8.15	618	10.2	0	23.1	7.82	<0.05	0.2
BSC4	2024-09-18	10.6	7.75	623	10	0	22.5	8.26	<0.05	0.1
BSC5	2024-09-18	13.7	7.98	662	9.58	0	54	2.99	<0.05	0.3
BSC6	2024-09-18	16	7.51	655	7.5	1.5	27.2	0.45	0.34	1
BSC7	2024-09-18	16.5	7.22	538	5.3	10.6	15.5	<0.05	0.76	1.9
UEC1	2024-09-18	11.7	8.17	534	10.4	0	11.2	3.65	<0.05	0.2
UEC2	2024-09-18	10.7	7.93	509	10.3	0	14	7.18	<0.05	0.2
UEC3	2024-09-18	15.7	8.06	394.9	11.6	0	5.2	0.25	<0.05	0.2
UEC4	2024-09-18	20.3	8.04	324	9.4	0	5.6	<0.05	0.05	0.6
UEC5	2024-09-18	13.3	7.98	352.6	9.7	0	3.1	<0.05	<0.05	0.3
UEC6	2024-09-18	10.6	7.76	336.8	9.27	0.45	2.7	0.23	<0.05	0.1

Site ID	Sampling Date	mg/L Total Phosphorus	mg/L Total Suspended Solids	mg/L Aluminum	mg/L Calcium	mg/L Iron	mg/L Magnesium	mg/L Sodium	m^3/s Discharge
BSC2	2022-04-19								0.013
BSC3	2022-04-19								0.018
BSC4	2022-04-19								0.015
BSC5	2022-04-19								0.055
BSC6	2022-04-19								0.018
BSC7	2022-04-19								0.014
UEC1	2022-04-19								0.031
UEC2	2022-04-19								0.083
UEC3	2022-04-19								
UEC4	2022-04-19								0.01
UEC5	2022-04-19								0.031
UEC6	2022-04-19								0.026
UEC6	2022-04-26								0.0012
BSC2	2022-06-08	0.122	< 3						0.024
BSC3	2022-06-08	0.019	< 3						0.115
BSC4	2022-06-08	0.016	3						0.027
BSC5	2022-06-08	0.084	8						0.086
BSC5	2022-06-08	0.087	10						
BSC6	2022-06-08	0.082	< 3						0.05
BSC7	2022-06-08	0.104	< 3						0.02
UEC4	2022-06-08	0.021	< 3						0.027
UEC5	2022-06-08	0.044	13						0.015
UEC6	2022-06-08	0.037	< 3						0.02
UEC1	2022-06-09	0.026	7						0.024
UEC2	2022-06-09	0.039	15						0.878
UEC3	2022-06-09	0.059	10						0.032
BSC2	2022-06-21	0.091	4						0.00105

BSC3	2022-06-21	0.008	4	0.133807
BSC4	2022-06-21	0.013	18	0.061661
BSC5	2022-06-21	0.025	7	0.008
BSC6	2022-06-21	0.024	4	0.006
BSC7	2022-06-21	0.074	4	0.00185
UEC2	2022-06-21	0.009	4	0.05
UEC4	2022-06-21	0.024	4	0
UEC5	2022-06-21	0.067	20	0.005
UEC1	2022-06-24	0.004	< 3	0.009
UEC3	2022-06-24	0.042	14	0.004
UEC3	2022-06-24	0.041	12	0.004
UEC6	2022-06-24	0.091	6	0.00168
BSC2	2022-07-19	0.085	< 3	0.000475
BSC3	2022-07-19	0.009	5	0.0998
BSC5	2022-07-19	0.035	7	0.0604
BSC6	2022-07-19	0.408	83	0.00114
BSC7	2022-07-19	0.081	7	
BSC7	2022-07-19	0.085	9	0.000149
UEC2	2022-07-19	0.101	8	0.177
UEC3	2022-07-19	0.153	61	0.0237
UEC4	2022-07-19	0.023	4	
UEC4	2022-07-19	0.021	11	0.000357
UEC5	2022-07-19	0.048	10	0.01
UEC6	2022-07-19	0.044	15	0.00134
BSC2	2022-08-17	0.086	3	0.00531
BSC3	2022-08-17	0.009	< 3	0.113
BSC5	2022-08-17	0.029	4	0.056
BSC5	2022-08-17	0.028	3	
UEC2	2022-08-17	0.01	< 3	0.193
UEC3	2022-08-17	0.051	16	0.004
UEC5	2022-08-17	0.06	10	0.003
UEC6	2022-08-17	0.179	16	0.0002
UEC6	2022-08-17	0.156	18	

UEC6	2022-08-17	0.156	18						
BSC2	2022-09-21	0.059	4						0.000171
BSC3	2022-09-21	< 0.002	3						
BSC4	2022-09-21	< 0.002	4						
BSC5	2022-09-21	0.02	5						
UEC2	2022-09-21	0.003	4						
UEC3	2022-09-21	0.015	9						
UEC5	2022-09-21	0.012	< 3						
UEC6	2022-09-21	0.059	6						
BSC2	2023-05-08	0.042	4	0.07	111	0.075	10.8	59.6	0.088
BSC3	2023-05-08	0.015	<3	0.06	92.5	0.036	14.1	10.8	0.14
BSC4	2023-05-08	0.009	<3	0.07	95.9	0.026	15.2	8.9	0.092
BSC5	2023-05-08	0.012	4	0.06	74.7	0.086	7.13	13.5	0.065
BSC6	2023-05-08	0.02	8	0.05	72	0.114	5.49	7.8	0.197
BSC7	2023-05-08	0.015	3	0.05	67.2	0.057	4.86	8	0.017
UEC1	2023-05-08	0.02	<3	0.07	76.1	0.036	14.2	6.7	0.011
UEC2	2023-05-08	0.029	5	0.06	75.7	0.044	9.45	4.3	0.751
UEC3	2023-05-08	0.019	5	0.06	65.1	0.208	6.45	3.7	0.014
UEC4	2023-05-08	0.026	4	0.05	62.9	0.214	4.58	2.7	0.091
UEC5	2023-05-08	0.047	14	0.06	56.2	0.218	4.78	2.3	0.014
UEC6	2023-05-08	0.021	4	0.08	65.1	0.185	4.46	1.3	0
BSC2	2023-05-17	0.092	<3	0.08	141	0.178	15.4	124	0.003
BSC3	2023-05-17	0.022	7	0.07	108	0.027	16.2	15.1	0.106
BSC4	2023-05-17	0.024	<3	0.08	117	0.019	17.8	10.9	0.079
BSC5	2023-05-17	0.027	3	0.07	80.9	0.135	12.3	23.3	0.008
BSC6	2023-05-17	0.044	3	0.04	62.7	0.382	6.38	11.3	0.102
BSC7	2023-05-17	0.03	<3	0.05	74.8	0.102	5.68	9.8	0.108
UEC1	2023-05-17	0.009	10	0.06	89.5	0.023	18.3	7.3	0.006
UEC2	2023-05-17	0.012	22	0.08	89.9	0.1	12.1	4.9	0.179
UEC3	2023-05-17	0.023	<3	0.03	65.9	0.164	7.09	3.1	0.006
UEC4	2023-05-17	0.02	<3	0.04	67.7	0.174	5.22	3	0.002
UEC5	2023-05-17	0.044	5	0.04	63.7	0.283	5.78	2.1	0.006
UEC6	2023-05-17	0.016	8	0.09	75.9	0.154	5.09	1.5	0
BSC2	2023-06-06	0.061	4	0.06	125	0.299	17.2	108	0

BSC3	2023-06-06	0.003	4	0.05	92	0.024	15.4	9.4	0.142
BSC4	2023-06-06	0.004	6	0.05	91.8	0.034	15.3	8.8	0.09
BSC5	2023-06-06	0.015	6	0.05	78.6	0.08	14.9	26.3	0.007
BSC6	2023-06-06								
BSC7	2023-06-06	0.047	5	0.06	95.8	0.269	7.58	9.6	0.036
UEC1	2023-06-06	0.01	4	0.07	78.9	0.057	18.5	6.1	0
UEC2	2023-06-06	0.011	6	0.06	83.6	0.083	11.8	4.4	0.216
UEC3	2023-06-06	0.01	5	0.05	67.1	0.183	7.78	2.8	0.004
UEC4	2023-06-06	0.012	5	0.03	57.1	0.249	5.27	3	0.034
UEC5	2023-06-06	0.022	49	0.06	59.8	0.281	6.13	2	0.004
UEC6	2023-06-06	0.067	26	0.24	65.2	0.754	4.49	1.4	0
BSC2	2023-06-20	0.115	19	0.09	112	0.503	16	106	0.001
BSC3	2023-06-20	0.01	4	0.06	89.4	0.029	15.2	9.6	0.061
BSC4	2023-06-20	0.011	5	0.06	96.6	0.047	15.8	9.2	0.039
BSC5	2023-06-20	0.02	5	0.06	80.8	0.084	14.4	25.4	0.006
BSC6	2023-06-20								
BSC7	2023-06-20	0.042	2	0.06	68.3	0.17	5.74	6.8	0.008
UEC1	2023-06-20	0.01	4	0.06	76.9	0.036	18.7	6.4	0.006
UEC2	2023-06-20	0.024	20	0.13	82.8	0.211	11.3	4.4	0.218
UEC3	2023-06-20	0.018	13	0.05	63.3	0.288	7.34	2.5	0.005
UEC4	2023-06-20	0.021	1	0.04	50.8	0.227	4.84	2.9	0.371
UEC5	2023-06-20	0.031	5	0.04	63	0.257	6.27	2	0.005
UEC6	2023-06-20	0.067	30	0.26	60.8	0.964	4.11	1.2	0
BSC2	2023-07-04	0.082	1	0.08	143	0.211	15.5	88.4	0.028
BSC3	2023-07-04	0.002	2	0.05	97.3	0.133	15.5	10.3	0.078
BSC4	2023-07-04	<0.002	2	0.06	99.8	0.034	16.2	9.2	0.099
BSC5	2023-07-04	0.033	6	0.06	87	0.144	14	25.8	0.008
BSC6	2023-07-04								
BSC7	2023-07-04	0.044	1	0.05	86.8	0.258	7.38	8.5	0.017
UEC1	2023-07-04	0.005	4	0.06	86.3	0.063	20.3	6.5	0.007
UEC2	2023-07-04	0.01	3	0.06	83.9	0.058	11.8	4.4	0.266
UEC3	2023-07-04	0.02	<1	0.06	73.4	0.285	8.01	2.5	0.004
UEC4	2023-07-04	0.014	10	0.04	51.6	0.163	5.78	3.1	0.34025
UEC5	2023-07-04	0.022	7	0.06	66.9	0.402	6.8	2.1	0.004
UEC6	2023-07-04	0.156	47	0.31	68.6	1.73	4.56	1.1	0.056

BSC2	2023-07-18	0.1	2	0.08	112	0.273	13.5	85.5	0.028
BSC3	2023-07-18	0.007	2	0.06	96.6	0.077	16	11.8	0.079
BSC4	2023-07-18	0.004	4	0.07	97.7	0.052	16.2	9.4	0.053
BSC5	2023-07-18	0.025	2	0.07	86.9	0.114	15.1	26	0.008
BSC6	2023-07-18	0.074	7	0.06	82	1.01	7.85	11.6	0.02
BSC7	2023-07-18	0.066	2	0.05	71.9	0.427	7.14	8.5	0.012
UEC1	2023-07-18	0.016	4	0.1	80	0.107	19.2	6.4	0.008
UEC2	2023-07-18	0.009	3	0.06	83.4	0.063	11.6	4.6	0.175
UEC3	2023-07-18	0.008	4	0.05	73.2	0.239	7.98	2.9	0.002
UEC4	2023-07-18	0.014	2	0.03	52.9	0.215	5.71	3	0.01
UEC5	2023-07-18	0.022	4	0.06	67.4	0.324	6.65	2.3	0.004
UEC6	2023-07-18	0.08	38	0.25	66.8	1.01	4.59	1.3	
BSC2	2023-08-09	0.109	2	0.08	118	0.417	14.5	85.3	0.015
BSC3	2023-08-09	0.009	2	0.08	105	0.092	17.1	11.8	0.112
BSC4	2023-08-09	0.004	2	0.06	102	0.033	16.6	9	0.072
BSC5	2023-08-09	0.037	3	0.06	92.2	0.199	14.3	26.8	0.011
BSC6	2023-08-09	0.051	3	0.06	95	0.57	8.59	11.3	0.057
BSC7	2023-08-09	0.058	1	0.05	85.3	0.309	7.95	8.1	0.018
UEC1	2023-08-09	0.011	7	0.06	84.6	0.042	20.4	6.2	0.011
UEC2	2023-08-09	0.017	4	0.06	83.6	0.072	11.2	4.2	0.211
UEC3	2023-08-09	0.012	2	0.05	76.7	0.131	7.93	3	0.013
UEC4	2023-08-09	0.039	1	0.03	61.6	0.206	6.52	3.3	0.000552
UEC5	2023-08-09	0.028	3	0.05	63.9	0.314	5.98	1.9	0.008
UEC6	2023-08-09	0.08	20	0.19	63.5	0.825	4.25	1.1	0.00616
BSC2	2023-08-22	0.073	17	0.11	126	2.03	20.2	132	0.007
BSC3	2023-08-22	0.005	8	0.05	88.5	0.048	16.6	9.6	0.105
BSC4	2023-08-22	0.006	3	0.03	91.9	0.021	17	9.1	0.076
BSC5	2023-08-22	0.023	1	0.04	80.8	0.077	16.5	27.9	0.003
BSC6	2023-08-22	0.034	8	0.07	99.8	0.737	9.67	14.2	0.01
BSC7	2023-08-22								
UEC1	2023-08-22	0.011	4	0.05	76.3	0.043	21.3	6.3	0.007
UEC2	2023-08-22	0.014	3	0.04	79.4	0.047	12.7	4.7	0.195
UEC3	2023-08-22	0.007	3	0.03	66.5	0.139	8.13	2.5	0.004
UEC4	2023-08-22	0.018	2	0.03	57.3	0.191	6.91	3.5	0.24135
UEC5	2023-08-22	0.021	6	0.05	61.3	0.293	7.19	2.3	0.004

UEC6	2023-08-22	0.046	11	0.12	62.2	0.456	5.01	1.5	0
BSC2	2023-09-05	0.204	35	0.35	152	2.96	23.4	148	0
BSC3	2023-09-05	0.032	20	0.14	94.1	0.224	15.7	8.9	0.108
BSC4	2023-09-05	0.023	16	0.12	93.7	0.172	14.9	8.1	0.084
BSC5	2023-09-05	0.026	2	0.07	82.2	0.09	16.4	27.9	0.005
BSC6	2023-09-05	0.048	10	0.08	120	0.513	9.87	13.6	0.004
BSC7	2023-09-05								
UEC1	2023-09-05	0.026	7	0.1	78.9	0.118	19.4	5.6	0.002
UEC2	2023-09-05	0.01	3	0.08	86.6	0.067	11.9	4.5	0.169
UEC3	2023-09-05	0.02	14	0.07	74.8	0.134	7.84	2.3	0.004
UEC4	2023-09-05	0.018	<1	0.04	48.6	0.127	6.65	3.4	0
UEC5	2023-09-05	0.024	4	0.05	68.8	0.239	7.16	2.2	0.002
UEC6	2023-09-05	0.048	6	0.11	65.1	0.502	4.52	1.3	0.003
BSC4	2023-09-19								
UEC5	2023-09-19								
BSC2	2023-09-26	0.081	6	0.08	133	1.15	21.5	0.366	0.075
BSC3	2023-09-26	<0.002	4	0.06	101	0.026	17.1	0.003	0.077
BSC4	2023-09-26	<0.002	3	0.07	103	0.027	16.8	0.002	0.077
BSC5	2023-09-26	<0.002	<3	0.06	85.3	0.08	16.9	0.022	0.004
BSC6	2023-09-26								No flow
BSC7	2023-09-26								Dry
UEC1	2023-09-26	0.002	6	0.07	82.2	0.045	20.5	0.008	0.008
UEC2	2023-09-26	<0.002	4	0.06	92.1	0.042	12.9	0.006	0.184
UEC3	2023-09-26	0.009	4	0.04	73.7	0.197	8.06	0.026	0.004
UEC4	2023-09-26								No Flow
UEC5	2023-09-26	0.01	7	0.04	63.9	0.216	6.92	0.023	0.002
UEC6	2023-09-26	0.015	5	0.05	69.2	0.219	4.78	0.076	0
BSC2	2023-10-17	0.05	3	0.04	118	0.728	21.2	106	0.0033
BSC3	2023-10-17	0.003	3	0.04	99.1	0.032	17.4	10.8	0.013
BSC4	2023-10-17	0.004	5	0.05	99.1	0.039	17	9.5	0.093
BSC5	2023-10-17	0.018	2	0.04	84.6	0.079	18.2	30.4	0.003
BSC6	2023-10-17								No Flow
BSC7	2023-10-17	0.059	1	0.06	124	0.082	10.7	8.8	0.000016
UEC1	2023-10-17	0.008	2	0.04	80.4	0.03	20.7	6.4	0.01

UEC2	2023-10-17	0.007	1	0.04	83.6	0.064	12.4	5	0.134
UEC3	2023-10-17	0.007	2	0.03	71.1	0.123	8.5	3.3	0.004
UEC4	2023-10-17	0.011	1	0.03	39.4	0.09	6.02	3.7	0.0003
UEC5	2023-10-17	0.019	2	0.04	62.5	0.204	7.2	2.5	0.002
UEC6	2023-10-17	0.013	9	0.04	67	0.088	5.02	1.7	0.001
BSC2	2023-11-08	0.05	<1	0.08	110	0.494	19.5	86.2	0.00053
BSC2	2023-11-08	0.037	2	0.08	113	0.51	19.9	88.1	
BSC3	2023-11-08	0.01	3	0.07	103	0.035	17.6	10.9	
BSC3	2023-11-08	<0.002	2	0.18	101	0.093	17.3	10.7	
BSC4	2023-11-08	0.011	2	0.09	98.4	0.036	16.4	9.2	0.07
BSC4	2023-11-08	<0.002	2	0.08	103	0.032	17.3	9.6	
BSC5	2023-11-08	<0.002	2	0.07	91.5	0.101	18.2	32.4	0.05
BSC5	2023-11-08	0.017	3	0.07	89.7	0.097	17.8	31.4	
BSC6	2023-11-08	0.032	9	0.09	123	0.991	10.6	24	
BSC6	2023-11-08	0.01	10	0.1	119	1.05	10	22.7	
BSC7	2023-11-08	0.019	1	0.07	114	0.056	10.4	8.6	0.00013
BSC7	2023-11-08	<0.002	<1	0.09	111	0.041	10.2	8.5	
UEC1	2023-11-08	<0.002	2	0.05	88.6	0.038	21.8	6.4	
UEC1	2023-11-08	<0.002	1	0.05	87.7	0.045	21.5	6.2	
UEC2	2023-11-08	<0.002	<1	0.04	94.1	0.036	13.3	5.2	
UEC2	2023-11-08	<0.002	3	0.03	86.3	0.035	12.1	4.7	
UEC3	2023-11-08	<0.002	3	0.03	75.4	0.142	8.75	3.3	
UEC3	2023-11-08	<0.002	2	0.02	74.3	0.139	8.62	3.2	
UEC4	2023-11-08	<0.002	1	0.02	54.6	0.075	6.61	3.8	0.0006
UEC4	2023-11-08	0.006	1	0.01	50.4	0.062	6.09	3.4	
UEC5	2023-11-08	0.01	26	0.08	70.3	0.456	7.75	2.5	
UEC5	2023-11-08	0.016	9	0.07	64.6	0.38	6.9	2.3	
UEC6	2023-11-08	<0.002	12	0.06	73.6	0.094	5.3	1.5	1.80E-06
UEC6	2023-11-08	0.008	4						
BSC2	2023-11-21	0.013	6	0.05	76.6	0.067	18.2	5.2	0.00056
BSC3	2023-11-21	0.012	3	0.05	87	0.049	11.5	4.3	0.119
BSC4	2023-11-21	0.014	3	0.04	67	0.177	7.04	2.4	0.067
BSC5	2023-11-21	0.008	<1	0.03	58.9	0.055	5.64	3.1	0.007
BSC6	2023-11-21	0.063	21	0.11	56.5	0.587	5.85	1.8	0.026

BSC7	2023-11-21	0.054	11	0.08	64.2	0.338	4.39	1.1	0.00048
UEC1	2023-11-21	<0.002	3	0.05	118	0.437	17.8	95.6	0.000126
UEC2	2023-11-21	0.005	1	0.05	113	0.028	17.6	10.5	0.193
UEC3	2023-11-21	0.004	3	0.05	109	0.03	16.6	8.9	0.012
UEC4	2023-11-21	0.022	<1	0.05	91.5	0.17	16.9	28.5	0.009
UEC5	2023-11-21	0.038	7	0.03	91.1	0.578	9.38	12.4	0.007
UEC6	2023-11-21	0.026	<1	0.04	95.4	0.076	9.22	8	2.88E-05
BSC2	2024-04-30	0.058	8	0.08	<0.005	0.091	9.5	38	0.218
BSC3	2024-04-30	0.012	3	0.07	<0.005	0.069	12.3	10.5	0.159
BSC4	2024-04-30	0.01	4	0.08	<0.005	0.076	16.2	9.9	0.1
BSC5	2024-04-30	0.028	12	0.15	<0.005	0.234	7.36	13.7	0.143
BSC6	2024-04-30	0.027	5	0.09	<0.005	0.165	6.66	8.7	0.337
BSC7	2024-04-30	0.024	2	0.07	<0.005	0.099	5.82	8.2	0.06
UEC1	2024-04-30	0.048	16	0.2	<0.005	0.232	12.1	9	0.025
UEC2	2024-04-30	0.02	8	0.08	<0.005	0.117	7.12	5.2	0.379
UEC3	2024-04-30	0.029	10	0.07	<0.005	0.29	6.6	4.4	0.05
UEC4	2024-04-30	0.012	<1	0.05	<0.005	0.089	4.94	2.3	0.347
UEC5	2024-04-30	0.021	5	0.06	<0.005	0.162	4.38	2.3	0.031
UEC6	2024-04-30	0.028	17	0.11	<0.005	0.242	4.48	1.2	0.000592
BSC2	2024-05-14	0.072	3	0.05	116	0.111	11.3	62.1	0.108
BSC3	2024-05-14	0.008	1	0.05	99.1	0.079	14.6	11.7	0.175
BSC4	2024-05-14	0.002	2	0.05	98.9	0.071	15.9	9.6	0.066
BSC5	2024-05-14	0.029	6	0.07	82.9	0.168	9.99	19	0.042
BSC6	2024-05-14	0.02	4	0.05	77.2	0.246	6.88	10.4	0.014
BSC7	2024-05-14	0.024	7	0.04	89	0.159	6.86	11.1	0.068
UEC1	2024-05-14	0.025	10	0.14	85.4	0.168	16.3	8.5	0.011
UEC2	2024-05-14	0.006	2	0.04	80.1	0.065	10.4	4.9	0.238
UEC3	2024-05-14	0.023	12	0.07	76.4	0.38	7.61	4.6	0.017
UEC4	2024-05-14	0.009	2	0.04	71.5	0.158	5.6	2.6	0.066
UEC5	2024-05-14	0.038	15	0.14	62.3	0.459	5.45	2.7	0.011
UEC6	2024-05-14	0.028	11	0.14	65.2	0.254	4.51	1.5	0.000369
BSC2	2024-06-03	0.075	2	0.07	144	0.2	17.2	110	0.001658
BSC3	2024-06-03	0.011	8	0.06	99.5	0.047	16.4	9.9	0.084
BSC4	2024-06-03	0.008	3	0.07	97.9	0.038	16.1	8.7	0.056
BSC5	2024-06-03	0.027	6	0.06	84.2	0.14	14.2	24	0.004

BSC6	2024-06-03	0.03	4	0.04	78.4	0.519	7.52	10.9	0.024
BSC7	2024-06-03	0.037	1	0.05	81.2	0.221	7.68	9.6	0.00098
UEC1	2024-06-03	0.019	20	0.12	84.6	0.146	18.7	6.4	0.007
UEC2	2024-06-03	0.011	3	0.05	84	0.058	11.6	4.2	0.183
UEC3	2024-06-03	0.021	18	0.07	76.3	0.484	8.33	2.6	0.003
UEC4	2024-06-03	0.015	2	0.04	64.3	0.142	6.24	2.2	0.001888
UEC5	2024-06-03	0.026	10	0.08	62	0.419	6.01	1.9	0.005
UEC6	2024-06-03	0.114	44	0.62	66.1	1.67	4.54	1.2	0.001
BSC2	2024-06-11	0.055	2	0.06	142	0.295	17.4	110	0.0012
BSC3	2024-06-11	<0.002	3	0.06	107	0.092	17.5	11.4	0.102
BSC4	2024-06-11	<0.002	3	0.05	100	0.051	16.5	9.7	0.078
BSC5	2024-06-11	0.021	4	0.06	83.2	0.189	14.1	25.2	0.005
BSC6	2024-06-11	0.04	5	0.04	85.9	0.654	8.04	12.9	0.028
BSC7	2024-06-11	0.032	1	0.03	80.4	0.442	8.61	10.2	0.0014
UEC1	2024-06-11	0.008	7	0.08	83.8	0.099	19.5	7	0.008
UEC2	2024-06-11	<0.002	2	0.04	86.8	0.059	11.9	4.8	0.202
UEC3	2024-06-11	0.018	13	0.07	74.2	0.441	7.85	3.1	0.007
UEC4	2024-06-11	0.01	2	0.03	62.9	0.279	6.39	2.6	0.003
UEC5	2024-06-11	0.018	6	0.06	66.7	0.402	6.57	2.4	0.0028
UEC6	2024-06-11	0.072	30	0.28	66.5	0.829	4.62	1.5	0.001
BSC2	2024-07-03	0.072	2	0.09	126	0.411	16.6	93.9	0.001094
BSC3	2024-07-03	0.005	7	0.09	97	0.072	16.3	9.9	0.163
BSC4	2024-07-03	0.003	4	0.08	101	0.057	16.7	9.3	0.063
BSC5	2024-07-03	0.03	6	0.1	84.2	0.198	14.9	25	0.007
BSC6	2024-07-03	0.028	10	0.07	86	0.595	7.97	10.5	0.015
BSC7	2024-07-03	0.043	<1	0.05	80.3	0.201	7.94	8.1	0.007088
UEC1	2024-07-03	0.012	6	0.07	80.5	0.075	19.3	6.3	0.007
UEC2	2024-07-03								
UEC3	2024-07-03	0.03	12	0.1	73.5	0.52	7.89	2.4	0.005
UEC4	2024-07-03	0.012	1	0.06	59	0.199	7	2.6	0.00087
UEC5	2024-07-03	0.028	5	0.08	69	0.424	7.01	2.2	0.004
UEC6	2024-07-03	0.066	30	0.29	70	0.951	5	1.4	0.00007
BSC2	2024-07-09	4	4	0.05	128	0.4	17.9	108	0.000543
BSC3	2024-07-09	5	5	0.06	94.2	0.081	17.2	10.9	0.113
BSC4	2024-07-09	11	11	0.05	91.6	0.046	16.6	9.7	0.103

BSC5	2024-07-09	12	12	0.07	79.7	0.143	16.1	28	
BSC6	2024-07-09	7	7	0.06	98.6	0.784	9.04	13.9	0.005
BSC7	2024-07-09	6	6	0.03	82.4	0.803	8.68	9.7	0.000298
UEC1	2024-07-09	9	9	0.14	75.4	0.191	19.7	6.5	0.005
UEC2	2024-07-09	3	3	0.05	79.2	0.058	12.2	4.4	0.049
UEC3	2024-07-09	10	10	0.06	66.6	0.365	7.73	2.3	0.005
UEC4	2024-07-09	3	3	0.02	40.8	0.172	6.3	2.7	0.000732
UEC5	2024-07-09	6	6	0.05	63.8	0.335	7.09	2.4	0.003
UEC6	2024-07-09	44	44	0.41	64	1.43	4.79	1.6	
BSC2	2024-07-31	0.04	4	0.06	113	0.947	9.5	14.5	0.000545
BSC3	2024-07-31	0.013	6	0.07	78.6	0.071	18.4	7.4	0.093
BSC4	2024-07-31	0.014	2	0.08	85.8	0.082	12.5	4.7	0.136
BSC5	2024-07-31	0.084	3	0.07	120	0.543	17.1	103	0.005
BSC6	2024-07-31	0.055	25	0.14	69.1	0.937	7.76	2.4	0.01
BSC7	2024-07-31	0.012	<1	0.04	46.4	0.171	5.68	2.3	0.000373
UEC1	2024-07-31	0.006	5	0.08	101	0.067	17.4	10.4	0.007
UEC2	2024-07-31	0.06	8	0.08	71.4	0.349	7.07	2	0.201
UEC3	2024-07-31	<0.002	4	0.07	95.2	0.032	16.4	8.9	0.012
UEC4	2024-07-31	0.123	35	0.33	69.4	1.41	4.81	1.4	0.001159
UEC5	2024-07-31	0.03	5	0.08	86.6	0.117	16.1	28.1	0.005
UEC6	2024-07-31	0.227	19	0.06	103	5.28	9.01	9.8	0
BSC2	2024-08-09	0.122	2	0.08	124	0.605	15.7	97.7	0.001189
BSC3	2024-08-09	0.009	1	0.07	96.4	0.056	15.8	10.8	0.076
BSC4	2024-08-09	0.009	28	0.07	96.2	0.101	15.7	9	0.067
BSC5	2024-08-09	0.033	5	0.06	83.8	0.136	14.8	26.6	0.008
BSC6	2024-08-09	0.062	19	0.13	105	1.55	8.08	12.8	0.02
BSC7	2024-08-09	0.092	3	0.06	93.4	1.08	8.39	9.6	0.000731
UEC1	2024-08-09	0.007	3	0.06	82.1	0.029	19.3	6.7	0.006
UEC2	2024-08-09	0.016	4	0.06	84.7	0.081	10.7	4.2	0.053
UEC3	2024-08-09	0.012	3	0.06	74.8	0.231	7.61	3.1	0.011
UEC4	2024-08-09	0.015	<1	0.03	51.2	0.261	5.57	2.4	0.004611
UEC5	2024-08-09	0.017	5	0.04	63.9	0.194	5.98	2	0.005
UEC6	2024-08-09	0.232	63	0.53	67.1	2.23	4.64	1.3	0
BSC2	2024-08-21	0.078	2	0.08	120	0.536	17.1	96.9	0.000476
BSC3	2024-08-21	0.011	6	0.06	96.7	0.059	16.4	9.7	0.12

BSC4	2024-08-21	0.018	8	0.09	103	0.131	17.1	9.2	0.063
BSC5	2024-08-21	0.028	2	0.07	88.8	0.109	15.9	27.3	0.006
BSC6	2024-08-21	0.063	6	0.07	101	0.926	8.83	12.2	0.001
BSC7	2024-08-21	0.268	26	0.07	86.9	7.25	8.05	8.1	0.000584
UEC1	2024-08-21	0.01	4	0.07	82.1	0.039	20.6	6.8	0.008
UEC2	2024-08-21	0.01	2	0.07	86	0.05	12.7	4.4	0.041
UEC3	2024-08-21	0.026	3	0.05	72.5	0.187	8.39	3	0.004
UEC4	2024-08-21	0.031	2	0.04	62.3	0.238	6.03	2.5	0.00069
UEC5	2024-08-21	0.066	31	0.32	65.5	0.849	6.81	2.7	0.005
UEC6	2024-08-21	0.039	6	0.06	64.7	0.285	4.71	1.3	0
BSC2	2024-09-03	0.076	2	0.04	138	0.657	19.7	116	0.000281
BSC3	2024-09-03	0.012	1	0.03	105	0.055	17.6	10.8	0.102
BSC4	2024-09-03	0.013	<1	0.04	107	0.041	17.7	10	0.075
BSC5	2024-09-03	0.052	9	0.13	95.6	0.263	18.2	32.2	0.006
BSC6	2024-09-03	0.052	9	0.1	112	1.2	9.7	15.5	0.013
BSC7	2024-09-03	0.061	<1	0.03	84.6	0.43	7.59	7.8	0.000575
UEC1	2024-09-03	0.015	<1	0.04	88	0.054	21.6	7	0.006
UEC2	2024-09-03	0.014	4	0.03	89.5	0.061	12.9	4.8	0.038
UEC3	2024-09-03	0.019	<1	0.08	87.3	0.155	9.17	3.7	0.005
UEC4	2024-09-03	0.019	<1	0.02	60.7	0.235	6.51	3.1	0.00054
UEC5	2024-09-03	0.018	<1	0.02	68.8	0.149	7.16	2.6	0.003
UEC6	2024-09-03	0.033	7	0.15	68.6	0.555	5.1	1.6	0
BSC2	2024-09-18	0.074	4	0.07	102	0.464	18.2	69.8	0.000952
BSC3	2024-09-18	0.006	3	0.06	102	0.043	17.1	10	0.118
BSC4	2024-09-18	0.007	6	0.08	99.7	0.035	16.5	8.9	0.063
BSC5	2024-09-18	0.024	2	0.07	92.7	0.097	17.5	29.9	0.005
BSC6	2024-09-18	0.033	7	0.08	112	0.776	9.6	15.1	0.003
BSC7	2024-09-18	0.74	46	0.06	89	15.5	8.41	8.4	9.86E-05
UEC1	2024-09-18	0.015	4	0.06	85.8	0.046	21.1	6.4	0.05
UEC2	2024-09-18	0.033	1	0.06	87.3	0.045	12.5	4.4	0.042
UEC3	2024-09-18	0.016	1	0.04	72.3	0.102	8.29	3.1	0.003
UEC4	2024-09-18	0.034	<1	0.05	58.8	0.09	6.24	2.8	0.00019
UEC5	2024-09-18	0.058	15	0.08	68	0.351	7.04	2.3	0.003
UEC6	2024-09-18	0.045	26	0.06	65.4	0.296	4.6	1.3	0

Table B2. Raw water quality results from the 2022 to 2024 monitoring period. Results from BSC1 are not included.

Site ID	Description	Latitude	Longitude	Sampling Date	°C Temperature	pH	µS/cm Conductivity	mg/L Dissolved Oxygen	mg/L Chloride	mg/L Nitrate	mg/L Nitrite	mg/L Total Ammonia
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2006-04-05	2.94	7.95	374	13.42	20	0.97	0.005	<0.01
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-04-05	2.1	8.09	559	13.32	42	3.07	0.003	0.005
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2006-04-05	2.92	8.07	508	12.76	34	2.51	0.005	0.01
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2006-04-05	2.92	7.9	504	12.87	37	1.6	0.003	0.01
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2006-05-12	13.02	7.53	381	8.7	19	0.53	0.006	0.03
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2006-05-12	11.11	7.74	497	9.36	40	1.18	0.006	0.1
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2006-05-12	12.93	7.73	478	6.93	39	0.213	0.003	0.04
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-05-12	12.08	7.73	529	9.01	38	1.21	0.008	0.04
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-06-13								
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2006-07-10	19.88	7.35	515	2.82	28	0.131	0.011	0.11
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-07-10	18.31	7.91	490	8.49	37	0.353	0.012	0.04
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2006-07-10	19.63	7.49	374	7.51	22	0.197	0.014	0.26
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2006-07-10	16.04	7.79	461	8.71	25	1.26	0.009	0.06
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2006-07-11	18.99	8.17	496	10.03	16	2.39	0.007	0.03
ECC1	McKee Road	44.10373501	-78.77607989	2006-07-11	15.63	7.84	393	9.37	6.8	0.663	0.003	0.07
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2006-07-11	20.7	7.54	431	5.66	19	0.685	0.013	0.12
ECC2	Malcolm Road	44.15680275	-78.78047428	2006-07-11	20.01	7.72	416	6.85	15	<0.0007	0.715	0.086
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-07-12								
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-08-15								
ECC1	McKee Road	44.10373501	-78.77607989	2006-08-23						1.41	0.004	0.06
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2006-08-23					28			
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-08-23					30			
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2006-08-23					29			
ECC1	McKee Road	44.10373501	-78.77607989	2006-08-23	13.73	7.87	439	10.11	8	1.41	0.004	0.06
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2006-08-23	19.29	8.44	504	12.49	16	8.21	0.251	0.11
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2006-08-23	19.86	7.48	534	3.21	28	<0.008	0.004	0.16
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-08-23	16.94	8.18	543	9.24	30	0.317	0.003	0.07
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2006-08-23	21.79	8.25	394	9.62	14	0.826	0.005	0.08
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2006-08-23	13.95	7.93	542	10	29	2.33	0.004	0.09
ECC2	Malcolm Road	44.15680275	-78.78047428	2006-08-23	22.23	8.18	348	8.03	3.82	0.762	0.1	0.07
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-09-20								
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2006-10-18	10.69	7.73	435	8.62	19	0.845	0.003	<0.01
ECC2	Malcolm Road	44.15680275	-78.78047428	2006-10-18	9.97	7.94	403	9.93	4.72	1 .17	0.005	< 0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2006-10-18	9.98	7.95	438	10.85	21	1.68	0.003	<0.01
ECC1	McKee Road	44.10373501	-78.77607989	2006-10-18	9.54	7.73	332	9.8	6.4	0.785	0.004	<0.01
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2006-10-18	10.23	7.42	357	8.1	12	1.15	0.004	0.03
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2006-10-18	9.89	7.77	434	9.95	24	1.44	0.003	<0.01
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2006-10-18	10.01	7.49	437	6.6	31	0.453	0.002	<0.01
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-10-18	9.74	7.68	450	9.28	34	0.653	0.004	0.005
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-10-19								
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-10-20								
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2006-11-21								
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2007-03-14	0.05	7.4	246	13.6				0.17

BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2007-03-14					27	1.49	0.019	0.4
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2007-03-14	0.26	7.05	202	12.55	8	0.736	0.017	0.66
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2007-03-14	0.06	7.36	159	13.7	13	0.656	0.011	0.42
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2007-03-14	0.14	7.2	254	12.26	27	0.87	0.017	0.74
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2007-06-19	24.5	8.63	208	8.99				
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2007-06-19	20.39	8.17	484	8.94				<0.01
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2007-06-19	19.86	8.15	486	8.5	30	0.334	0.003	0.005
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2007-06-19	16.41	8.01	488	10.19	30	2.16	0.007	0.06
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2007-06-19	23.02	7.78	478	6.23	28	0.124	0.004	0.03
BR1A	Blackstock Creek at RR19 west of RR 57	44.08364811	-78.80344608	2007-09-12	13.97	7.47	492	9.97				
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2007-09-12					26	1.01	0.008	<0.01
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2007-09-12	15.05	7.89	504	10.22	29	<0.008	0.002	0.005
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2007-09-12	12.94	7.62	508	10.54	30	2.01	0.004	<0.01
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2007-09-12	16.18	7.35	509	6.68	30	<0.008	0.003	0.01
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2007-10-24					36	1.24	0.001	0.26
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2007-10-24					36	1.71	0.001	<0.01
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2007-10-24					34	0.86	0.003	0.02
ECF2	East Cross Forest Tributary - Downstream of hydro line	44.09368589	-78.72934584	2008-05-14					1	0.02	0.005	0.005
ECF3	East Cross Creek Tributary at Devitts Road	44.09877128	-78.73940964	2008-05-14					1.9	0.05	0.007	0.005
ECF1	East Cross Forest Tributary - Upstream of hydro line	44.09084952	-78.72970066	2008-05-14					1	0.02	0.005	< 0.01
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2008-05-15	14.37	8.14	474	11.78	23	1.1	0.01	0.18
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2008-05-15	14.64	7.71	630	12.35	1.2	<0.001	<0.00001	0.09
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2008-05-15	10.12	7.7	483	11.88	13	4.7	0.005	<0.02
BR2A	Blackstock Tributary at Bradburn west of RR57	44.09554951	-78.81177643	2008-05-15	9.08	7.39	599	11.81	28	0.005	0.15	<0.02
ECC2	Malcolm Road	44.15680275	-78.78047428	2008-05-15	16.54	8.25	389	10.74	4.07	< 0.0001	0.68	0.0205
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2008-05-15	17.07	7.93	422	9.75	25	0.43	0.01	0.12
BR1A	Blackstock Creek at RR19 west of RR 57	44.08364811	-78.80344608	2008-05-15	11.61	7.71	494	11.53	31	0.74	0.006	0.05
BR4B	Blackstock Tributary at Beacock Rd	44.13163203	-78.82924662	2008-05-15	11.26	7.58	786	11.93	94	1.28	0.005	0.02
ECC1	McKee Road	44.10373501	-78.77607989	2008-05-15	10.2	7.45	434	11.34	8.6	1.04	0.008	0.03
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2008-05-15	14.42	7.42	453	10.45	26	0.12	0.009	0.16
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2008-05-15	10.5	7.58	551	11.74	47	3.7	0.009	0.06
BR1B	Blackstock Tributary at Devitts Road	44.08425457	-78.80089939	2008-05-15	9.46	7.74	648	11.83	67	0.96	0.006	0.05
ECF1	East Cross Forest Tributary - Upstream of hydro line	44.09084952	-78.72970066	2008-06-16						0.02	0.002	0.01
ECF2	East Cross Forest Tributary - Downstream of hydro line	44.09368589	-78.72934584	2008-06-16					1	0.02	0.001	0.005
ECF3	East Cross Creek Tributary at Devitts Road	44.09877128	-78.73940964	2008-06-16	19.9	7.2	372	7.42	2.8	0.02	0.001	0.005
ECF2	East Cross Forest Tributary - Downstream of hydro line	44.09368589	-78.72934584	2008-07-23						< 0.02	0.004	0.005
ECF1	East Cross Forest Tributary - Upstream of hydro line	44.09084952	-78.72970066	2008-07-23					1	0.02	0.004	0.005
ECF3	East Cross Creek Tributary at Devitts Road	44.09877128	-78.73940964	2008-07-23	18.9	7.62	276	6.29	2.8	0.13	0.006	0.1
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2008-08-18	17.28	7.2	785	7.51	1.2	<0.001	<0.00001	<0.01
BR2A	Blackstock Tributary at Bradburn west of RR57	44.09554951	-78.81177643	2008-08-18	12.32	6.84	591	10.25	21	0.004	1.1	<0.01
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2008-08-18	23.26	7.89	565	11.49	32	<0.02	0.005	<0.01
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2008-08-18	17.79	7.39	551	8.54	32	1.4	0.009	<0.01
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2008-08-18	20.03	7.09	513	8.13	18	0.6	0.007	<0.01
BR1A	Blackstock Creek at RR19 west of RR 57	44.08364811	-78.80344608	2008-08-18	20.19	6.92	502	8.32	18	1	0.005	0.005
BR1B	Blackstock Tributary at Devitts Road	44.08425457	-78.80089939	2008-08-18	17.01	7.12	653	8.77	58	1.1	0.008	<0.01
BR4B	Blackstock Tributary at Beacock Rd	44.13163203	-78.82924662	2008-08-18	16.12	7.49	773	9.41	70	1.5	0.006	<0.01
ECC2	Malcolm Road	44.15680275	-78.78047428	2008-08-22	22.09	7.88	458	7.76		0.0014	1	0.0221

ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2008-08-22	20.35	8.07	519	11.71	17	3.31	0.009	0.02
ECC1	McKee Road	44.10373501	-78.77607989	2008-08-22	14	6.84	443	10.11	7.4	1.3	0.006	<0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2008-08-22	20.3	7.4	490	5.78	15	0.62	0.009	<0.01
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2008-08-22	12.87	6.81	489	10.86	14	5.5	0.006	<0.01
ECC4A	Janetville Creek at Nesbitt Line			2008-08-22	17.51	7.31	600	8.1	30	0.88	0.007	<0.01
ECF3	East Cross Creek Tributary at Devitts Road	44.09877128	-78.73940964	2008-09-08	15.7	7.3	385	8.64		0.203		0.02
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2008-09-22	10.72	7.57	695	8.3	0.8	<0.001	<0.00001	<0.01
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2008-09-22	13.8	8.2	506	12.52	20	2.9	0.008	0.06
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2008-09-22	10.09	7.73	804	11.48	14	5.8	0.005	<0.01
ECC4A	Janetville Creek at Nesbitt Line			2008-09-22	12.25	7.88	599	10.69	31	0.8	0.005	<0.01
BR4B	Blackstock Tributary at Beacock Rd	44.13163203	-78.82924662	2008-09-22	12.2	7.63	746	11.14	74	0.9	0.009	<0.01
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2008-09-22	10.78	7.75	576	10.38	36	1.8	0.012	0.06
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2008-09-23						1	0.012	<0.01
ECC2	Malcolm Road	44.15680275	-78.78047428	2008-09-24	11.7	7.7	376	9.22		204		5
ECF3	East Cross Creek Tributary at Devitts Road	44.09877128	-78.73940964	2008-09-24					2.9	0.1	0.004	0.005
ECF1	East Cross Forest Tributary - Upstream of hydro line	44.09084952	-78.72970066	2008-09-24					1	0.1	0.005	0.005
ECF2	East Cross Forest Tributary - Downstream of hydro line	44.09368589	-78.72934584	2008-09-24					0.9	0.1	0.004	0.005
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2008-12-15						1.32	0.019	0.13
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2009-07-22					14	5.1	0.021	0.23
ECC2	Malcolm Road	44.15680275	-78.78047428	2009-07-22	22.1	8.23	372	8.06		0.0011	1.08	0.0256
ECC1	McKee Road	44.10373501	-78.77607989	2009-07-22	13.41	8.01	403	9.98	7.8	1.76	0.008	<0.01
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2009-07-22	11.95	7.95	453	10.6	12	5.6	0.008	<0.01
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2009-07-22	20.31	7.87	505	8.14	28	0.08	0.007	<0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2009-07-22	21.29	8.03	406	8	15	0.88	0.015	0.02
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2009-07-22	14.62	8.01	511	9.79	31	1.88	0.012	<0.01
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2009-07-22	18.31	8.18	496	9.14	0.6			0.02
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2009-07-22	17.57	7.73	498	4.23	22	0.04	0.008	0.08
ECC2	Malcolm Road	44.15680275	-78.78047428	2009-08-31	17.02	8.17	485	9.33		0.0012	1.2	0.0299
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2009-08-31	16.96	7.68	514	5.44	16	0.34	0.01	0.11
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2009-08-31	12.46	7.8	717	6.85	0.7			0.04
ECC1	McKee Road	44.10373501	-78.77607989	2009-08-31	12.23	8.08	468	10.68	8.3	1.6	0.005	0.04
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2009-08-31	11.2	8.05	514	11.11	14	5.8	0.005	0.03
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2009-08-31	15.93	7.99	595	9.3	32	0.11	0.005	0.05
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2009-08-31	13.16	8.1	613	10.24	33	1.28	0.006	0.05
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2009-08-31	14.75	7.75	563	7.32	16	0.08	0.006	0.04
BR1B	Blackstock Tributary at Devitts Road	44.08425457	-78.80089939	2009-08-31	11.98	7.98	621	10.37	38	0.48	0.005	0.27
ECC2	Malcolm Road	44.15680275	-78.78047428	2009-09-29	13.69	8.07	409	8.75		0.0011	1.2	0.0884
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2009-09-29	12.67	8.11	446	10.58	20	1.4	0.009	<0.01
ECC1	McKee Road	44.10373501	-78.77607989	2009-09-29	12.12	7.91	353	9.27	7.1	0.44	0.01	<0.01
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2009-09-29	11.81	7.93	367	10.22	9.2	2.1	0.007	<0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2009-09-29	14.08	7.95	411	7.16	16	0.8	0.014	<0.01
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2009-09-29	13.16	7.74	473	3.08	29	0.2	0.007	<0.01
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2009-09-29	12.62	7.87	470	9.41	26	0.84	0.006	<0.01
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2009-09-29	12.69	7.91	618	6.92	2			<0.01
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2009-09-29	13.13	7.75	373	7.4	13	0.15	0.006	<0.01
BR2A	Blackstock Tributary at Bradburn west of RR57	44.09554951	-78.81177643	2010-03-16						0.004	0.19	<0.01
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2010-03-16	4.41	7.66	554	11.6				<0.01

ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2010-03-16	2.78	7.56	349	12.76		2.3	0.004	<0.01
ECC2	Malcolm Road	44.15680275	-78.78047428	2010-03-16	2.76	7.53	326	12.08			1.07	
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2010-03-16	0.82	7.7	214	13.21		0.31	0.007	0.05
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2010-03-16	1.44	7.46	323	11.49		0.45	0.008	0.07
BR1B	Blackstock Tributary at Devitts Road	44.08425457	-78.80089939	2010-03-16	1.83	7.48	542	12.12		0.85	0.013	0.06
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2010-03-16	2.46	7.57	380	10.23		0.83	0.01	0.11
BR4B	Blackstock Tributary at Beacock Rd	44.13163203	-78.82924662	2010-03-16	4.1	7.68	615	12.33		3.6	0.02	0.12
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2010-03-16	1.48	7.52	412	12.15	30			
ECC1	McKee Road	44.10373501	-78.77607989	2010-03-16	2.86	7.64	324	12.32	6.7	0.97	0.006	<0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2010-03-16	0.86	7.64	207	11.98	7.9	0.41	0.008	0.08
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2010-03-16	1.67	7.64	370	13.08	22	0.89	0.006	0.05
BR2A	Blackstock Tributary at Bradburn west of RR57	44.09554951	-78.81177643	2010-05-19	10.06	7.95	611	10.91		0.002	0.1	<0.01
BR1	Blackstock Creek at Byers Road	44.06936544	-78.80643054	2010-05-19	23.01	8.26	492	13.92		0.19	0.004	<0.01
BR1B	Blackstock Tributary at Devitts Road	44.08425457	-78.80089939	2010-05-19	13.47	8.06	587	10.88		0.44	0.004	<0.01
BR3	Blackstock Creek at Jobb Road	44.12231836	-78.81169696	2010-05-19	16.25	8.1	554	10.01		0.67	0.009	<0.01
BR4A	Blackstock Tributary at Highway 7A	44.13186909	-78.82671969	2010-05-19	12.05	7.86	774	12.58				<0.01
BR4B	Blackstock Tributary at Beacock Rd	44.13163203	-78.82924662	2010-05-19	10.18	8.02	722	11.65		1.12	0.002	<0.01
BR1A	Blackstock Creek at RR19 west of RR 57	44.08364811	-78.80344608	2010-05-19	15.63	8.15	489	10.91		0.66	0.005	0.005
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2010-05-19	14.57	8.21	553	12.08	34	1.08	0.004	<0.01
BR4	Blackstock Creek at RR 57 North - 2006-2007	44.1318853	-78.82877535	2010-05-20	14.53	8.17	570	10.63		0.99	0.008	<0.01
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2010-05-20	14.69	8.28	495	10.76		1.87	0.009	<0.01
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2010-05-20	11.65	8.08	514	11.48		5	0.005	<0.01
ECC2	Malcolm Road	44.15680275	-78.78047428	2010-05-20	16.54	8.3	350	8.81			0.75	
ECC1	McKee Road	44.10373501	-78.77607989	2010-05-20	14.27	8.15	444	10.52	8.1	1.48	0.004	<0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2010-05-20	19.32	8.01	436	8.47	16	1.03	0.009	<0.01
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2010-08-09	18.91	7.99	435	10.28		2.48	0.016	<0.01
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2010-08-09	13.53	7.75	450	10.84		4.49	0.007	<0.01
ECC2	Malcolm Road	44.15680275	-78.78047428	2010-08-09	21.7	8	383	7.62			0.27	
BR2	Blackstock Creek at McKee Road	44.09718424	-78.80455416	2010-08-09					34	1.23	0.007	<0.01
ECC1	McKee Road	44.10373501	-78.77607989	2010-08-09	14.07	7.76	415	10.31	8.3	1.03	0.007	<0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2010-08-09	21.35	7.86	383	5.82	16	0.23	0.014	<0.01
ECC2	Malcolm Road	44.15680275	-78.78047428	2010-10-27								0.039
ECC4	Janetville Creek at Janetville	44.21258232	-78.72771493	2010-10-27						0.65	0.008	<0.01
ECC1A	McKee Road at Corner of Cartwright East 1/4 Line	44.10687328	-78.76256699	2010-10-27						3.29	0.007	<0.01
ECC3	East Cross at Golf Course Rd.	44.22311994	-78.74236911	2010-10-27					20	0.47	0.017	<0.01
ECC1	McKee Road	44.10373501	-78.77607989	2010-10-27					8.1	0.55	0.009	<0.01

Site ID	Sampling Date	mg/L Total Kjeldahl Nitrogen	mg/L Total Phosphorus	mg/L Total Suspended Solids	mg/L Alkalinity	mg/L Bicarbonate	mg/L Carbonate	mg/L Sulphate	mg/L Aluminum	mg/L Antimony	mg/L Arsenic	mg/L Barium	mg/L Beryllium	mg/L Boron
BR1	2006-04-05	0.66	0.043	6	152	150	2	14	0.11	<0.0002	<0.0005	0.0209	<0.0001	0.007
BR4	2006-04-05	0.47	0.019	<2	198	191	7	20	0.03	<0.0002	<0.0005	0.0413	0.0001	0.01
BR2	2006-04-05	0.47	0.025	2	178	173	5	20	0.04	<0.0002	<0.0005	0.0389	<0.0001	0.008
BR3	2006-04-05	0.47	0.019	<2	178	178	<2	20	<0.01	<0.0002	0.0006	0.0397	0.0001	0.01
BR1	2006-05-12	0.9	0.05	<2	161	161	<2	12	0.0718	<0.0002	0.0007	0.0219	<0.0001	0.011
BR2	2006-05-12	1.6	0.157	54	173	173	<2	15	0.219	<0.0002	0.0006	0.051	<0.0001	0.012
BR3	2006-05-12	0.69	0.043	4	197	197	<2	14	0.0082	<0.0002	0.0007	0.0461	0.0001	0.014
BR4	2006-05-12	0.94	0.084	20	185	185	<2	16	0.0727	<0.0002	0.0009	0.0538	0.0001	0.014
BR4	2006-06-13											0.0556	0.0000304	
BR3	2006-07-10	0.79	0.149	5	157	157	<2	9.9	0.0195	<0.0002	0.0011	0.0639	0.0001	0.013
BR4	2006-07-10	0.78	0.117	22	180	177	2	12	0.379	<0.0002	0.0006	0.0555	0.0001	0.014
BR1	2006-07-10	0.92	0.063	18	135	135	<2	11	0.254	0.0004	0.0007	0.0251	<0.0001	0.016
BR2	2006-07-10	2.53	0.375	221	158	158	<2	15	2.02	0.0002	0.0016	0.0917	<0.0001	0.015
ECC4	2006-07-11	0.84	0.063		202	196	6		0.041	<0.0002	<0.0005	0.0657	<0.0001	0.015
ECC1	2006-07-11	0.41	0.039	4	126	126	<2		0.037	<0.0002	<0.0005	0.014	<0.0001	<0.014
ECC3	2006-07-11	0.69	0.065	3	150	150	<2		0.0155	<0.0002	<0.0005	0.015	<0.0001	0.015
ECC2	2006-07-11	0.036	0.86	21	135	135	< 2		0.086000003	< 0.0002	< 0.0005	0.081200004	< 0.0001	0.014
BR4	2006-07-12											0.0578		
BR4	2006-08-15											0.0552		
ECC1	2006-08-23	0.2	0.022											
BR3	2006-08-23			< 2	228	< 2	228	14	0.0026	< 0.0002	0.0013	0.060699999	< 0.0001	0.011
BR4	2006-08-23			< 2	236	7	229	15	0.0196	< 0.0002	0.0007	0.0561	< 0.0001	0.011
BR2	2006-08-23			7	215	4	211	21	0.0143	< 0.0002	0.001	0.068999998	< 0.0001	0.011
ECC1	2006-08-23	0.2	0.022	<2	199	199	<2		0.0106	0.0004	0.0008	0.696	<0.0001	0.013
ECC4	2006-08-23	0.88	0.047		186	180	6		0.0149	0.0004	<0.0005	0.0585	<0.0001	0.012
BR3	2006-08-23	0.5	0.1	<2	228	228	<2	14	0.0026	<0.0002	0.0013	0.0607	<0.0001	0.011
BR4	2006-08-23	0.39	0.081	<2	236	229	7	15	0.0196	<0.0002	0.0007	0.0561	<0.0001	0.011
ECC3	2006-08-23	0.43	0.04	<2	164	161	3		0.0123	0.0004	0.0009	0.05	<0.0001	0.014
BR2	2006-08-23	0.25	0.022	7	215	209	4	21	0.0143	<0.0002	0.001	0.069	<0.0001	0.011
ECC2	2006-08-23	0.57	0.043	6		<0.0001	46.4		140	3.87	0.0004	0.0007	0.0314	140
BR4	2006-09-20											0.0588		
ECC4	2006-10-18	0.61	0.032		191	191	<2		0.02	0.0003	<0.0005	0.0485	<0.0001	<0.02
ECC2	2006-10-18	0.58	0.033	3		<0.0001			186	2.46	0.0004	<0.0005	0.0443	186
ECC3	2006-10-18	0.88	0.053	3	191	191	<2		0.02	0.0004	<0.0005	0.056	<0.0001	<0.02
ECC1	2006-10-18	0.53	0.042	7	163	163	<2		0.06	0.0005	0.0007	0.0476	<0.0001	<0.02
BR1	2006-10-18	0.83	0.051	3	156	156	<2	17	0.05	0.0002	<0.0005	0.0234	<0.0001	<0.02
BR2	2006-10-18	0.79	0.07	16	185	185	<2	18	0.18	<0.0002	<0.0005	0.0431	<0.0001	<0.02
BR3	2006-10-18	0.62	0.041	3	177	177	<2	22	0.02	0.0002	<0.0005	0.0448	<0.0001	<0.02
BR4	2006-10-18	0.76	0.091	51	181	181	<2	22	0.39	0.0066	0.0011	0.0548	<0.0001	<0.02
BR4	2006-10-19											0.0527		
BR4	2006-10-20													
BR4	2006-11-21											0.0495		
BR4A	2007-03-14													

BR4	2007-03-14	1.75	0.315	74	80	80	<2		1.26	<0.0002	0.0003	0.037	0.00005	0.009
BR1	2007-03-14	1.69	0.262	19	85	85	<2	5.2	0.33	<0.0002	<0.0002	0.0149	<0.00004	0.006
BR2	2007-03-14	2	0.261	66	54	54	<2	5	0.93	<0.0002	0.0005	0.0279	0.00004	0.007
BR3	2007-03-14	2.14	0.257	26	78	78	<2	8.9	0.43	<0.0002	0.0003	0.0281	<0.00004	0.01
BR1	2007-06-19													
BR4A	2007-06-19													
BR4	2007-06-19	0.4	0.098	4	213	188	25		0.0293	<0.0002	0.0012	0.0584	<0.0001	<0.02
BR2	2007-06-19	0.25	0.047	3	197	172	25	22	0.0251	<0.0002	0.0006	0.0704	<0.0001	<0.02
BR3	2007-06-19	0.61	0.121	4	207	190	17	12	0.0062	<0.0002	0.0014	0.0758	<0.0001	<0.02
BR1A	2007-09-12													
BR1	2007-09-12	0.67	0.05	5	211	210	<2	22	0.0106	0.00005	0.0012	0.0661	<0.0001	0.013
BR4	2007-09-12	0.3	0.048	3	230	219	11		0.008	0.00004	0.0009	0.0533	<0.0001	0.01
BR2	2007-09-12	0.2	0.016	<2	224	222	2	22	0.0106	0.00005	0.0007	0.0671	<0.0001	0.01
BR3	2007-09-12	0.43	0.064	3	230	230	<2	15	0.008	0.00004	0.001	0.071	<0.0001	0.008
BR1	2007-10-24	0.8	0.028	<2	231	231	<2	30	0.0141	0.00015	0.0008	0.0639	<0.001	0.017
BR2	2007-10-24	0.26	0.018	<2	219	219	<2	26	0.0117	<0.001	0.0007	0.0692	<0.0001	0.01
BR4	2007-10-24	0.35	0.039	<2	223	219	3		0.0036	0.00012	0.0006	0.0513	<0.0001	0.007
ECF2	2008-05-14	0.22	0.02		181	181	< 2		0.0218	< 0.00002	0.0005	0.0228	< 0.00002	0.0068
ECF3	2008-05-14	0.45	0.025	9	247	247	< 2		0.0841	< 0.00002	0.0004	0.0265	< 0.00002	0.0067
ECF1	2008-05-14	0.24	0.017	< 2	181	181	< 2		0.0074	0.00102	0.0009	0.021	< 0.00002	0.005
ECC4	2008-05-15	0.7	0.026		210	201	9		0.0327	0.0001	0.0005	0.0615	<0.0001	0.01
BR4A	2008-05-15		22.4		252	0.000009	<0.001		0.0419	0.0823	<0.0001	252	0.013	
ECC1A	2008-05-15	0.26	0.006	2	209	207	<2		0.0141	0.00006	0.0002	0.0464	<0.0001	<0.002
BR2A	2008-05-15	<0.002		<2	244	244	< 2	27	0.0062	0.00003	0.0002	0.0623	<0.0001	<0.002
ECC2	2008-05-15	0.014	0.44	3		<0.0001	54.2		163	-2.03	0.00005	0.0004	0.0301	160
ECC3	2008-05-15	0.51	0.02	2	177	177	<2		0.0139	0.00005	0.0005	0.0441	<0.0001	0.011
BR1A	2008-05-15	0.5	0.025	2	213	213	<2	15	0.0172	0.0001	0.0006	0.0385	<0.0001	0.007
BR4B	2008-05-15	0.25	0.011	<2	253	252	< 2		0.0395	0.00005	0.0005	0.105	<0.0001	0.007
ECC1	2008-05-15	0.25	0.015	2	202	197	5		0.0305	0.00004	0.0005	0.0675	<0.0001	0.011
BR1	2008-05-15	0.73	0.022	2	187	187	<2	12	0.0273	0.00014	0.0005	0.0263	<0.0001	0.005
BR2	2008-05-15	0.36	0.012	<2	217	217	<2	19	0.0121	0.00006	0.0005	0.0577	<0.0001	0.004
BR1B	2008-05-15	0.29	0.021	8	227	227	<2	22	0.0138	0.00007	0.0011	0.0884	<0.0001	0.005
ECF1	2008-06-16	0.73	0.155	5	184	184	< 2		0.124	0.00004	0.0012	0.0366	< 0.0001	0.013
ECF2	2008-06-16	0.33	0.041	4	181	181	< 2		0.0126	0.00004	0.0009	0.029	< 0.0001	0.007
ECF3	2008-06-16	0.56	0.027	5	192	192	< 2		0.0354	0.00006	0.0008	0.0328	< 0.0001	0.008
ECF2	2008-07-23	0.39	0.057	5	174	174	< 2		0.0074	0.00006	0.0006	0.0357	< 0.0001	0.003
ECF1	2008-07-23	0.53	0.096	6		163	< 2		0.0234	0.00007	0.0008	0.0299	< 0.0001	0.006
ECF3	2008-07-23	0.81	0.046	7	132	132	< 2		0.194	0.00009	0.0006	0.0268	< 0.0001	0.009
BR4A	2008-08-18		28.8		315	<0.000003	<0.001		0.0599	0.0856	<0.0001	315	0.003	
BR2A	2008-08-18	<0.002		< 2	247	247	< 2	27	0.0074	< 0.00002	0.0005	0.0636	< 0.0001	< 0.002
BR3	2008-08-18	0.72	0.089	4	255	255	< 2	6.3	0.0055	0.00007	0.0013	0.0541	< 0.0001	< 0.002
BR2	2008-08-18	0.38	0.02	<2	239	239	<2	14	0.021	0.00006	0.0011	0.0569	< 0.0001	< 0.002
BR1	2008-08-18	0.64	0.023	<2	244	244	< 2	7	0.0131	0.00009	0.0012	0.0287	< 0.0001	< 0.002
BR1A	2008-08-18	0.55	0.021	< 2	233	233	< 2	10	0.022	0.00008	0.0011	0.0327	< 0.0001	< 0.002
BR1B	2008-08-18	0.26	0.028	<2	247	247	< 2	20	0.0159	0.00004	0.0018	0.0965	< 0.0001	< 0.002
BR4B	2008-08-18	0.31	0.037	5	295	295	< 2		0.146	0.00005	0.0012	0.0942	< 0.0001	0.003
ECC2	2008-08-22	0.017	0.5	4		< 0.0001	68.3		211		0.0001	0.001	0.0694	211

ECC4	2008-08-22	0.97	0.053		245	221	24		0.0312	0.00011	0.0012	0.0692	< 0.0001	0.012
ECC1	2008-08-22	0.2	0.027	2	217	217	< 2		0.0178	0.00006	0.001	0.0646	< 0.0001	0.021
ECC3	2008-08-22	0.6	0.043		229	229	< 2		0.0158	0.0001	0.0016	0.0683	< 0.0001	0.014
ECC1A	2008-08-22	0.34	0.015	3	213	213	< 2		0.0352	0.00004	0.001	0.0511	< 0.0001	0.011
ECC4A	2008-08-22	0.67	0.043	11	264	264	< 2		0.045	0.00009	0.0021	0.0772	< 0.0001	0.012
ECF3	2008-09-08	0.27	0.01		206									
BR4A	2008-09-22		20.9		299	0.000008	<0.001		0.0287	0.0997	<0.0001	299	0.115	
ECC4	2008-09-22	0.85	0.054		245	225	19		0.0344	0.00017	0.0008	0.0669	< 0.0001	0.136
ECC1A	2008-09-22	0.19	0.011	< 2	213	213	< 2		0.0532	0.00013	0.0005	0.0512	< 0.0001	0.134
ECC4A	2008-09-22	0.46	0.03	< 2	266	266	< 2		0.0246	0.00013	0.0012	0.076	< 0.0001	0.137
BR4B	2008-09-22	0.15	0.01	2	253	253	< 2		0.0085	0.00009	0.0009	0.131	< 0.0001	0.066
BR2	2008-09-22	0.31	0.02	2	240	240	< 2	21	0.0197	0.00015	0.001	0.0599	< 0.0001	1.16
ECC3	2008-09-23	0.44	0.036											
ECC2	2008-09-24	350	22		203									
ECF3	2008-09-24	0.35	0.022		203	203	< 2		0.0508	< 0.00002	0.0005	0.028	< 0.0001	0.013
ECF1	2008-09-24	0.32	0.055	2	189	189	< 2		0.0051	0.00002	0.0006	0.0218	< 0.0001	0.019
ECF2	2008-09-24	0.31	0.037	5	197	197	< 2		0.0566	0.00003	0.0007	0.0288	< 0.0001	0.014
BR2	2008-12-15	2.92	0.42		0				0					
ECC4	2009-07-22	1.43	0.098						0.0292					
ECC2	2009-07-22	0.023	0.45	4										
ECC1	2009-07-22	0.15	0.02	2					0.0238					
ECC1A	2009-07-22	0.29	0.019	4					0.0281					
BR3	2009-07-22	0.46	0.065	3	249			9.1	0.0076					
ECC3	2009-07-22	0.49	0.05	2					0.0197					
BR2	2009-07-22	0.23	0.022	2	232			20	0.0271					
BR4A	2009-07-22		15.9		244	<0.000003	<0.001		0.0254					
BR1	2009-07-22	0.74	0.016	5	258			5.6	0.0819					
ECC2	2009-08-31	0.021	0.44	4										
ECC3	2009-08-31	0.66	0.042	<2					0.0051					
BR4A	2009-08-31				271	0.000006	<0.001		0.0215					
ECC1	2009-08-31	0.21	0.025	2					0.0151					
ECC1A	2009-08-31	0.25	0.01	3					0.0248					
BR3	2009-08-31	0.55	0.051	2	269			8.7	0.0058					
BR2	2009-08-31	0.41	0.02	<2	265			15	0.0185					
BR1	2009-08-31	0.77	0.038	3	284			3.4	0.0132					
BR1B	2009-08-31	0.35	0.026	<2	258	258	< 2	19	0.0186	<0.0002	0.0019	0.0762	<0.0001	0.004
ECC2	2009-09-29	0.014	0.53	15										
ECC4	2009-09-29	0.72	0.069						0.071					
ECC1	2009-09-29	0.57	0.07	17					0.181					
ECC1A	2009-09-29	0.86	0.113	43					0.582					
ECC3	2009-09-29	0.61	0.064	4					0.023					
BR3	2009-09-29	0.53	0.075	5	213			13	0.0156					
BR2	2009-09-29	0.93	0.083	17	204			13	0.1					
BR4A	2009-09-29		24.3		210	0.000017	<0.001		0.17					
BR1	2009-09-29	0.78	0.067	3	173			13	0.0361					
BR2A	2010-03-16	0.029		3										
BR4A	2010-03-16													

ECC1A	2010-03-16	0.45	0.047	17				
ECC2	2010-03-16	0.008	0.64	9				
ECC4	2010-03-16	0.84	0.145					
BR1	2010-03-16	0.57	0.045	4				
BR1B	2010-03-16	0.61	0.056	16				
BR3	2010-03-16	0.72	0.054	3				
BR4B	2010-03-16	0.89	0.138	25				
BR4	2010-03-16			23				0.273
ECC1	2010-03-16	0.43	0.044	14				0.117
ECC3	2010-03-16	0.7	0.113	4				0.0993
BR2	2010-03-16	0.8	0.065	17	0		8.7	0.211
BR2A	2010-05-19	0.005		<2				
BR1	2010-05-19	0.64	0.028	3				
BR1B	2010-05-19	0.19	0.019	3				
BR3	2010-05-19	0.53	0.059	4				
BR4A	2010-05-19							
BR4B	2010-05-19	0.13	0.02	4				
BR1A	2010-05-19	0.54	0.036	3				
BR2	2010-05-19	0.33	0.017	2	0		19	0.0228
BR4	2010-05-20	0.43	0.038					
ECC4	2010-05-20	0.69	0.04					
ECC1A	2010-05-20	0.25	0.017	16				
ECC2	2010-05-20	0.015	0.48	7				
ECC1	2010-05-20	0.19	0.025	3				0.0372
ECC3	2010-05-20	0.57	0.045	6				0.0395
ECC4	2010-08-09	0.94	0.105					
ECC1A	2010-08-09	0.38	0.032	8				
ECC2	2010-08-09	0.013	0.6	14				
BR2	2010-08-09	0.23	0.031	2	211		18	0.0147
ECC1	2010-08-09	0.15	0.033	4				0.025
ECC3	2010-08-09	0.44	0.067	3				0.0186
ECC2	2010-10-27			2				
ECC4	2010-10-27	1.37	0.055					
ECC1A	2010-10-27	0.74	0.044	9				
ECC3	2010-10-27	0.91	0.028	1				0.02
ECC1	2010-10-27	0.57	0.028	6				0.0441

Site ID	Sampling Date	mg/L Calcium(dissolved)	mg/L Calcium	mg/L Cadmium	mg/L Chromium	mg/L Cobalt	mg/L Copper	mg/L Iron	mg/L Lead	mg/L Lithium	mg/L Magnesium(dissolved)	mg/L Magnesium	mg/L Manganese(dissolved)	mg/L Manganese
BR1	2006-04-05	61.1		<0.00006	<0.0003	0.00008	<0.001	0.16	0.0004		4.45		0.014	0.032
BR4	2006-04-05	77.4		<0.00006	<0.0003	0.00002	<0.001	0.06	0.00051		8.96		0.005	0.01
BR2	2006-04-05		74.2	<0.00006	<0.0003	0.00004	<0.001	0.09	0.00021		8.46			0.018
BR3	2006-04-05	70.4	0	0.0001	<0.0003	0.00002	<0.001	0.04	0.00012		8.73		0.003	0.004
BR1	2006-05-12	65	69.1	0.00006	<0.0003	0.00019	<0.001	0.18	0.00005			5.23		0.079
BR2	2006-05-12		73.2	<0.00006	<0.0003	0.00026	<0.001	0.36	0.00067			8.09		0.121
BR3	2006-05-12	65.7	74.1	<0.00006	<0.0003	0.00015	<0.001	0.19	<0.00004			9.5	0.003	0.028
BR4	2006-05-12	68.5	76.5	<0.00006	<0.0003	0.00022	<0.001	0.35	0.00008			10.5	0.01	0.103
BR4	2006-06-13		83.4											
BR3	2006-07-10		80.3	<0.00006	0.0003	0.000104	<0.001	0.63	0.00086			12.1		0.275
BR4	2006-07-10		69.3	<0.00006	0.0009	0.000249	<0.001	0.68	0.0002			10.3		0.104
BR1	2006-07-10		64	0.00006	0.0007	0.000251	0.001	0.55	0.00036			5.63		0.195
BR2	2006-07-10		75.8	0.00016	0.0031	0.000865	0.002	3.18	0.00384			11.9		0.323
ECC4	2006-07-11		83.5	<0.00006	<0.0003	0.000126	<0.001	0.19	<0.00002			11.6		0.054
ECC1	2006-07-11		67	<0.00006	<0.0003	0.000105	<0.001	0.19	<0.00002			10.9	0.03	
ECC3	2006-07-11		64.6	<0.00006	<0.0003	0.000102	<0.001	0.23	<0.00002			11.3		0.061
ECC2	2006-07-11	<0.00006	64.19999695	< 0.00006	< 0.0003	0.000133	< 0.001	0.439999998	3E-05				12.60000038	0.092
BR4	2006-07-12		77.4											
BR4	2006-08-15		77.2											
ECC1	2006-08-23													
BR3	2006-08-23		79.59999847	< 0.00006	< 0.0003	0.00011	< 0.002	0.349999994	0.00037			14.89999962		0.114
BR4	2006-08-23		81.30000305	< 0.00006	< 0.0003	0.00013	< 0.002	0.150000006	0.00042			15.10000038		0.044
BR2	2006-08-23		78.80000305	< 0.00006	0.0005	8E-05	< 0.002	0.090000004	0.00033			15.5		0.02
ECC1	2006-08-23		68.9	<0.00006	<0.0003	0.00013	<0.002	0.07	0.00025			14.9	0.018	
ECC4	2006-08-23		80.5	<0.00006	0.0004	0.00012	<0.002	0.13	0.00039			14.4	0.03	
BR3	2006-08-23		79.6	<0.00006	<0.0003	0.00011	<0.002	0.35	0.00037			14.9		0.114
BR4	2006-08-23		81.3	<0.00006	<0.0003	0.00013	<0.002	0.15	0.00042			15.1		0.044
ECC3	2006-08-23		56.7	<0.00006	<0.0003	0.00007	<0.002	0.1	0.00037			14.3	0.021	
BR2	2006-08-23		78.8	<0.00006	0.0005	0.00008	<0.002	0.09	0.00033			0.16		0.02
ECC2	2006-08-23	<0.00006		0.015	13	0.0003	0.00012	1.08	0.05		0.0004		14	0.025
BR4	2006-09-20		76											
ECC4	2006-10-18			<0.00006	<0.001	0.000076	0.0004	0.12	0.00027				0.02052	
ECC2	2006-10-18	<0.00006		<0.02	13	<0.001	0.000108	1.05	0.28		0.00051			0.02837
ECC3	2006-10-18			<0.00006	<0.001	0.000064	0.0003	0.1	0.00023				0.01327	
ECC1	2006-10-18			<0.00006	<0.001	0.000087	0.0005	0.21	0.00049				0.02837	
BR1	2006-10-18			<0.00006	<0.001	0.000086	0.0009	0.11	0.00024					0.01524
BR2	2006-10-18			<0.00006	<0.001	0.000148	0.0009	0.32	0.00052					0.03964
BR3	2006-10-18		0	<0.00006	<0.001	0.000092	0.0005	0.15	0.00046			0		0.01444
BR4	2006-10-18			<0.00006	<0.001	0.000299	0.0011	0.69	0.00067					0.07953
BR4	2006-10-19		0											
BR4	2006-10-20		75.6											
BR4	2006-11-21		89.4											
BR4A	2007-03-14										1.22	0.015	0.91	0.129
BR4	2007-03-14			<0.00006	0.0018	0.000821	0.0029	1.86	0.00171					0.141
BR1	2007-03-14			<0.00006	0.001	0.000275	0.0018	0.58	0.00058					0.0741

BR2	2007-03-14			0.00006	0.0015	0.000473	0.0021	1.38	0.00201					0.113
BR3	2007-03-14		0	<0.00006	0.0009	0.00027	0.0017	1	0.00098			0		0.117
BR1	2007-06-19													
BR4A	2007-06-19									0.312		0.003	0.46	0.103
BR4	2007-06-19			<0.00006	<0.001	0.000148	0.0004	0.22	0.00022					0.0424
BR2	2007-06-19			<0.00006	0.001	0.000124	0.0005	0.05	0.0002					0.0234
BR3	2007-06-19		0	<0.00006	<0.001	0.000146	0.0004	0.55	0.00033			0		0.168
BR1A	2007-09-12													
BR1	2007-09-12			0.000007	<0.001	0.000025	0.0005	0.2	0.00038					0.0483
BR4	2007-09-12			<0.000003	<0.001	0.000018	<0.0005	0.12	0.0002					0.0301
BR2	2007-09-12			0.000007	<0.001	0.00008	<0.0005	0.1	0.00019					0.0207
BR3	2007-09-12		0	0.000011	<0.001	0.000035	<0.0005	0.28	0.0003					0.0301
BR1	2007-10-24			<0.000003	<0.001	0.000113	0.001	0.14	0.00021					0.047
BR2	2007-10-24			0.000007	<0.001	0.0001	0.0011	0.09	0.00014					0.021
BR4	2007-10-24			0.000003	<0.001	0.00011	0.0008	0.07	0.00036					0.0103
ECF2	2008-05-14		67.7	0.000007		0.000108	0.0014	0.56	0.00059			5.78	0.163	
ECF3	2008-05-14		64.5	0.000012		0.000104	0.0012	0.35	0.00051			6.89	0.0645	
ECF1	2008-05-14		66.1	0.000029		0.000129	0.0015	0.25	0.00032			5.59	0.0808	
ECC4	2008-05-15		76.4	0.000007	<0.001	0.000088	<0.0005	0.1	0.00016			11	0.048	
BR4A	2008-05-15	<2	52	90.5	283	0.12	0.00011	0.0465	0.0005	0.28		0.009	0.45	0.013
ECC1A	2008-05-15		77.5	0.000004	<0.001	0.00005	<0.0005	0.02	0.00038			11.2	0.0073	
BR2A	2008-05-15		94.5	0.000009	0.001	0.00006	0.0006	<0.01	0.00047			15.8	0.0017	0.00014
ECC2	2008-05-15	<0.000003		0.006	21	<0.001	0.000058	0.96	-7.67	0.00019			11.8	0.0314
ECC3	2008-05-15		60.3	0.000004	<0.001	0.000068	0.0006	0.07	0.00043			11.1	0.0266	
BR1A	2008-05-15		76.9	0.000007	<0.001	0.000095	0.0006	0.14	0.00033			9.78		0.0427
BR4B	2008-05-15		99	0.000003	< 0.001	0.000093	0.0007	0.07	0.00009			16.3		0.0144
ECC1	2008-05-15		73.1	0.000007	<0.001	0.000057	0.0006	0.09	0.00021			13.2	0.0305	
BR1	2008-05-15		74.9	0.000011	<0.001	0.000119	0.0007	0.15	0.00053			6.16		0.105
BR2	2008-05-15		75.5	0.000006	<0.001	0.000092	0.0005	0.05	0.00014			12.1		0.0198
BR1B	2008-05-15		76.1	0.000006	<0.001	0.000063	0.0007	0.08	0.00026			14.9		0.0286
ECF1	2008-06-16		61.5	0.000015		0.000248	< 0.0005	2.49	0.00065			5.39	0.686	
ECF2	2008-06-16		60.2	0.000003		0.000149	< 0.0005	1.32	0.00031			5.3	0.685	
ECF3	2008-06-16		66.1	0.00001		0.000113	0.0005	0.31	0.00046			6.43	0.0578	
ECF2	2008-07-23		61	0.000017		0.000104	< 0.0005	1.62	0.00019			5.44	0.671	
ECF1	2008-07-23		60.2	0.000023		0.000139	< 0.0005	1.4	0.00027			5.27	0.521	
ECF3	2008-07-23		59	0.000024		0.000125	0.0013	0.36	0.00044			4.95	0.0506	
BR4A	2008-08-18	<2	63	114	347	0.18	0.00019	0.045	0.0004	1.1		0.007	2.14	0.025
BR2A	2008-08-18		94.9	0.000007	< 0.001	0.000142	0.0005	0.02	0.00016			15.6	0.00228	0.00013
BR3	2008-08-18		87.9	< 0.000003	< 0.001	0.000155	< 0.0005	0.31	0.00016			11.3		0.0302
BR2	2008-08-18		87.9	0.000003	<0.001	0.000143	< 0.0005	0.11	0.00023			11.5		0.034
BR1	2008-08-18		98.6	0.000007	< 0.001	0.000172	0.0005	0.09	0.00025			7.18		0.016
BR1A	2008-08-18		90.5	0.000008	< 0.001	0.000159	< 0.0005	0.16	0.00018			8.61		0.0341
BR1B	2008-08-18		85.9	< 0.000003	< 0.001	0.000124	0.0007	0.13	0.00017			15.9		0.0332
BR4B	2008-08-18		114	< 0.000003	< 0.001	0.000251	0.0014	0.24	0.00033			15.3		0.0265
ECC2	2008-08-22	< 0.000003		0.014	14	< 0.001	0.00013			0.00024			12	0.0317
ECC4	2008-08-22		87.5	0.000005	< 0.001	0.00017	0.0008	0.17	0.00022			12.8	0.0321	
ECC1	2008-08-22		69.1	< 0.000003	< 0.001	0.000104	0.0008	0.12	0.00021			13.1	0.0139	

ECC3	2008-08-22		77.7	0.000003	< 0.001	0.000145	0.0007	0.16	0.00022			12.6	0.0489	
ECC1A	2008-08-22		81.7	0.000006	< 0.001	0.000123	0.0007	0.07	0.00023			11.7	0.00916	
ECC4A	2008-08-22		88.1	0.000008	< 0.001	0.000187	0.001	0.38	0.00027			15.6	0.0559	
ECF3	2008-09-08							0.15						
BR4A	2008-09-22	<2	45	97	313	0.28	0.00022	0.0567	0.0018	0.6		0.013	0.3	0.017
ECC4	2008-09-22		85.2	0.000006	< 0.001	0.00011	0.0007	0.1	0.00074			12.7	0.0239	
ECC1A	2008-09-22		82.9	< 0.000003	< 0.001	0.000052	0.0007	0.04	0.00039			12.4	0.0096	
ECC4A	2008-09-22		89	< 0.000003	< 0.001	0.000093	0.0009	0.11	0.00031			17.6	0.036	
BR4B	2008-09-22		90.2	0.000007	< 0.001	0.00012	0.0007	0.11	0.00021			19.3		0.021
BR2	2008-09-22		79.6	0.00001	<0.001	0.000129	0.0008	0.16	0.00028			13.4		0.024
ECC3	2008-09-23													
ECC2	2008-09-24							0.27						
ECF3	2008-09-24		66.5	0.000085		0.000127	0.0006	0.27	0.00044			7.67	0.0445	
ECF1	2008-09-24		63.5	0.000071		0.000124	< 0.0005	0.68	0.00022			5.49	0.305	
ECF2	2008-09-24		65.5	0.000079		0.000132	< 0.0005	1.07	0.00044			5.93	0.34	
BR2	2008-12-15													
ECC4	2009-07-22				<0.001	0.000137	0.0007	0.1	0.00027				0.0298	
ECC2	2009-07-22				15	<0.000003	0.000097			0.00018				0.0395
ECC1	2009-07-22				<0.001	0.000092	0.0006	0.1	0.00013				0.0151	
ECC1A	2009-07-22				<0.001	0.000099	0.0006	0.06	0.00044				0.00806	
BR3	2009-07-22			< 0.000003	< 0.001	0.000139	< 0.0005	0.41	0.00011					0.125
ECC3	2009-07-22				<0.001	0.00011	0.0005	0.16	0.00014				0.0598	
BR2	2009-07-22			<0.00003	<0.001	0.000122	0.0007	0.12	0.00014					0.0318
BR4A	2009-07-22	<2	28		257	0.2	0.00015	0.0613	0.0016	0.2		0.007	0.39	0.046
BR1	2009-07-22		90.5	0.000007	<0.001	0.000336	0.0007	0.58	0.0005					1.57
ECC2	2009-08-31				20	<0.001	0.000108			0.00027				0.0308
ECC3	2009-08-31				<0.001	0.000103	<0.0005	0.11	0.00013				0.0284	
BR4A	2009-08-31		37		278	0.16	0.00016			0.4		0.005	0.47	0.04
ECC1	2009-08-31				<0.001	0.000085	0.0005	0.1	0.00021				0.012	
ECC1A	2009-08-31				<0.001	0.000107	0.0005	0.05	0.00023				0.00956	
BR3	2009-08-31			< 0.000003	< 0.001	0.000122	< 0.0005	0.17	0.00015					0.0467
BR2	2009-08-31			0.000004	<0.001	0.000135	0.0007	0.12	0.00027					0.0269
BR1	2009-08-31		92.4	0.000003	<0.001	0.000107	0.0005	0.16	0.00036					0.0767
BR1B	2009-08-31		75	0.000003	<0.001	0.000115	0.0007	0.11	0.0002			13.5		0.026
ECC2	2009-09-29				14	<0.001	0.000132			0.00038				0.0606
ECC4	2009-09-29				<0.001	0.000165	0.0009	0.18	0.00029				0.0284	
ECC1	2009-09-29				<0.001	0.000179	0.0009	0.45	0.0006				0.0538	
ECC1A	2009-09-29				<0.001	0.000311	0.0011	0.76	0.00094				0.0774	
ECC3	2009-09-29				<0.001	0.000115	0.0007	0.17	0.00018				0.0465	
BR3	2009-09-29			0.000005	< 0.001	0.000147	0.0007	0.29	0.00021					0.0775
BR2	2009-09-29			0.000024	<0.001	0.000201	0.0018	0.31	0.0004					0.039
BR4A	2009-09-29		48		268	0.34	0.00042	0.0478	0.0017	0.48		0.008	1.02	0.143
BR1	2009-09-29		71.3	0.000063	< 0.001	0.00025	0.0011	0.19	0.00027					0.106
BR2A	2010-03-16													
BR4A	2010-03-16									1.95		0.01	0.61	0.08
ECC1A	2010-03-16													
ECC2	2010-03-16													

ECC4	2010-03-16										
BR1	2010-03-16										
BR1B	2010-03-16										
BR3	2010-03-16										
BR4B	2010-03-16										
BR4	2010-03-16	<0.001	0.000248	0.0011	0.45	0.0008					0.0612
ECC1	2010-03-16	<0.001	0.000138	0.0007	0.28	0.00077			0.0361		
ECC3	2010-03-16	<0.001	0.000143	0.0011	0.14	0.00068			0.0121		
BR2	2010-03-16	<0.001	0.000219	0.001	0.39	0.00129					0.0536
BR2A	2010-05-19										
BR1	2010-05-19										
BR1B	2010-05-19										
BR3	2010-05-19										
BR4A	2010-05-19						2.19	0.013	0.71	0.075	
BR4B	2010-05-19										
BR1A	2010-05-19										
BR2	2010-05-19	0.0011	0.000106	<0.0005	0.118	0.0003					0.0307
BR4	2010-05-20										
ECC4	2010-05-20										
ECC1A	2010-05-20										
ECC2	2010-05-20										
ECC1	2010-05-20	0.0006	0.000086	<0.0005	0.127	0.00053			0.022		
ECC3	2010-05-20	0.0011	0.000098	<0.0005	0.181	0.00039			0.0483		
ECC4	2010-08-09										
ECC1A	2010-08-09										
ECC2	2010-08-09										
BR2	2010-08-09	<0.0005	0.000105	0.0006	0.107	0.00043					0.0259
ECC1	2010-08-09	<0.0005	0.000089	0.0007	0.131	0.00012			0.0197		
ECC3	2010-08-09	<0.0005	0.000101	0.0005	0.147	0.00013			0.0436		
ECC2	2010-10-27	15									
ECC4	2010-10-27										
ECC1A	2010-10-27										
ECC3	2010-10-27				0.129						
ECC1	2010-10-27				0.167						

Site ID	Sampling Date	mg/L Molybdenum	mg/L Nickel	mg/L Potassium(dissolved)	mg/L Potassium	mg/L Selenium	mg/L Silver	mg/L Sodium (Dissolved)	mg/L Sodium	mg/L Strontium	mg/L Thallium	mg/L Titanium	mg/L Tungsten	mg/L Uranium	mg/L Vanadium	mg/L Zinc
BR1	2006-04-05	0.0004	<0.0007	1.99		<0.003	<0.00003	6.48		0.12	<0.0001	0.004		<0.001	<0.001	<0.010
BR4	2006-04-05	0.00064	<0.0007	1.95		<0.003	<0.00003	20		0.178	<0.0001	0.002		0.00117	<0.001	<0.01
BR2	2006-04-05	0.00047	<0.0007	1.63	0	<0.003	<0.00003	16.8	0	0.148	<0.0001	0.002	0	0.00106	<0.001	<0.01
BR3	2006-04-05	0.00044	<0.0007	1.9	0	<0.003	<0.00003	17		0.164	<0.0001	<0.001	0	0.00124	<0.001	<0.01
BR1	2006-05-12	0.00047	<0.0007		1.68	<0.003	<0.00003		8.47	0.141	<0.0001	0.002		0.00083	<0.001	<0.001
BR2	2006-05-12	0.00041	<0.0007		1.84	<0.003	<0.00003		20.7	0.158	<0.0001	0.004	0	0.00111	<0.001	0.002
BR3	2006-05-12	0.00052	<0.0007	1.53	1.65	<0.003	<0.00003		18.5	0.176	<0.0001	<0.001	0	0.00091	<0.001	<0.001
BR4	2006-05-12	0.00045	<0.0007	1.92	2.11	<0.003	<0.00003		20.5	0.184	<0.0001	0.002		0.00105	<0.001	<0.001
BR4	2006-06-13															
BR3	2006-07-10	0.00048	0.0007		2.01	<0.003	<0.00003		14.8	0.207	<0.0001	<0.001	0	0.00059	<0.001	0.0014
BR4	2006-07-10	0.00056	0.001		1.91	<0.003	<0.00003		23.7	0.182	<0.0001	0.015		0.00077	<0.001	0.0046
BR1	2006-07-10	0.00041	0.0009		1.44	<0.003	0.00005		8.62	0.133	<0.0001	0.009		0.00068	<0.001	0.0105
BR2	2006-07-10	0.00042	0.0024		1.73	<0.003	0.00005		13.5	0.186	<0.0001	0.084	0	0.00108	0.004	0.0156
ECC4	2006-07-11	0.00045	<0.0007		1.5	<0.003	<0.00003		7.24	0.208						
ECC1	2006-07-11	0.00048	<0.0007		0.92	<0.003	<0.00003		4.31	0.169	<0.0001	0.002		0.00068	<0.001	<0.001
ECC3	2006-07-11	0.00056	<0.0007		1.18	<0.003	<0.00003		8.92	0.182	<0.0001	<0.001		0.00066	<0.001	<0.001
ECC2	2006-07-11	0.0005	< 0.0007			< 0.003	< 0.00003	8.029999733		0.194000006	< 0.0001	0.004		0.00068	< 0.001	0.005
BR4	2006-07-12															
BR4	2006-08-15															
ECC1	2006-08-23															
BR3	2006-08-23	0.00019	< 0.0007			< 0.003	< 0.00003	13.89999962		0.209999993	< 0.0001	< 0.001		0.00041	< 0.001	0.0033
BR4	2006-08-23	0.00048	< 0.0007			< 0.003	< 0.00003	14.39999962		0.216000006	< 0.0001	< 0.001		0.00057	< 0.001	0.0027
BR2	2006-08-23	0.00037	< 0.0007			< 0.003	< 0.00003	15.19999981		0.194999993	< 0.0001	< 0.001		0.00094	< 0.001	0.0028
ECC1	2006-08-23	0.00057	<0.0007			<0.003	<0.00003		5.66	0.192	<0.0001	<0.001		0.00104	<0.001	0.0027
ECC4	2006-08-23	0.0004	<0.0007		2.32	<0.003	<0.00003		5.48	0.198						
BR3	2006-08-23	0.00019	<0.0007		1.58	<0.003	<0.00003		13.9	0.21	<0.0001	<0.001	0	0.00041	<0.001	0.0033
BR4	2006-08-23	0.00048	<0.0007		1.65	<0.003	<0.00003		14.4	0.216	<0.0001	<0.001		0.00057	<0.001	0.0027
ECC3	2006-08-23	0.00042	<0.0007		0.1	<0.003	<0.00003		7.62	0.175	<0.0001	0.002		0.0008	<0.001	0.0043
BR2	2006-08-23	0.00037	<0.0007		1.52	<0.003	<0.00003		15.2	0.195	<0.0001	<0.001	0	0.00094	<0.001	0.0028
ECC2	2006-08-23		0.0005	0.043	0.92	<0.003	<0.00003		7.4	0.157	<0.0001	<0.001		0.00072	<0.001	0.0023
BR4	2006-09-20															
ECC4	2006-10-18	0.0005	0.0007			<0.003	<0.00003			0.178						
ECC2	2006-10-18		0.00061	0.033		<0.003	<0.00003			0.172	<0.0001	0.0041	<0.0002	0.00066	0.00048	0.0015
ECC3	2006-10-18	0.00058	0.0007			<0.003	<0.00003			0.172	<0.0001	0.0017	<0.0002	0.0006	0.00034	0.0014
ECC1	2006-10-18	0.00061	0.0007			<0.003	<0.00003			0.137	<0.0001	0.0042	<0.0002	0.00046	0.00049	0.0018
BR1	2006-10-18	0.00022	0.0009			<0.003	<0.00003			0.122	<0.0001	0.002	<0.0002	0.00061	0.00053	0.0043
BR2	2006-10-18	0.00038	0.001		0	<0.003	<0.00003		0	0.152	<0.0001	0.0081	<0.0002	0.00093	0.00086	0.0017
BR3	2006-10-18	0.00054	0.0008		0	<0.003	<0.00003		0	0.162	<0.0001	0.0017	<0.0002	0.00088	0.00042	0.0005
BR4	2006-10-18	0.0009	0.0012			<0.003	<0.00003			0.184	0.0002	0.0187	0.0017	0.00118	0.00137	0.0029
BR4	2006-10-19															

BR4	2006-10-20																
BR4	2006-11-21																
BR4A	2007-03-14																
BR4	2007-03-14	0.00041	0.0016			<0.001	<0.00003			0.0942	<0.0001	0.0545	<0.00007	0.00044	0.00281	0.0085	
BR1	2007-03-14	0.00029	<0.0007			<0.001	<0.00003			0.0632	<0.0001	0.0126	<0.00007	0.00059	0.00122	0.0067	
BR2	2007-03-14	0.00033	0.001		0	<0.001	<0.00003		0	0.0525	<0.0001	0.0358	<0.00007	0.00038	0.00212	0.0083	
BR3	2007-03-14	0.0004	0.0007		0	<0.001	<0.00003		0	0.0785	<0.0001	0.0167	<0.00007	0.00032	0.00126	0.0053	
BR1	2007-06-19																
BR4A	2007-06-19																
BR4	2007-06-19	0.00005	0.0011			<0.001	<0.00003			0.215	<0.0001	0.0018	<0.00007	0.00064	0.00069	<0.0003	
BR2	2007-06-19	<0.00005	0.001		0	<0.001	<0.00003		0	0.196	<0.0001	0.0015	<0.00007	0.00109	0.00062	<0.0003	
BR3	2007-06-19	<0.00005	0.001		0	<0.001	<0.00003		0	0.214	<0.0001	0.0011	<0.00007	0.00064	0.00042	<0.0003	
BR1A	2007-09-12																
BR1	2007-09-12	0.00071	0.0006			<0.001	<0.00001			0.173	<0.00001	0.002	<0.00003	0.00111	0.00064	<0.001	
BR4	2007-09-12	0.00041	0.0004			<0.001	<0.00001			0.197	<0.00001	0.0006	<0.00003	0.00065	0.00052	<0.001	
BR2	2007-09-12	0.0005	0.0004		0	<0.001	<0.00001		0	0.173	<0.00001	0.002	<0.00003	0.00101	0.00051	<0.001	
BR3	2007-09-12	0.00037	0.0006		0	<0.001	<0.00001		0	0.193	<0.00001	0.0007	<0.00003	0.000613	0.00044	<0.001	
BR1	2007-10-24	0.00056	0.0011			<0.001	<0.00001			0.199	<0.0001	0.0007	0.00008	0.00118	0.00031	0.002	
BR2	2007-10-24	0.00055	0.0011		0	<0.001	<0.00001		0	0.21	<0.00001	0.0007	0	0.0013	0.0003	<0.001	
BR4	2007-10-24	0.0004	0.0011			<0.001	<0.00001			0.214	<0.00001	0.0005	0.00005	0.000912	0.00031	<0.001	
ECF2	2008-05-14	0.00017	0.0007		0.54	< 0.001	0.00022		1.38	0.119	0.000003	0.0008	0.00003	0.000217	0.00019	0.004	
ECF3	2008-05-14	0.00035	0.0007		0.48	< 0.001	0.00018		2.02	0.125	0.000003	0.0027	< 0.00003	0.000968	0.0004	0.004	
ECF1	2008-05-14	0.00018	0.0007		0.57	0.001	0.00053		1.31	0.118	0.000013	0.0004	0.00006	0.000178	0.0001	0.003	
ECC4	2008-05-15	0.0007	0.0003		1.55	<0.001	<0.00001		7.65	0.187							
BR4A	2008-05-15		2.47	0.265	20	0.0021	<2	352	<0.00003	0.00105	<0.001	0.00015					
ECC1A	2008-05-15	0.00022	0.0002		0.88	<0.001	<0.00001		3.88	0.155	<0.000002	0.0009	<0.00003	0.000561	0.00031	<0.001	
BR2A	2008-05-15	0.0004	5.5		1.17	<0.001	<0.00001		7.52	0.193	<0.000002	0.0006	<0.00003	0.000825	0.00026	0.001	
ECC2	2008-05-15		0.00052	0.022	1.07	<0.001	<0.00001		8.36	0.152	<0.000002	0.001	< 0.00003	0.000835	0.00055	< 0.001	
ECC3	2008-05-15	0.00061	0.0002		1.21	<0.001	<0.00001		8.56	0.163	<0.000002	0.0008	<0.00003	0.000862	0.00047	<0.001	
BR1A	2008-05-15	0.00046	0.0003		1.37	<0.001	<0.00001		11.7	0.164	<0.000002	0.0009	<0.00003	0.00106	0.00048	<0.001	
BR4B	2008-05-15	0.00071	0.0003		1.97	< 0.001	<0.00001		37.1	0.242	0.000011	0.001	<0.00003	0.00176	0.00047	0.003	
ECC1	2008-05-15	0.00059	0.0002		1.2	<0.001	<0.00001		5.41	0.184	<0.000002	0.0011	<0.00003	0.00104	0.00042	<0.001	
BR1	2008-05-15	0.00039	0.0004		0.95	<0.001	<0.00001		9.8	0.144	<0.000002	0.0014	<0.00003	0.00108	0.00053	0.002	
BR2	2008-05-15	0.00047	0.0002		1.44	< 0.001	0.00001		17.5	0.18	<0.00001	0.0007	0.00004	0.00103	0.00043	<0.001	
BR1B	2008-05-15	0.00051	0.0002		1.89	<0.001	0.00001		32	0.235	<0.000002	0.0009	0.00005	0.000898	0.0003	<0.001	
ECF1	2008-06-16	0.00014	0.0008		0.8	< 0.001	< 0.00001		1.15	0.116	< 0.000002	0.0043	< 0.00003	0.000132	0.00053	0.005	
ECF2	2008-06-16	0.00011	0.0005		0.6	< 0.001	< 0.00001		1.11	0.111	< 0.000002	0.0007	< 0.00003	0.000162	0.00021	0.008	
ECF3	2008-06-16	0.0006	0.0008		0.56	< 0.001	< 0.00001		2.28	0.131	< 0.000002	0.0011	0.00007	0.00102	0.00042	0.005	
ECF2	2008-07-23	0.00024	0.0008		0.82	< 0.001	< 0.00001		1.18	0.115	< 0.000002	0.0008	< 0.00003	0.000086	0.00014	< 0.001	
ECF1	2008-07-23	0.00039	0.0009		0.72	< 0.001	< 0.00001		1.2	0.111	< 0.000002	0.0009	< 0.00003	0.000097	0.00021	0.002	
ECF3	2008-07-23	0.0005	0.0012		1.33	< 0.001	< 0.00001		1.7	0.108	0.000005	0.0067	< 0.00003	0.000548	0.00071	0.002	
BR4A	2008-08-18		3.05	0.31	16	0.003	2		<0.00003	0.00146	0.002	0.00013					

BR2A	2008-08-18	< 0.0001	5.7		1.21	< 0.001	< 0.00001		7.38	0.192	0.000003	0.0007	< 0.00003	0.000825	0.00026	0.002
BR3	2008-08-18	0.00043	0.0002		1.95	< 0.001	< 0.00001		16.2	0.225	0.000002	0.0008	< 0.00003	0.000727	0.00042	0.002
BR2	2008-08-18	0.00044	0.0002		1.73	< 0.001	< 0.00001		15.7	0.202	0.000004	0.0011	< 0.00003	0.000927	0.0006	0.002
BR1	2008-08-18	0.00039	0.0004		1.57	< 0.001	< 0.00001		8.55	0.19	0.000005	0.0011	< 0.00003	0.00112	0.00049	0.003
BR1A	2008-08-18	0.00042	0.0002		2.02	< 0.001	< 0.00001		8.47	0.187	0.000004	0.0011	< 0.00003	0.000815	0.0006	0.001
BR1B	2008-08-18	0.0005	0.0002		1.78	< 0.001	< 0.00001		31.5	0.266	0.000003	0.001	0.00004	0.000779	0.00041	0.002
BR4B	2008-08-18	0.00067	0.0006		1.9	< 0.001	0.00003		31.1	0.259	0.000006	0.0058	0.00004	0.0016	0.00115	0.003
ECC2	2008-08-22		0.00046	0.03	1.2	<0.001	<0.00001		7.56	0.187	<0.000002	0.0016	< 0.00003	0.000782	0.00058	0.002
ECC4	2008-08-22	0.00024	0.0019		1.45	<0.001	<0.00001		7.72	0.22						
ECC1	2008-08-22	0.00038	0.0014		1.08	<0.001	<0.00001		5.17	0.184	<0.000002	0.001	< 0.00003	0.000903	0.00038	0.002
ECC3	2008-08-22	0.0004	0.0016		1.27	<0.001	<0.00001		8.33	0.21	<0.000002	0.0011	< 0.00003	0.000812	0.00049	0.002
ECC1A	2008-08-22	0.00008	0.0015		0.95	<0.001	<0.00001		4.01	0.166	<0.000002	0.0018	< 0.00003	0.000561	0.00043	0.003
ECC4A	2008-08-22	0.00076	0.002		1.88	<0.001	<0.00001		14.7	0.253	<0.000002	0.0026	< 0.00003	0.000874	0.00066	0.004
ECF3	2008-09-08															
BR4A	2008-09-22		2.53	0.307	20	0.0017	<2		<0.00003	0.000789	<0.001	0.00013				
ECC4	2008-09-22	0.00034	0.0017		1.75	< 0.001	< 0.00001		8.79							
ECC1A	2008-09-22	0.00019	0.0079		1.05	< 0.001	< 0.00001		3.66	0.165	0.000003	0.0023	< 0.00003	0.000569	0.00026	< 0.001
ECC4A	2008-09-22	0.00078	0.0033		1.66	< 0.001	< 0.00001		17.5	0.256	0.000002	0.0012	< 0.00003	0.000907	0.0003	0.002
BR4B	2008-09-22	0.00075	0.0015		1.95	< 0.001	< 0.00001		29.7	0.252	0.000004	0.0011	< 0.00003	0.00121	0.00083	< 0.001
BR2	2008-09-22	0.00048	0.0014		1.62	< 0.002	< 0.00001		16	0.194	0.000003	0.0011	< 0.00003	0.00103	0.00071	0.002
ECC3	2008-09-23															
ECC2	2008-09-24															
ECF3	2008-09-24	0.00015	0.0013		0.63	< 0.001	< 0.00001		1.79	0.13	< 0.000002	0.0022	< 0.00003	0.000807	0.00043	0.003
ECF1	2008-09-24	0.00004	0.0012		0.8	< 0.001	< 0.00001		2.28	0.117	< 0.000002	0.0006	< 0.00003	0.000114	0.0002	0.004
ECF2	2008-09-24	0.00001	0.0012		0.62	< 0.001	< 0.00001		1.31	0.117	< 0.000002	0.0027	< 0.00003	0.000165	0.00048	0.002
BR2	2008-12-15															
ECC4	2009-07-22		0.0015						6.45							
ECC2	2009-07-22			0.035					8.72							0.002
ECC1	2009-07-22		0.0012						5.61							0.002
ECC1A	2009-07-22		0.0017						3.54							0.001
BR3	2009-07-22		0.0015						15.5							0.002
ECC3	2009-07-22		0.0012						8.58							0.002
BR2	2009-07-22		0.0014						17.7							0.002
BR4A	2009-07-22				12		2	298			0.002					
BR1	2009-07-22		0.0021						14.7							0.002
ECC2	2009-08-31			0.029					7.82							0.002

ECC3	2009-08-31		0.0014					8.45								0.001
BR4A	2009-08-31				12		2			0.002						
ECC1	2009-08-31		0.0013					4.95								0.002
ECC1A	2009-08-31		0.0012					3.42								0.001
BR3	2009-08-31		0.0015					15								0.002
BR2	2009-08-31		0.0016					15.5								0.002
BR1	2009-08-31		0.0019					8.53								0.002
BR1B	2009-08-31	0.00052	0.0014		1.78	< 0.001	0.00001	20.5	0.222	<0.0002	0.0009	0.00004	0.0007	0.00034		0.002
ECC2	2009-09-29			0.049				8.25								<0.001
ECC4	2009-09-29		0.0013					9.12								
ECC1	2009-09-29		0.0011					4.38								0.002
ECC1A	2009-09-29		0.0013					3.45								0.003
ECC3	2009-09-29		0.001					8.66								0.001
BR3	2009-09-29		0.0013					15.5								<0.001
BR2	2009-09-29		0.0014					16.4								0.002
BR4A	2009-09-29				20		6			0.003						
BR1	2009-09-29		0.0014					6.5								0.002
BR2A	2010-03-16		4.8													
BR4A	2010-03-16						14									
ECC1A	2010-03-16															
ECC2	2010-03-16			0.057												
ECC4	2010-03-16															
BR1	2010-03-16															
BR1B	2010-03-16															
BR3	2010-03-16															
BR4B	2010-03-16															
BR4	2010-03-16	0	0.0008					14.3								0.003
ECC1	2010-03-16		0.0003					3.88								0.002
ECC3	2010-03-16		0.0001					4								0.002
BR2	2010-03-16		0.0005					11.1								0.003
BR2A	2010-05-19		6													
BR1	2010-05-19															
BR1B	2010-05-19															
BR3	2010-05-19															
BR4A	2010-05-19						17									
BR4B	2010-05-19															
BR1A	2010-05-19															
BR2	2010-05-19		0.0007					17.5								<0.002
BR4	2010-05-20															
ECC4	2010-05-20															
ECC1A	2010-05-20															
ECC2	2010-05-20			0.043												
ECC1	2010-05-20							4.64								<0.002
ECC3	2010-05-20		0.0007					7.82								<0.002
ECC4	2010-08-09															
ECC1A	2010-08-09															
ECC2	2010-08-09			0.067												

BR2	2010-08-09	0.0009	16.5	<0.002
ECC1	2010-08-09	0.0008	5.27	<0.002
ECC3	2010-08-09	0.0007	8	<0.002
ECC2	2010-10-27			<0.001
ECC4	2010-10-27			
ECC1A	2010-10-27			
ECC3	2010-10-27			<0.002
ECC1	2010-10-27			0.002