2009 Surface Water Quality Summary

Regional Watershed Monitoring Program

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Watershed Monitoring and Reporting Section
Ecology Division

TORONTO AND REGION Conservation
for The Living City

Acknowledgments

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1. Introduction

Since 2002, the Toronto and Region Conservation Authority (TRCA) has monitored monthly stream water quality at selected locations within the watersheds of the greater Toronto region. These activities have been undertaken as part of TRCA's Regional Watershed Monitoring Program (RWMP) in partnership with the Ontario Ministry of the Environment (MOE) and the City of Toronto. The data collected is shared with partner municipalities and other agencies, and is used for planning, implementation and reporting activities including the development of watershed plans and report cards as well as watershed characterization reports in support of source water protection planning.

This report presents the 2009 laboratory results from the RWMP surface water quality sampling program and provides a general overview and description of the range of water quality conditions across the TRCA jurisdiction. This report and associated data can assist in identifying areas of concern, elevated levels of contaminants, and can be used to affirm both poor and good water quality in different land use areas. Results should be interpreted with caution however, since sampling events were not targeted to capture specific stream flow conditions (e.g. wet weather events). In this respect, samples may represent both baseflow and stormflow conditions.

2. Methods

In 2009, surface water quality samples were collected at 38 sites (Figure 1) throughout the TRCA's jurisdiction. Sample collection and laboratory analysis was carried out through several partnerships. These partnerships are outlined below and in Table 1.

- 11 sites were sampled by TRCA under the MOE's Provincial Water Quality Monitoring Network (PWQMN).
- 25 sites were sampled by TRCA in partnership with the City of Toronto which provided in-kind laboratory analysis (Jan-May). Samples collected from June through December were submitted to the York-Durham Laboratory for analysis. This included 2 new sites established in 2009 (PT001WM and FB003WM).
- 2 sites (one near the mouth of the Humber River, and one near the mouth of the Don River) were sampled bi-weekly by MOE from January through March, and monthly by TRCA from June through December.

Sample collection was undertaken monthly using in-stream "grab" techniques following the MOE PWQMN protocol (MOE 2003). Samples also included in-situ water chemistry measurements (e.g. water temperature, conductivity, and dissolved oxygen) collected using a hand-held YSI meter (Model 600QS). Sampling occurred year-round (usually the third week of each month) and was independent of precipitation. Samples were submitted to the MOE Rexdale laboratory, the City of Toronto Dee Avenue Laboratory, York-Durham Regional Environmental Laboratory and a private laboratory for analysis. Samples for months not covered by

the PWQMN partnership (e.g. December to March) were submitted to the City of Toronto Lab from January through March and to the York-Durham Regional Environmental Laboratory in December in order to augment water quality data from these sites and to maintain a year-round dataset.

Stream conditions were noted at the time of sampling in order to characterize the sample with respect to flow response to recent or occurring precipitation. These field notes (Appendix A) along with 2009 precipitation records from Pearson International Airport (Figures 3 and 4) are included in this report to provide context to assist with interpretation of results.

Parameters assessed are listed in Table 2 and include the standard suite of nutrients, metals and conventional water quality parameters used by the PWQMN. Microbiological samples were collected by TRCA at 36 sites in 2009 and submitted to either a private lab (Maxxam Analytics Inc) or the York-Durham Regional Environmental Laboratory. MOE staff collected samples bi-weekly at 2 sites (83019, 85014) in the month of March which were submitted to the MOE Rexdale Laboratory for analysis. In June, TRCA agreed to take responsibility for the ongoing sample collection at these two stations and continued submission of metals, nutrients, general chemistry, conventional and microbiological samples to the MOE laboratory.

Laboratory results are compared to the Provincial Water Quality Objectives (PWQO) when available. The PWQO are a set of numerical and narrative ambient surface water quality criteria that represent a desirable level of water quality that will protect all forms of aquatic life and all aspects of the aquatic life cycles during indefinite exposure to the water as well as protecting recreational water usage based on public health considerations and aesthetics (OMOEE 1994). When PWQO were not available, other objectives such as Canadian Council of Ministers of the Environment (CCME 2007) and Recommended Water Quality Guidelines for the Protection of Aquatic Life under the Canadian Environmental Sustainability Indicators Initiative (EC 2005) were used. All laboratory results that were reported as zero, negative values or undetectable were omitted from this summary report in order to minimize any influences on the data.

Surface water quality data is stored in "*Water"*, a relational Microsoft Access database that is part of the TRCA's corporate database *EnviroBase*. The *Water* database includes laboratory results and metadata such as laboratory analysis methods and sampling equipment.

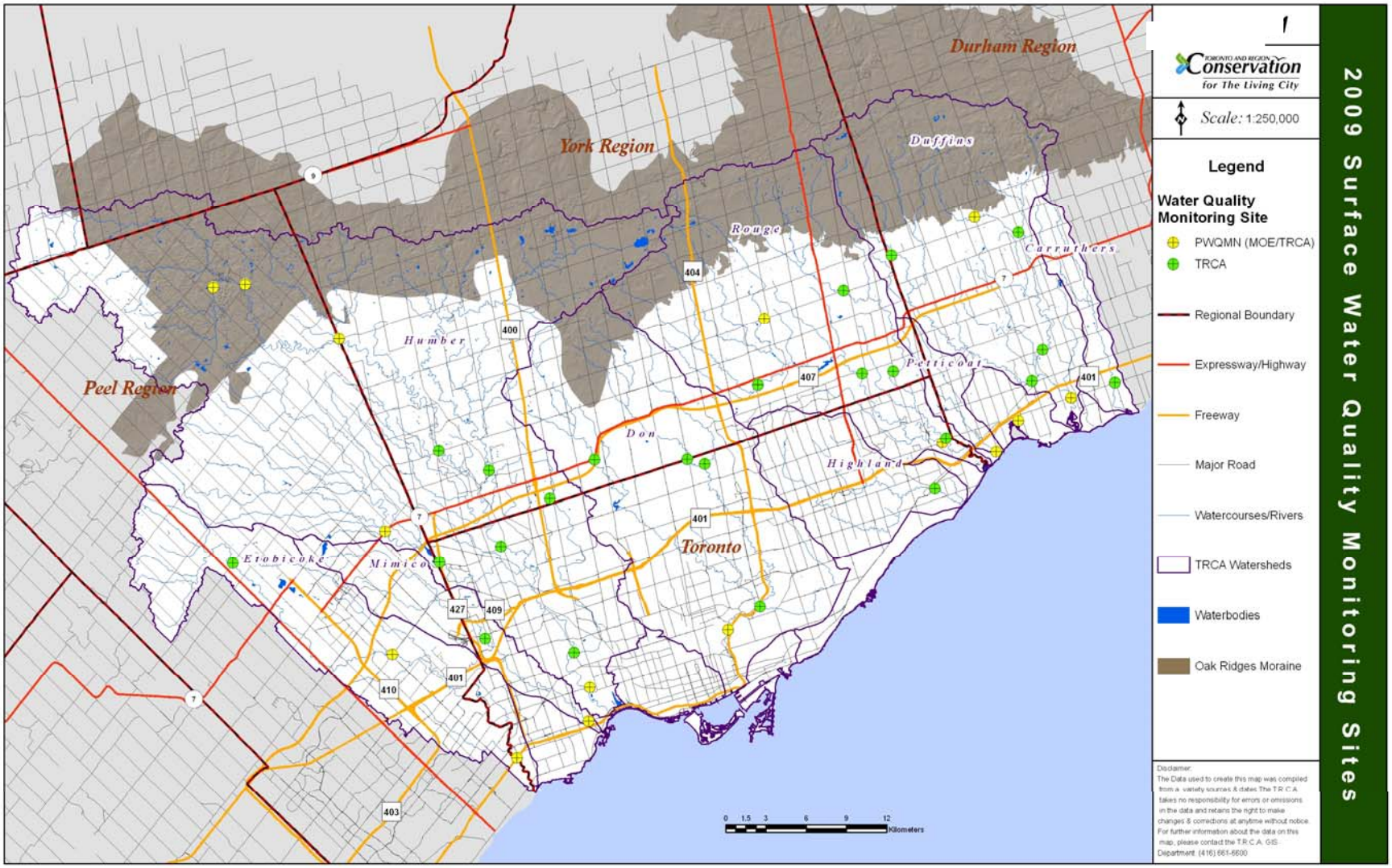

Figure 1. 2009 surface water quality monitoring sites

Table 1. 2009 RWMP surface water quality sites and associated laboratories

Station	Watershed	UTM		General Chemistry, Metals and Nutrients				Bacteria		Program
		Northing	Easting	Jan- Mar	Apr-May	June-Nov	Dec	Jan-May	Jun-Dec	Partner
Mayfield Road	Etobicoke	4843488	595028	C	C	Y	Y	P	Y	City of Toronto
80007	Etobicoke	4836746	606933	C	M	M	Y	P	Y	MOE/PWQMN
80006	Etobicoke	4829016	616234	C	M	M	M	P	Y	MOE/PWQMN
MM003WM	Mimico	4837916	613849	C	C	Y	Y	P	Y	City of Toronto
82003	Mimico	4831713	621585	C	M	M	M	P	Y	MOE/PWQMN
83104	Humber	4864112	593560	C	M	M	Y	P	Y	MOE/PWQMN
83018	Humber	4864329	595961	C	M	M	Y	P	Y	MOE/PWQMN
83009	Humber	4860243	602980	C	M	M	Y	P	Y	MOE/PWQMN
83020	Humber	4851861	610386	C	C	Y	Y	P	Y	City of Toronto
83004	Humber	4850423	614148	C	C	Y	Y	P	Y	City of Toronto
HU010WM	Humber	4844744	615027	C	C	Y	Y	P	Y	City of Toronto
83103	Humber	4845870	606385	C	M	M	Y	P	Y	MOE/PWQMN
83002	Humber	4843562	610459	C	C	Y	Y	P	Y	City of Toronto
HU1RWMP	Humber	4848311	618678	C	C	Y	Y	P	Y	City of Toronto
83012	Humber	4836845	620488	C	C	Y	Y	P	Y	City of Toronto
83019*	Humber	4834265	621663	M	M	M	M	M	M	MOE/PWQMN
85004	Don	4851207	622014	C	C	Y	Y	P	Y	City of Toronto
85003	Don	4851256	628954	C	C	Y	Y	P	Y	City of Toronto
DN008WM	Don	4850889	630236	C	C	Y	Y	P	Y	City of Toronto
DM 6.0	Don	4840251	634378	C	C	Y	Y	P	Y	City of Toronto
85014*	Don	4838576	632000	M	M	M	M	M	M	MOE/PWQMN
94002	Highland	4849056	647429	C	C	Y	Y	P	Y	City of Toronto
97018	Rouge	4861770	634680	C	M	M	Y	P	Y	MOE/PWQMN
97999	Rouge	4863887	640589	C	C	Y	Y	P	Y	City of Toronto
97777	Rouge	4856823	634214	C	C	Y	Y	P	Y	City of Toronto
RG008WM	Rouge	4857669	641985	C	C	Y	Y	P	Y	City of Toronto
RG007WM	Rouge	4857816	644300	C	C	Y	Y	P	Y	City of Toronto
97013	Rouge	4852830	648243	C	C	Y	Y	P	Y	City of Toronto
97011	Rouge	4852511	648007	C	M	M	M	P	Y	MOE/PWQMN
104008	Duffins	4869299	650372	C	M	M	Y	P	Y	MOE/PWQMN
PT001WM**	Petticoat	4851804	652005	C	C	Y	Y	P	Y	City of Toronto
FB003WM	Pine Creek	4854151	653659	n/a	n/a	Y	Y	P	Y	City of Toronto
7th Concession	Duffins	4868158	653641	C	C	Y	Y	P	Y	City of Toronto
8th Concession	Duffins	4866462	644191	C	C	Y	Y	P	Y	City of Toronto
Brock Ridge	Duffins	4857115	654656	C	C	Y	Y	P	Y	City of Toronto
Paulyn Park	Duffins	4859419	655458	C	C	Y	Y	P	Y	City of Toronto
104001/Annadale	Duffins	4855880	657579	C	M	M	M	P	Y	MOE/PWQMN
Shoal Point	Carruthers	4856972	660850	C	C	Y	Y	P	Y	City of Toronto

* Samples collected bi-weekly by MOE in March; **Began sampling monthly by TRCA in July 2009
M:MOE Laboratory; C: City of Toronto Laboratory; Y: York-Durham; P: Private Laboratory

Table 2. Standard suite of water quality parameters analyzed[1]

General Chemistry	Water Temperature	Biochemical Oxygen Demand	*Total Suspended Solids	Total Dissolved Solids	Dissolved Oxygen
	Conductivity	Hardness	Magnesium	pH	Potassium
	Alkalinity	Sodium	Calcium	*Chloride	Turbidity
Nutrients	Nitrogen, Total Kjeldahl	*Total Phosphorus	Phosphate	Ammonia	*Nitrate/Nitrite
Microbiological	Escherichia coli	Background Colonies			
Metals	Aluminum	Barium	Beryllium	Cadmium	Chromium
	Cobalt	*Copper	Iron	*Lead	Manganese
	Molybdenum	Nickel	Strontium	Vanadium	*Zinc

Note: [1]Additional parameters may be analyzed on a site/project specific basis
*PWQMN recommended indicator parameters

3. Results & Discussion

Sampling results are presented in box plots (e.g. Figure 2) which summarize the distribution of results for each parameter over the course of the year. Box plots display the range of data that falls within 1.5 times the upper and lower quartiles and excludes extreme values. The use of box plots allows the reader to view the range of results with the majority (50%) of results being located within the box section.

The ends of the boxes represent the 25th and 75th quartiles. The difference between the quartiles is the interquartile range. The line across the middle of the box identifies the median sample value. The "Whiskers" represent the calculated value of plus or minus 1.5 times the interquartile range.

Sample stations are arranged in each graph from upstream to downstream (left to right) and watersheds are arranged from west to east along the x-axis of each graph.

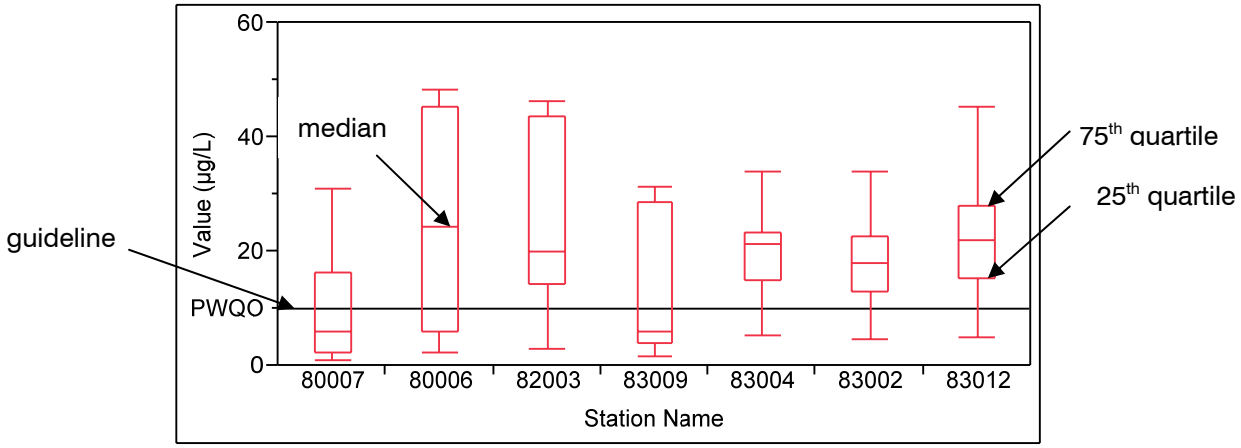

Figure 2. Box plot graphic example

Due to the low annual sample size (n=12) for each site, only a limited number of high results (e.g. wet weather flow) are required to skew the median results upwards. All laboratory results equalling a value of 0 were omitted from this summary report. The MOE (MOE 2003) recommends a minimum sample size of 30, as this sample size will help reduce the influence of unusual conditions such as spills, extreme runoff events and drought.

3.1 Precipitation

The total amount of precipitation recorded in 2009 at the Lester B. Pearson International Airport measured 904 mm, classifying it as the second wettest year when compared to the previous 10 years (Figure 3). Seasonal precipitation values for 2009 are displayed in Figure 4. Precipitation quantity peaked in April and August of 2009 and may have contributed to the levels of pollutants found at some sites.

Sampling occurred year round and was independent of precipitation, however less than one fifth (17%) of the samples collected in 2009 were taken during and/or immediately after precipitation events (Appendix A).

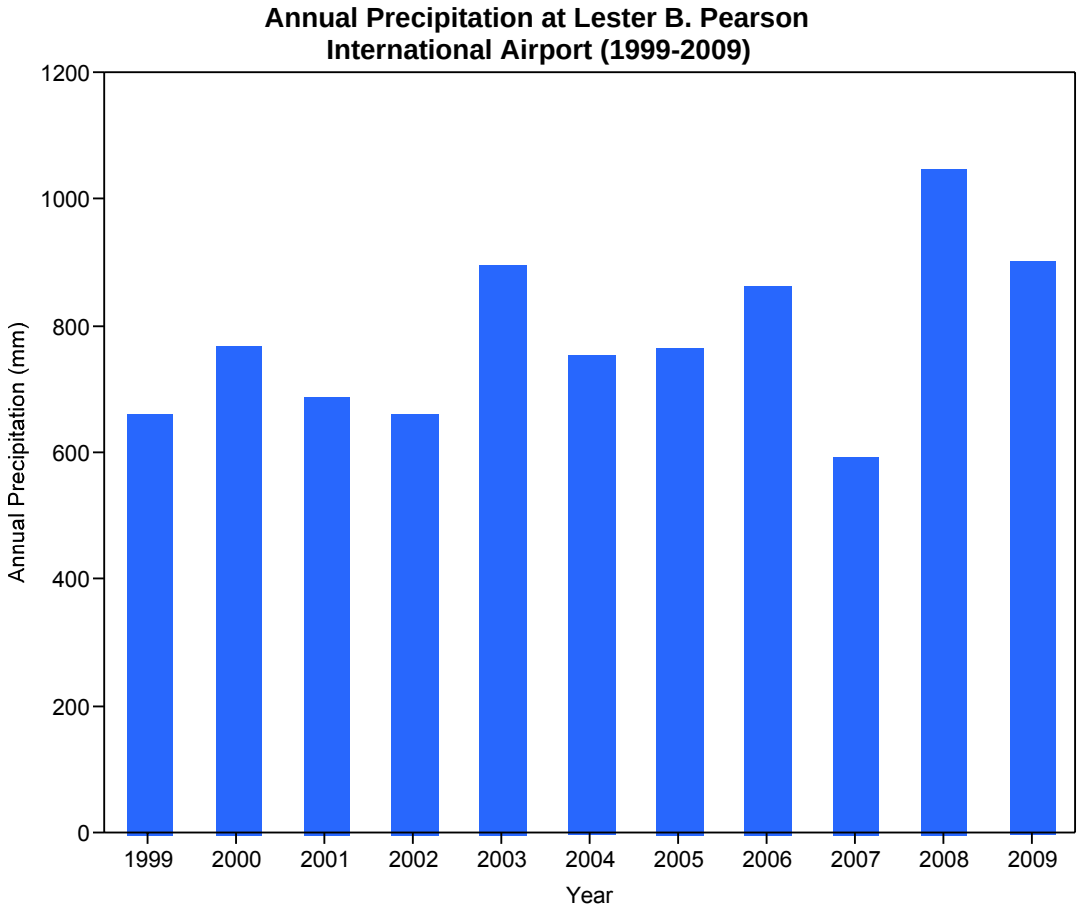

Figure 3. Annual precipitation at Lester B. Pearson International Airport (1999-2009)

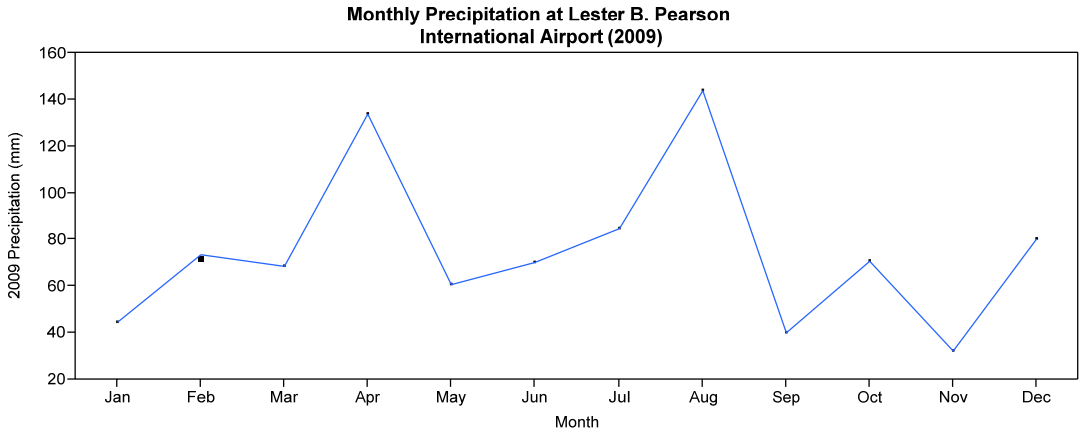

Figure 4. Monthly precipitation at Lester B. Pearson International Airport (2009)

3.2 Metals

Metals occur naturally in the environment, but human activities such as industrial processes and urban runoff can dramatically alter their distribution and increase their occurrence. When metals are released into the environment in higher than natural concentrations, they can be toxic, cause disruptions to aquatic ecosystems and decrease a waterbody's suitability for supporting aquatic life and domestic uses.

Lead

Median levels of lead were below the PWQO for all 38 sites as shown in Figure 5. January results from the samples submitted to the City of Toronto laboratory were omitted from this report due to the tendency to report higher than expected lead values during this time period when compared to other similarly accredited laboratories (TRCA 2008b). For example, the January City of Toronto laboratory lead results displayed a range of 35-40 µg/L for two-thirds of the data and 20-30 µg/L for the remaining third, which is extreme and highly unlikely across all stations submitted to this laboratory. The MOE laboratory lead values were also omitted due to the MOE reporting detection limit being 11µg/L, which is well above the PWQO of 5 µg/L. The MOE lead dataset is not comparable due to higher variability at low concentrations. As a result, the lead dataset is greatly reduced and therefore results should be interpreted with caution.

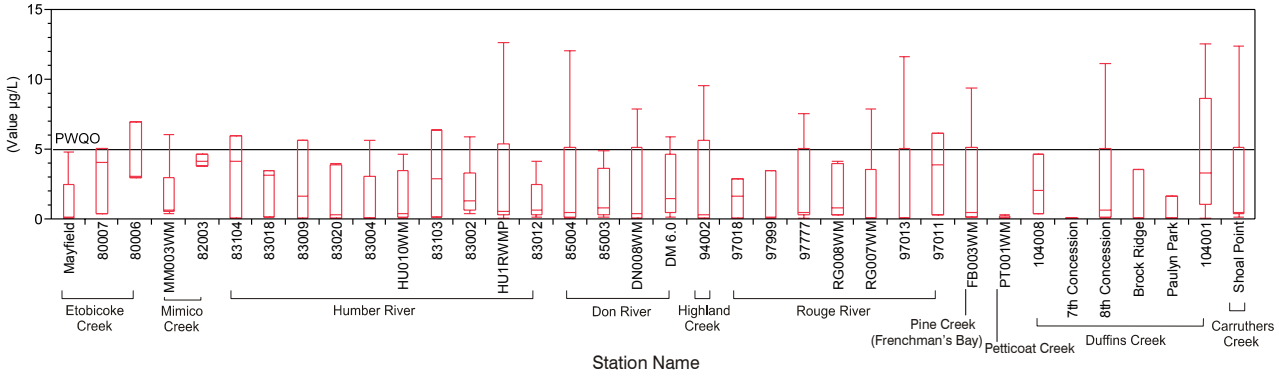

Figure 5. Lead concentrations (µg/L) at 36 sites within TRCA jurisdiction (PWQO: 5 µg/L)

Arsenic

Arsenic data presented in this report is based on a limited dataset since all stations are not analyzed regularly for this parameter. Arsenic levels in 2009 (Figure 6) were well below the PWQO of 5 µg/L. Only samples submitted to the City of Toronto and York-Durham Environmental laboratories were analyzed for arsenic since this parameter is not analyzed by MOE under the PWQMN (See Table 1). This includes station 83019 and 85014 from which samples are analyzed exclusively by MOE.

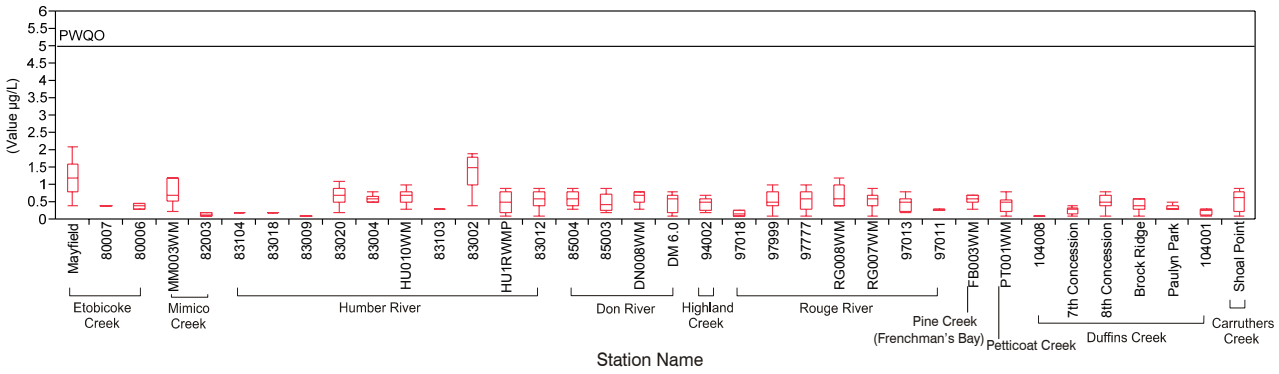

Figure 6. Arsenic concentrations (µg/L) at 36 sites within TRCA jurisdiction (PWQO: 5 µg/L)

Iron

Median iron values that exceeded or approached the PWQO of 300 µg/L were localized mainly in urbanized areas in the mid-lower Humber River, the Don River, Frechman's Bay and Carruthers Creek site (Figure 7). Iron concentrations appeared to be highest at station 83002. This site is located downstream of the Claireville Reservoir and Wild Water Kingdom. These results may be a result of high sediment loads.

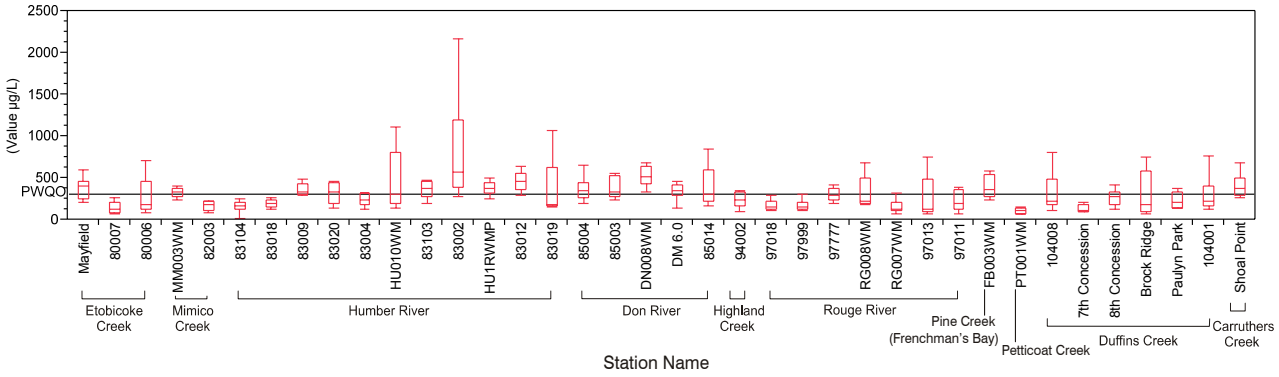

Figure 7. Iron concentrations (µg/L) at 38 sites within TRCA jurisdiction (PWQO: 300 µg/L)

Copper

Copper (Figure 8) displayed elevated median levels at sites located closest to the mouths of Etobicoke Creek, Mimico Creek and the Don River and at one station of the Humber River. Concentrations in Etobicoke Creek and the Humber River were lowest at the most northern (upstream) stations (Mayfield and 83104) and generally showed increases in copper further south (downstream) in the watersheds. Duffins Creek exhibited copper levels well below the PWQO for all six sites.

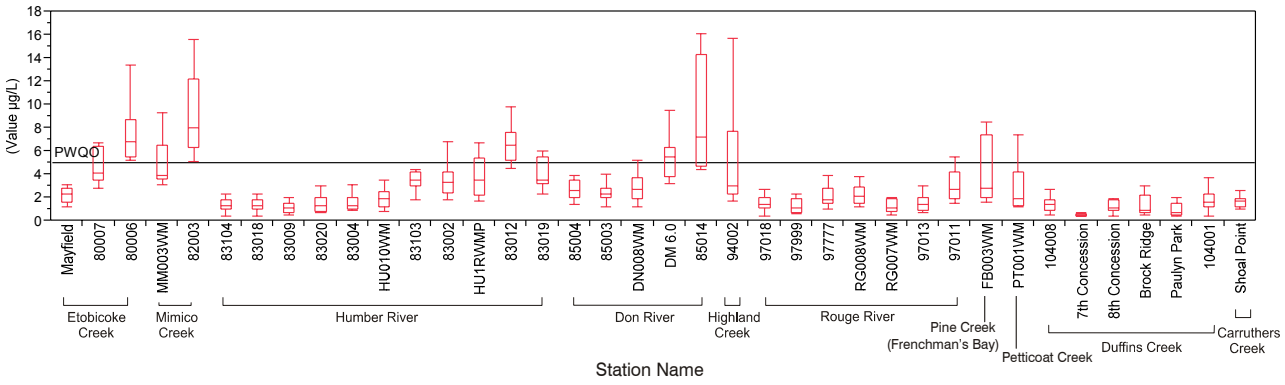

Figure 8. Copper concentrations (*µ*g/L) at 38 sites within TRCA jurisdiction (PWQO: 5 *µ*g/L)

Zinc

Median zinc concentrations (Figure 9) exceeded the PWQO at only one station (83012). In addition, several locations in Etobicoke Creek, Mimico Creek, the Humber River and the Don River displayed sample values that greatly exceeded the PWQO, which may be a potential concern in the future.

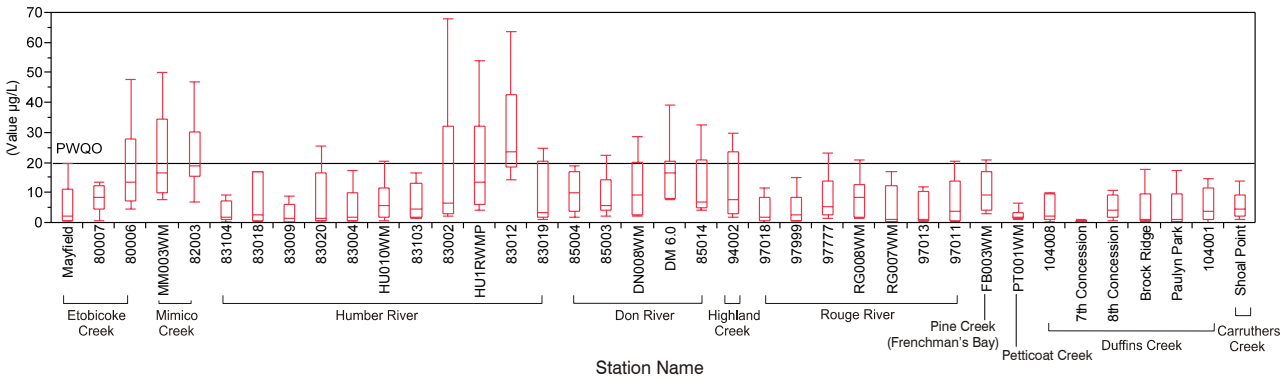

Figure 9. Zinc concentrations (*µ*g/L) at 38 sites within TRCA jurisdiction (PWQO: 20 *µ*g/L)

Aluminum

Currently, there is no PWQO, CWQG or EC guideline which defines the amount of allowable total aluminum for the protection of aquatic life. Higher levels did appear in sites located in urban areas within all the watersheds however, the Humber and Don River had the highest number of sites with elevated levels (Figure 10).

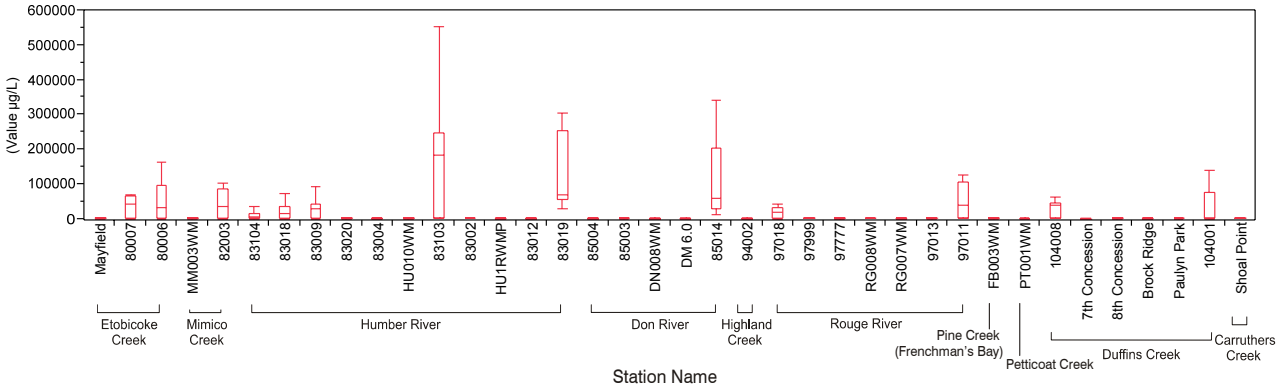

Figure 10. Total aluminum concentrations (µg/L) at 38 sites within TRCA jurisdiction

Mercury

Mercury (Figure 11) median and range values were well below the PWQO for all 8 sites sampled. Outlet stations were the only sites sampled for mercury in 2009. Samples taken at stations 85014 and 83019 were analyzed for mercury 9 times by the MOE laboratory. The remaining stations had mercury analyzed once in March 2009 by the City of Toronto laboratory. Mercury analysis was previously scheduled every three months; however, it ceased following the transition to the York-Durham laboratory due cost and low overall mercury values observed in recent years.

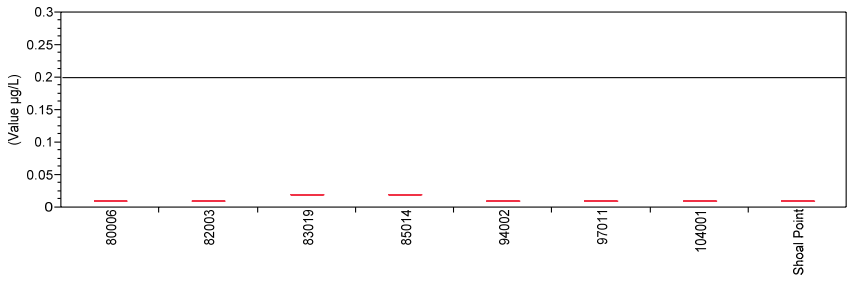

Figure 11. Mercury concentrations (µg/L) at 8 sites within TRCA jurisdiction (PWQO: 0.2 µg/L)

Nickel

Nickel (Figure 12) results were all below the PWQO OF 25 µg/L. The stations which had samples analyzed by the City of Toronto laboratory displayed higher ranges than the two stations analyzed strictly by the MOE lab (83019 and 85014). These higher ranges may be a result of the City of Toronto laboratory's tendency to report higher than expected nickel levels when compared to other laboratories (TRCA 2008b).

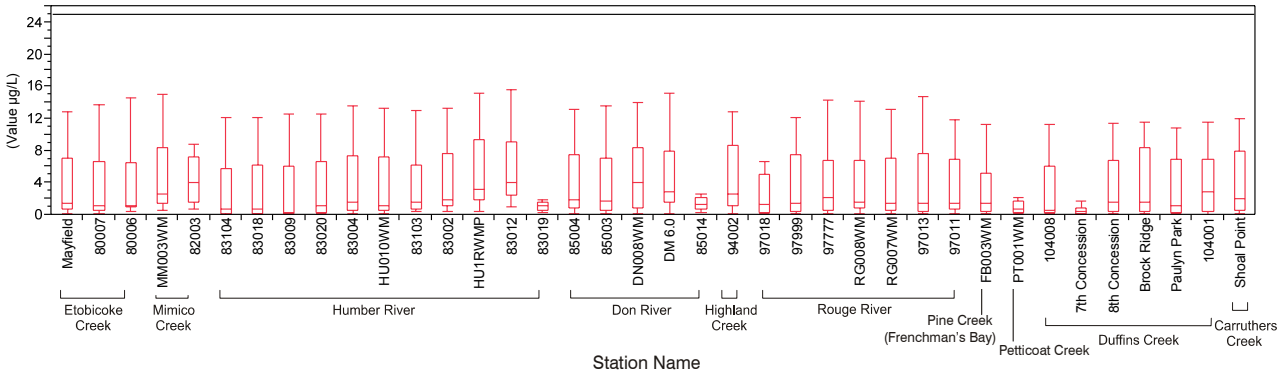

Figure 12. Nickel concentrations (µg/L) at 38 sites within TRCA jurisdiction (PWQO: 25 µg/L)

3.3 Bacteria

Escherichia coli (*E. coli)* median levels met or exceeded the PWQO of 100 colony forming units (CFU)/100 mL at 21 of 38 stations in 2009 (Figure 13). The median values for 10 stations were above 500 CFU/100 mL and 6 of those were above 1000 CFU/100 mL. Areas of concern include Etobicoke Creek, lower Mimico Creek, lower Humber River, the Don River, Highland Creek, and a mid-section of the Rouge River. The 3 stations with the most extreme median values are located in Pine Creek, the lower portion of the Humber River and the Don River. FB003WM in Pine Creek displayed the highest median value and range of *E. coli* with a median value in excess of 4000 CFU/100mL.

In contrast, Duffins Creek displayed relatively low levels of *E. coli* overall. Only one station (8th Concession) had a median value over the PWQO with a value of 150 CFU/100 mL. Also, four of five upper Humber River stations north of Highway 7 exhibited lower median values and ranges of *E. coli* when compared to the PWQO and other stations within the Humber River watershed.

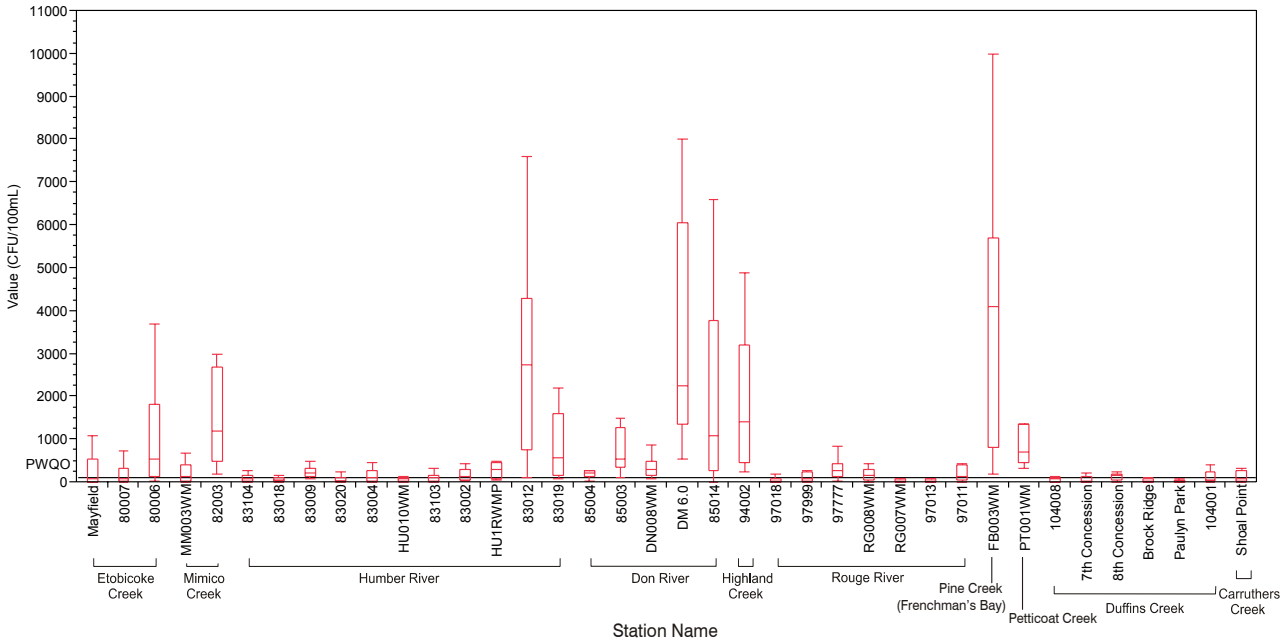

Figure 13. ***Escherichia coli*** **concentrations (CFU/100mL) at 38 sites within TRCA jurisdiction (PWQO: 100 CFU/100 mL)**

3.4 Nutrients

Nutrient levels are presented in Figures 14-18. Portions of the Humber and Don River display elevated nutrient levels. Ammonia values, both range and median, for station 83012 in the Humber exceeded 400 mg/L. Stations DM 6.0 and 85014 had median values above 100 mg/L. This can be attributed to combined sewer systems and 85014 being located 1.5 km downstream of the North Toronto Wastewater Treatment Plant which discharges effluent into the lower Don River.

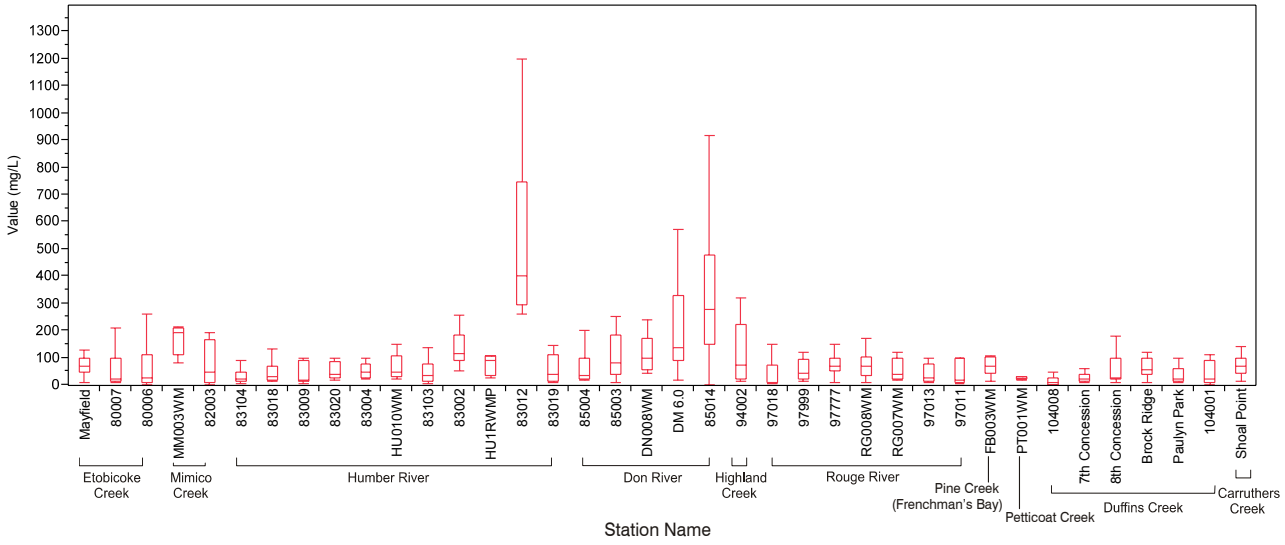

Figure 14. Total ammonia concentrations (mg/L) at 38 sites within TRCA jurisdiction

Phosphorus levels exceeded the PWQO of 0.03 mg/L at 17 stations in 2009. The majority of stations are located in Etobicoke Creek, Mimico Creek, Don River and Carruthers Creek. Five of eleven stations located in the Humber River also exceeded the PWQO. Stations 85014 and 83002 displayed the highest elevated levels of phosphorus.

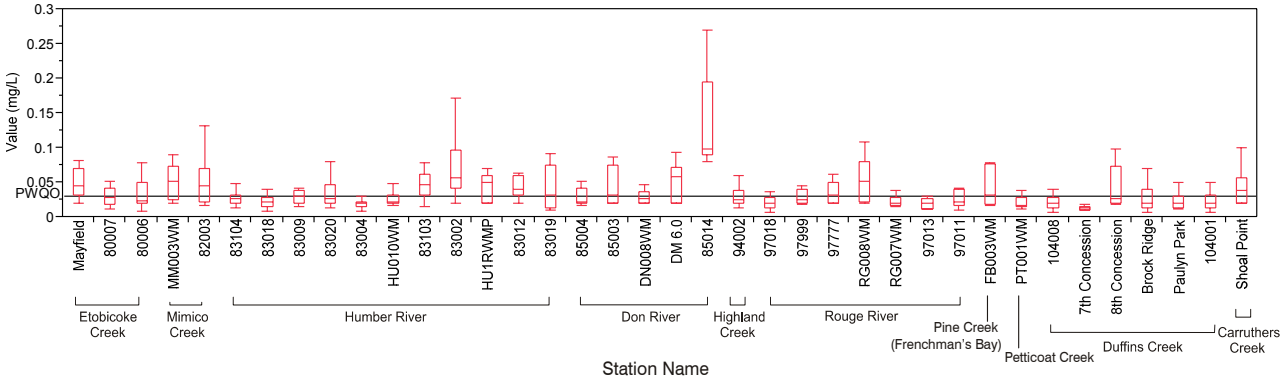

Figure 15. Total phosphorus concentrations (mg/L) at 38 sites within TRCA jurisdiction (PWQO: 0.03 mg/L)

In contrast, none of the median values for the 38 sites exceeded the CWQG for nitrite, nitrate and TKN. Despite median values remaining below the CWQG, nitrite ranges appeared elevated at stations 83012, DM 6.0, 85014, 82003 and FB003WM and nitrate ranges surpassed the Environment Canada guideline for stations 83103, 83002, 97018, 97999 and 97013. Two of these stations (83103 and 83002) are located in the Humber River and the remaining stations (97018, 97999 and 97013) are located in the Rouge River watershed.

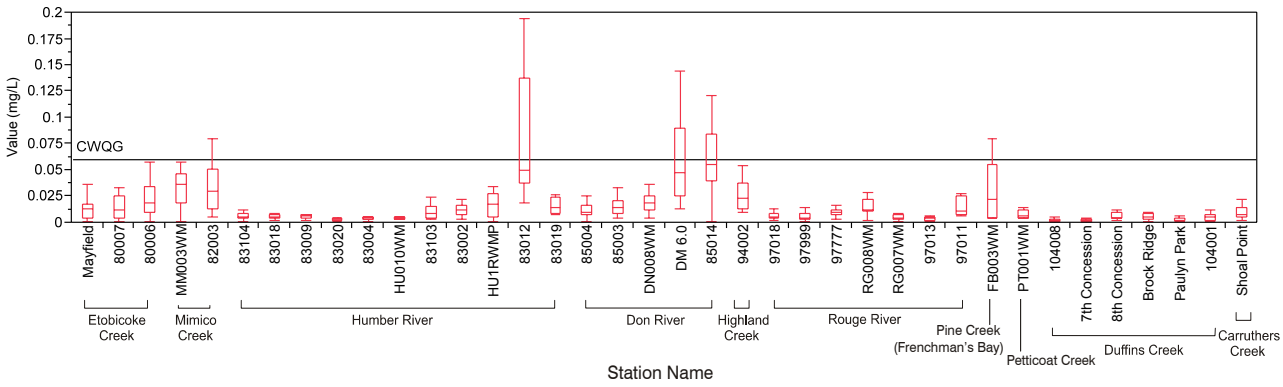

Figure 16. Nitrite concentrations (mg/L) at 38 sites within TRCA jurisdiction (CWQG: 0.06 mg/L)

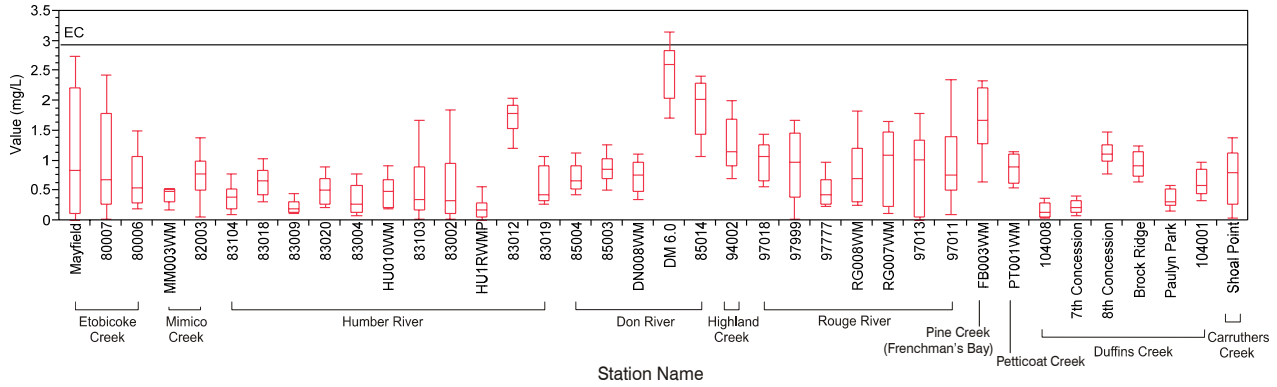

Figure 17. Nitrate concentrations (mg/L) at 38 sites within TRCA jurisdiction (EC: 2.93 mg/L)

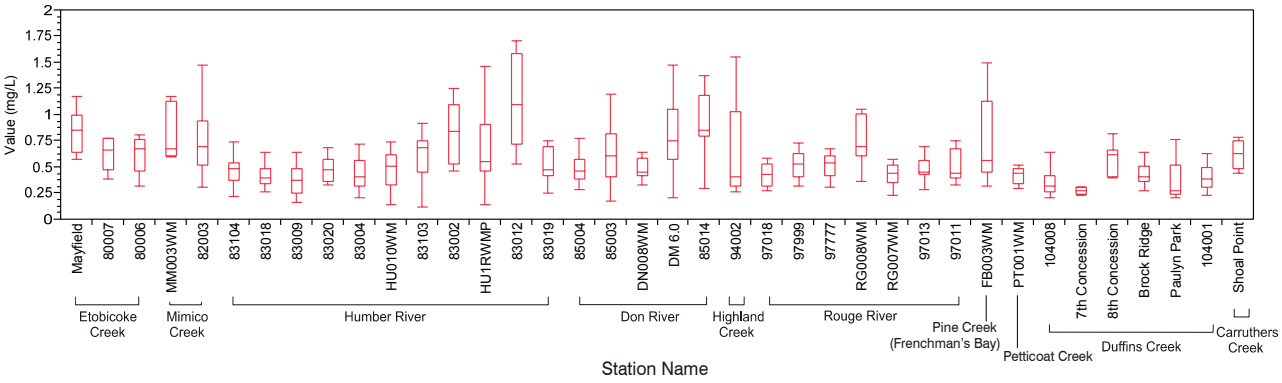

Figure 18. Total kjeldahl nitrogen (TKN) concentrations (mg/L) at 38 sites within TRCA jurisdiction

3.5 General Chemistry Parameters

Chloride and Specific Conductivity

Chloride (Figure 19) and specific conductivity (Figure 20) displayed similar patterns of increased ranges at 20 stations that surpassed the proposed CCME long-term chloride guideline of 128 mg/L. Included in these 20 stations were MM003WM, 82003 and HU1RWMP which exceeded the proposed CCME short-term chloride guideline of 508 mg/L. They are located in Mimico Creek and the Humber River.

The high levels, both range and median, of chloride at all 20 stations was likely a result of the surrounding land-use. All stations are located in developed urban areas with varying land uses (i.e. industrial, commercial, residential etc). Road salting is directly linked to urbanization and increased chloride and specific conductivity levels. In contrast, Brock Ridge, Paulyn Park and 104001 located on Duffins Creek close to the watershed outlet in a developed area did not display elevated chloride or specific conductivity levels. Similarly, stations located in natural/rural areas do not display elevated levels of Chloride or specific conductivity.

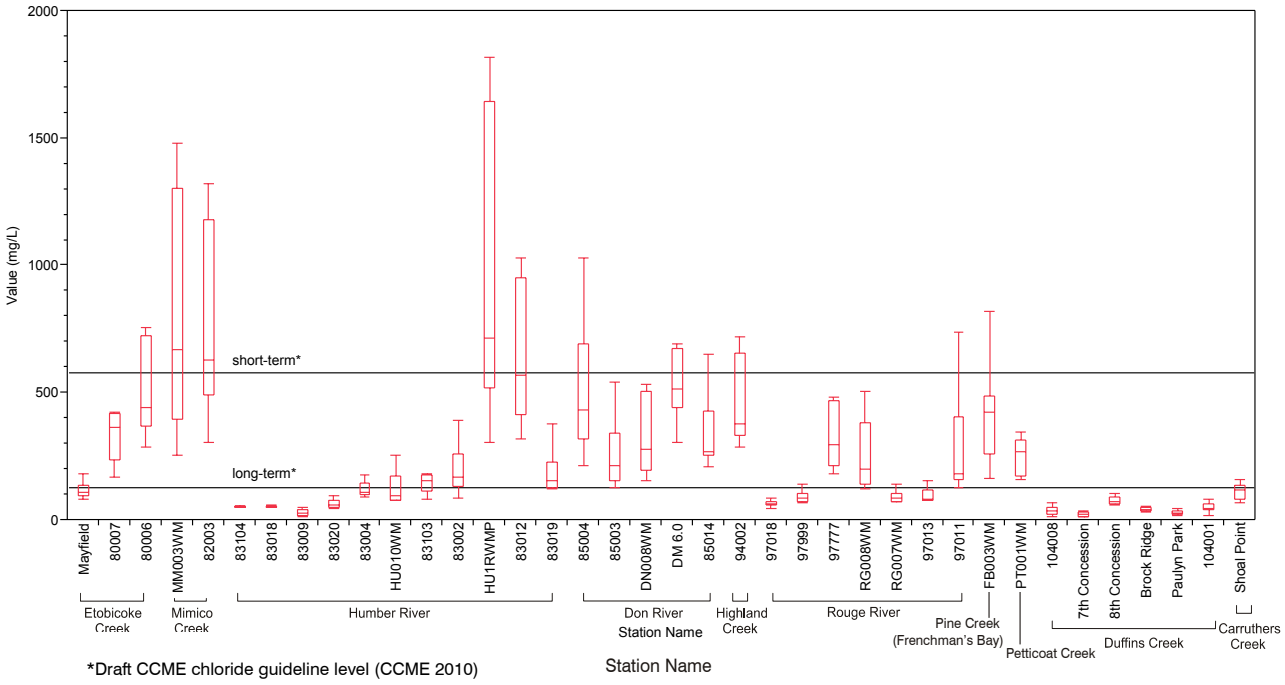

Figure 19. Chloride concentrations (mg/L) at 38 sites within TRCA jurisdiction (Draft CCME chloride guideline level: 128 mg/L and 577 mg/L; CCME 2010)

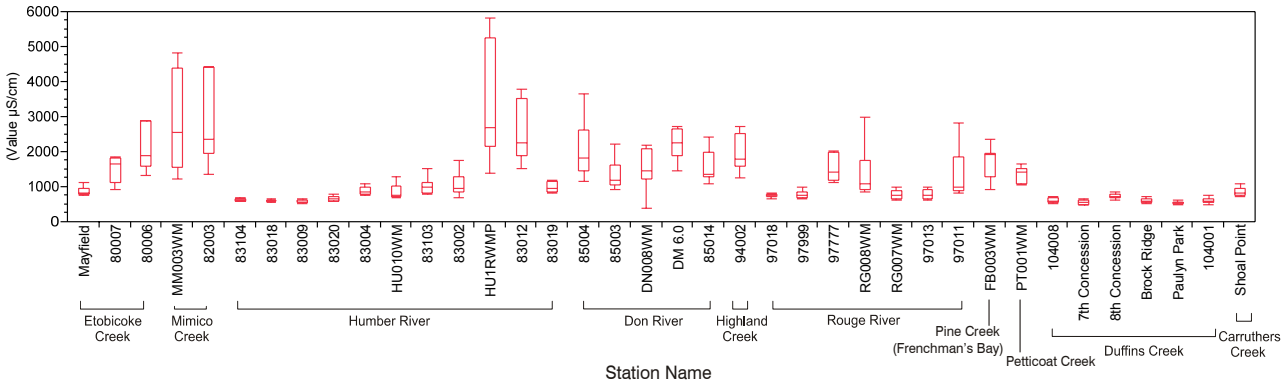

Figure 20. Specific conductivity (*µ*S/cm) at 38 sites within TRCA jurisdiction

Total Suspended Solids

Median values for total suspended solids remained below the CWQG of 30 mg/L for all stations (Figure 21). The range of values however exceeded the objective at 9 of the 38 sites. Furthermore, the Humber River exhibited a gradual increase in median and range values as station proximity to the lake and urbanization increased.

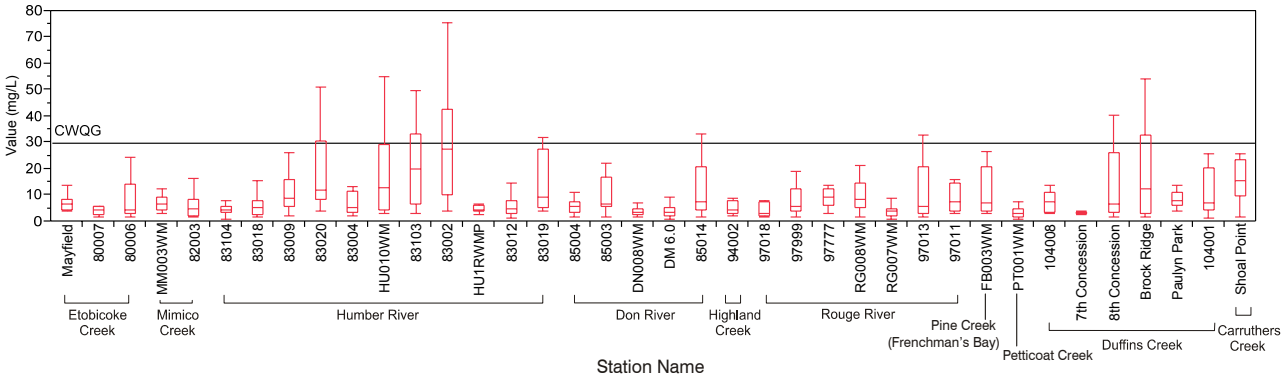

Figure 21. Total suspended solids (TSS) concentrations (mg/L) at 38 sites within TRCA jurisdiction (CWQG: 30 mg/L)

pH

Median pH values were within PWQO of 6.5 to 8.5 for all stations (Figure 22). The majority of median values were within 8 to 8.5 and only 2 stations had upper values that exceeded the PWQO.

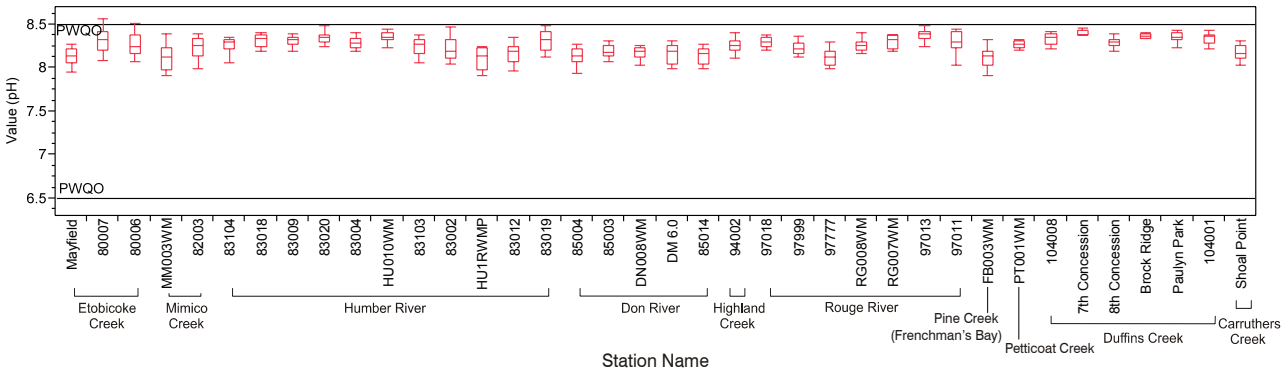

Figure 22. pH values at 38 sites within TRCA jurisdiction (PWQO: 6.5-8.5 pH)

4. Summary

The results represented in this report represent ambient water quality conditions found in 2009. Non-point source pollution (e.g. stormwater runoff) continues to influence water quality within the Greater Toronto Area. As water flows through each watershed towards Lake Ontario, water quality becomes degraded as it passes through agricultural and urban areas. Stations located in developed areas of Etobicoke Creek, Mimico Creek, the Humber River and the Don River all revealed elevated levels of several contaminants. Point sources of pollution also contribute to the degradation of Toronto's water quality. In particular, the lower Don River and Humber River displayed the greatest levels of degradation within the TRCA jurisdiction.

The data collect through the monthly grab samples represent an ambient condition of water quality since samples are collected irrespective of precipitation and flows. It is expected that levels of many parameters presented in this report would be higher when mobilized by storm events.

5. References

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Appendix A – Water quality stream conditions from field notes

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Wet (# samples)	Dry (# samples)
83009	Frozen	Clear	Clear	Turbid	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	1	11
83018	Frozen	Frozen	Clear	Turbid, High	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	1	11
83104	Frozen	Frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	0	12
Mayfield	Frozen	Clear	Clear	Turbid, High	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Slightly high	2	10
80007	Frozen	Partially frozen	Clear	Slightly Turbid, High	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	1	11
83103	Frozen	Frozen	Clear	Turbid, High	Clear	Slightly turbid	Low, Algae bloom	Clear	Clear	Clear	Clear	Clear	2	10
83002	Frozen	Partially frozen	Clear	Turbid, High	Clear	Turbid	Low	Clear	Clear	Turbid	Clear	Clear	3	9
MM003WM	Frozen	Clear	Clear	Slightly turbid	Clear	Clear	Extremely low	Clear	Clear	Clear	Clear	Slightly turbid	2	10
HU010WM	Frozen	Clear	Turbid	Turbid, High	Clear	Turbid	Clear	Slightly turbid	Clear	Clear	Clear	Slightly high, Turbid	5	7
83020	Partially frozen	Clear	Turbid	Turbid, High	Clear	Turbid	Slightly brown	Clear	Clear	Slightly turbid	Clear	Clear	5	7
83004	Frozen	Clear	Turbid	Turbid, High	Clear	Turbid	Clear	Clear	Clear	Clear	Clear	Clear	3	9
HU1RWMP	Partially frozen	Clear	Clear	Clear	Clear	Clear	Low	Clear	Clear	Clear	Clear	Clear	0	12

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Wet (# samples)	Dry (# samples)
85004	Partially frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	0	12
85003	Frozen	Odd smell	Clear	Slightly turbid	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	1	11
DN008WM	Frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	0	12
97777	Partially frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	0	12
RG008WM	Frozen	Clear	Clear	Slightly turbid	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Slightly turbid	2	10
RG007WM	Partially frozen	Partially frozen	Slightly turbid	High, Clear, Yellow colour	Clear	Clear	Extremely low	Clear	Clear	Clear	Clear	Slightly Turbid, Frozen	2	10
97018	Partially frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	0	12
97999	Frozen	Frozen	Slightly turbid	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Partly frozen	1	11
8th Concession	Partially frozen	Partially frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Partly frozen	0	12
104008	Partially frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	0	12
7th Concession	Frozen	Partially frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	0	12
Paulyn Park	Frozen	Clear	Turbid	Slight green colour	Clear	Clear	Clear	Slightly turbid	Clear	Clear	Clear	Clear	2	10
Brock Ridge	Frozen	Partially frozen	Turbid	Turbid	Clear	Clear	Extremely low	Clear	Clear	Clear	Clear	Clear	2	10

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Wet (# samples)	Dry (# samples)
104001/ Annadale	Frozen	Clear	Turbid	Turbid	Clear	Clear	Extremely low	Clear	Clear	Clear	Clear	Turbid	2	10
Shoal Point	Frozen	Clear	Slightly turbid	Slightly turbid	Clear	Clear	Clear	High, Turbid	High	Clear	Clear	High, Turbid	4	8
80006	Frozen	Clear	Clear	Slightly turbid	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Slightly high, Turbid	2	10
82003	Frozen	Clear	Clear	High	Clear	Clear	Clear	Clear	Clear, Brown	Clear	Clear	High, Turbid	1	11
83012	Frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	High, Turbid	1	11
DM 6.0	Partially frozen	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Water stained black	Clear	Slightly turbid	1	11
97011	Frozen	Turbid	Slightly turbid	Green colour	Very turbid	Clear	Clear	Clear	Clear	Clear	Clear	Clear	3	9
97013	Frozen	Turbid	Slightly turbid	Clear	Turbid	Clear	Clear	Clear	Clear	Clear	Clear	Clear	3	9
94002	Open	Clear	Slightly turbid	Clear	High, Turbid	Clear	Clear	Clear	Clear	Slightly turbid	Clear	Clear	3	9
FB003WM**	N/A	N/A	N/A	Clear	Slightly turbid	Clear	Clear	Clear	Clear	Water stained black	Clear	High, Slightly turbid	2	7
PT001WM**	N/A	N/A	N/A	N/A	N/A	N/A	Clear	Clear	Clear	Water stained black	Clear	High, Clear	0	6

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Wet (# samples)	Dry (# samples)
85014*	N/A	N/A	N/A	N/A	N/A	Clear	Clear	Clear	Clear	Water stained black	Clear	Turbid	1	6
83019*	N/A	N/A	N/A	N/A	N/A	Clear	Clear	Clear	Clear	Clear	Clear	Partly frozen, High, Turbid	1	6
Note: *Stream conditions not available for Jan-May (samples collected by MOE staff). **Sample locations established later in the year.													59	378
437 samples taken in 2009.														