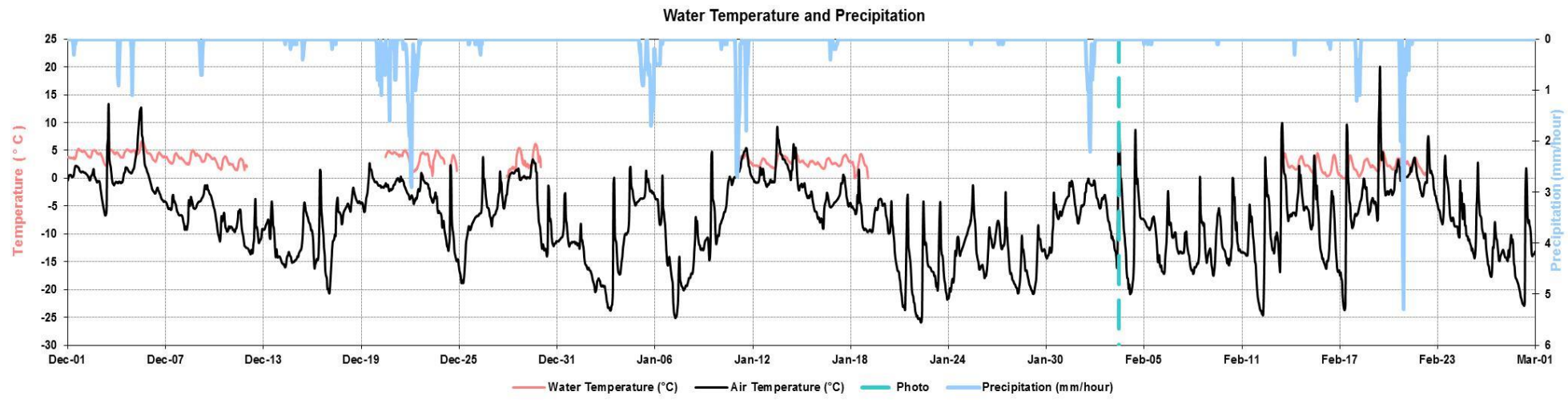
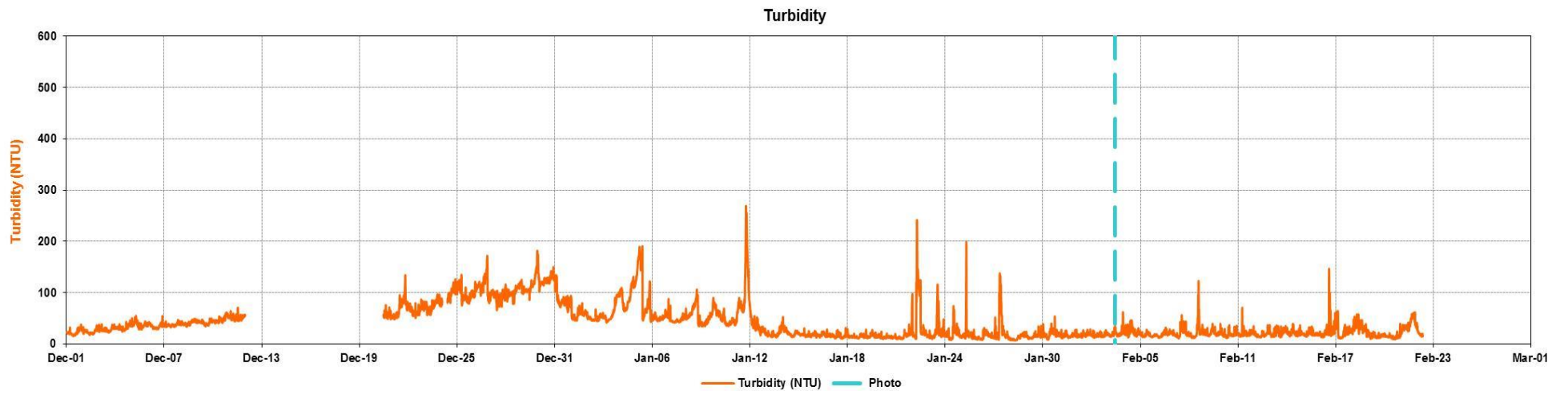
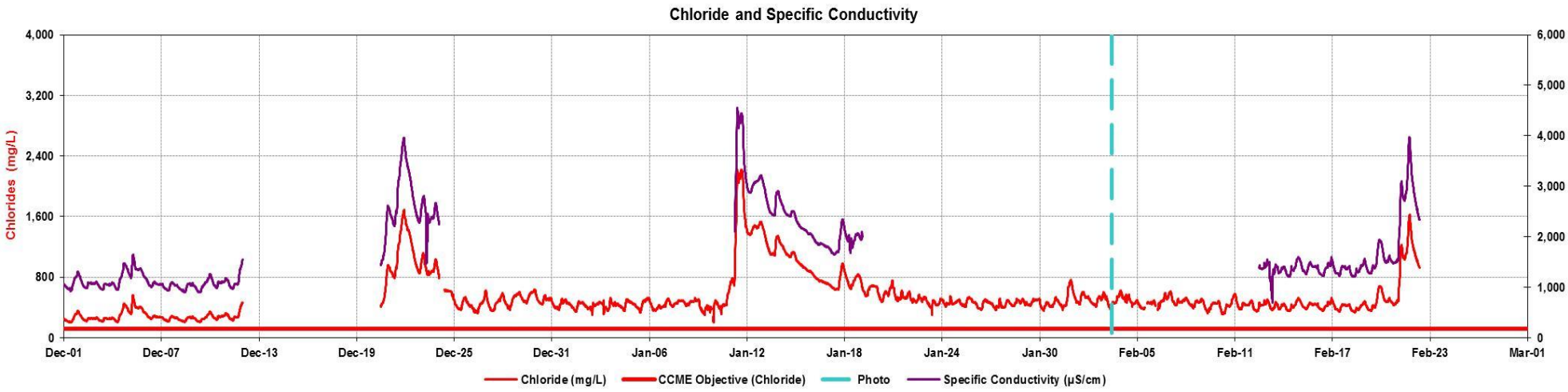
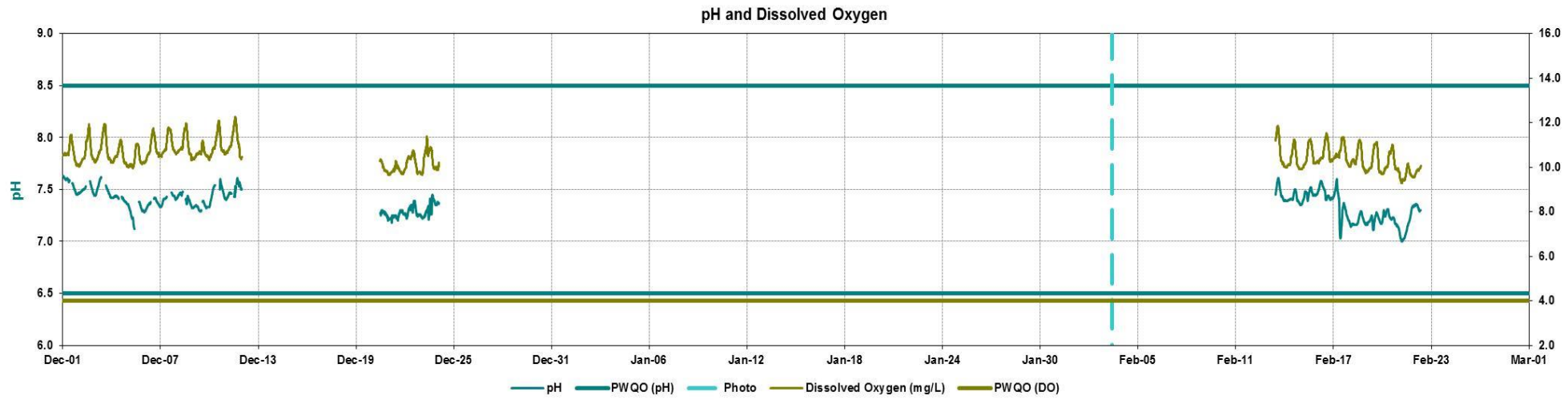
Real-Time Water Quality: Winter 2014

Credit River in Orangeville









↑ ↓ Coloured arrows indicate whether the given parameter should be above or below the indicated Water Quality Objective. Objective may be off-scale for some graphs.

Seasonal Exceedance of Water Quality Objectives

	Water Temperature			Dissolved Oxygen		pH		Chloride
	Cold	**Mixed**	**Warm**	**Cold**	**Warm**	**Lower limit**	**Upper limit**	**Upper limit**
Objective/Guideline	26 ºC	28 ºC	30 ºC	5 mg/L	4 mg/L	6.5	8.5	120 mg/L
Number of Days	0	0	0	0	0	0	0	76
Percent of Readings	0.00	0.00	0.00	0.0	0.00	0.00	0.00	100.00

Water Temperature — Aquatic organisms, especially fish, are sensitive to extreme highs in river water temperature. If the water temperature exceeds CVC's maximum objective, fish will suffer. CVC has set an absolute maximum water temperature objective of no greater than 26 °C for cold water streams such as the Credit River in Orangeville.

Water Level — The water level at each site is essential to translate parameter concentrations to loadings. Water level also allows us to determine when a rain event has occurred and how fast the water level increased, and returned to normal during and after a storm, respectively.

Dissolved Oxygen — Aquatic habitats need sufficient oxygen in water to survive and thrive. DO fluctuates over a diurnal cycle; high during the day and lower during the night, and with temperature (colder water holds more oxygen). Provincial Water Quality Objective for cold water fish is greater than 5 mg/L, and for warm water fish is greater than 4mg/L. The Credit River in Orangeville represents a cold water fish habitat.

Turbidity — Turbidity is a measurement of water clarity. A high turbidity indicates the presence of solids, sediments, or pollutants. Turbidity is used to estimate total suspended solid concentration.

Specific Conductivity — Conductivity measures the ability of water to pass an electrical current. Higher conductivity indicates a higher concentration of salts and other ions in the water.

Chloride — Chlorides are often elevated in highly urbanized areas as a result of road salt application and the drainage of swimming pools, or water softeners. The CCME guideline for chlorides is 120mg/L.

pH — pH level is a measurement of the acidity or alkalinity of water. The pH scale ranges from 0 to 14. Extreme levels of both alkalinity and acidity can be detrimental to aquatic life. The MOE has set a Provincial Water Quality Objective of in between 6.5 and 8.5 units.

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Water Temperature, Air Temperature, and Daily Precipitation

- Air temperature ranged from -25.88°C to 20°C. The lowest air temperature was observed on January 22nd*.
- Water temperature peaked at 6.68°C. Minimum water temperature cannot be determined due to periods of unreliable data likely caused by the sensor being out of the water. The percentage of days with water temperature below freezing can also not be determined for the same reason.
- Water does not freeze at this location because of frequent discharge of warmer water from the upstream waste water treatment plant.
- Air temperature dropped below freezing on 98% of the days measured this winter*.
- At this location*, 33.1mm of rain, snow, and freezing rain (snow water equivalent) fell on December 20th, 21st, and 22nd as part of the "ice storm" in southern Ontario.
- A total of 114.1mm of precipitation (snow water equivalent) was recorded* this season.

*Measured at the Island Lake climate station, roughly 2.5km from the water quality station, and within its drainage area.

Water Level and Turbidity

- No reliable water level data are available this winter due to the sensor being periodically out of the water.
- Ambient turbidity was around 15 to 20NTU.
- Elevated turbidity in December is likely a result of debris build-up around the sensor.

Chloride and Specific Conductivity

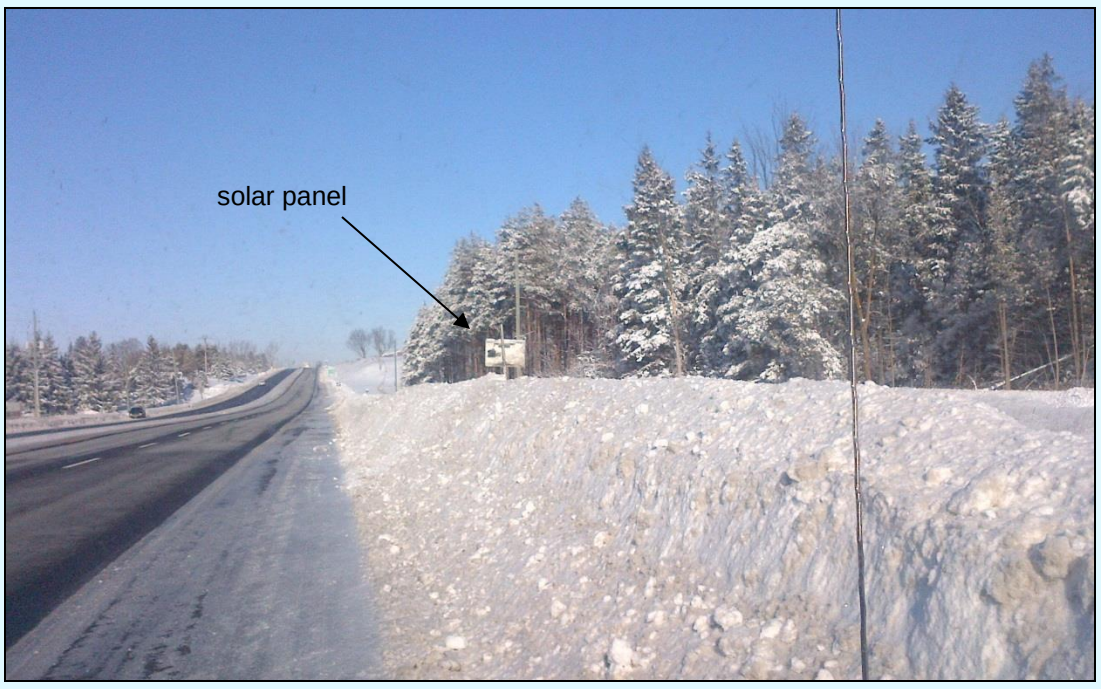
- Chloride ranged from 198mg/L to 2,222mg/L.
- Peak chloride was measured on January 11th following above freezing temperatures and a rain event.
- Specific conductivity data were removed for two periods when the sensor was likely out of the water.
- Increases in chloride and specific conductivity occur when road salt washes into the river after being applied, and when temperatures increase allowing salt-rich snow to melt and flow into the river.

pH and Dissolved Oxygen

- Dissolved oxygen ranged from 9.29mg/L to 12.26mg/L this winter, staying above the 5mg/L Provincial Water Quality Objective (PWQO) 100% of the time.
- pH also remained within the PWQO of 6.5 to 8.5 for the entire season, with values ranging from 7.00 to 7.63.
- Some pH and DO data were removed when the sensors appear to be out of the water.

Quality Control Issues

- All of the water level data have been removed from the winter months. Lower water level throughout the winter has meant that sensors were often out of the water. This has affected water temperature, water level, specific conductivity, chloride, pH and dissolved oxygen.
- The high snow accumulation this winter has resulted in large piles of snow plowed onto the shoulder of highway 10. This resulted in the solar panel being pushed out of position on February 22nd, and some wires coming loose. The station was mostly inaccessible, due to snow build up, until the beginning of March at which time the solar panel was re-connected.



Figures 1 and 2: Snow build up at the Orangeville station on February 3rd, 2014. Equipment enclosure is entirely covered in snow.

Deployment Information

- Deployment period: November 11th, 2013 to April 8th, 2014 (148 days)
- Monitoring equipment used
  - Water quality parameters: Hydrolab DS5X
  - Precipitation: Island Lake climate station
  - Air temperature: Island Lake climate station

Questions or Comments?

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