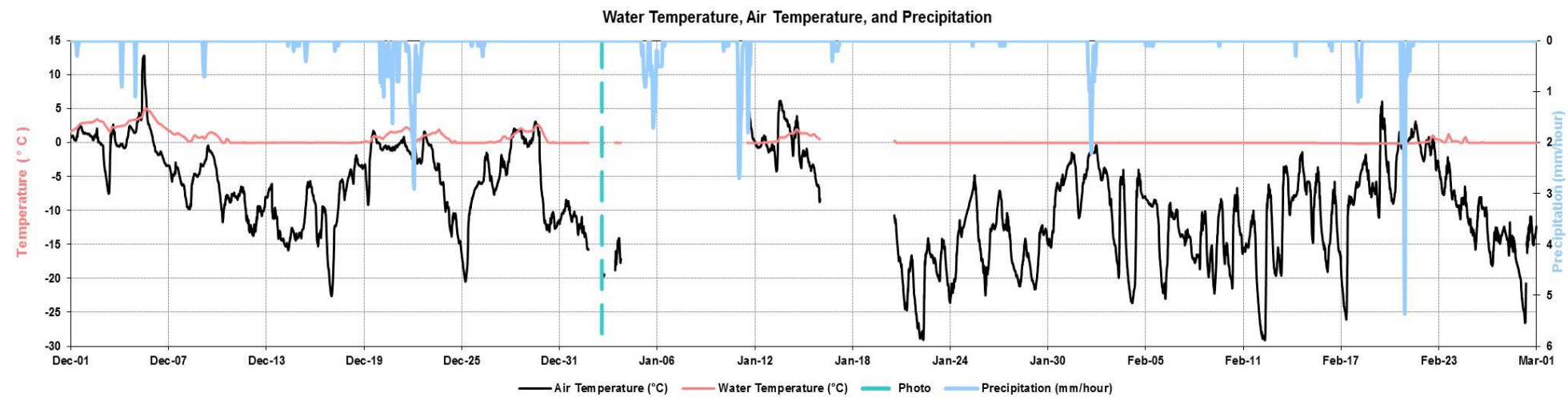
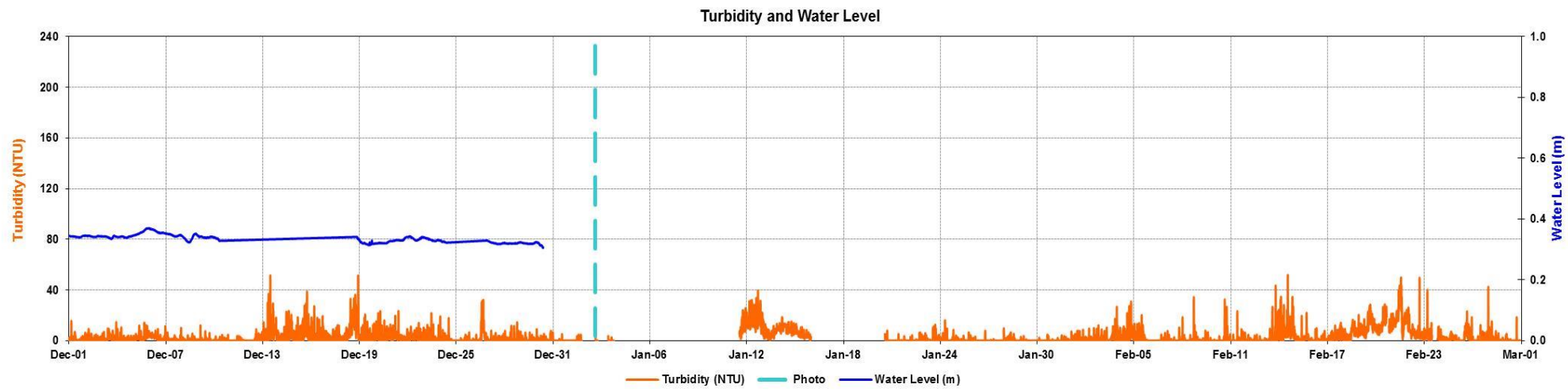
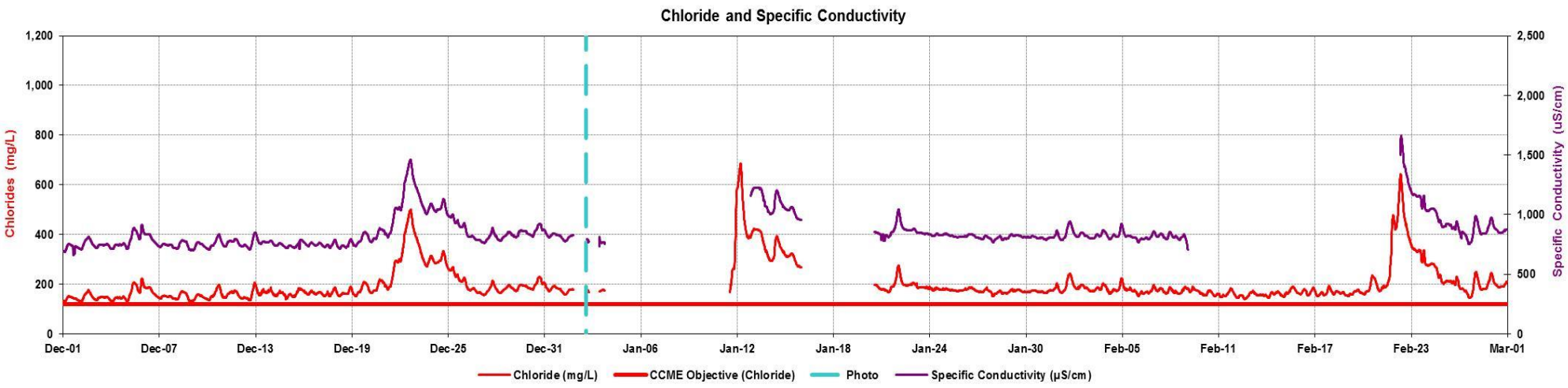
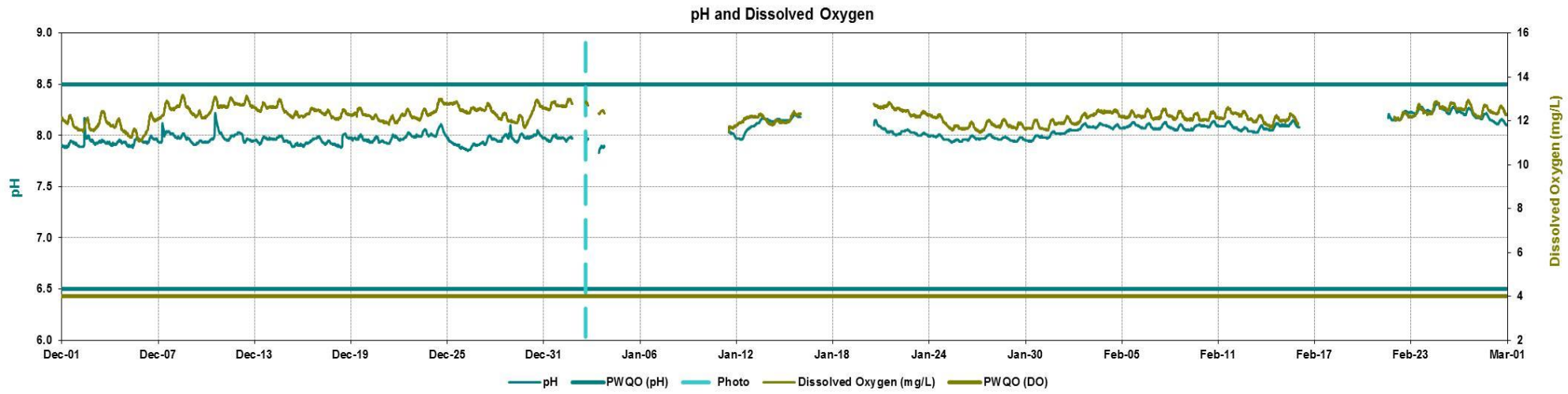
Real-Time Water Quality: Winter 2014

Credit River at Cataract Falls









↑ ↓ 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	79
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 streams such as the upper Credit River.

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 upper Credit River 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 -29.12°C to 12.82°C. The coldest temperature of all 11 stations was recorded here on January 22nd.
- Water temperature ranged from -0.15°C to 5.04°C and reached it's lowest point on January 10th.
- Air temperature dropped below freezing on 96% of the days measured this winter.
- Water temperature dropped to or below freezing on 75% 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.
- Temperature data are missing from January 1st to 11th and 16th to 20th due to loss of power.

*Measured at the Island Lake climate station, roughly 12km north of the water quality station, and within its drainage area.

Water Level and Turbidity

- Ambient water level in the early part of the season was around 0.3m. Much of the water level data were removed from the end of December onwards when ice formation was skewing results.
- A linear interpolation was applied to water level data from December 10th to 18th; ice formation was skewing the results.
- Ambient turbidity was around 0 to 5NTU.
- Turbidity values experienced some variation but remained below 50 NTU.
- Data are missing from January 1st to 11th and 16th to 20th due to loss of power.

Chloride and Specific Conductivity

- Chloride ranged from 130mg/L to 684mg/L.
- Peak chloride was measured on January 12th, following above freezing temperatures and a rain event.
- Increases in chloride and specific conductivity occur when road salt is washed into the river after application, and when temperatures increase allowing salt-rich snow to melt and flow into the river.
- Specific conductivity values were removed for 13 days in mid-February when the sensor was out of the water.
- Data are missing from January 1st to 11th and 16th to 20th due to loss of power.

pH and Dissolved Oxygen

- Dissolved oxygen ranged from 11.06mg/L to 15.26mg/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 7.83 to 8.31.
- Five days of pH and DO data were removed in mid-February. The values at this time were likely skewed as a result of the sensors being out of the water.
- Data are missing from January 1st to 11th and 16th to 20th due to loss of power.

Quality Control Issues

- The significant amount of snow received this year has meant that solar panels were often covered. When the solar panel is not able to charge the battery for a few days, the equipment will have insufficient power and no data will be recorded. From January 1st to 11th and 16th to 20th, data are missing for this reason.
- Thicker than normal ice cover has been able to form on the river this year causing a reduction in the depth of water flowing beneath the ice. At times, the sensors may not have been entirely submerged in flowing water, resulting in unreliable data which have been removed.

Deployment Information

- Deployment period: October 2nd, 2013 to April 8th, 2014 (188 days)
- Monitoring equipment used:
  - Water quality parameters: Hydrolab DS5X
  - Air temperature: 5600-0025-1 thermistor
  - Water level: OTT Pressure Level Sensor
  - Precipitation: Island Lake climate station

Questions or Comments?

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Figure 1, above: Cataract Falls partially frozen on January 2nd, immediately downstream of the station.