

Real-Time Water Quality Deployment Report

Rattling Brook Network

March 6, 2015 to April 22, 2015



Government of Newfoundland & Labrador Department of Environment and Conservation Water Resources Management Division St. John's, NL, A1B 4J6 Canada



General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Rattling Brook Big Pond remained offline due to ice conditions. Due to unusually calm spring weather and thick ice, Big Pond remained ice covered up until the end of this deployment period. Monitoring at Big Pond will likely remain suspended until mid- to late-May when WRMD staff can schedule a maintenance and calibration visit.
- A recent update to the hydrometric equipment at Plant Discharge station has inadvertently resulted in irregularly recorded stage level data. Because of this, a trace is not apparent on the graphs discussed in this report. A statistical process has allowed for interpolation of the limited points available, however.
- Hydrometric data included in this report is provisional and used only for illustrative purposes. Corrected and finalized data may be retrieved from the Water Survey of Canada website (http://www.ec.gc.ca/rhc-wsc/)*.

Maintenance and Calibration of Instrument

- As part of the Quality Assurance and Quality Control protocol (QAQC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of the deployment period. The procedure is based on the approach used by the United States Geological Survey.
 - Upon deployment, a QA/QC Sonde is temporarily deployed *in situ*, adjacent to the Field Sonde. Depending on the degree of difference between each parameter from the Field and QAQC sondes a qualitative rank is assigned (See Table 1). The possible ranks, from most to least desirable, are: Excellent, Good, Fair, Marginal, and Poor. A grab sample is also taken for additional confirmation of conditions at deployment and to allow for future modelling studies.
 - At the end of a deployment period, a freshly cleaned and calibrated QAQC Sonde is placed *in situ*, adjacent to the Field Sonde. Values are compared between all parameters and differences are ranked for placement in Table 1.

Station	Date	Action	Comparison Ranking				
			Temperature	pН	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook below Bridge	March 6, 2015	Deployment	Excellent	Good	Excellent	Good	Excellent
	April 22, 2015	Removal	Excellent	Good	Excellent	Fair	Excellent
Rattling Brook below Plant Discharge	March 6, 2015	Deployment	Good	Fair	Excellent	Excellent	Excellent
	April 22, 2015	Removal	Excellent	Excellent	Excellent	Excellent	Excellent

Table 1: Qualitative QAQC Ranking

Data Interpretation

Temperature

Water Temperature is a major factor used to describe water quality. Temperature has major implications on both the ecology and chemistry of a water body, governing processes such as the metabolic rate of aquatic plants and animals and the degree of dissolved oxygen saturation.



Water temperatures at both stations increased from late-winter icy conditions and show early spring warming trends, up to a max temperature of 7.47°C at Plant Discharge station. Water temperature at each station was similar throughout the 46 day deployment period.

pН

pH is used to give an indication of the acidity or basicity of a solution. A pH of 7 denotes a neutral solution while lower values are acidic and higher values are basic. Technically, the pH of a solution indicates the availability of protons to react with molecules dissolved in water. Such reactions can affect how molecules function chemically and metabolically.



- pH fell at both stations approximately mid-deployment and remained at the lower level until removal on April 22nd.
- Values were in the upper reaches of the Site Specific Guidelines (SSGs:dashed lines) for Bridge station and was mostly above SSGs for the deployment period. This is fairly typical: Plant Discharge tends to be more alkaline than upstream conditions.

Specific Conductivity

Conductivity relates to the ease of passing an electric charge – or resistance – through a solution. Conductivity is highly influenced by the concentration of dissolved ions in solution: distilled water has zero conductivity (infinite resistance) while salty solutions have high conductivity (low resistance). Specific Conductivity is corrected to 25° C to allow comparison across variable temperatures.



 Conductivity showed an overall decline over the deployment period, despite significant variability induced by precipitation and snowmelt conditions. Especially notable variability was observed at Plant Discharge station – this may be due to interception of sedimentation pond water containing higher levels of dissolved solids than those found upstream near Bridge station.

Dissolved Oxygen

Dissolved oxygen is a metabolic requirement of aquatic plants and animals. The concentration of oxygen in water depends on many factors, especially temperature – the saturation of oxygen in water is inversely proportional to water temperature. Oxygen concentrations also tend to be higher in flowing water compared to still, lake environments. Low oxygen concentrations can give an indication of excessive decomposition of organic matter or the presence of oxidizing materials.



• As water temperature increased, dissolved oxygen concentration declined due to a reduction in saturation levels. The concentration of oxygen is expected to decline through the spring and summer until approximately August.

Turbidity

Turbidity is typically caused by fine suspended solids such as silt, clay, or organic material. Consistently high levels of turbidity tend to block sunlight penetration into a waterbody, discouraging plant growth. High turbidity can also damage the delicate respiratory organs of aquatic animals and cover spawning areas.



• Turbidity events were synchronous with major conductivity events as both are are highly influenced by weather patterns. A mid-deployment turbidity event was observed at both Bridge and Plant Discharge stations beginning March 25th, likely due to a snow-melt period. Another event was observed around April 11th at both stations but was confined mostly upstream at Bridge Station.

Appendix



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