

Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

July 4 to 31, 2013



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.

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.
- 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.

			Comparison Ranking				
Station	Date	Action	Temperature	pН	Conductivity	Dissolved Oxygen	Turbidity
Leary's Brook at Prince Philip Drive	July 4,2013	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	July 31,2013	Removal	Excellent	Excellent	Good	Excellent	Poor

Table 1: Qualitative QAQC Ranking

- All parameters except conductivity and turbidity ranked "Excellent" at the time of removal.
- The turbidity for field sonde is questionable at the time of removal likely due to biofouling of sensor at the end of deployment period.
- The maximum, minimum, median and mean for Temperature, pH, Specific Conductivity, Dissolved Oxygen and Turbidity is shown below in table 2.

Parameter	Max	Min	Median	Mean
Temperature('C)	23.70	11.70	16.30	16.63
pH	7.01	6.19	6.81	6.80
Specific Conductivity (µS/cm)	750.0	125.5	627.0	613.2
TDS (g/ml)	0.4800	0.0803	0.4010	0.3924
Dissolved Oxygen (%-Sat)	131.6	80.3	94.3	94.3
Dissolved Oxygen (mg/l)	10.52	7.16	9.21	9.17
Turbidity (NTU)	7.7	0.0	0.0	0.2

Table 2: Parameter Statistics during deployment period

• A grab sample was also taken for additional confirmation of conditions at deployment and to allow for future modelling studies. The results of the grab sample ranking in compared to field sonde data is shown in table 3.

Grab Sample Date	pН	Conductivity	Turbidity	
Field	6.76	560.6	0.7	
Grab	6.9	588	0.4	
Ranking	Excellent	Good	Excellent	

Table 3: Comparison Grab Sample Ranking with Field Sonde Data at Deployment

Data Interpretation



Water Temperature and Stage Level

- Overall, an expected increasing trend in water temperature was observed at Leary's Brook from the beginning to the end of July.
- Water temperature cycles diurnally and range from a low of 11.7°C to 23.7°C (median value: 16.3°C).

Water pH and Stage Level



- Generally speaking, NL waters are slightly acidic which is reflected in the pH values lying closer to the lower CCME Protection of Aquatic Life guideline value of 6.5
- After an initial adjustment of pH in the sonde reading, the pH reading was steadily above the lower CCME guideline. There was a drop in pH level on July 18th. This could be a combination of increased precipitation and increased stage level the previous day.
- pH ranged from 6.19 to 7.01 (Median: 6.81).



- There were mid ranged spikes in specific conductance. The increases in conductivity were related to decreased stage level while the decreases in conductivity were related to increased precipitation at the same time period.
- The increase in specific conductivity could be attributed to an increase in the concentration of dissolved solids in the water, resulting from a decrease in stage that occurred over that time period.
- The spikes ranged from 125.5 750 μ s/cm throughout the deployment period (the median is 627 μ s/cm).



- DO values dropped rapidly below the CCME Guideline for the Protection of Early Life Stage (9.5 mg/L) during the period of July 23-27. There were other time periods where these values dropped below the guideline throughout the deployment period. The solubility of oxygen is greater in colder water than in warmer water, thus as water temperatures increase DO levels decrease, and vice versa. This can be noted by an increased temperature during the same period.
- Concentrations ranged from 7.16 mg/l to 9.21 mg/l (median value: 9.17 mg/l) for DO while 80.3% to 131.6% (median value 94.3%) for percent saturation.

Water Turbidity and Stage Level



- The turbidity spikes are related to a combination of increased stage level and accumulation of debris along with aquatic growth surrounding the sensor areas.
- An increase in turbidity due to calibration / bio-fouling drift was observed from July 9th onward resulting in questionable turbidity values. As a result all values after July 9th is removed from the dataset.
- Turbidity ranged between 0.0 NTU and 7.7 NTU (median value: 0.0 NTU) during this deployment period.

Conclusions

- The pH values showed some variation throughout the deployment period and at times were below the lower guideline of 6.5.
- The specific conductance was consistent in the mid-range throughout the deployment period.
- The DO values dropped below the CCME Guideline for the Protection of Early Life Stage during the period of July 23-27 due to rise in temperature. There were other periods where this drop was observed throughout the deployment period due to change in water temperature along with consumption of oxygen by aquatic organisms and plants during darkness.
- The turbidity values were questionable after July 9th due to increased calibration / biofouling drift around with aquatic growth surrounding the turbidity sensor. As a result all turbidity values were removed from the dataset after July 9th.

Appendix

The graph below shows the daily temperature and total precipitation taken from Environment Canada for St. John's (Airport Station).



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