Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

October 30 to November 21, 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.

Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Leary's Brook at Prince Philip Drive	October 30, 2013	Deployment	Poor	Excellent	Excellent	Fair	Excellent
	November 21, 2013	Removal	Poor	Excellent	Fair	Excellent	Excellent

- The temperature ranked "Poor" due to faulty QA sensor reading during deployment and removal.
- The DO ranked "Fair" at deployment due to initial adjustment of sensor reading.
- The maximum, minimum, median and mean for Temperature, pH, Specific Conductivity, Dissolved Oxygen and Turbidity is shown below in table 2.

Table 2: Parameter Statistics during deployment period

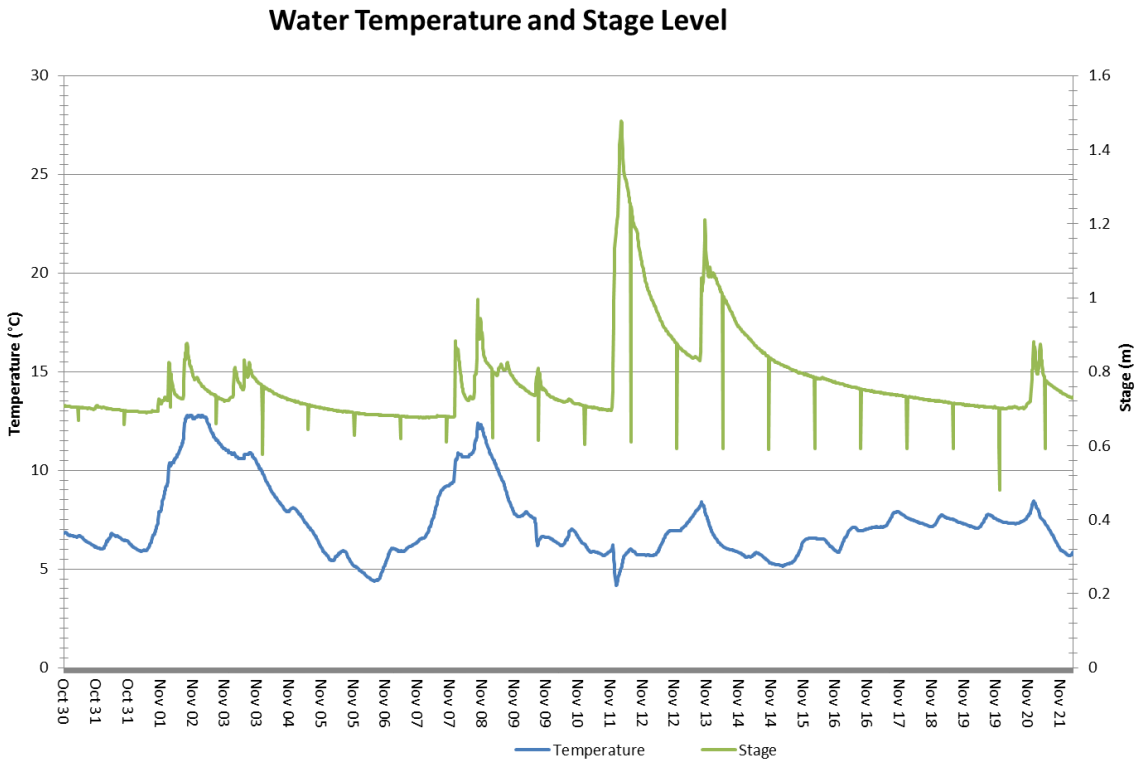
Parameter	Max	Min	Median	Mean
Temperature('C)	12.80	4.16	6.93	7.34
pH	7.02	6.02	6.69	6.62
Specific Conductivity (µS/cm)	3032.9	128.4	281.0	294.0
TDS (g/ml)	1.9400	0.0822	0.1800	0.1882
Dissolved Oxygen (%-Sat)	97.5	91.8	95.0	94.9
Dissolved Oxygen (mg/l)	12.50	9.96	11.60	11.43
Turbidity (NTU)	791.0	0.0	0.0	4.7

- 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.

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

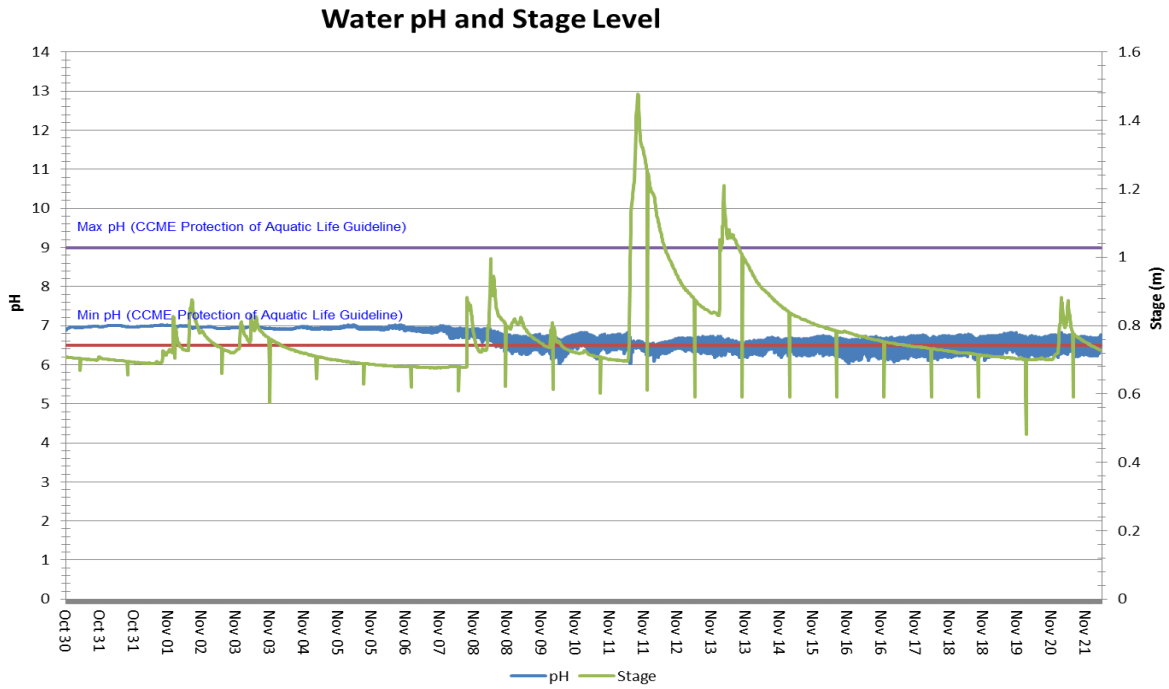
Grab Sample Date	pH	Conductivity	Turbidity
Field	6.84	321.8	0.7
Grab	7.46	343	0.8
Ranking	Fair	Good	Excellent

Data Interpretation



- Overall, the drop in temperature was not noticeable at Leary's Brook from the end of October to the later part of mid-November.

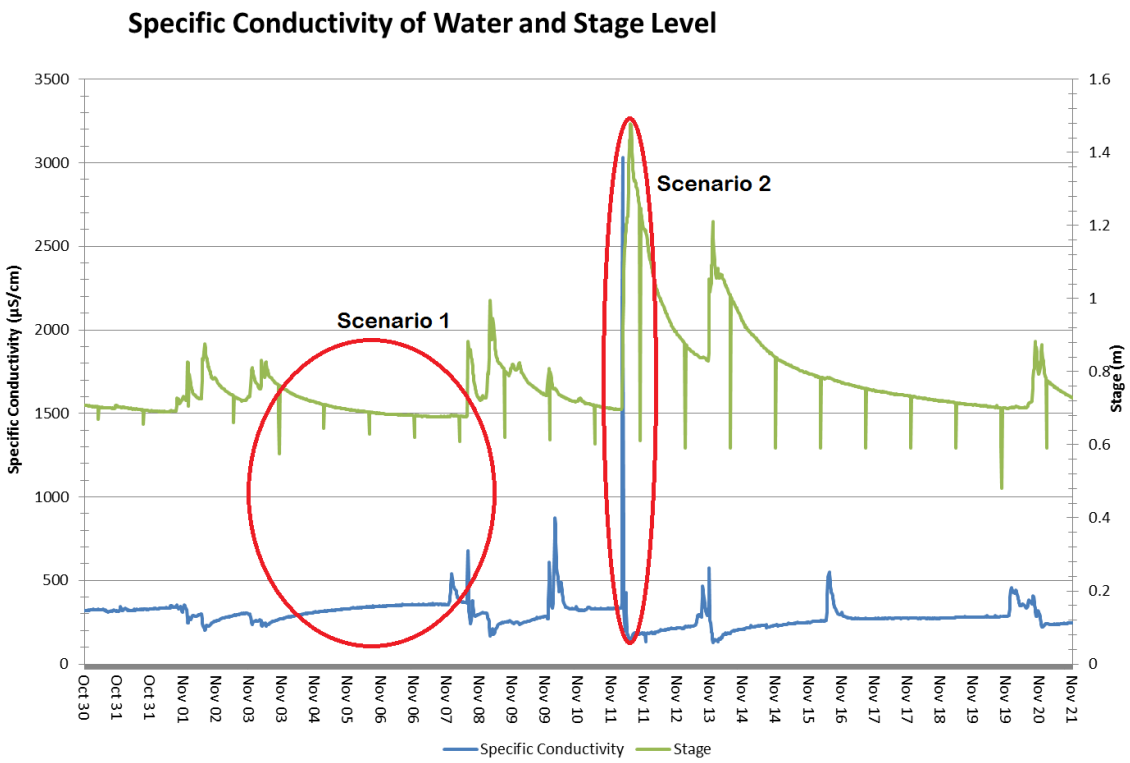
- Water temperature cycles diurnally and ranges from a low of 4.16^{o}C to a high of 12.8^{o}C (median value: 6.93^{o}C).



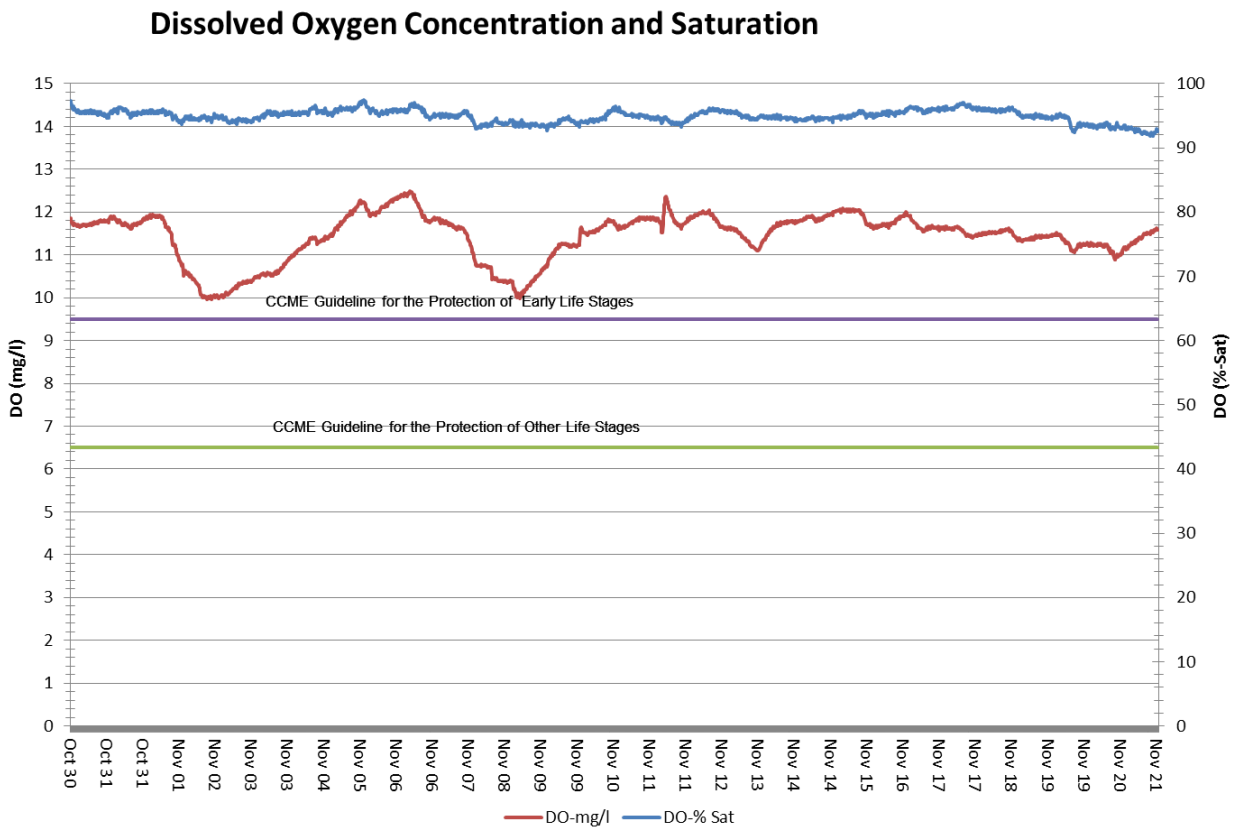
- Generally speaking, NL waters are slightly acidic which is reflected in the pH values lying closer to the lower CCME Protection of Aquatic Life guideline value of 6.5.

- The pH readings are just above the lower CCME guideline for the first third of the deployment period. There was a gradual decline in pH sensor reading as well as greater daily variation in sensor reading toward the end of the deployment period indicating a potential issue with the sensor.

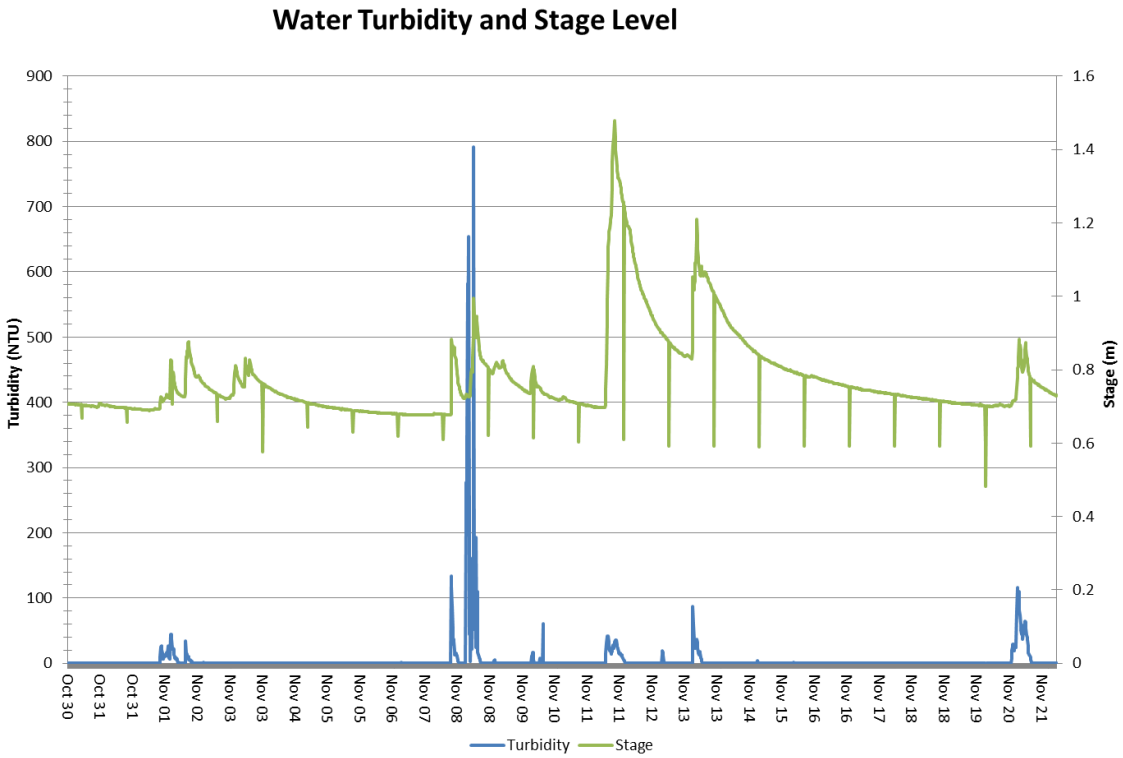
- pH ranged from 6.02 to 7.02 (Median: 6.69).



- There were mid ranged to high spikes in specific conductance. The increases in conductivity were related to decreased stage level and vice versa.
- The specific conductance is dependent on the amount of dissolved materials present in the water. In Leary's Brook station, due to decreased surface area, when water level is low the concentration of dissolved materials in it increases. As a result the specific conductance increases as stage decreases. This was noticed in some of the spikes ("Scenario 1") in specific conductance with a corresponding dips in stage level.
- During high precipitation there is an initial increase of specific conductance resulting from the increased dissolved materials flowing into the water. After an initial increase, the specific conductance decreases as stage increases. The dilution effect in water is causing a decrease in specific conductance. This was noticed in some of the surges ("Scenario 2") in specific conductance following by a rapid decrease with a corresponding increase in stage level.
- The spikes ranged from 128.4 – 3032.9 µs/cm throughout the deployment period (the median is 281 µs/cm).



- DO values were above the CCME Guideline for the Protection of Early Life Stages (9.5 mg/L) for most part of 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.
- Concentrations ranged from 9.96 mg/l to 12.50 mg/l (median value: 11.6 mg/l) for DO while 91.8% to 97.5% (median value 95 %) for percent saturation.



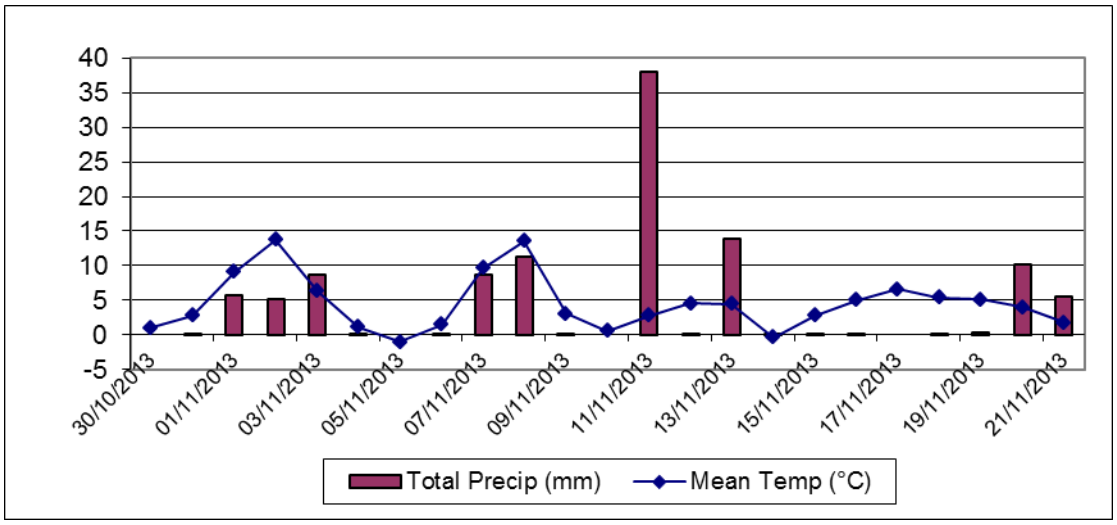
- The turbidity spikes are related to a combination of increased stage level and precipitation.
- There were two big turbidity spikes from November 8-9. The stage level was high during the same period along with increased precipitation.
- Turbidity ranged between 0.0 NTU and 791.9 NTU (median value: 0 NTU) during this deployment period.

Conclusions

- There was an increased daily variation of pH values towards the end of the deployment period indicating a sensor error in reading.
- There were instances of high specific conductance marked with increased stage level.
- DO values were above the CCME Guideline for the Protection of Early Life Stages (9.5 mg/L) for most part of the deployment periods.
- Two big turbidity spikes were observed marked with increased stage level and precipitation.

Appendix

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



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