Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

August 27 to October 2, 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

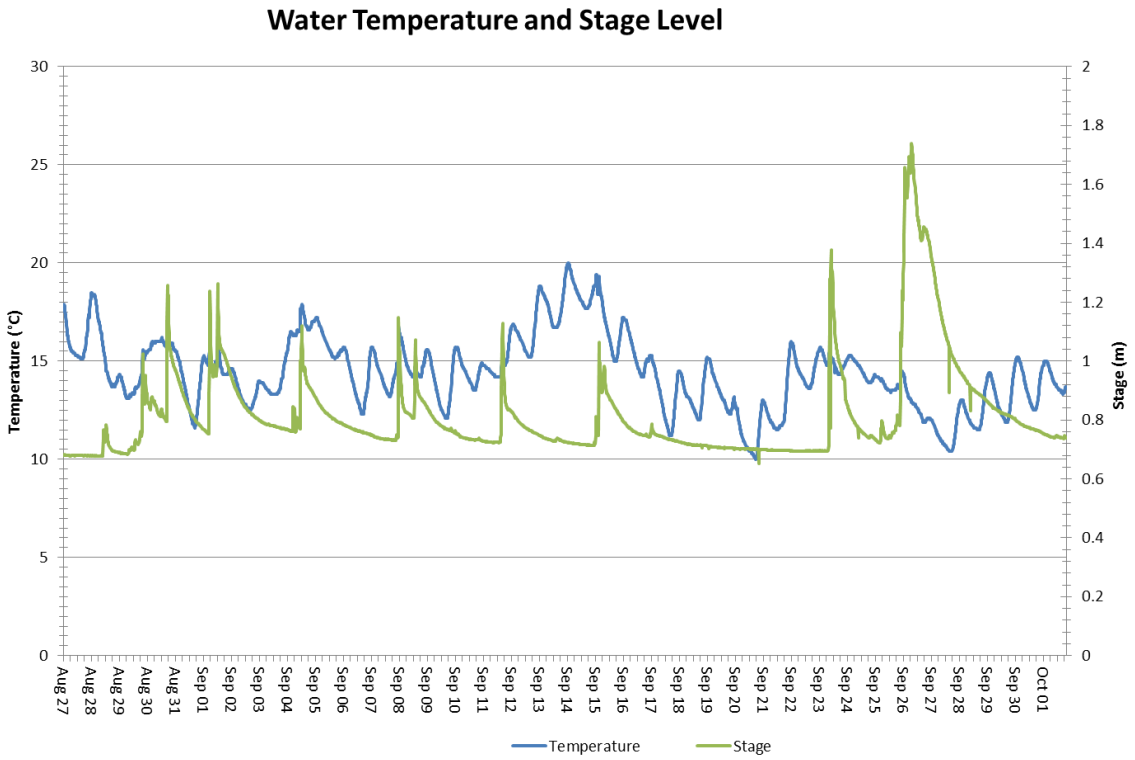
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Leary's Brook at Prince Philip Drive	August 27, 2013	Deployment	Excellent	Fair	Fair	Excellent	Excellent
	October 10, 2013	Removal	Good	Excellent	Poor	Excellent	Poor

- pH ranked "Fair" at the time of deployment. This could be due to the initial adjustment time taken by the pH sensor. It can be observed that the ranking settled to Excellent at the time of removal.
- Conductivity ranked "Fair" at the time of deployment. This could be the result of a calibration drift shown by the "Poor" ranking at the time of removal.
- The turbidity for field sonde is questionable at the time of removal likely due to bio-fouling 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.

Table 2: Parameter Statistics during deployment period

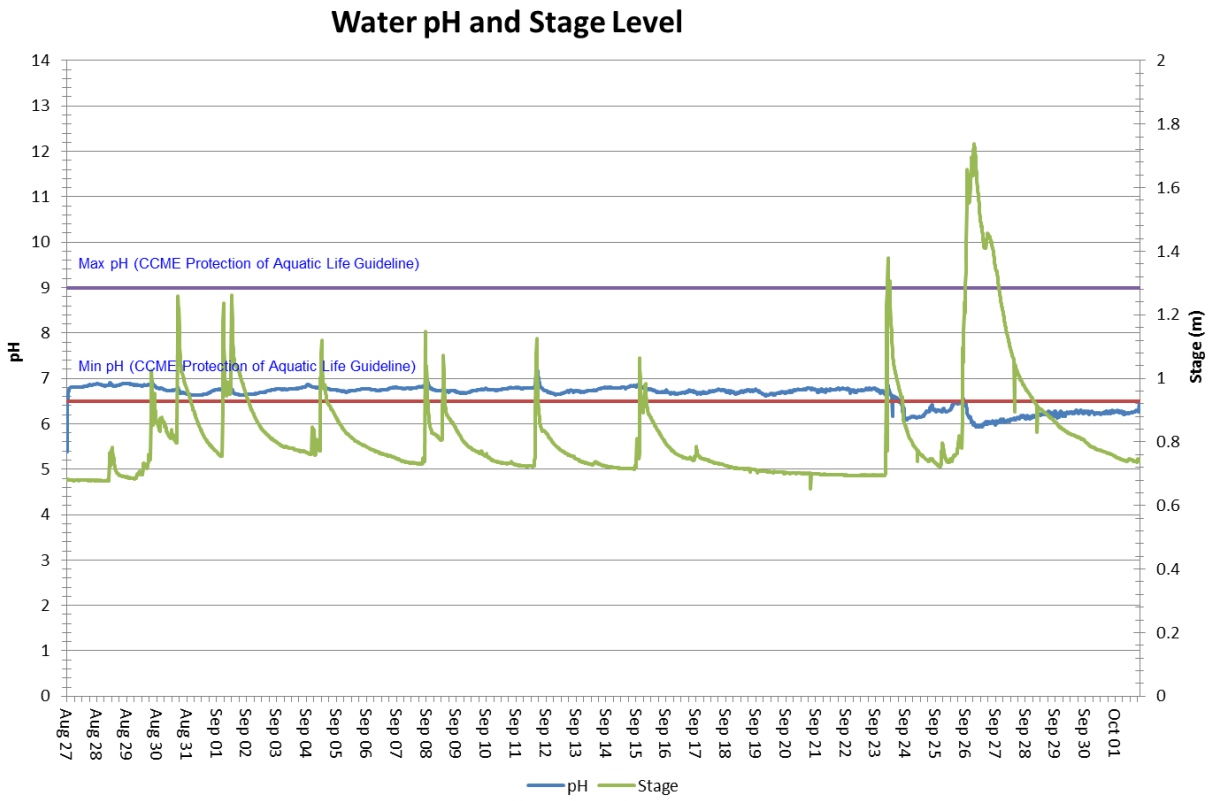
Parameter	Max	Min	Median	Mean
Temperature('C)	20.00	10.00	14.30	14.42
pH	7.31	5.38	6.72	6.63
Specific Conductivity (µS/cm)	547.0	77.3	266.0	257.3
TDS (g/ml)	0.3500	0.0495	0.1700	0.1647
Dissolved Oxygen (%-Sat)	98.1	85.9	94.7	94.6
Dissolved Oxygen (mg/l)	10.83	8.37	9.64	9.66
Turbidity (NTU)	909.0	0.0	103.9	148.5

Data Interpretation

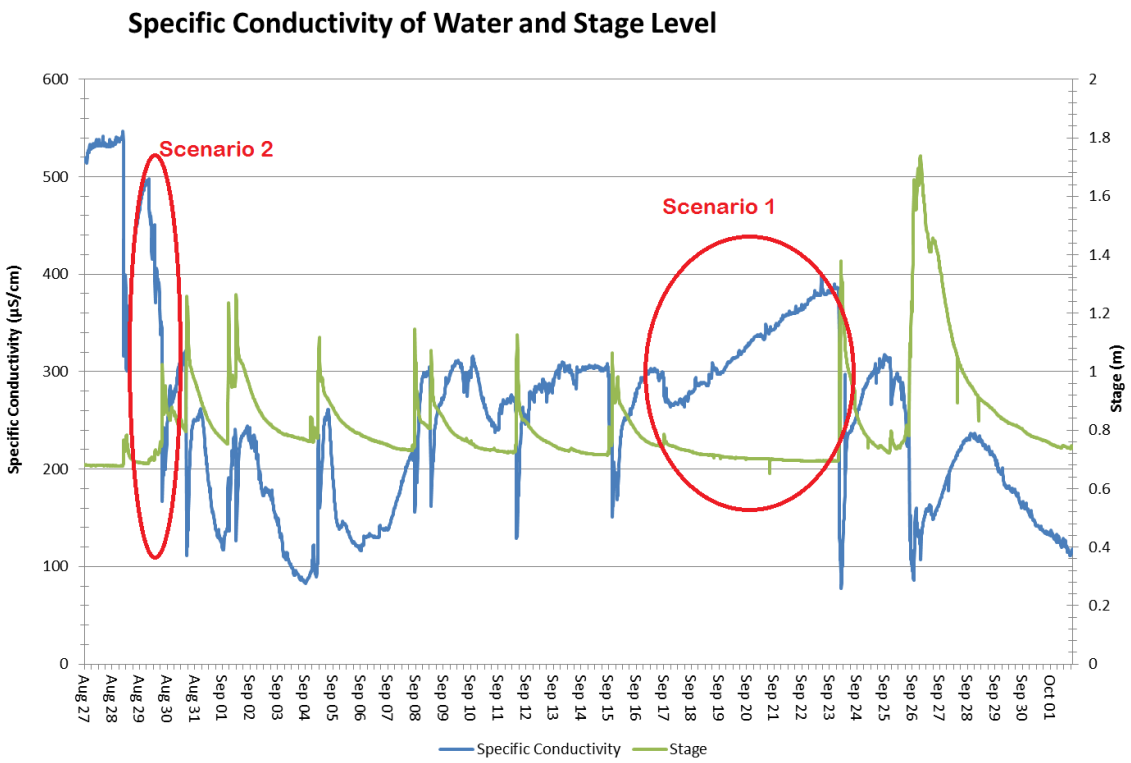


- Overall, the temperature was stable without significant variation at Leary's Brook from the end of August to the beginning of October.

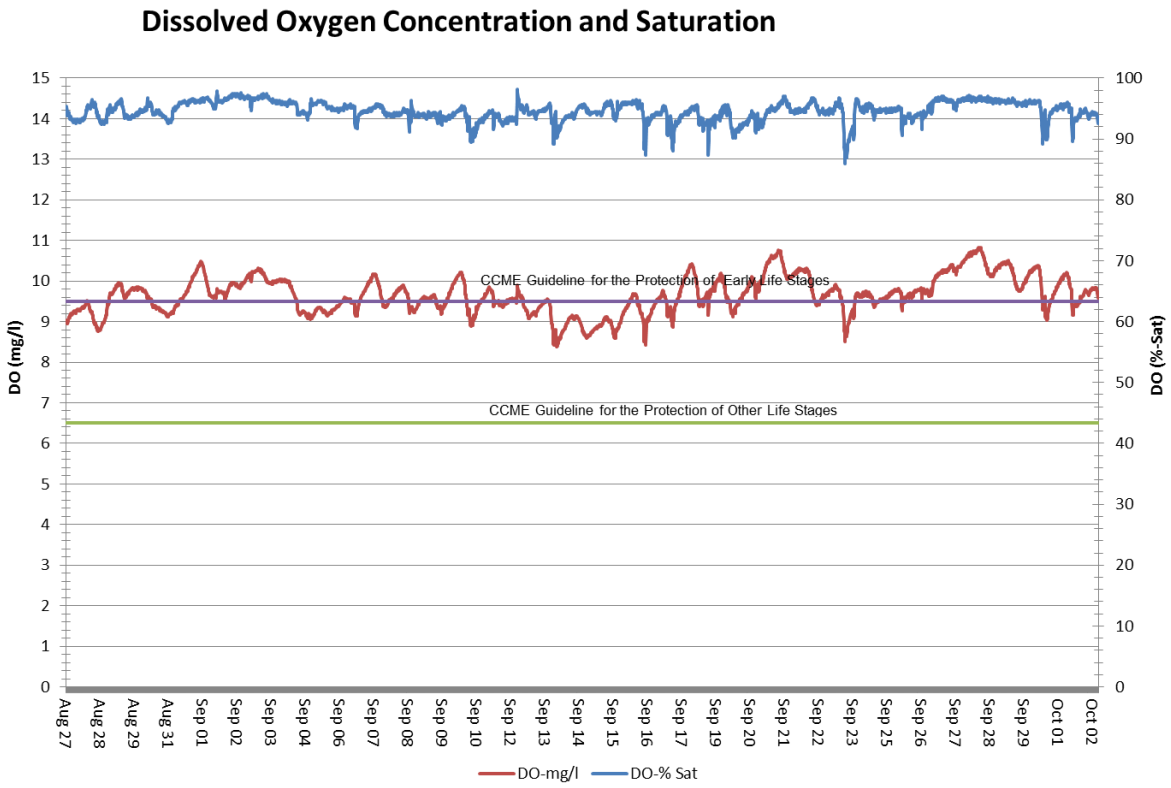
- Water temperature cycles diurnally and ranges from a low of 10^{o}C to a high of 20^{o}C (median value: 14.3^{o}C).



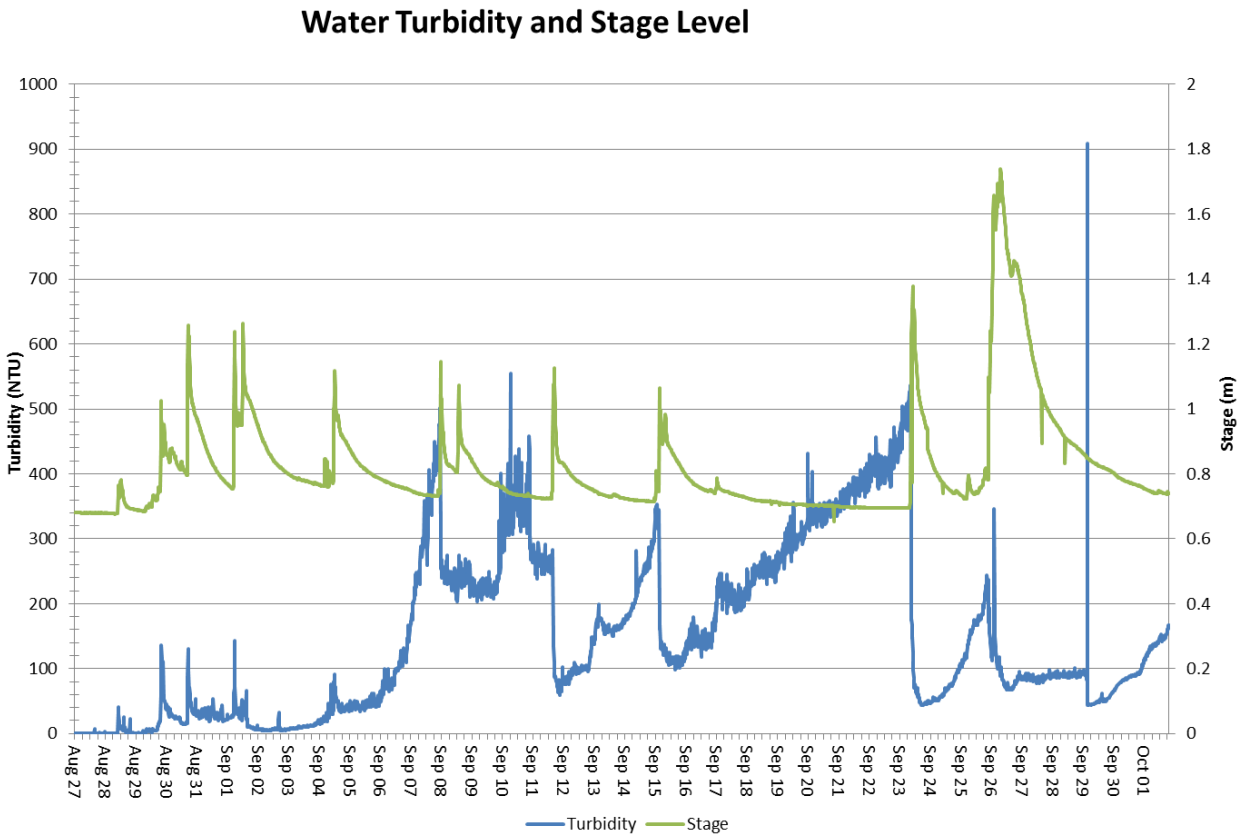
- Generally speaking, NL waters are slightly acidic which is reflected in the pH values lying closer to the lower CCME Protection of Aquatic Life guideline value of 6.5
- The pH reading remained close to the lower CCME guideline for most part of the deployment except a drop in pH value during the last week. This could be due to increased stage level during that period.
- pH ranged from 5.38 to 7.31 (Median: 6.72).



- 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 77.3 - 547 µs/cm throughout the deployment period (the median is 266 µs/cm).



- DO values were around 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. This can be noted by an increased temperature during the same period.
- Concentrations ranged from 8.37 mg/l to 10.83 mg/l (median value: 9.64 mg/l) for DO while 85.9% to 98.1% (median value 94.7%) for percent saturation.



- The turbidity spikes are related to a combination of increased stage level and precipitation.
- A series of increased turbidity due to calibration / bio-fouling drift can be observed from September 4th to 24th *resulting in questionable turbidity values*. This can occur due to accumulation of debris along with aquatic growth surrounding the sensor areas
- Turbidity ranged between 0.0 NTU and 909.9 NTU (median value: 103.9 NTU) during this deployment period.

Conclusions

- The pH values dropped during the last week due to increased stage level during that period.

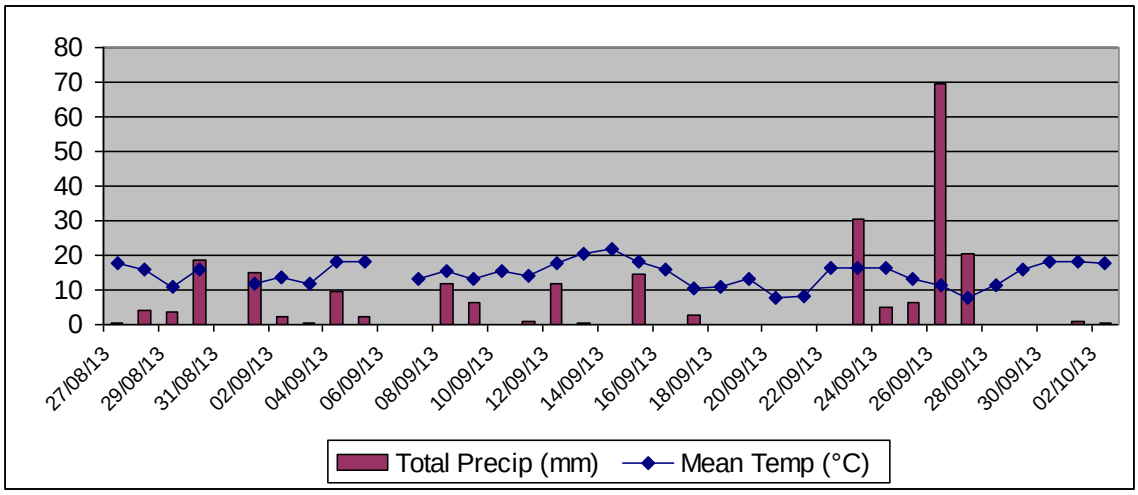
- The specific conductance was consistent in the mid-range throughout the deployment period.

- DO values were around the CCME Guideline for the Protection of Early Life Stages (9.5 mg/L) for most part of the deployment periods.

- The turbidity values were questionable after September 4th -24th due to increased calibration drifts and bio-fouling due to aquatic growth surrounding the turbidity sensor.

Appendix

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



Prepared by:
Shibly Rahman
Department of Environment and Conservation
Water Resources Management Division
Phone: 709.729.4540
Fax: 709.729.3020