**Real-Time Water Quality Deployment Report**

# Leary's Brook at Prince Philip Drive

**July 31 to August 27, 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 | July 31,2013 | Deployment | Excellent | Fair | Excellent | Excellent | Excellent |
| | August 27,2013 | Removal | Good | Good | Good | Good | Poor |

- pH ranked "Fair" at the time of deployment. This could be due to the initial adjustment time taken by the pH sensor. This can be further justified as the field sonde to grab sample comparison was "Good".
- All parameters except pH and turbidity ranked "Excellent" 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

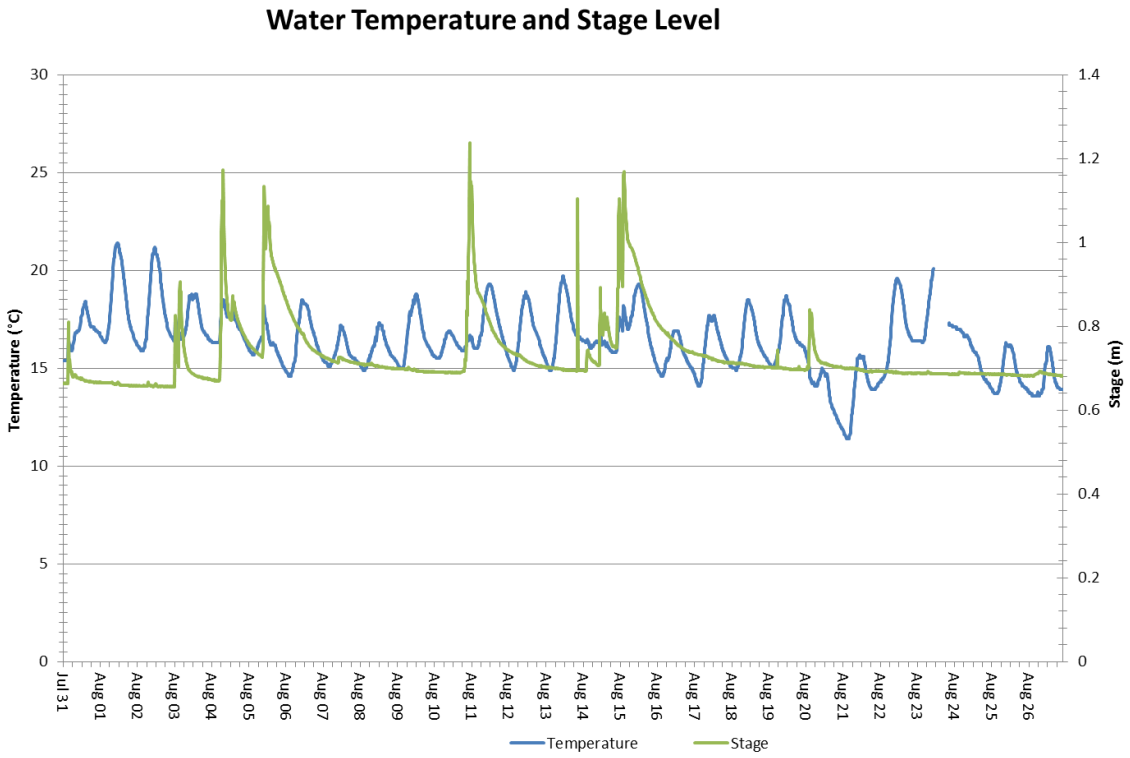
| Parameter | Max | Min | Median | Mean |
|---|---|---|---|---|
| Temperature('C) | 21.40 | 11.40 | 16.30 | 16.34 |
| pH | 6.81 | 6.19 | 6.58 | 6.58 |
| Specific Conductivity (µS/cm) | 914.0 | 134.7 | 499.0 | 462.7 |
| TDS (g/ml) | 0.5850 | 0.0862 | 0.3200 | 0.2961 |
| Dissolved Oxygen (%-Sat) | 97.6 | 74.9 | 94.1 | 93.4 |
| Dissolved Oxygen (mg/l) | 10.26 | 6.82 | 9.23 | 9.15 |
| Turbidity (NTU) | 1464.9 | 0.0 | 91.6 | 110.2 |

- 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

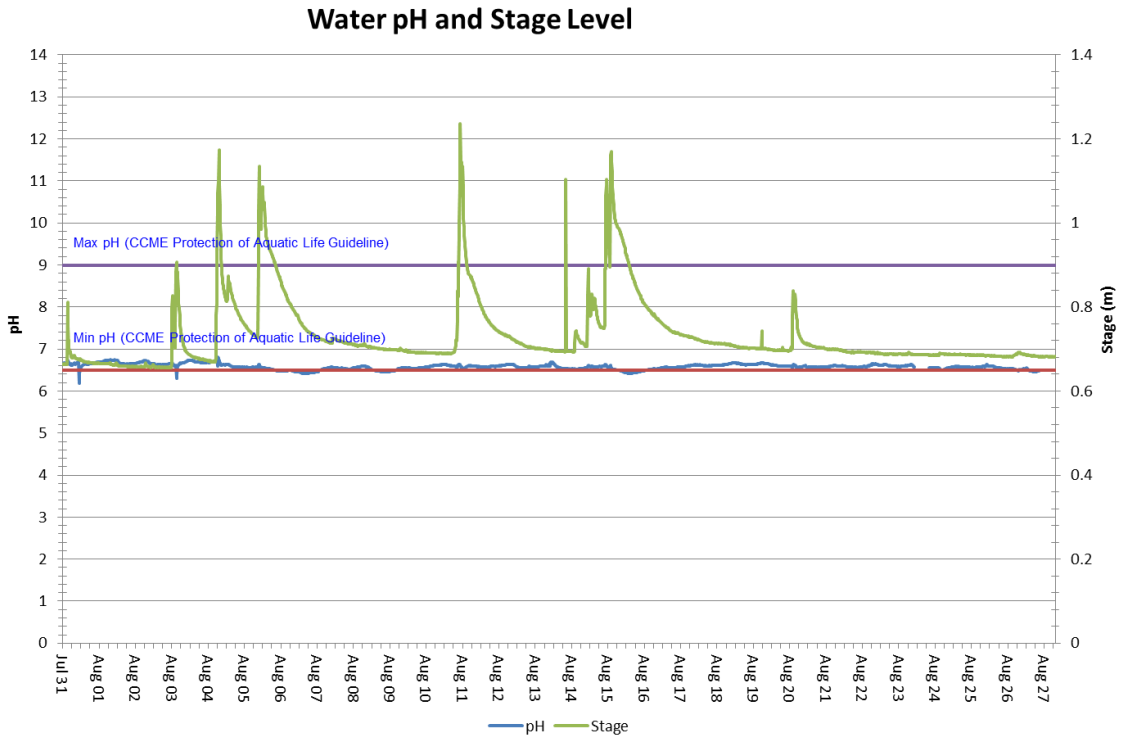
| Grab Sample Date | pH | Conductivity | Turbidity |
|---|---|---|---|
| Field | 6.24 | 560.6 | 0.7 |
| Grab | 6.67 | 574 | 2.2 |
| Ranking | Good | Good | Good |

## Data Interpretation

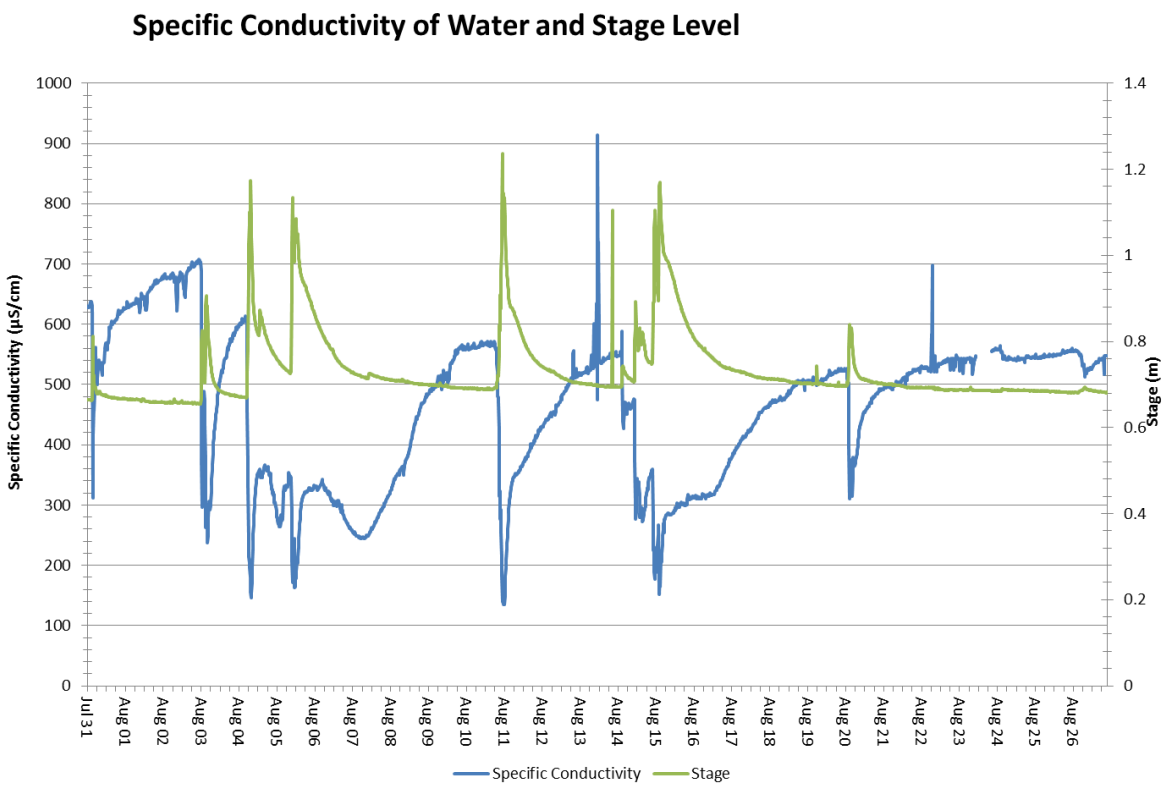



- Overall, the temperature was stable at Leary's Brook from the end of July to end of August.

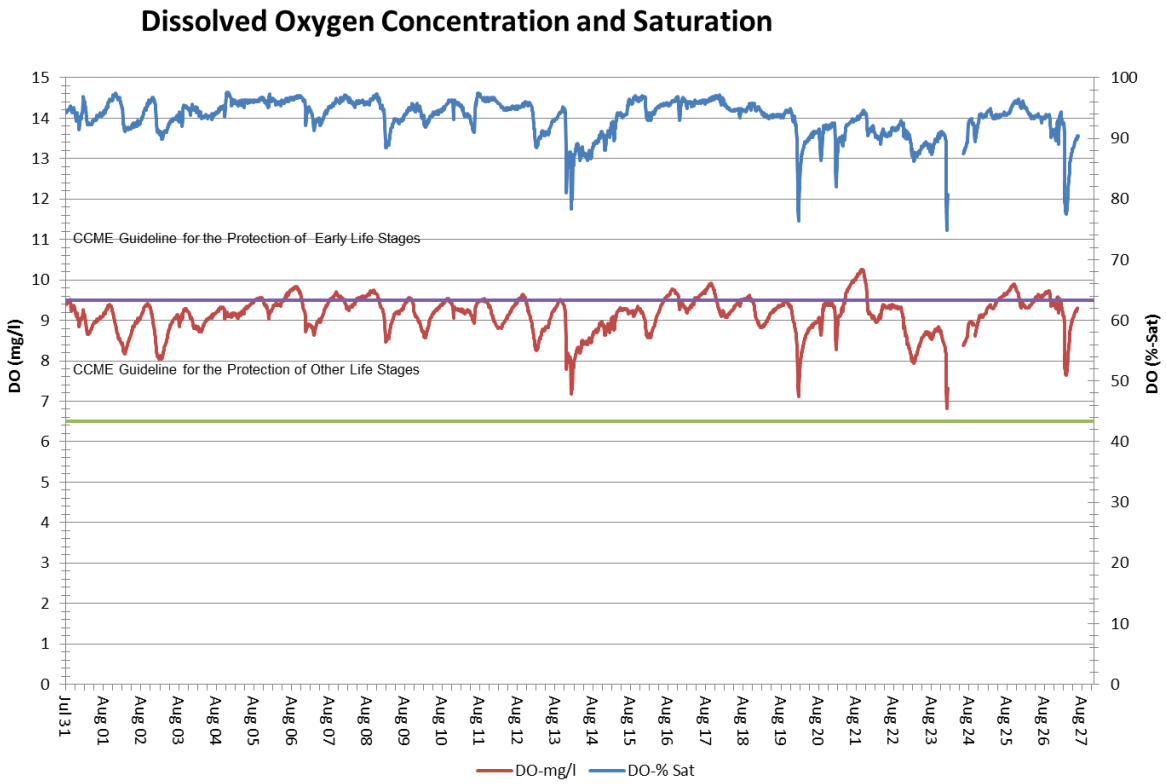
- Water temperature cycles diurnally and range from a low of 11.4$^{o}$C to 21.4$^{o}$C (median value: 16.3$^{o}$C).



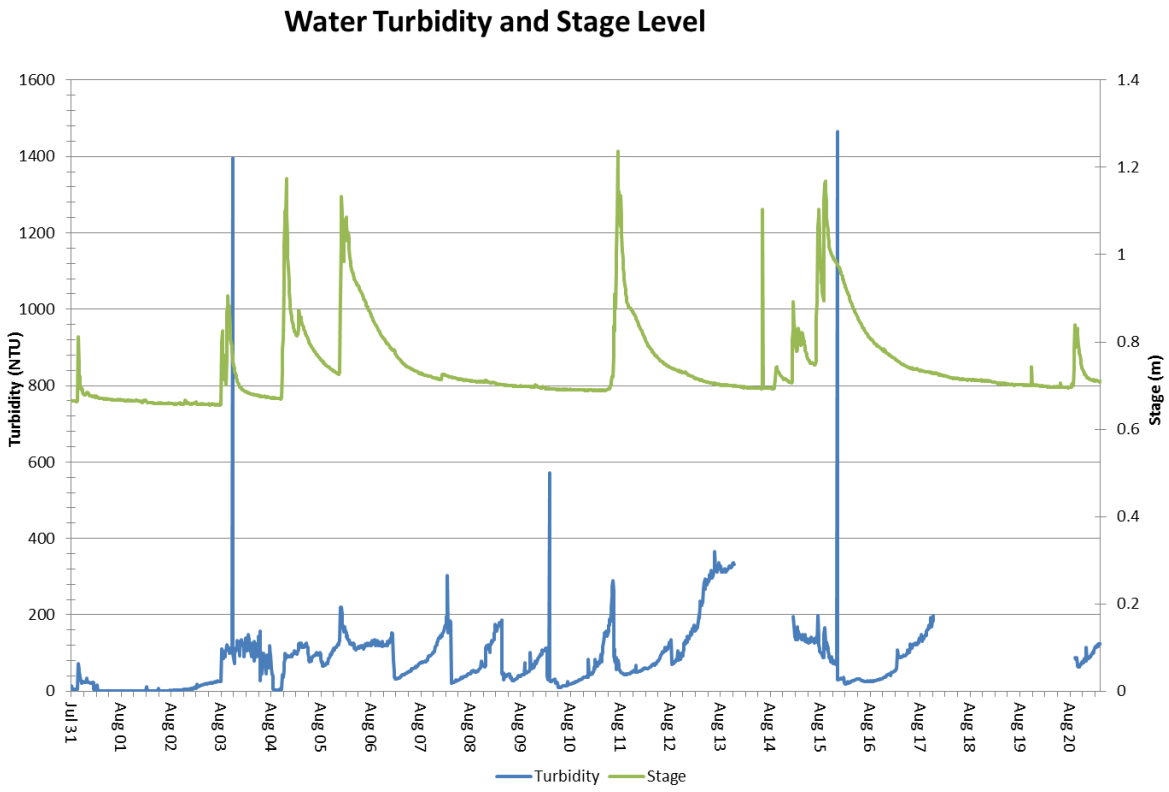

- Generally speaking, NL waters are slightly acidic which is reflected in the pH values lying closer to the lower CCME Protection of Aquatic Life guideline value of 6.5
- The pH reading lied close to the lower CCME guideline. There was a drop in pH level on August 1st and 3rd. This could due to increased stage level the previous day.
- pH ranged from 6.19 to 6.81 (Median: 6.58).




- There were mid ranged spikes in specific conductance. The increases in conductivity were related to decreased stage level and vice versa.
- 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 134.7 - 914 µs/cm throughout the deployment period (the median is 499 µs/cm).




- DO values were below the CCME Guideline for the Protection of Early Life Stages (9.5 mg/L) in 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 6.82 mg/l to 10.26 mg/l (median value: 9.23 mg/l) for DO while 74.9% to 97.6% (median value 94.1%) for percent saturation.



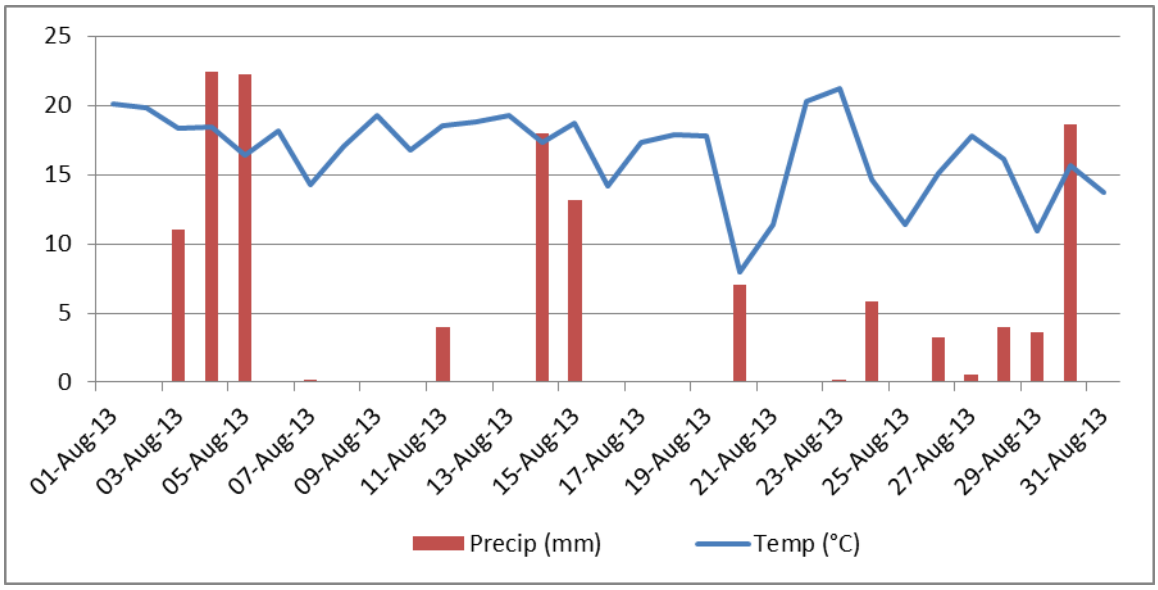

- The turbidity spikes are related to a combination of increased stage level and precipitation.
- An increase in turbidity due to calibration / bio-fouling drift can be observed from August 13-14$^{th}$, 17-20$^{th}$ resulting in questionable turbidity values. This can occur due to accumulation of debris along with aquatic growth surrounding the sensor areas
- Turbidity ranged between 0.0 NTU and 1464.9 NTU (median value: 91.6 NTU) during this deployment period.

## Conclusions

- The pH values were close to the lower guideline of 6.5 throughout the deployment period.
- 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 in most part of 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 August 12-15th, 17-20th due to increased calibration / bio-fouling drift around with aquatic growth surrounding the turbidity sensor.
- There were no data transmissions on August 23rd from 2:15 PM to 11:45 PM.

## 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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