Real-Time Water Quality Deployment Report

Leary's Brook at Prince Philip Drive

May 30 to July 4, 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	May30,2013	Deployment	Excellent	Good	Fair	Excellent	Excellent
	July 4, 2013	Removal	Good	Excellent	Marginal	Good	Poor

- All parameters except pH and conductivity ranked "Excellent" during deployment.
- 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 conductivity data was consistent throughout the 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

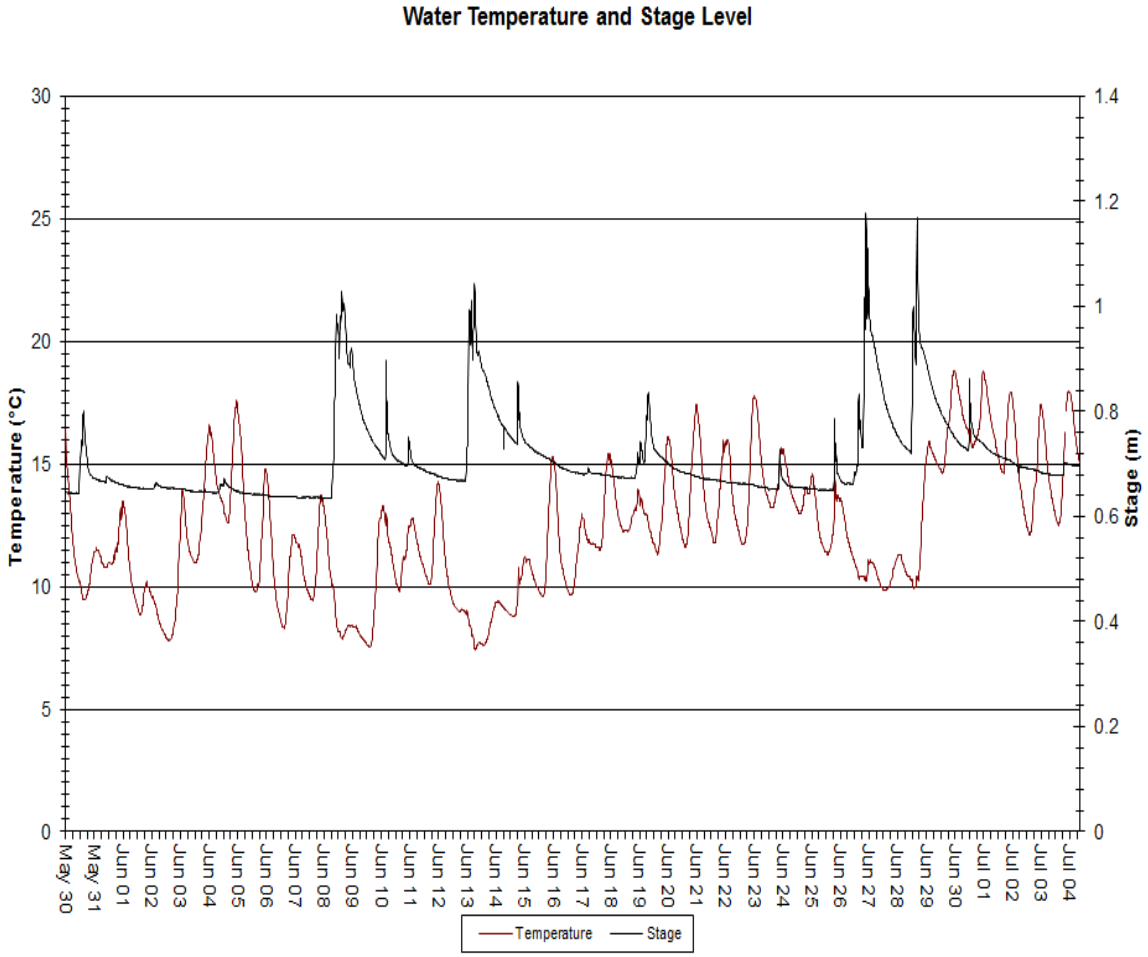
Parameter	Max	Min	Median	Mean
Temperature('C)	18.80	7.41	12.00	12.25
pH	7.02	5.88	6.82	6.82
Spec. Conductivity (µS/cm)	739.0	147.7	538.0	513.7
TDS (g/ml)	0.4730	0.0945	0.3440	0.3288
Dissolved Oxygen (%-Sat)	99.1	84.7	94.6	94.5
Dissolved Oxygen (mg/l)	11.55	8.47	10.14	10.13
Turbidity (NTU)	1696.0	0.0	448.5	598.9
Stage (m)	1.18	0.63	0.68	0.71
Flow (m)	3.25	0.25	0.36	0.49

- 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

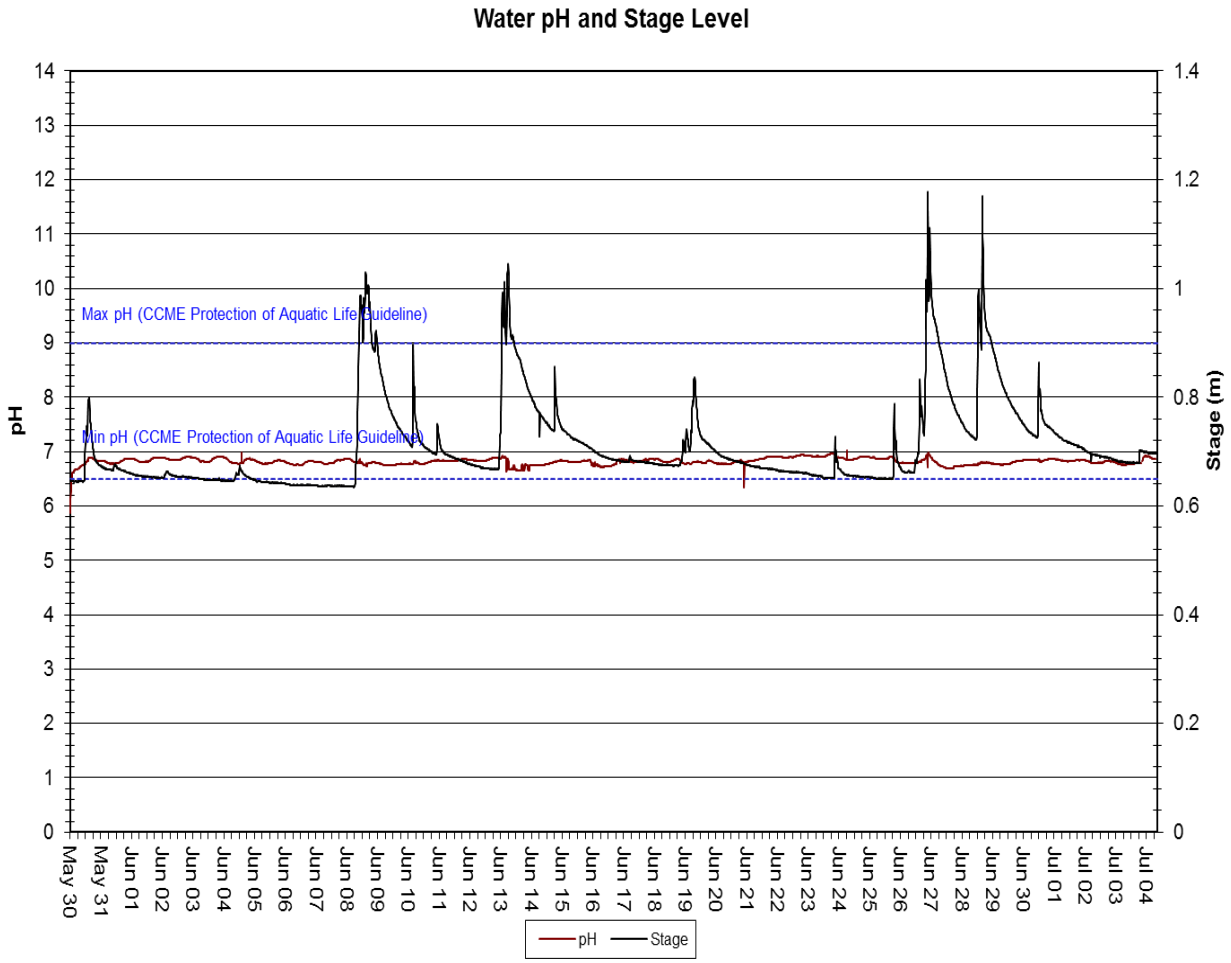
Grab Sample Date	pH	Conductivity	Turbidity
Field	6.35	672.2	0
Grab	6.45	760	0.4
Ranking	Excellent	Fair	Excellent

Data Interpretation

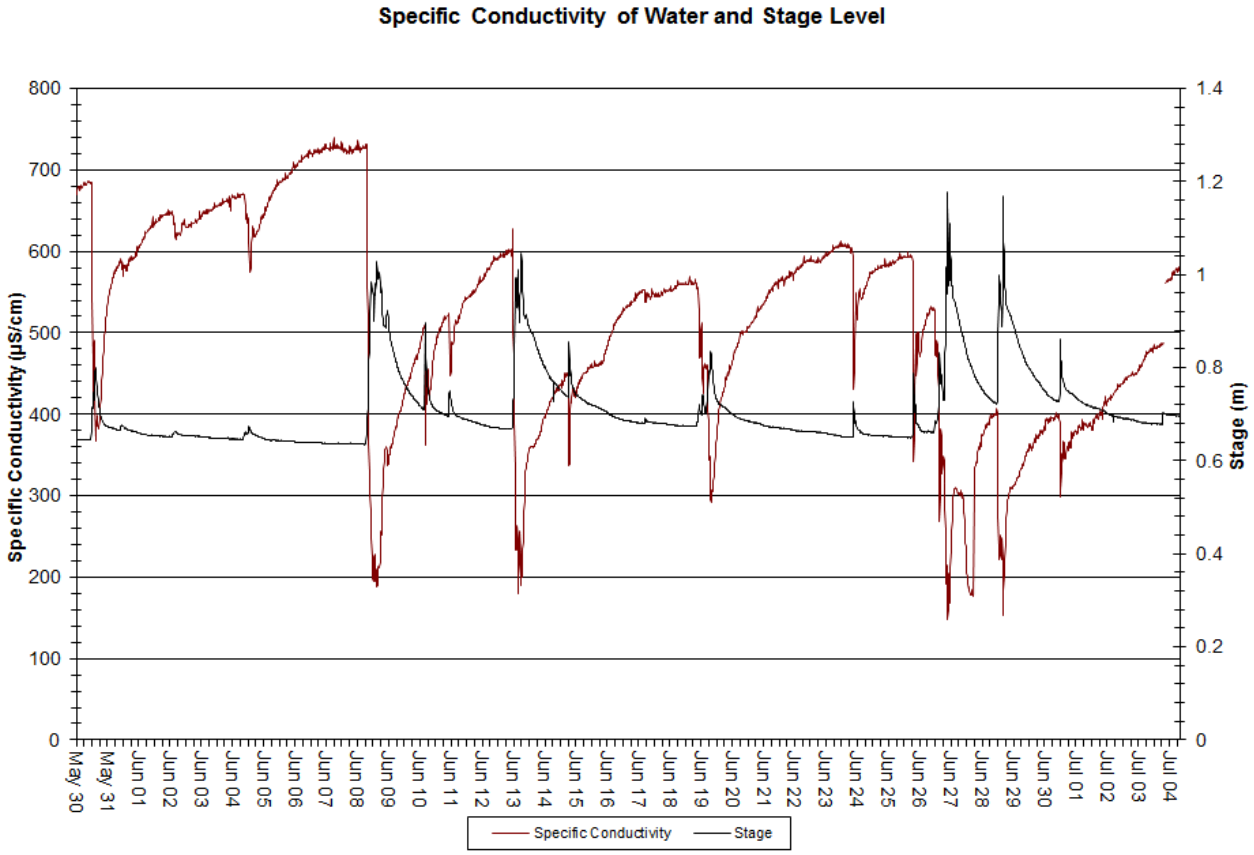


- Overall, an expected increasing trend in water temperature was observed at Leary's Brook from end of May to beginning of July.

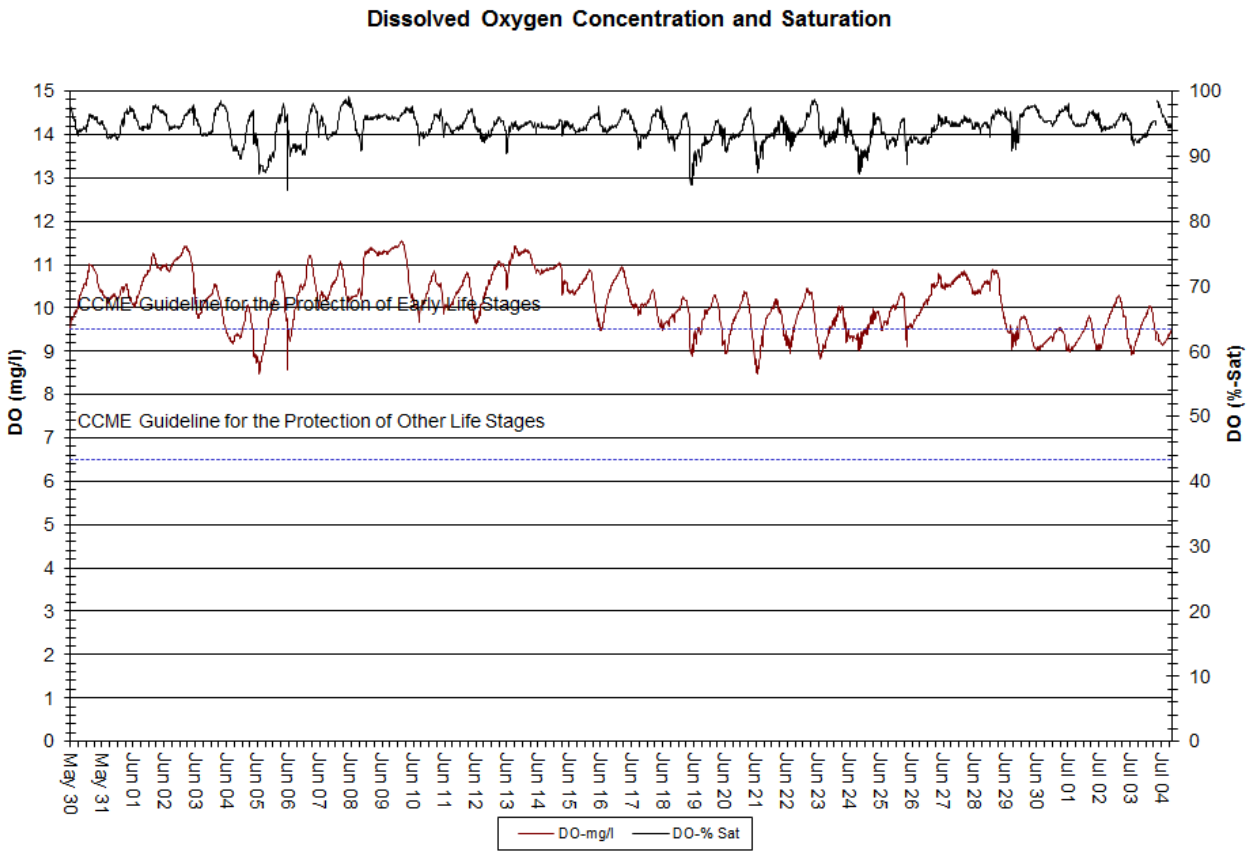
- Water temperature cycles diurnally and range from a low of 7.41^{o}C to 18.8^{o}C (median value: 12^{o}C).



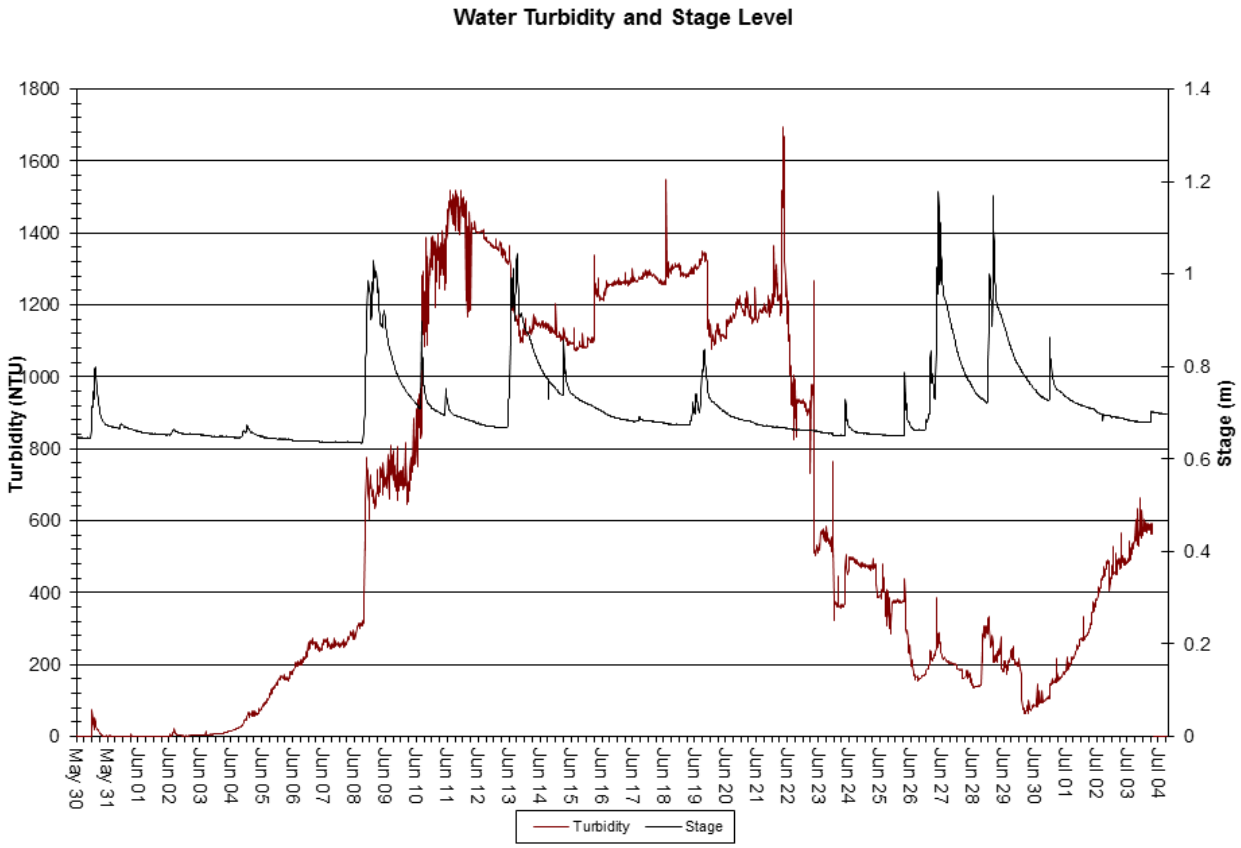
- Generally speaking, NL waters are slightly acidic which is reflected in the pH values lying closer to the lower CCME Protection of Aquatic Life guideline value of 6.5
- After an initial adjustment of pH in the sonde reading, the pH reading was steadily above the lower CCME guideline. There was a drop in pH level on June 21st. This could be a combination of increased precipitation and increased stage level the previous day.
- pH ranged from 5.88 to 7.02 (Median: 6.82).



- 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 147.7 - 739 µs/cm throughout the deployment period (the median is 538 µs/cm).



- DO values dropped below the CCME Guideline for the Protection of Early Life Stage (9.5 mg/L) during the period of June 4-5, June 19-24 and again on June 29 to the end of 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 8.47 mg/l to 11.55 mg/l (median value: 10.13 mg/l) for DO while 84.7% to 99.1% (median value 94.6%) for percent saturation.



- 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 can be observed from June 4 onward resulting in questionable turbidity values.
- Turbidity ranged between 0.0 NTU and 1696 NTU (median value: 448.5 NTU) during this deployment period.

Conclusions

- The pH values were showing little variation throughout the deployment period and consistently above the lower guideline of 6.5.

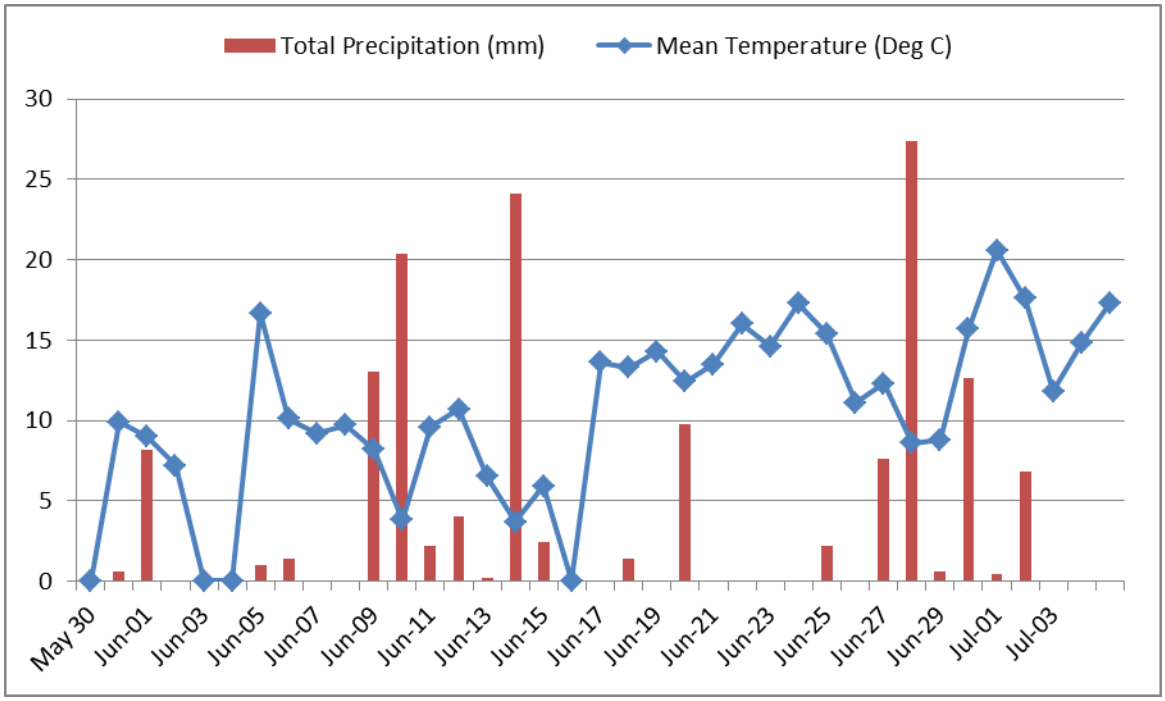
- The specific conductance was consistent in the mid-range throughout the deployment period.

- The DO values dropped below the CCME Guideline for the Protection of Early Life Stage during the period of June 4-5, June 19-24 and again on June 29 to the end of deployment period due to rise in temperature.

- The turbidity values were questionable after June 4th due to increased calibration / bio-fouling drift around with 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).



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