Real-Time Water Quality Deployment Report

Paddy's Pond

November 14, 2014 to December 10, 2014

Government of Newfoundland & Labrador
Department of Environment and Conservation
Water Resources Management Division
St. John's, NL, A1B 4J6 Canada

Newfoundland Labrador

Real-Time Water Quality Deployment Report
Paddy's Pond
2014-11-14 to 2014-12-10

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Paddy's Pond is a Research and Development test site used to trial atypical instrumentation and deployment techniques. During this period, the field sonde deployed was a YSI 6600 multi-parameter sonde.
    - A fault in the turbidity sensor resulted in a lack of data for this sensor.
- Following removal on December 10th, monitoring at this station will be suspended until ice cover recedes sufficiently for redeployment.

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.
    - Upon deployment, a QA/QC Sonde is temporarily deployed *in situ*, adjacent to the Field Sonde. 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. A grab sample is also taken for additional confirmation of conditions at deployment and to allow for future modelling studies.
    - At the end of a deployment period, a freshly cleaned and calibrated QAQC Sonde is placed *in situ*, adjacent to the Field Sonde. Values are compared between all parameters and differences are ranked for placement in Table 1.

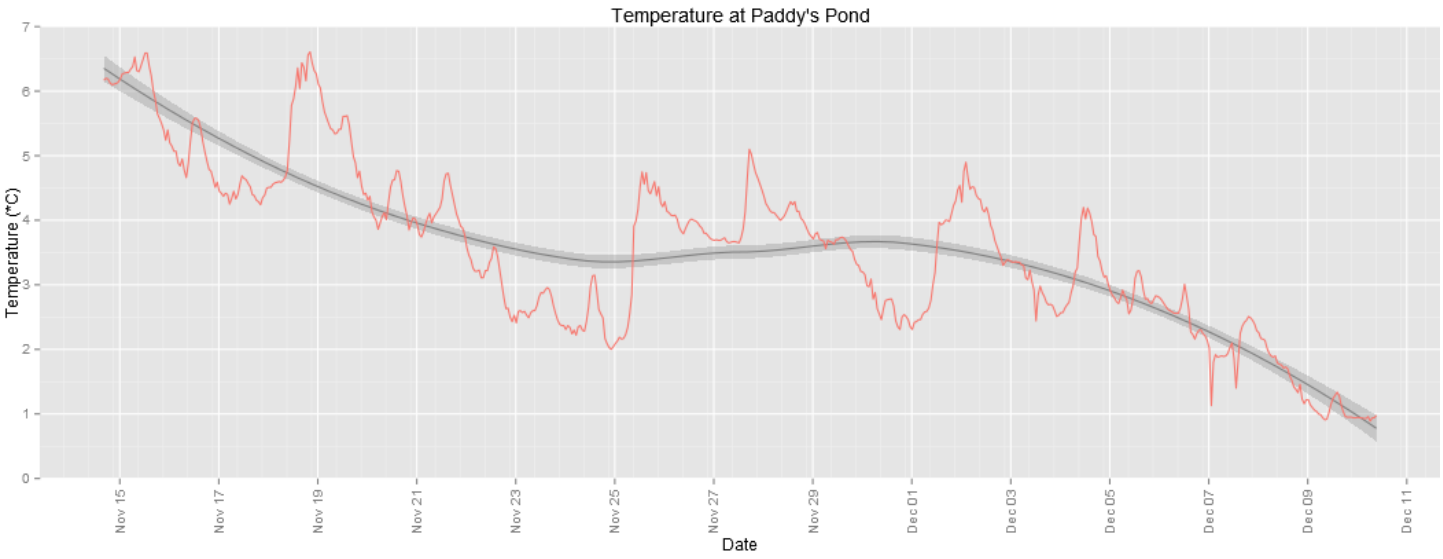
Table 1: Qualitative QAQC Ranking

Date	Action	Comparison Ranking				
		Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
November 14, 2014	Deployment	Good	Excellent	Good	Excellent	NA
December 10, 2014	Removal	Excellent	Good	Good	Excellent	NA

Data Interpretation

Temperature

Water Temperature is a major factor used to describe water quality. Temperature has major implications on both the ecology and chemistry of a water body, governing processes such as the metabolic rate of aquatic plants and animals and the degree of dissolved oxygen saturation.

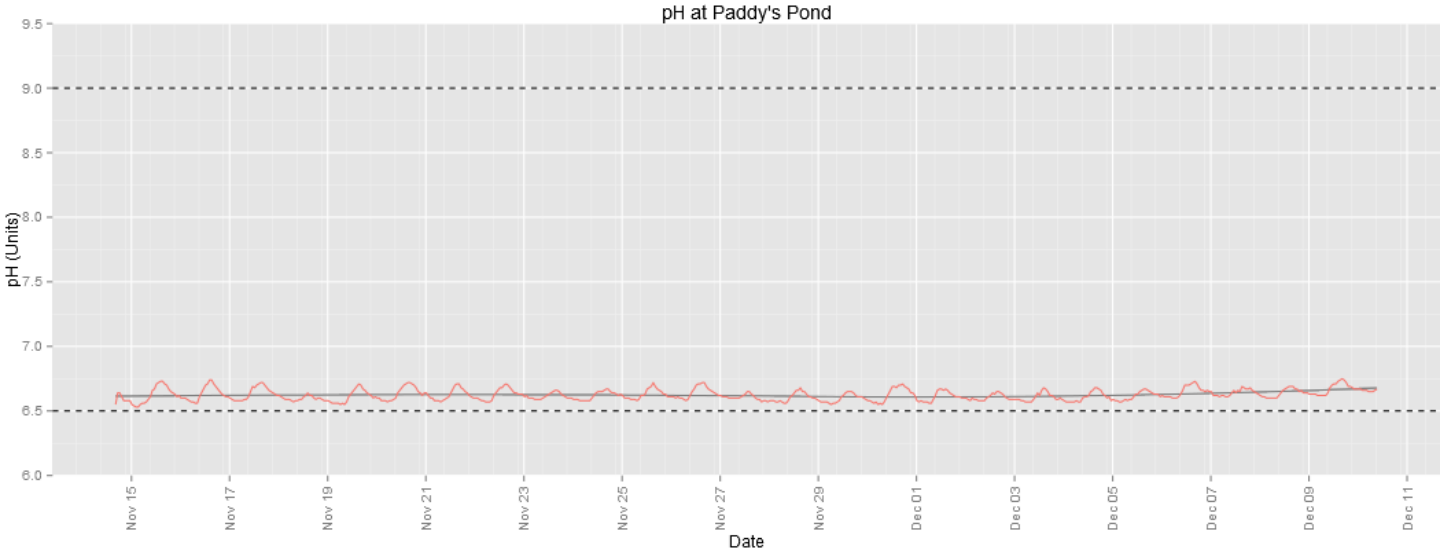


Mean	Median	Min	Max
3.55	3.67	0.89	6.61

- Water temperature declined towards its annual minimum temperature near 0^{o}C during this deployment period. Upon removal, several inches of ice was chopped to extract the equipment from the water.

pH

pH is used to give an indication of the acidity or basicity of a solution. A pH of 7 denotes a neutral solution while lower values are acidic and higher values are basic. Technically, the pH of a solution indicates the availability of protons to react with molecules dissolved in water. Such reactions can affect how molecules function chemically and metabolically.

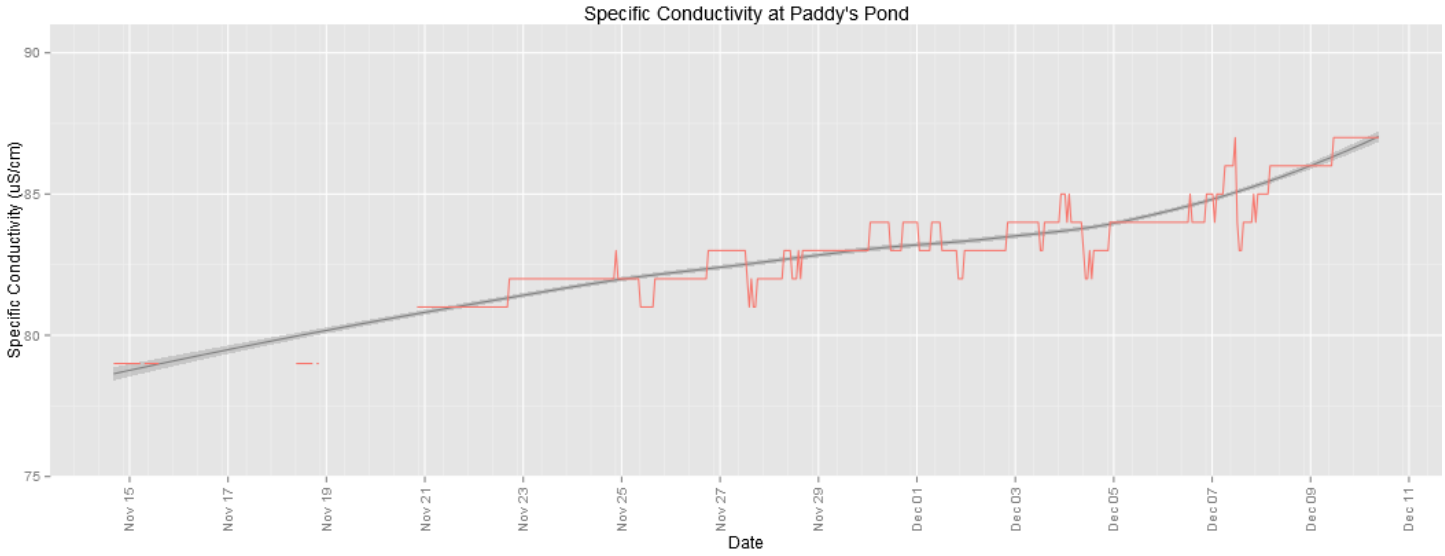


Mean	Median	Min	Max
6.62	6.62	6.53	6.75

- pH was stable during this deployment period with both a mean and median value of 6.62. Some diurnal cycling was observed through the deployment period, however even this is much reduced compared to mid-summer cycling – at the peak of productivity, pH swings ranged from 7.5 in the day to 6.5 at night.

Specific Conductivity

Conductivity relates to the ease of passing an electric charge – or resistance – through a solution. Conductivity is highly influenced by the concentration of dissolved ions in solution: distilled water has zero conductivity (infinite resistance) while salty solutions have high conductivity (low resistance). Specific Conductivity is corrected to 25°C to allow comparison across variable temperatures.

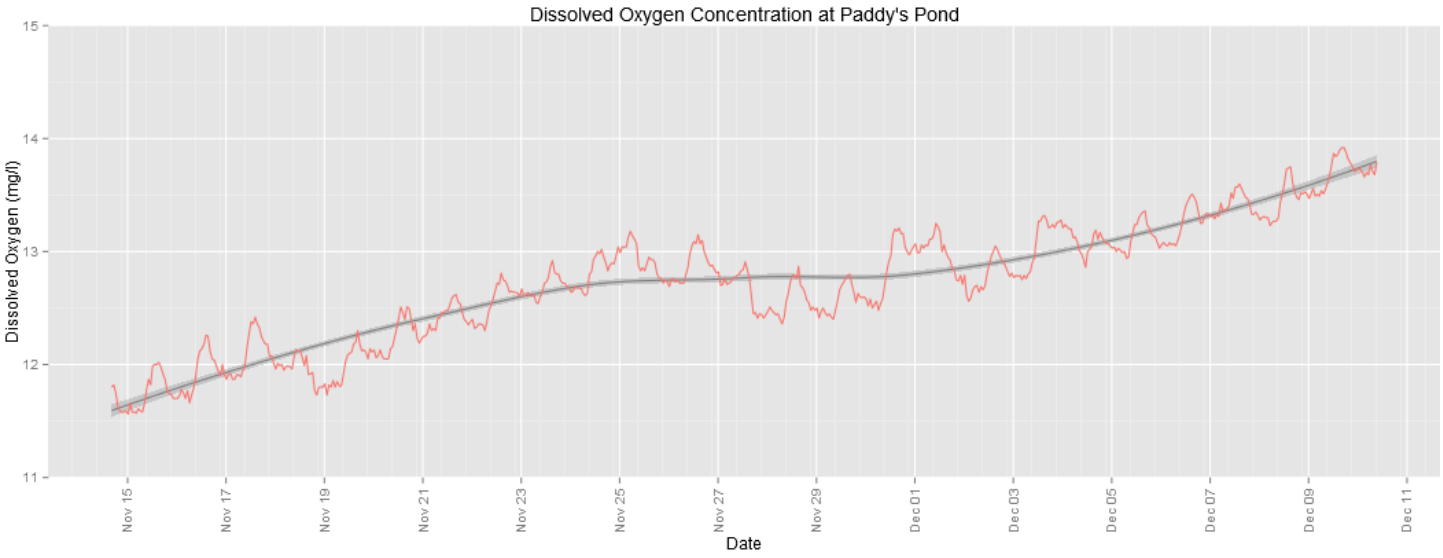


Mean	Median	Min	Max
83	83	79	87

- An increase in conductivity is observed throughout the entire deployment period, from a minimum of 79 to a max value of 87 uS/cm. This might be the result of salt application to the TCH located south of the station.

Dissolved Oxygen

Dissolved oxygen is a metabolic requirement of aquatic plants and animals. The concentration of oxygen in water depends on many factors, especially temperature – the saturation of oxygen in water is inversely proportional to water temperature. Oxygen concentrations also tend to be higher in flowing water compared to still, lake environments. Low oxygen concentrations can give an indication of excessive decomposition of organic matter or the presence of oxidizing materials.

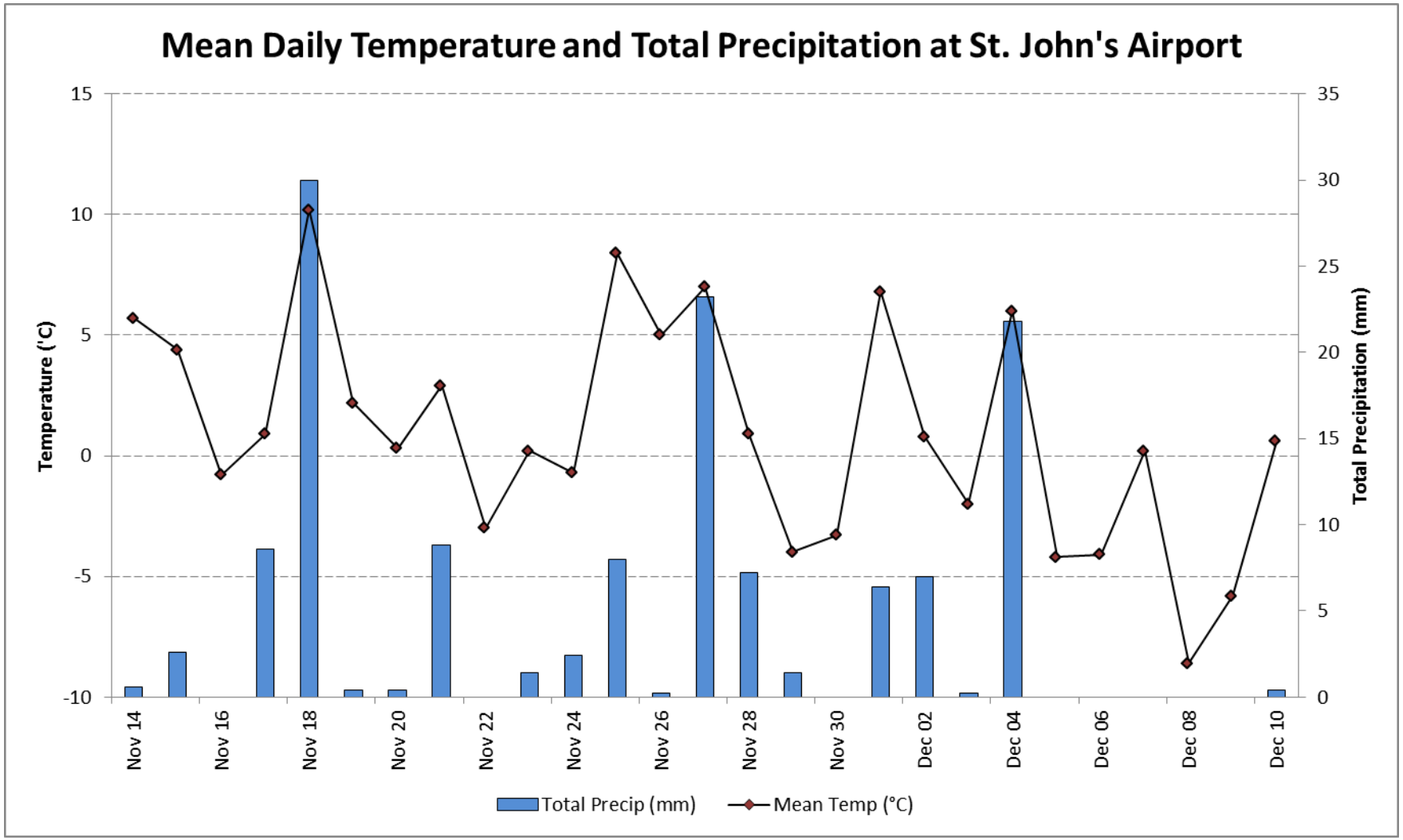


Variable	Mean	Median	Min	Max
DO (mg/l)	12.72	12.75	11.56	13.92
DO ('%-Sat')	95.8	96.1	91.2	100.6

- Dissolved oxygen increased throughout the deployment period, consistently with the decline in water temperature. The max concentration of 13.92 mg/l DO is close to the theoretical* maximum saturation of 14.26 mg/l DO.

* Theoretical dissolved oxygen saturation calculator produced by the USGS. Retrieved June, 2015: http://water.usgs.gov/software/DOTABLES/

Appendix



Prepared by:
Ryan Pugh
Department of Environment and Conservation
Water Resources Management Division
Phone: 709.729.1681
Fax: 709.729.3020