Real-Time Water Quality Deployment Report

Paddy's Pond

August 14, 2014 to September 25, 2014

Newfoundland Labrador

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

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2014-08-14 to 2014-09-25

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.
- An instrument failure on August 28th resulted in data loss until redeployment in late September.

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.

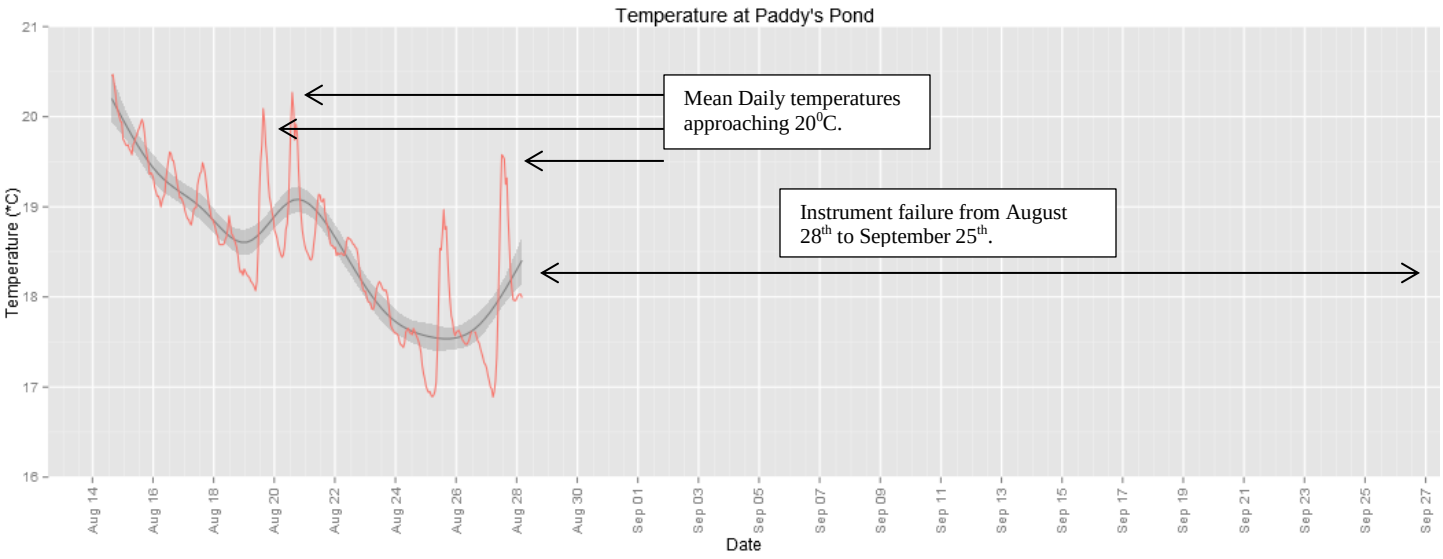
Table 1: Qualitative QAQC Ranking

Date	Action	Comparison Ranking				
		Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
August 14, 2014	Deployment	Excellent	Excellent	Good	Excellent	Excellent
September 25, 2014	Removal	NA	NA	NA	NA	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.

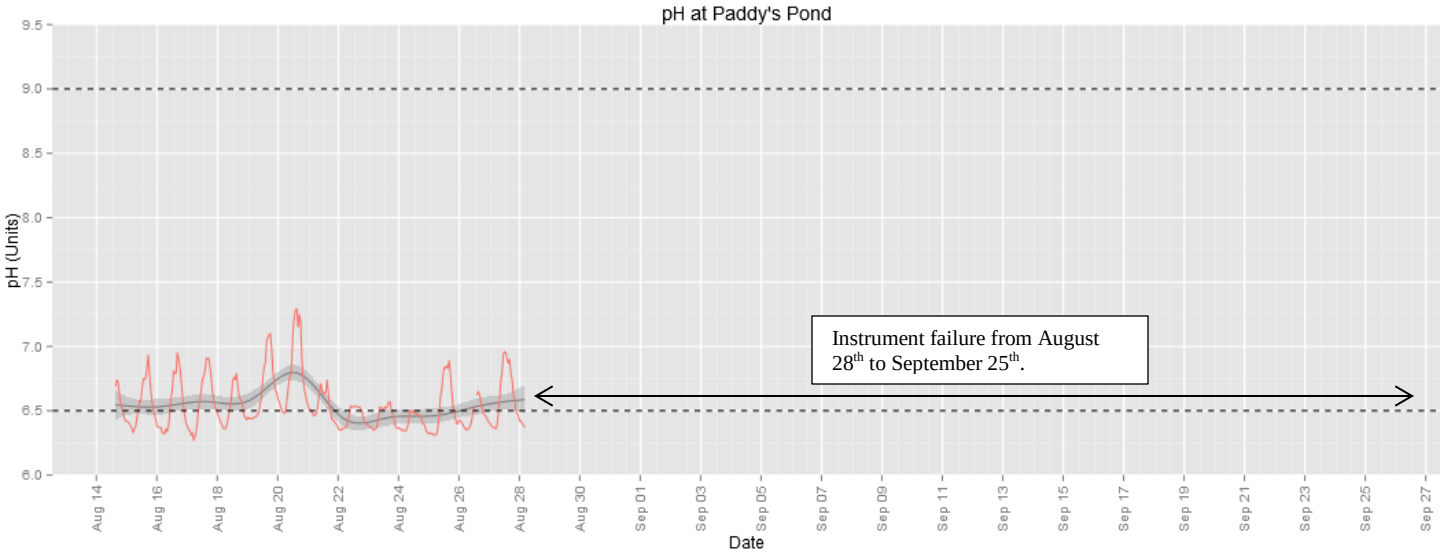


Mean	Median	Min	Max
18.54	18.57	16.89	20.47

- Water temperatures fell into late August as mean air temperatures begin to decline into late summer. Periodic above-seasonal temperatures resulted in a few temperature peaks throughout the reported data.

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.

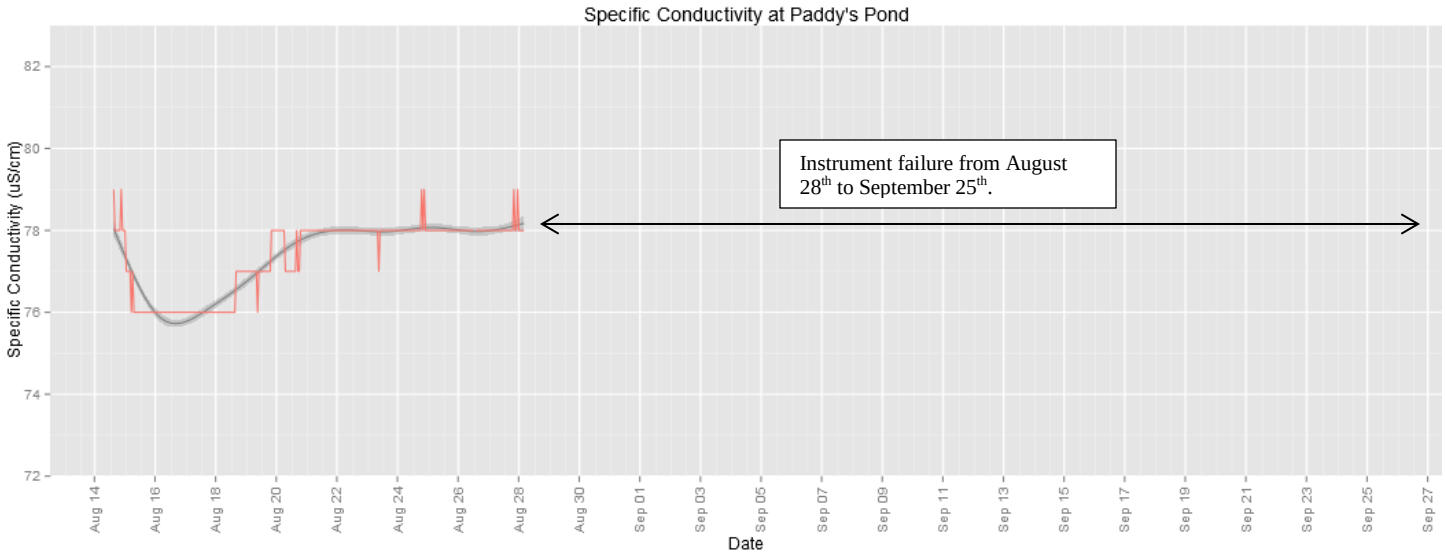


Mean	Median	Min	Max
6.55	6.49	6.27	7.29

- CCME Guidelines for the protection of aquatic life are indicated by dashed lines at 6.5 and 9.0 pH units. Most values fall within those guidelines; however waters in Newfoundland and Labrador tend to be more acidic than the nationally-derived guidelines.
- For the data available, pH levels appear to be stable, except for diurnal cycling and a slight peak from August 19th to 21st (a period of frequent precipitation). On especially warm days, diurnal cycling appears to be especially notable, indicating a temperature-dependent relationship – potentially related to metabolic rate of aquatic life.

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.

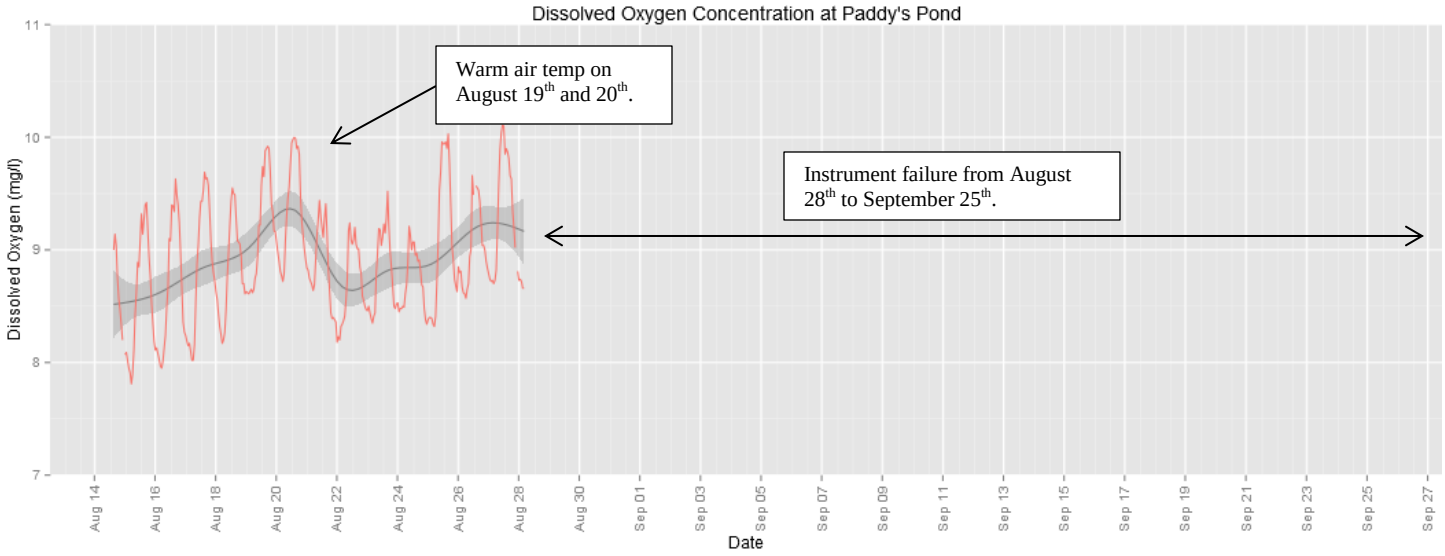


Mean	Median	Min	Max
77	78	76	79

- Specific conductivity increased somewhat following frequent precipitation from August 18th to 21st.

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.

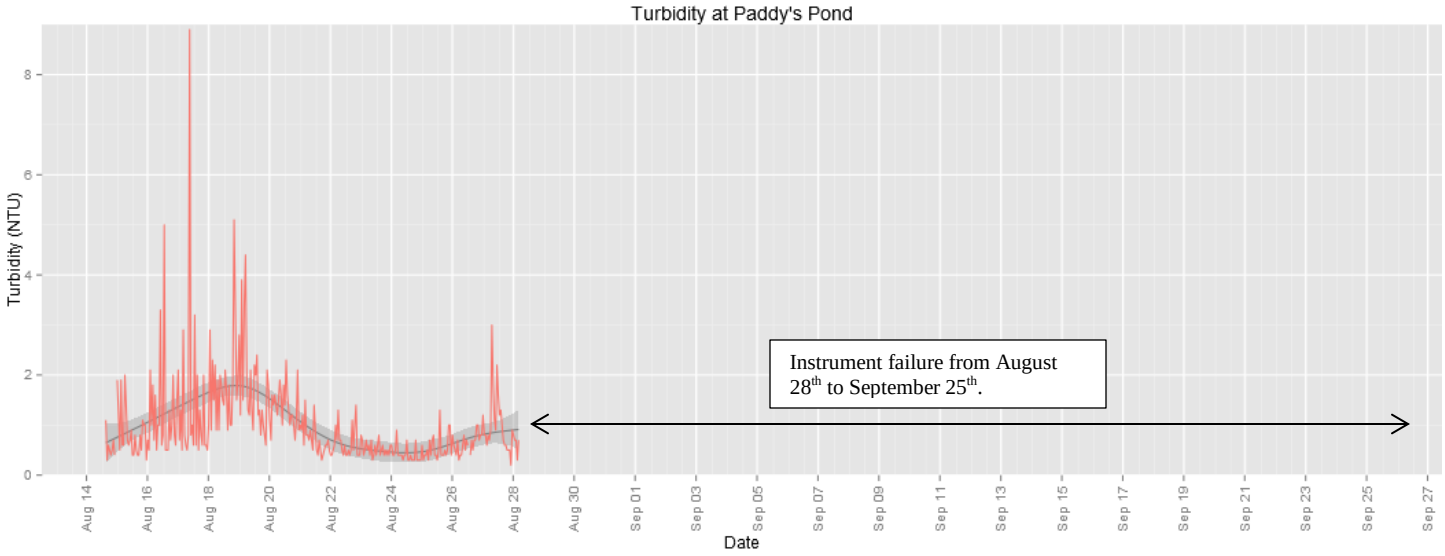


Variable	Mean	Median	Min	Max
DO (mg/l)	8.92	8.88	7.81	10.11
DO ('%-Sat')	95.30	94.10	85.30	110.60

- Decreasing water temperature allows for a higher oxygen saturation level. Consequently, dissolved oxygen concentration increased through the available deployment period. Warm air temperature (and water temperature) on August 19th and 20th, resulted in a subsequent drop in concentrations.

Turbidity

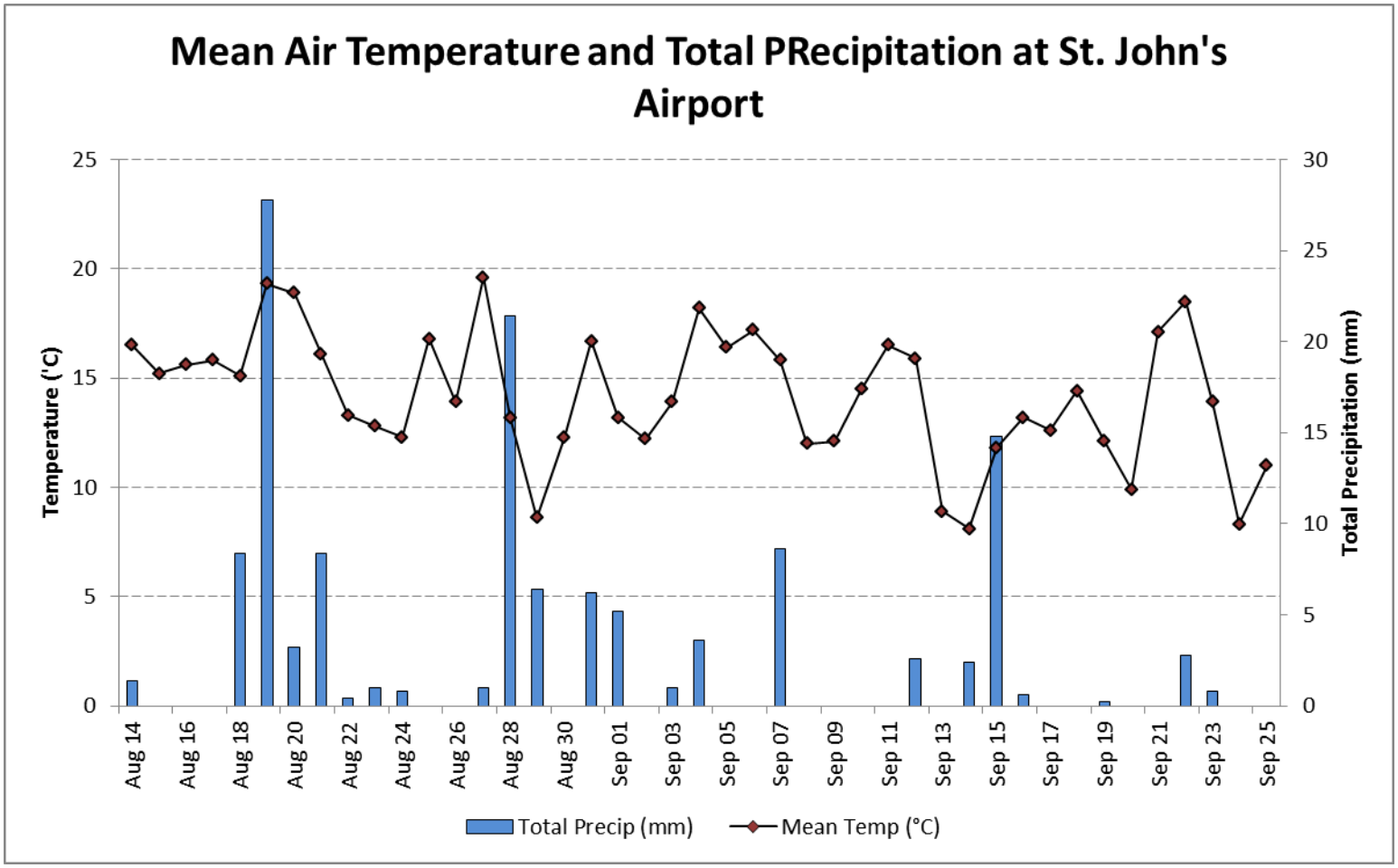
Turbidity is typically caused by fine suspended solids such as silt, clay, or organic material. Consistently high levels of turbidity tend to block sunlight penetration into a waterbody, discouraging plant growth. High turbidity can also damage the delicate respiratory organs of aquatic animals and cover spawning areas.



Mean	Median	Min	Max
1.0	0.7	0.2	8.9

- Turbidity was found to be low during the available deployment period with occasional peaks that may have been influenced by precipitation and weather conditions.

Appendix



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