Real-Time Water Quality Deployment Report

Paddy's Pond

November 9, 2017 to December 8, 2017

Newfoundland Labrador

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

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2017-11-09 to 2017-12-08

General

- Department of Municipal Affairs and Environment staff monitors the real-time web pages consistently.
- Hydrometric data included in this report is provisional and used only for illustrative purposes. Corrected and finalized data may be retrieved from the Water Survey of Canada website (http://www.ec.gc.ca/rhc-wsc/)*.

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.

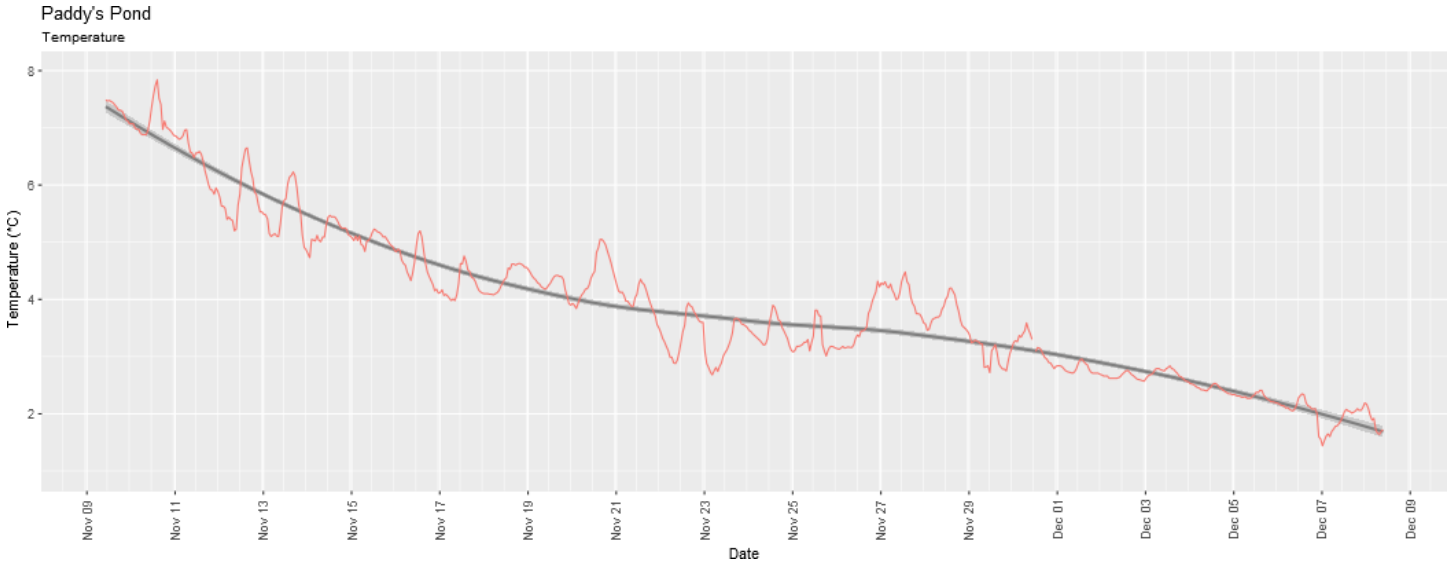
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Paddy's Pond	November 9, 2017	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	December 8, 2017	Removal	Good	Good	Fair	Fair	Excellent

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.

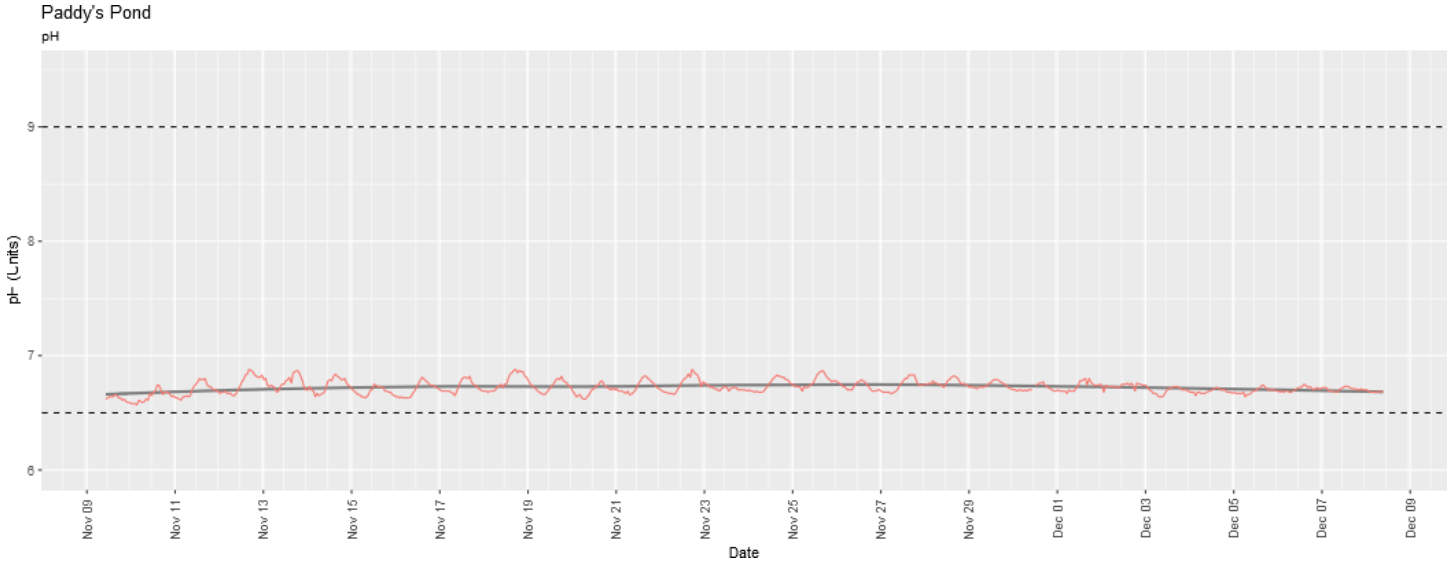


Mean	Median	Min	Max
3.93	3.74	1.44	7.84

- The seasonal decline in water temperature saw a range of 6.4°C from early November to early December. A decline is expected to continue into late December and January before the annual minimum temperature is reached on a consistent basis.

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.

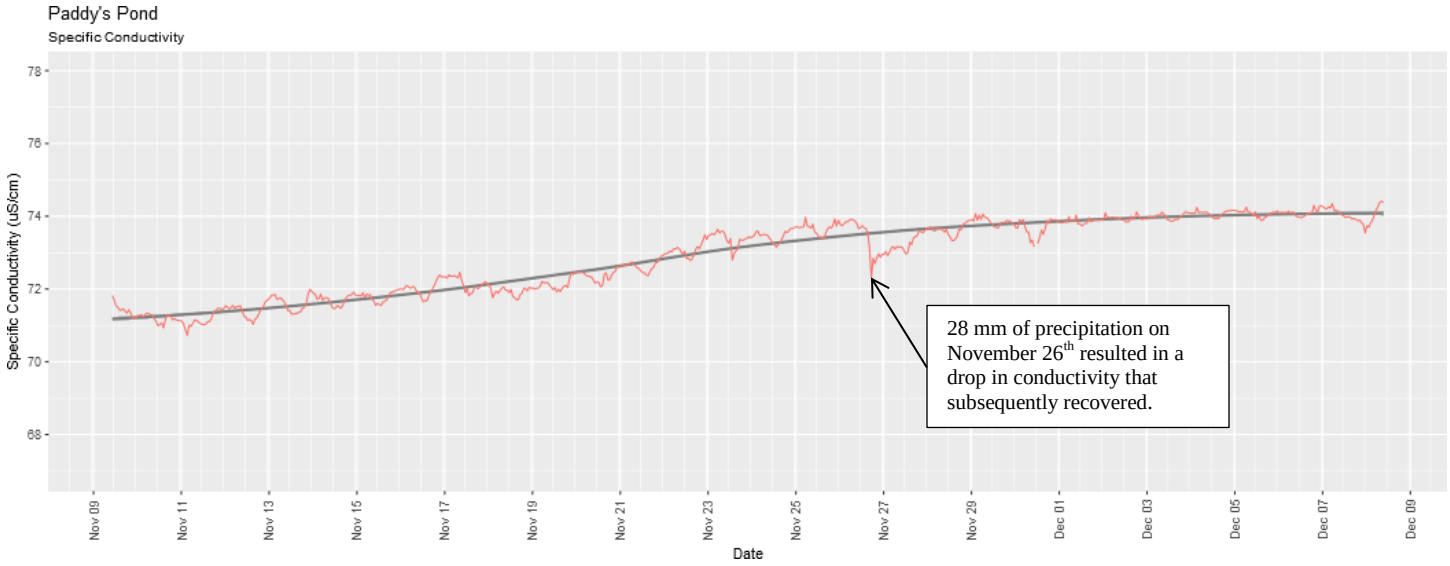


Mean	Median	Min	Max
6.72	6.72	6.57	6.88

- All pH values were found to be within the CCME guidelines of 6.5 to 9 for the protection of cold-water aquatic life. Diurnal cycling in pH was visible through the majority of the deployment period, although appears to decline in magnitude towards the end of the deployment period. This indicates a slowing of metabolic processes as water temperature and solar intensity wanes into late autumn.

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.

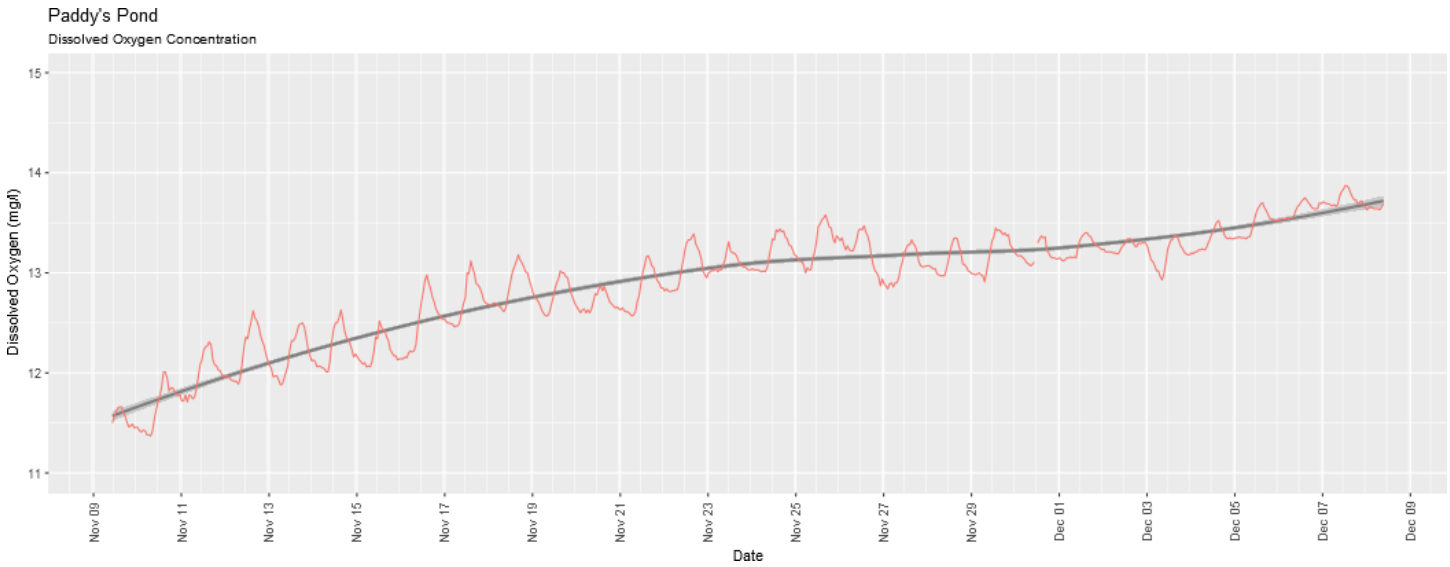


Mean	Median	Min	Max
72.90	73.17	70.73	74.42

- Specific conductivity increased steadily into the deployment period. Twenty seven millimeters of precipitation on November 26th caused a sharp drop in conductivity that subsequently recovered.

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.

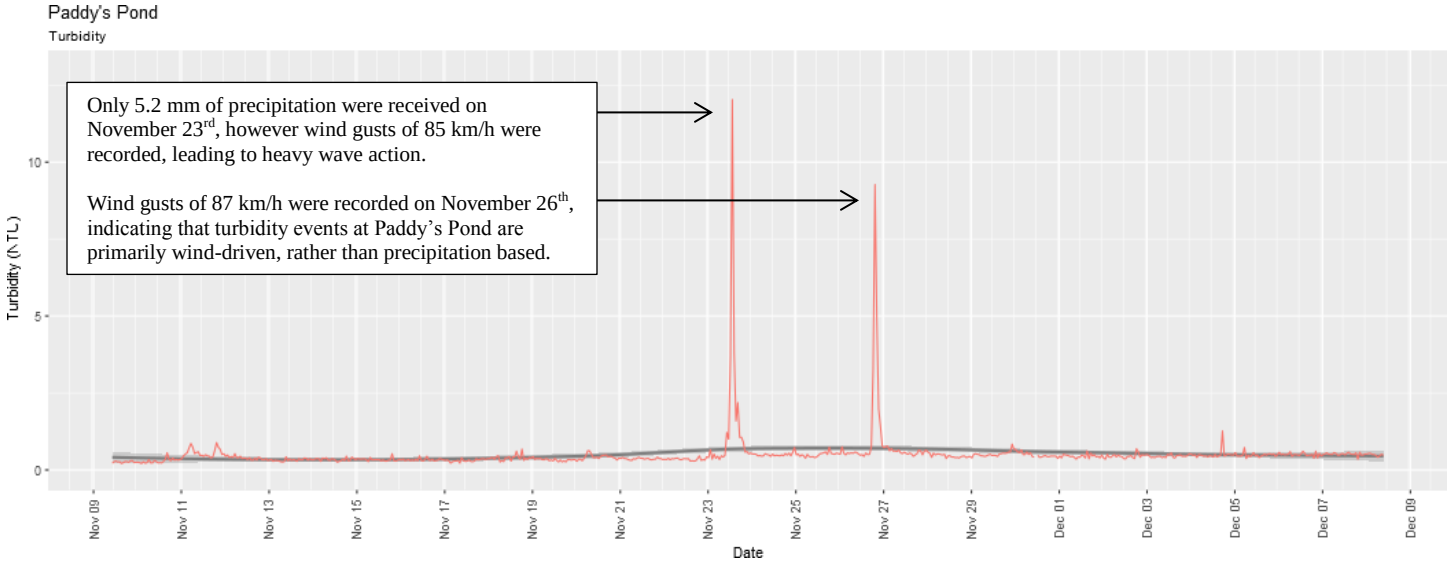


Mean	Median	Min	Max
12.88	13.03	11.37	13.87

- A steady increase in dissolved oxygen concentration was observed in conjunction with a declining temperature. Diurnal cycling in dissolved oxygen also become more muted towards the end of the deployment period, much like pH. This is likely a combination of a slowing of biological processes in Paddy's Pond and a drop in temperature range between daytime and nighttime temperatures.

Turbidity

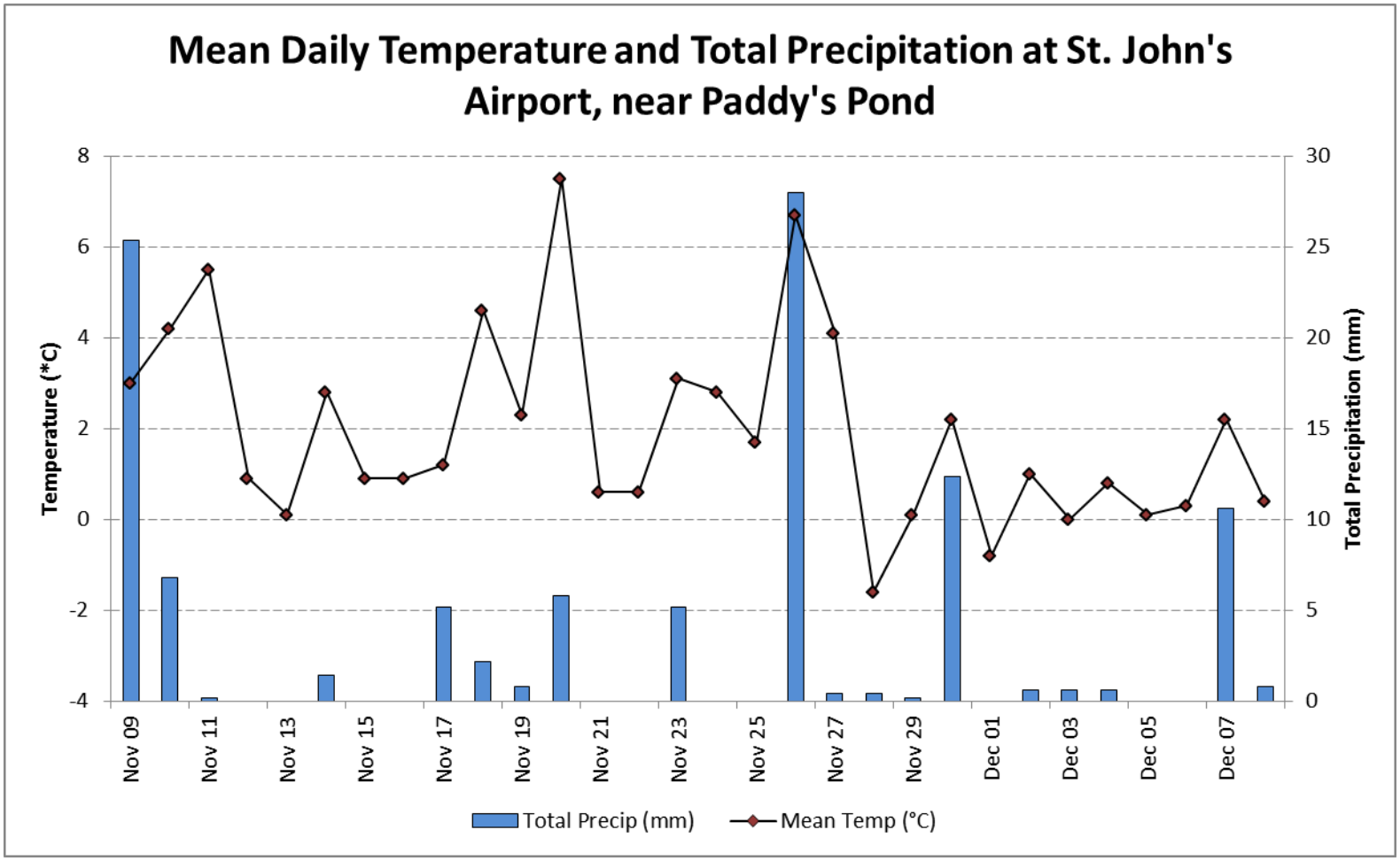
Turbidity is typically caused by fine suspended solids such as silt, clay, or organic material. Consistently high levels of turbidity tend to block sunlight penetration into a waterbody, discouraging plant growth. High turbidity can also damage the delicate respiratory organs of aquatic animals and cover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



Mean	Median	Min	Max
0.49	0.44	0.21	12.03

- Turbidity levels within Paddy's Pond were generally low with a couple of notable turbidity events related to precipitation and unsettled weather stirring up sediment and adding silt to the water body. No substantial trend in turbidity was noted during the deployment period.

Appendix


Mean Daily Temperature and Total Precipitation at St. John's Airport, near Paddy's Pond
Temperature (*C)
Total Precipitation (mm)
8
6
4
2
0
-2
-4
30
25
20
15
10
5
0
Nov 09
Nov 11
Nov 13
Nov 15
Nov 17
Nov 19
Nov 21
Nov 23
Nov 25
Nov 27
Nov 29
Dec 01
Dec 03
Dec 05
Dec 07
Total Precip (mm)
Mean Temp (°C)