Real-Time Water Quality Deployment Report

Paddy's Pond

July 28, 2017 to September 7, 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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2017-07-28 to 2017-09-07

General

- Department of Municipal Affairs and Environment staff monitors the real-time web pages consistently.
- All water quality parameters were found to be within expected ranges during this deployment period.

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.

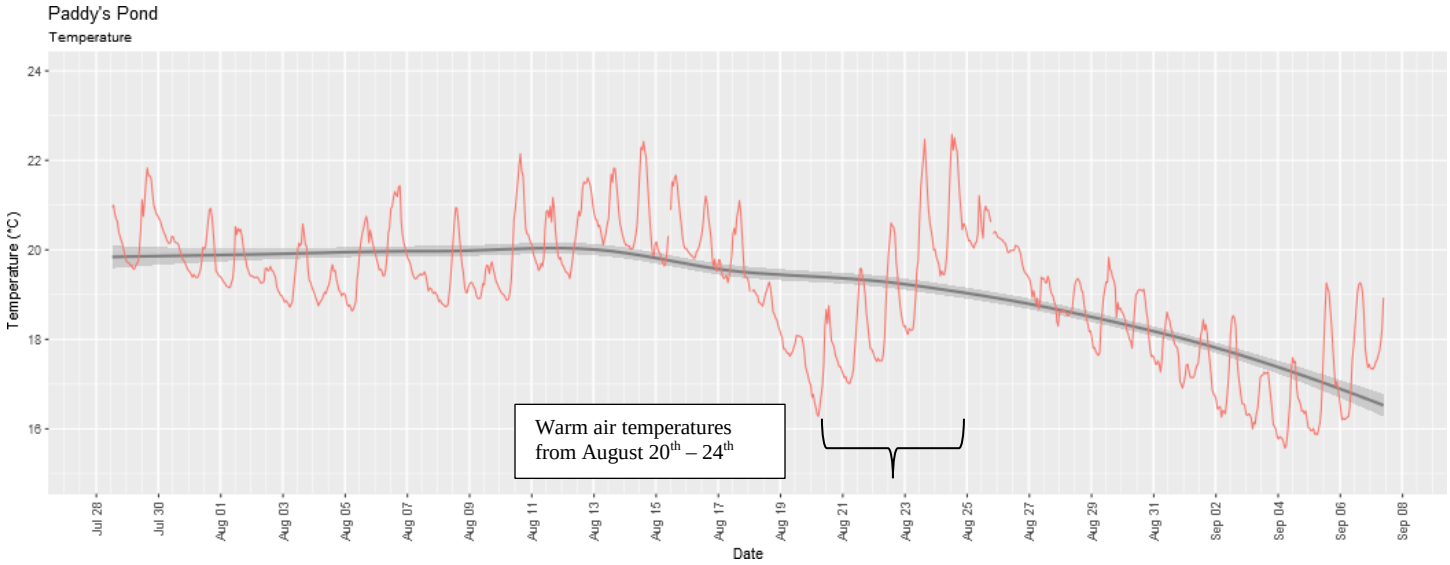
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Paddy's Pond	July 28, 2017	Deployment	Good	Excellent	Excellent	Excellent	Excellent
	September 7, 2017	Removal	Good	Good	Good	Excellent	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.

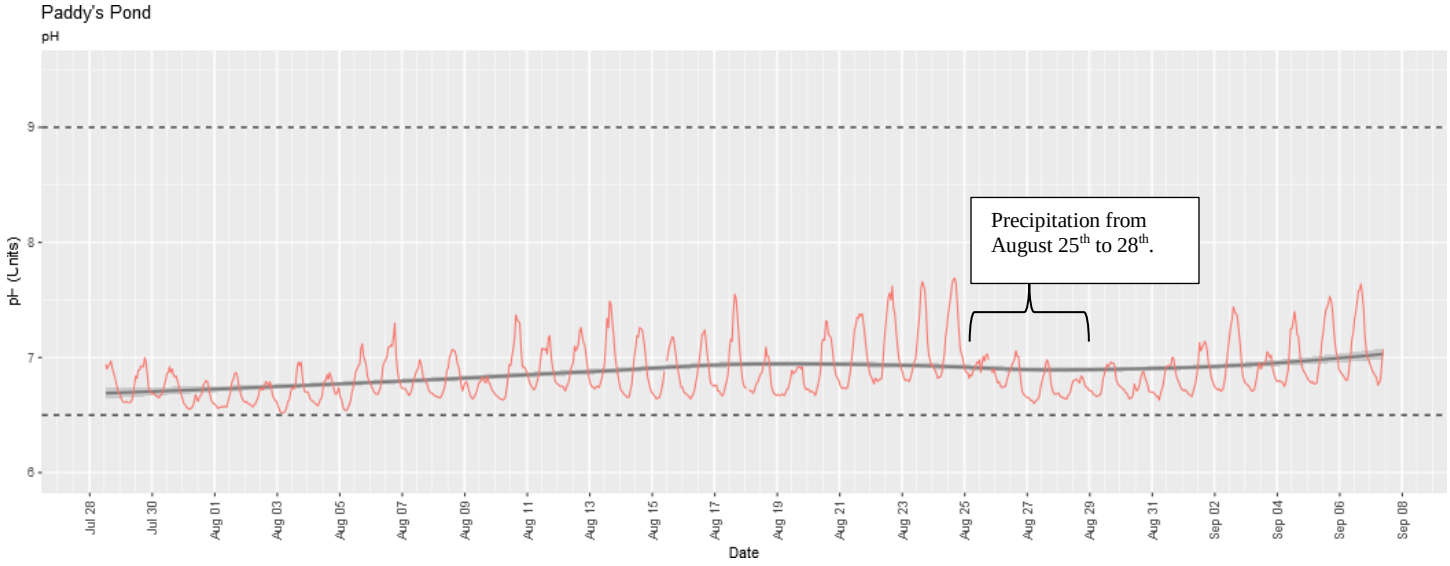


Mean	Median	Min	Max
19.15	19.35	15.57	22.58

- From deployment until August 14th, water temperature was more or less stable. A drop in air temperature resulted in a decline that heralded the decline from summer to fall water temperatures. A warm spell from August 20th to 24th briefly interrupted the downward trend.

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.

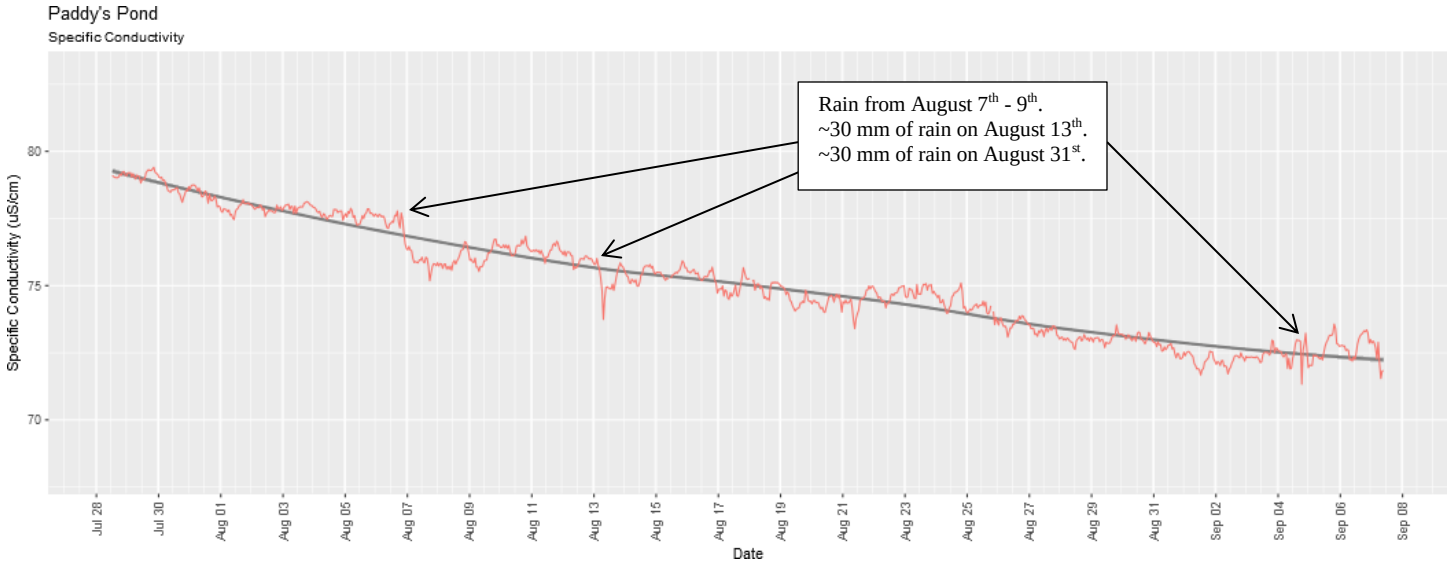


Mean	Median	Min	Max
6.86	6.80	6.52	7.69

- A slow rising pH and increasing magnitude of diurnal cycles is the hallmark of this deployment period. All pH values were found to reside within CCME guidelines of 6.5 to 9 for the protection of aquatic life. Cool weather and several days of precipitation beginning on August 25th resulted in a suppression of pH and diurnal cycling which later resumed.

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.

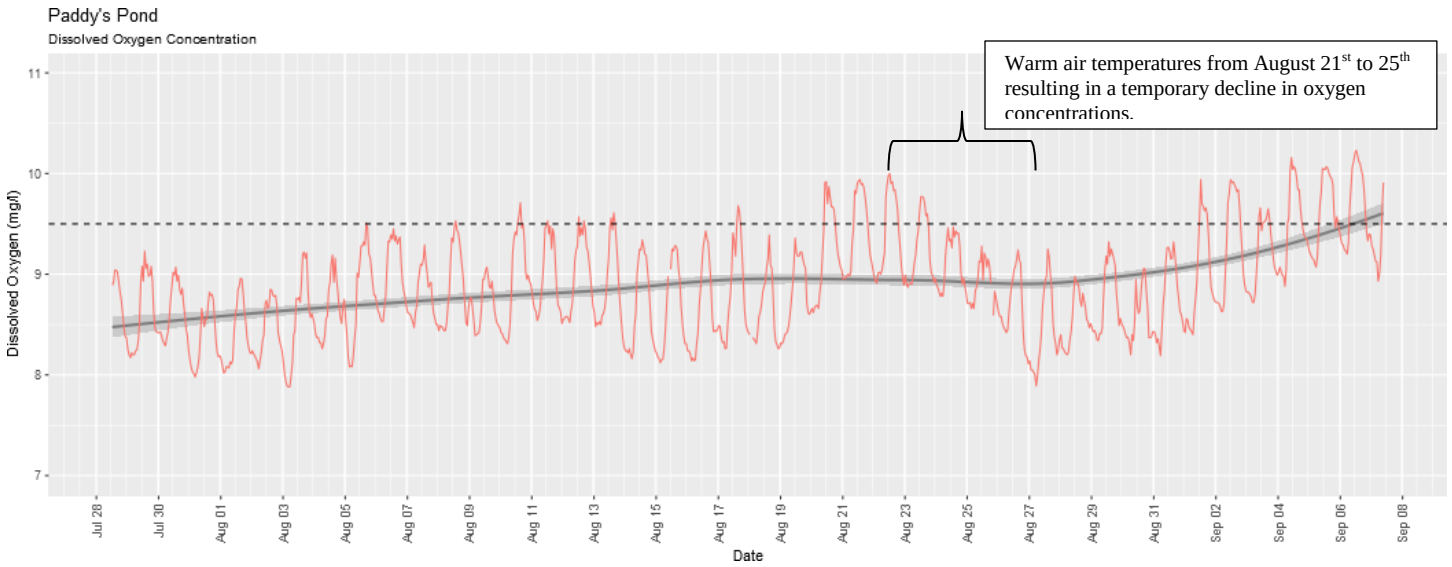


Mean	Median	Min	Max
75.15	74.98	71.33	79.41

- A steady downward trend in conductivity is apparent during this deployment period. A few instances of isolated drops with a resumption of the background decline punctuate the trend as indicated.

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.

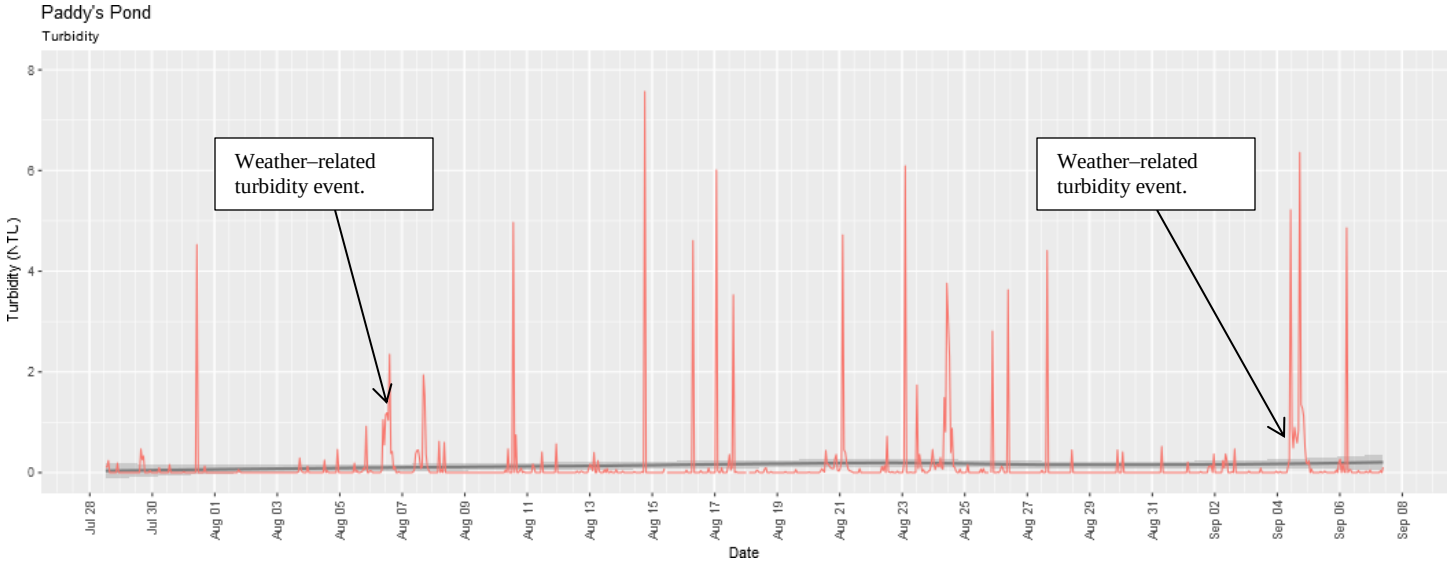


Variable	Mean	Median	Min	Max
DO (mg/l)	8.88	8.85	7.88	10.23
DO ('%-Sat')	96.07	95.40	84.50	111.90

- As water temperature declined over the latter part of the deployment period, dissolved oxygen concentration subsequently increased. This increase is expected to continue into the winter months.

Turbidity

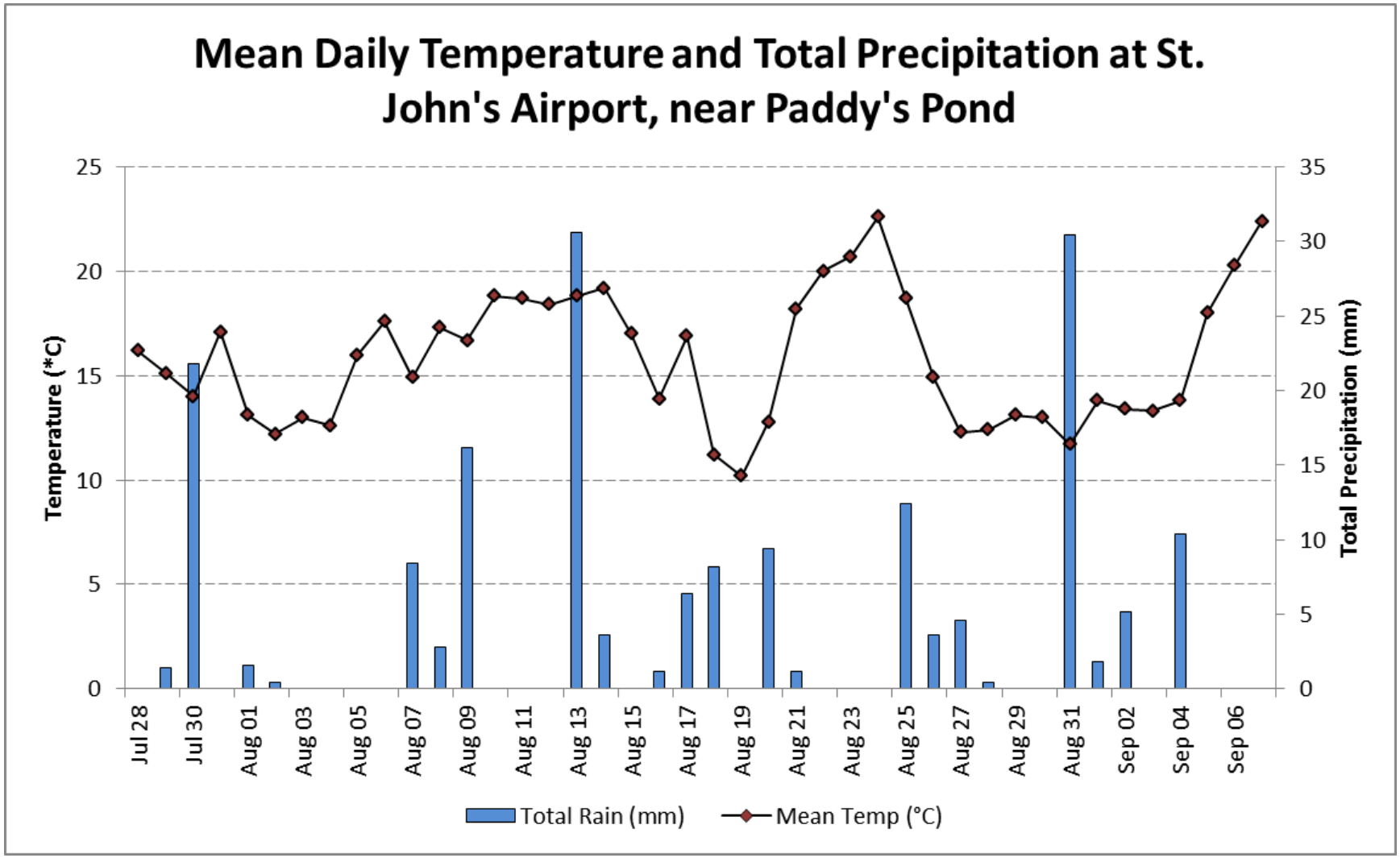
Turbidity is typically caused by fine suspended solids such as silt, clay, or organic material. Consistently high levels of turbidity tend to block sunlight penetration into a waterbody, discouraging plant growth. High turbidity can also damage the delicate respiratory organs of aquatic animals and cover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



Mean	Median	Min	Max
0.14	0.00	0.00	7.57

- Turbidity levels were largely low during this deployment period, with occasional spikes reaching a high of 7.57 NTU. Some of these spikes were found to be associated with precipitation events. Others may be due to wave action stirring up debris and sediments.

Appendix


Mean Daily Temperature and Total Precipitation at St. John's Airport, near Paddy's Pond
Temperature (*C)
Total Precipitation (mm)
25
20
15
10
5
0
35
30
25
20
15
10
5
0
Jul 28
Jul 30
Aug 01
Aug 03
Aug 05
Aug 07
Aug 09
Aug 11
Aug 13
Aug 15
Aug 17
Aug 19
Aug 21
Aug 23
Aug 25
Aug 27
Aug 29
Aug 31
Sep 02
Sep 04
Sep 06
Total Rain (mm)
Mean Temp (°C)