

Real-Time Water Quality Deployment Report

Paddy's Pond at Outlet

April 12, 2019 to June 12, 2019



Government of Newfoundland & Labrador
Department of Municipal Affairs and Environment
Water Resources Management Division
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General

- Department of Municipal Affairs and Environment staff monitors the real-time web pages consistently.
- This deployment follows a long-term winter period of under-ice monitoring.
- 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

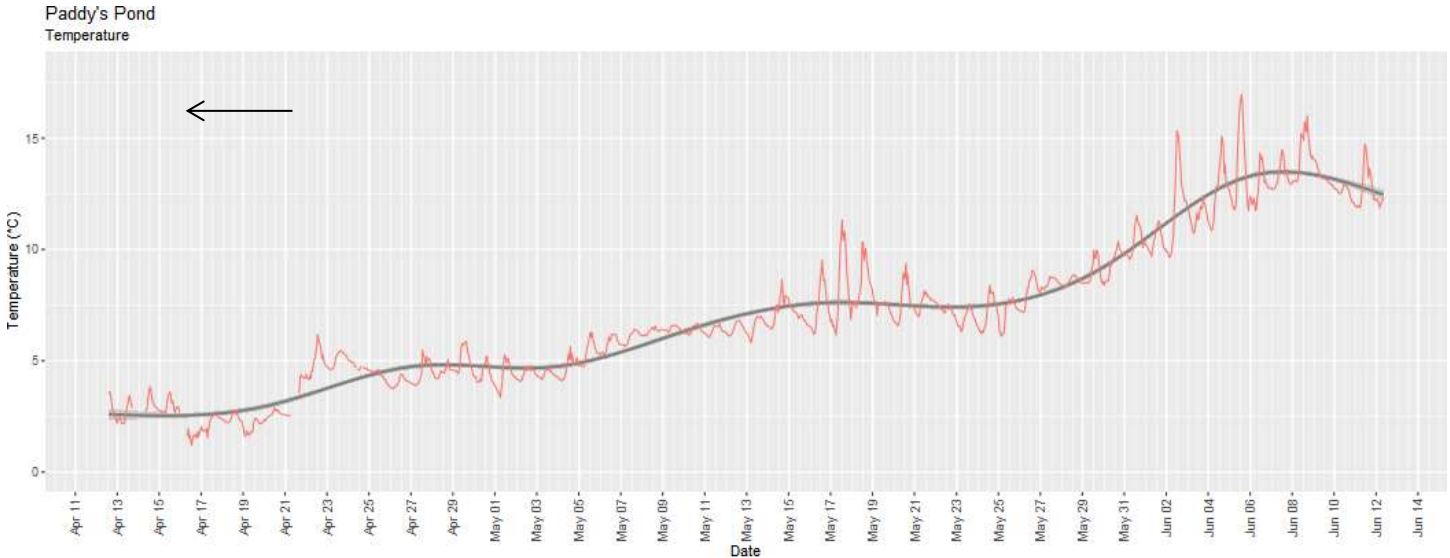
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Paddy's Pond at Outlet	April 12, 2019	Deployment	Excellent	NA	Excellent	Excellent	Excellent
	June 12, 2019	Removal	Excellent	NA	Excellent	Excellent	Excellent

- The QAQC sonde was the same during deployment and removal. The pH sensor was under deferred maintenance and was not available for QAQC ranking.

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.

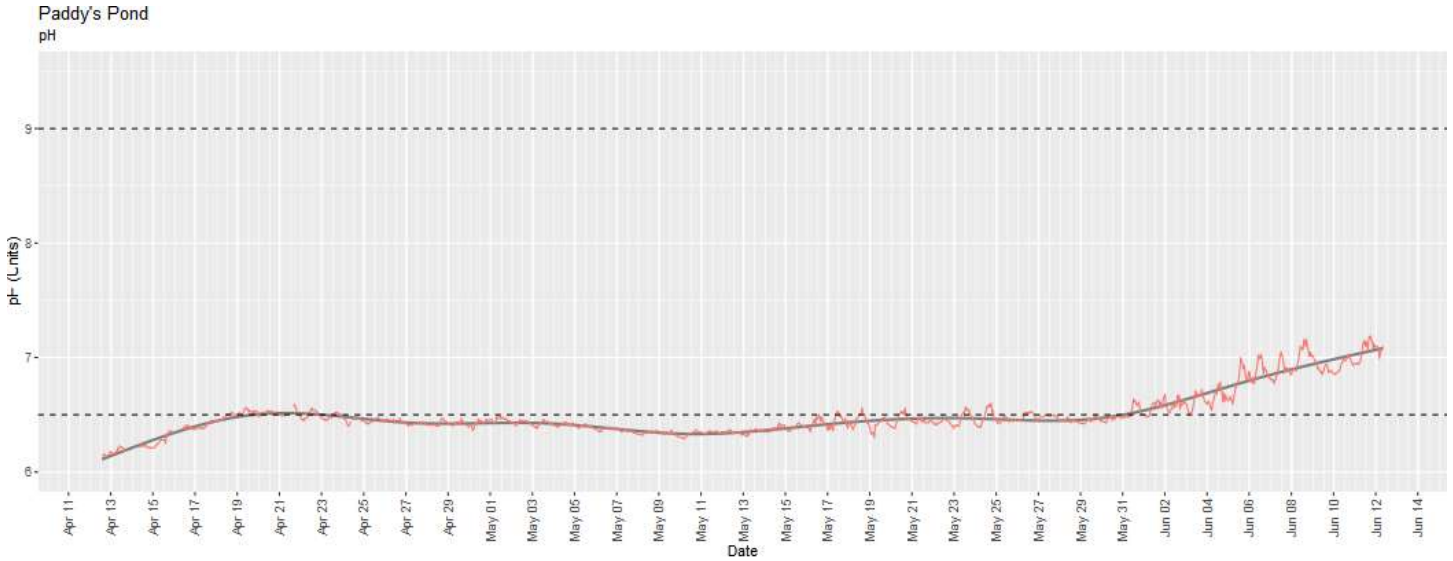


Mean	Median	Min	Max
7.12	6.55	0.41	16.98

- Water temperature increased steadily during this deployment period through to a cooling period in mid-June.

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.

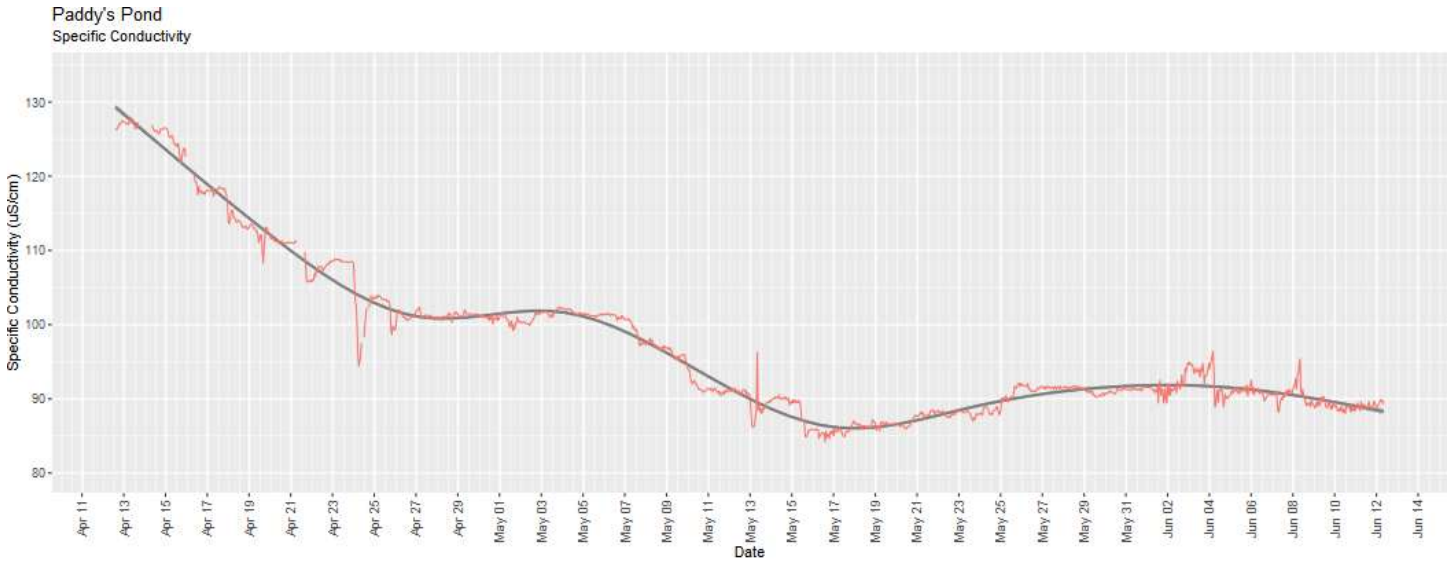


Mean	Median	Min	Max
6.50	6.45	6.14	7.19

- For the first week of this deployment period, pH increased to sit just at the lower CCME guideline of 6.5. pH remained mostly stable until early June when pH began to increase towards the end of the deployment period.

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.

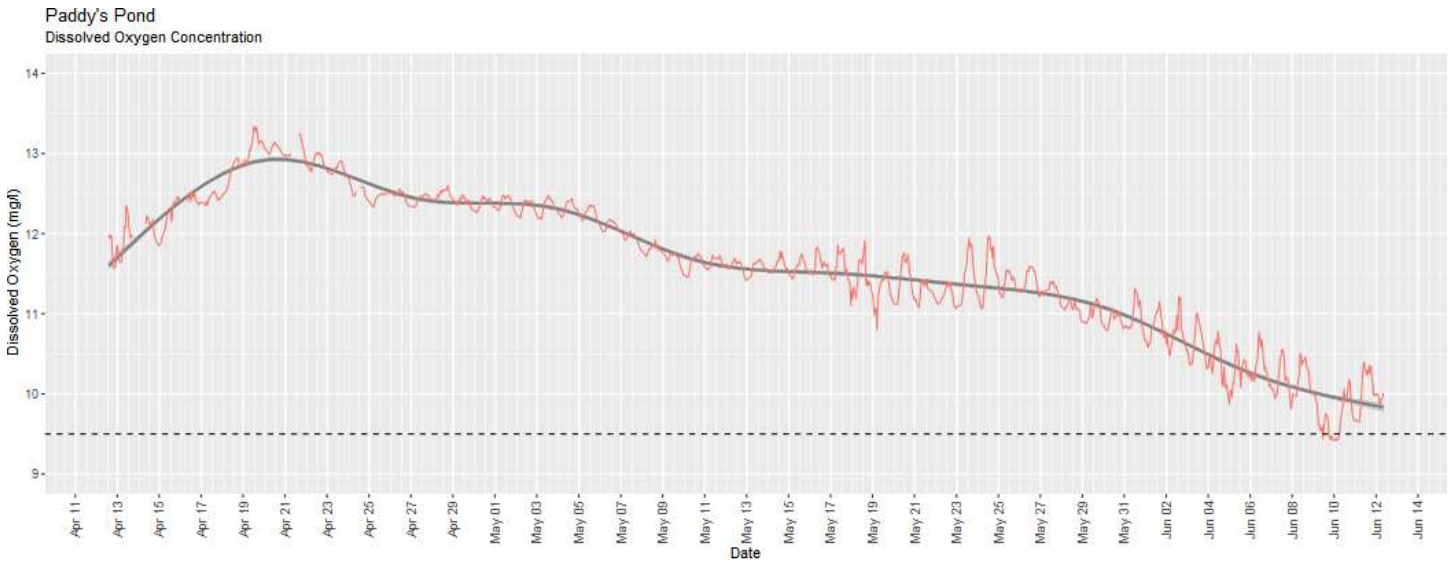


Mean	Median	Min	Max
97.10	91.70	84.17	127.95

- Specific conductivity fell drastically during this deployment period from a max of 127.95 uS/cm to a minimum of 84.17 uS/cm. A well-defined plateau appears to be in response to two distinct periods of heavy precipitation in late April and another in early-mid May.

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.

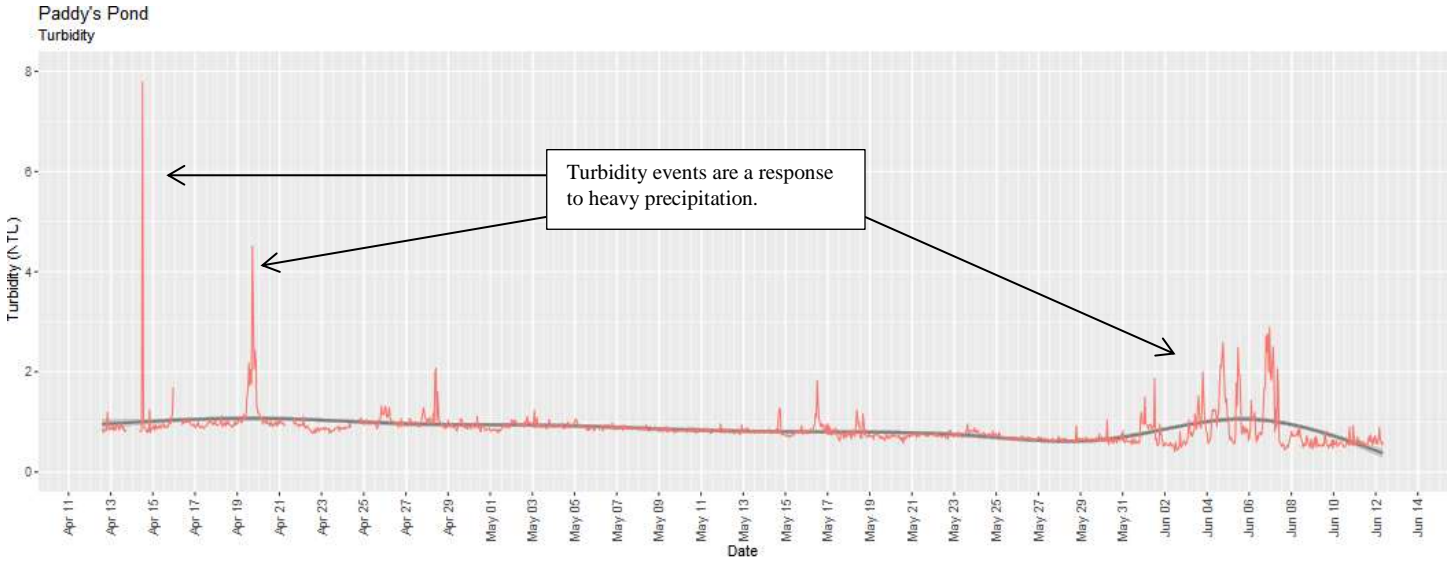


Mean	Median	Min	Max
11.61	11.64	9.42	13.34

- Overall dissolved oxygen declined as water temperature increased. By June 9th, dissolved oxygen concentration fell below the CCME guideline of 9.5 mg/l DO for the protection of early life stage aquatic life which is typical for the time of year. By this time of year most aquatic organisms have developed beyond the most sensitive period of their life cycles.
- Towards the end of this deployment period, strong diurnal signals in DO are a response to both daily swings in water temperature, but also photosynthesis by aquatic vegetation.

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
0.87	0.84	0.41	7.79

- Turbidity levels were largely low during this deployment period but a declining trend in baseline turbidity is evident. Events above baseline level are a response to heavy precipitation events. As a result, events didn't last much longer than the duration of the precipitation event.

Appendix

