Real-Time Water Quality Deployment Report

Paddy's Pond

September 30, 2016 to November 25, 2016

Newfoundland Labrador

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

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General

- Department of Environment and Climate Change 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

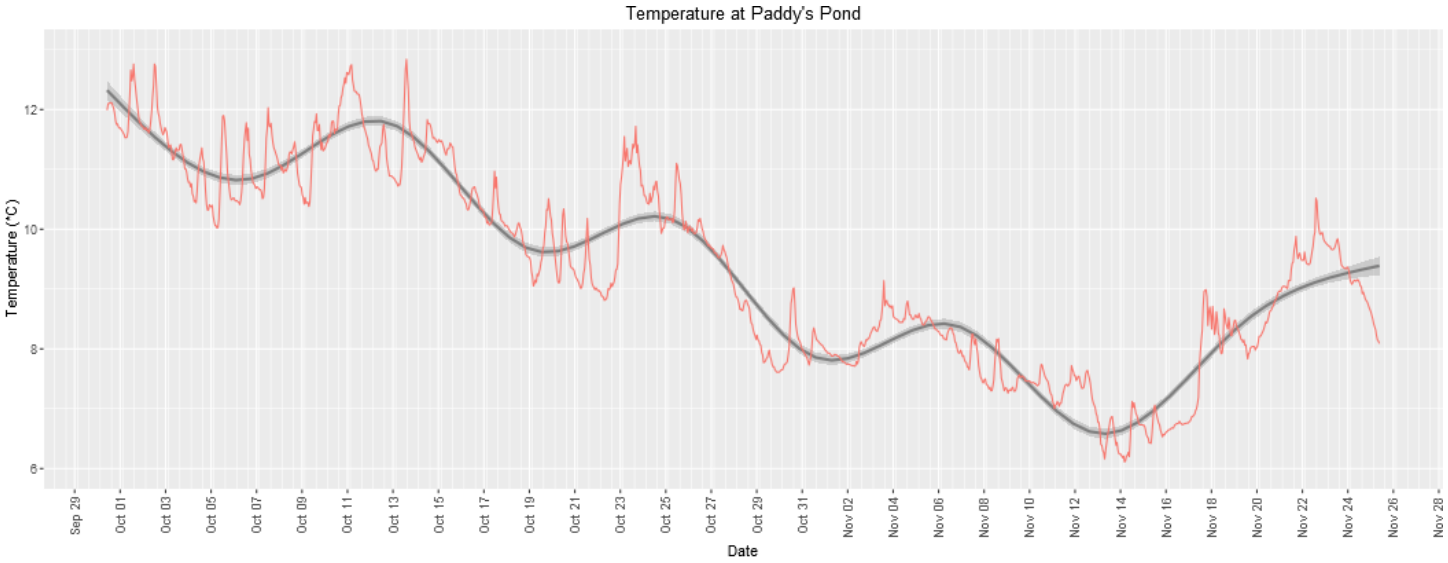
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Paddy's Pond	September 30, 2016	Deployment	NA	NA	NA	NA	NA
	November 25, 2016	Removal	Good	Poor	Fair	Excellent	Excellent

- The QAQC sonde would not connect on September 30th, preventing the calculation of rankings during deployment. The QAQC sonde pH sensor was slow to equilibrate during removal and may have led to an inaccurate 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.



variable	Mean	Median	Min	Max
Temperature (C)	9.36	9.29	6.11	12.84

- Water temperature declined from initial deployment until November 14th. A brief warming trend in the weather led to a rise in water temperature before a second falling trend was observed to finish off the deployment period.

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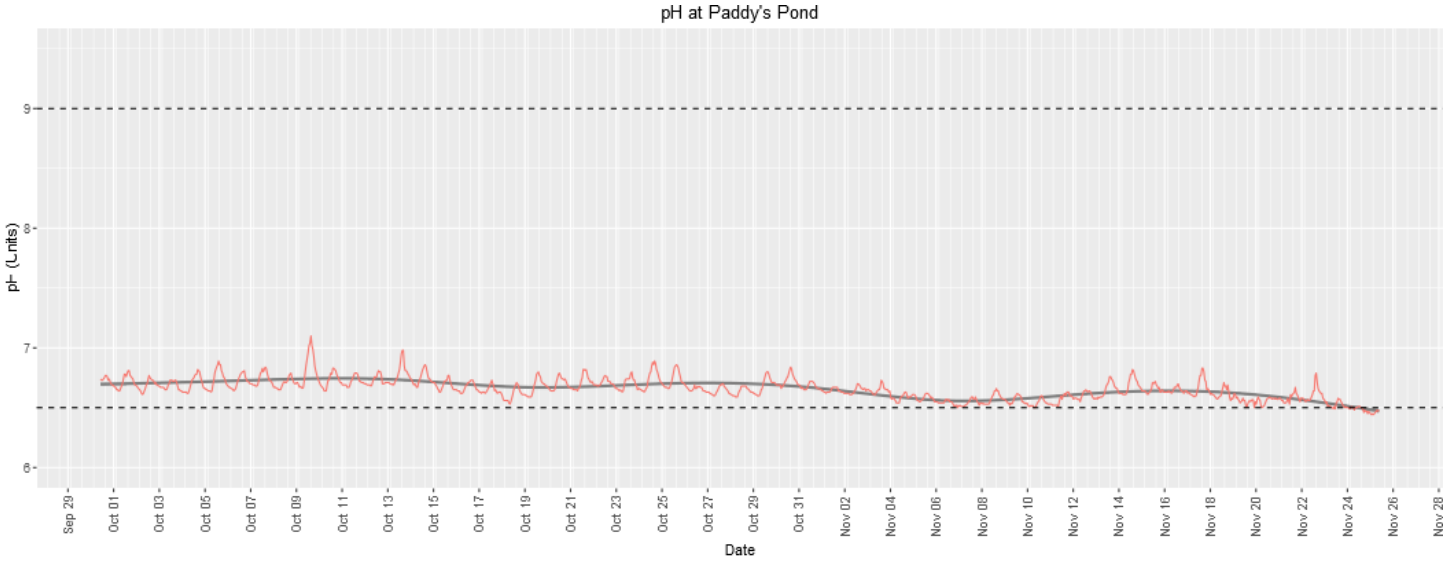
pH

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.



variable	Mean	Median	Min	Max
pH (Units)	6.66	6.65	6.44	7.10

- A slight decline in pH was observed over the course of this deployment period. Most values were found to be above the CCME pH Guideline of 6.5, however the downward trend show some values falling below the guideline.

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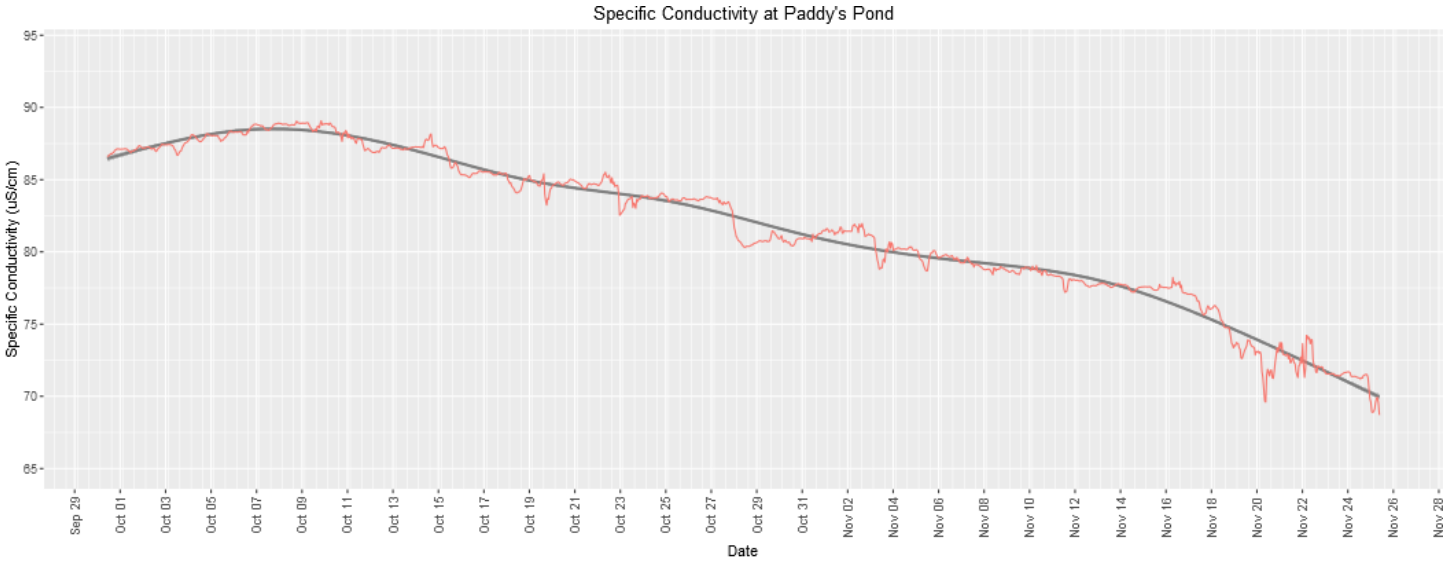
Specific Conductivity

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.



variable	Mean	Median	Min	Max
Conductivity (uS/cm)	81.80	81.71	68.71	89.08

- Specific conductivity fell throughout the deployment period – likely the result of high precipitation volume during the deployment (329 mm).

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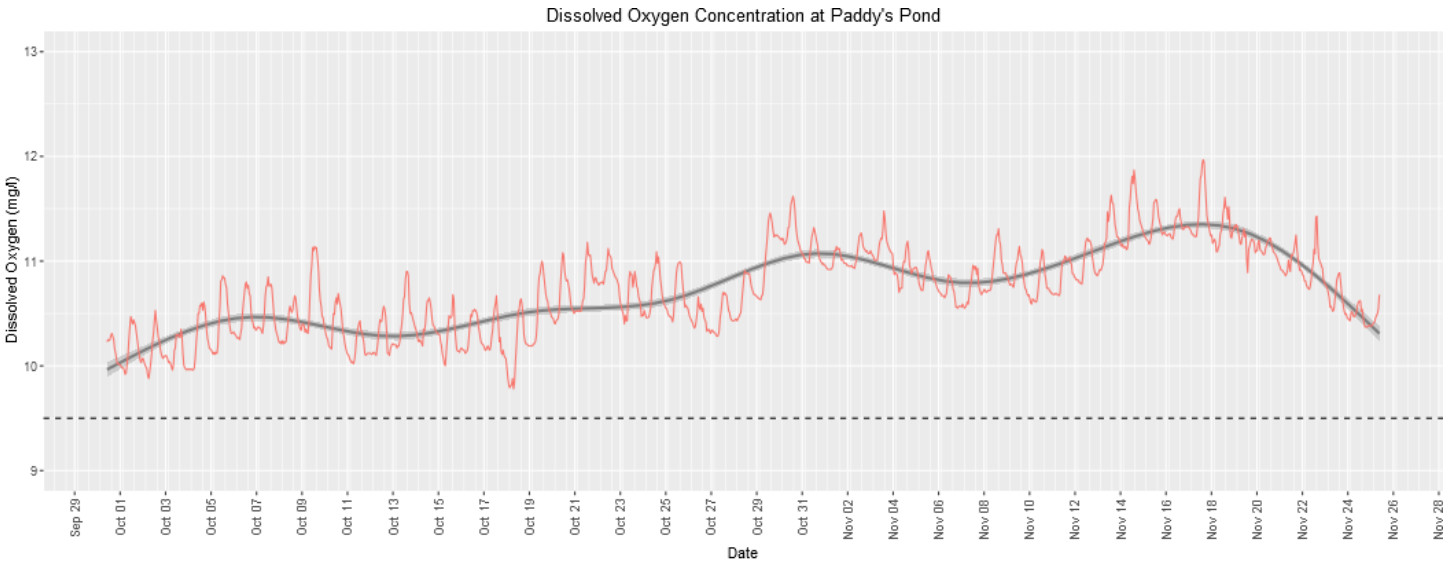
Dissolved Oxygen

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)	10.72	10.71	9.78	11.97

- As water temperature decreased, dissolved oxygen levels increased. Similarly, during the warming period near the end of the deployment, dissolved oxygen levels fell. They are expected to recover soon as water levels begin to recede once more.
- All dissolved oxygen values were found to be above the 9.5 mg/l CCME guideline for the protection of aquatic life.

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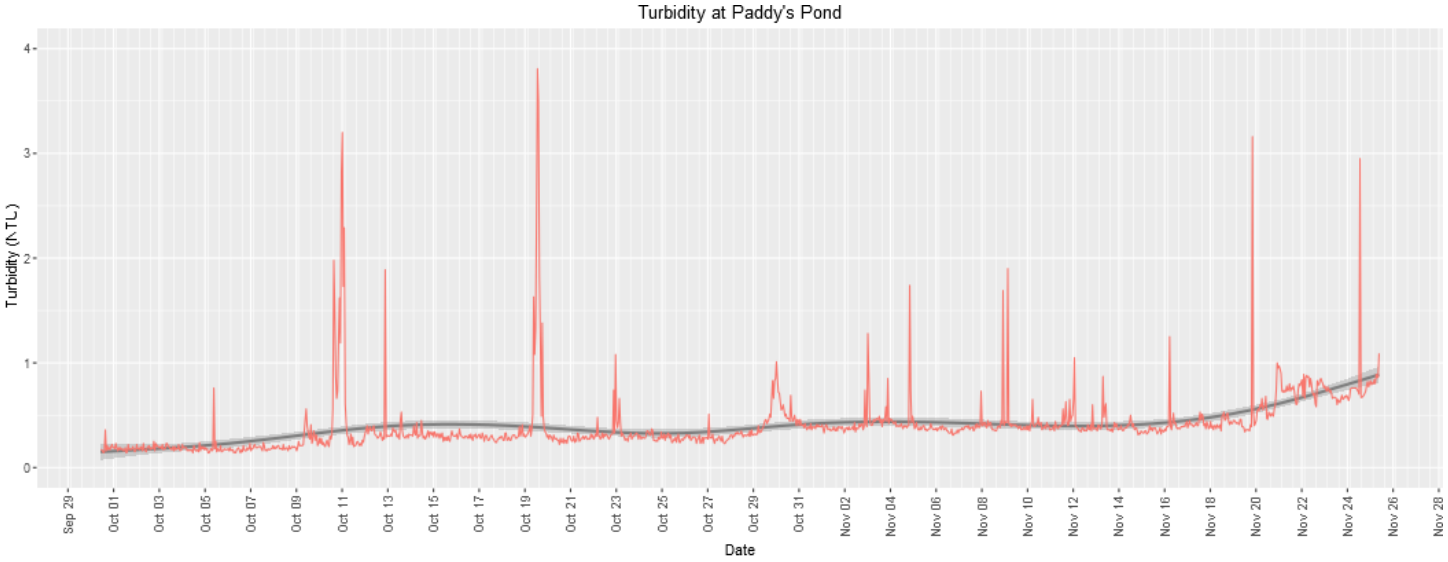
Turbidity

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.



variable	Mean	Median	Min	Max
Turb (NTU)	0.40	0.35	0.14	3.81

- A general increase in turbidity was seen over time at this station, although the maximum level of 3.81 NTU is fairly low.

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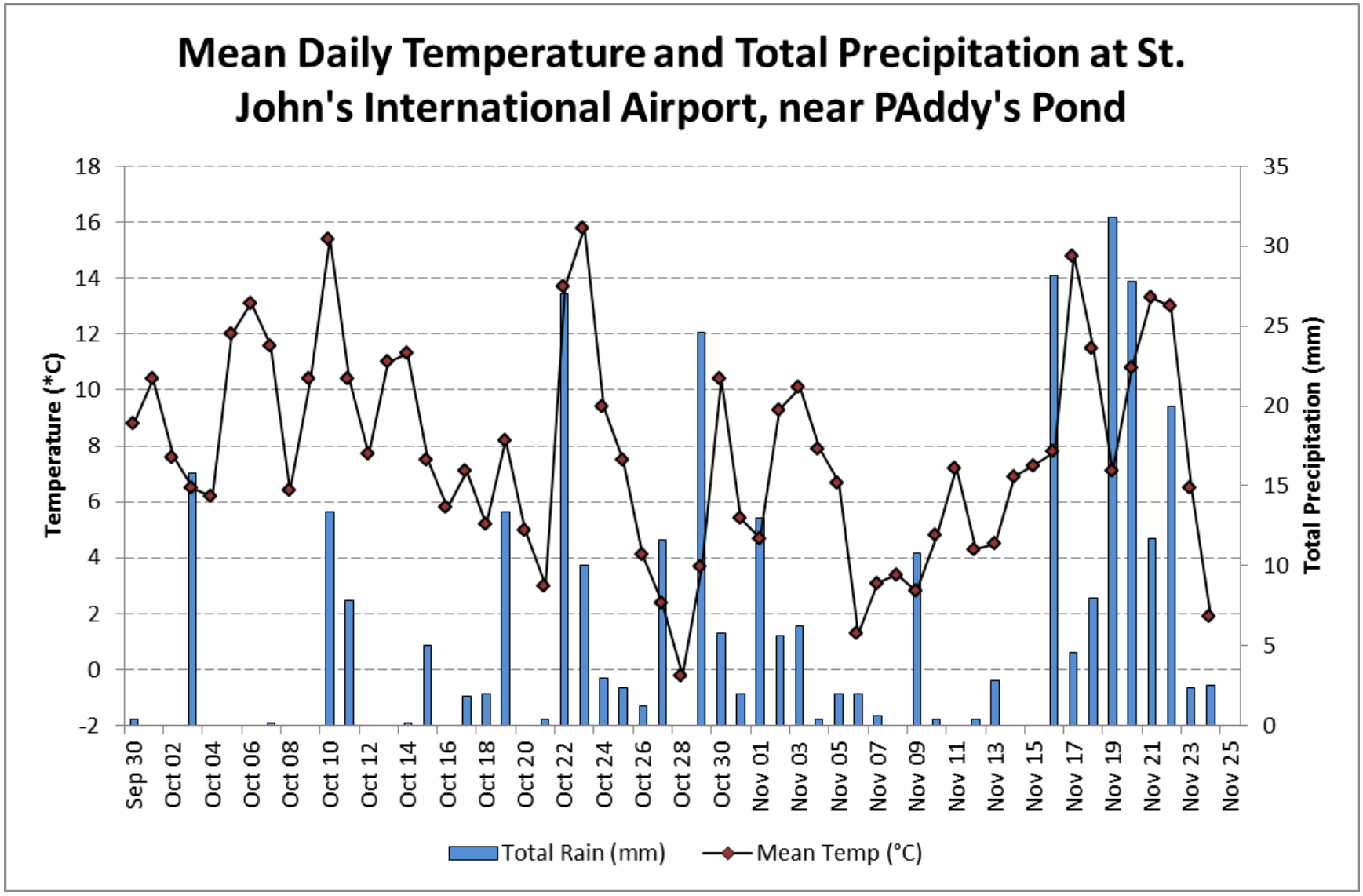
Appendix


Mean Daily Temperature and Total Precipitation at St. John's International Airport, near PAddy's Pond
Temperature (*C)
Total Precipitation (mm)
18
16
14
12
10
8
6
4
2
0
-2
35
30
25
20
15
10
5
0
Sep 30
Oct 02
Oct 04
Oct 06
Oct 08
Oct 10
Oct 12
Oct 14
Oct 16
Oct 18
Oct 20
Oct 22
Oct 24
Oct 26
Oct 28
Oct 30
Nov 01
Nov 03
Nov 05
Nov 07
Nov 09
Nov 11
Nov 13
Nov 15
Nov 17
Nov 19
Nov 21
Nov 23
Nov 25
Total Rain (mm)
Mean Temp (°C)