Real-Time Water Quality Deployment Report

Paddy's Pond

March 29, 2018 to May 25, 2018

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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2018-03-29 to 2018-05-25

General

- Department of Municipal Affairs and Environment staff monitors the real-time web pages consistently.
- Water quality parameters fell within expected levels for the time of year this report covers.

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.

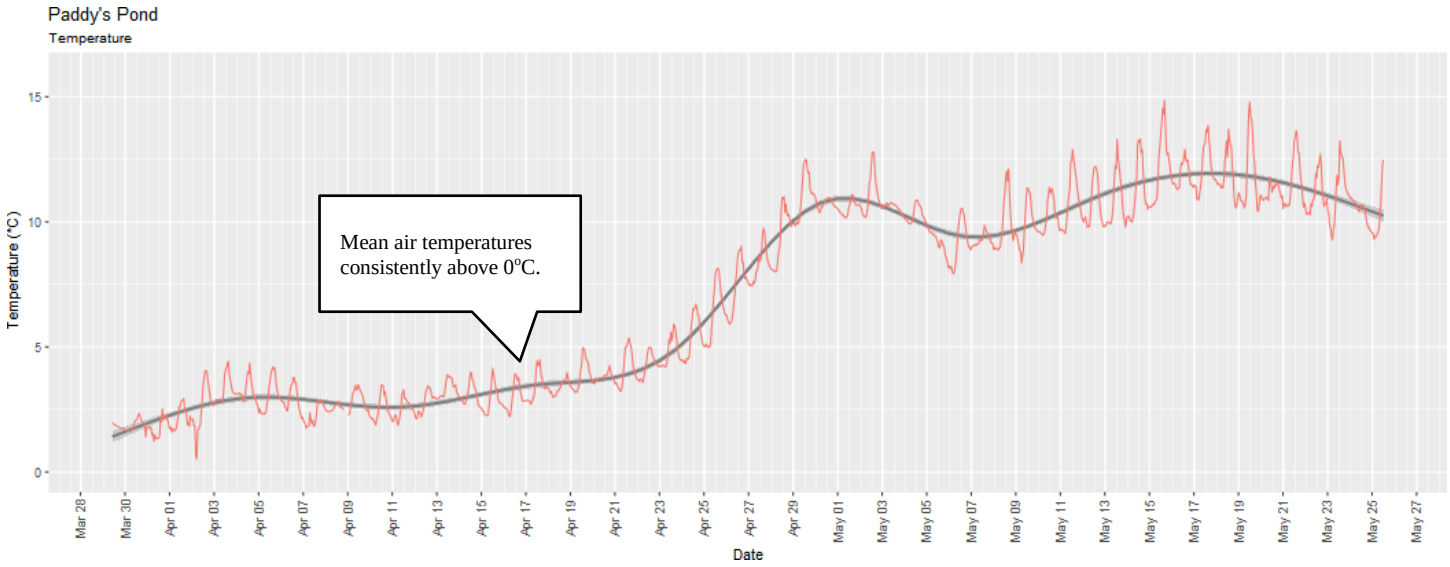
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Paddy's Pond	Deployment	March 29, 2018	Excellent	Good	Good	Excellent	Excellent
	Removal	May 25, 2018	Excellent	Excellent	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.

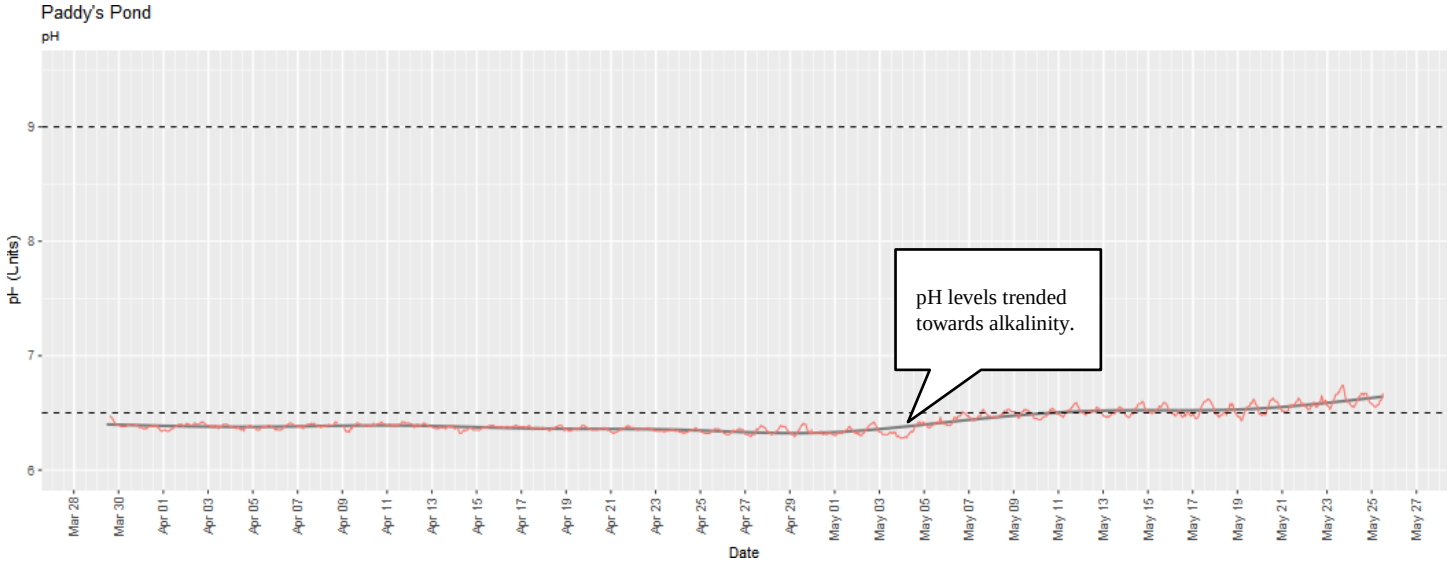


Mean	Median	Min	Max
7.04	8.01	0.52	14.85

- The springtime water temperature increase is well underway during this deployment period with a range in water temperature of 14.33°C. Mean daily air temperatures were consistently above 0°C from April 17th onwards and resulted in rapidly rising water temperatures soon after.

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.

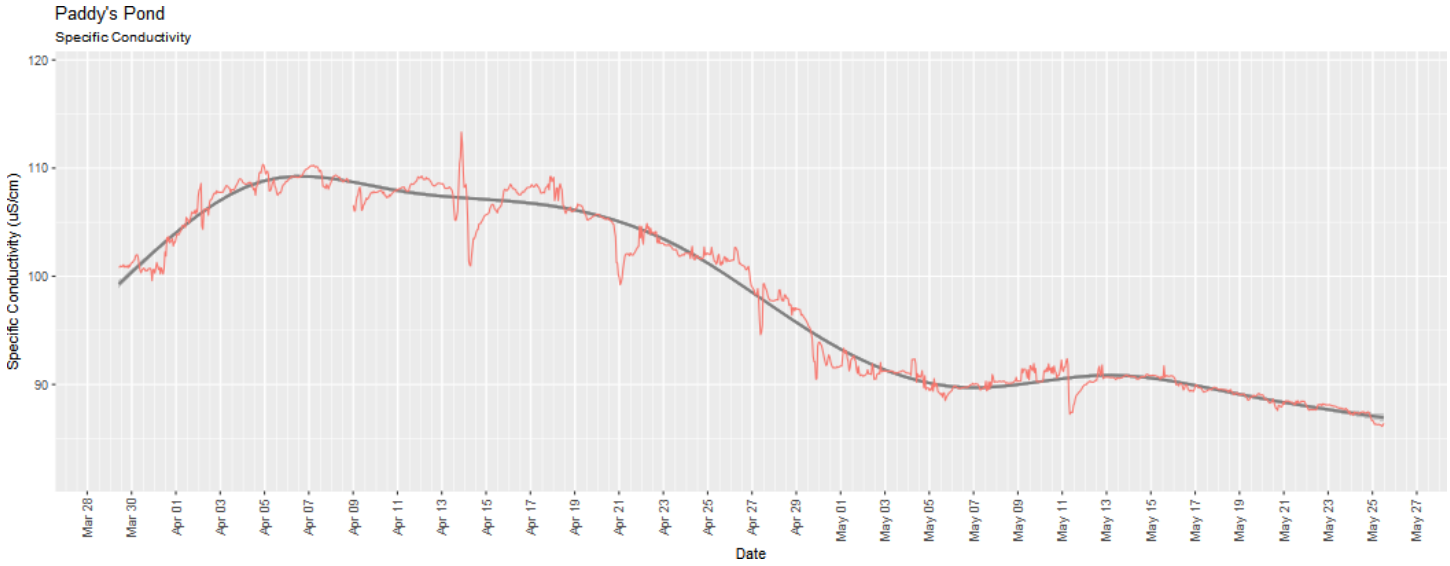


Mean	Median	Min	Max
6.42	6.39	6.28	6.74

- pH continued to decline from the previous deployment period until May 2nd when a trend towards more alkaline conditions began. pH levels increased above the minimum CCME guideline for the protection of aquatic life on May 9th.
- This identified trend towards alkalinity is likely related to a resurgence of photosynthesis by aquatic vegetation. With the resumption of photosynthesis, there is a net reduction in dissolved carbon dioxide and a resultant decrease in carbonic acid concentration in the water column.

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.

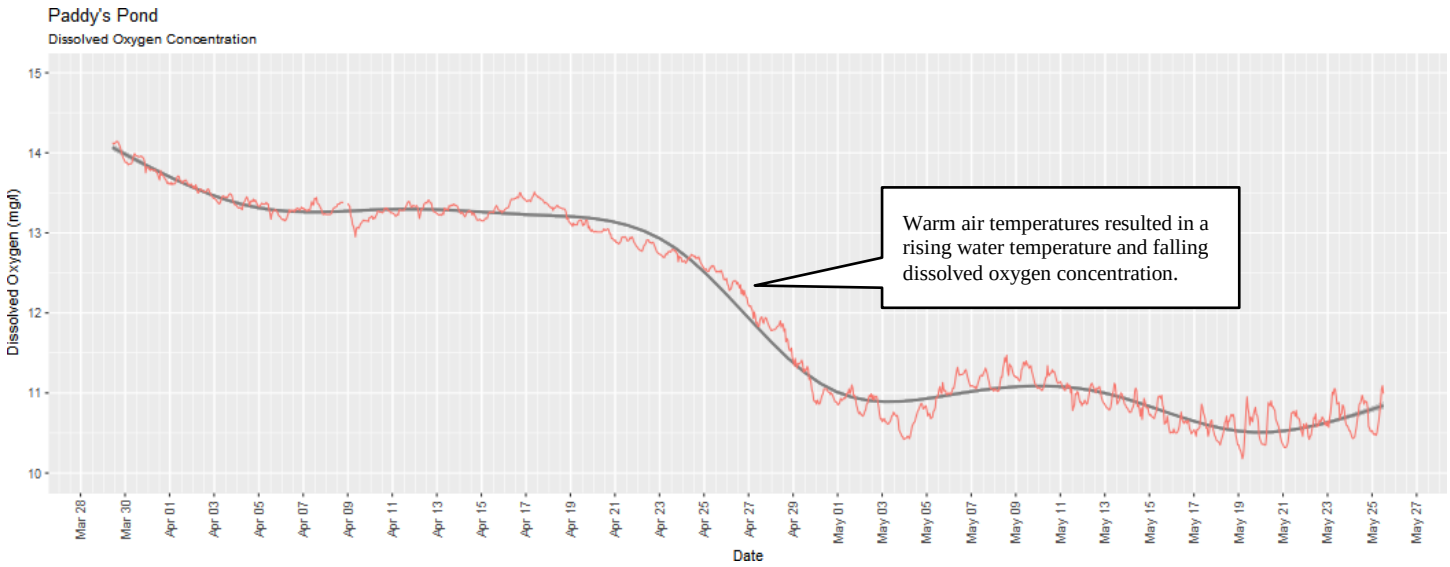


Mean	Median	Min	Max
12.07	12.09	10.18	14.14

- Following the high run-off and ice control season in early April, specific conductivity began to decline into late May. Values can be expected to decline into the summer season as freshwater inputs into the water system continues to flush out dissolved solids.

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.

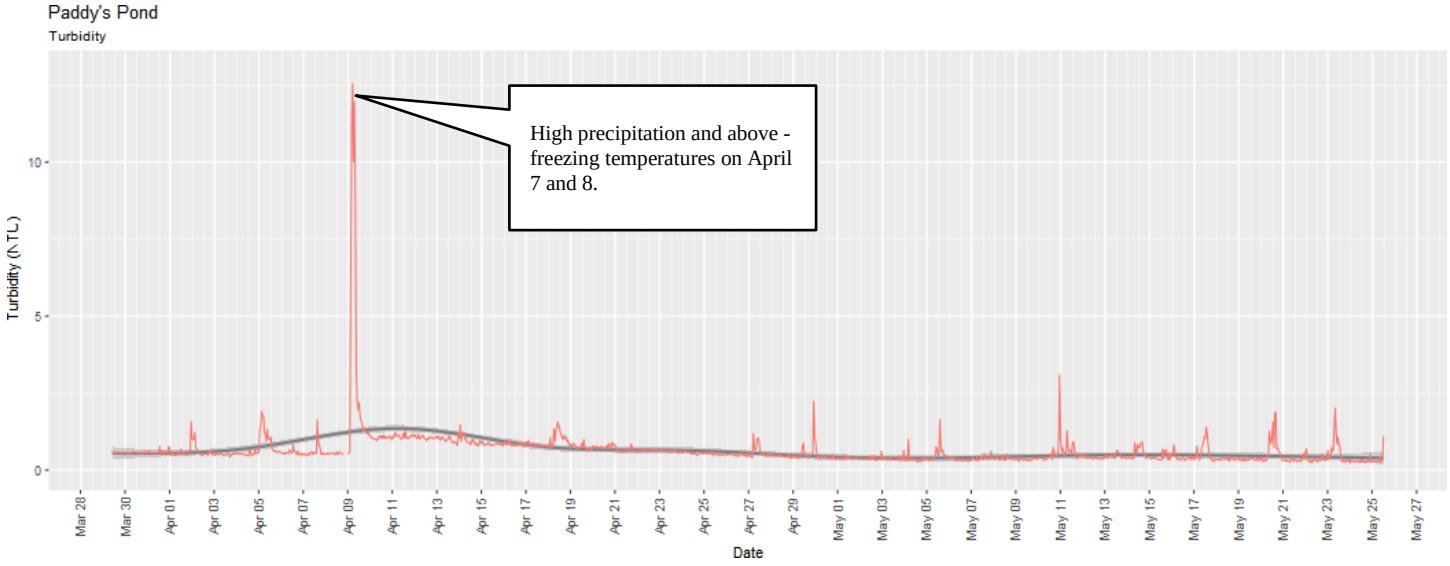


Mean	Median	Min	Max
12.07	12.09	10.18	14.14

- The seasonal downward trend in dissolved oxygen was well underway by mid-deployment as water temperatures increased at Paddy's Pond. Dissolved oxygen levels were found to be above the CCME guideline of 9.5 mg/l for the protection of early life stage aquatic life throughout the deployment. Dissolved oxygen values can be expected to approach and fall below this guideline sometime in early to mid-June as in previous years.

Turbidity

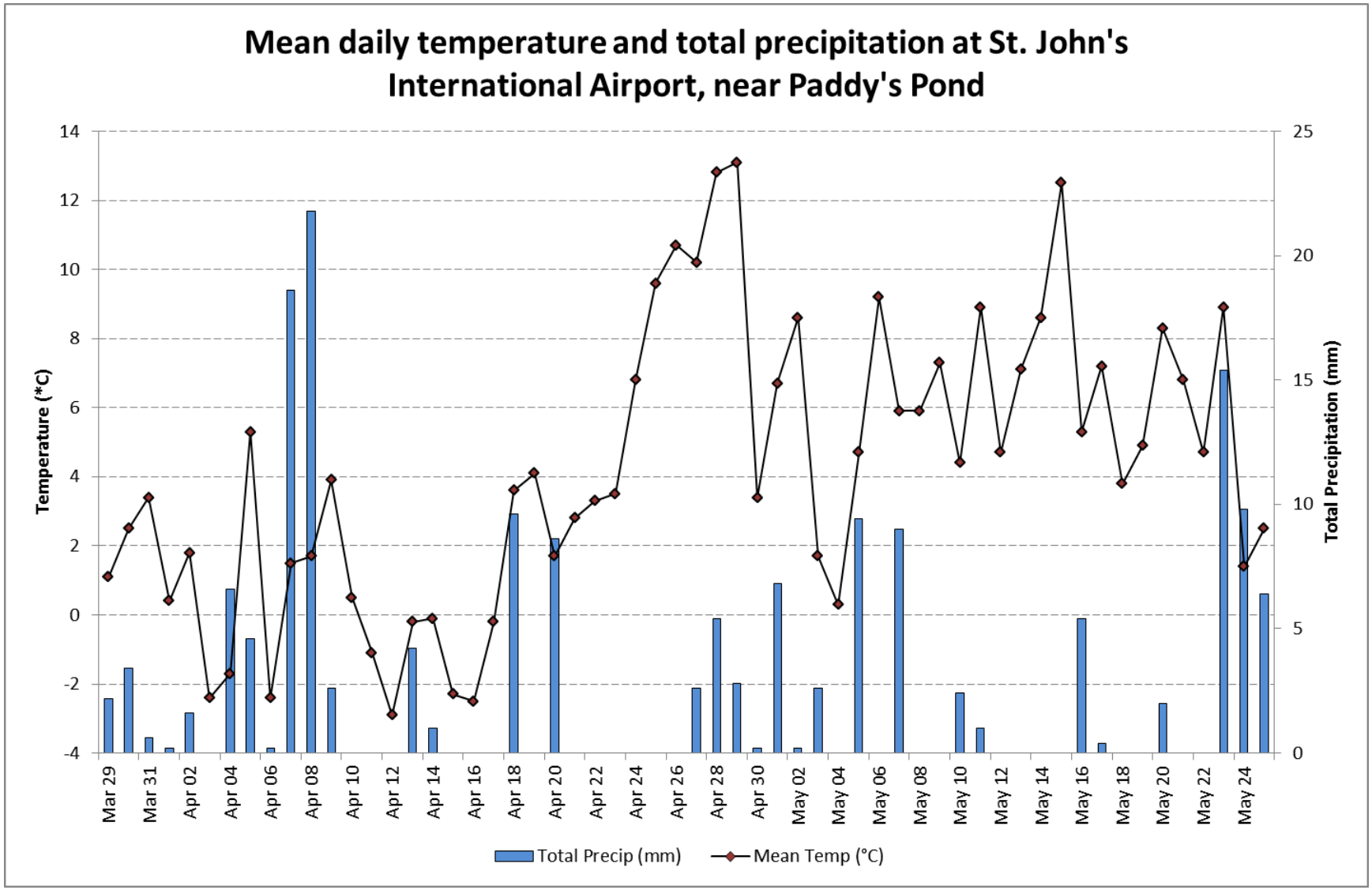
Turbidity is typically caused by fine suspended solids such as silt, clay, or organic material. Consistently high levels of turbidity tend to block sunlight penetration into a waterbody, discouraging plant growth. High turbidity can also damage the delicate respiratory organs of aquatic animals and cover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



Mean	Median	Min	Max
0.64	0.52	0.22	12.55

- Turbidity was low during this deployment period and reached a maximum of 12.55 NTU. Occasional low-level peaks occurred during weather events.

Appendix


Mean daily temperature and total precipitation at St. John's International Airport, near Paddy's Pond
Temperature (*C)
Total Precipitation (mm)
14
12
10
8
6
4
2
0
-2
-4
25
20
15
10
5
0
Mar 29
Mar 31
Apr 02
Apr 04
Apr 06
Apr 08
Apr 10
Apr 12
Apr 14
Apr 16
Apr 18
Apr 20
Apr 22
Apr 24
Apr 26
Apr 28
Apr 30
May 02
May 04
May 06
May 08
May 10
May 12
May 14
May 16
May 18
May 20
May 22
May 24
Total Precip (mm)
Mean Temp (°C)