# Real-Time Water Quality Deployment Report

## Paddy's Pond

**August 12, 2016 to September 30, 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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2016-08-12 to 2016-09-30

## General

- Department of Environment and Climate Change staff monitors the real-time web pages consistently.
- Equipment problems resulted in transmission errors during this deployment period. As such, numerous gaps are present.
- 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**

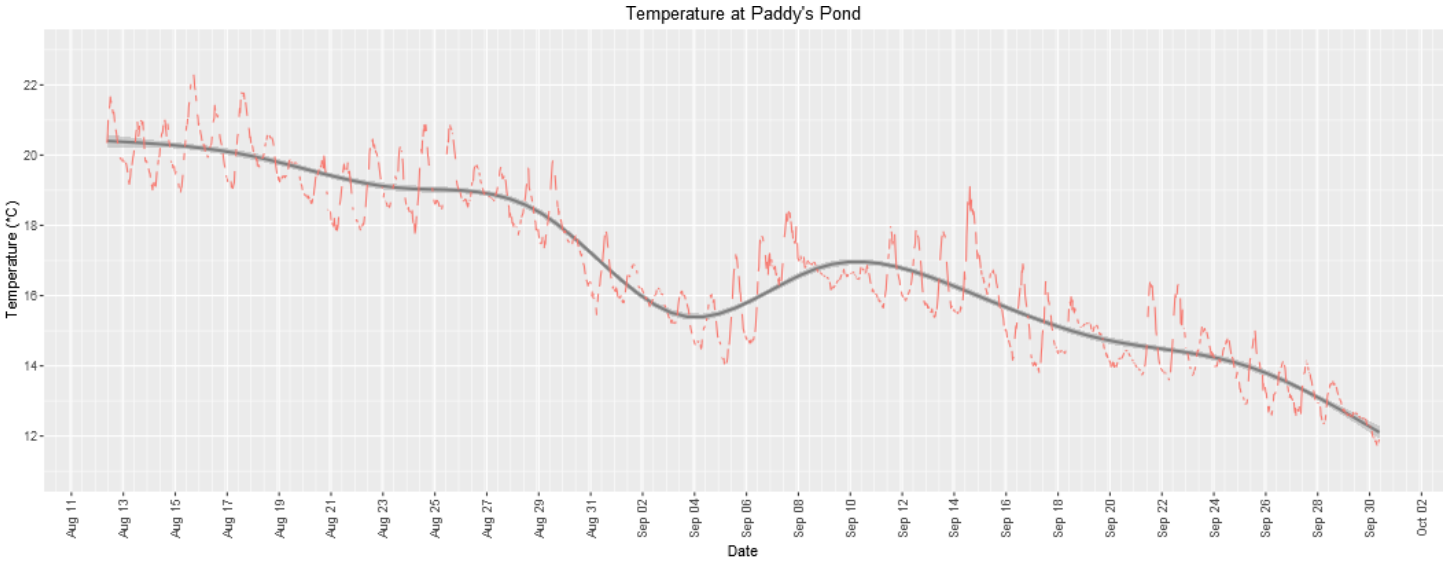
| Station | Date | Action | Comparison Ranking | | | | |
|---|---|---|---|---|---|---|---|
| | | | Temperature | pH | Conductivity | Dissolved Oxygen | Turbidity |
| Paddy's Pond | August 12, 2016 | Deployment | NA | NA | NA | NA | NA |
| | September 30, 2016 | Removal | NA | NA | NA | NA | NA |

- Connectivity problems resulted in a failure to calculate QAQC rankings.

## 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 |
|---|---|---|---|
| 16.79 | 16.56 | 11.73 | 22.29 |

- Water temperature fell throughout the deployment period with an exception occurring mid-deployment; on September 4th a mean temperature of 8°C was recorded before rising to 21°C three days later. After this, water temperature continued to decline.

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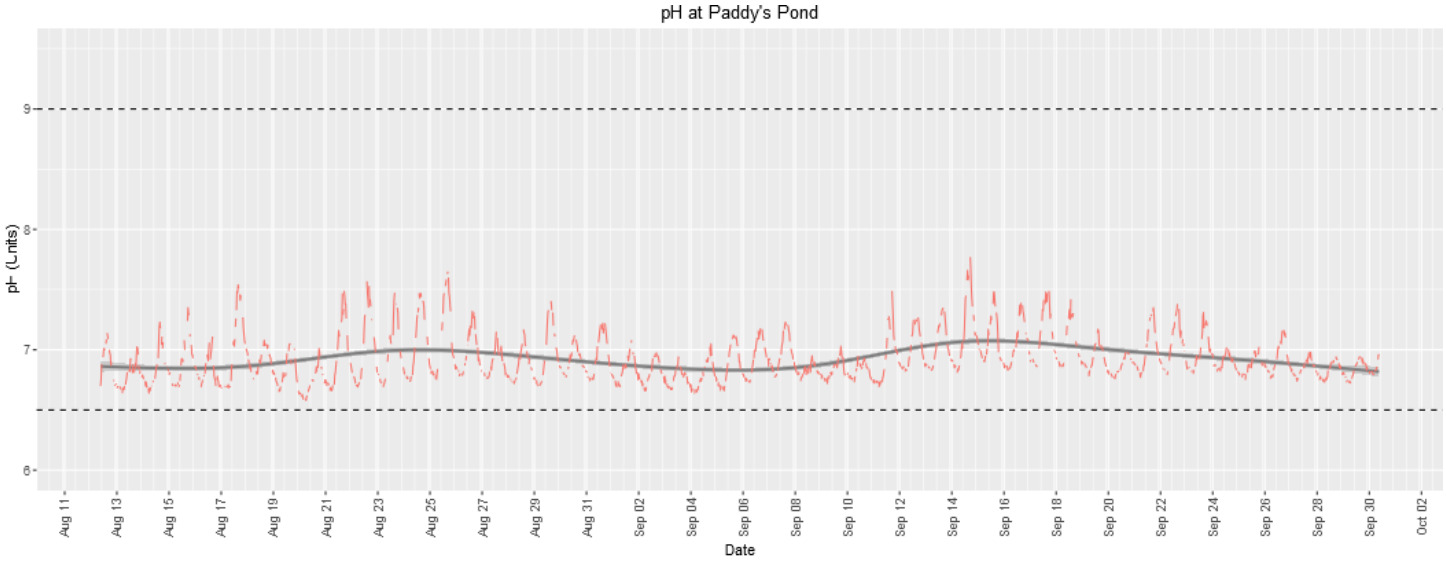
## pH

*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.*




| Mean | Median | Min | Max |
|---|---|---|---|
| 6.93 | 6.88 | 6.58 | 7.77 |

- pH values were consistent at Paddy's Pond during the deployment period and fell within CCME guidelines (as depicted by dashed lines in the figure above). Diminishing diurnal cycles are indicated by reduction in the range of daily pH values which could indicate a decrease in productivity by aquatic vegetation. During the day vegetation is a net consumer of acid-generating CO2 due to photosynthesis. In the night, a reversal takes place and vegetation is a net producer of CO2 due to cellular respiration, driving pH down. As the effect of vegetative metabolism decreases, a smaller diurnal cycle is observed.

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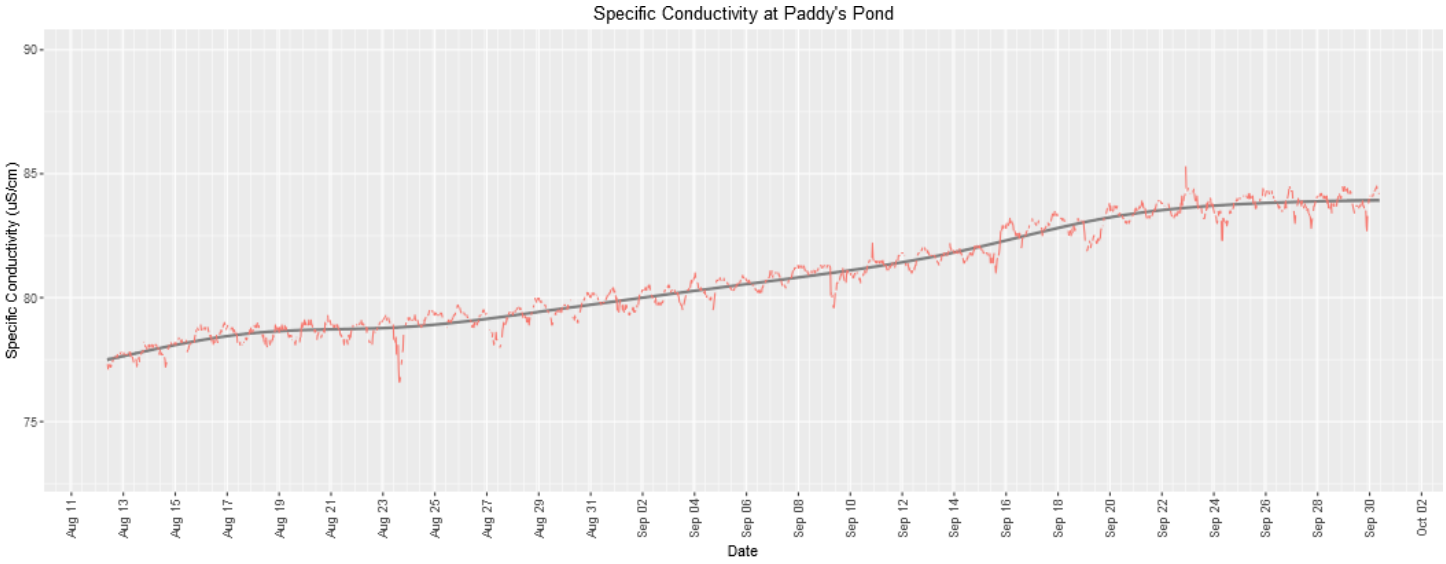
## Specific Conductivity

*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.*




| Mean | Median | Min | Max |
|---|---|---|---|
| 80.8 | 80.6 | 76.6 | 85.3 |

- Specific conductivity increased notably during the deployment period indicating a rise in the concentration of dissolved solids.

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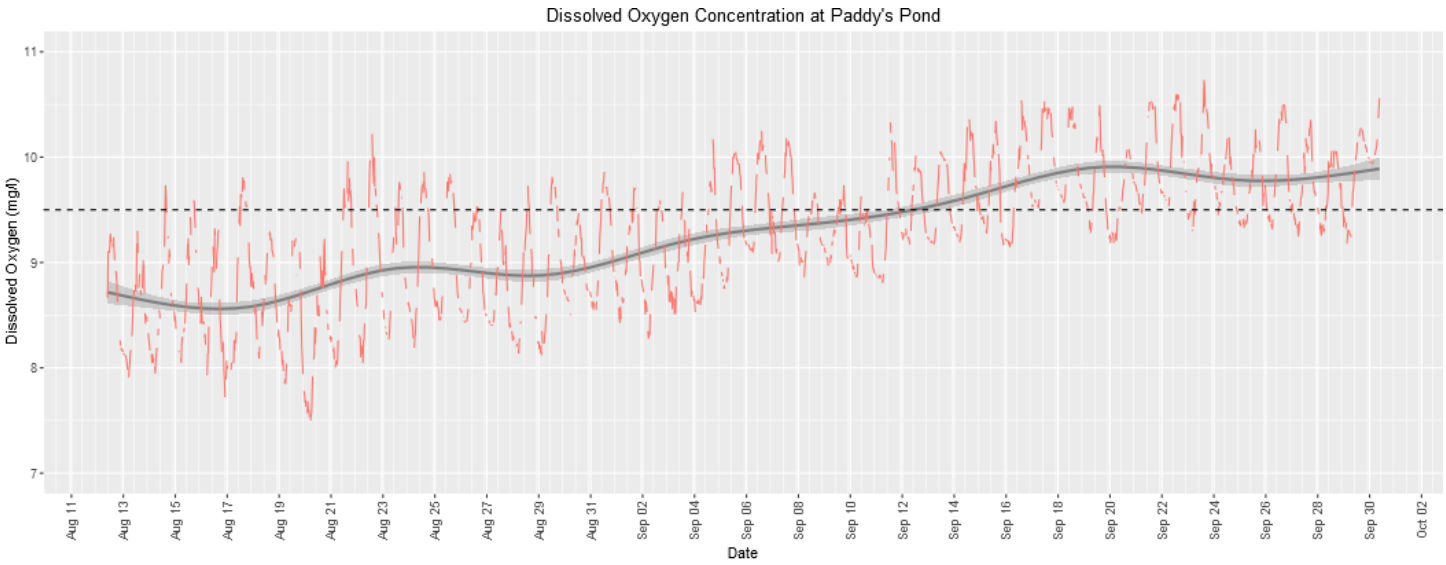
## Dissolved Oxygen

*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.*




| Mean | Median | Min | Max |
|---|---|---|---|
| 9.28 | 9.33 | 7.50 | 10.73 |

- As water temperatures declined, the concentration of dissolved oxygen increased throughout the deployment period. Towards the end of the deployment period, oxygen concentrations were generally greater than the CCME guidelines of 6.5 mg/l and 9.5 mg/l for the protection of early life stage, and other life stage cold water organisms.

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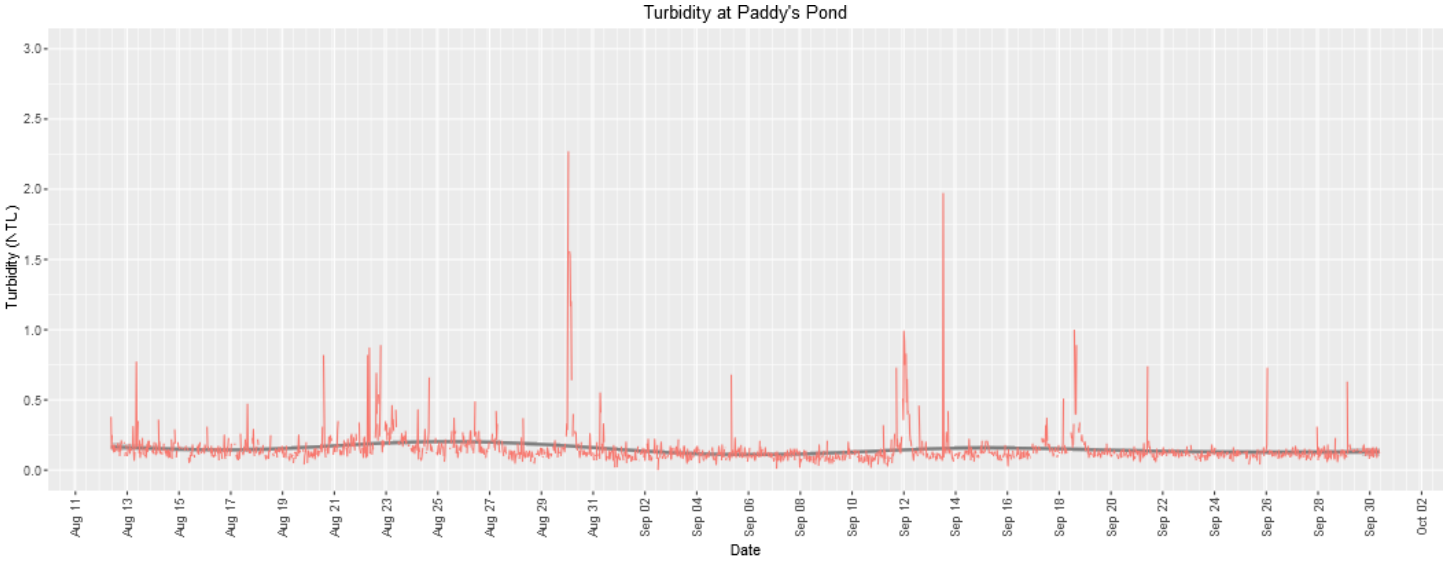
## Turbidity

*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.*




| Mean | Median | Min | Max |
|---|---|---|---|
| 0.15 | 0.12 | 0.00 | 2.82 |

- A few turbidity peaks were recorded in conjunction with precipitation events, however levels were generally low and within expected limits.

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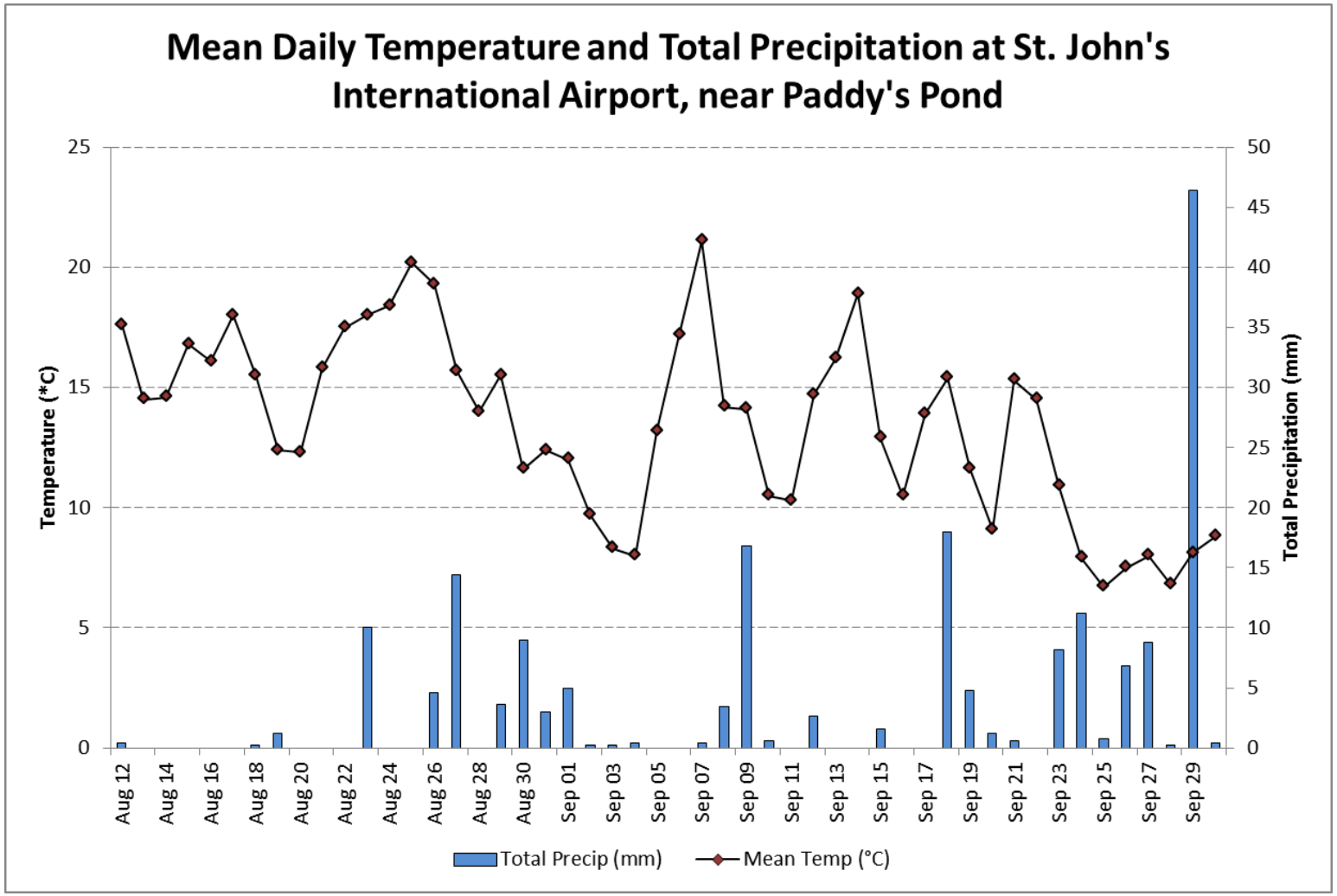
# Appendix


Mean Daily Temperature and Total Precipitation at St. John's International Airport, near Paddy's Pond
Temperature (*C)
Total Precipitation (mm)
25
20
15
10
5
0
50
45
40
35
30
25
20
15
10
5
0
Aug 12
Aug 14
Aug 16
Aug 18
Aug 20
Aug 22
Aug 24
Aug 26
Aug 28
Aug 30
Sep 01
Sep 03
Sep 05
Sep 07
Sep 09
Sep 11
Sep 13
Sep 15
Sep 17
Sep 19
Sep 21
Sep 23
Sep 25
Sep 27
Sep 29
Total Precip (mm)
Mean Temp (°C)