Real-Time Water Quality Deployment Report

Rattling Brook Network

November 3, 2017 to December 14, 2017

Newfoundland Labrador

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

Real-Time Water Quality Deployment Report

Rattling Brook Network

2017-11-03 to 2017-12-14

General

- Department of Municipal Affairs and Environment staff monitors the real-time web pages consistently.
- A newly constructed flow control structure at the outlet of Big Pond was commissioned in early November. As a result, water level at Big Pond increased by more than 1 m in elevation over the course of the deployment period. The deployment position was adjusted to account for the substantially higher water level. This may be adjusted frequently as conditions at Big Pond stabilize over time. It is assumed that considerable shoreline erosion will occur as wave action displaces previously-dry soil.
- Due to a field sonde failure upon deployment at Big Pond stations on November 3, 2017, the QAQC sonde was used as a stand in for the month. As a result, no QAQC sonde was available for the other stations. Similarly, a QAQC sonde problem prevented QAQC data from being recorded during removal on December 14, 2017. No rankings were available during deployment or removal.
- 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/)*.

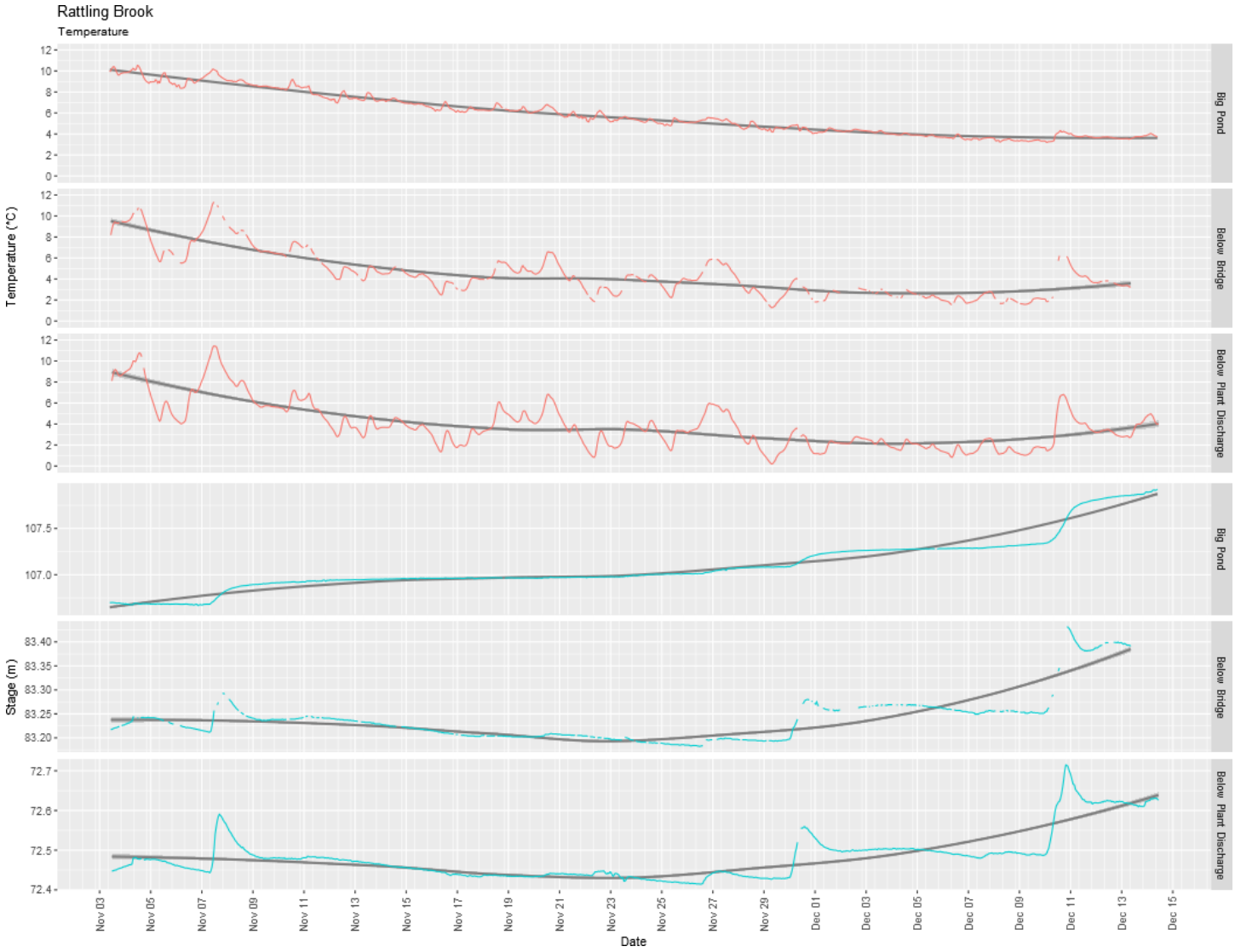
Maintenance and Calibration of Instrument

- The routine method for Quality Assurance and Quality Control (QAQC) in the Real-Time Water Quality Monitoring Program is outlined below. As stated above, some problems were encountered with Field and QAQC sondes during deployment on November 3rd and removal on December 12th. As such, routine QAQC protocol could not be followed for this interval.
- As part of the QAQC protocol, 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. 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.

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.



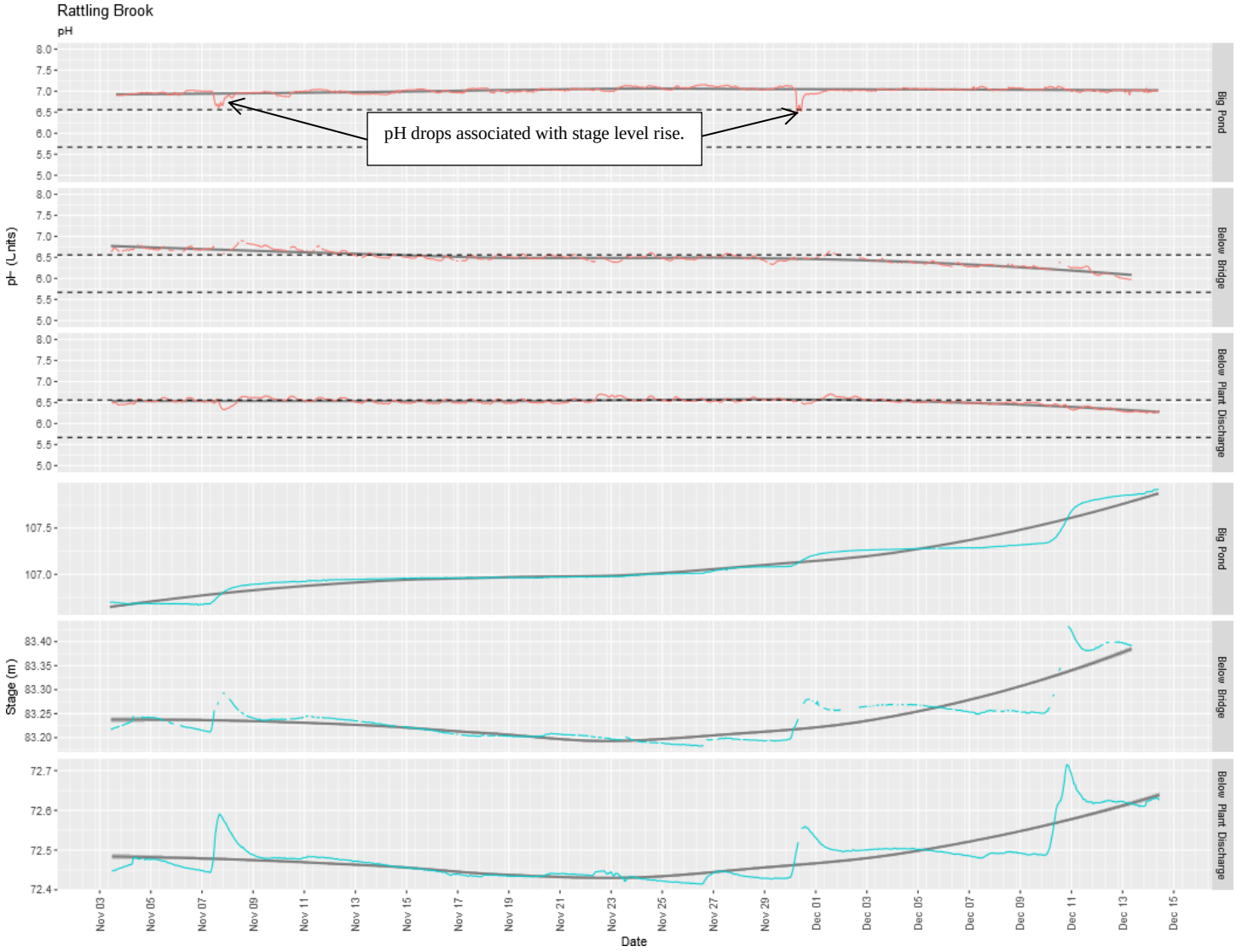
Station	Mean	Median	Min	Max
Big Pond	5.86	5.43	3.19	10.54
Below Bridge	4.41	4.04	1.26	11.33
Below Plant Discharge	3.86	3.46	0.18	11.45

- Water temperature was still dropping and approaching annual minimum temperatures at Big Pond during the removal work on December 14, 2017. Below Bridge and Plant Discharge stations indicated a slight warming trend towards the end of the deployment period.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.



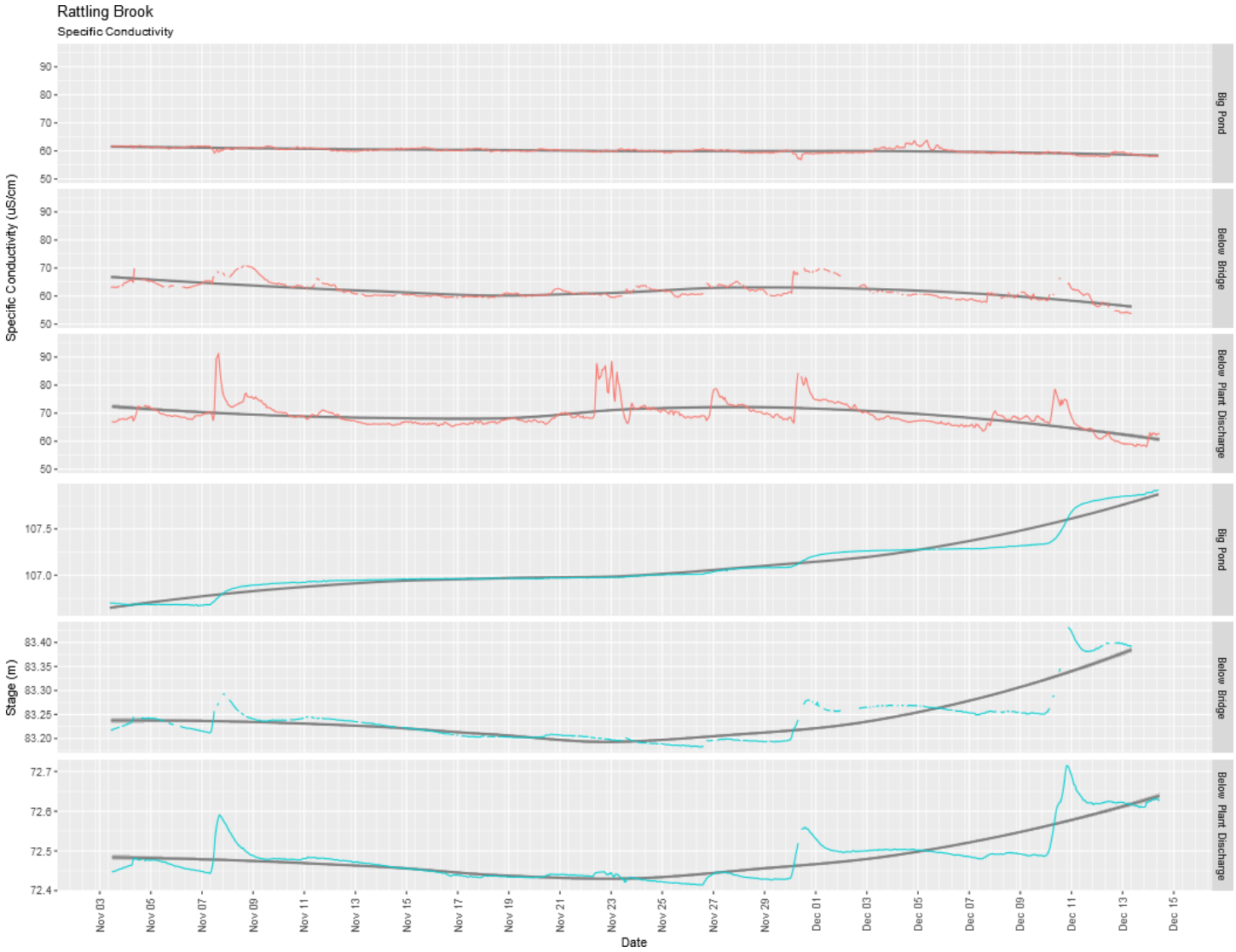
Station	Mean	Median	Min	Max
Big Pond	7.01	7.02	6.46	7.16
Below Bridge	6.49	6.49	5.97	6.90
Below Plant Discharge	6.52	6.53	6.25	6.70

- pH values were at or just above the site-specific guidelines indicated by dashed lines in the figure above. A slight downward trend was observed at Bridge and Plant Discharge stations (potentially due to sensor drift) while stable values were observed at Big Pond.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.



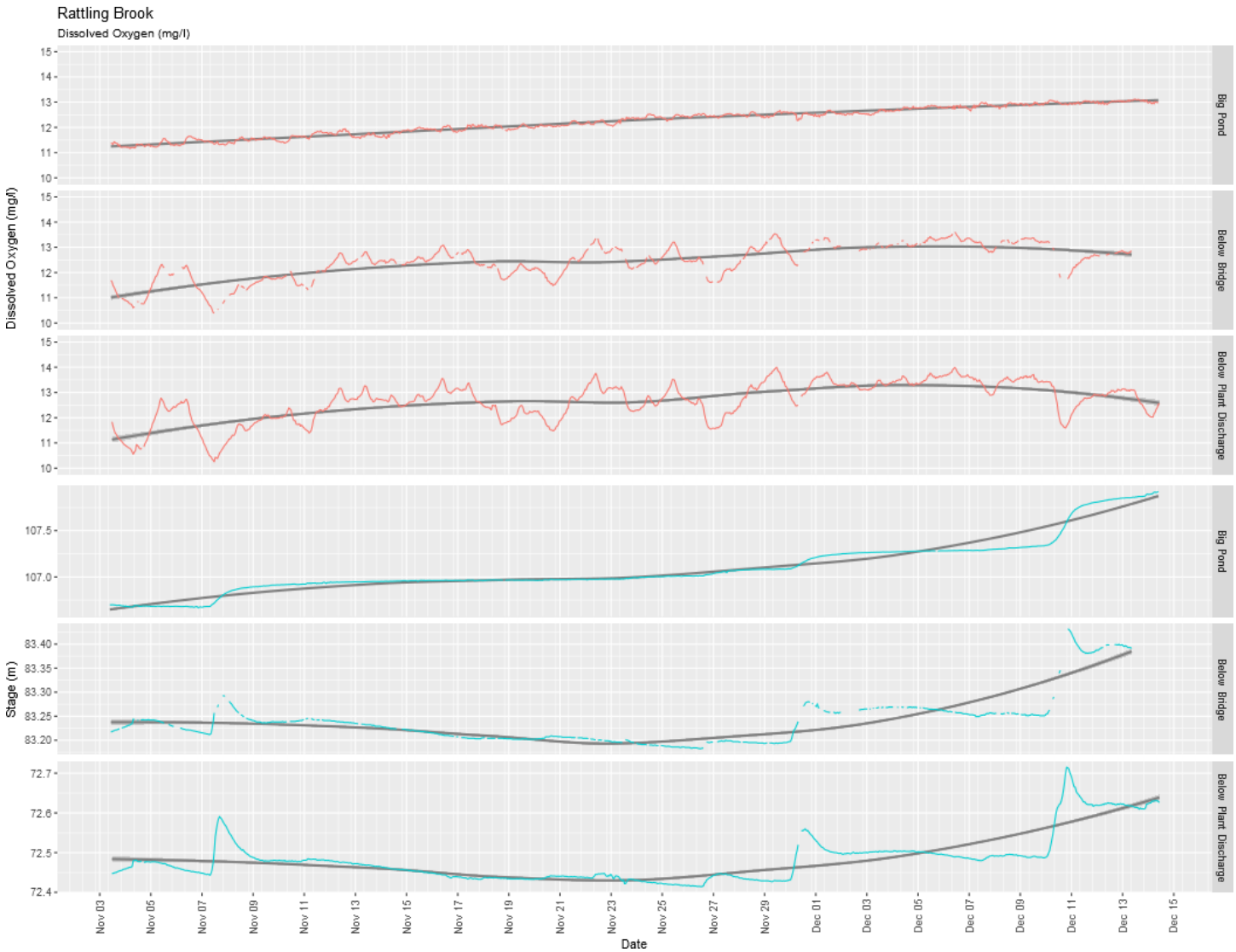
Station	Mean	Median	Min	Max
Big Pond	60.2	60.1	56.9	63.8
Below Bridge	61.9	61.0	53.8	70.9
Below Plant Discharge	69.2	68.5	58.0	91.3

- Specific conductivity was variable over the course of the deployment period at Bridge and Plant Discharge stations, in accordance with precipitation. A slow decline in conductivity was noticed at Big Pond station.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.



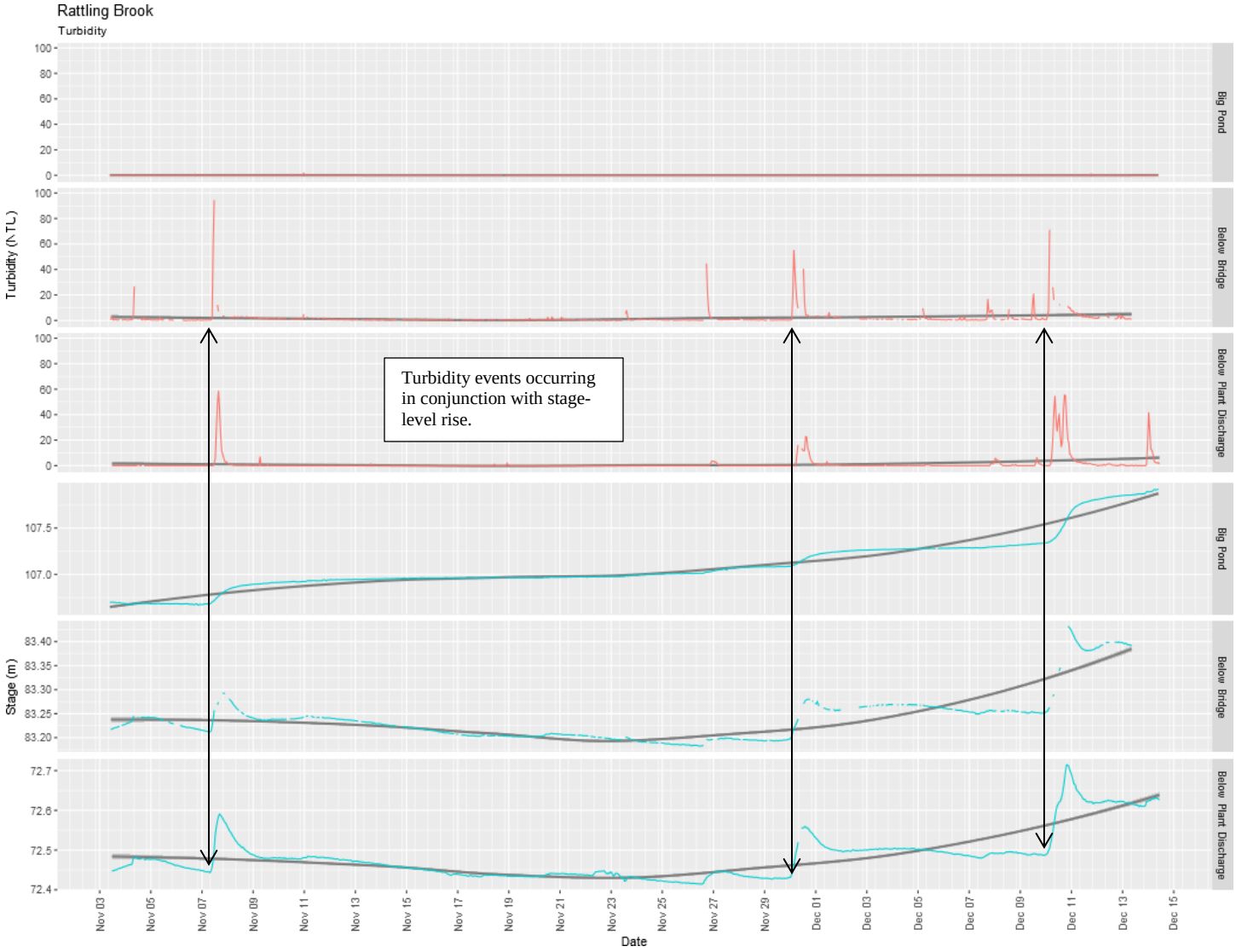
Station	Mean	Median	Min	Max
Big Pond	12.23	12.33	11.16	13.12
Below Bridge	12.44	12.50	10.39	13.61
Below Plant Discharge	12.65	12.75	10.25	14.00

- Variation in dissolved oxygen levels mirror one another at Bridge and Plant Discharge stations, largely due to air temperature variations. Due to the stable water temperatures at Big Pond, a steady increase in dissolved oxygen was observed as water temperatures cooled gradually.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.

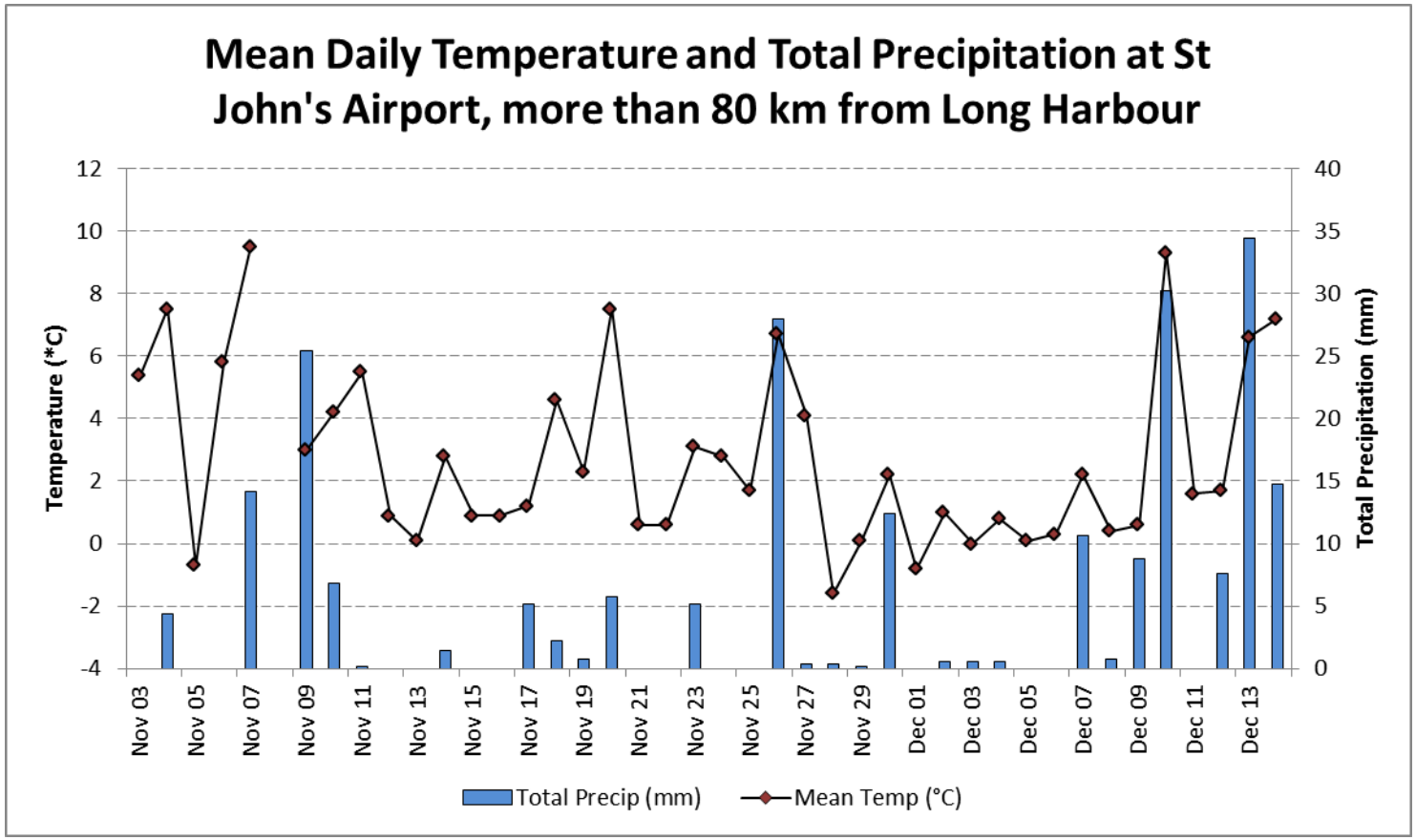


Station	Mean	Median	Min	Max
Big Pond	0.0	0.0	0.0	1.7
Below Bridge	2.0	0.6	0.0	94.6
Below Plant Discharge	1.3	0.0	0.0	58.5

- Turbidity levels were largely low during the deployment period, especially at Big Pond – despite stage levels that were significantly higher than normal.
- At Bridge and Plant Discharge levels, most notable turbidity events were related to stage level increases.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

Appendix


Mean Daily Temperature and Total Precipitation at St John's Airport, more than 80 km from Long Harbour
Temperature (*C)
Total Precipitation (mm)
12
10
8
6
4
2
0
-2
-4
40
35
30
25
20
15
10
5
0
Nov 03
Nov 05
Nov 07
Nov 09
Nov 11
Nov 13
Nov 15
Nov 17
Nov 19
Nov 21
Nov 23
Nov 25
Nov 27
Nov 29
Dec 01
Dec 03
Dec 05
Dec 07
Dec 09
Dec 11
Dec 13
Total Precip (mm)
Mean Temp (°C)