Real-Time Water Quality Deployment Report

Rattling Brook Network

June 26, 2015 to July 23, 2015

Newfoundland Labrador

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

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General

- Department of Environment and Conservation 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/)*.
    - Note: Hydrometric (stage) data for Plant Discharge station tends to be recorded out of sync with water quality data - only stage data recorded simultaneously is presented. Because this data is relatively sparse, an apparently blank trace is presented, however, the LOESS line on the graph is statistically accurate and may be used for reference.

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

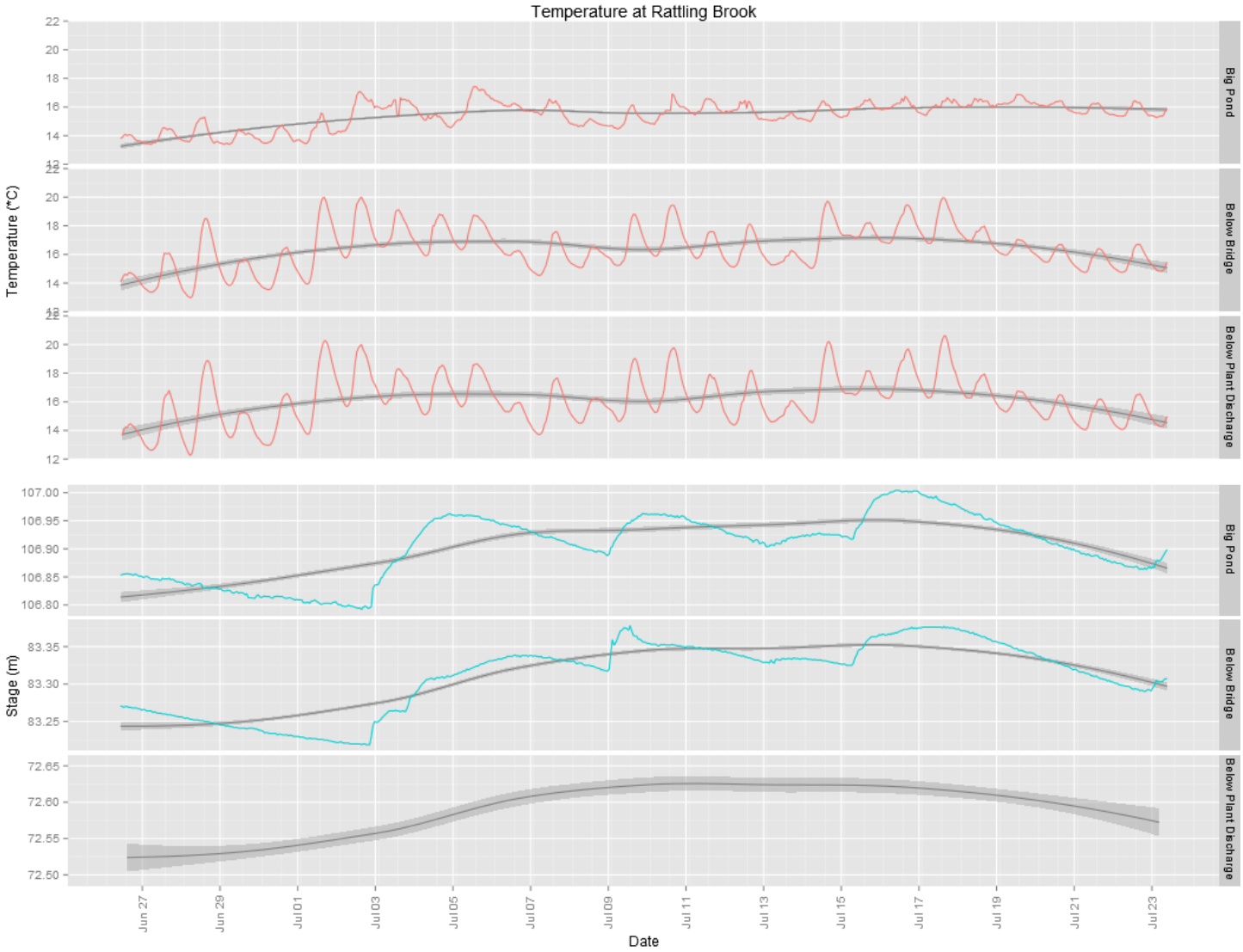
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	June 26, 2015	Deployment	Excellent	Poor	Fair	Poor	Excellent
	July 23, 2015	Removal	Excellent	Good	Good	Excellent	Excellent
Rattling Brook below Bridge	June 26, 2015	Deployment	Good	Marginal	Fair	Poor	Excellent
	July 23, 2015	Removal	Good	Poor	Good	Good	Excellent
Rattling Brook below Plant Discharge	June 26, 2015	Deployment	Good	Good	Fair	Good	Excellent
	July 23, 2015	Removal	Good	Fair	Good	Good	Good

- "Poor" rankings for pH may have been due to slow stabilization of the QAQC instrument during deployment and removal.
- "Poor" rankings for DO are the result of the QAQC instrument readings approximately 10% lower than the field sonde at Big Pond and Bridge stations.

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	15.44	15.61	13.38	17.43
Below Bridge	16.43	16.28	12.98	20.00
Below Plant Discharge	16.14	16.02	12.26	20.61

- An increasing temperature trend is observed – though it is below average compared to previous years. Cooler summer temperatures will likely have some impact on aquatic productivity, possibly affecting DO saturation and pH level in the system.

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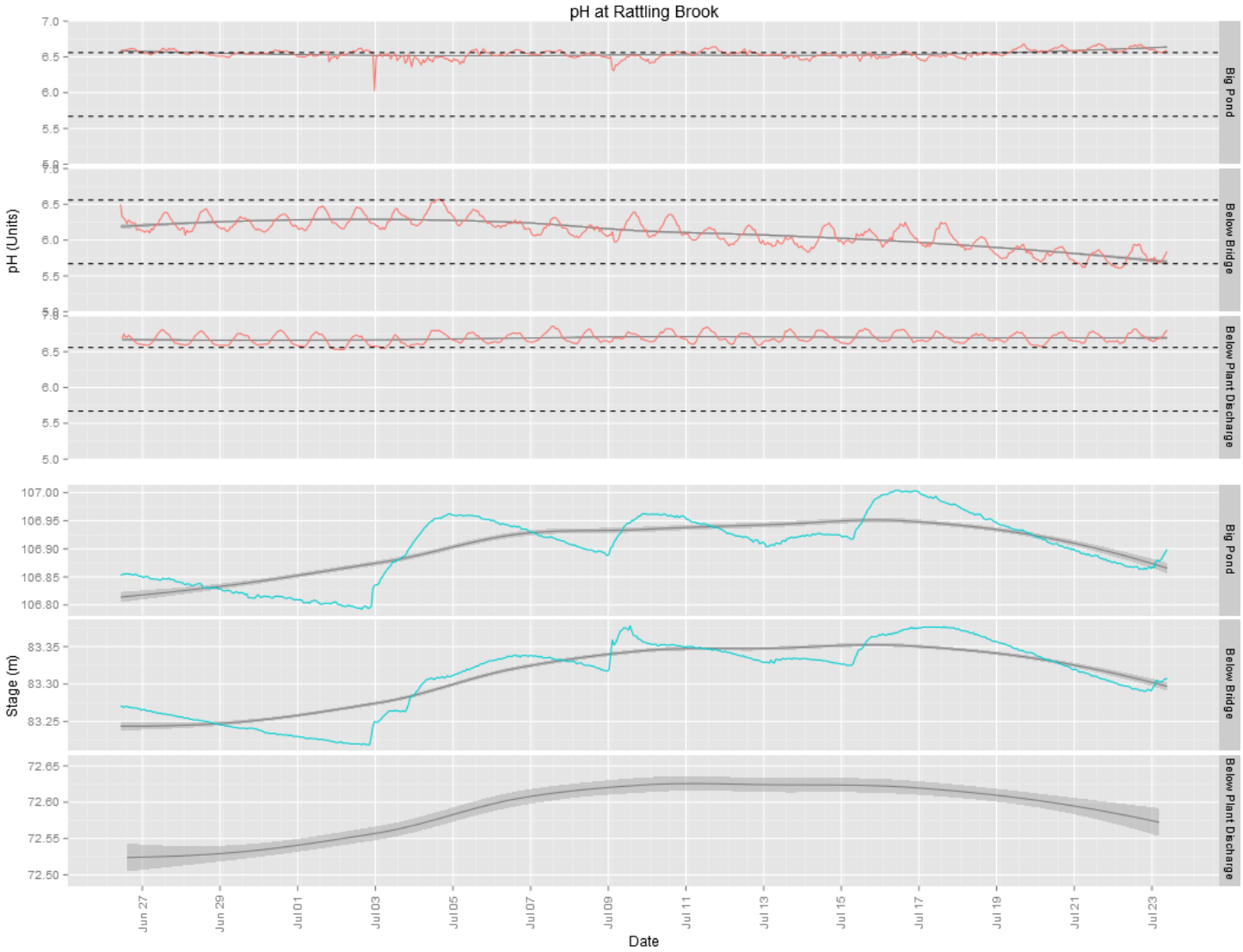
pH

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.



Station	Mean	Median	Min	Max
Big Pond	6.54	6.54	6.03	6.68
Below Bridge	6.10	6.14	5.61	6.57
Below Plant Discharge	6.69	6.68	6.53	6.86

- pH levels at Big Pond and Plant Discharge stations were found to be at the top of the Site Specific Guidelines (dashed lines) for the Rattling Brook system – this has been fairly consistent for the past several months. Bridge station, however, tends to fall in the middle of the guidelines and is generally more acidic.

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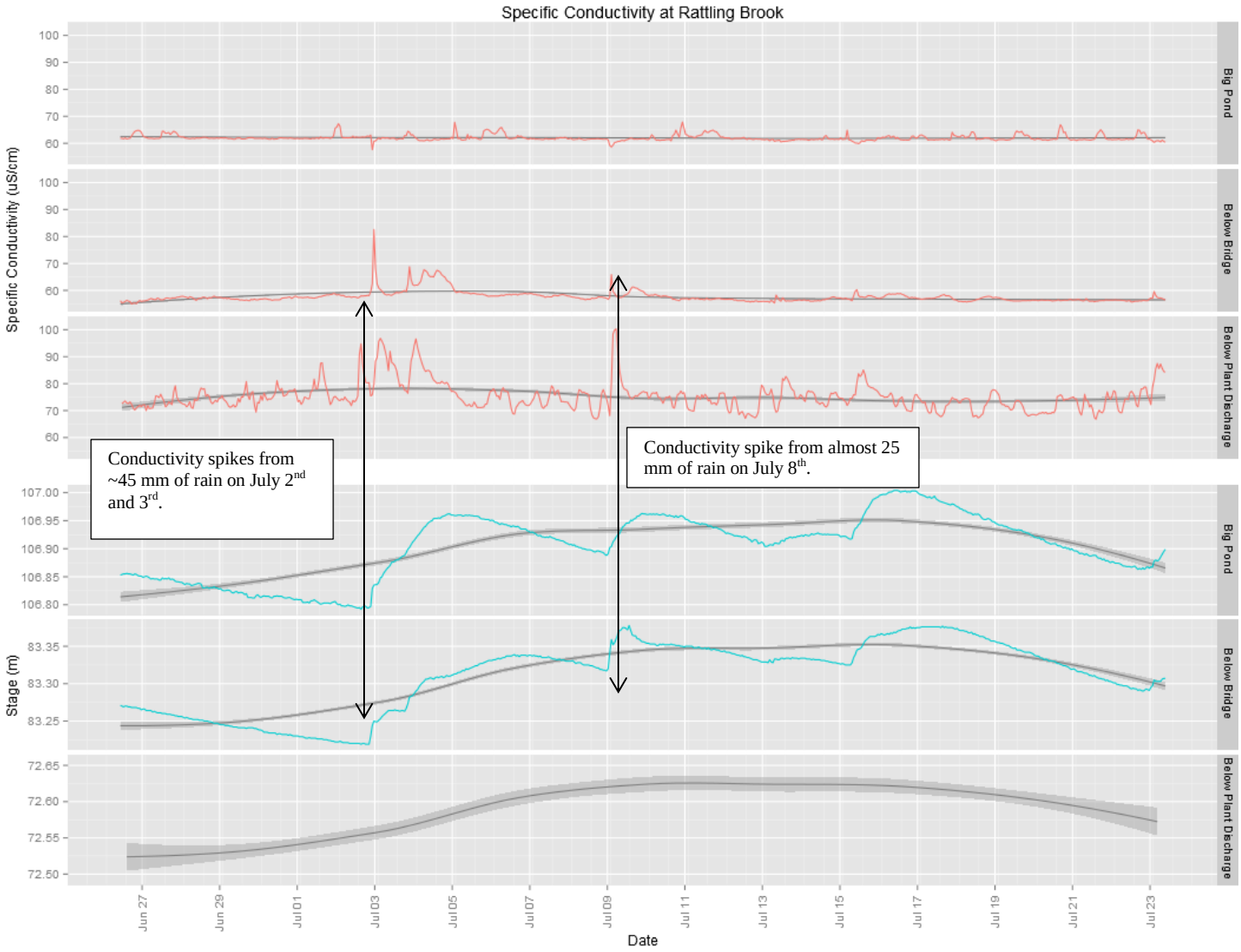
Specific Conductivity

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.



Station	Mean	Median	Min	Max
Big Pond	62.0	61.8	57.6	67.9
Below Bridge	57.7	57.2	54.9	82.6
Below Plant Discharge	75.2	74.4	66.8	100.3

- Conductivity at Rattling Brook did not show any particular trend during this deployment period, however, variability does tend to increase as water flows downstream from Big Pond indicating additions of dissolved solids, especially just above Plant Discharge station.

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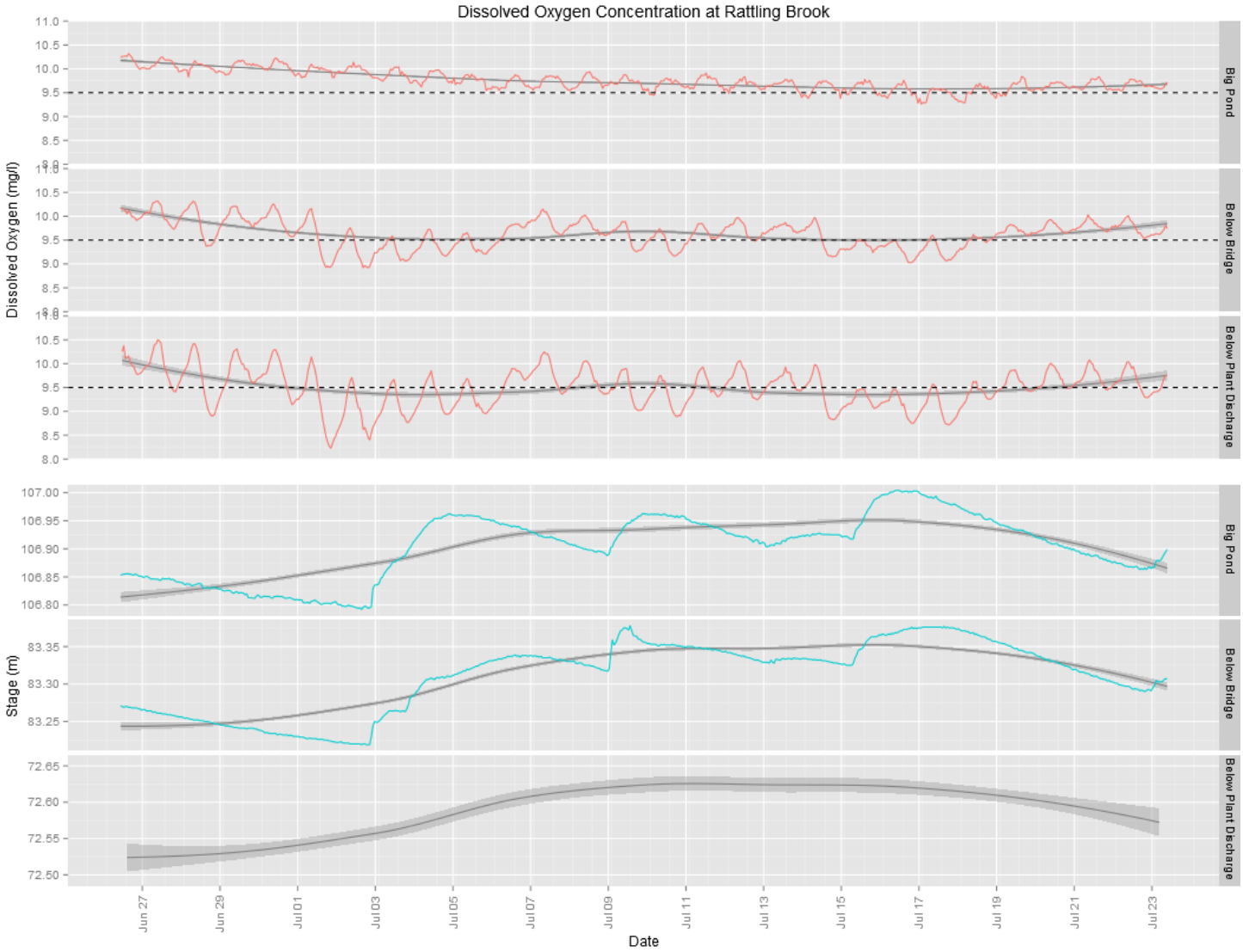
Dissolved Oxygen

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.



Station	Mean	Median	Min	Max
Big Pond	9.76	9.72	9.26	10.32
Below Bridge	9.63	9.65	8.92	10.32
Below Plant Discharge	9.48	9.49	8.23	10.50

- Dissolved oxygen saturation straddled the CCME guideline of 9.5 mg/l during much of this deployment period. Due to lower than average water temperatures, oxygen saturation is higher than normal for this time of year. Unless there is a substantial warming trend over the next few weeks, oxygen values are unlikely to go much lower.

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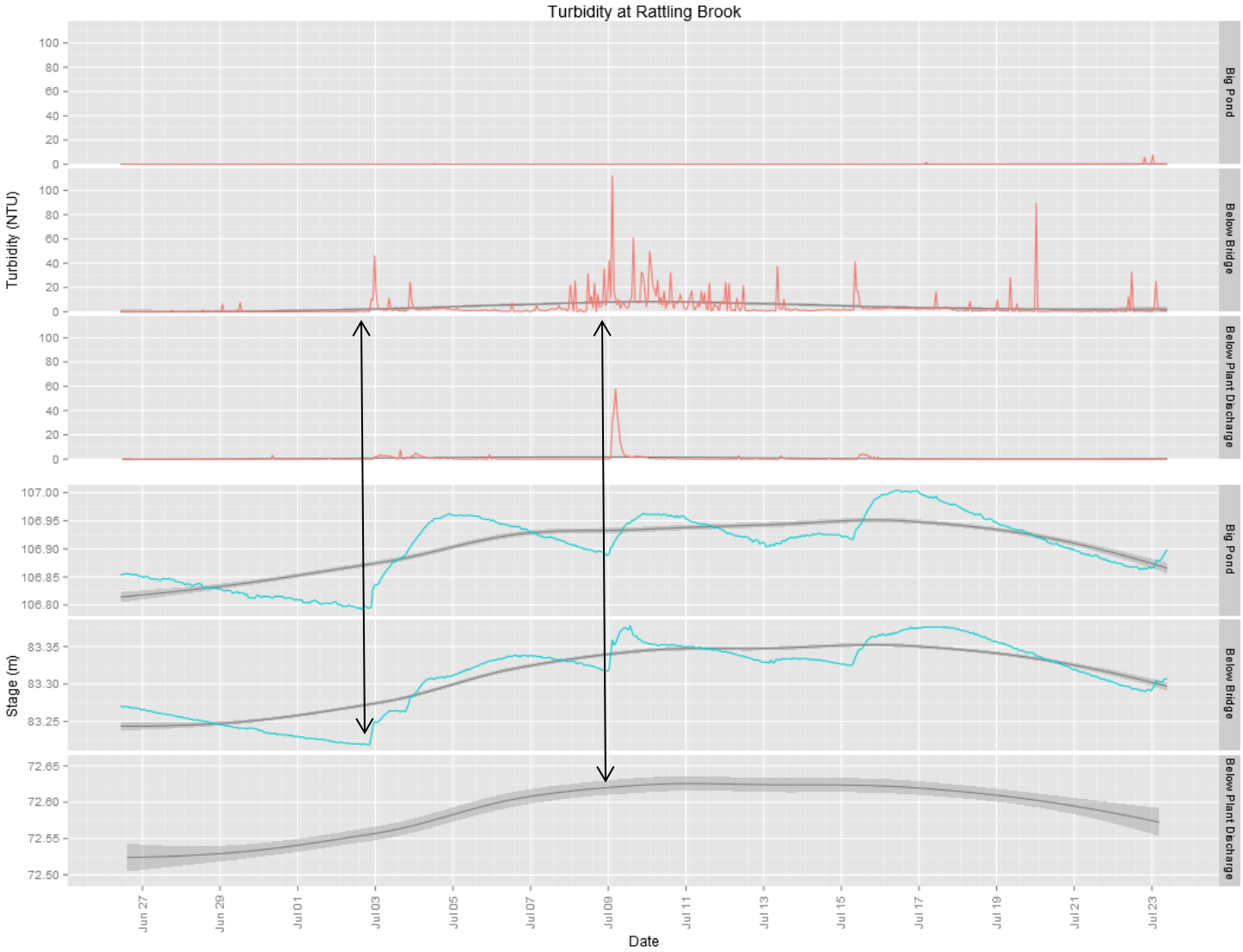
Turbidity

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.



Station	Mean	Median	Min	Max
Big Pond	0.0	0.0	0.0	7.7
Below Bridge	3.5	0.9	0.0	112.1
Below Plant Discharge	0.6	0.0	0.0	57.9

- A period of rainfall on July 8th resulted in turbidity events at Bridge and Plant Discharge stations which quickly returned to low levels. Turbidity at Bridge remained somewhat variable due to perturbations that began around July 8th.
- A small turbidity event was encountered at Bridge and Plant Discharge stations on July 2nd in response to precipitation.

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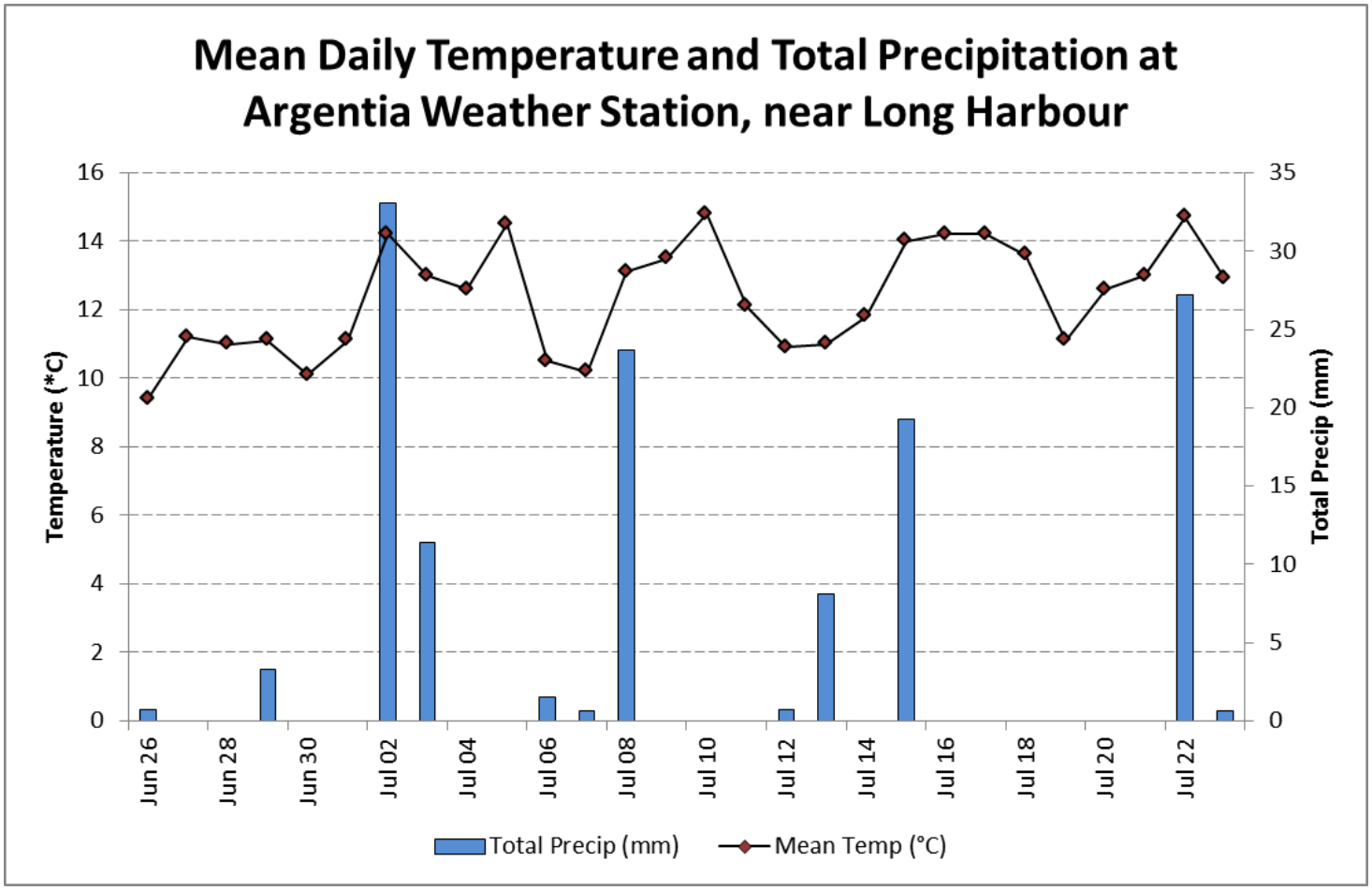
Appendix



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