

Real-Time Water Quality Deployment Report

Rattling Brook Network

July 22, 2020 to August 18, 2020



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

General

- Department of Environment, Climate Change and Municipalities staff monitor 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 (https://wateroffice.ec.gc.ca/index_e.html)*.

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.
 - Turbidity data for the Below Bridge station was suspect after August 13th due to fouling on the sensor as seen on the picture below. This also resulted in a 'Poor' ranking on removal.



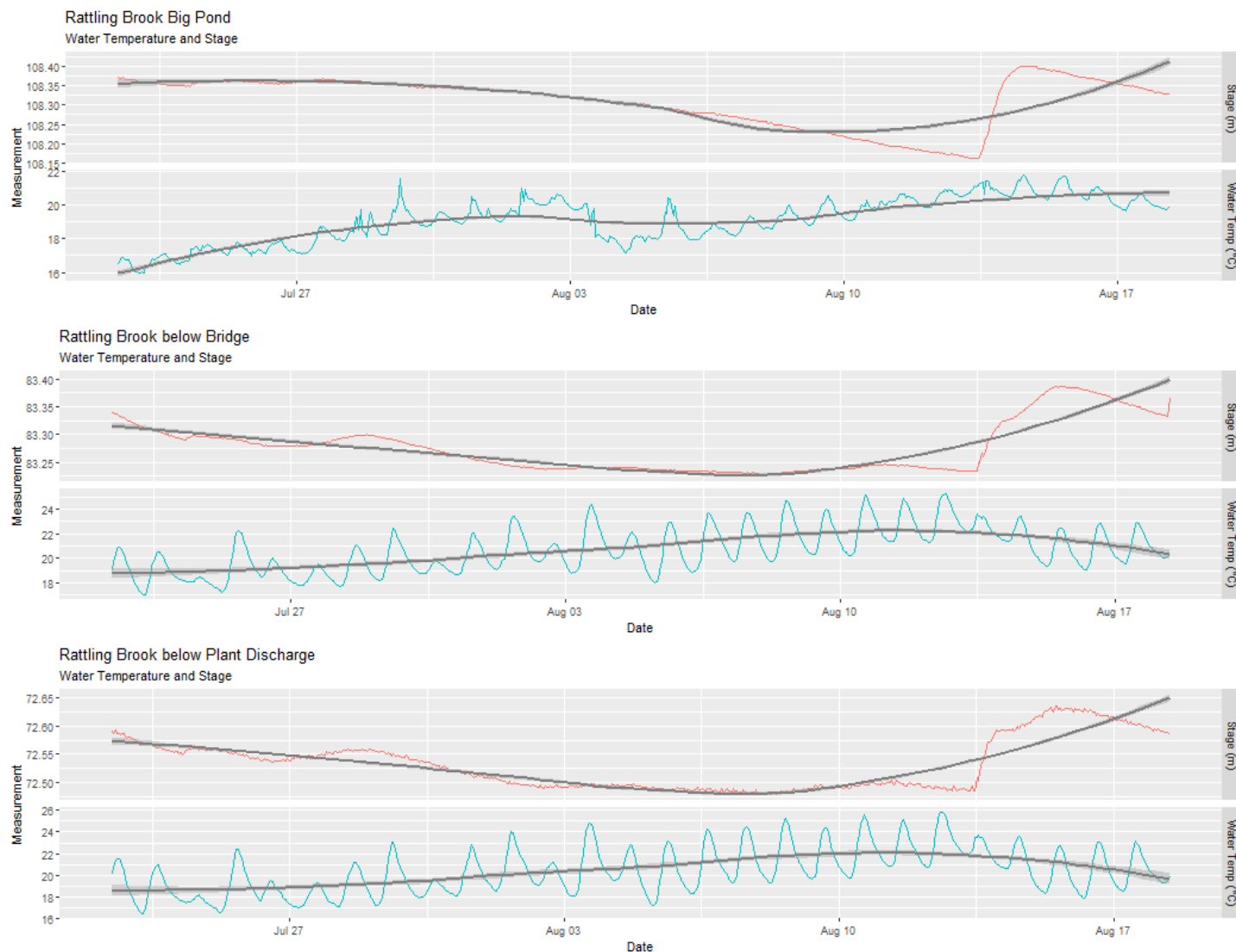
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	July 22	Deployment	Excellent	Fair	Good	Excellent	Good
	August 18	Removal	Excellent	Good	Good	Excellent	Excellent
Rattling Brook below Bridge	July 22	Deployment	Excellent	Good	Fair	Excellent	Excellent
	August 18	Removal	Excellent	Fair	Fair	Excellent	Poor
Rattling Brook below Plant Discharge	July 22	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	August 18	Removal	Good	Fair	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.



Station	Max	Min	Median	Mean
Big Pond	21.77	15.95	19.31	19.12
Below Bridge	25.23	17.02	20.47	20.68
Below Plant Discharge	25.8	16.45	20.16	20.41

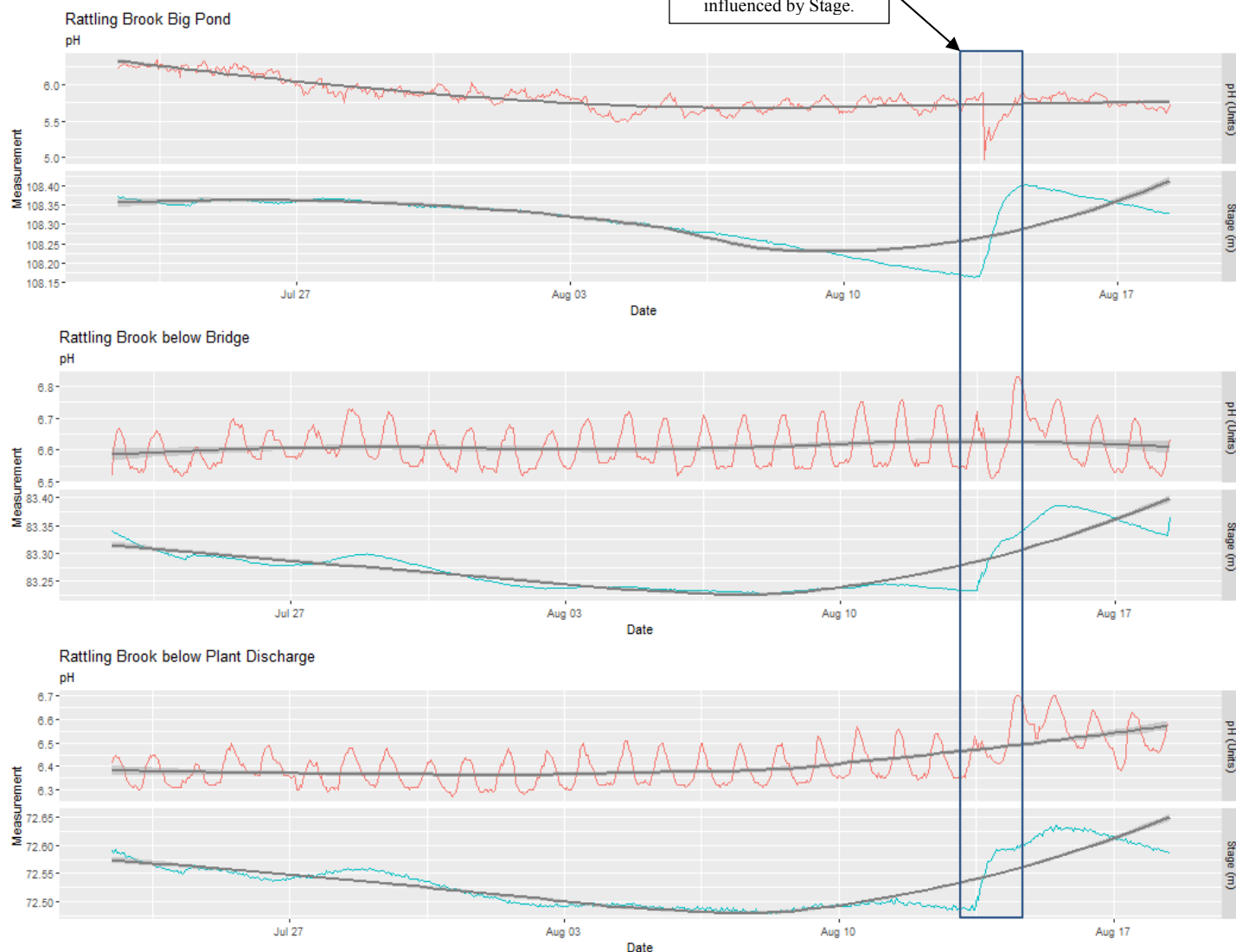
- Water temperature trend lines for all stations show diurnal patterns related to ambient air temperature during this deployment period.

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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.

Example of pH
influenced by Stage.

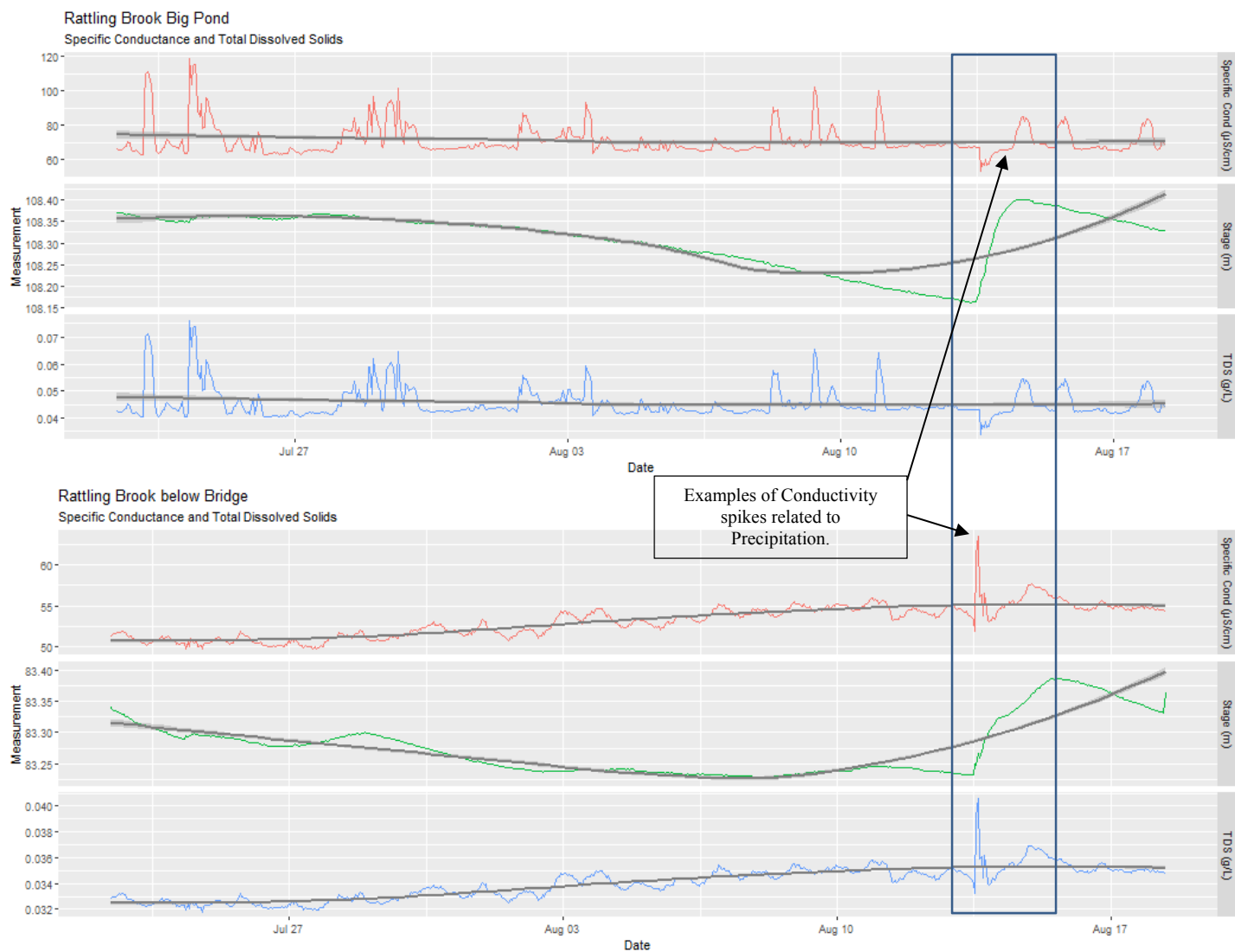


- pH values were consistent over the deployment period and the majority fell within site-specific guidelines (5.67-6.56 pH Units). Variations in measurement are a result of the precipitation and runoff.

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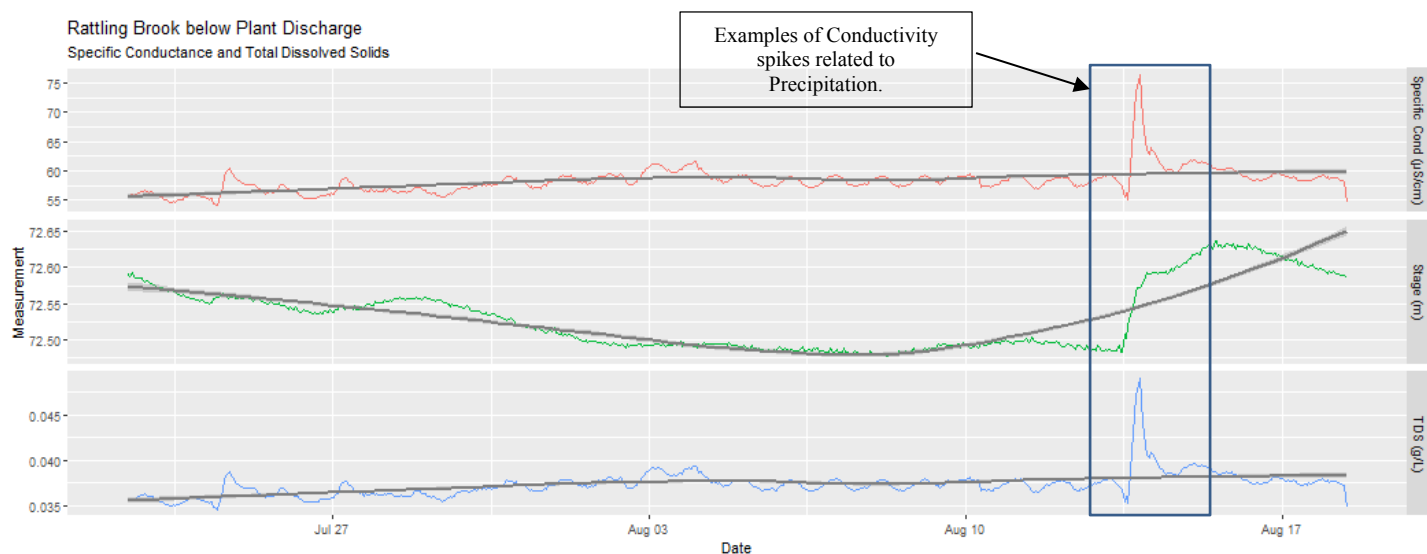
Specific Conductivity

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.



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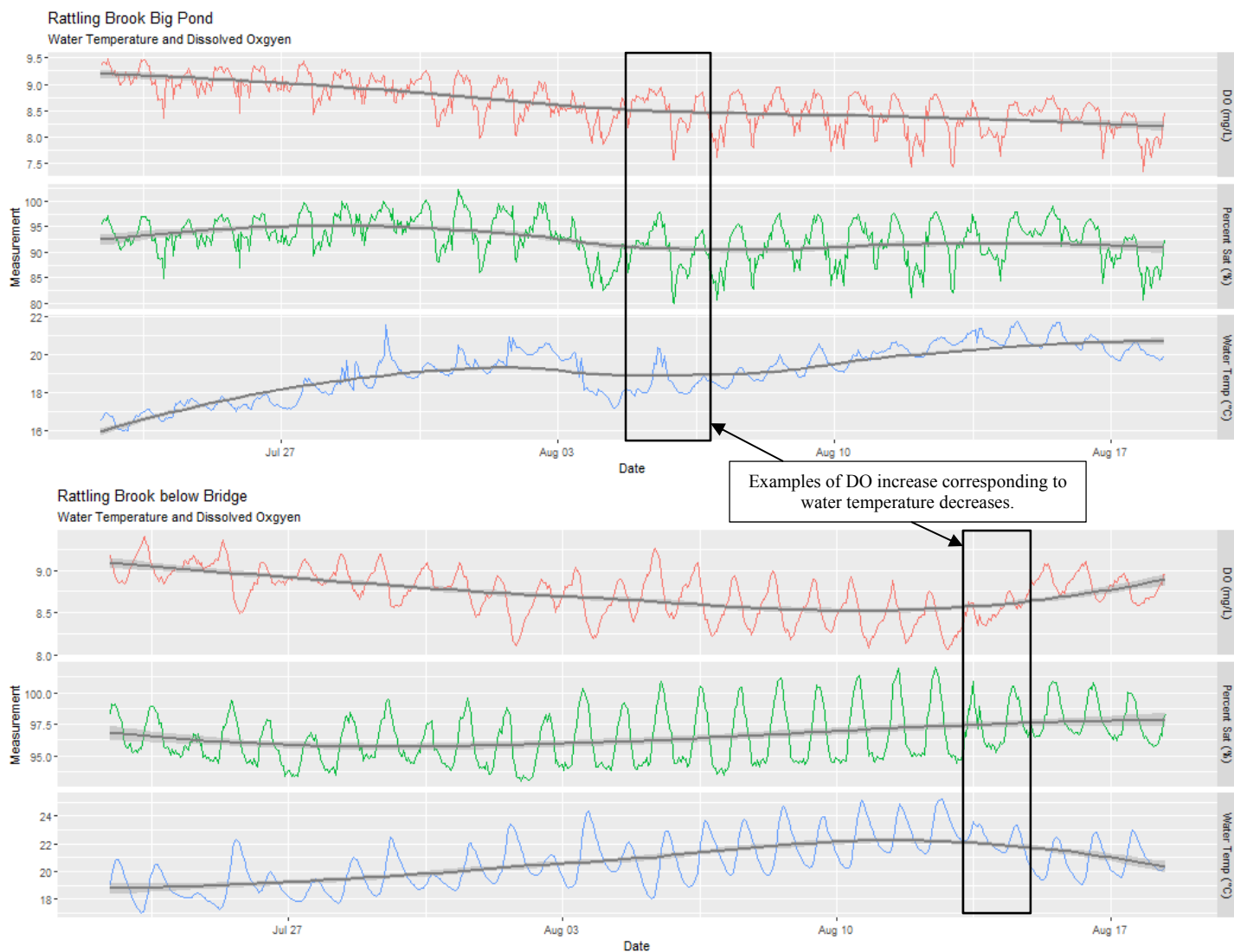
Station	Max	Min	Median	Mean
Big Pond	119.0	53.1	68.0	71.1
Below Bridge	63.5	49.7	53.3	53.1
Below Plant Discharge	76.5	54.1	58.3	58.3

- During the deployment period, specific conductivity ranged from 53.1 $\mu\text{S}/\text{cm}$ to 119.0 $\mu\text{S}/\text{cm}$ at Big Pond, 49.7 $\mu\text{S}/\text{cm}$ to 63.5 $\mu\text{S}/\text{cm}$ at Below Bridge and from 54.1 $\mu\text{S}/\text{cm}$ to 76.5 $\mu\text{S}/\text{cm}$ at Plant Discharge.
- Fluctuations in Specific Conductivity are generally related to variations in Stage caused by precipitation.

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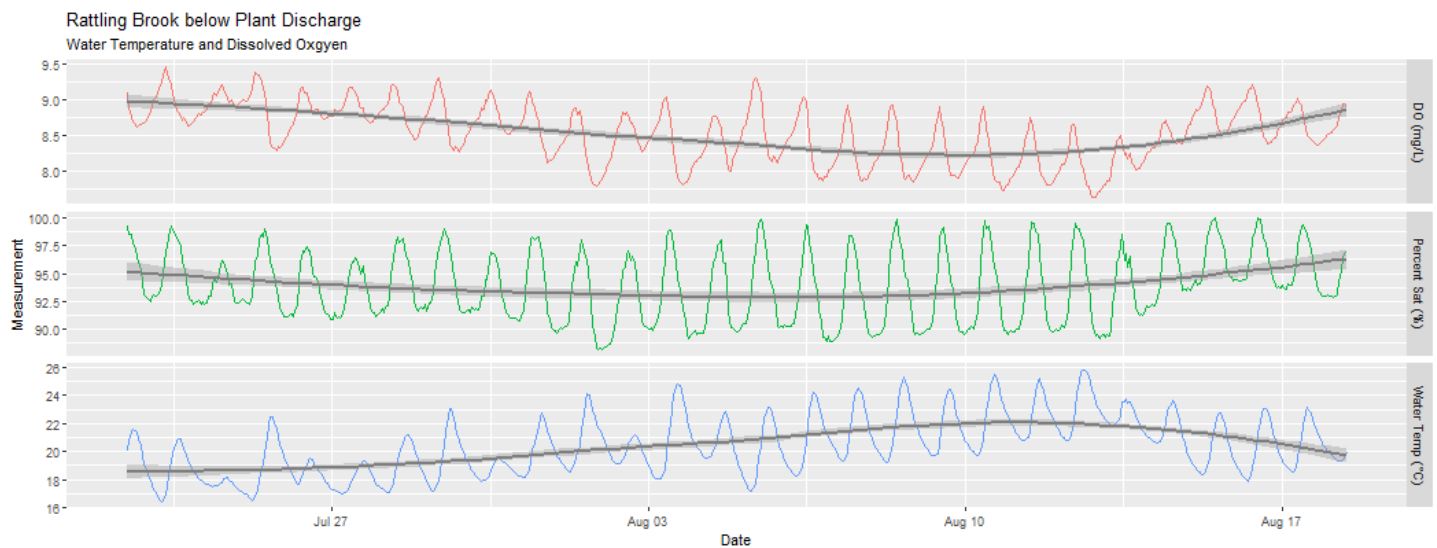
Dissolved Oxygen

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 oxidation reactions.



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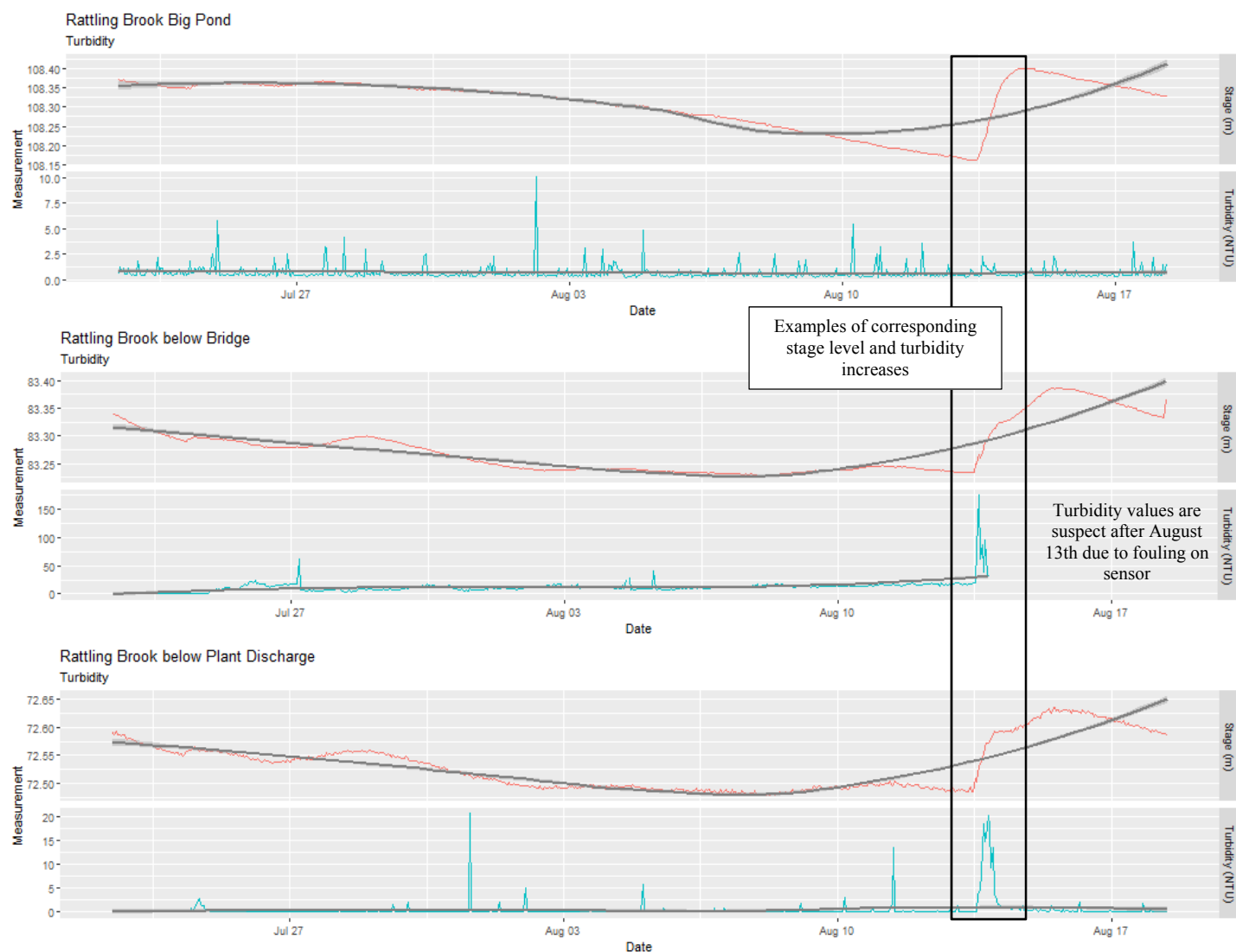
Station	Max	Min	Median	Mean
Big Pond	9.49	7.34	8.64	8.63
Below Bridge	9.41	8.06	8.76	8.73
Below Plant Discharge	9.46	7.62	8.57	8.53

- DO was relatively stable over the deployment period and showing obvious diurnal trends that correlate to the temperature trends.
- During this deployment period, all values were above the minimum CCME Aquatic Guideline for other life stages (6.5 mg/l).

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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	Max	Min	Median	Mean
Big Pond	10.1	0.2	0.5	0.7
Below Bridge	130.7	0.0	11.7	11.2
Below Plant Discharge	20.6	0.0	0.0	0.4

- During the deployment period covered by this report, turbidity values ranged from 0.2 NTU to 10.1 NTU at Big Pond, 0.0 NTU to 130.7 NTU at Below Bridge and from 0.0 NTU to 20.6 NTU at Plant Discharge.
- Below Bridge and Plant Discharge experienced significant spikes August 13th which was determined to be heavy precipitation at the time.

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Appendix

