

Real-Time Water Quality Deployment Report

Rattling Brook Network

December 18, 2023 to February 8, 2024



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

General

- Department of Environment and Climate Change 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.

Table 1: Qualitative QAQC Ranking

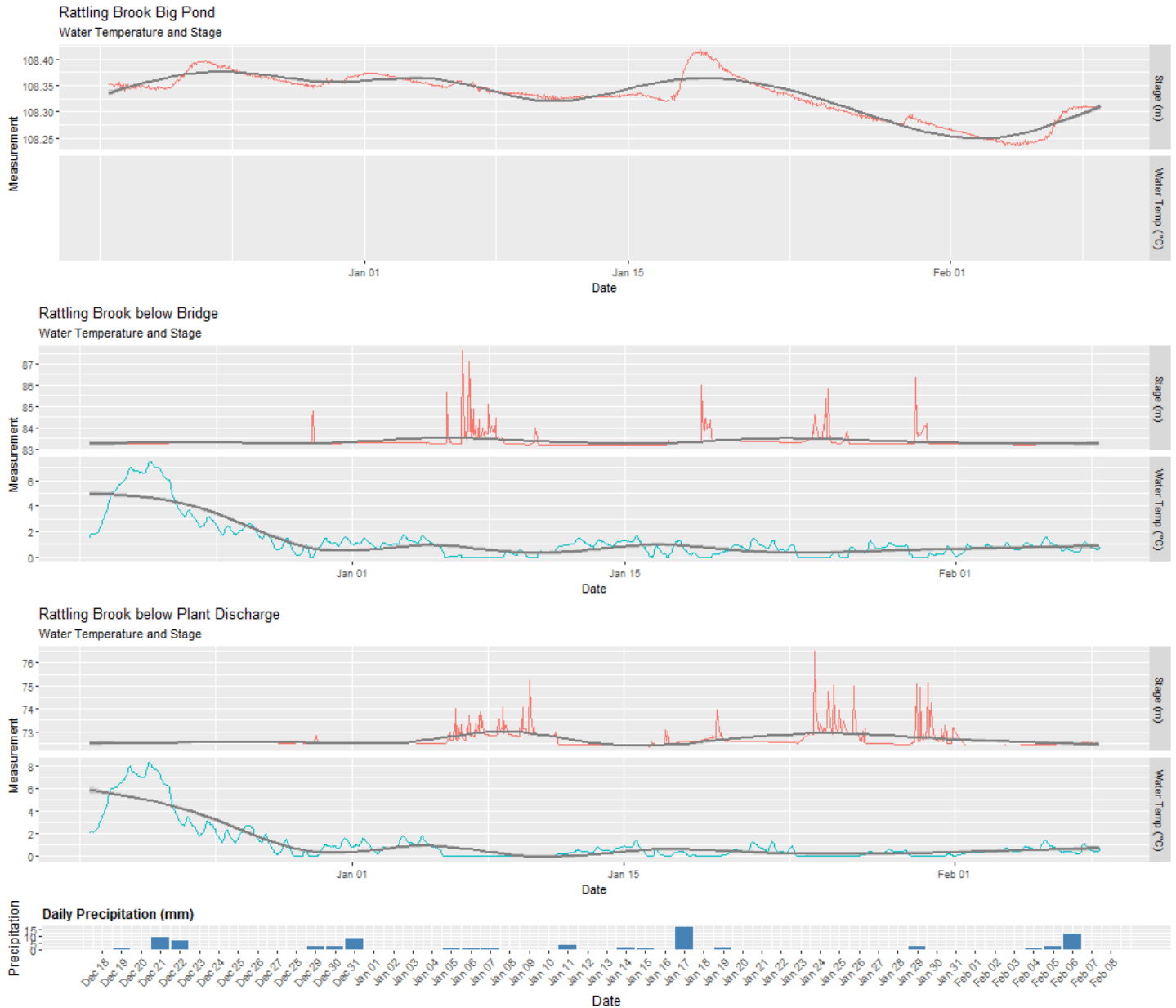
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	December 18	Deployment	Excellent	Excellent	Marginal	Marginal	Excellent
	February 8	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Rattling Brook below Bridge	December 18	Deployment	Excellent	Marginal	Marginal	Marginal	Excellent
	February 8	Removal	Excellent	Good	Marginal	Excellent	Good
Rattling Brook below Plant Discharge	December 18	Deployment	Good	Fair	Marginal	Poor	Good
	February 8	Removal	Excellent	Good	Marginal	Fair	Good

- Big Pond water temperature data is not available due to a datalogger change and programming issue. This will be rectified once Water Survey Canada visits the station to update the program.
- Rattling Brook below Plant Discharge DO sensor rated ‘poor’ upon deployment. The field sonde value was 14.4mg/L while QA/QC was 13.34mg/L. The sonde is removed for its annual Performance Testing and Evaluation.

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.



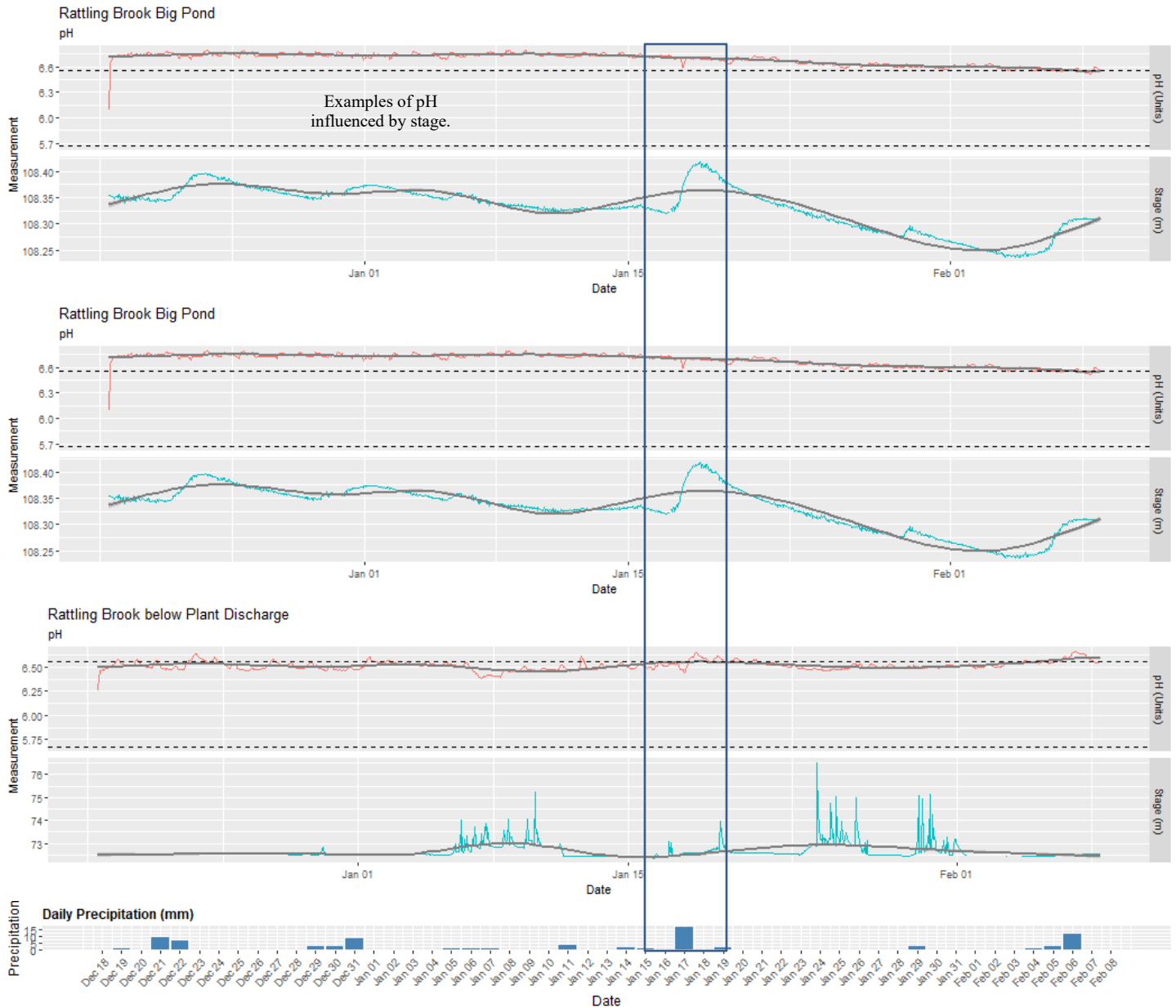
Station	Max	Min	Median	Mean
Big Pond	N/A	N/A	N/A	N/A
Below Bridge	7.47	-0.03	0.85	1.24
Below Plant Discharge	8.27	0.0	0.41	1.04

- Trend lines indicate that the water temperature stabilized at Below Bridge and Plant Discharge stations.

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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.



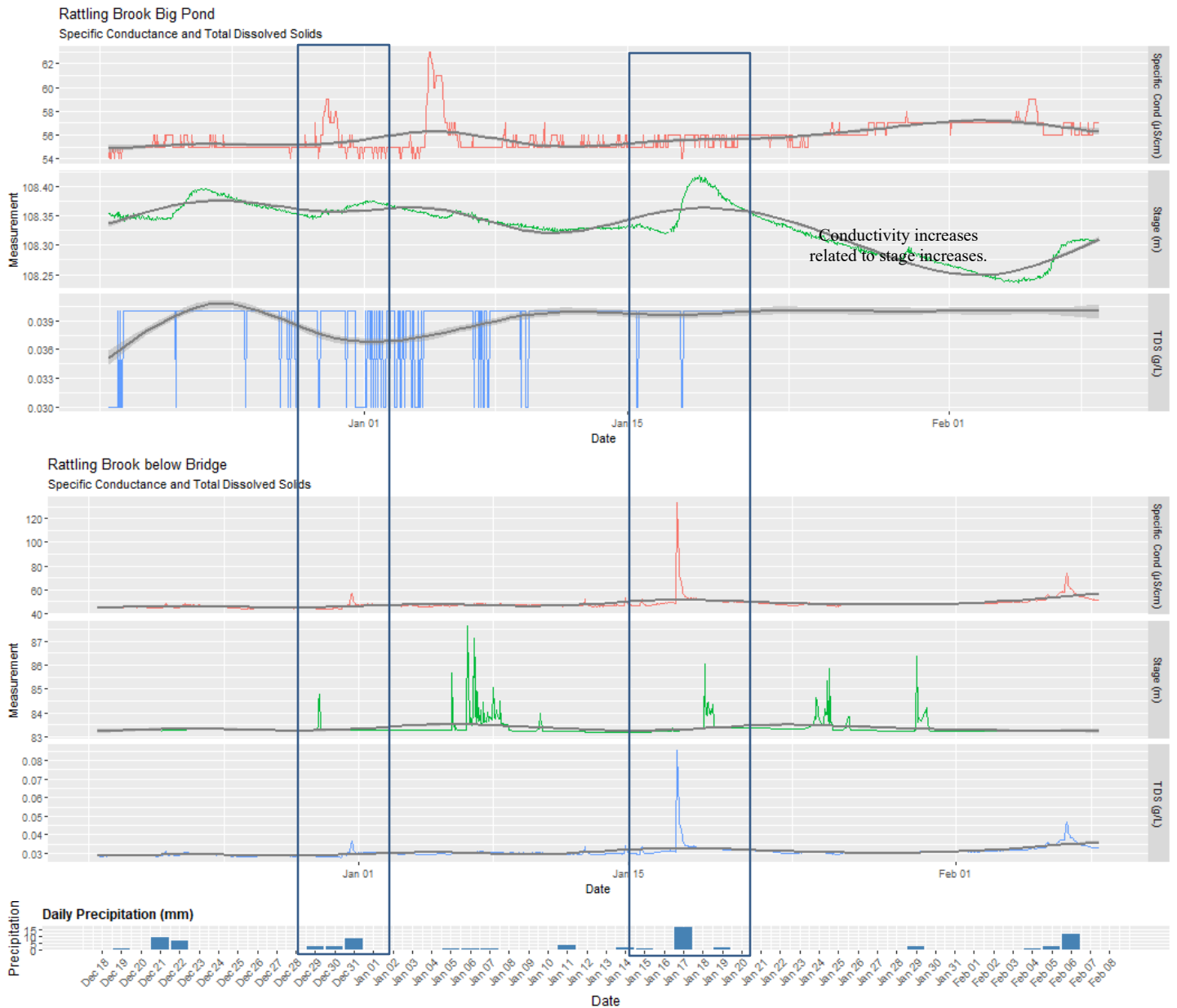
Station	Max	Min	Median	Mean
Big Pond	6.79	6.10	6.71	6.69
Below Bridge	6.85	6.52	6.60	6.62
Below Plant Discharge	6.66	6.26	6.51	6.52

- pH values remained steady, with the majority hovering around the upper site-specific guidelines (5.67-6.56 pH Units) for all three stations.

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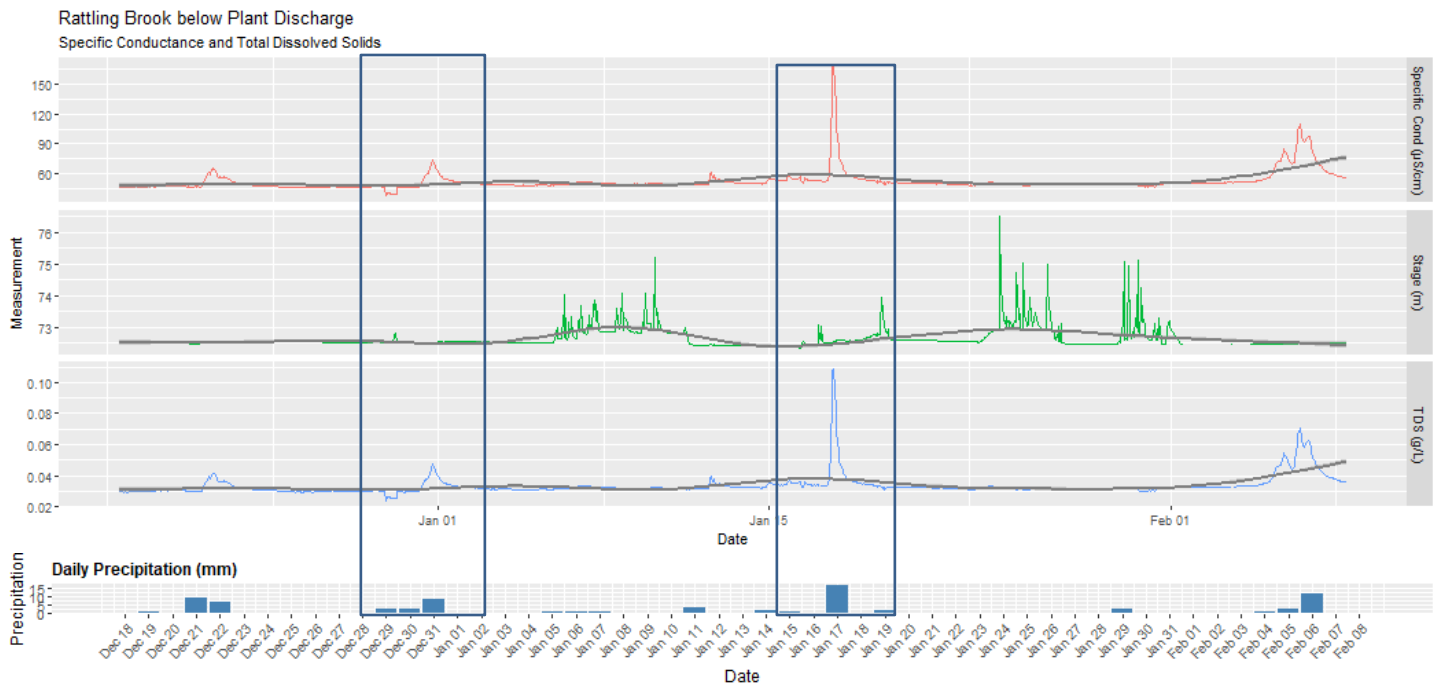
Specific Conductivity

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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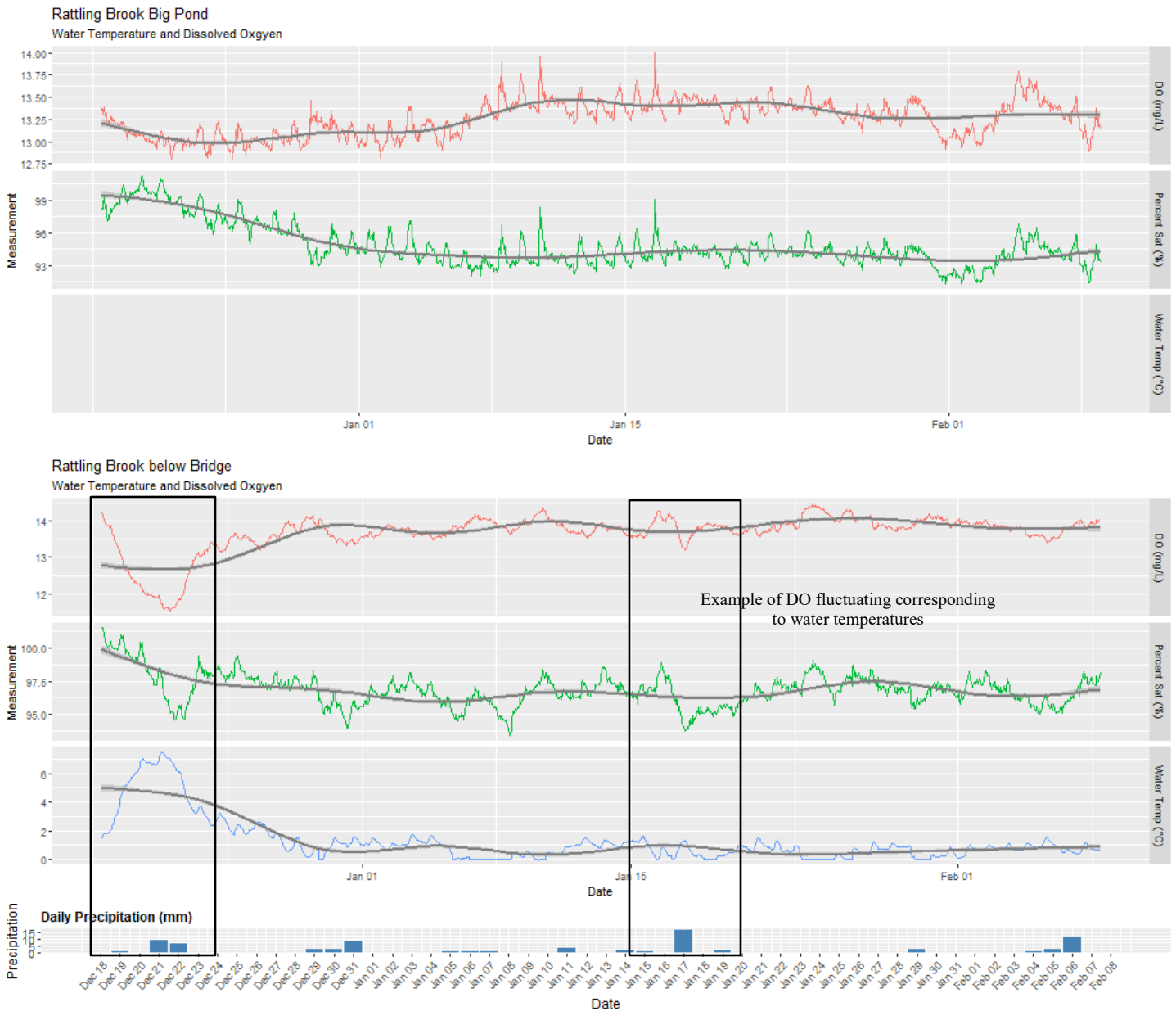
Station	Max	Min	Median	Mean
Big Pond	63.0	54.0	56.0	55.8
Below Bridge	133.6	43.4	47.3	47.9
Below Plant Discharge	170.0	37.6	50.0	52.3

- Specific conductivity was relatively stable at all stations with most peaks occurring during precipitation events.

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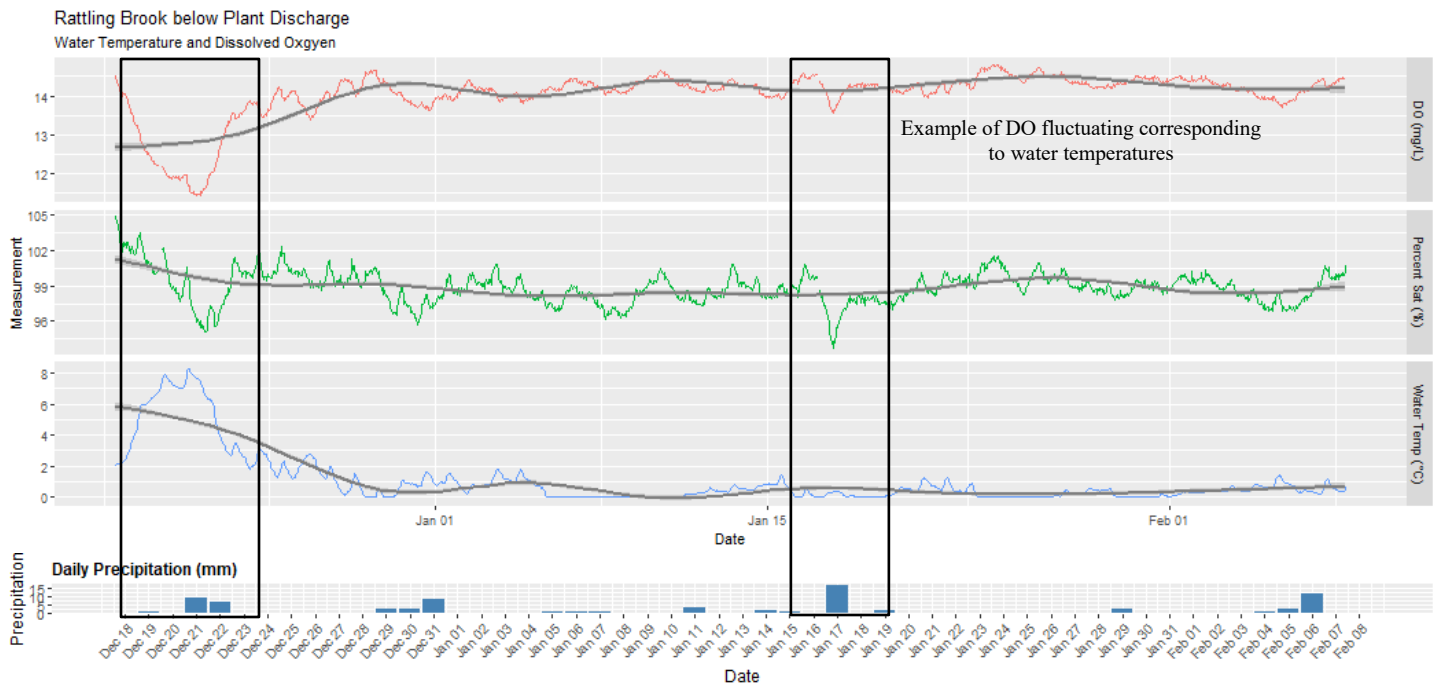
Dissolved Oxygen

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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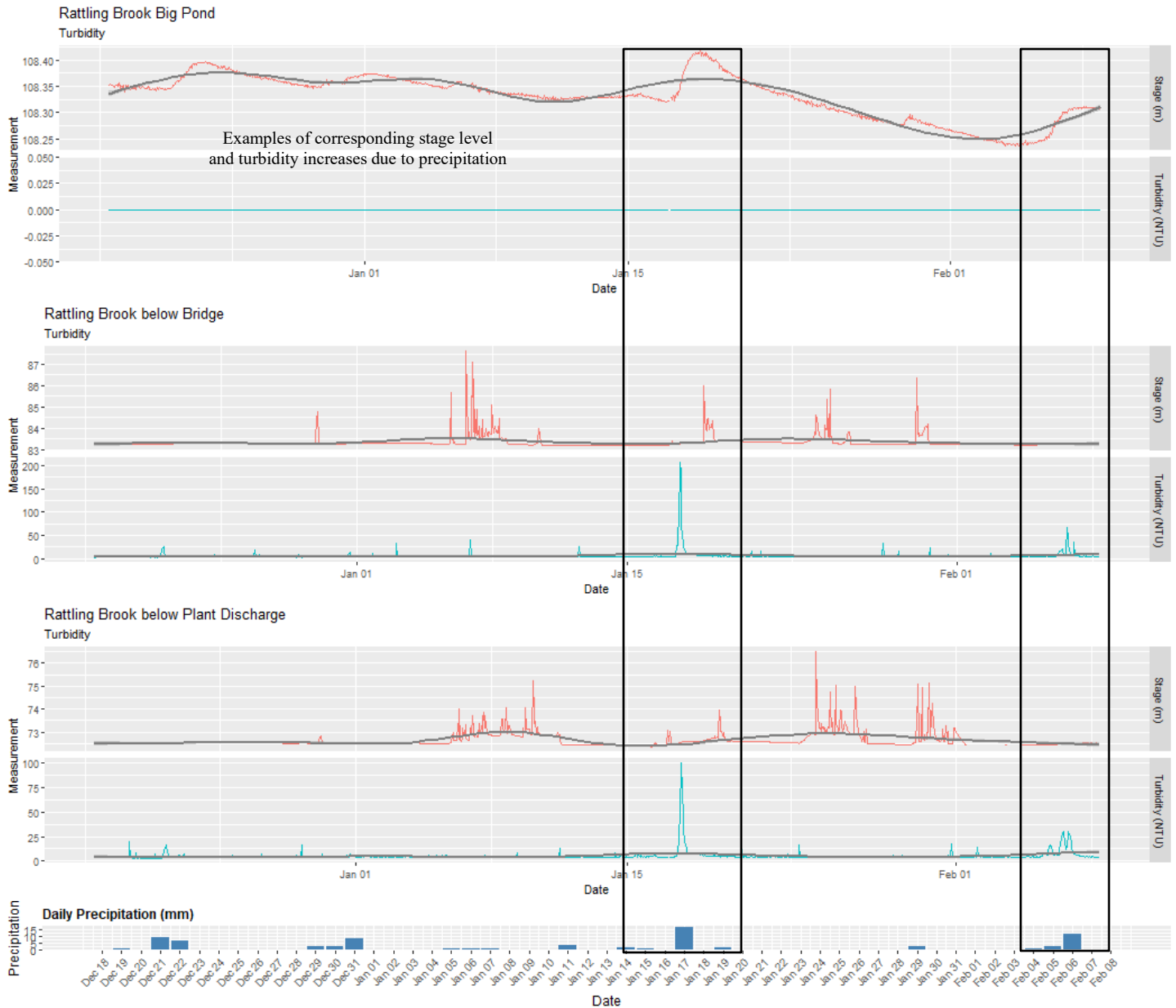
Station	Max	Min	Median	Mean
Big Pond	14.01	12.80	13.27	13.25
Below Bridge	14.47	11.52	13.797	13.67
Below Plant Discharge	14.81	11.43	14.19	14.04

- As shown on all three graphs, DO is slowly increasing at all three stations as water temperatures cool. This aligns with the CCME guideline of 9.5 mg/l for the protection of cold water biota.

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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	0.0	0.0	0.0	0.0
Below Bridge	207.1	2.3	3.9	5.2
Below Plant Discharge	100.2	2.6	4.0	5.0

- Big Pond is ice covered hence the 0.0NTU readings as sediment isn't moving around without wave action. Turbidity was stable at Below Bridge and Plant Discharge with exception of during precipitation events.

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Appendix

