

Real-Time Water Quality Deployment Report

Rattling Brook Network

January 11, 2022 to February 17, 2022



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

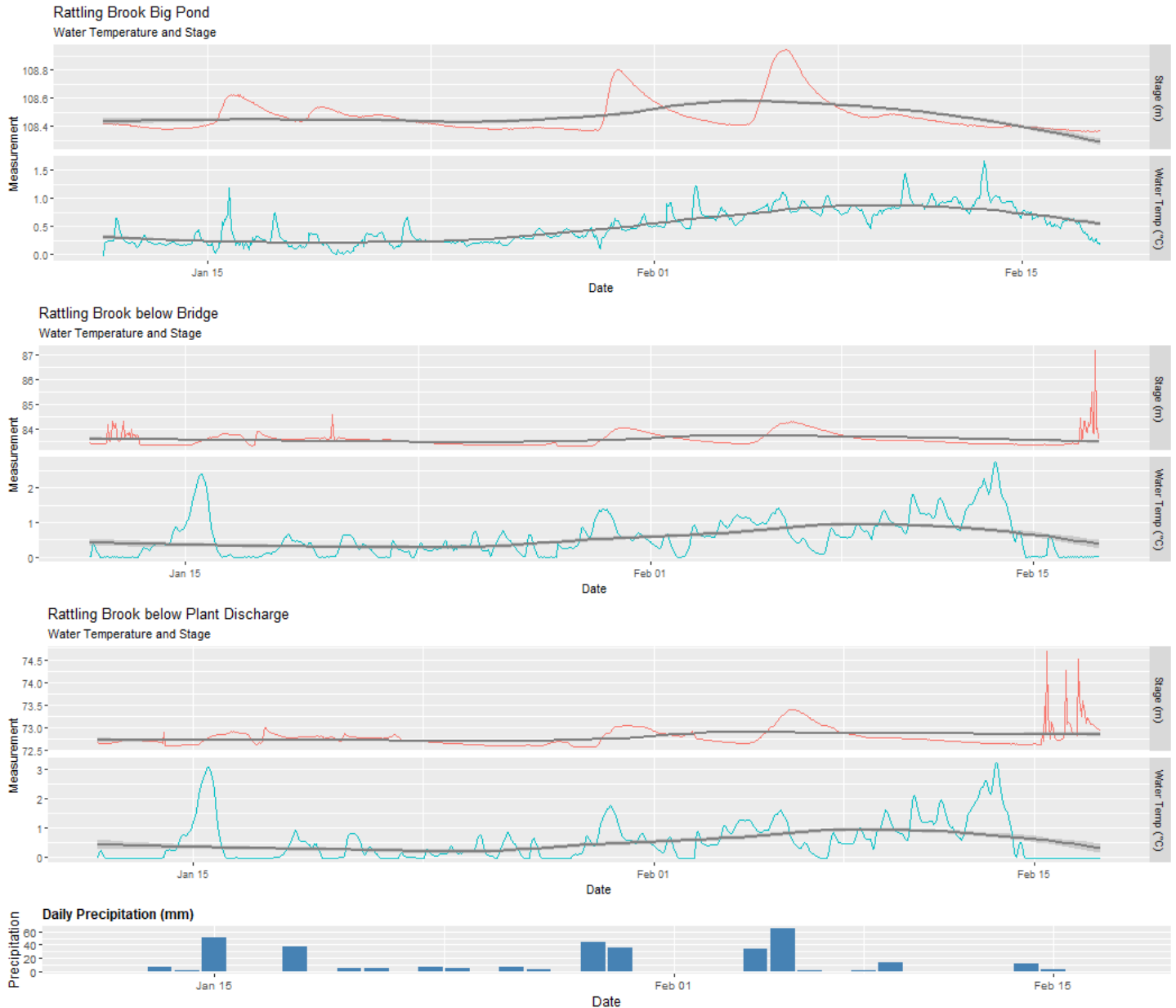
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	December 2	Deployment	Excellent	Good	Good	Excellent	Fair
		Ongoing	N/A	N/A	N/A	N/A	N/A
Rattling Brook below Bridge	January 11	Deployment	Excellent	Good	Good	Fair	Excellent
	February 17	Removal	Excellent	Fair	Poor	Marginal	Excellent
Rattling Brook below Plant Discharge	January 11	Deployment	Excellent	Excellent	Good	Good	Good
	February 17	Removal	Excellent	Good	Good	Marginal	Excellent

- Big Pond was not removed on February 17th due to ice coverage. It will continue to be an ongoing deployment until ice conditions allow removal.
- During this deployment, the Vale weather station was compromised during a wind event and data is suspect. This report is utilizing weather data at St. John’s West 78kms from Long Harbour.
- During removal at Below Bridge conductivity rated ‘Poor’ due to the QA/QC instrument’s placement based on ice conditions.

- 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.



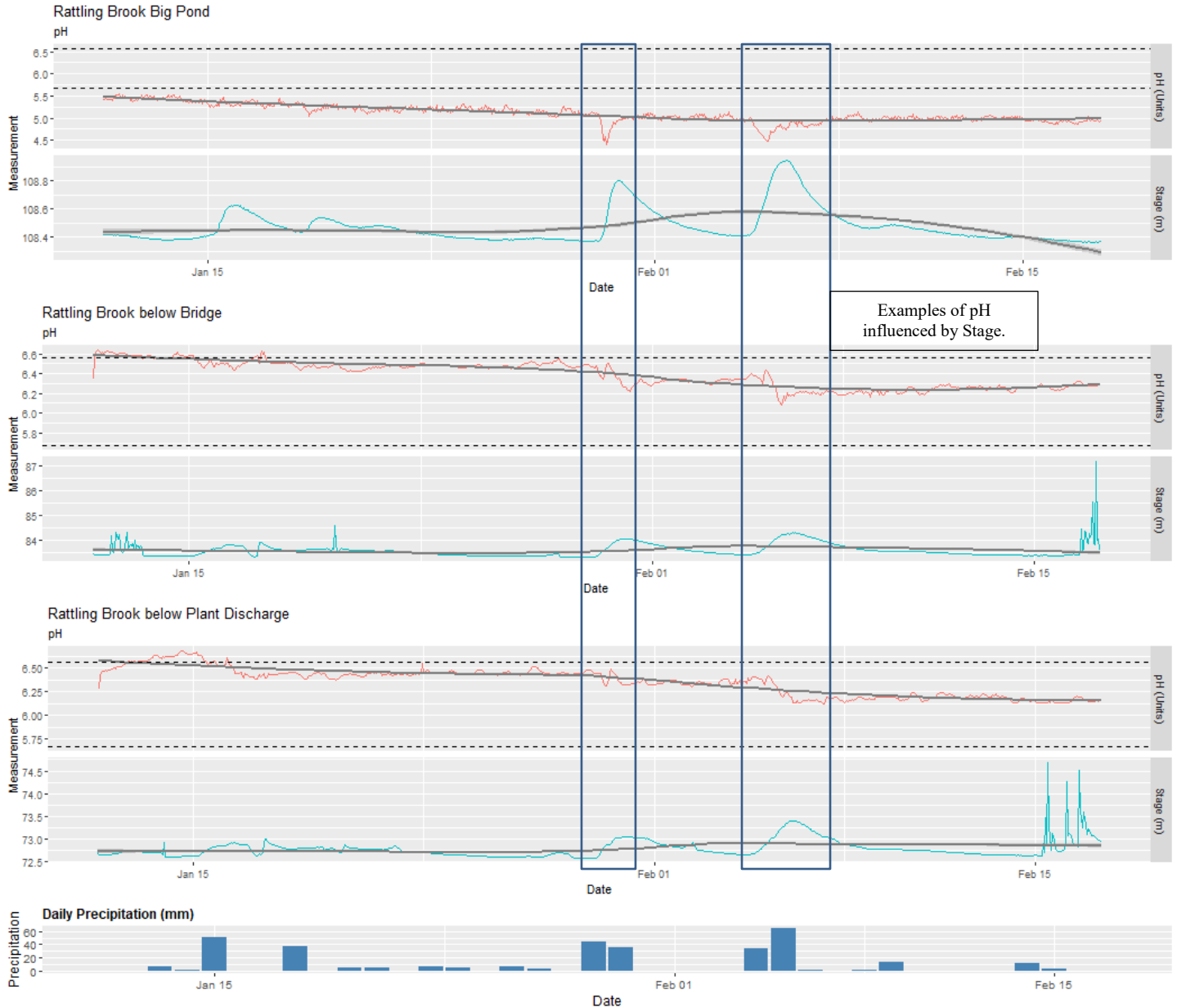
Station	Max	Min	Median	Mean
Big Pond	1.66	-0.04	0.44	0.50
Below Bridge	2.76	-0.01	0.44	0.57
Below Plant Discharge	3.24	-0.04	0.33	0.54

- Water temperature plateaued during deployment. It was also noted the riverbed was accumulating ice.

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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.



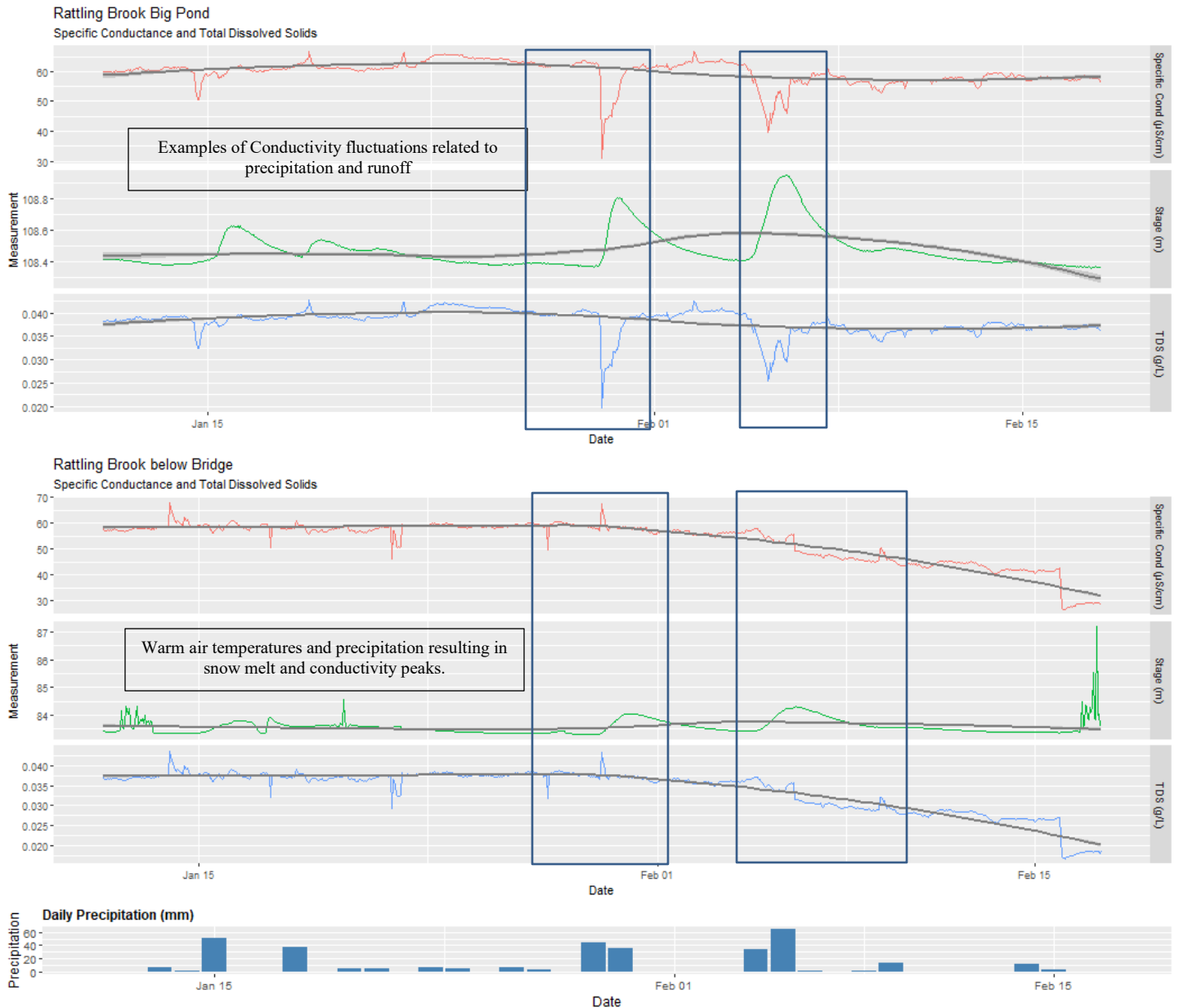
Station	Max	Min	Median	Mean
Big Pond	5.54	4.40	5.08	5.11
Below Bridge	6.64	6.08	6.43	6.39
Below Plant Discharge	6.68	6.12	6.40	6.36

- pH values were generally consistent with the majority of values within the site-specific guidelines (5.67-6.56 pH Units). Big Pond showed low pH measurements caused by sensor drift due to extended deployment.

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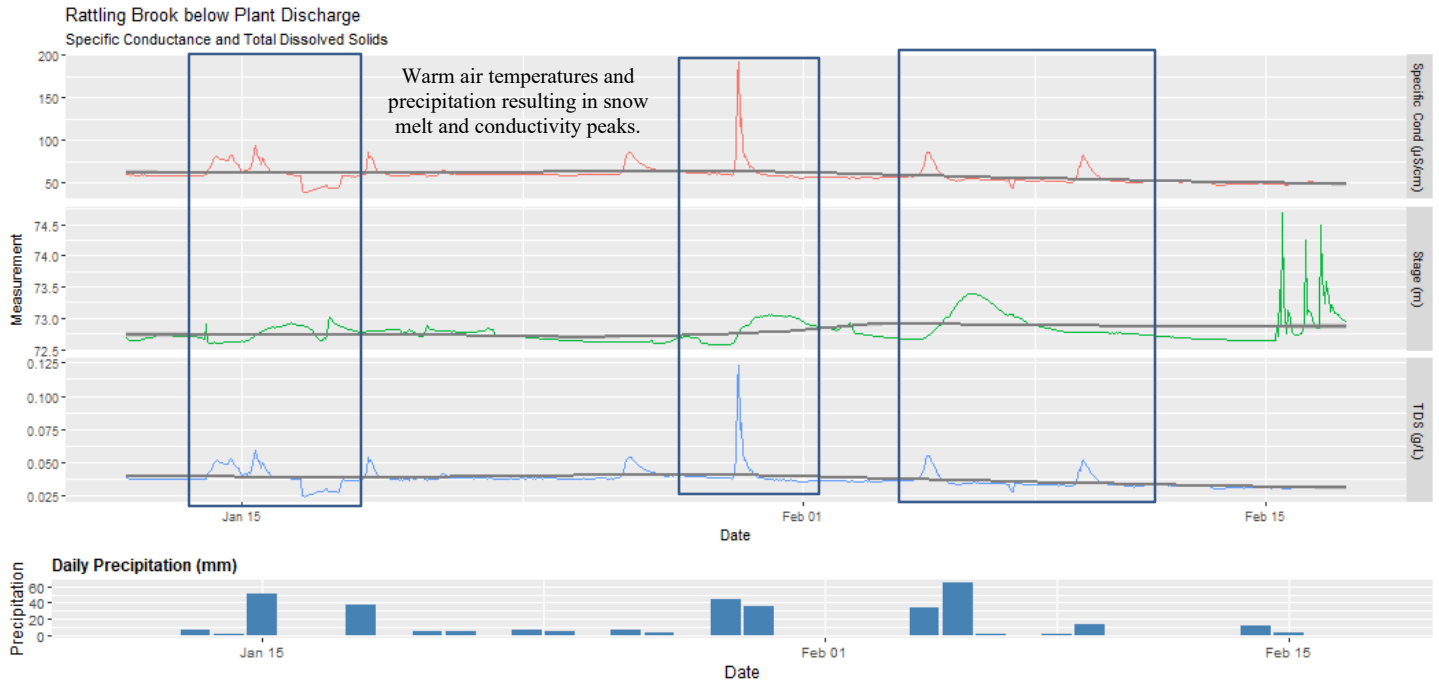
Specific Conductivity

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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Rattling Brook Network, Long Harbour, Newfoundland and Labrador



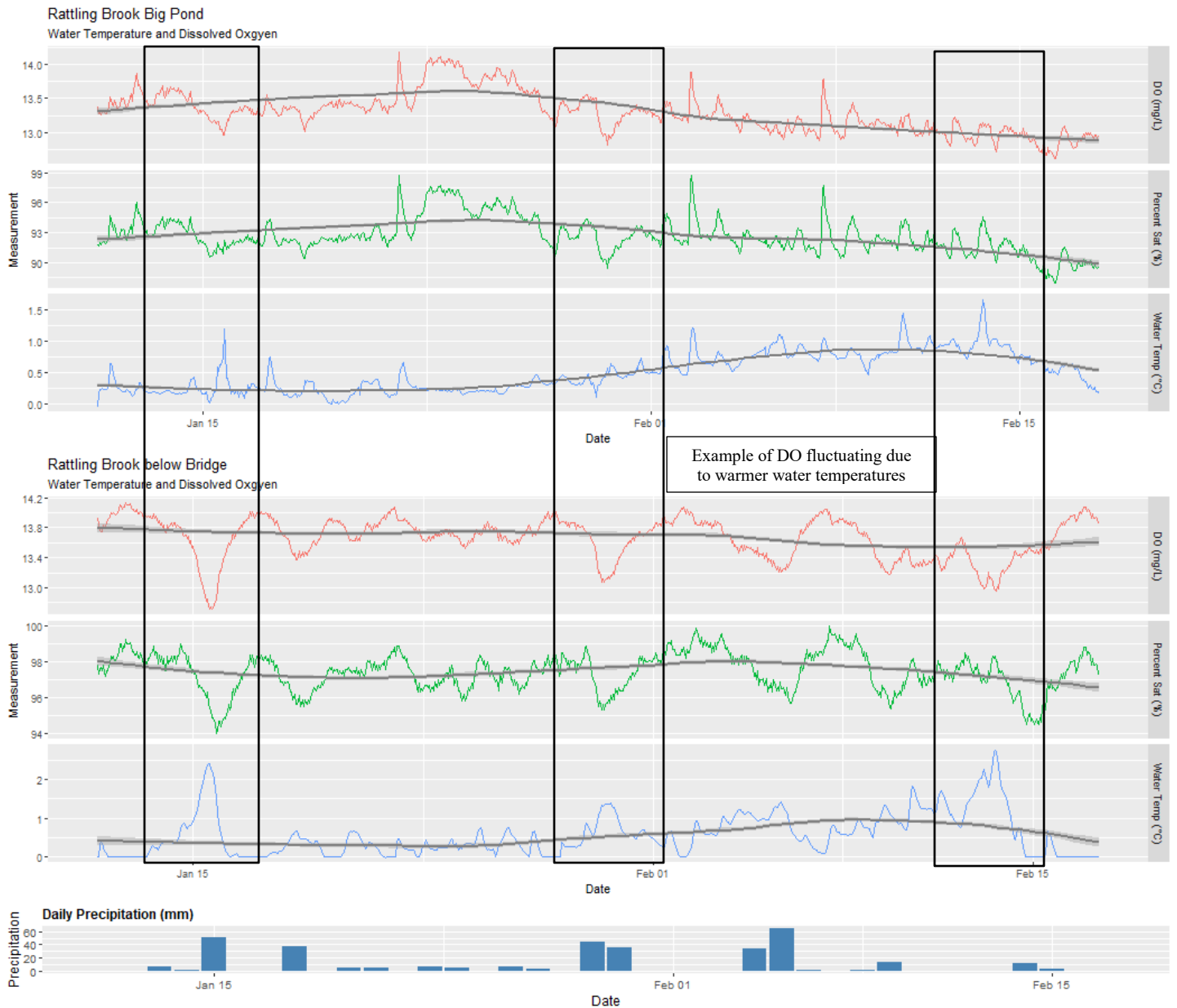
Station	Max	Min	Median	Mean
Big Pond	66.8	30.9	60.6	59.8
Below Bridge	68.0	26.4	57.1	53.1
Below Plant Discharge	192.7	38.3	58.1	58.3

- Specific conductivity was relatively stable at all stations except Below Bridge which showed a gradual downward trend.

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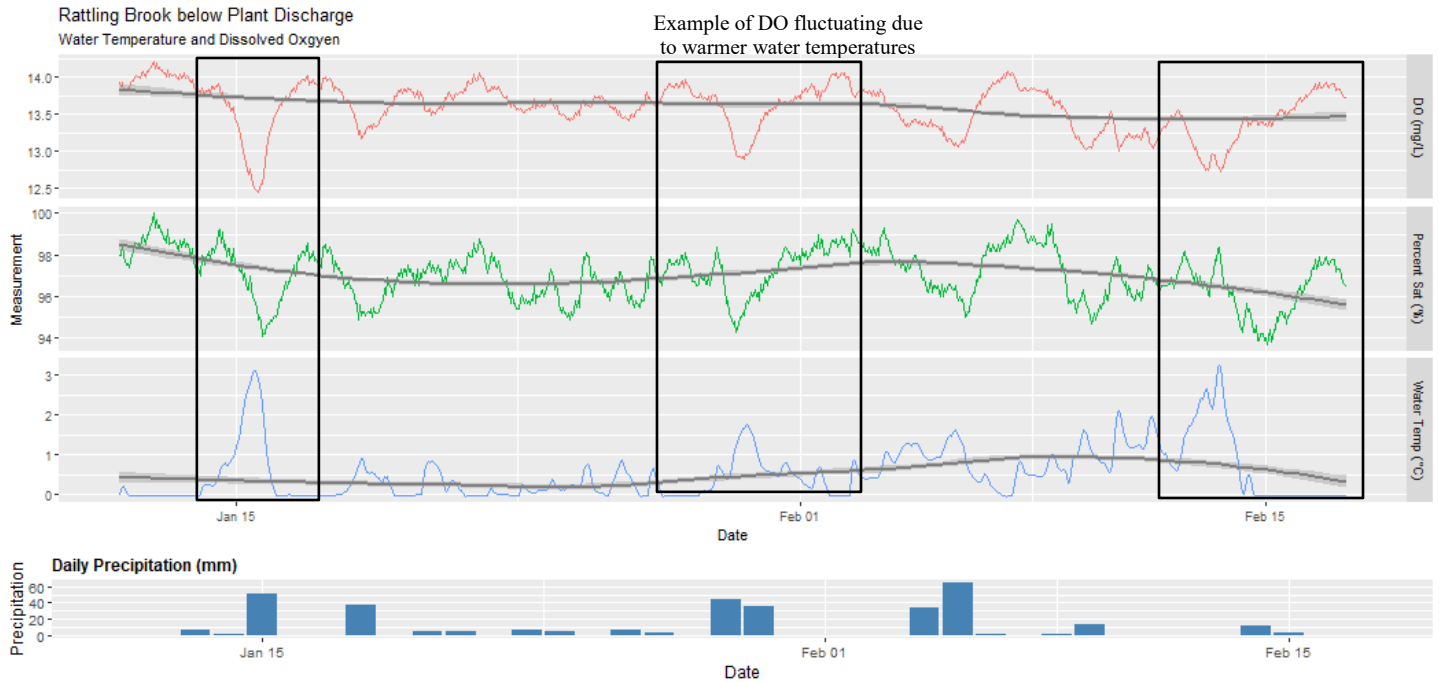
Dissolved Oxygen

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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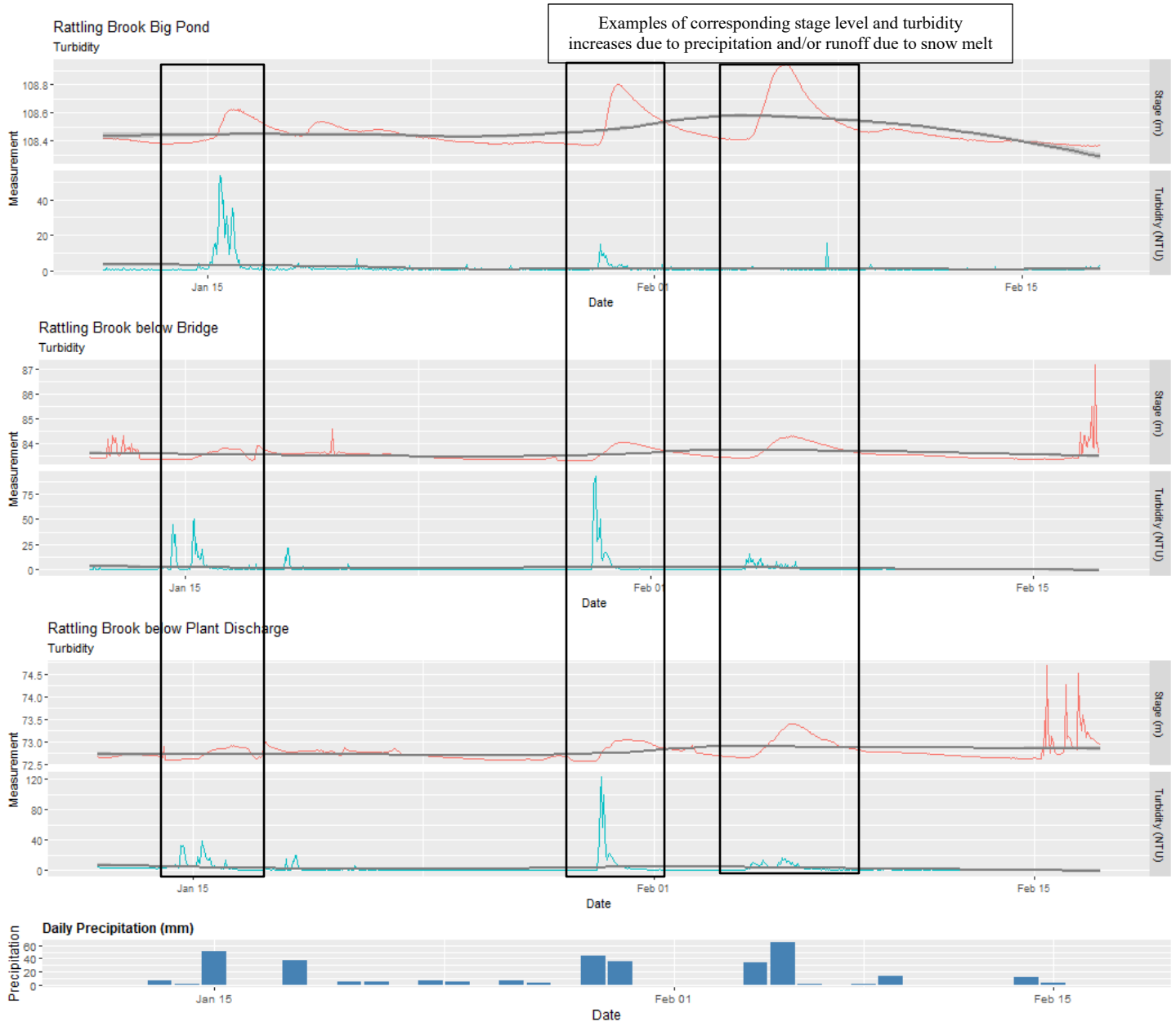
Station	Max	Min	Median	Mean
Big Pond	14.19	12.61	13.29	13.30
Below Bridge	14.14	12.71	13.72	13.66
Below Plant Discharge	14.21	12.44	13.64	13.58

- As water temperatures stabilized for winter, dissolved oxygen concentrations plateaued. A few abnormally warm periods throughout the deployment caused DO fluctuations for a short period of time at all stations.
- During this deployment period all measurements were found to be above the CCME dissolved oxygen guideline of 9.5 mg/L for the protection of early life stage 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	53.5	0.4	0.9	1.8
Below Bridge	92.7	0.0	0.0	1.5
Below Plant Discharge	123.5	0.0	0.2	2.4

- Isolated turbidity events were experienced simultaneously with precipitation and runoff events and are of short duration.

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Appendix

