Real-Time Water Quality Deployment Report

Rattling Brook Network

February 19, 2016 to March 23, 206

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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2016-02-19 to 2016-03-23

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Due to ice conditions, monitoring at Rattling Brook Big Pond station is on hold. Operation will likely resume during the next deployment period in late April or early May.
- 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

- 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.

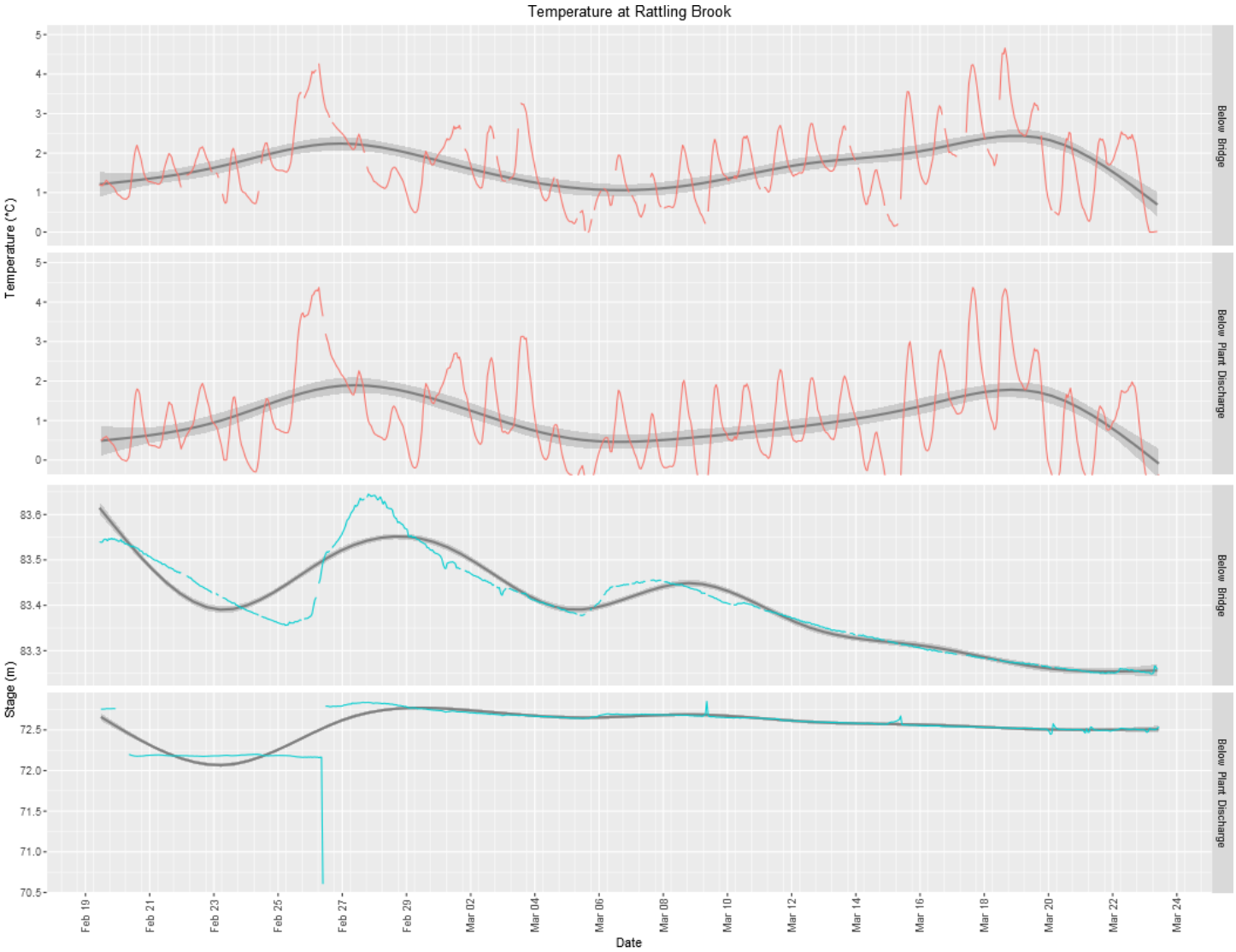
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	Removed for season						
Rattling Brook below Bridge	2016-02-19	Deployment	Good	Excellent	Excellent	Excellent	Fair
	2016-03-23	Removal	Good	Fair	Excellent	Fair	Fair
Rattling Brook below Plant Discharge	2016-02-19	Deployment	Excellent	Good	Excellent	Good	Good
	2016-03-23	Removal	Excellent	Excellent	Excellent	Good	Good

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
Below Bridge	1.69	1.59	0.00	4.66
Below Plant Discharge	1.08	0.90	-0.55	4.37

- Variability in water temperature increased throughout the deployment period as the difference in daily temperature extremes became greater. This is a combination of longer daytimes and more powerful incoming solar radiation as winter gives way to spring. Temperature can be expected to increase much more into the next deployment period.

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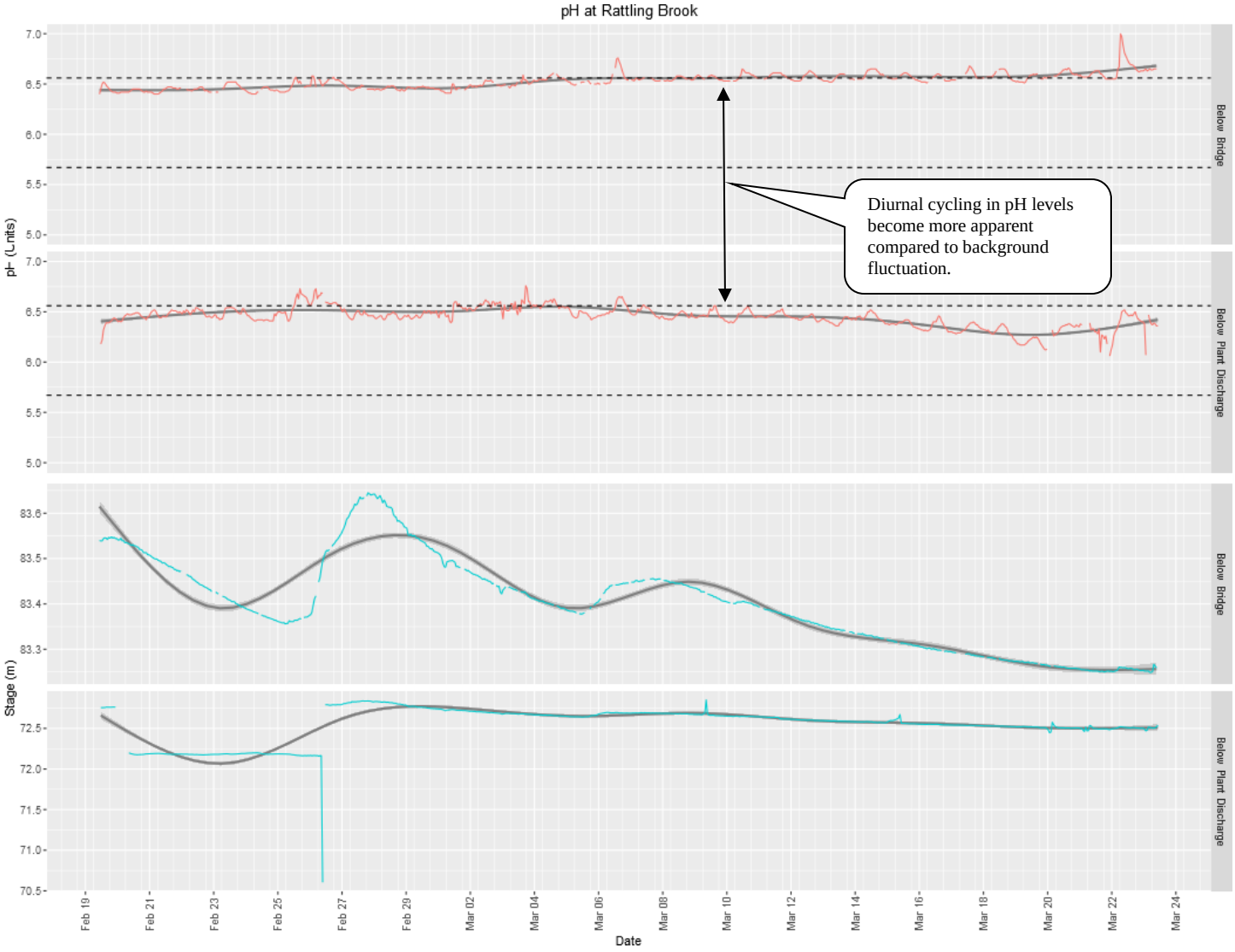
pH

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.



Station	Mean	Median	Min	Max
Below Bridge	6.53	6.54	6.40	7.00
Below Plant Discharge	6.45	6.46	6.06	6.76

- pH levels were near the upper threshold of Site Specific Guidelines (dashed lines) at Bridge and Discharge stations for most of the deployment period
- By mid-March diurnal cycling in pH values was beginning to become more apparent as aquatic vegetation productivity was spurred by stronger sunlight levels.

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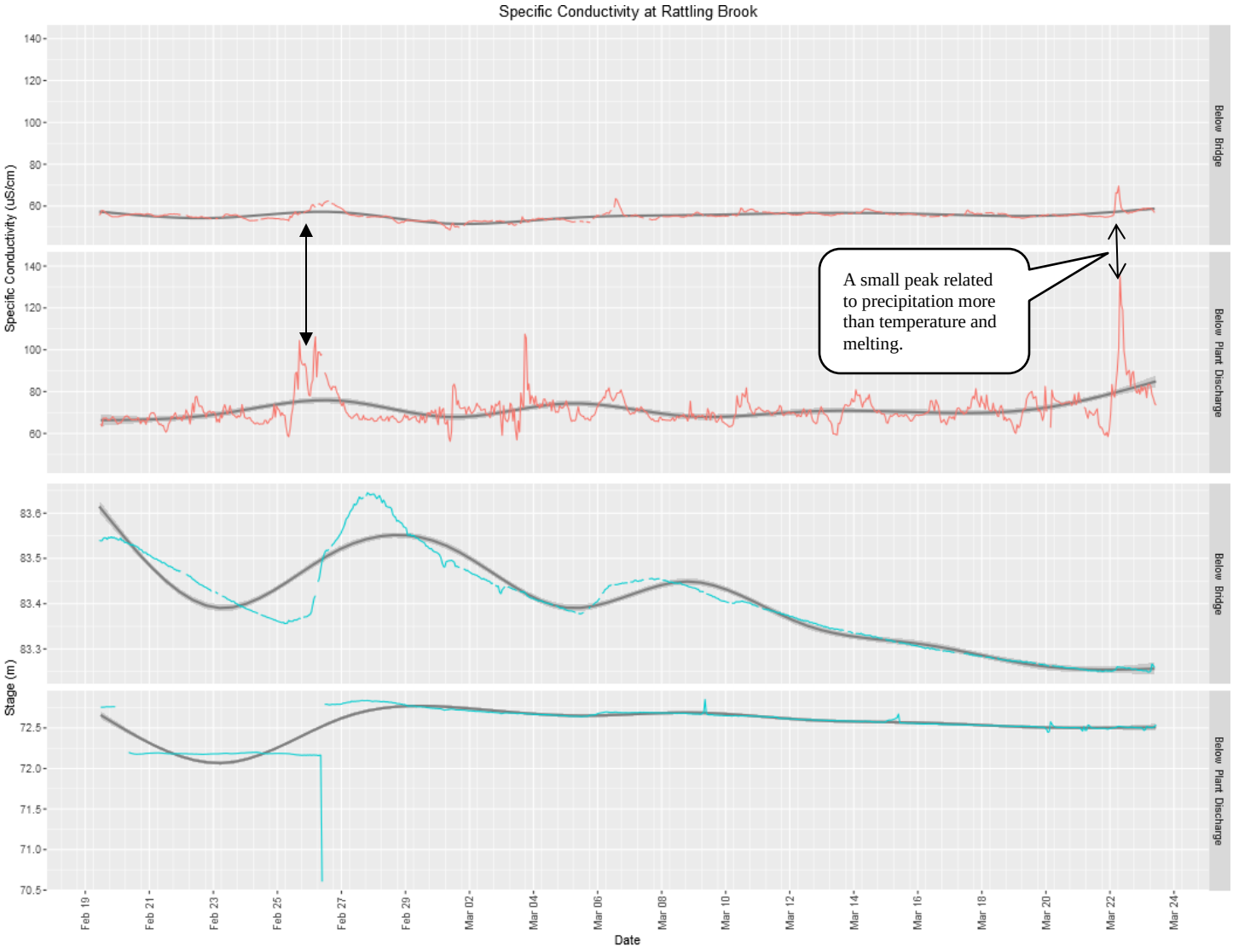
Specific Conductivity

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
Below Bridge	55.4	55.4	48.7	69.6
Below Plant Discharge	71.3	69.5	56.2	135.4

- Specific conductivity showed an increase throughout the deployment period with occasional peaks in conductivity, especially at Discharge station.
- A major peak occurred on February 25th and lasted several days in response to a combination of air temperatures in excess of 8°C and about 25 mm of precipitation. Much of the spring melt occurred during this timeframe, resulting in the long duration. Another, shorter duration, peak was seen on March 22nd.

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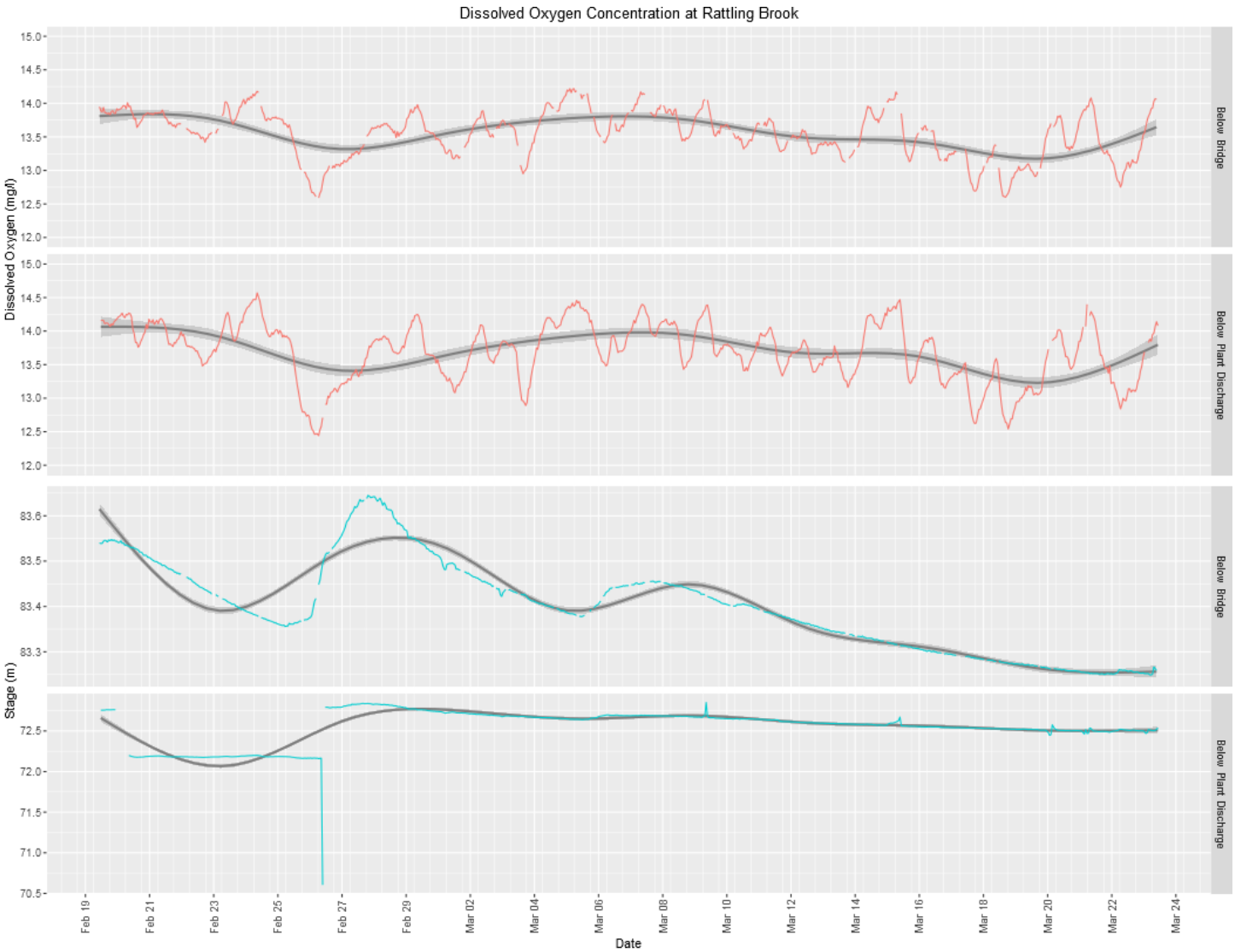
Dissolved Oxygen

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
Below Bridge	13.55	13.59	12.59	14.22
Below Plant Discharge	13.70	13.75	12.44	14.57

- Dissolved oxygen concentration did not show a substantial trend during the deployment period at Bridge and Plant Discharge station. Like pH, there may be indications of greater diurnal cycling of dissolved oxygen near the end of the deployment period compared to the start of the period – possibly because of rising aquatic productivity as daylight and sun strength rises.

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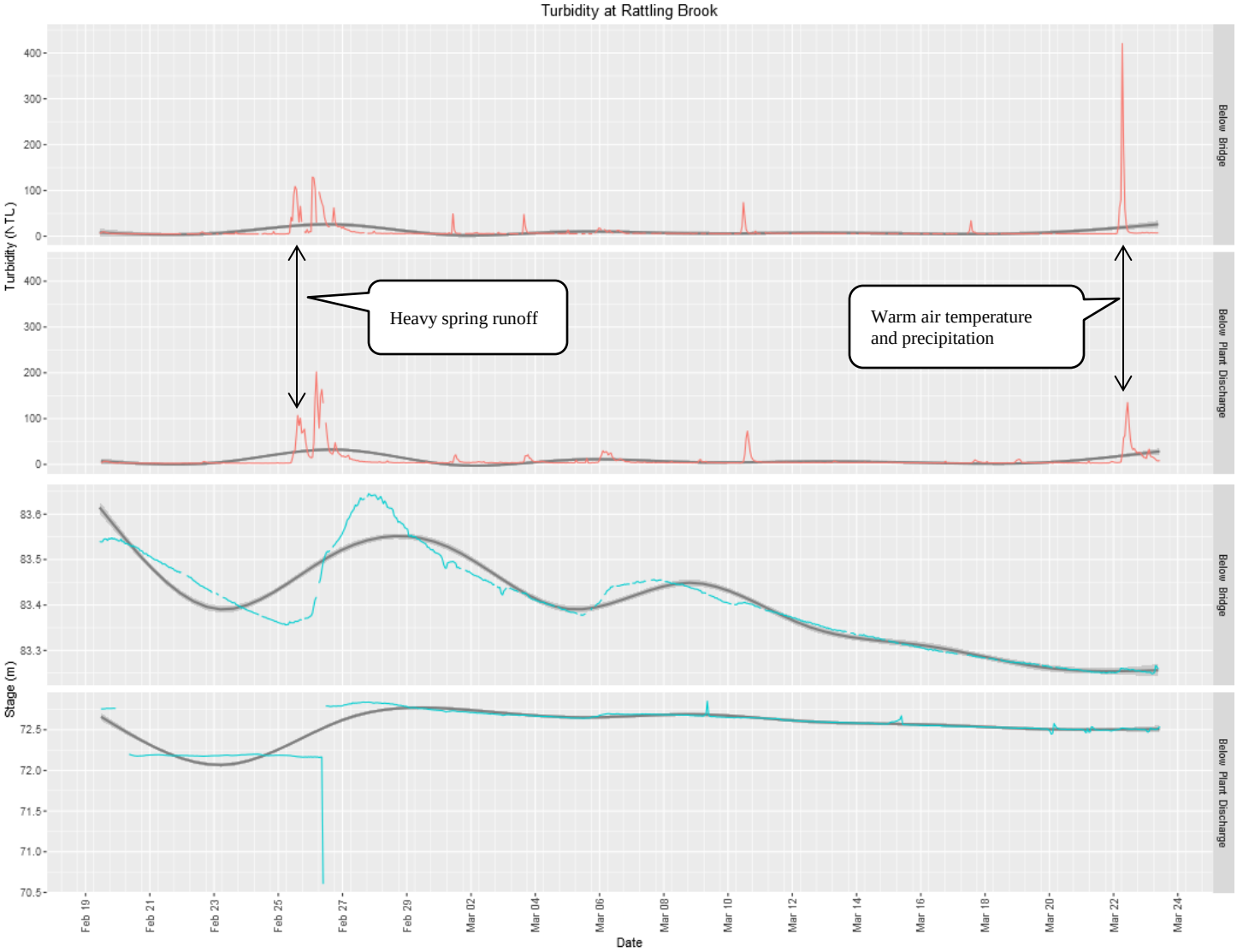
Turbidity

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
Below Bridge	9.8	5.9	4.9	421.0
Below Plant Discharge	8.8	4.0	2.4	202.1

- Turbidity levels were moderately elevated above background levels throughout the whole deployment period with minima of 4.9 NTU at Bridge station and 2.4 NTU at Plant Discharge station. As snow pack melts and soils thaw, silt and sediments that have collected over the winter are freer to move into Rattling Brook.
- High temperatures and precipitation resulted in a sustained turbidity event beginning on February 25th, mirroring the conductivity event mentioned above. A shorter turbidity event was observed on March 22nd.

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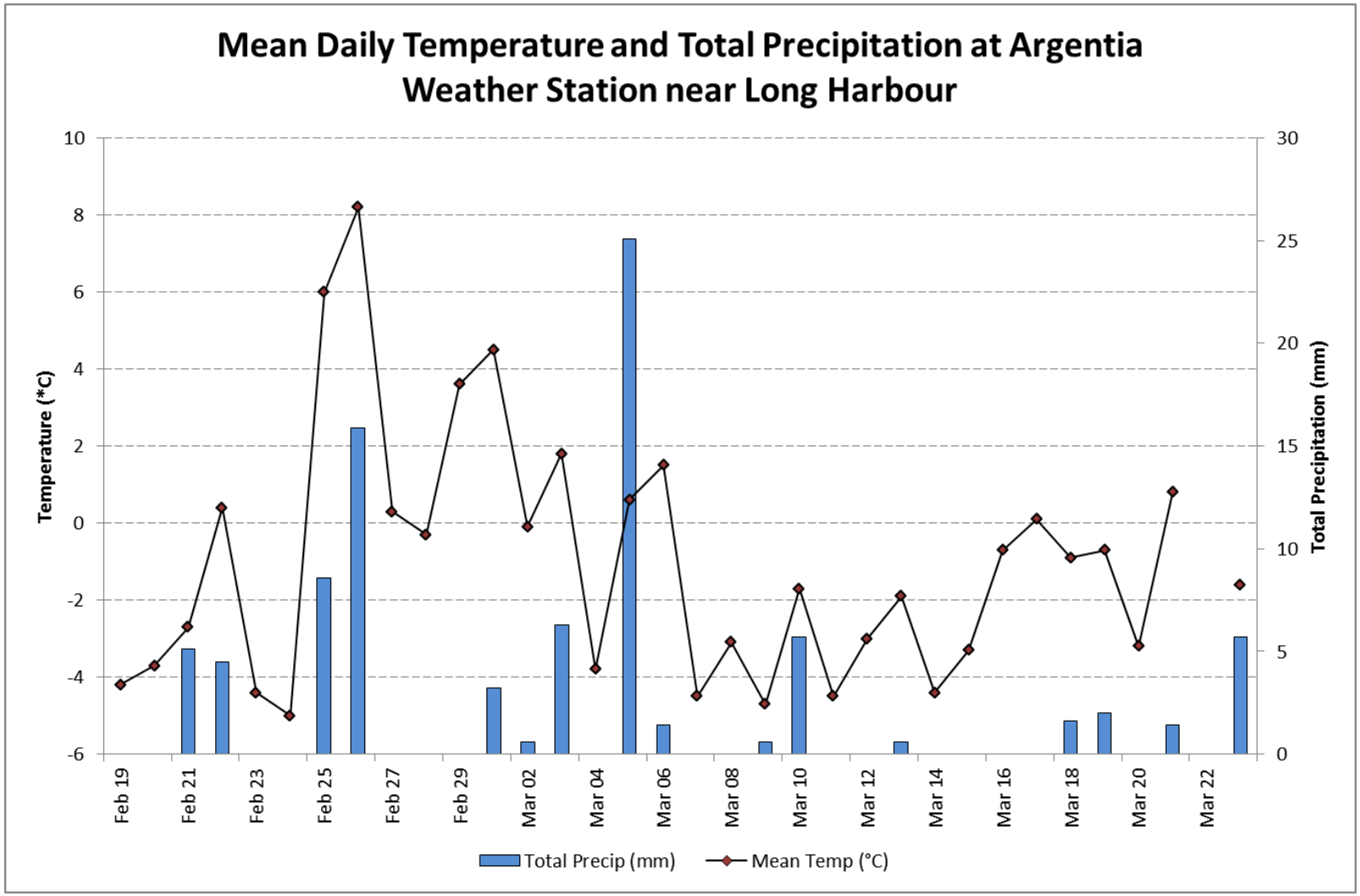
Appendix



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