Real-Time Water Quality Deployment Report

Rattling Brook Network

February 6, 2015 to March 5, 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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2015-02-06 to 2015-03-05

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Due to heavy and potentially damaging ice conditions, monitoring at Rattling Brook Big Pond has been suspended. It is expected to resume in late April once the ice has broken up.
- 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

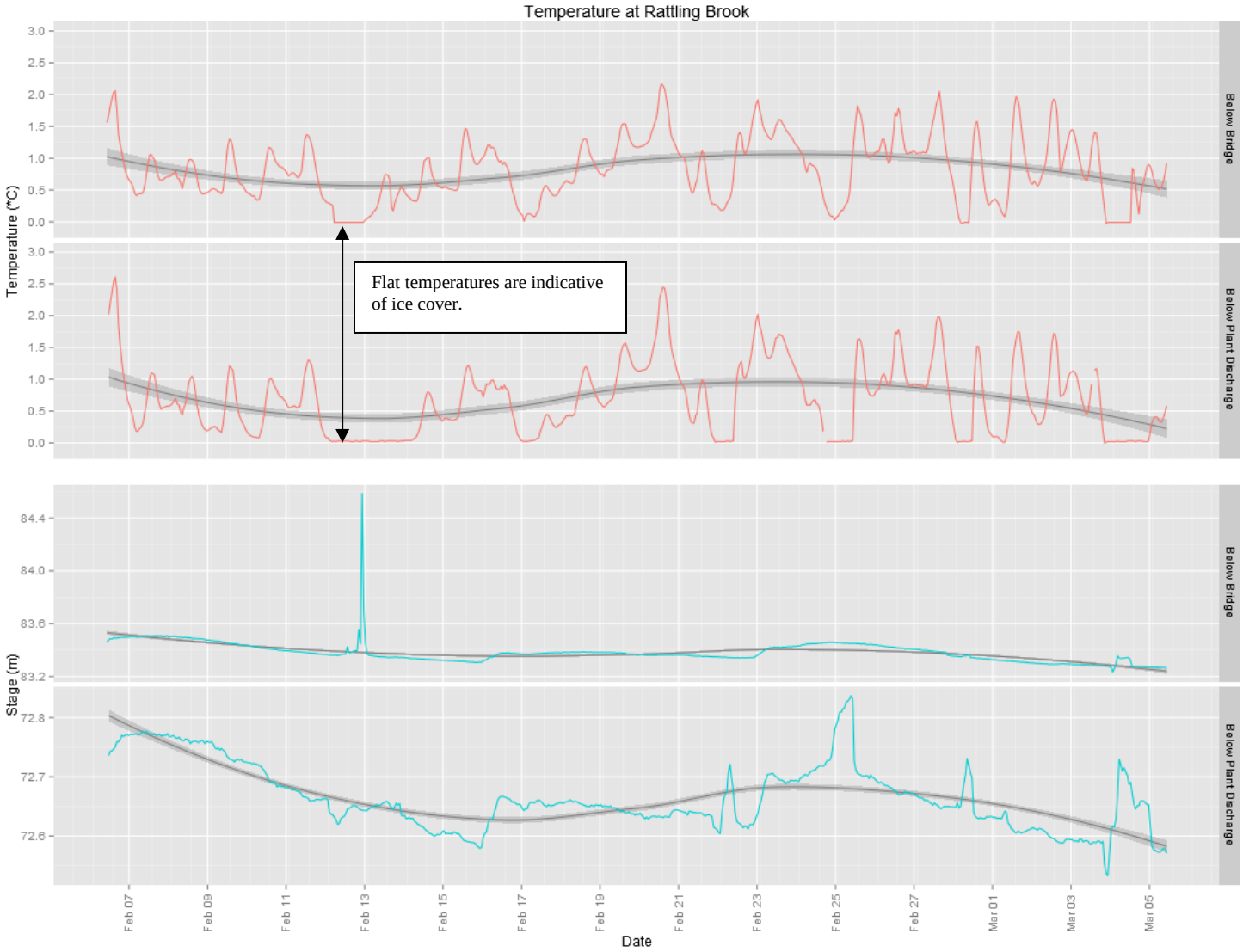
Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook below Bridge	February 6, 2015	Deployment	Excellent	Fair	Excellent	Excellent	Good
	March 5, 2015	Removal	Excellent	Good	Excellent	NA	NA
Rattling Brook below Plant Discharge	February 6, 2015	Deployment	Excellent	Excellent	Excellent	Excellent	Marginal
	March 5, 2015	Removal	Excellent	Good	Excellent	NA	NA

- No rankings were available for Dissolved Oxygen and Turbidity at removal due to limited power in handheld reader.

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	0.81	0.78	-0.03	2.17
Below Plant Discharge	0.67	0.60	0.00	2.61

- During this deployment, water temperature was lower at Plant Discharge than Bridge station. Evidence of more substantial ice cover at Plant Discharge station is evident by the relatively lengthy periods of stable low temperatures near 0°C.

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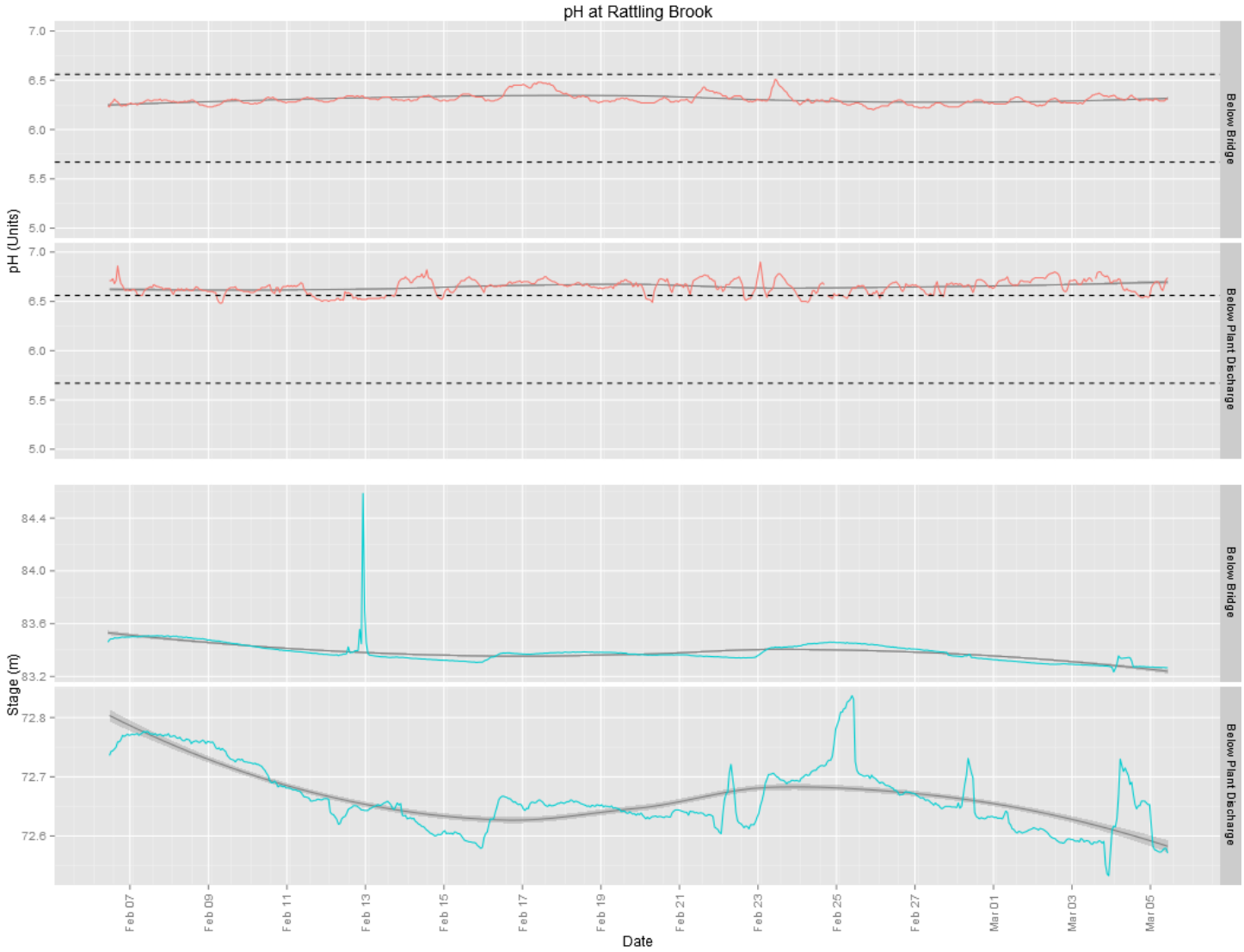
pH

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	6.30	6.30	6.20	6.51
Below Plant Discharge	6.64	6.65	6.48	6.90

- No major trend in pH is observed at Bridge or Plant Discharge stations. Values fell within the Site Specific Guidelines (SSGs, dashed lines) for Bridge station while values at Plant Discharge station straddled the upper SSG of 6.56 units. Plant Discharge indicated slightly more alkaline conditions than Bridge station, possibly due to the moderating effect of the settling ponds between the two stations.

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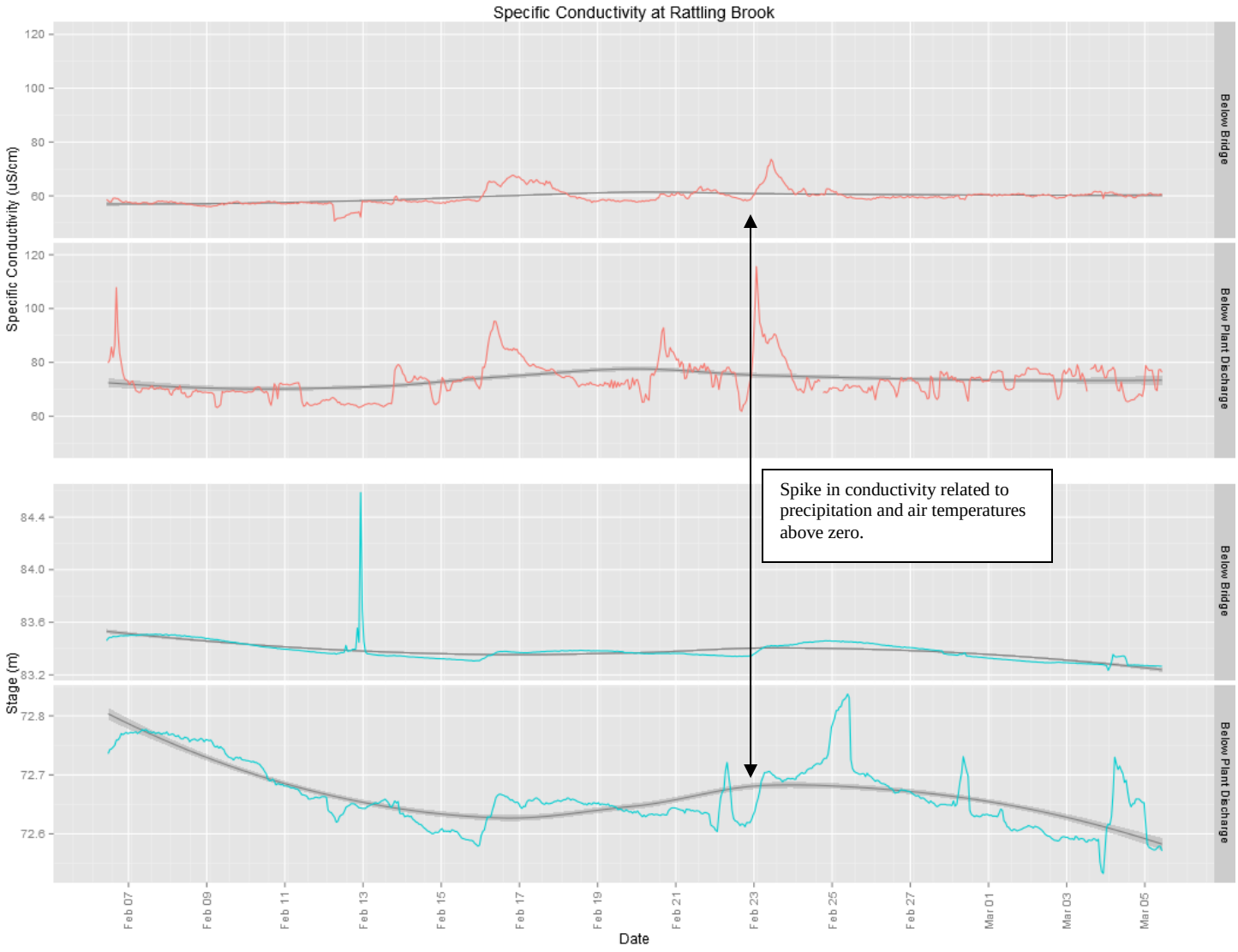
Specific Conductivity

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.



Station	Mean	Median.	Min	Max
Below Bridge	59.6	59.3	50.6	73.6
Below Plant Discharge	73.3	72.6	61.8	115.6

- Specific conductivity is seen to increase slightly over the course of the deployment period at both Bridge and Plant Discharge stations – with Plant Discharge having higher conductivity. Variability in conductivity has largely been related to precipitation, especially during periods with air temperatures above freezing.

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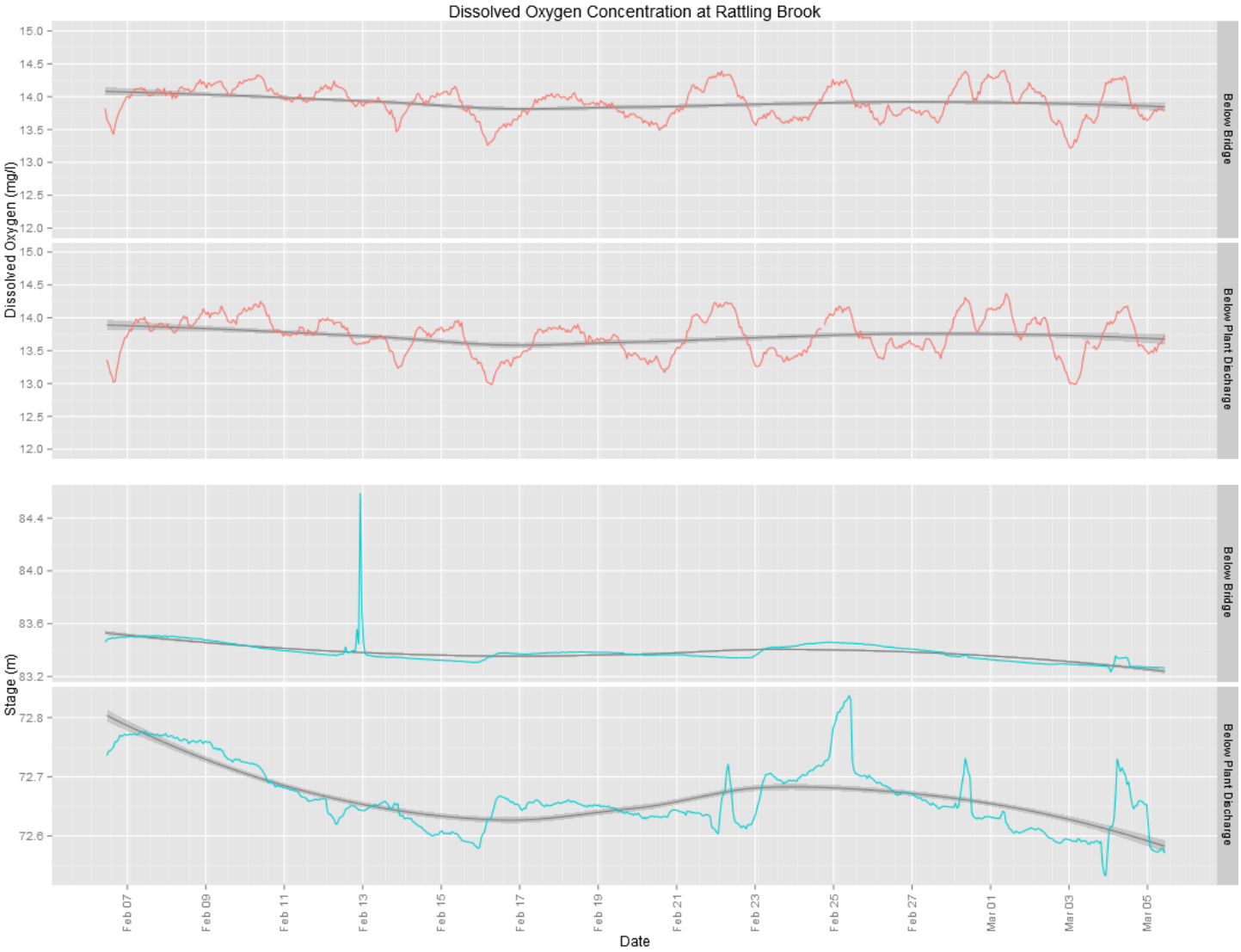
Dissolved Oxygen

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	13.92	13.93	13.22	14.40
Below Plant Discharge	13.73	13.75	12.98	14.37

- Dissolved oxygen concentration was greater than the minimum CCME guideline of 9.5 mg/l O_2 for the protection of early life stage cold water biota. Oxygen concentrations were found to be slightly higher at Bridge station where water movement tends to be somewhat more vigorous, offsetting the cooler water temperatures at Plant Discharge station.

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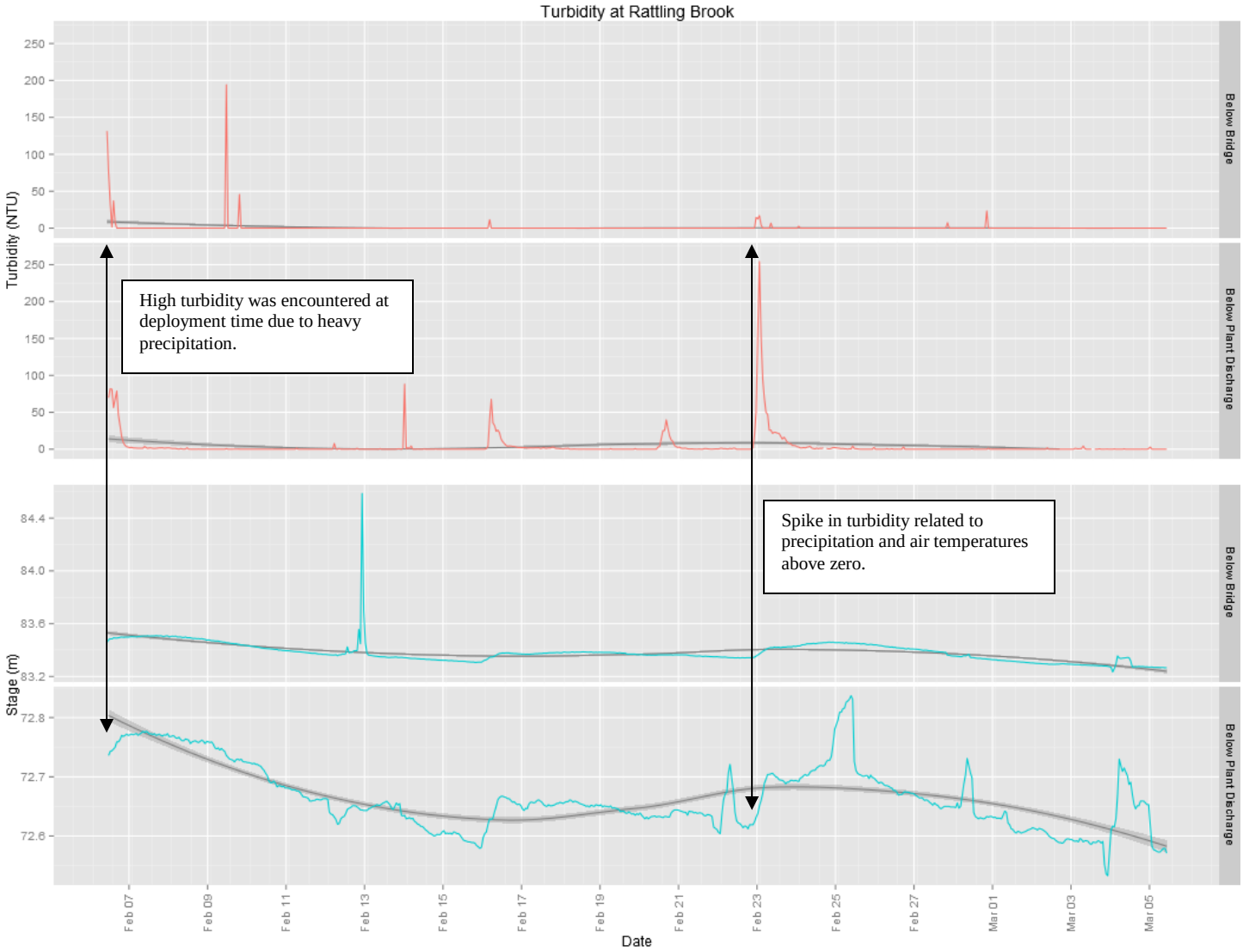
Turbidity

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	1.0	0.0	0.0	194.2
Below Plant Discharge	3.9	0.0	0.0	254.2

- In the winter it is not uncommon to see occasional high turbidity readings for single observations (less than 1 hour duration). This is generally due to ice interference near the sensor and generally passes without intervention. Two notable turbidity events are observed during this deployment: at the initiation of deployment and on February 23rd. Both events occurred during heavy precipitation and air temperatures greater than 0°C.

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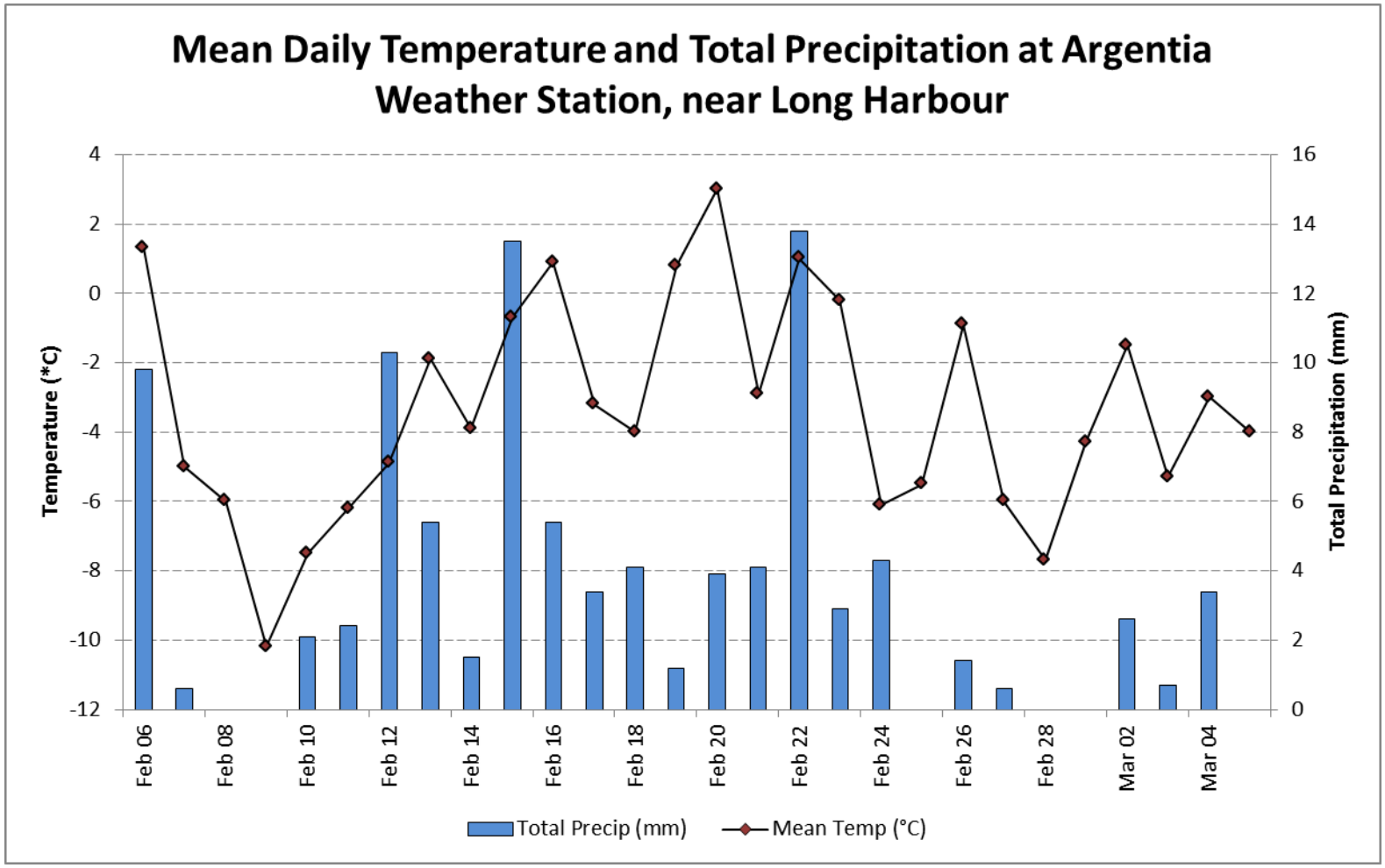
Appendix



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