Real-Time Water Quality Deployment Report

Rattling Brook Network

January 22, 2016 to February 18, 2016

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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2016-01-22 to 2016-02-18

General

- Department of Environment and Conservation staff monitors the real-time web pages consistently.
- Water Quality Monitoring at Rattling Brook Big Pond has been temporarily suspended due to ice conditions. Earlier estimates of redeployment were for April; however, unexpectedly warm conditions may permit redeployment in March.
- 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.

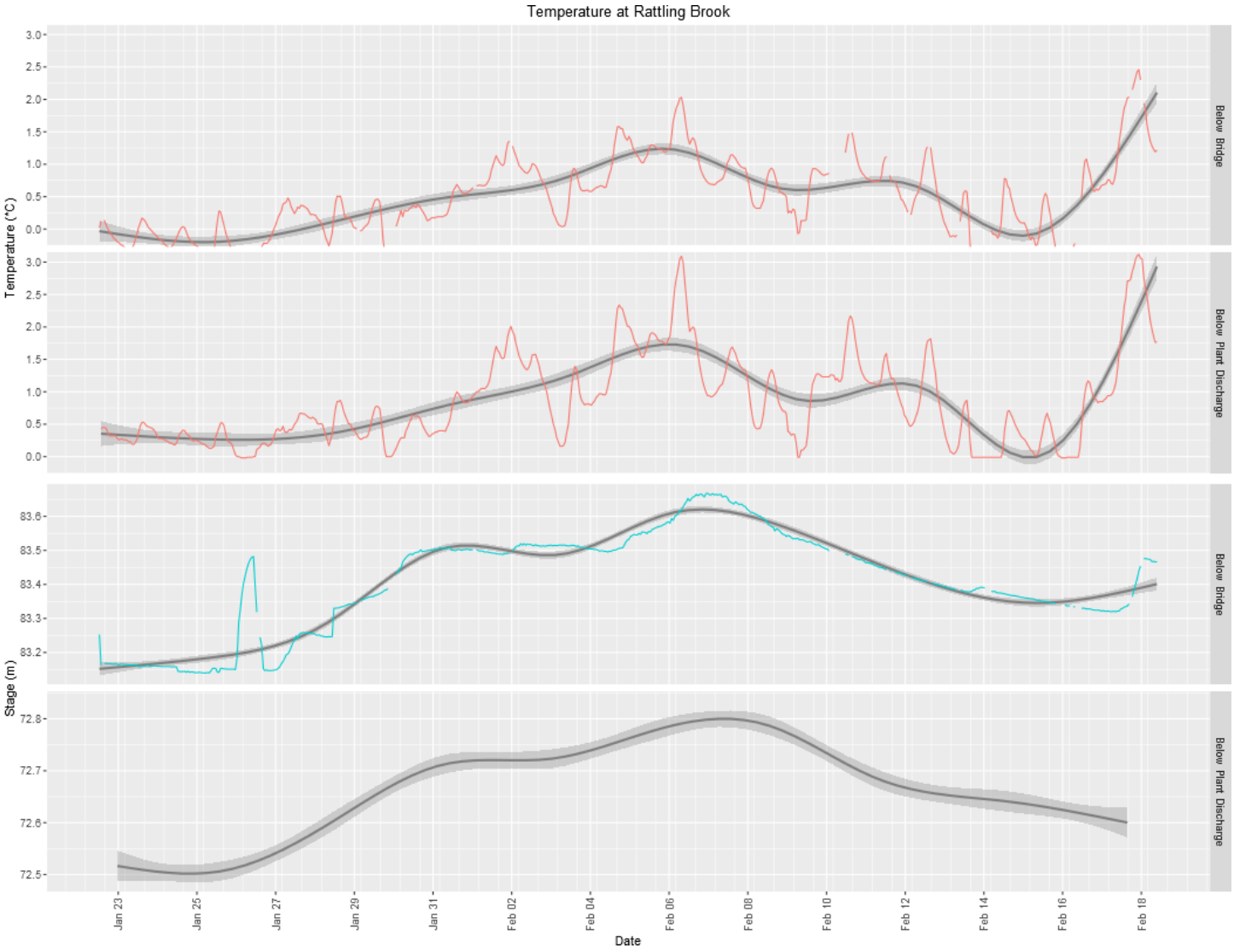
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook Big Pond	Inactive due to ice conditions						
Rattling Brook below Bridge	January 22, 2016	Deployment	Excellent	Good	Excellent	Marginal	Excellent
	February 18, 2016	Removal	Excellent	Good	Excellent	Good	Good
Rattling Brook below Plant Discharge	January 22, 2016	Deployment	Good	Good	Excellent	Marginal	Excellent
	February 18, 2016	Removal	Good	Good	Excellent	Excellent	Fair

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	0.49	0.44	-0.54	2.46
Below Plant Discharge	0.85	0.66	-0.02	3.12

- Water temperatures indicate a general rising trend over the deployment period – especially a mid-deployment peak and a late-deployment peak that were influenced by warming air temperatures. Further increases are expected as water begins its seasonal increase into spring as days become longer and air temperatures rise.

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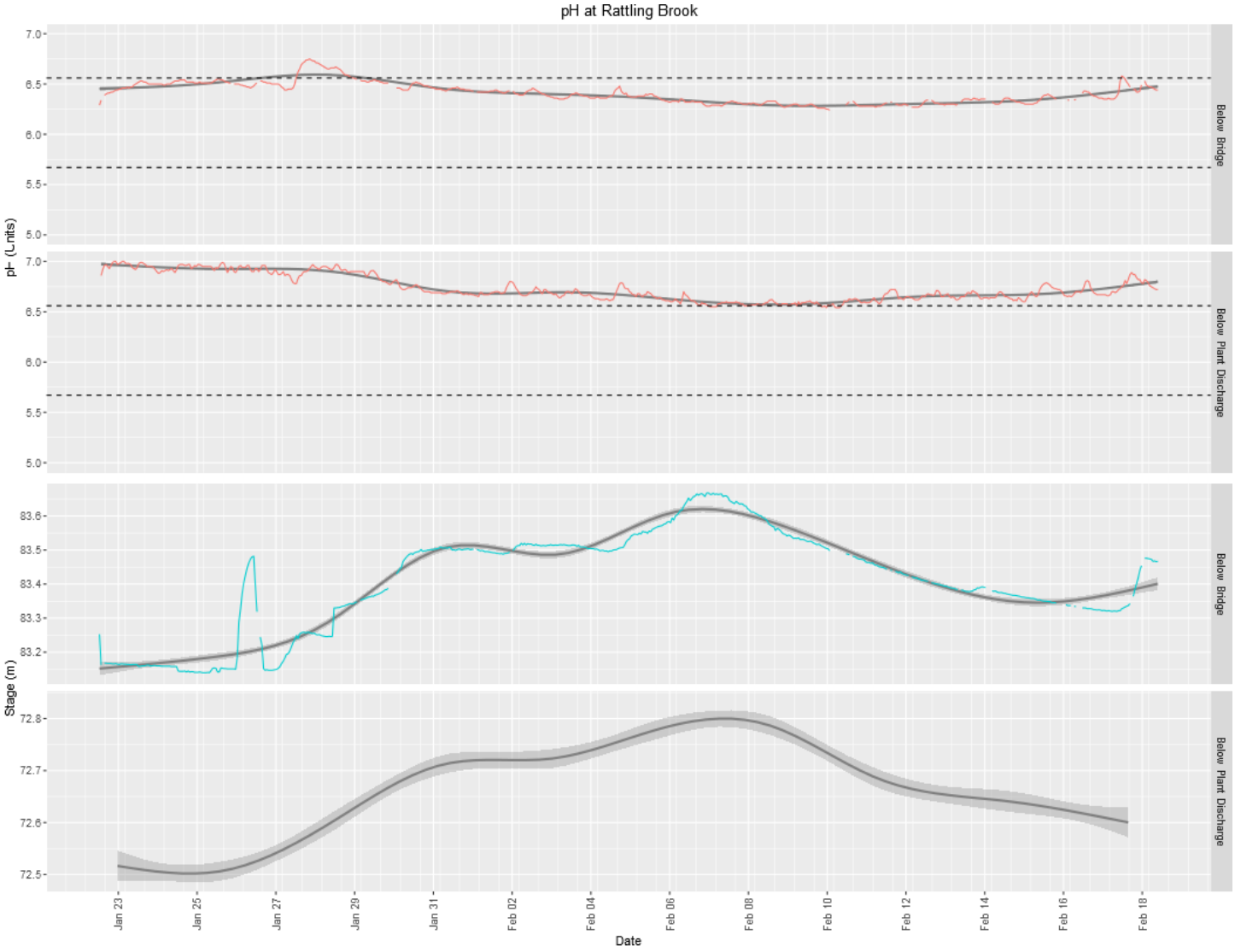
pH

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	6.41	6.39	6.24	6.75
Below Plant Discharge	6.73	6.69	6.54	7.00

- pH levels do not appear to show any particular trend during this deployment period, despite a substantial mid-deployment dip observed at Bridge and Plant Discharge stations. All values were at or just below the Site Specific Guidelines (dashed lines).

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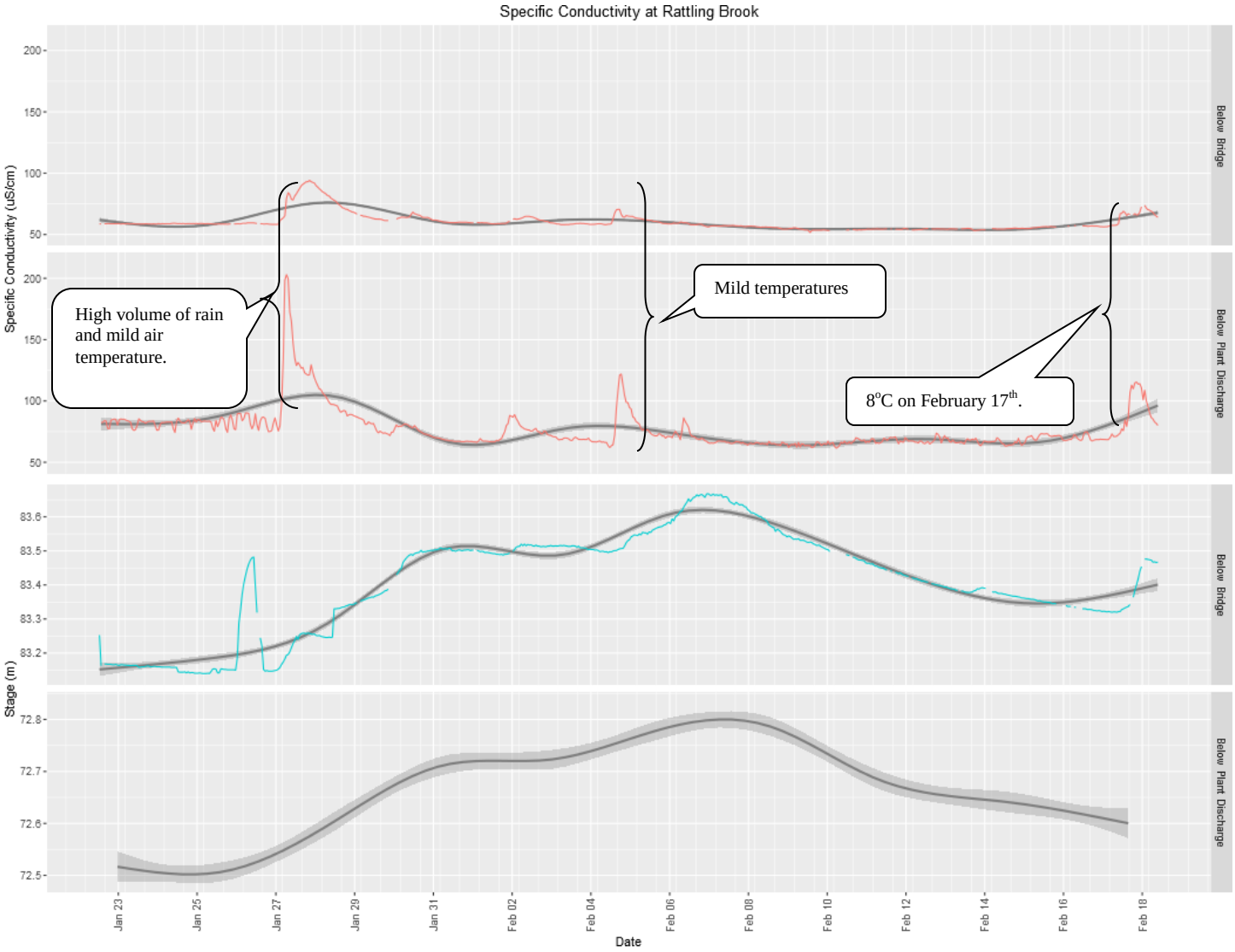
Specific Conductivity

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	60.3	58.8	51.6	94.2
Below Plant Discharge	76.9	71.3	61.5	203.0

- Three conductivity events were captured at both stations during the deployment period – One around January 27th, another around February 4th, and another around February 17th.

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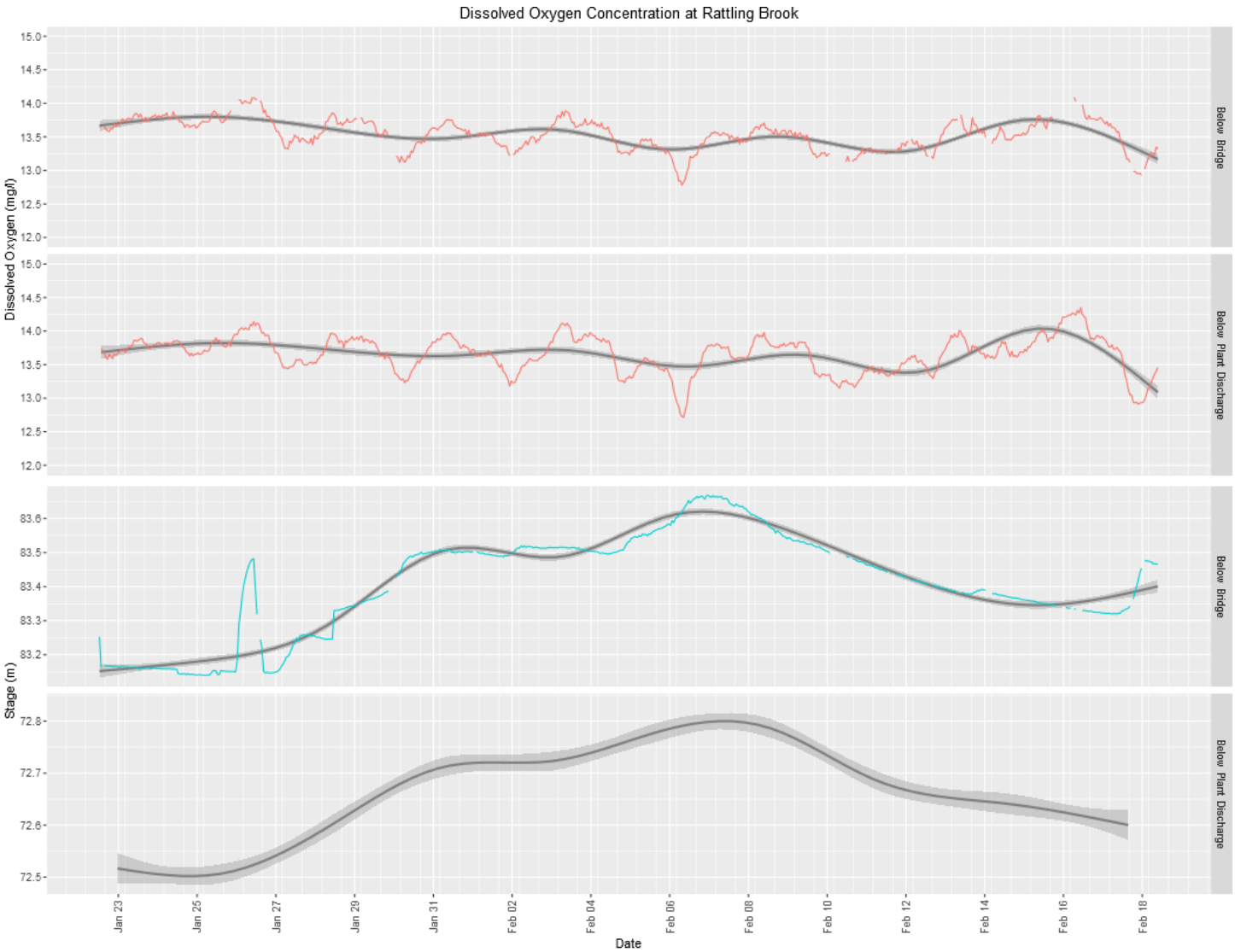
Dissolved Oxygen

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	13.54	13.56	12.78	14.09
Below Plant Discharge	13.66	13.70	12.71	14.35

- Dissolved oxygen concentration was relatively stable during this time period with a slight downward trend in response to an overall increase in water temperature. A series of rapid declines followed by a return to background level is a response to meltwater inflow.

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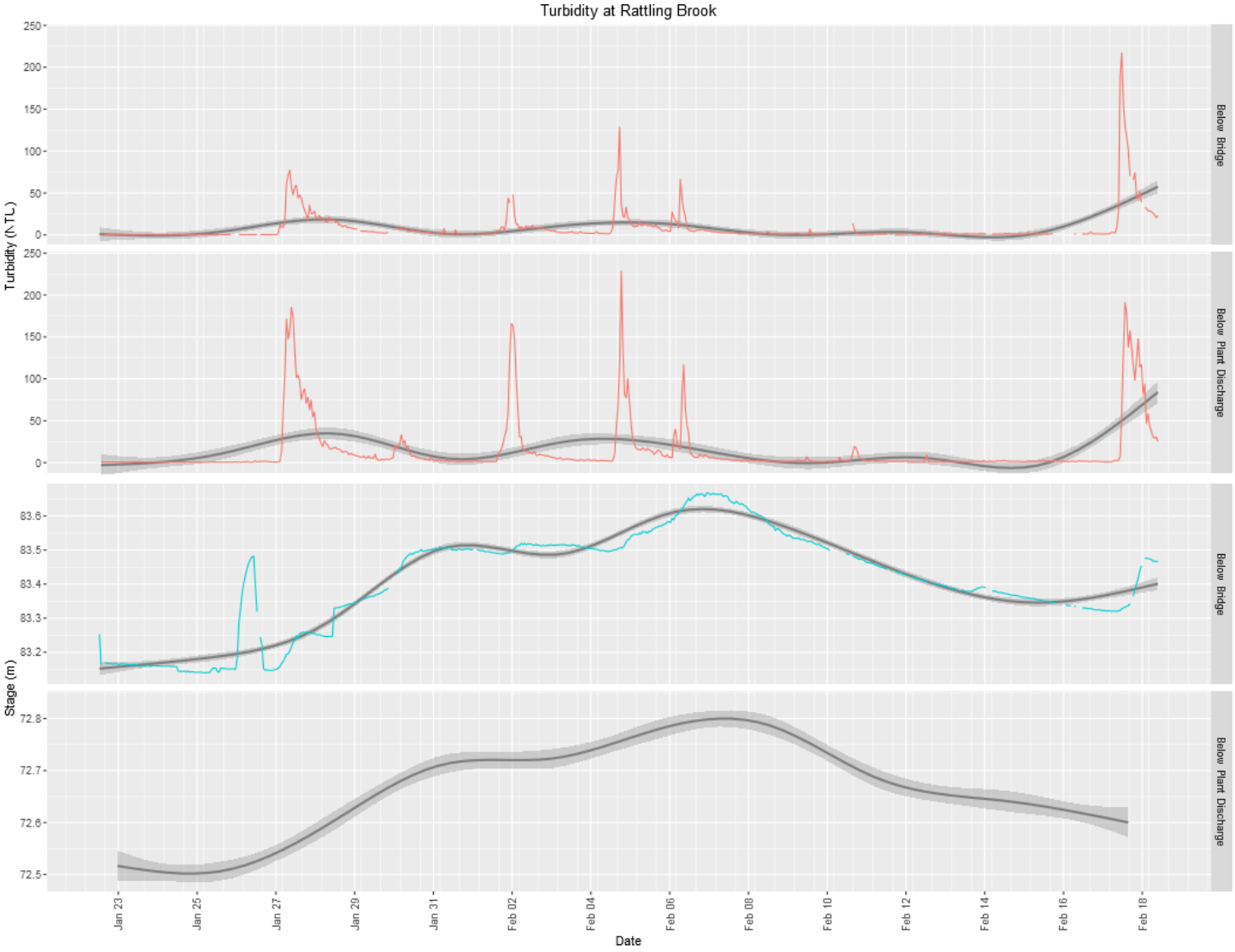
Turbidity

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	8.2	1.6	0.1	217.0
Below Plant Discharge	14.2	2.2	0.5	228.4

- Turbidity was slightly elevated during the deployment period due to frequent melt periods and high flow. Five turbidity events were substantial enough to trigger automated alerts (turbidity > 40 NTU).

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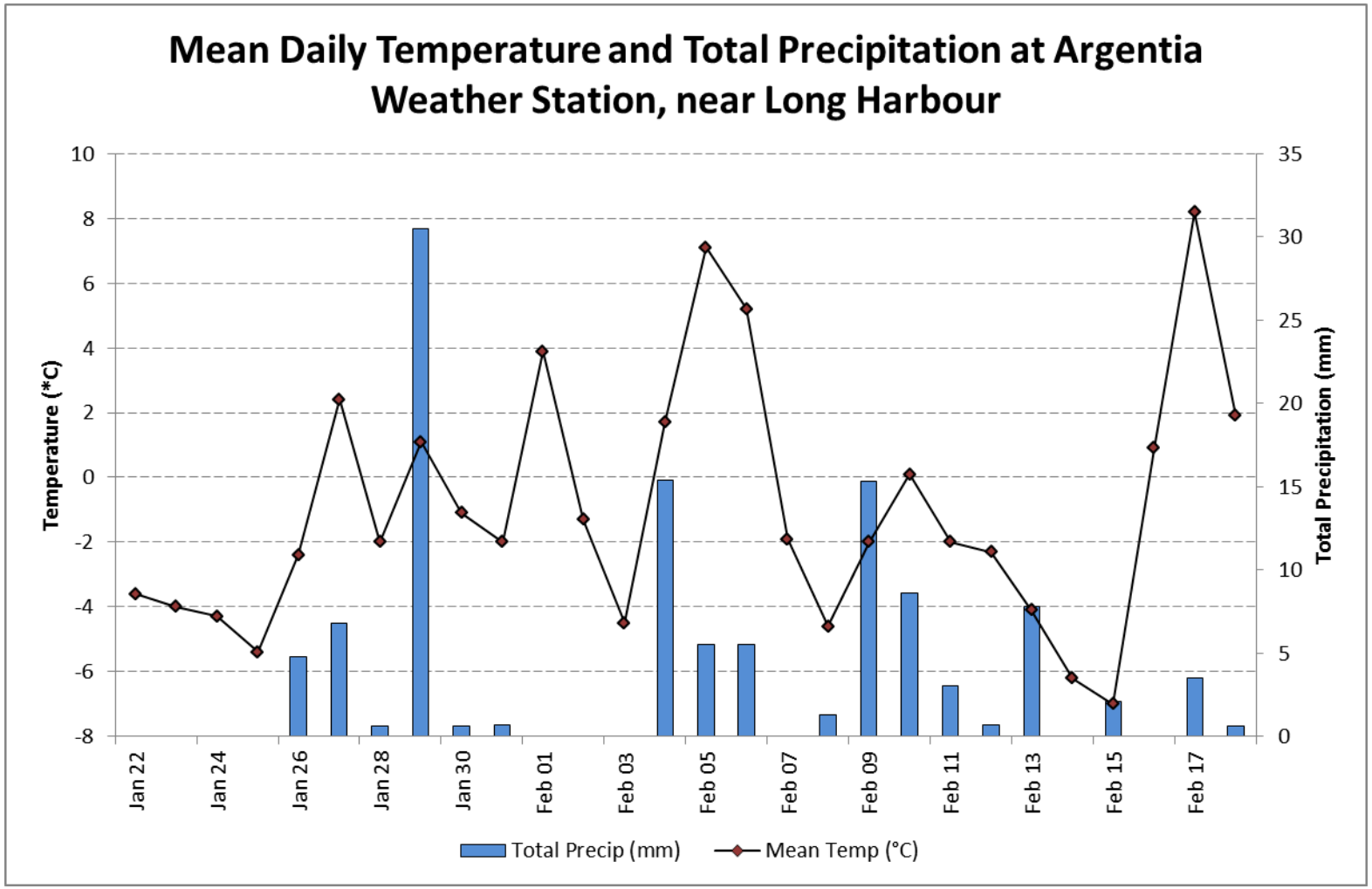
Appendix



Prepared by:
Ryan Pugh
Department of Environment and Conservation
Water Resources Management Division
Phone: 709.729.1681
Fax: 709.729.3020