Real-Time Water Quality Deployment Report

Rattling Brook Network

April 23, 2015 to May 21, 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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General

- Department of Environment and Conservation staff monitors 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 (http://www.ec.gc.ca/rhc-wsc/)*.
- Ice conditions at the beginning of this deployment precluded safe deployment of equipment at Big Pond station. By the end of the deployment period, however, all ice had receded. Monitoring at Big Pond station will resume in late May.

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.

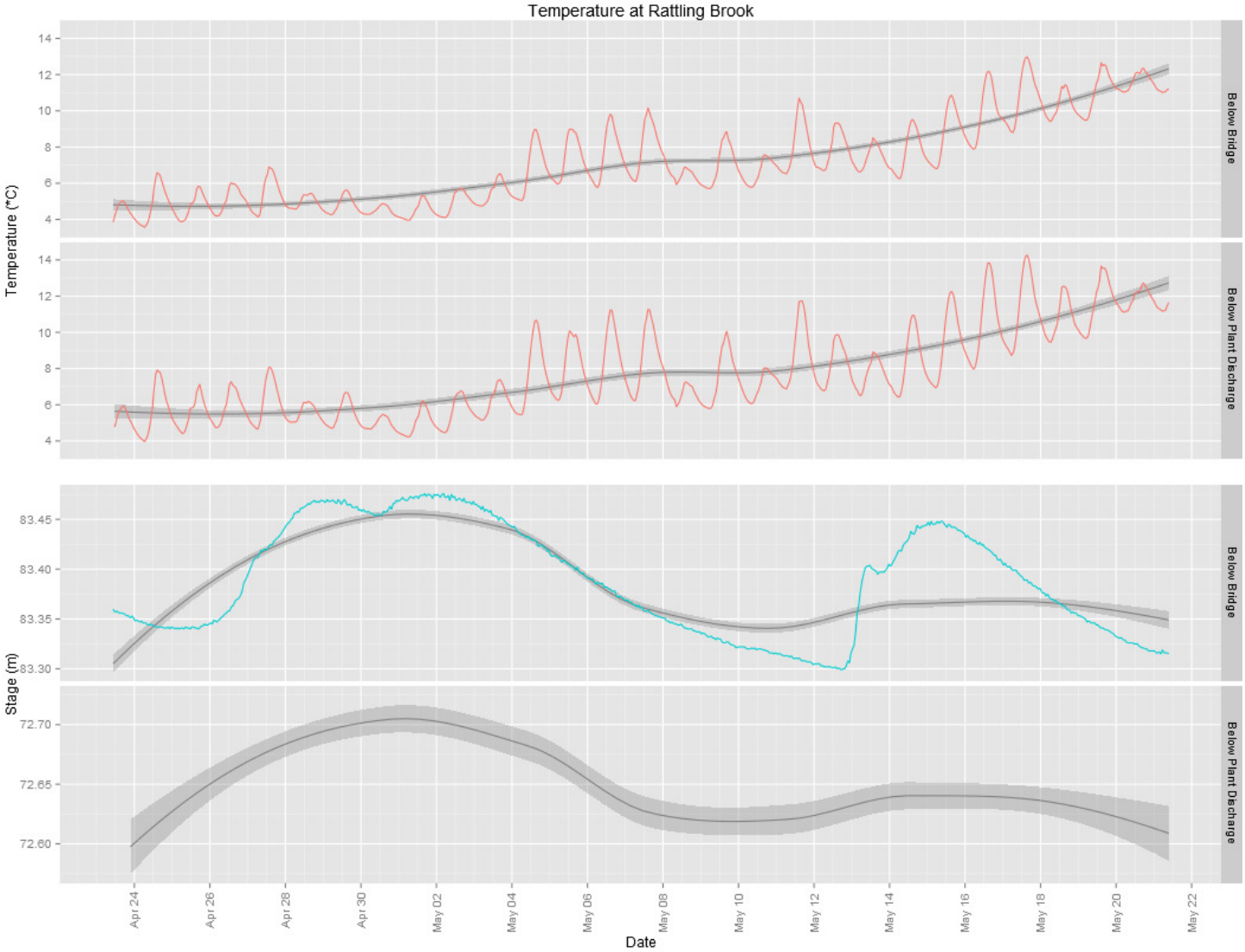
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Rattling Brook below Bridge	2015-04-23	Deployment	Good	Good	Excellent	Excellent	Excellent
	2015-05-21	Removal	Good	Good	Fair	Excellent	Excellent
Rattling Brook below Plant Discharge	2015-04-23	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	2015-05-21	Removal	Excellent	Excellent	Excellent	Excellent	Excellent

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	7.14	6.67	3.56	12.98
Below Plant Discharge	7.74	7.09	3.96	14.26

- Spring conditions have resulted in a steady increase in water temperature at both Bridge and Plant Discharge stations.

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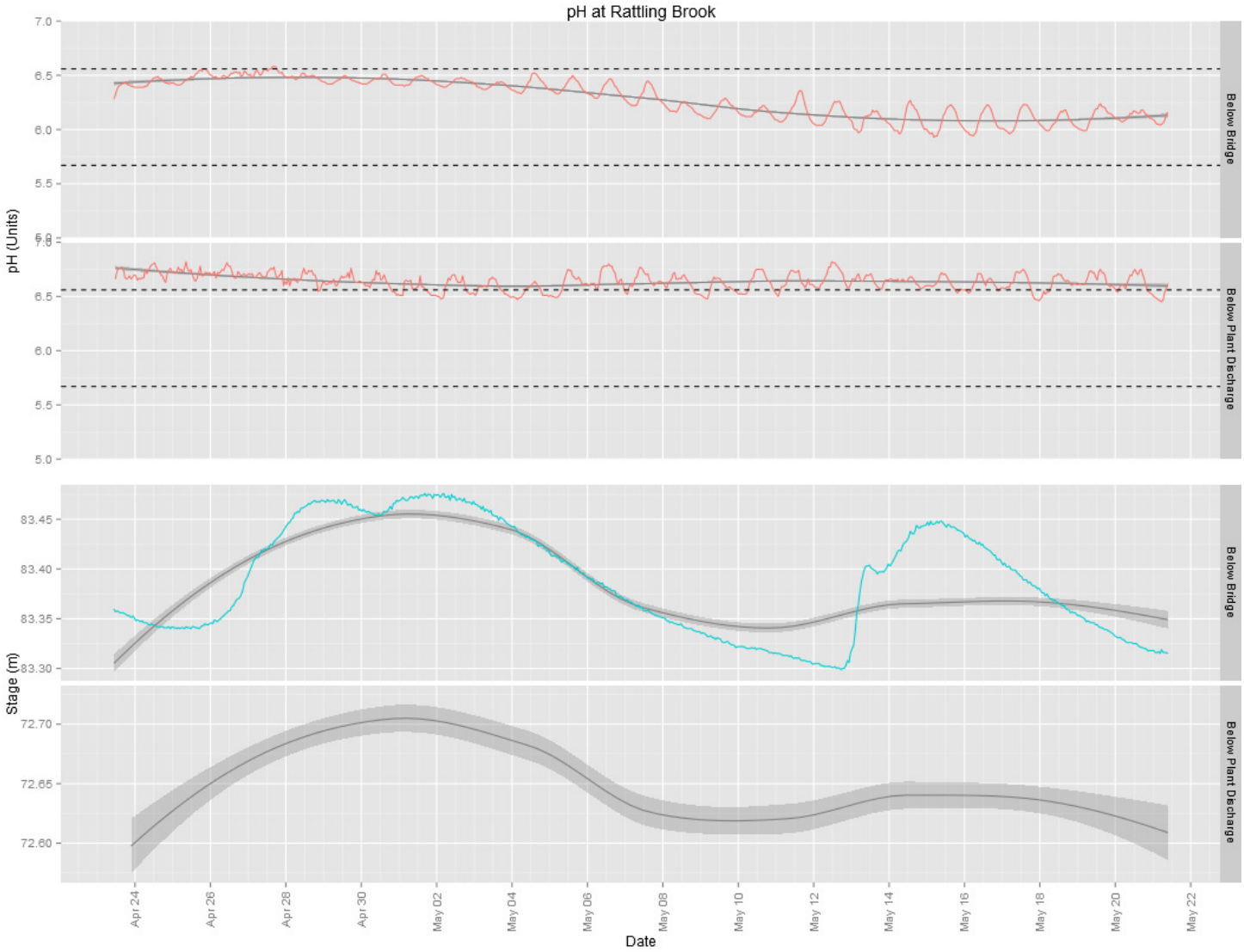
pH

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	Mean	Median	Min	Max
Below Bridge	6.28	6.29	5.93	6.58
Below Plant Discharge	6.64	6.64	6.45	6.82

- The behavior of pH at Bridge and Plant Discharge stations remained similar to previous deployment periods with slightly more alkaline conditions at Plant Discharge station compared to bridge station. Though conditions are slightly more alkaline, they fall close to the Site Specific Guidelines (dashed lines).

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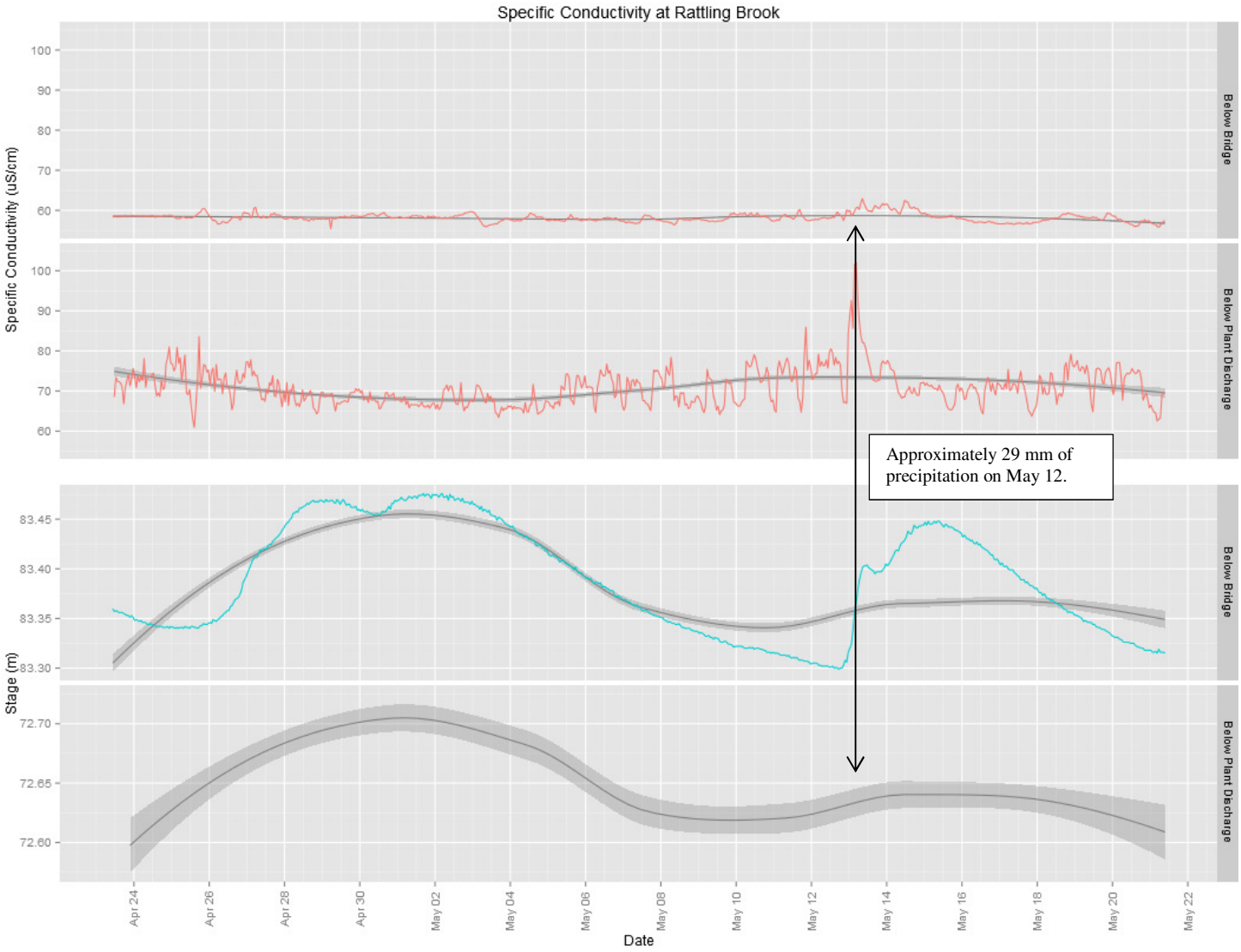
Specific Conductivity

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	58.2	58.2	55.4	62.9
Below Plant Discharge	70.9	70.3	60.9	102.1

- Specific conductivity is considerably more variable and of a greater magnitude at Plant Discharge station compared to Bridge station. This is a combination of a tendency for dissolved solid concentration to increase as water flows downstream and also input from nearby sedimentation ponds.
- A precipitation event of about 29 mm led to a small conductivity increase at Bridge station and a sharp increase in at Plant Discharge station, peaking at 62.9 uS/cm and 102.1 uS/cm, respectively.

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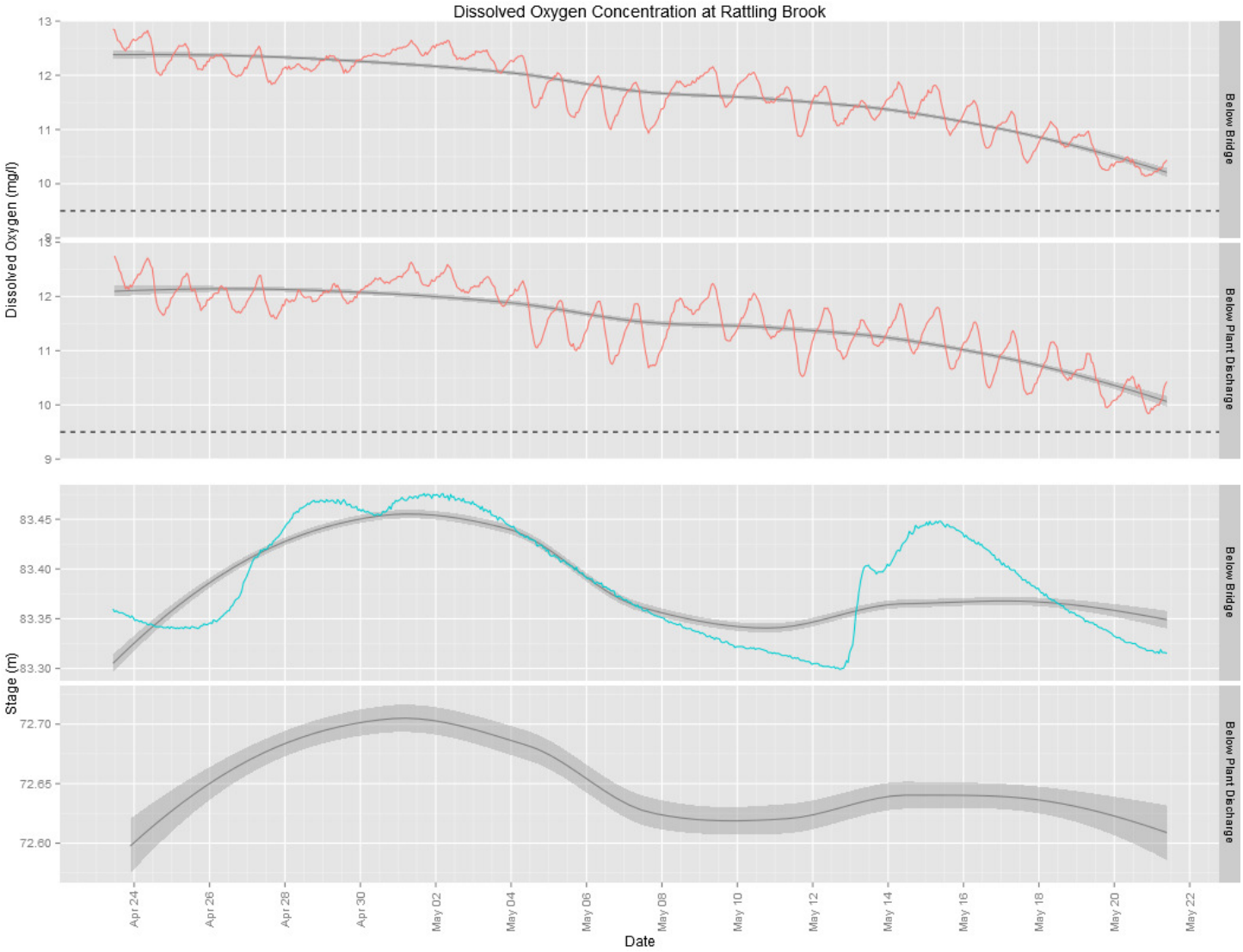
Dissolved Oxygen

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	11.69	11.80	10.14	12.85
Below Plant Discharge	11.53	11.67	9.84	12.75

- With increasing water temperatures, dissolved oxygen concentrations have begun to fall and approach the CCME Guideline of 9.5 mg/l for the protection of early life stage cold water biota. This is typical for the time of year.

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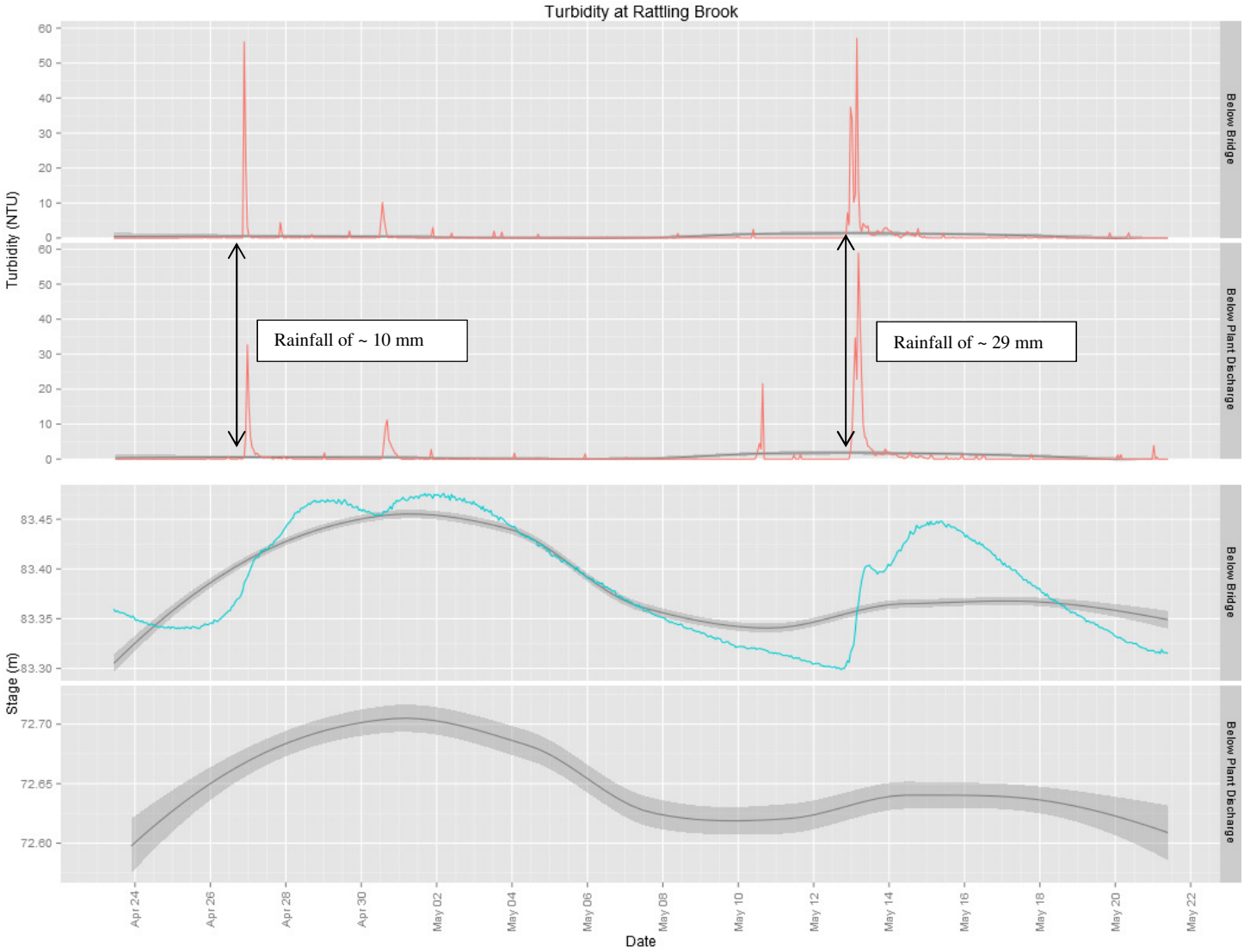
Turbidity

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	0.6	0.0	0.0	57.1
Below Plant Discharge	0.7	0.0	0.0	58.9

- While turbidity levels were mostly clear through this deployment period, there were a few notable events on April 26th and 27th and May 12th and 13th. These turbidity events were related to rainfall amounts of approximately 10 mm and 29 mm, respectively. Turbidity levels fell back to pre-event levels quickly.

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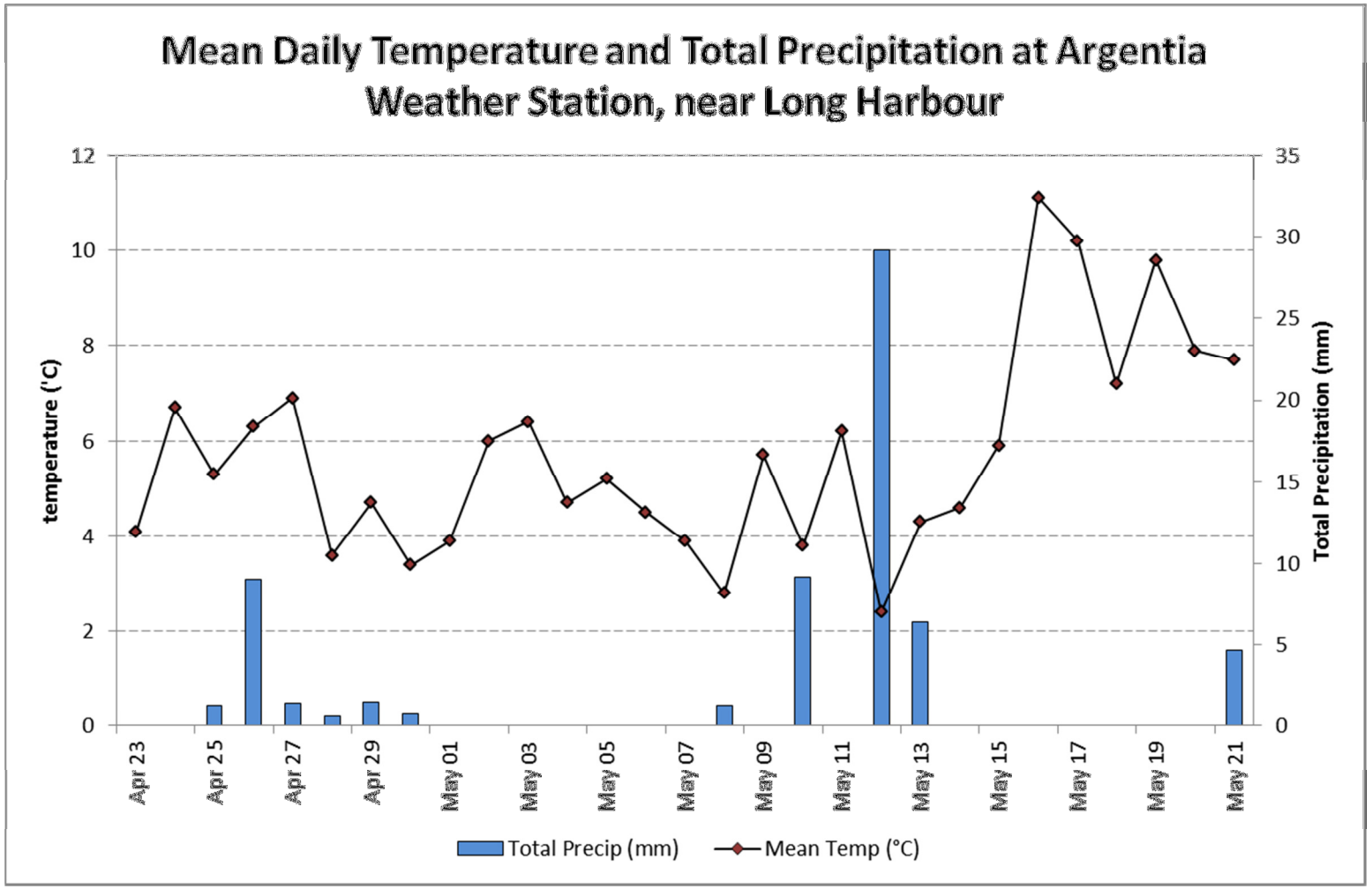
Appendix



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