Real-Time Water Quality Deployment Report

Teck: Duck Pond Operations

August 30, 2016 to October 5, 2016

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Environment and Climate Change
Water Resources Management Division
St. John's, NL, A1B 4J6 Canada

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2016-08-30 to 2016-10-05

General

- Department of Environment and Climate Change staff monitors the real-time web pages consistently.
- Throughout this report, East Pond Brook and Tributary to Gills Pond Brook stations will be referred to as EPB and TGPB, respectively.
- A cable failure at EPB resulted in partial data loss and inability to attain QAQC rankings at removal time.
- 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.

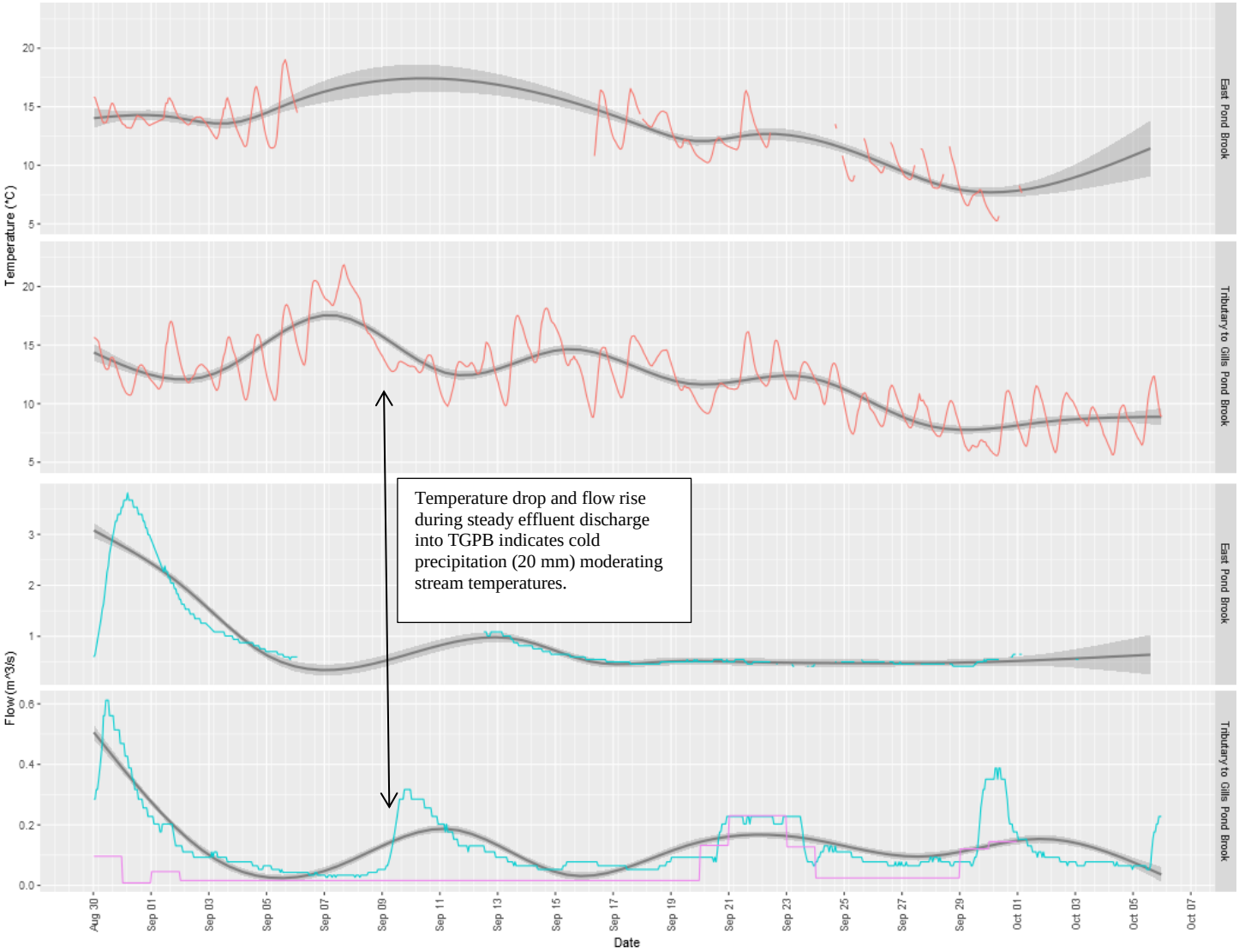
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
East Pond Brook	August 30, 2016	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	October 5, 2016	Removal	NA	NA	NA	NA	NA
Tributary to Gills Pond Brook	August 30, 2016	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	October 5, 2016	Removal	Excellent	Good	Marginal	Good	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
East Pond Brook	12.23	12.39	5.25	19.02
Tributary to Gills Pond Brook	12.13	12.05	5.56	21.86

- Water temperatures were seen to decline throughout the deployment period as expected, given the time of year. Water temperatures are expected to continue falling into December as freeze up commences.

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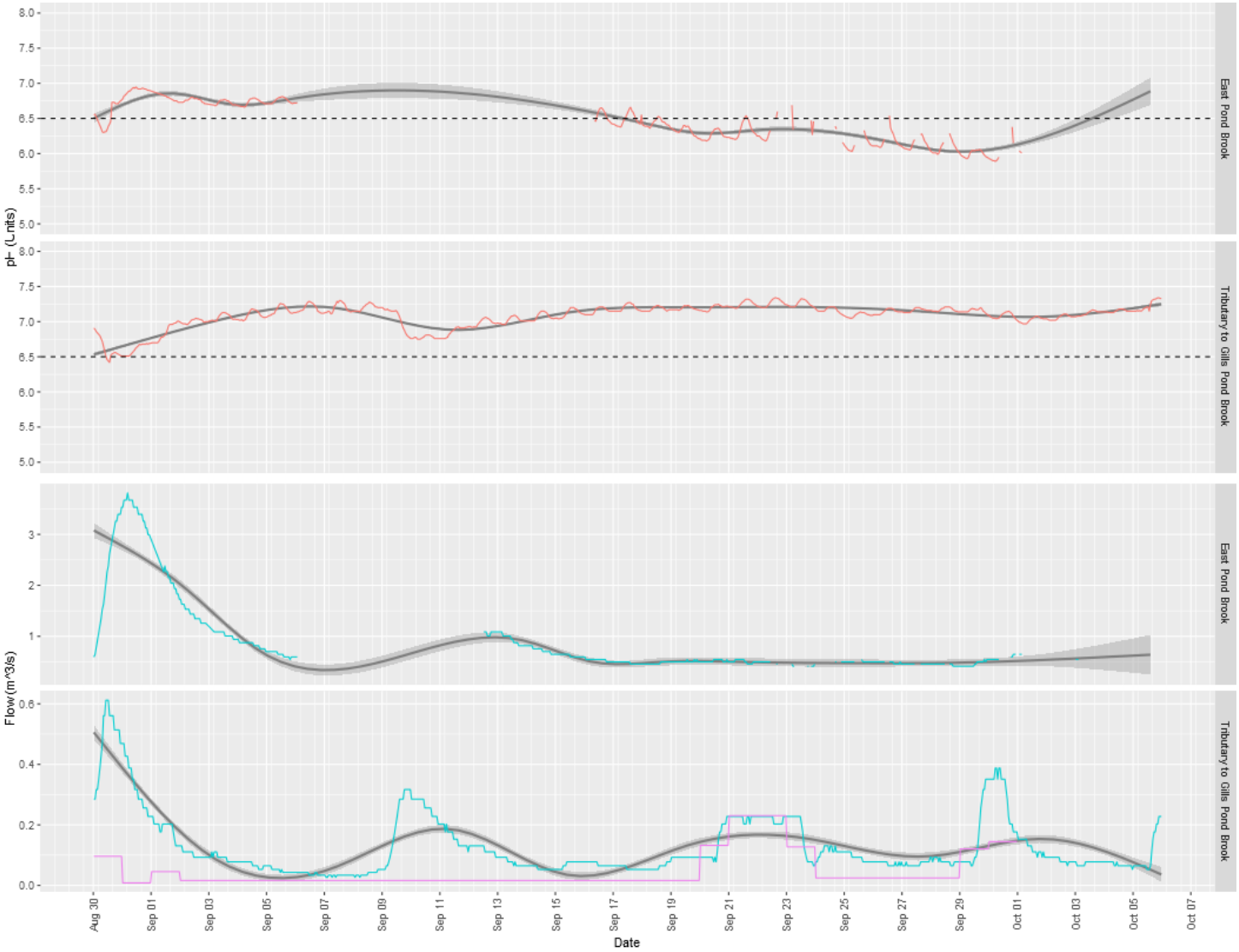
pH

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
East Pond Brook	6.43	6.40	5.89	6.95
Tributary to Gills Pond Brook	7.08	7.14	6.42	7.34

- After an early-deployment rise, pH values were largely stable at TGPB. A decline in water temperature is likely met with a consequential decline in biological activity. This change in biological activity alters the carbon dioxide flux in the water, due to a drop in respiration by aquatic vegetation. Since carbon dioxide is not consumed in substantial quantities, carbon dioxide exists at higher concentrations, lowering pH. This is especially visible at EPB station.

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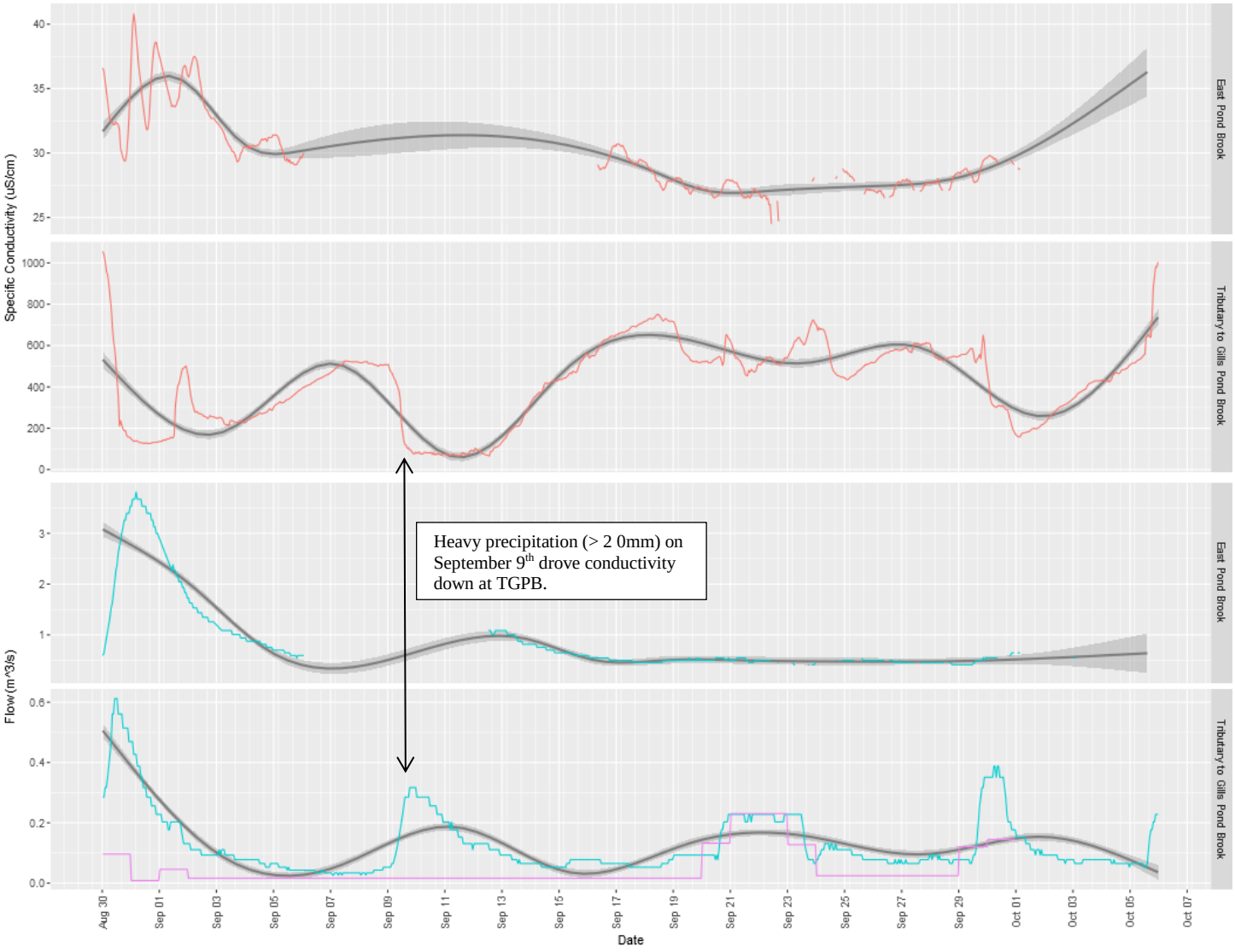
Specific Conductivity

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
East Pond Brook	29.6	28.8	24.5	40.8
Tributary to Gills Pond Brook	419.0	461.0	65.5	1056.0

- Specific conductivity at TGPB is highly variable due to strong influence by effluent discharge. Precipitation tends to freshen the water at this station as seen on September 9th where conductivity rebounds soon after precipitation effects are reduced.

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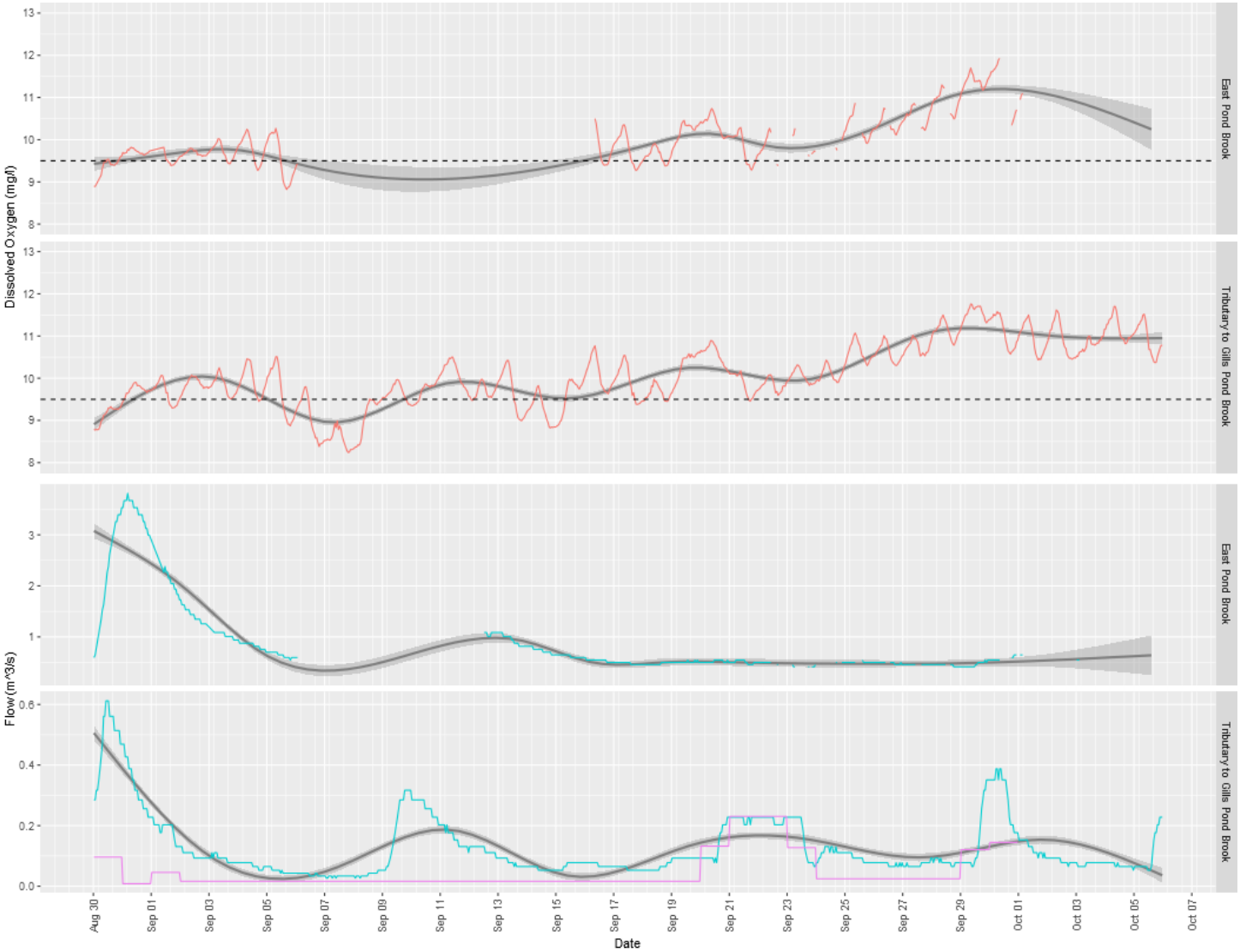
Dissolved Oxygen

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
East Pond Brook	10.07	9.98	8.82	11.93
Tributary to Gills Pond Brook	10.09	9.98	8.24	11.76

- Declining water temperatures during the fall season result in rising dissolved oxygen concentrations. By late September all values were found to be above the CCME Guideline of 9.5 mg/l DO for the protection of cold water organisms.

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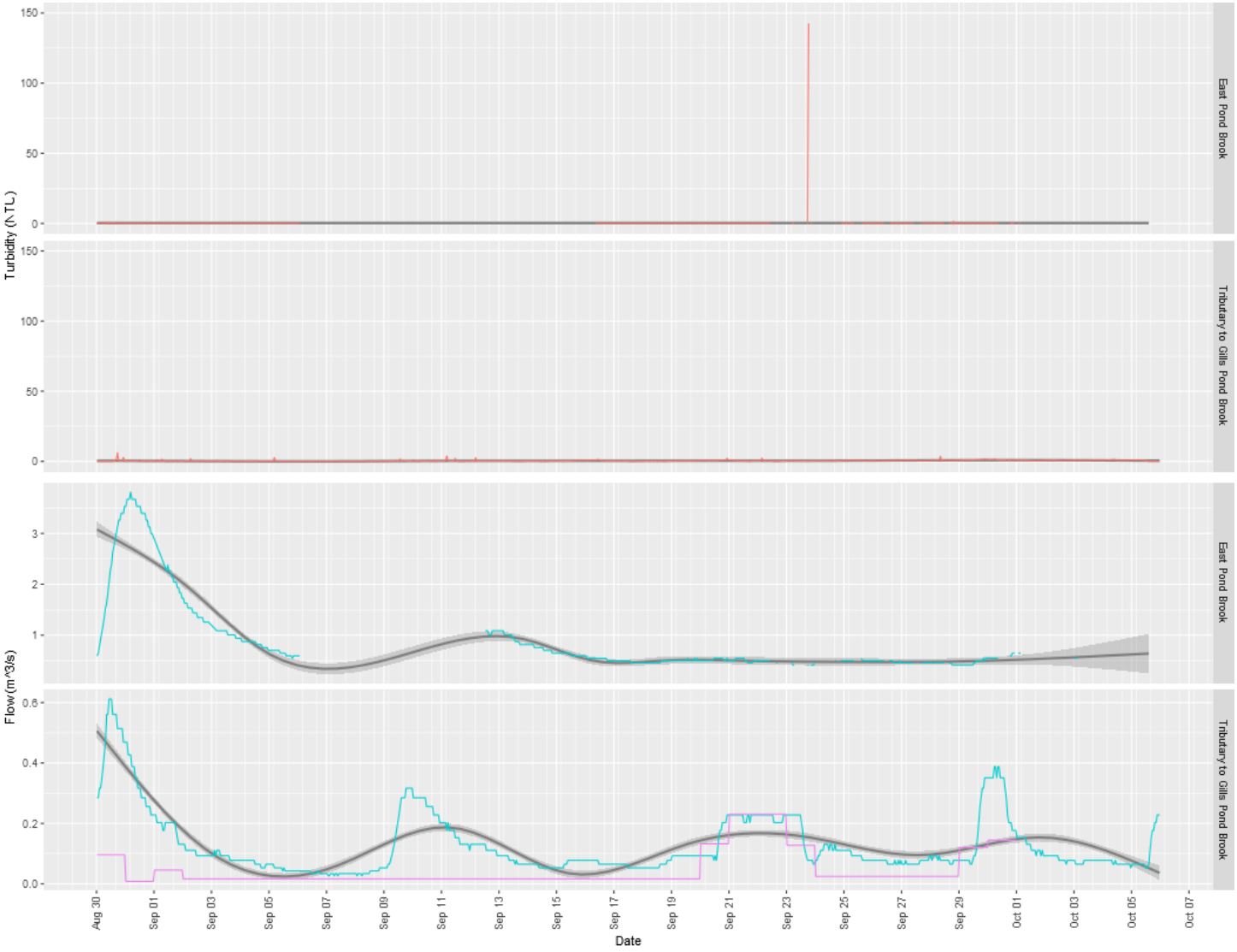
Turbidity

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
East Pond Brook	0.3	0.0	0.0	142.6
Tributary to Gills Pond Brook	0.4	0.3	0.0	6.2

- Turbidity values were low at both EPB and TGPB stations during this deployment period. Occasional turbidity events may have been related to spurious sensor obstruction or sediment movement.

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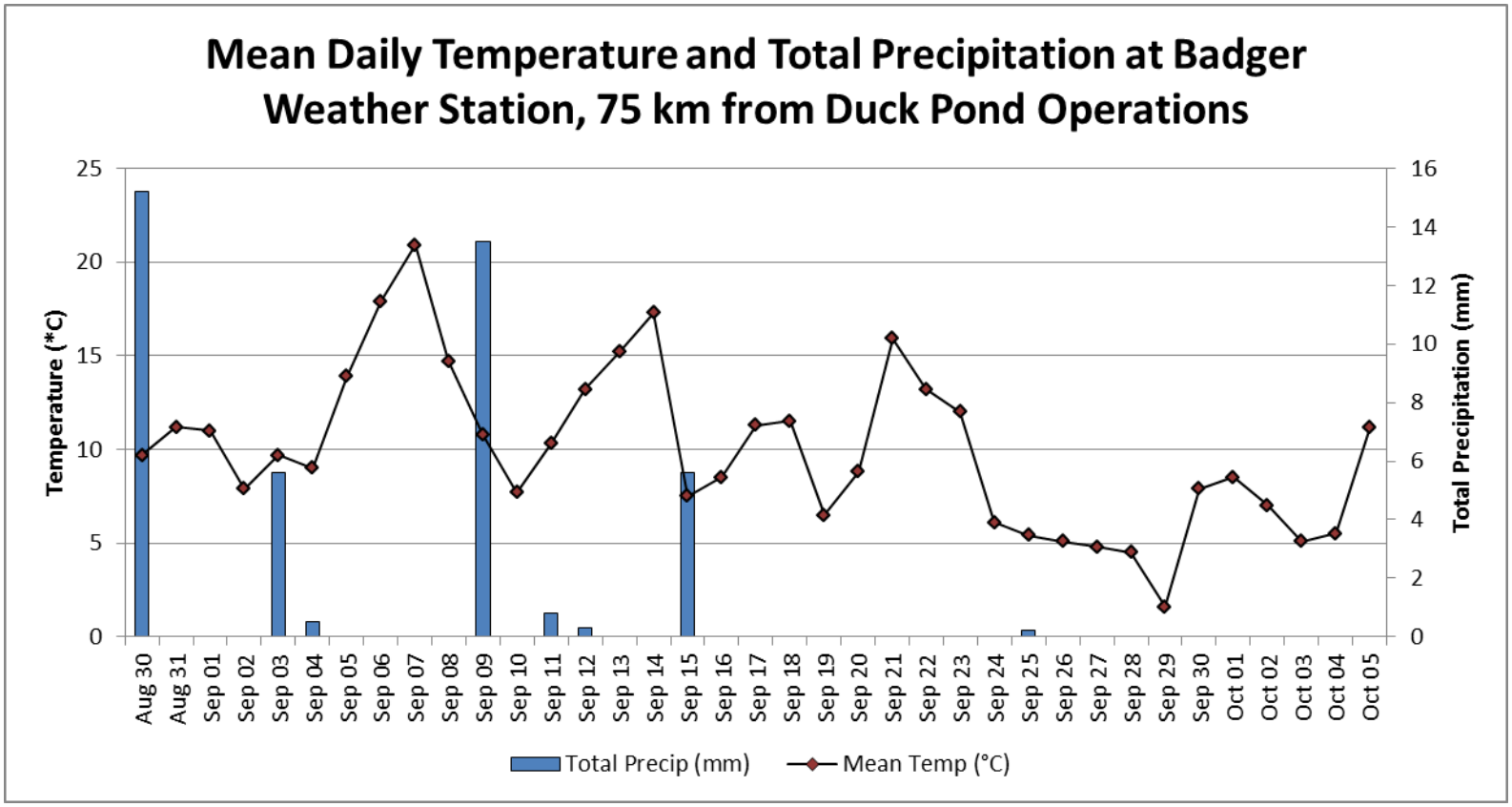
Appendix



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