Real-Time Water Quality Deployment Report

Duck Pond Network

July 6, 2016 to August 30, 2016

Newfoundland Labrador

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

Newfoundland Labrador

Real-Time Water Quality Deployment Report
Duck Pond Network
2016-07-06 to 2016-08-30

General

- Department of Environment and Climate Change staff monitors the real-time web pages consistently.
- The Duck Pond Network consists of two surface water stations: East Pond Brook below East Pond and Tributary to Gills Pond Brook. In this report, they will be abbreviated as EPB and TGPB, respectively. Additionally, a groundwater monitoring well is located down gradient of the tailings retention dam. Due to the relatively slow rate of change in groundwater, this data will be addressed in the annual report.
- Instantaneous effluent discharge from Teck Duck Pond Operationr (DPO) into Tributary to Gills Pond Brook is included as a violet trace on flow diagrams throughout the report. Instantaneous data is calculated from daily discharge provided by DPO on a monthly basis. Due to the mis-match between deployment intervals and discharge reporting, the record is likely to be incomplete. Annual reporting will assess the entire record.
- 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.

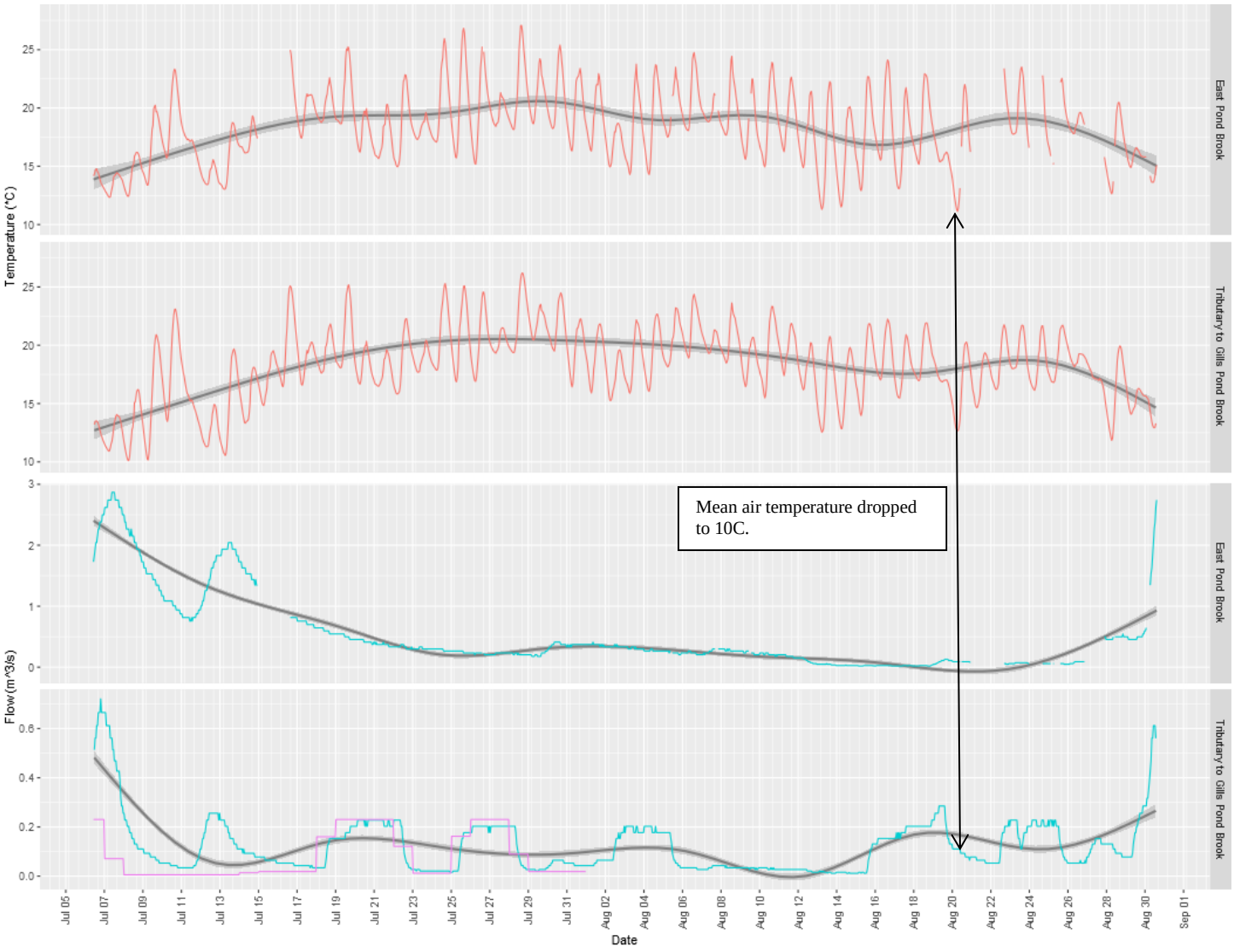
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
East Pond Brook	July 6, 2016	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	August 30, 2016	Removal	Excellent	Excellent	Excellent	Excellent	Excellent
Tributary to Gills Pond Brook	July 6, 2016	Deployment	Excellent	Excellent	Good	Excellent	Excellent
	August 30, 2016	Removal	Good	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.



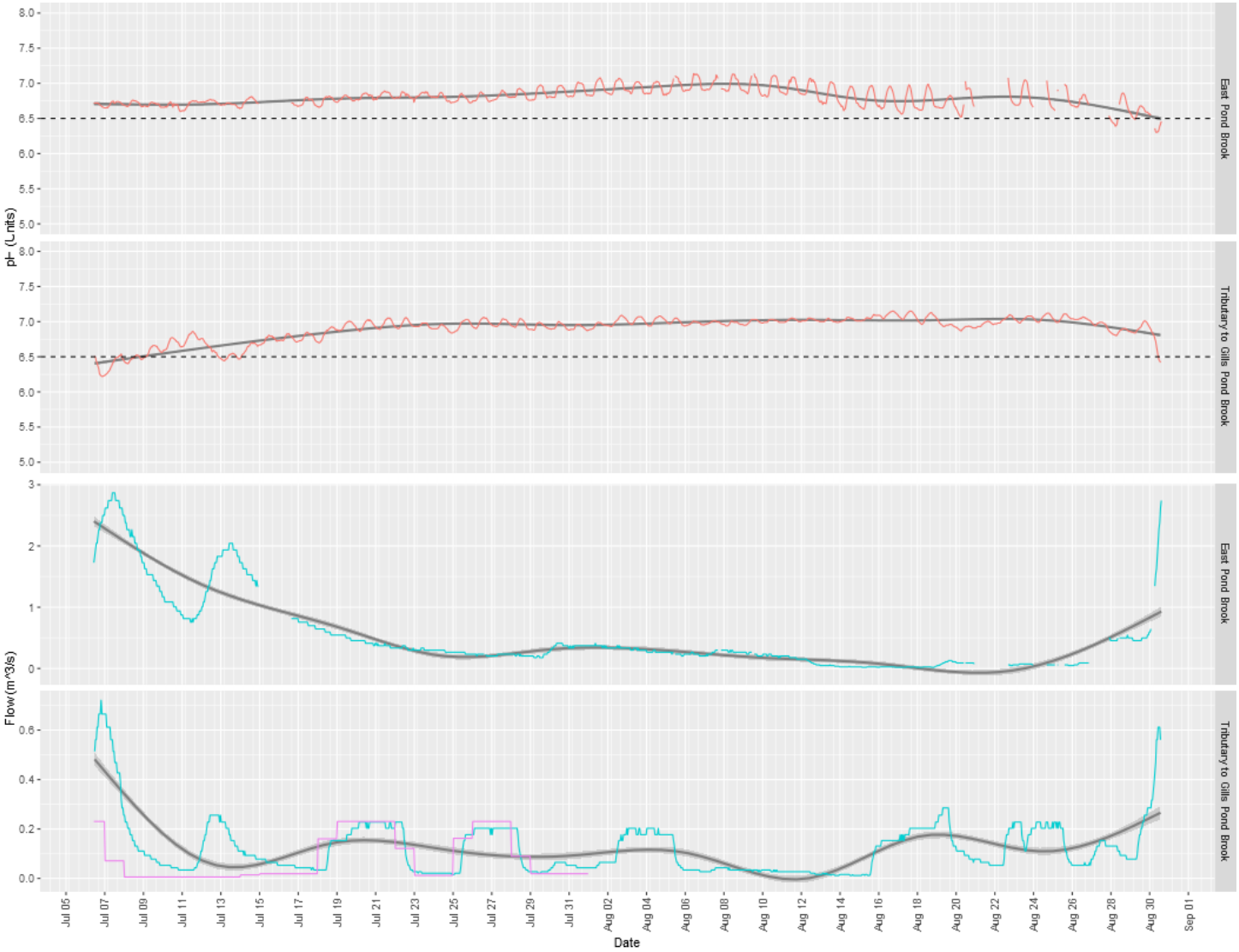
Station	Mean	Median	Min	Max
East Pond Brook	18.35	18.39	11.14	27.09
Tributary to Gills Pond Brook	18.31	18.49	10.12	26.22

- Water temperature peaked at both stations in late July after which a slow decline into August occurs.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.



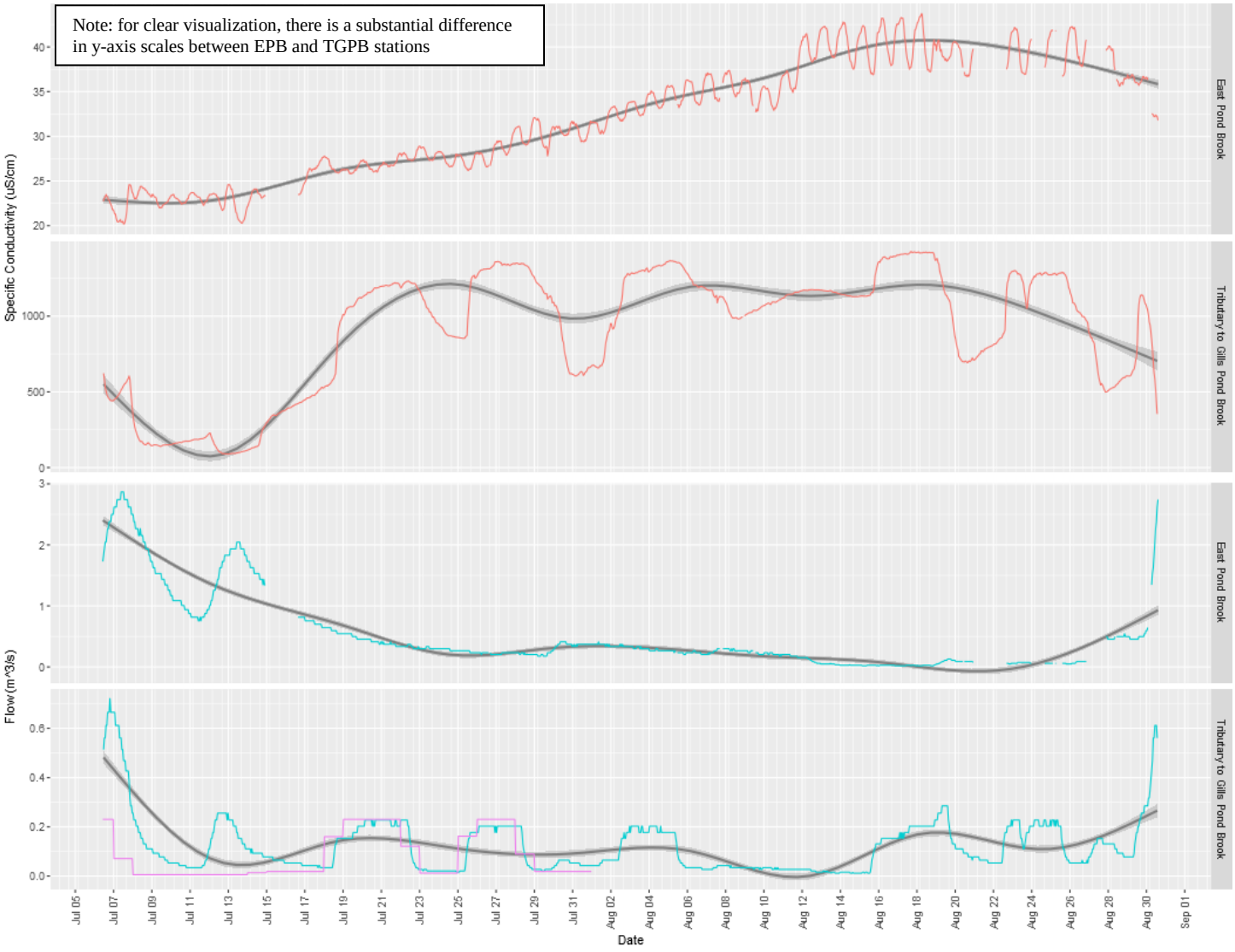
Station	Mean	Median	Min	Max
East Pond Brook	6.81	6.80	6.30	7.16
Tributary to Gills Pond Brook	6.90	6.96	6.22	7.15

- pH was very stable at both stations during this time frame with most values within the CCME Guidelines for the protection of aquatic life (dashed lines). A slight downward trend is seen near the end of the deployment.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.



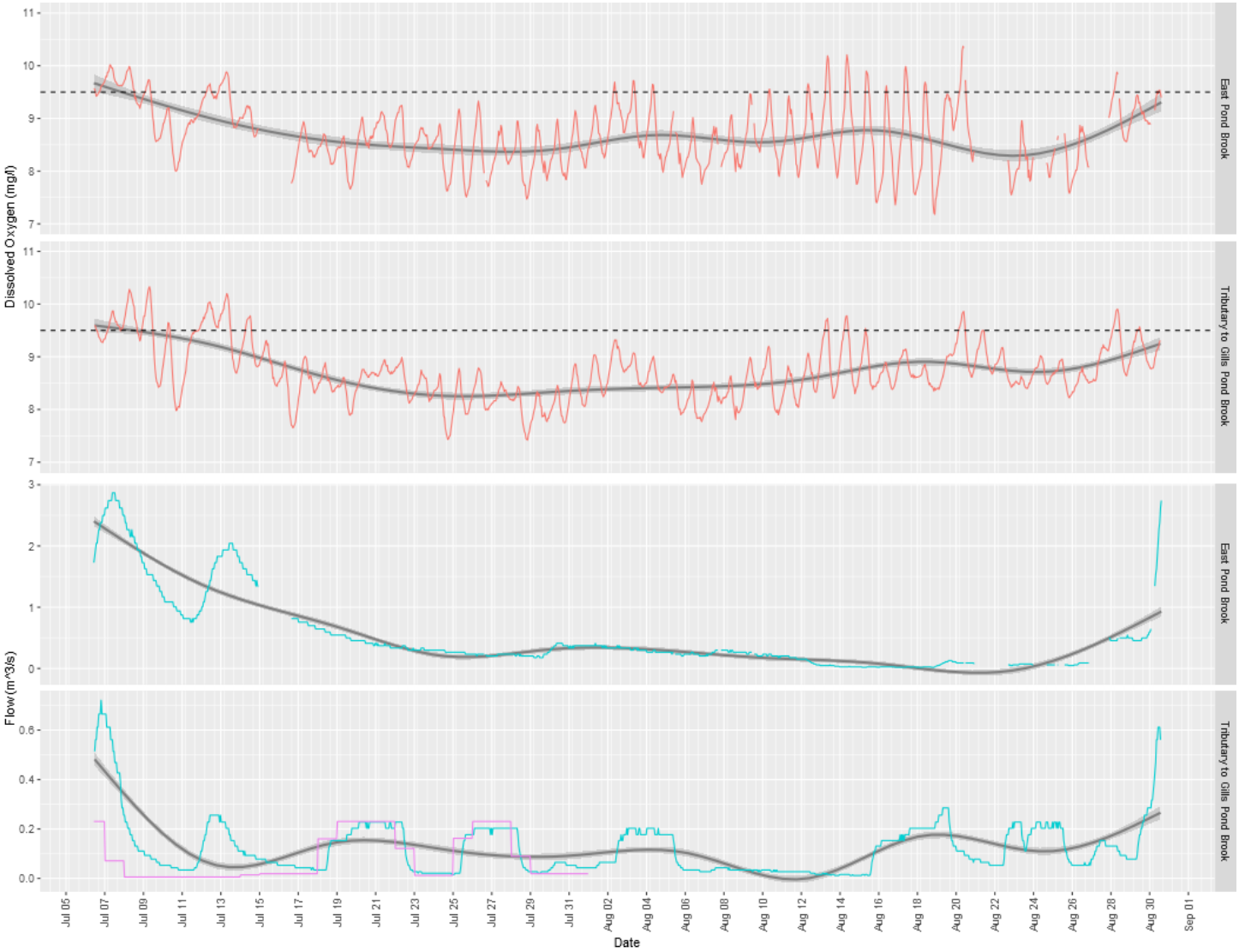
Station	Mean	Median	Min	Max
East Pond Brook	31.9	31.9	20.2	43.7
Tributary to Gills Pond Brook	912.8	1070.5	87.3	1428.0

- Specific conductivity climbed at EPB through most of the deployment period until peaking in mid-August. This is due to groundwater inflow becoming more predominant than surface water influence as water level declines over the summer.
- Conductivity at TGPB is influenced to a great degree by effluent discharge containing large amounts of dissolved solids. For this reason the characteristics are much different than EPB.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.



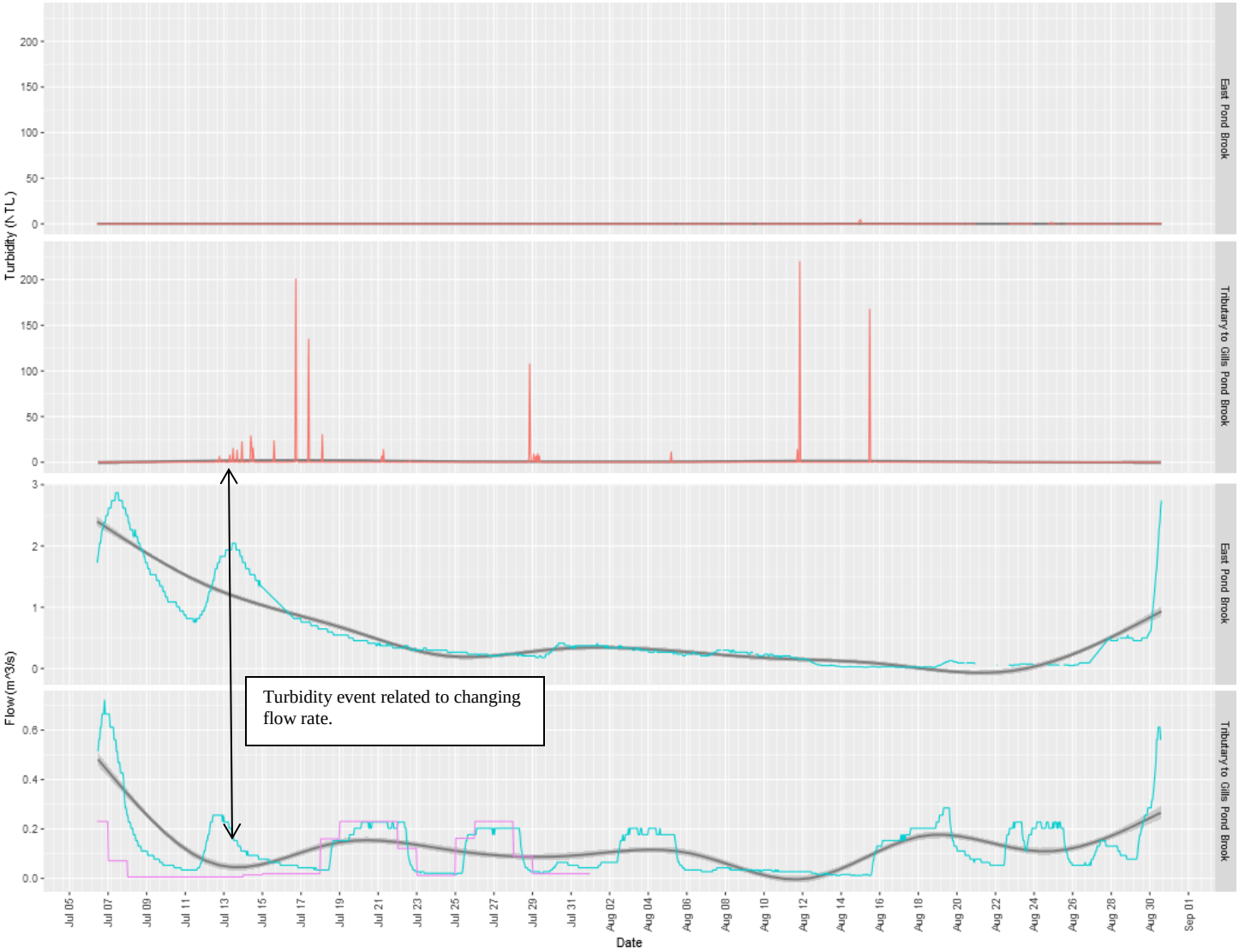
Station	Mean	Median	Min	Max
East Pond Brook	8.68	8.64	7.18	10.37
Tributary to Gills Pond Brook	8.71	8.64	7.42	10.33

- Dissolved oxygen values fell mostly under the upper CCME Guideline of 9.5 mg/l for early life stage aquatic organisms. This is typical for the time of year and associated water temperatures. Towards the end of the deployment, dissolved oxygen is seen to increase in response to cooling water.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

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.

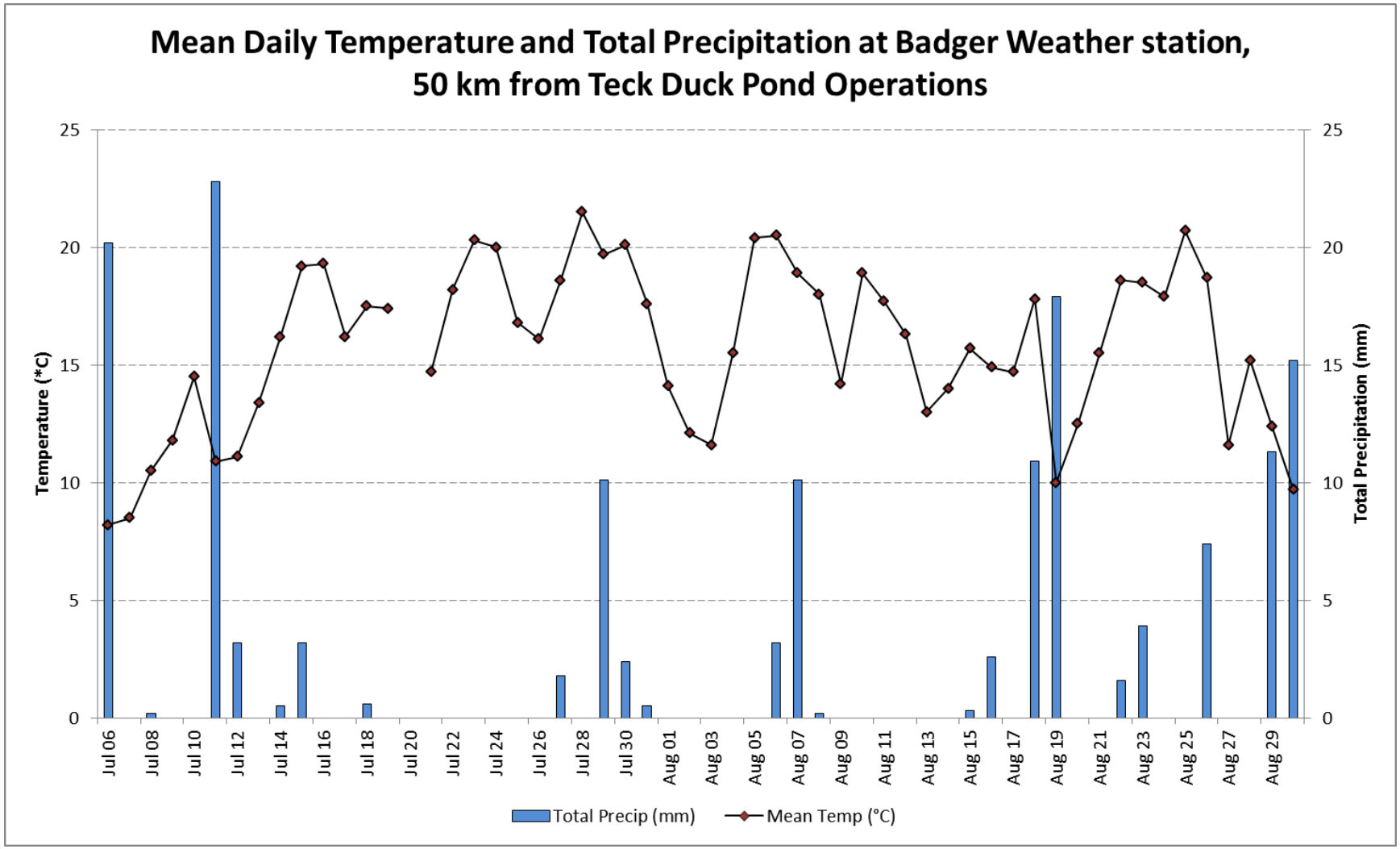


Station	Mean	Median	Min	Max
East Pond Brook	0.0	0.0	0.0	4.5
Tributary to Gills Pond Brook	0.9	0.0	0.0	219.8

- Turbidity levels were low at both stations from July to August with mean and median values near 0 NTU. Most turbidity events are short lived and occur during substantial changes in flow.

*All hydrometric data is provisional and is subject to correction. Please consult Water survey of Canada for finalized data and interpretation.

Appendix



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