

Real-Time Water Quality Deployment Report

Teck: Duck Pond Operations

May 30, 2019 to July 24, 2019



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

General

- Department of Municipal Affairs and Environment staff monitors the real-time web pages consistently.
- In this report Tributary to Gill’s Pond Brook and East Pond Brook are abbreviated at TGPB and EPB, respectively.
- 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.

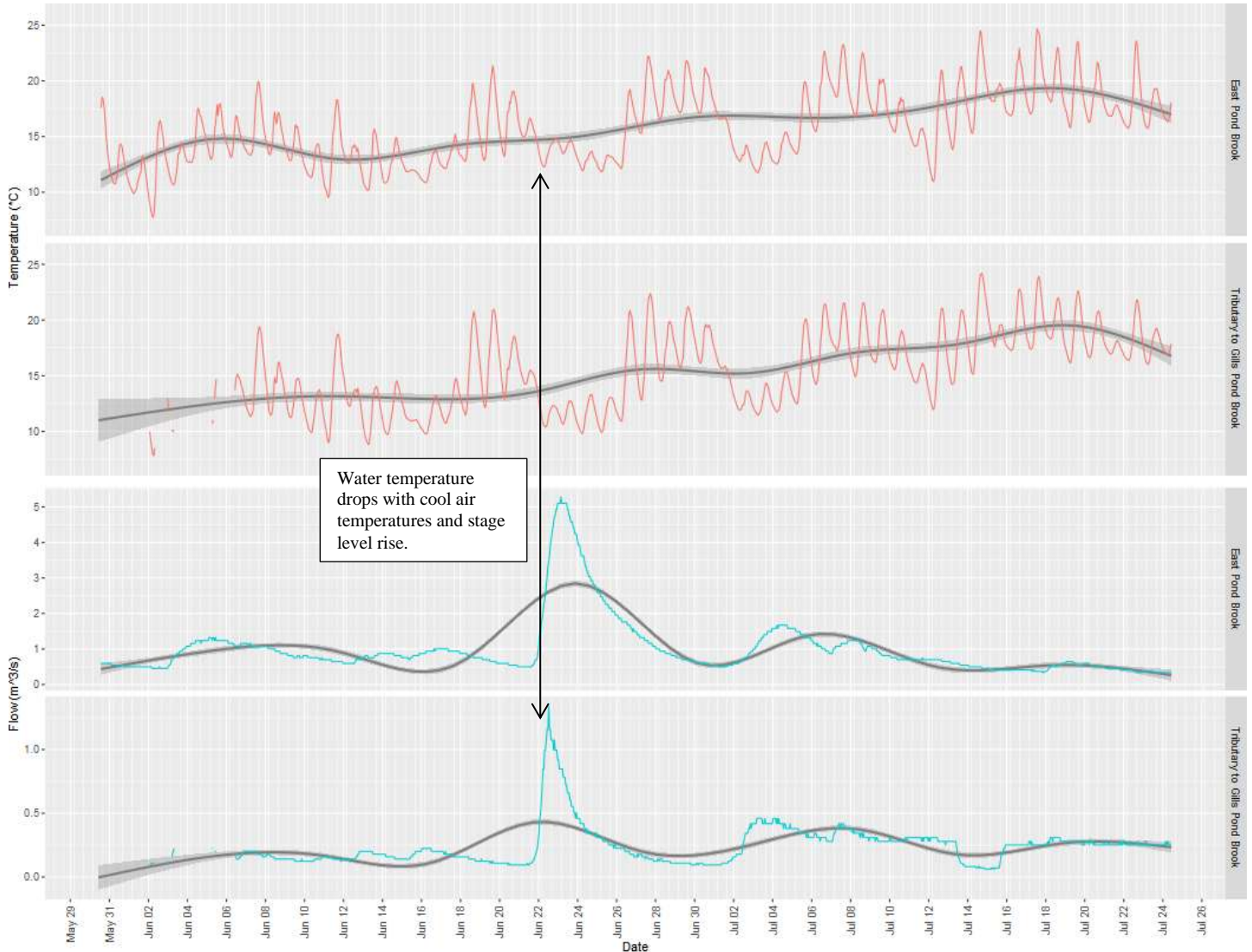
Table 1: Qualitative QAQC Ranking

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Tributary to Gill’s Pond Brook	May 30, 2019	Deployment	Excellent	Excellent	Excellent	Good	Good
	July 24, 2019	Removal	Good	Fair	Good	Excellent	Good
East Pond Brook below East Pond	May 30, 2019	Deployment	Fair	Excellent	Excellent	Fair	Excellent
	July 24, 2019	Removal	Excellent	Good	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.



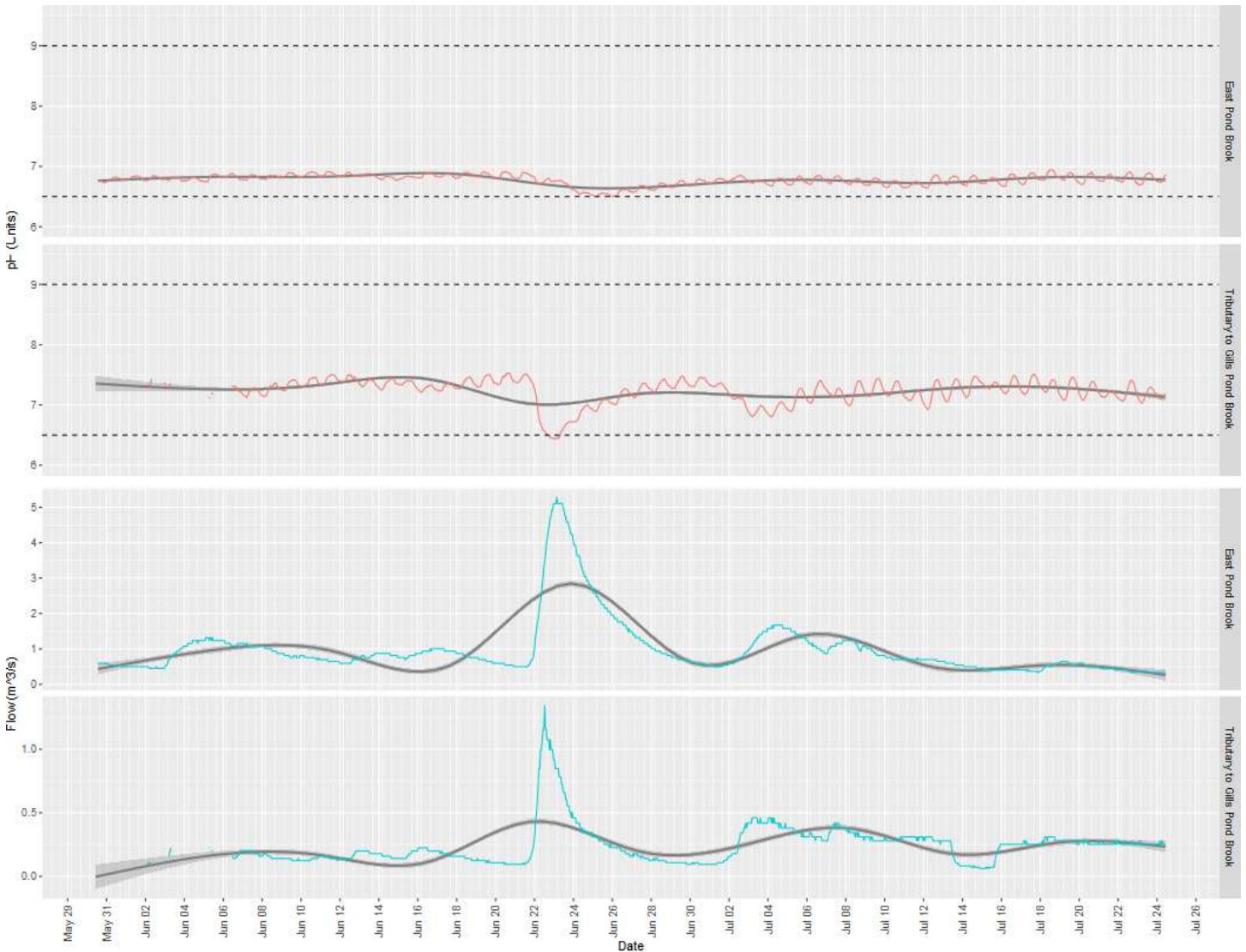
Station	Mean	Median	Min	Max
East Pond Brook	15.80	15.56	7.74	24.67
Tributary to Gills Pond Brook	15.54	15.52	7.82	24.19

- Water temperature increased over the course of the deployment period at both TGPB and EPB stations. Occasional depressions in water temperature were observed following cool air events.

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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.



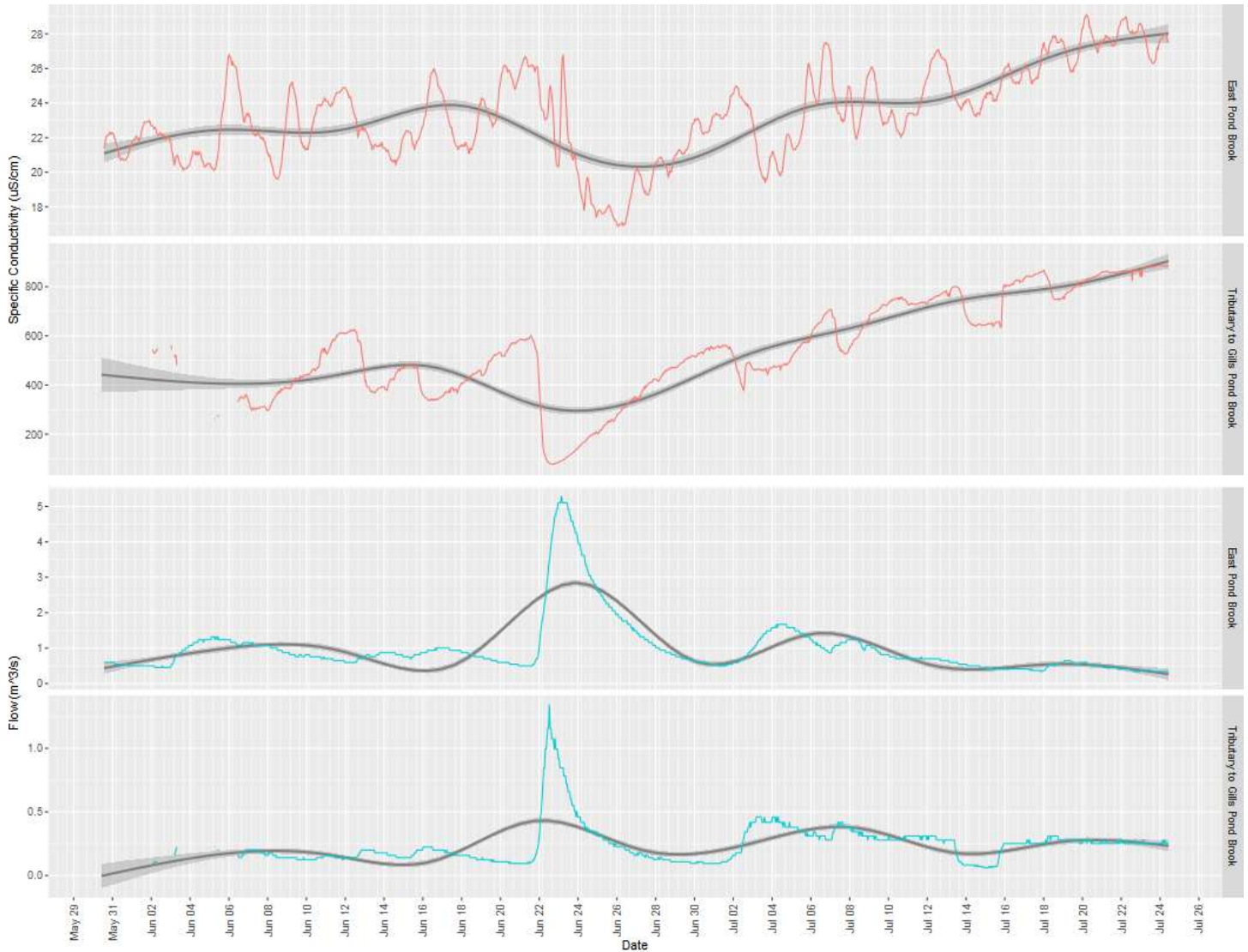
Station	Mean	Median	Min	Max
East Pond Brook	6.78	6.79	6.50	6.94
Tributary to Gills Pond Brook	7.23	7.27	6.44	7.53

- pH levels were generally steady at EPB and TGPB stations during this deployment period. A suspected precipitation event rolling through the area on June 22nd resulted in a substantial stage level rise at both stations and a one-unit drop in pH at EPB. No pH drop was seen at TGPB station, likely due to the high level of pH buffering alkalinity in that river system.

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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.



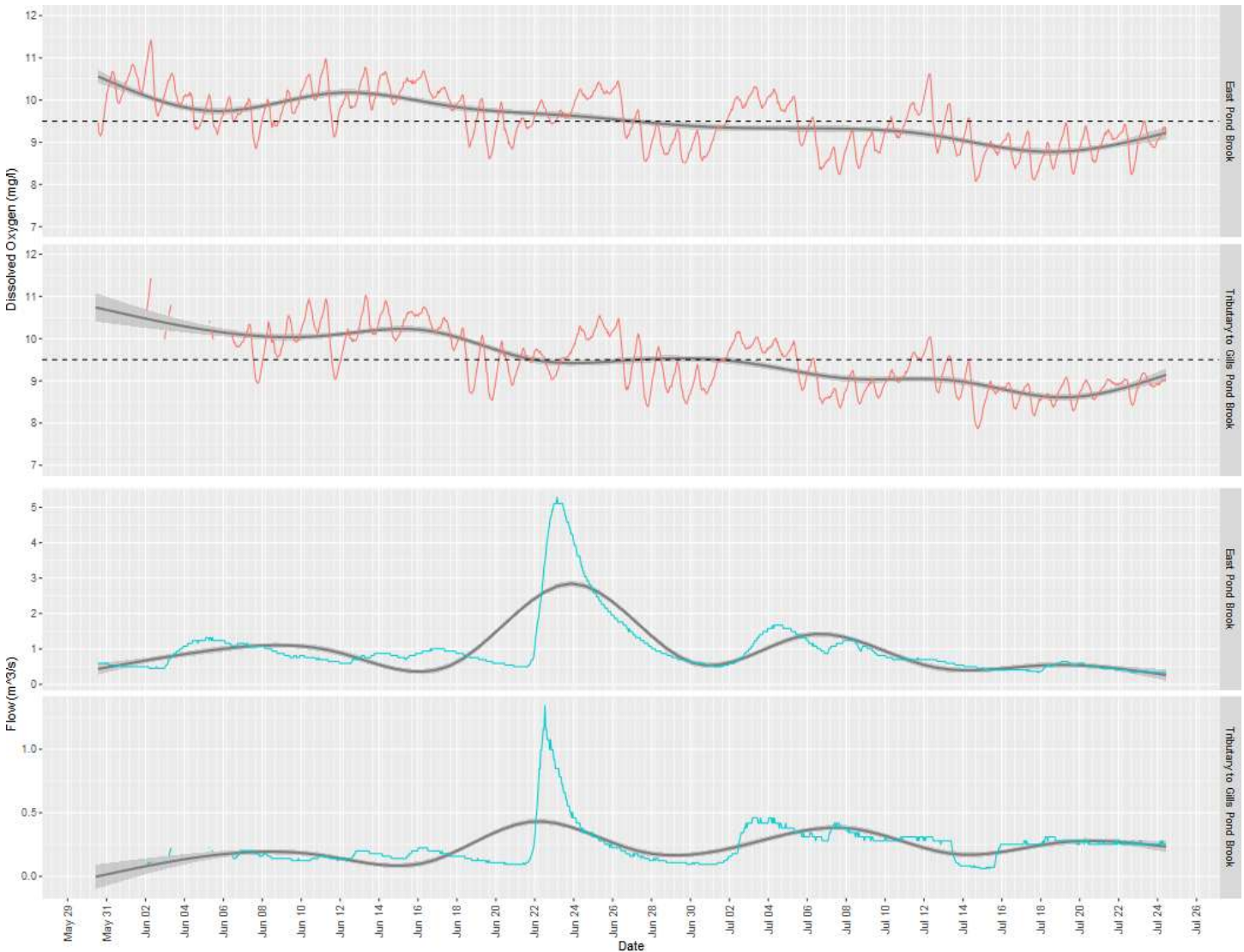
Station	Mean	Median	Min	Max
East Pond Brook	23.3	23.2	16.9	29.1
Tributary to Gills Pond Brook	546.5	533.0	77.2	889.0

- As the deployment interval progressed towards the summer low-flow season, specific conductivity increased at both stations, especially TGPB station. This results as freshwater inputs are minimized after the major springtime melt. As flows in river systems are decreased to baseline levels, groundwater inflows dominate the water quality characteristics and groundwater tends to be higher in dissolved solids compared to precipitation.

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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.



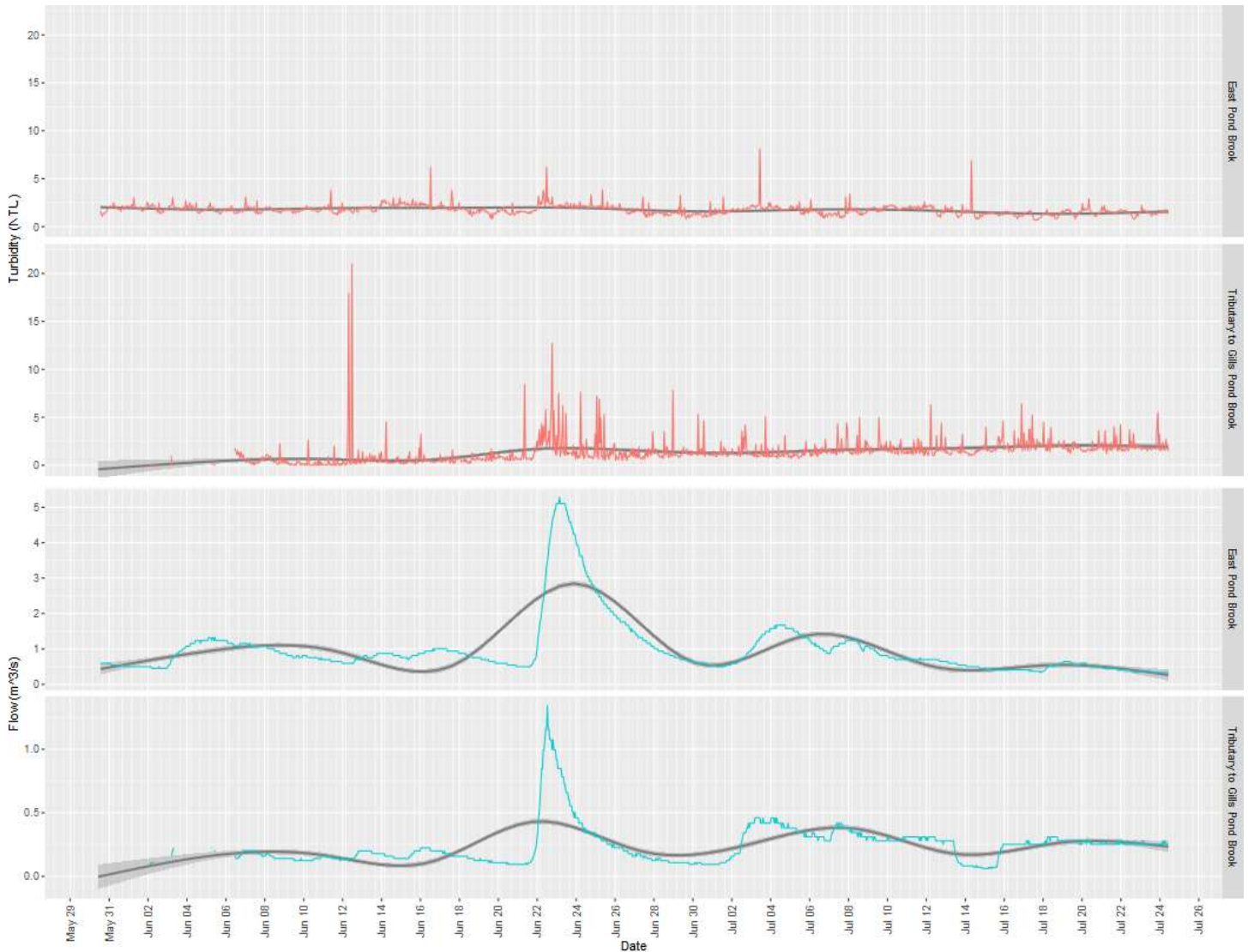
Station	Mean	Median	Min	Max
East Pond Brook	9.53	9.53	8.08	11.42
Tributary to Gills Pond Brook	9.44	9.41	7.87	11.42

- Dissolved oxygen levels declined with rising water temperatures and, by mid-July, remained below the upper CCME guideline of 9.5 mg/l DO for the protection of adult life stage aquatic life (typical for this 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
East Pond Brook	1.8	1.7	0.7	8.1
Tributary to Gills Pond Brook	1.4	1.2	0.0	21.0

- Turbidity levels were generally low with periodic ephemeral spikes, likely related to weather conditions.
- A slight rising trend was observed at EPB station. This slow rise may have been a combination of naturally rising turbidity and fouling of the turbidity sensor following the late-June precipitation event.

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Appendix

