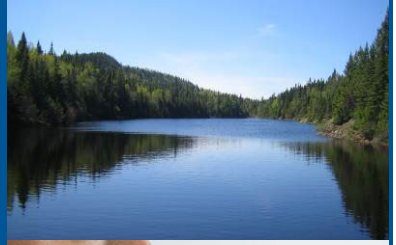
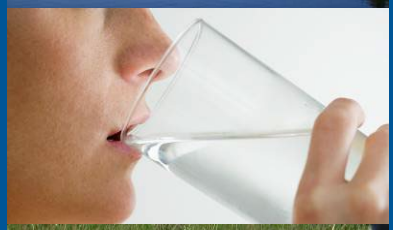






Real-Time Water Quality Report

Leary's Brook at Prince Philip Drive

Deployment Period
June 6th, 2025 to July 16th, 2025

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Environment, Conservation & Climate Change
Water Resources Management Division

Leary's Brook, Newfoundland and Labrador

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General

- The Water Resources Management Division (WRMD), in partnership with Environment and Climate Change Canada (ECCC), maintains a real-time water quality and water quantity monitoring station at Leary's Brook adjacent to Prince Phillip Parkway.
- The real-time station allows for assessment and management of the water body. This deployment report discusses water quality related events occurring at the Leary's Brook station.
- The purpose of this real-time station is to monitor, process and publish hydrometric (water quantity) and real-time water quality data at the real-time station. Leary's Brook is an urban stream that flows through industrial and commercial areas and adjacent to a major roadway.
- This report covers the period between the deployment on June 6th, 2025, and removal on July 16th 2025.

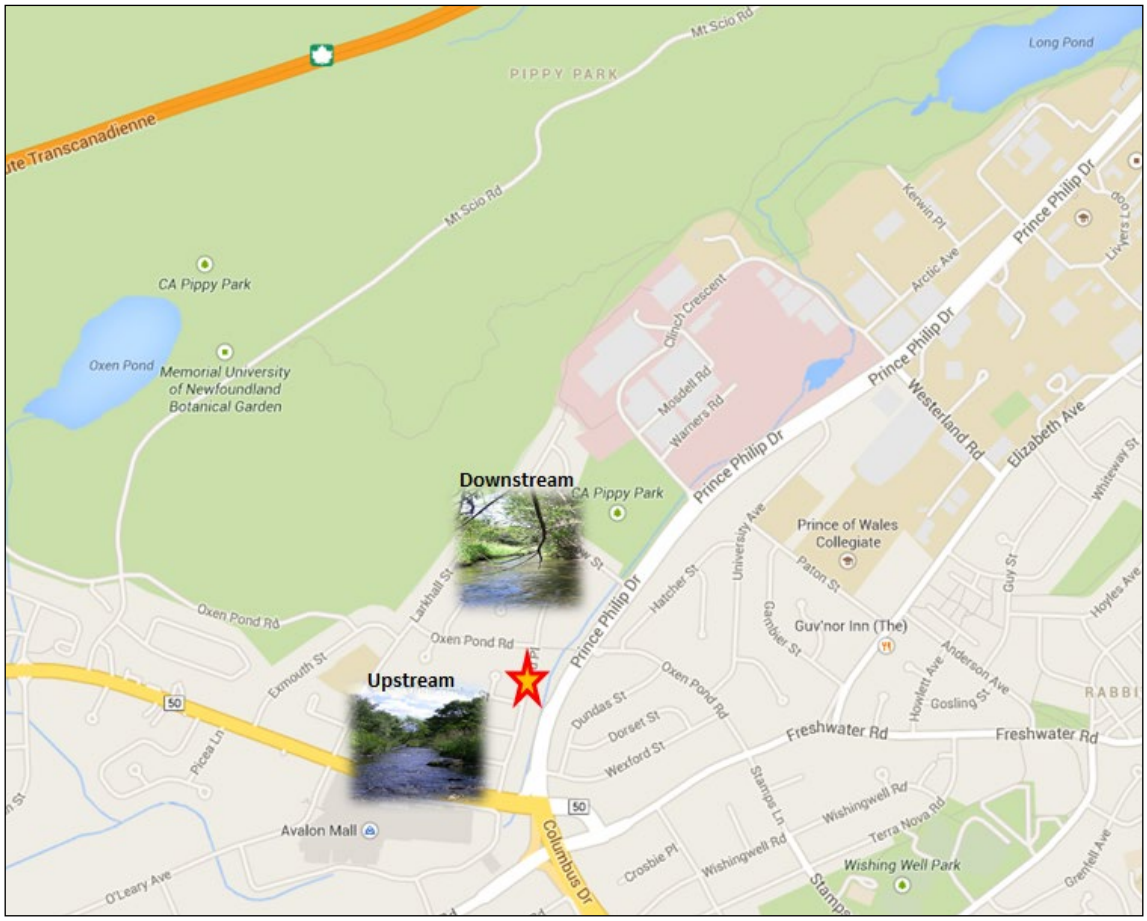

Figure 1: Leary's Brook Real-Time Water Quality and Quantity Station.

Quality Assurance and Quality Control

- As part of the Quality Assurance and Quality Control protocol (QA/QC), 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.
- At deployment and removal, a QA/QC Sonde is temporarily deployed adjacent to the Field Sonde. Values for temperature, pH, conductivity, dissolved oxygen and turbidity are compared between the two instruments**.** Based on the degree of difference between the parameters on the Field Sonde and QA/QC Sonde at deployment and at removal, a qualitative statement is made on the data quality (Table 1).

Table 1: Instrument Performance Ranking classifications for deployment and removal

	Rank				
Parameter	**Excellent**	**Good**	**Fair**	**Marginal**	**Poor**
Temperature (°C)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	<+/-1
pH (unit)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Sp. Conductance (µS/cm)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Sp. Conductance > 35 µS/cm (%)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Dissolved Oxygen (mg/L) (% Sat)	<=+/-0.3	>+/-0.3 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Turbidity <40 NTU (NTU)	<=+/-2	>+/-2 to 5	>+/-5 to 8	>+/-8 to 10	>+/-10
Turbidity > 40 NTU (%)	<=+/-5	>+/-5 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20

- The temperature sensor on any sonde is the most important. All other parameters can be divided into subgroups of: temperature dependent, temperature compensated and temperature independent. Due to the temperature sensor's location on the sonde, the entire sonde must be at a constant temperature before the temperature sensor will stabilize. The values may take some time to climb to the appropriate reading; if a reading is taken too soon it may not accurately portray the water body.
- Deployment and removal instrument performance rankings for **Leary's Brook** for this period are summarized in Table 2.

Table 2: Instrument performance rankings for Leary's Brook

Station	**Date**	**Action**	**Comparison Ranking**				
			Temperature	**pH**	**Conductivity**	**Dissolved Oxygen**	**Turbidity**
Leary's Brook	**June 6th 2025**	**Deployment**	Excellent	Good	Excellent	Excellent	Excellent
	July 16th, 2025	**Removal**	Excellent	Excellent	Good	Excellent	Excellent

- At the Leary's Brook station at the time of deployment, temperature, conductivity, dissolved oxygen and turbidity ranked "Excellent" while pH readings ranked as "Good".

- At the time of removal, temperature, pH, dissolved oxygen and turbidity ranked as "Excellent" while conductivity ranked as "Good".

Data Interpretation

- The following graphs and discussion illustrate water quality-related events from June 6th 2025, to July 16th, 2025 at the Leary's Brook station.
- Except for water quantity data (stage), all data used in the preparation of the graphs and subsequent discussion below adhere to this stringent QA/QC protocol. Water Survey of Canada (WSC) is responsible for QA/QC of water quantity data. Corrected and finalized data may be retrieved from the WSC website (http://www.ec.gc.ca/rhc-wsc/)
- Precipitation data from the deployment period was retrieved from the ECCC weather station at St. John's International Airport.
- Several interruptions in data transmission occurred during this deployment period, likely the result of transmission equipment failures.

Leary's Brook

Water Temperature

- Water temperature ranged from 9.82°C to 21.37°C during this deployment period (Figure 2).
- Water temperature at Leary's Brook displays a typical variation over the deployment period. Water temperature is influenced by air temperature and steadily increases into the summer months.
- The water temperature data displayed on Figure 2 is typical of shallow streams and ponds. Shallow water bodies are highly influenced by variations in ambient air temperatures. Water temperature will fall overnight and rise during daylight hours.
- Please note the stage data is raw data that is published on the ECCC web page. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

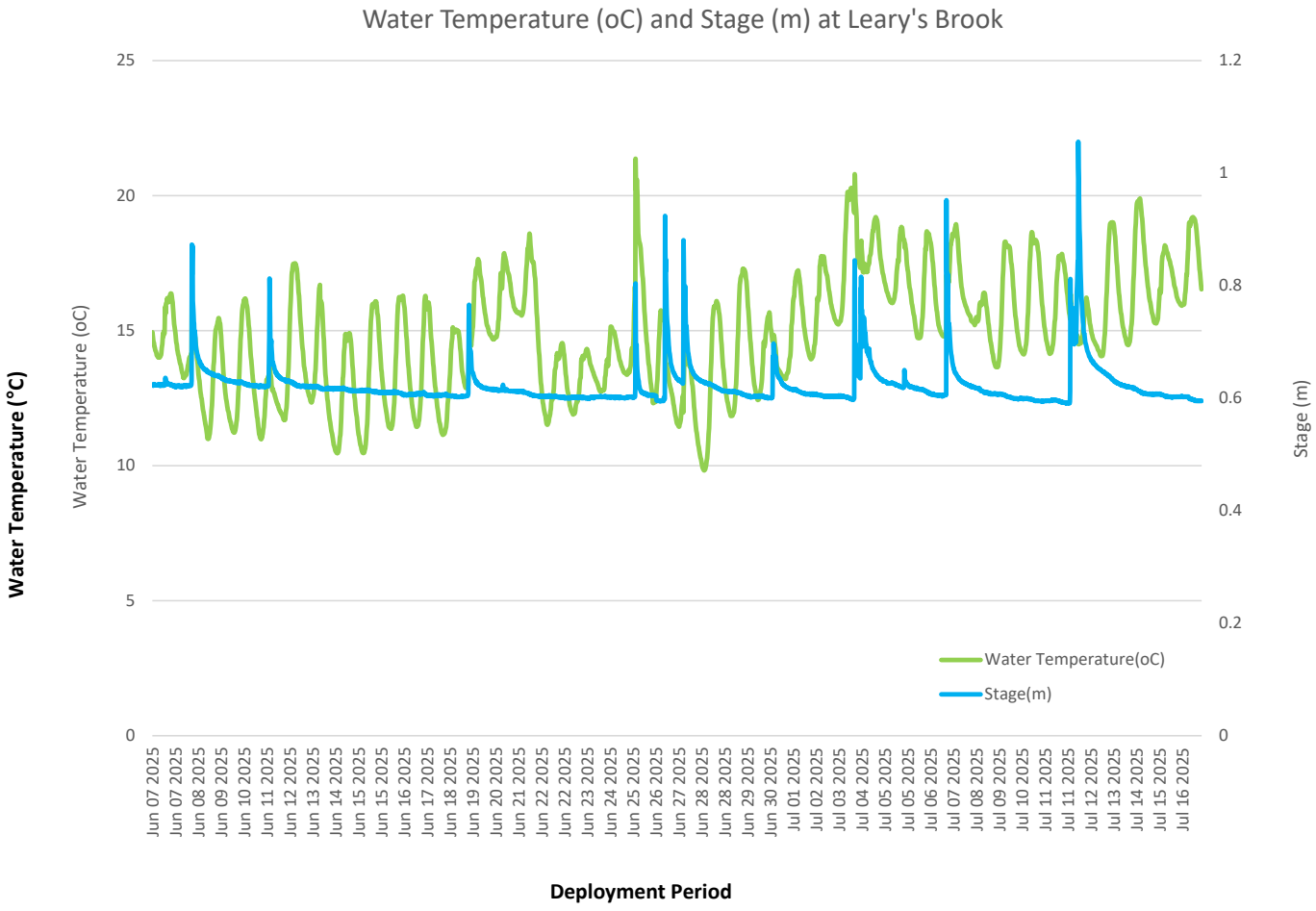

Figure 2: Water Temperature and Stage Level at Leary's Brook

pH

- Throughout this deployment period pH values ranged between 6.45 pH units and 7.26 pH units (Figure 3).
- The CCME guideline provides a basis by which to judge the overall health of the brook. Naturally, all streams and brooks are different. Leary's Brook pH median was 6.77 (pH units) for this deployment period.
- pH typically falls slightly in Leary's Brook (the water becomes more acidic) at the same time as stage and flow are increasing. In general, precipitation entering Leary's Brook has a lower pH than local surface water and this causes a reduction in the pH of the brook.
- pH remained within the range that is protective of aquatic life for the duration of the deployment period with a few temporary exceptions during precipitation events.

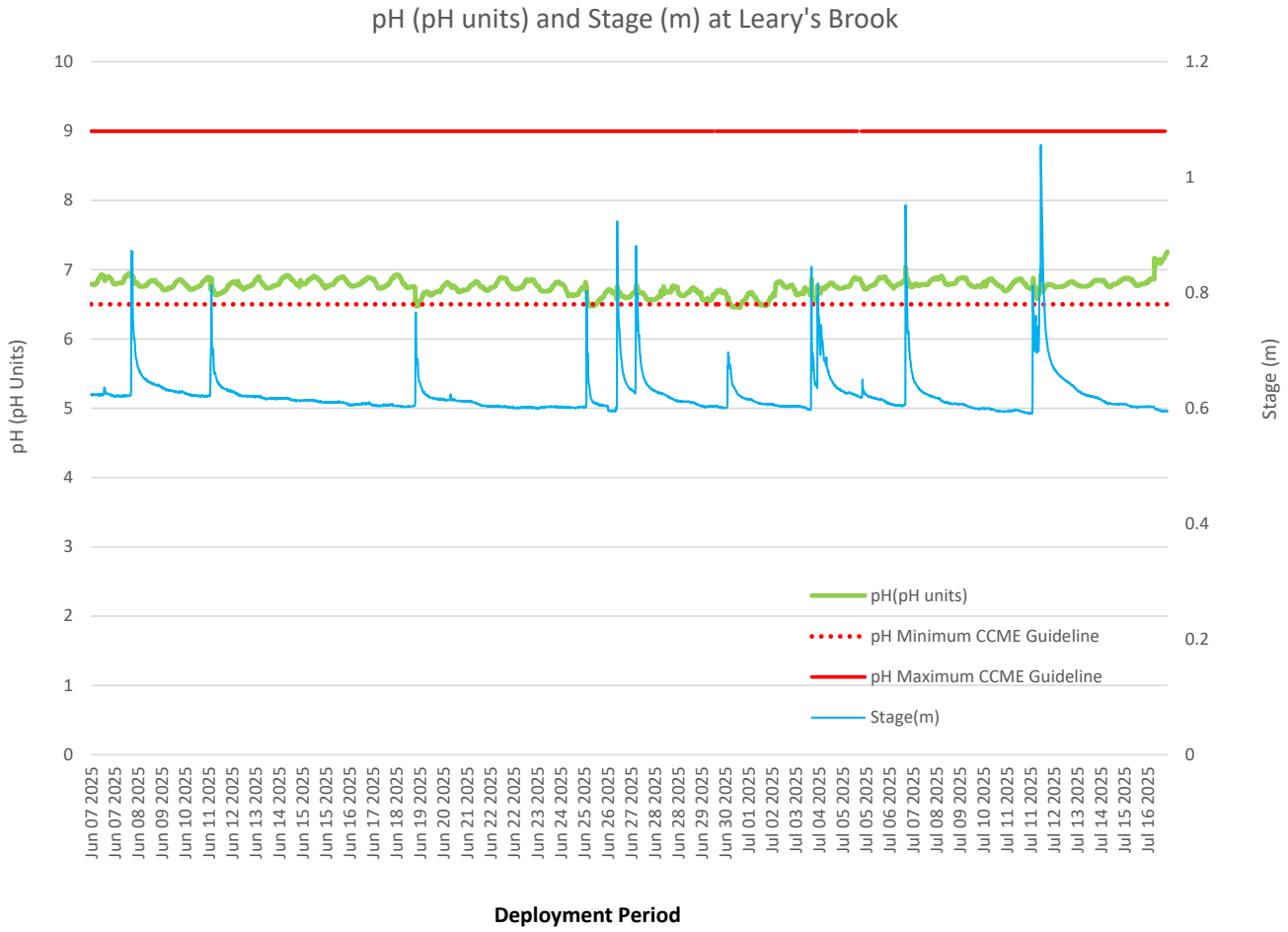

Figure 3: Water pH (pH units) values at Leary's Brook Station

Specific Conductivity

- The conductivity levels ranged between 237 µS/cm and 1290 µS/cm during this deployment period. The median was 1099 µS/cm. TDS ranged from 0.152 g/ml to 0.825 g/ml. (Figure 4)
- The rapid increases in conductivity seen during the beginning of this deployment period are associated with an increase in stage level and road runoff.

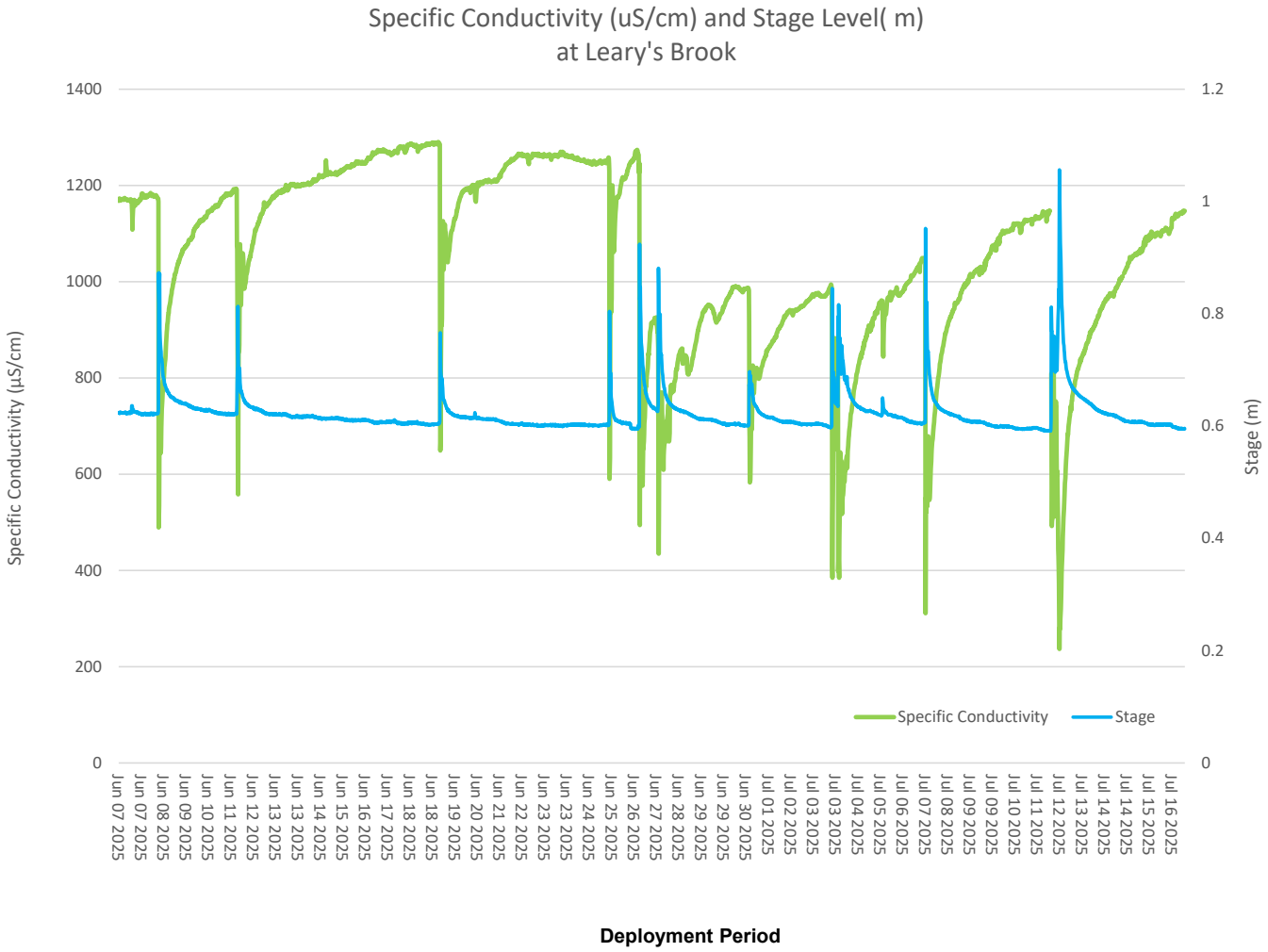

Figure 4: Specific conductivity values at Leary's Brook Station

Dissolved Oxygen

- The instrument measures dissolved oxygen (mg/L) and then calculates the percent saturation (% Sat.).
- The Dissolved Oxygen % Sat levels within this deployment period were between 82.6% Sat and 102.6% Sat. Dissolved Oxygen (mg/L) measured between 7.51mg/L and 10.95mg/L. (Figure 5)
- The DO mg/L values were above the minimum DO CCME guidelines for the protection of other life stages during this deployment period (Figure 5).
- Small decreases in available oxygen are associated with increases in water temperature. Water temperature will continue to increase with the change in seasons. Warm water can hold less dissolved oxygen than cooler water.
- The lowest levels of DO correspond with the highest water temperatures recorded during this deployment period.

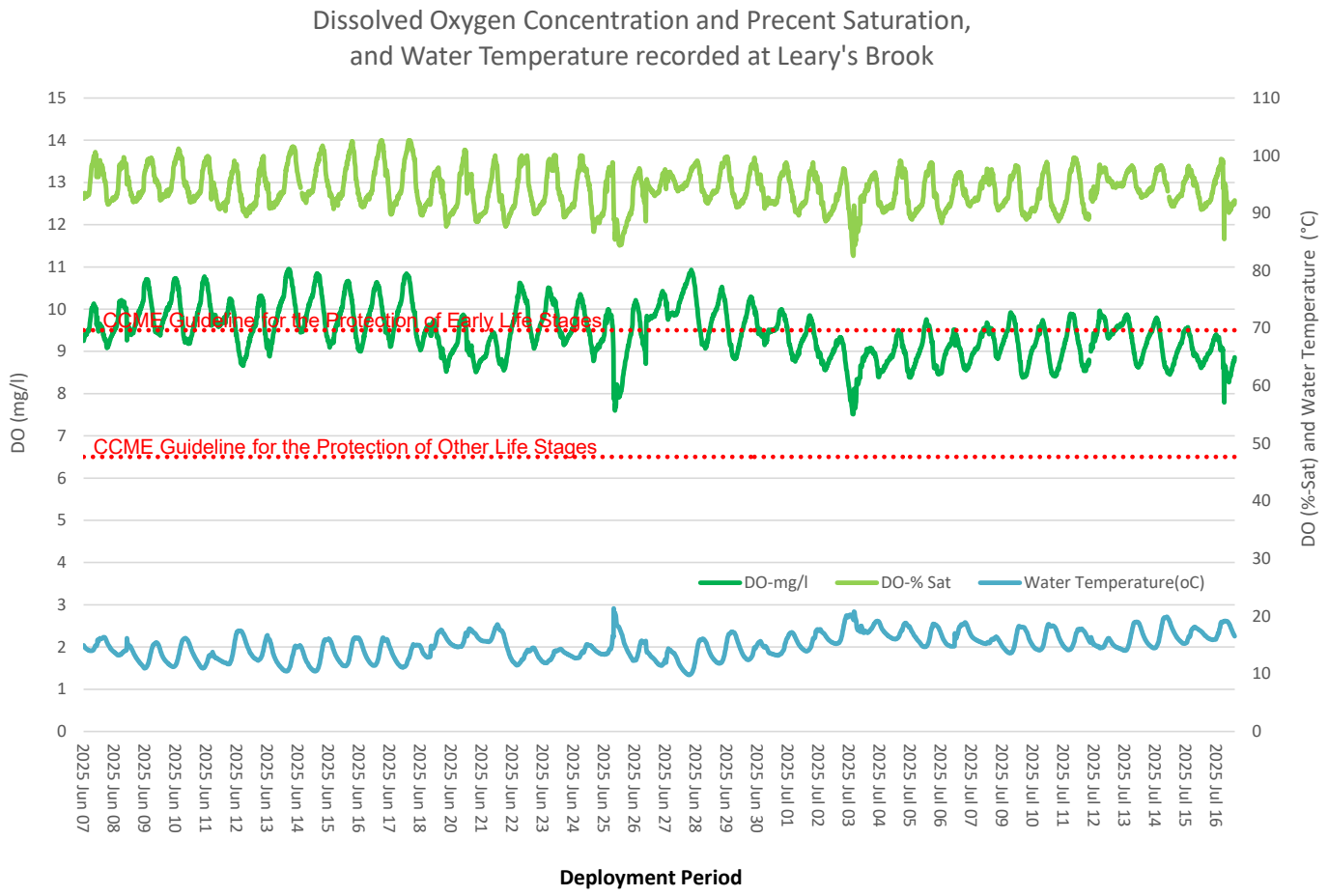

Figure 5: Dissolved oxygen (mg/L & % sat) and water temperature (°C) values at Leary's Brook Station

Turbidity

- The turbidity sensor records values between 0 NTU and 3000 NTU. A turbidity reading of 3000 NTU is identified as an error and is not a true value. Readings of 3000 NTU will not be included in any statistical analysis.
- This deployment captured the turbidity sensor becoming buried by debris after a spike in stage level. This resulted in the data from June 20th onwards being removed from the dataset, as it did not represent the brook (Figure 6).
- The turbidity readings during this deployment ranged between 0.0 NTU to 55.8 NTU (Figure 6).
- Turbidity data at this brook can be inconsistent. During precipitation events or spring thaw the surrounding environment runoffs into the brook causing the turbidity data to increase for a period (Figure 6).

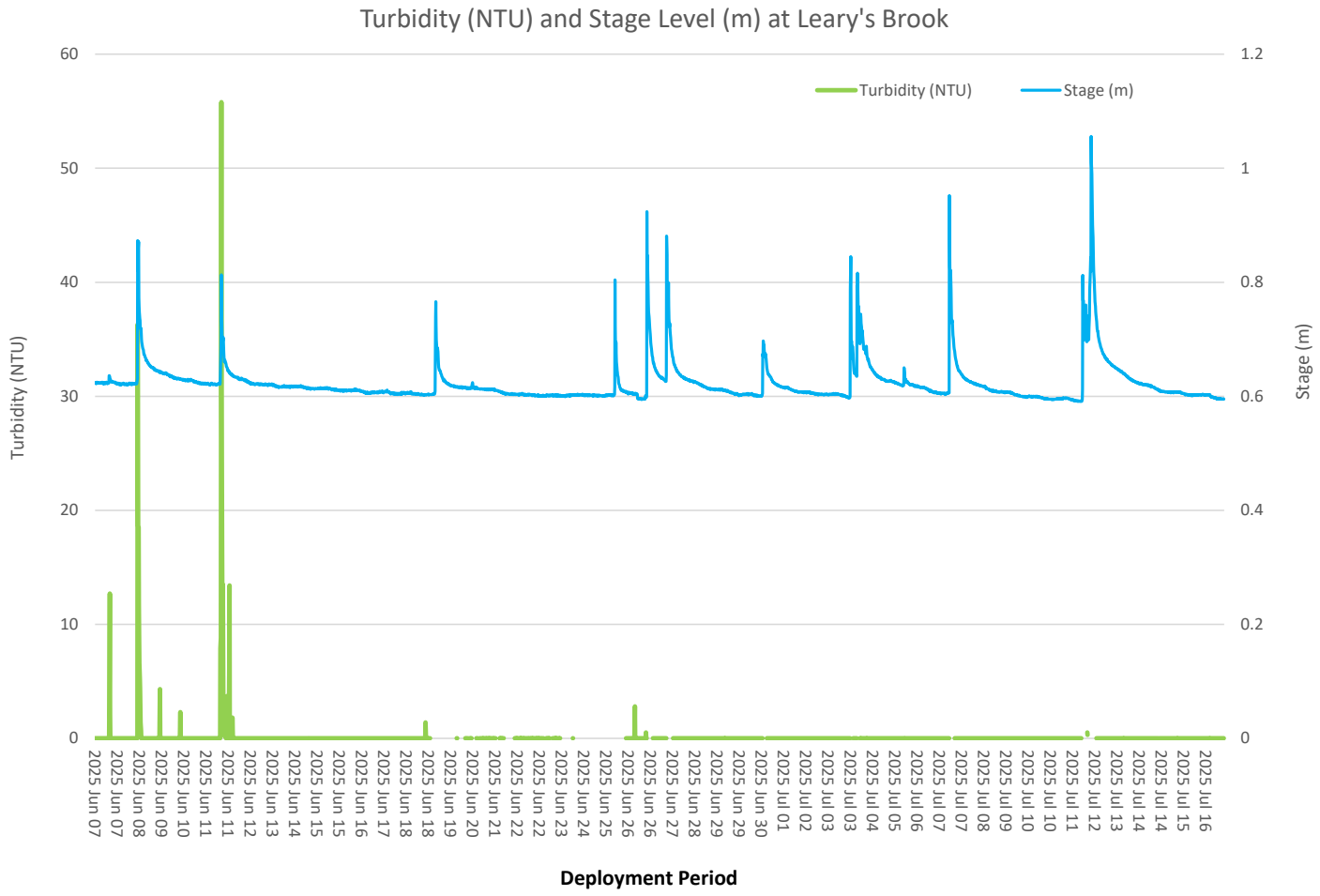

Figure 6: Turbidity (NTU) values at Leary's Brook Station.

Stage and Total Precipitation

- The graph below shows daily total precipitation data from St. John's International Airport weather station and the daily average stage recorded at Leary's Brook (Figure 7).
- Please note that the stage data in this report is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.
- Stage (and streamflow) usually varies significantly throughout a deployment period in Leary's Brook.

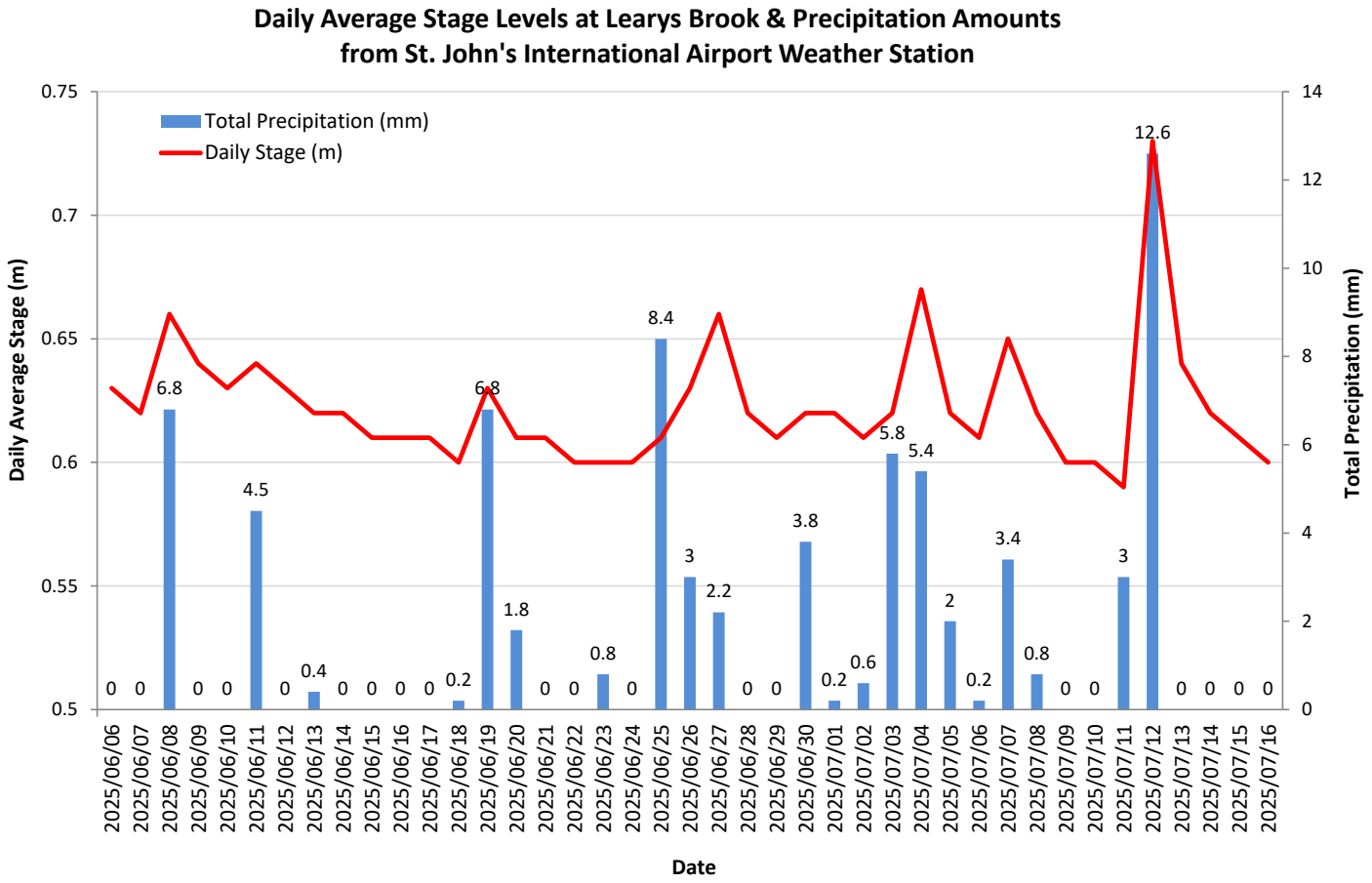

Figure 7: Daily average stage values (m) from Leary's Brook and daily total precipitation values (mm) from St. John's International Airport.

Conclusions

In both natural and urban environments, climate and weather conditions can contribute in large part to variations in water quality. During this deployment it was evident that many of the changes in Leary's Brook water quality are related to intermittent precipitation events and small climatic changes of the seasons.

Precipitation and runoff events during the deployment period led to related increases in stage, which thus influenced the values of turbidity, pH, specific conductance, and TDS. Also, when ambient air temperatures increased there were correspondingly warmer water temperatures, which in turn decreased the amount of dissolved oxygen in the water.

During this deployment period the median water temperature at the Leary's Brook station was 14.87°C.

The median pH value for Leary's Brook Station was 6.77 (pH units). The pH level usually decreases temporarily at this station during rainfall events and increases during dry periods.

Conductivity had a median value of 1099 µS/cm. The maximum conductivity was 1290 µS/cm, which is lower than the previous deployment of 4440 µS/cm. At this time of year, there is less road salt and less precipitation which in turn reduces the flush of minerals and sediment into the brook.

Dissolved Oxygen at Leary's Brook had a median of 93.8 %Sat and 9.43 mg/L during the deployment period. As the air temperature increases with the change in seasons, so does the water temperature. Warmer water temperatures will decrease the dissolved oxygen levels in the water column. This is an expected response.