



# Real-Time Water Quality Report

## Leary's Brook at Prince Philip Drive

Deployment Period  
August 18<sup>th</sup>, 2025 to October 3<sup>rd</sup>, 2025



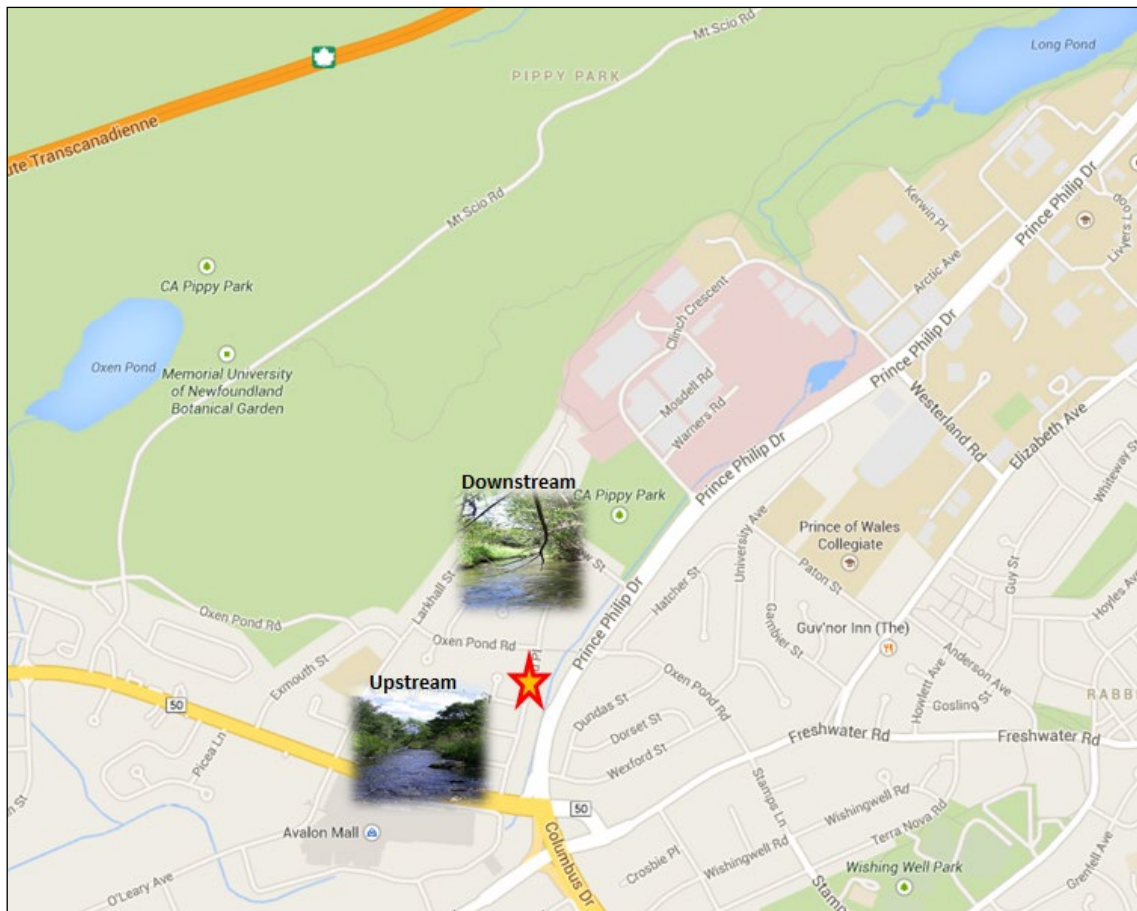
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## General

- 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 August 18<sup>th</sup>, and removal on October 3<sup>rd</sup>, 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

| Parameter                       | Rank      |                |                |              |        |
|---------------------------------|-----------|----------------|----------------|--------------|--------|
|                                 | 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 | Aug 18 <sup>th</sup> 2025 | Deployment | Excellent          | Excellent | Excellent    | Excellent        | Excellent |
|               | Oct 3 <sup>rd</sup> 2025  | Removal    | Excellent          | Excellent | Excellent    | Excellent        | Excellent |

- At the Leary's Brook station at the time of deployment and removal, all parameters ranked "excellent".

## **Data Interpretation**

- The following graphs and discussion illustrate water quality-related events from August 18<sup>th</sup> to October 3<sup>rd</sup>, 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.

## Leary's Brook

### Water Temperature

- Water temperature ranged from 7.21°C to 20.22°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 with the lowest temperatures recorded at the end of deployment into the fall season.
- 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.

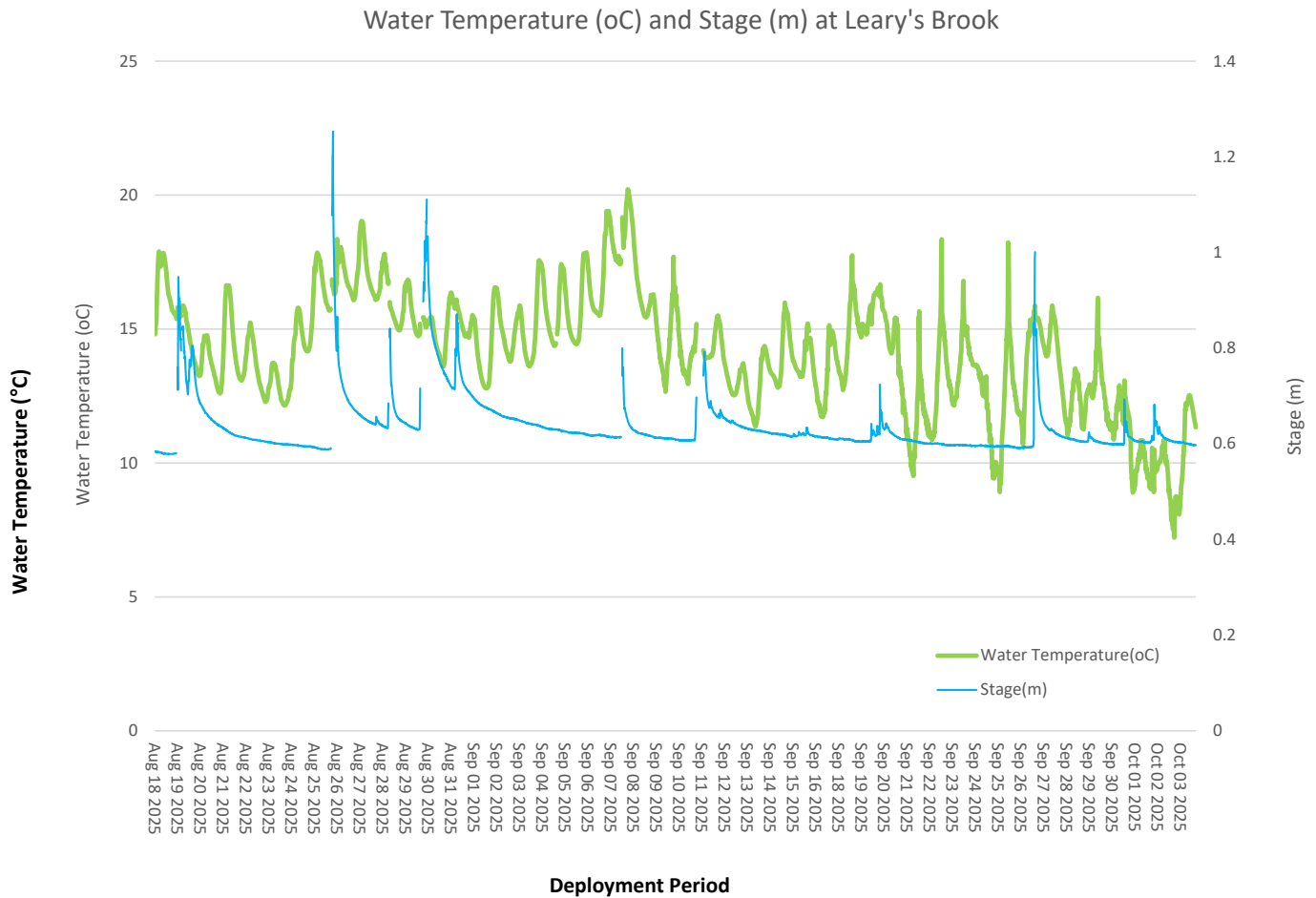


Figure 2: Water Temperature and Stage Level at Leary's Brook

### pH

- Throughout this deployment period pH values ranged between 6.6 pH units and 7.3 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 6.9 pH units, lower than the previous deployment median of 8.12 (pH units) which was noted as unusually high.
- As stage and flow are increasing during precipitation events, the pH values fall (the water becomes more acidic). The 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.

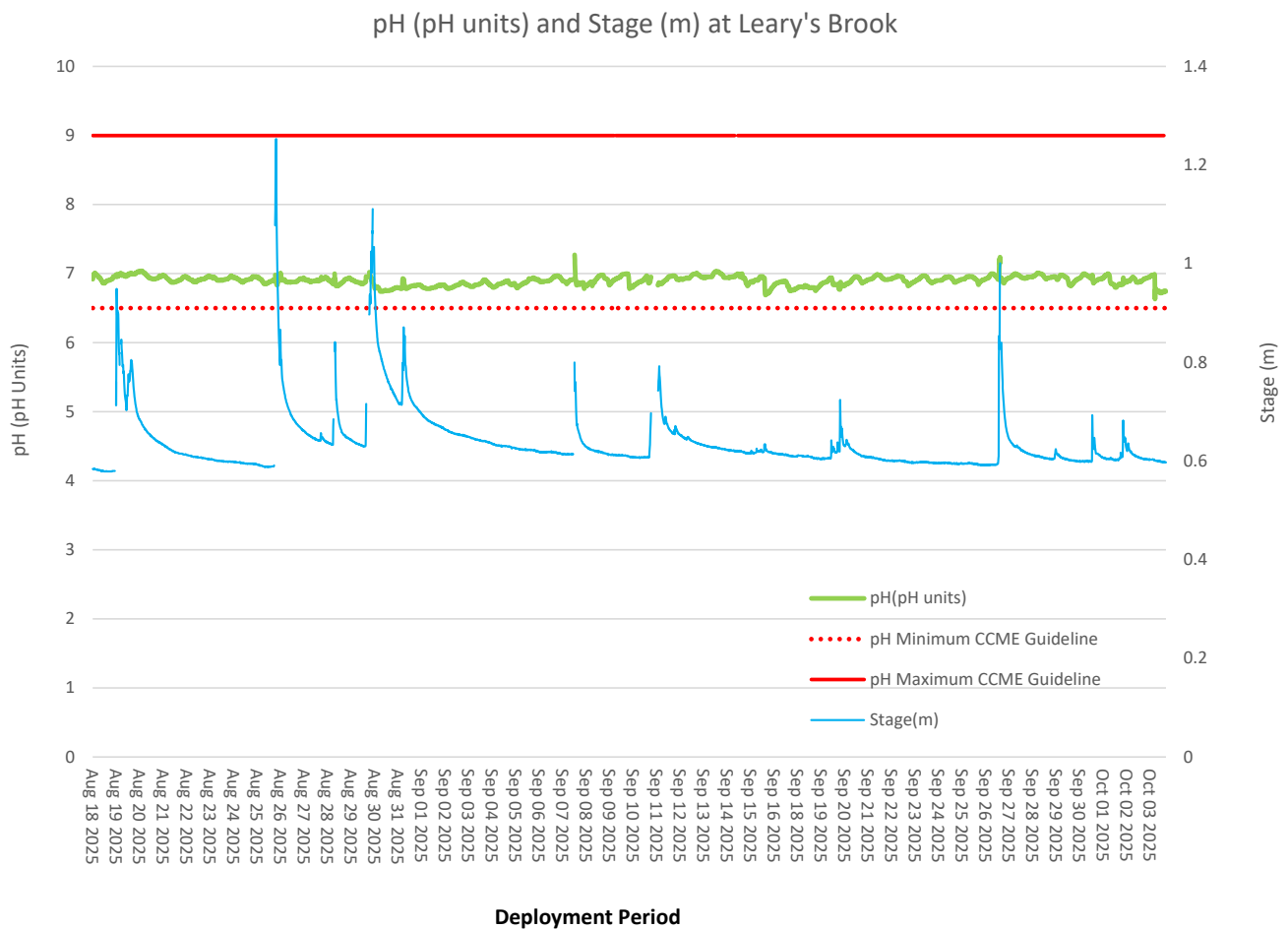


Figure 3: Water pH (pH units) values at Leary's Brook Station

### Specific Conductivity

- The conductivity levels ranged between 21.1  $\mu\text{S}/\text{cm}$  and 1198  $\mu\text{S}/\text{cm}$  during this deployment period. The median was 1027  $\mu\text{S}/\text{cm}$ . Total Dissolved Solids ranged from 0.0135 g/l to 0.767 g/l. (Figure 4)
- Total Dissolved Solids (TDS) is a calculated value derived from specific conductivity and water temperature. There is no TDS sensor on the instrument that detects the value, it is an automatic calculation from the water quality sonde that provides the data.
- Most of the rapid decreases in conductivity seen across deployment are associated with increases in stage level, indicating the higher flows flushed the brook for a period, reducing the presence of minerals and dissolved sediment.

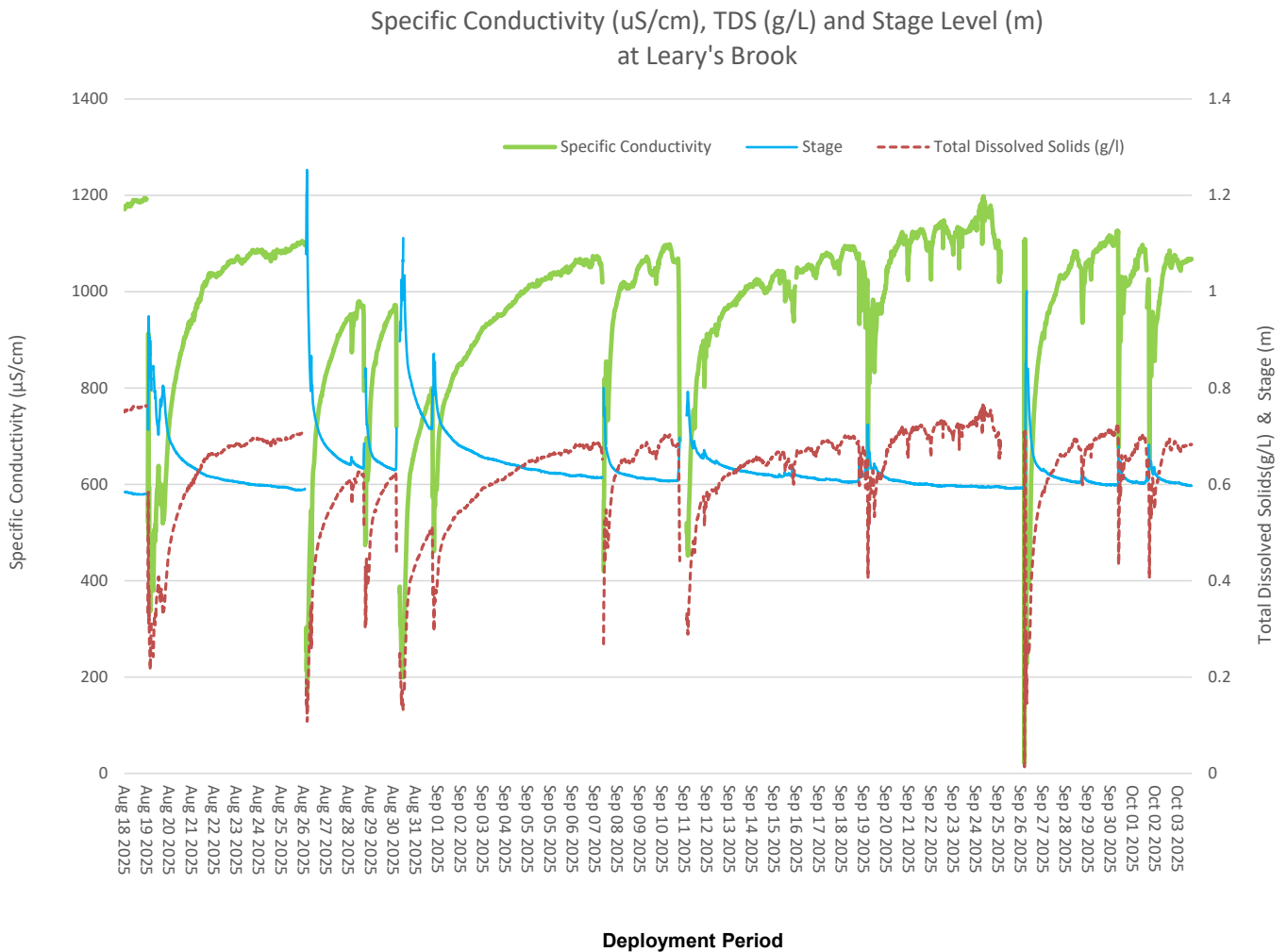
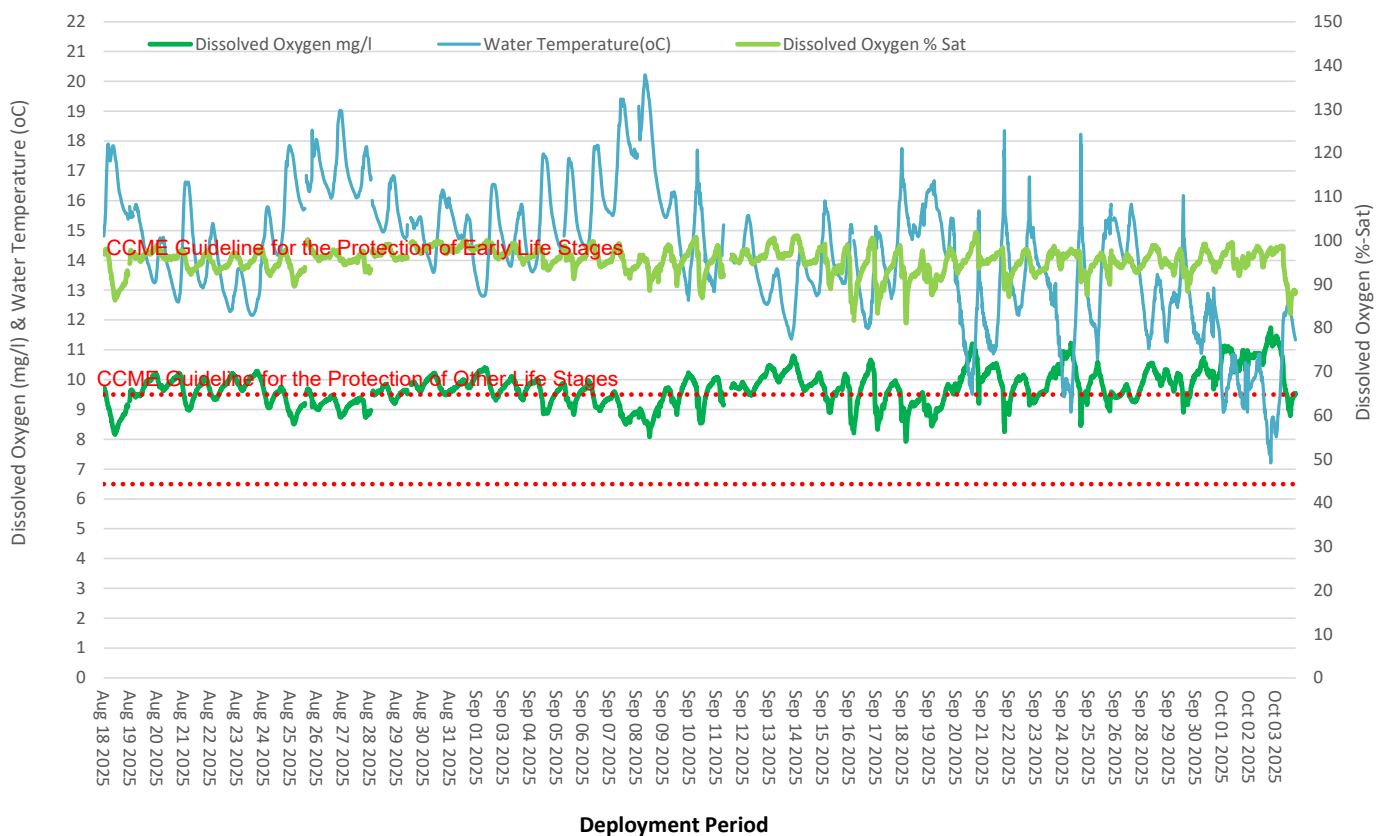


Figure 4: Specific conductivity & TDS values at Leary's Brook Station

### 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 81.1% Sat and 101.8% Sat. Dissolved Oxygen (mg/L) measured between 7.93mg/L and 11.74mg/L. (Figure 5)
- The DO mg/L values were above the 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 into Fall. 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.

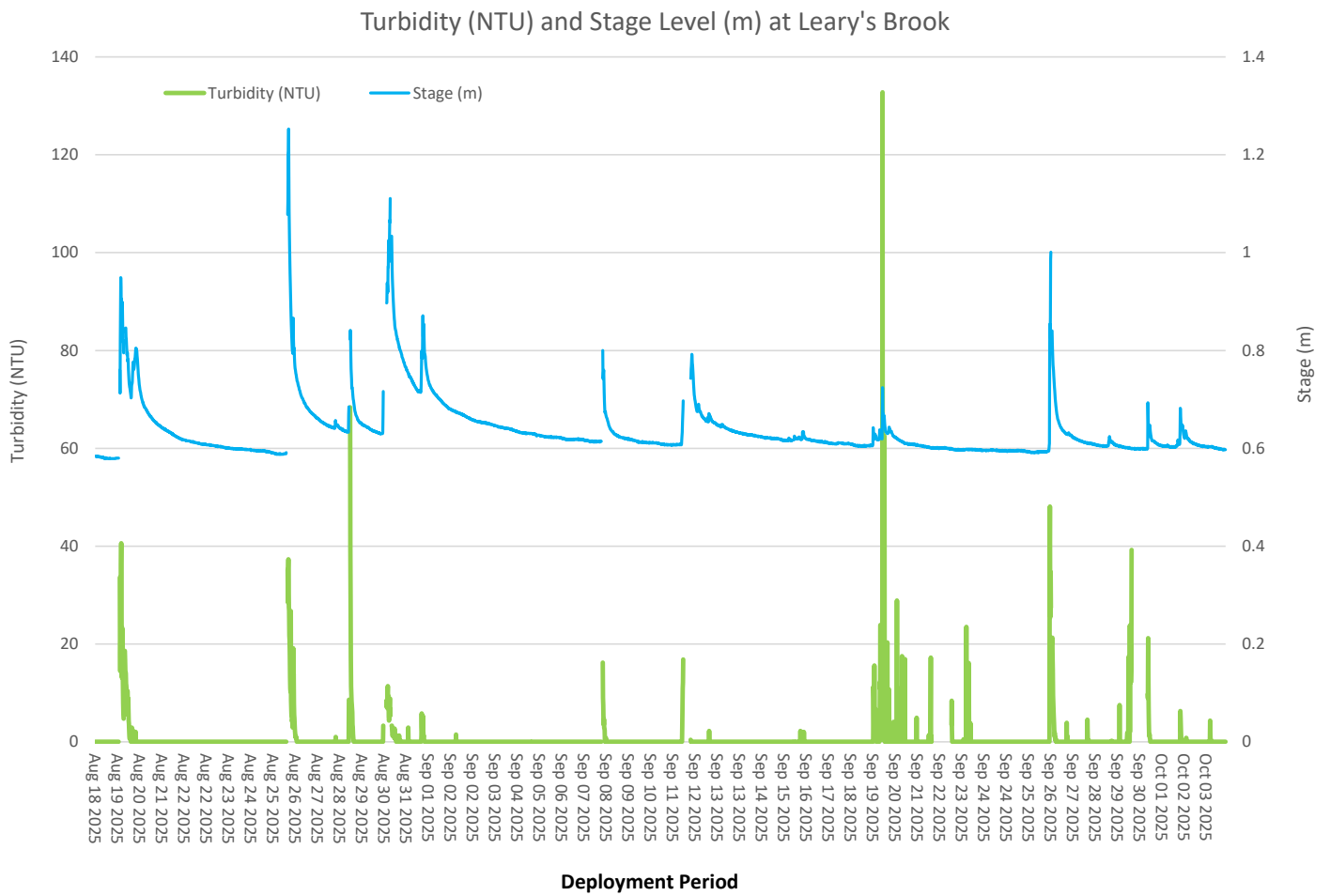
Dissolved Oxygen (mg/L & %Sat) and Water Temperature recorded at Leary's Brook



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

### Turbidity

- The turbidity readings during this deployment ranged between 0.0 NTU to 132.8 NTU (Figure 6).
- Turbidity data responded to stage increases with spikes in data.
- The turbidity sensor on this instrument records values between 0 NTU and 3000 NTU. A turbidity reading of 3000 NTU is identified as a blocked sensor and an error. It is not a true value. Readings of 3000 NTU will not be included in any statistical analysis.
- The brook is heavily influenced by its surrounding urban environment. During precipitation events, rainfall and runoff can increase the volume of water in the brook quickly (Figure 6). Turbidity can fluctuate rapidly with heavy flows often burying the instrument for a period of time.



**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.
- Precipitation in the form of snow does not have the same immediate effect as rain on stage or streamflow.

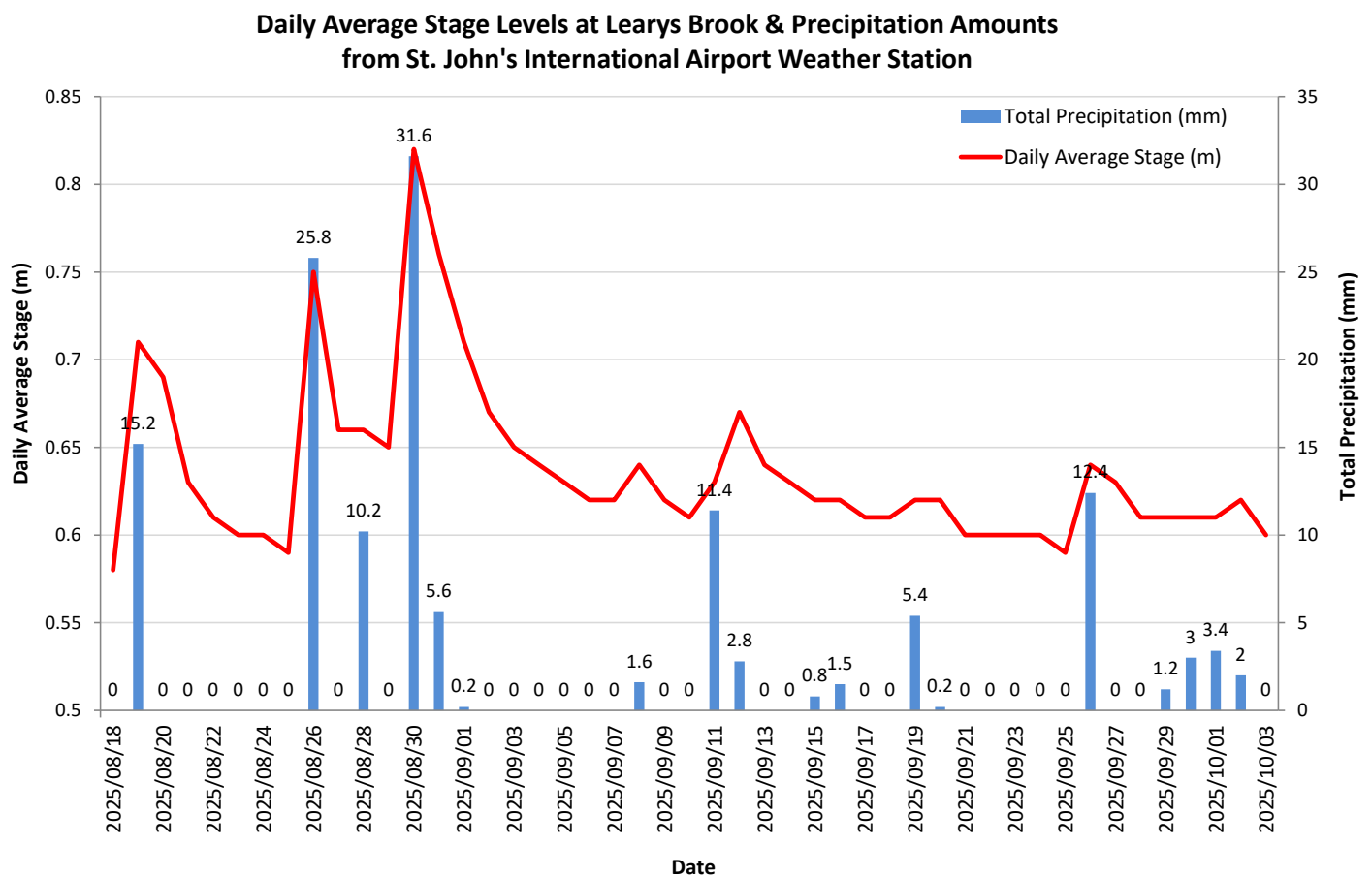


Figure 7: Daily average stage values (m) from Leary's Brook and daily total precipitation values (mm) from St. John's International Airport.

## 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 14.3°C.

The median pH value for Leary's Brook Station was 6.9 pH. This median is lower than the previous deployment, which was 8.12 pH units, however the pH level usually decreases at this station during rainfall events and increases during dry periods.

Conductivity had a median value of 1027  $\mu\text{S}/\text{cm}$ . At this time of year, there is less precipitation which in turn reduces the fluctuation of minerals and sediment into the brook through runoff.

Dissolved Oxygen at Leary's Brook had a median of 95.9 %Sat and 9.7 mg/L during the deployment period. As the air temperature decreases with the change in seasons, so will the water temperature. Cooler water temperatures will increase the dissolved oxygen levels in the water column. This is an expected response.

Turbidity at Leary's brook had a median of 0.0 NTU. This was a result of the lower precipitation across the deployment with less runoff and debris present in the brook during this time.