Real Time Water Quality Deployment Report
Learys Brook at Prince Philip Drive
NF02ZM0178

2025-03-11 to 2025-04-25

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

Learys Brook at Prince Philip Drive

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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 Philip Drive. This was WRMD's first real time water quality station, established in 2001. The real-time station allows for assessment and management of the water body. The purpose of this real-time station is to monitor, process, and publish hydrometric (water quantity) and real-time water quality data at the station.

The watershed is outlined in the figure to the left in light blue. The headwaters for Learys Brook are Hummocky Marsh and Yellow Marsh. Waters from these two marshes converge near the Avalon Mall and the river is then culverted underneath the mall parking lot. Oxen Pond which is located in Pippy Park also drains into the brook before it is culverted. The brook flows northeast from the mall parking lot through a developed section of St. John's and drains into Long Pond.

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. Water Survey Canada operates the hydrometric component of this station. Due to differences in protocols, Water Survey Canada hydrometric data is quality controlled on a less frequent basis than water quality data. The hydrometric data shown in this report is provisional and has not undergone quality control checks. Corrected hydrometric data can be obtained at https://wateroffice.ec.gc.ca/ or upon request to Water Survey Canada.

Parameter	Excellent	Good	Fair	Marginal	Poor
pH	≤ ± 0.2 units	≤ ± 0.21 - 0.5 units	≤ ± 0.51 - 0.8 units	≤ ± 0.81 - 1 units	> ± 1 units
Water Temperature	≤ ± 0.2°C	≤ ± 0.21 - 0.5°C	≤ ± 0.51 - 0.8°C	≤ ± 0.81 - 1°C	> ± 1°C
Dissolved oxygen	≤ ± 0.3 mg/L	≤ ± 0.31 -0.5 mg/L	≤ ± 0.51 - 0.8 mg/L	≤ ± 0.81 - 1 mg/L	> ± 1 mg/L
Turbidity	≤ ± 2 turbidity units or ≤ ± 5%, whichever is greater	≤ ± 2.1-5 turbidity units or ≤ ± 5.1-10 %, whichever is greater	≤ ± 5.1-8 turbidity units or ≤ ± 10.1-15 %, whichever is greater	≤ ± 8.1-10 turbidity units or ≤ ± 15.1-20 %, whichever is greater	> ± 10 turbidity units or > ± 20 %, whichever is greater
Specific Conductance	≤ ± 3 µS/cm or ≤ ± 3%, whichever is greater	≤ ± 3.1-10 µS/cm or ≤ ± 3.1-10%, whichever is greater	≤ ± 10 - 15 µS/cm or ≤ ± 10.1-15 %, whichever is greater	≤ ± 15.1 - 20 µS/cm or ≤ ± 15.1-20 %, whichever is greater	> ± 20 µS/cm or > ± 20 %, whichever is greater

At both 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 parameters recorded by the Field Sonde and the QA/QC Sonde, a qualitative statement is made regarding data quality.

Several factors can contribute to QA/QC rankings below “excellent,” including the relative placement of the QA/QC Sonde to the Field Sonde, the stabilization time allowed before recording measurements, and potential deterioration of sensor performance.

Of all sensors, temperature is the most critical. Other parameters fall into three groups: temperature-dependent, temperature-compensated, and temperature-independent. Because of the temperature sensor’s location on the sonde, the entire instrument must equilibrate before the sensor stabilizes. During this period, readings may gradually adjust; if recorded prematurely, they may not accurately represent in-situ conditions.

QAQC Rankings

Parameter	Deployment Ranks	Removal Ranks	Grab Sample Ranks
Dissolved Oxygen (mg/l)	Excellent	Excellent	
pH	Good	Good	Good
Specific Conductivity (µS/cm)	Excellent	Good	Excellent
Temperature ('C)	Excellent	Excellent	
Turbidity (NTU)	Excellent	Excellent	Excellent

At deployment and removal, all parameters ranked as good or excellent, indicating minimal discrepancies between the field sonde and the QA/QC sonde. Grab sample comparisons ranked as good or excellent at deployment.

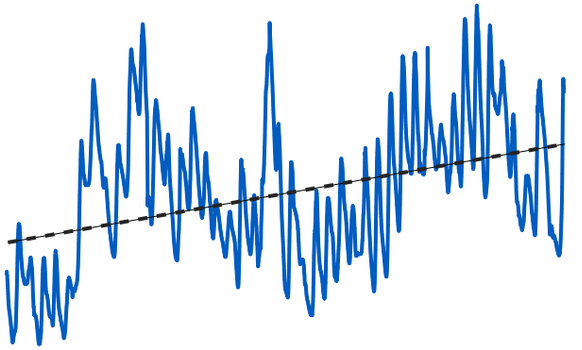
Water Temperature

4.67	4.67	0.86	9.45
Average (°C)	Median (°C)	Minimum (°C)	Maximum (°C)

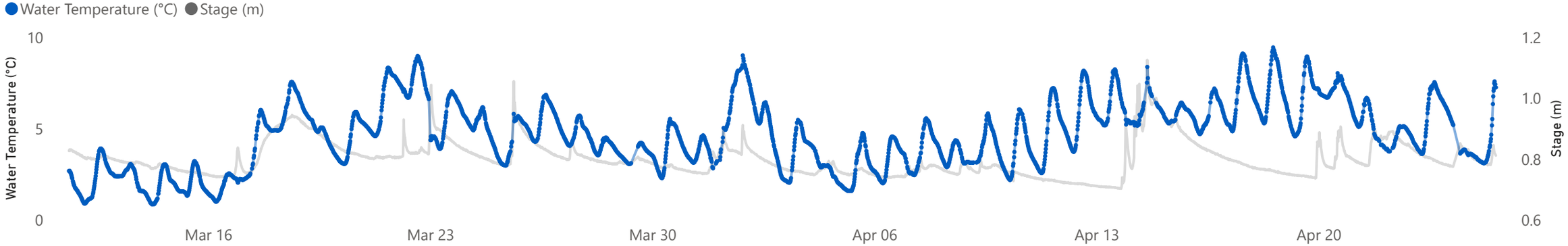
Water temperature is an important parameter for wildlife. Many organisms cannot regulate their own temperatures, and rely on surrounding air and water temperatures. Water temperature may be affected by inputs from industry or by modifying natural conditions like clearing trees and other vegetation, which eliminates the canopy protection they offer. Water temperature also affects other parameters monitored including dissolved oxygen and specific conductivity.

Water temperature data for this deployment was collected from 2025-03-11 until 2025-04-25. The minimum water temperature, 0.86°C, occurred on 2025-03-14. The maximum water temperature, 9.45°C, occurred on 2025-04-18. Water temperature usually falls overnight and rises during the day. Leary's Brook is a shallow, urban waterway; water temperatures in shallow streams respond quickly to changes in air temperature. Water temperature showed an upward trend over the deployment period, reflecting rising air temperatures as the season shifted from winter to spring.

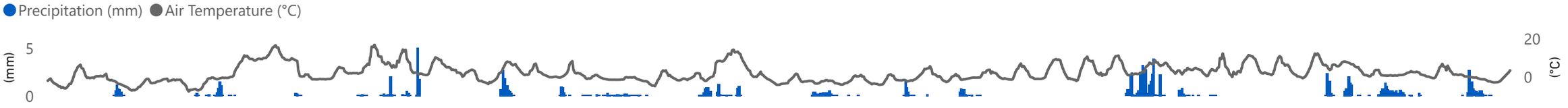
Water Temperature Trendline



Water Temperaure and Stage at Leary's Brook at Prince Philip Drive



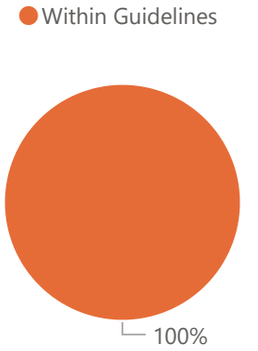
Precipitation and Air Temperature at Pippy Park in St. John's



pH

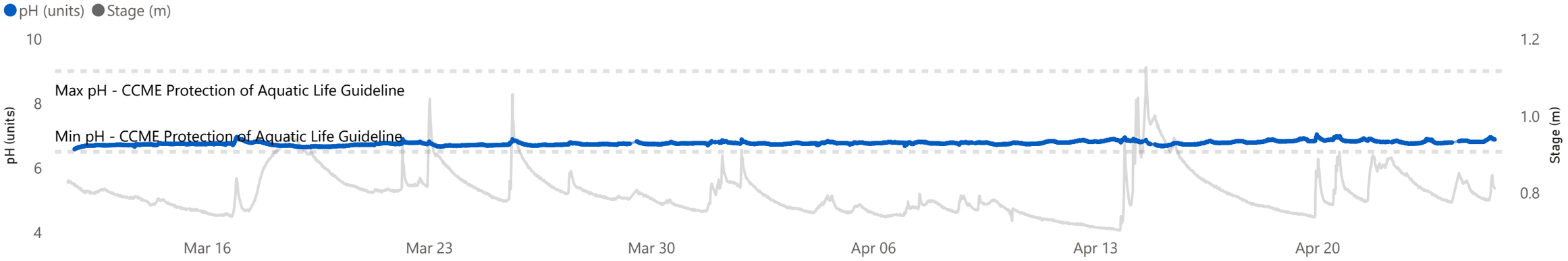
6.77	6.76	6.58	7.04
Average pH	Median pH	Minimum pH	Maximum pH

pH relates to the free hydrogen ions in water and it is a measure of acidity in water. A pH of 7 indicates a neutral pH, below 7 is considered acidic, and above 7 is considered basic. The Canadian Council of Ministers of the Environment (CCME) Freshwater Aquatic Life guideline provides a basis by which to judge the overall health of the brook. Their freshwater guidelines recommend a minimum pH of 6.5 and a maximum pH of 9.0; however, many rivers in Newfoundland and Labrador are naturally more acidic due to the local geology. Water parameter maps can be found on the Water Resources Management website.

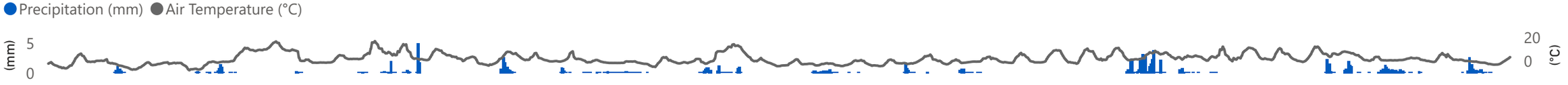


pH data for this deployment was collected from 2025-03-11 until 2025-04-25. The minimum pH, 6.58 pH units, occurred on 2025-03-11, shortly after deployment while the instrument was still stabilizing with the water. The maximum pH, 7.04 pH units, occurred on 2025-04-19. Minor daily fluctuations in pH were observed, which are typical and influenced by temperature shifts and the photosynthetic activity of aquatic plants. During the deployment, 100% of pH values fell within the CCME guideline range of 6.5-9.0 pH units. Overall, pH remained stable and consistent, with minor dips and spikes coinciding with stage increases and precipitation events. Rainfall can temporarily lower pH, as it is naturally more acidic; however, values generally return to background levels within a few days.

pH and Stage at Learys Brook at Prince Philip Drive



Precipitation and Air Temperature at Pippy Park in St. John's



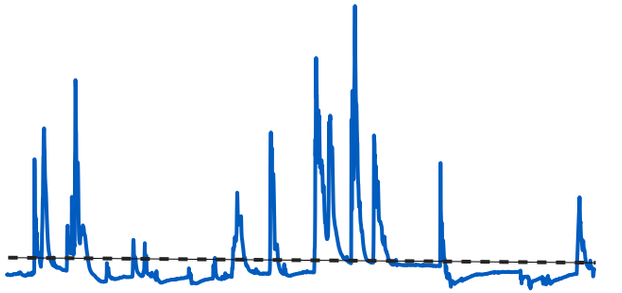
Specific Conductivity

1.35K	1059	661	7668
Average µS/cm	Median µS/cm	Minumum µS/cm	Maximum µS/cm

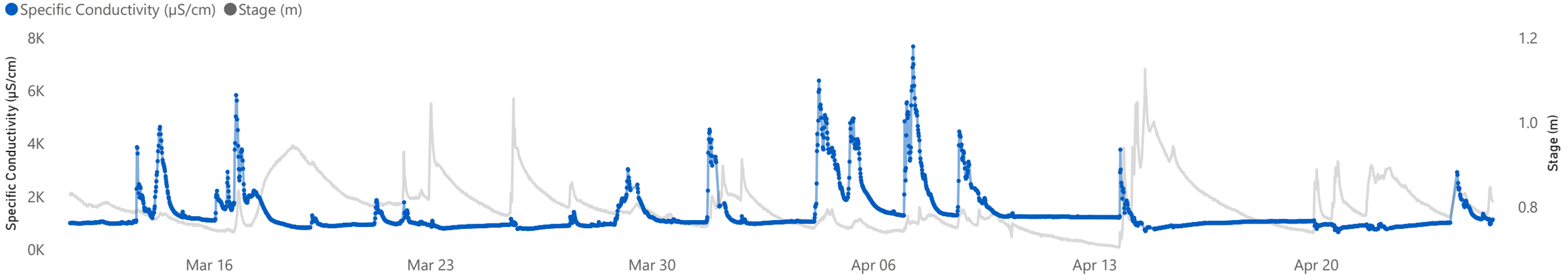
Conductivity relates to the ability of an electric charge to pass through a solution. Pure water has low conductance and water with dissolved ions has higher conductance. Specific conductance is corrected to 25°C to allow comparison across temperatures. Water parameter maps can be found on the Water Resources Management website.

Specific conductance data for this deployment was collected from 2025-03-11 until 2025-04-25. The minimum specific conductance, 661 µS/cm, occurred on 2025-04-20 during a precipitation event. The maximum specific conductance, 7668 µS/cm, occurred on 2025-04-07 Precipitation and specific conductivity are often linked. Since rainwater typically has lower conductivity than surface water, it dilutes the water column and causes temporary decreases in conductivity. The conductivity spikes observed in the early to mid-stages of this deployment are likely due to road salt application during late winter and early spring snow and freeze events. Although fluctuations occurred, the overall data trend remained relatively stable.

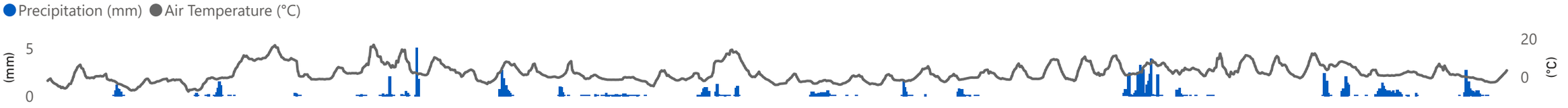
Specific Conductivity Trendline



Specific Conductivity and Stage at Learys Brook at Prince Philip



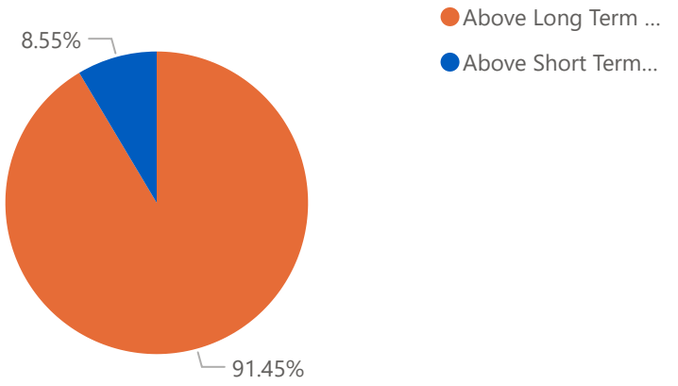
Precipitation and Air Temperature at Pippy Park in St. John's



Chloride Concentration

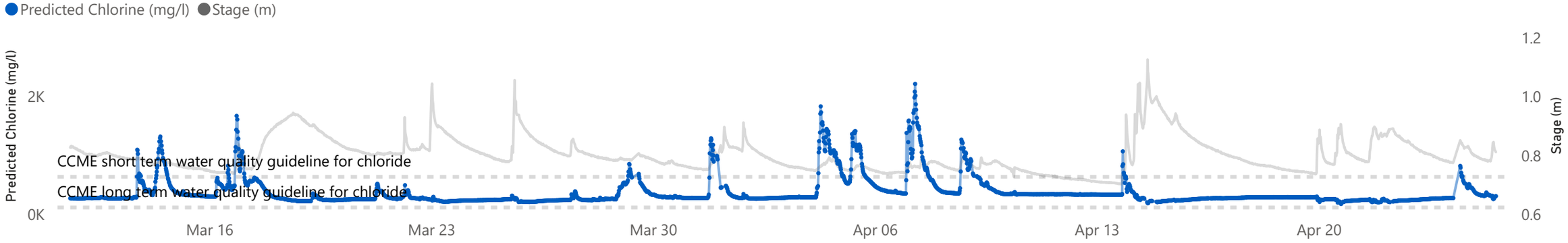
374.04	291.61	179.93	2.22K
Average mg/L	Median mg/L	Minimum mg/L	Maximum mg/L

Chloride ions are calculated from specific conductivity values, leading to similar trends in data. Chloride is naturally found in waterways due to local geology, sea spray, and other processes. Human activities including roadway de-icing can also lead to increased concentrations of chloride. High concentrations of chloride can be toxic to aquatic life, and harm vegetation. CCME has established freshwater quality guidelines for the protection of Aquatic Life. The CCME short term water quality guideline for chloride is 640mg/L and the CCME long term water quality guideline for chloride is 120mg/L.

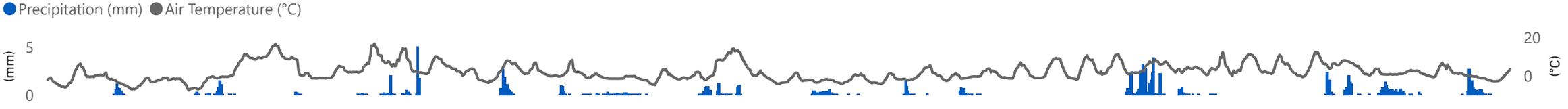


Data used to calculate chloride concentration for this deployment was collected from 2025-03-11 until 2025-04-25. The minimum predicted chloride concentration, 179.93 mg/L, occurred on 2025-04-20. The maximum predicted chloride concentration, 2,215.99 mg/L, occurred on 2025-04-07. The median concentration during this deployment was 291.61 mg/L, slightly lower than the previous deployment's median of 345.03 mg/L, likely due to reduced road salt usage. Chloride concentrations exceeded the short-term guideline for 8.55% of the deployment period and the long-term guideline for 91.45% of the period. Similar to conductivity, chloride levels are influenced by road salt application during the colder months. The spikes in the early to mid stages of this deployment are likely due to road salt application during late winter and early spring snow and freeze events.

Predicted Chloride Concentration and Stage at Learys Brook at Prince Philip



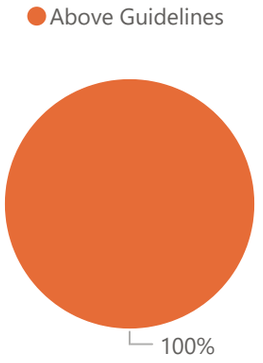
Precipitation and Air Temperature at Pippy Park in St. John's



Dissolved Oxygen

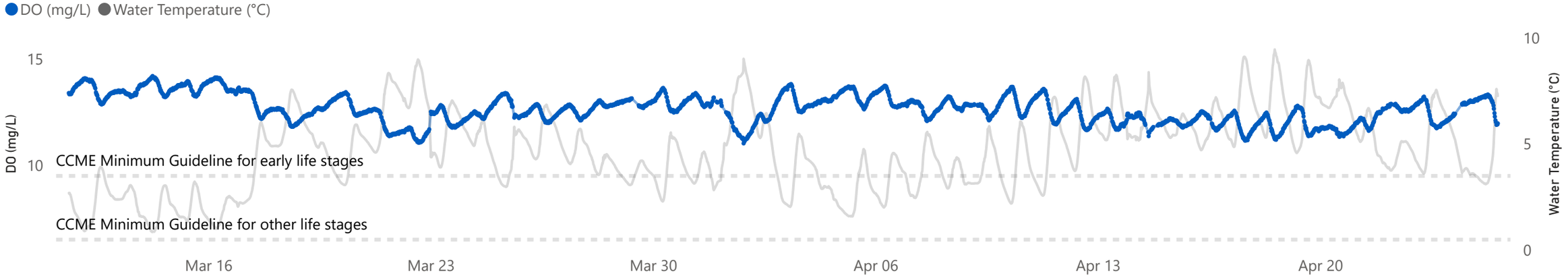
12.64	12.64	11.03	14.20
Average (mg/L)	Median (mg/L)	Minimum (mg/L)	Maximum (mg/L)

Dissolved oxygen (DO) in water is crucial for aquatic life. The CCME (Canadian Council of Ministers of the Environment) Freshwater Aquatic Life guidelines provide a basis by which to judge the overall health of waterways. The minimum guideline for early life stages in cold water is 9.5 mg/L and the minimum guideline for other life stages is 6.5 mg/L. DO and water temperatures are correlated; colder waters can hold higher concentrations of DO than warm waters.

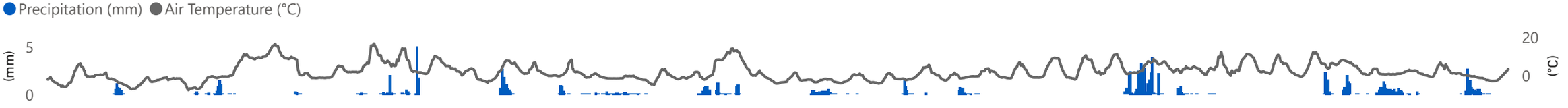


DO data for this deployment was collected from 2025-03-11 until 2025-04-25. The minimum DO reading, 11.03 mg/L, occurred on 2025-04-01. The maximum DO reading, 14.20 mg/L, occurred on 2025-03-14. Daily fluctuations are common due to changes in temperature and respiration of aquatic plants. Throughout this deployment period, DO remained above the CCME minimum guideline for the protection of early life stages and other life stages. This would be expected throughout colder months when water temperature is lower and capable of holding more oxygen. A slight decreasing trend in dissolved oxygen (DO) levels was observed over the deployment period, coinciding with rising water and atmospheric temperatures.

Dissolved Oxygen and Water Temperature at Learys Brook at Prince Philip Drive



Precipitation and Air Temperature at Pippy Park in St. John's



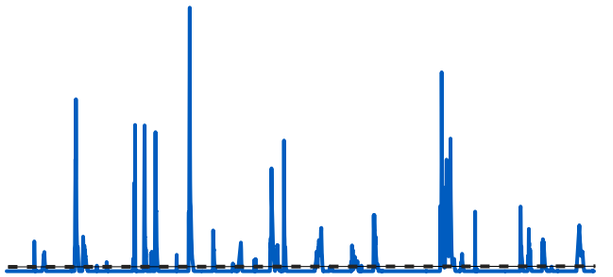
Turbidity

2.90	0.00	0.00	204.30
Average (NTU)	Median (NTU)	Minimum (NTU)	Maximum (NTU)

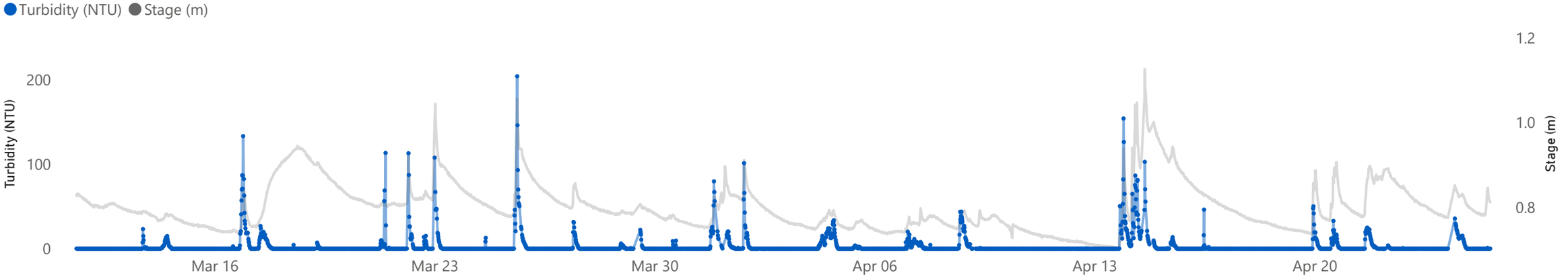
Increases in turbidity (cloudiness) are often caused by increased runoff during precipitation events. Runoff carries silt and other debris into the waterbody. Turbid conditions can prevent light from reaching plants, negatively impact benthic habitats, and clog or damage fish gills and equipment.

Turbidity data for this deployment was collected from 2025-03-11 until 2025-04-25. The minimum turbidity was 0.00 NTUs. The maximum turbidity, 204.30 NTUs, coincides with a precipitation event that occurred on 2025-03-25. Short-term spikes coincided with stage increases following precipitation events, as runoff transported silt and debris into the waterway, temporarily elevating turbidity levels. In each case, turbidity returned to background conditions within several days of the event. Although turbidity varied throughout the deployment, the overall data trend remained relatively stable.

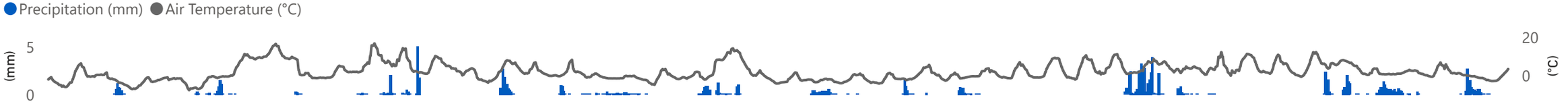
Turbidity Trendline



Turbidity and Stage at Learys Brook at Prince Philip Drive



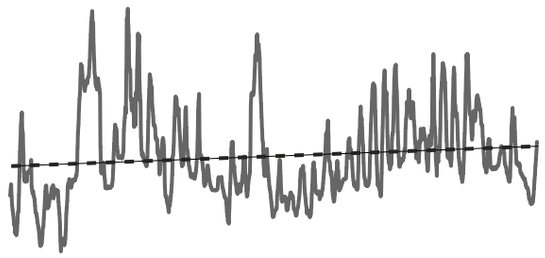
Precipitation and Air Temperature at Pippy Park in St. John's



Meteorological and Hydrometric Data

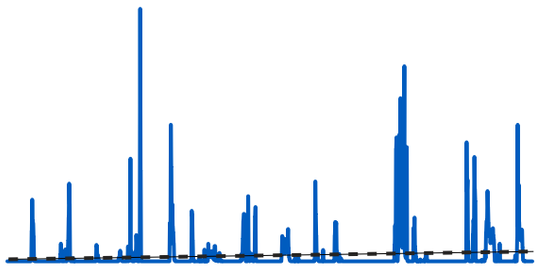
Newfoundland Labrador

Air Temperature Trendline



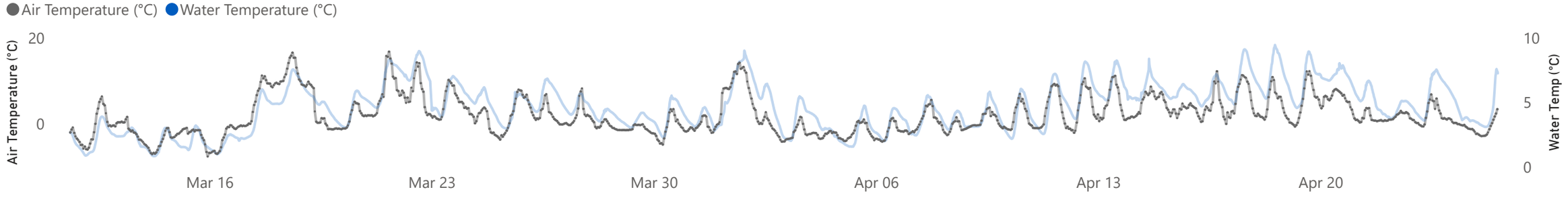
2.03	1.10
Average (°C)	Median (°C)
-7.50	16.79
Minimum (°C)	Maximum (°C)

Precipitation Trendline



0.12	0.00
Average (mm/hr)	Median (mm/hr)
0.00	5.05
Minimum (mm/hr)	Maximum (mm/hr)

Water Temperature from Learys Brook at Prince Philip Drive and Air Temperature from Pippy Park in St. John's



Precipitation from Pippy Park In St. John's and Stage from Learys Brook at Prince Philip Drive