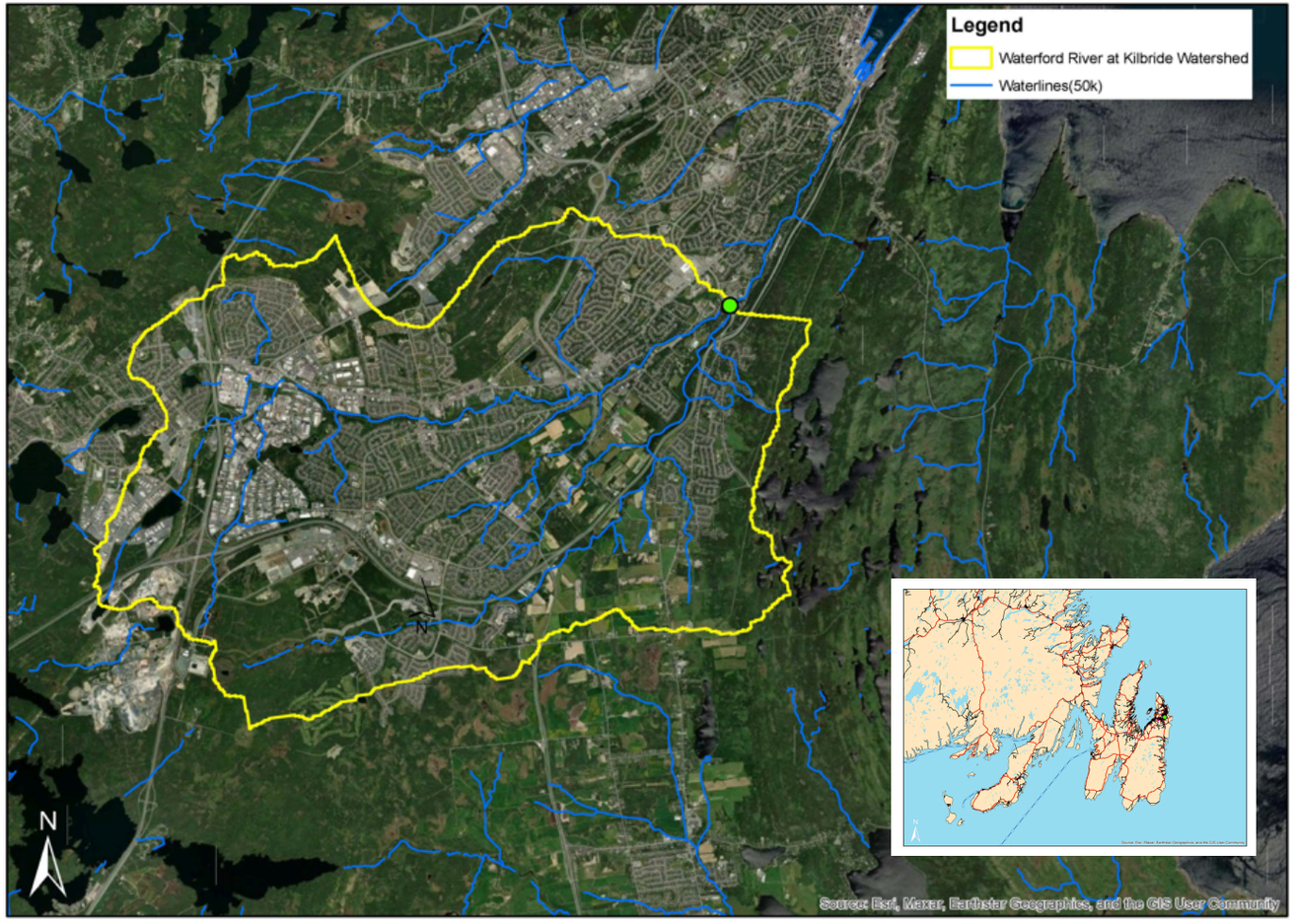
Real Time Water Quality Deployment Report
Waterford River at Kilbride
NF02ZM0009

2025-07-08 to 2025-07-31

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

Waterford River at Kilbride NF02ZM009



Waterford River at Kilbride NF02ZM0009

The Water Resources Management Division (WRMD), in partnership with Water Survey of Canada - Environment and Climate Change Canada (WSC-ECCC), maintain a real-time water quality and water quantity monitoring station on Waterford River at Kilbride.

The purpose of the real-time water quality station is to monitor, process and publish real-time water quality data.

On 2025-07-08, a clean and calibrated real-time water quality monitoring instrument was deployed at the station Waterford River at Kilbride. The instrument was deployed for a period of 24 days and was removed on 07/31/2025 . The instrument was removed for the purpose of adding additional sensors.

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
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
pH	≤ ± 0.2 units	≤ ± 0.21 - 0.5 units	≤ ± 0.51 - 0.8 units	≤ ± 0.81 - 1 units	> ± 1 units
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
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
Water Temperature	≤ ± 0.2°C	≤ ± 0.21 - 0.5°C	≤ ± 0.51 - 0.8°C	≤ ± 0.81 - 1°C	> ± 1°C

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 parameters recorded by the Field Sonde and QA/QC Sonde at deployment and at removal, a qualitative statement is made on the data quality.

There are a few circumstances which may cause QA/QC rankings below excellent, including the placement of the QA/QC sonde in relation to the field sonde, the amount of time each sonde was given to stabilize before readings were recorded, and deteriorating performance of one of the sensors.

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.

QAQC Rankings

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

At deployment and removal, when compared to the QA/QC sonde, all parameters ranked either 'good' or 'excellent', with exception to temperature and turbidity, which ranked 'fair' and 'poor' respectively. This is likely the result of inadequate time for the instrument to acclimate to current conditions or placement of the QAQC instrument within the waterbody with respect to the field sonde. The turbidity rank of 'poor' is due to the accumulation of sediment and organic matter within the sonde casing.

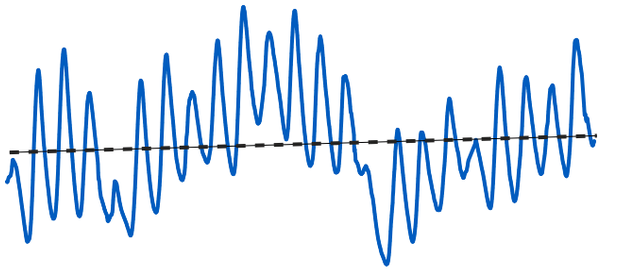
Water Temperature

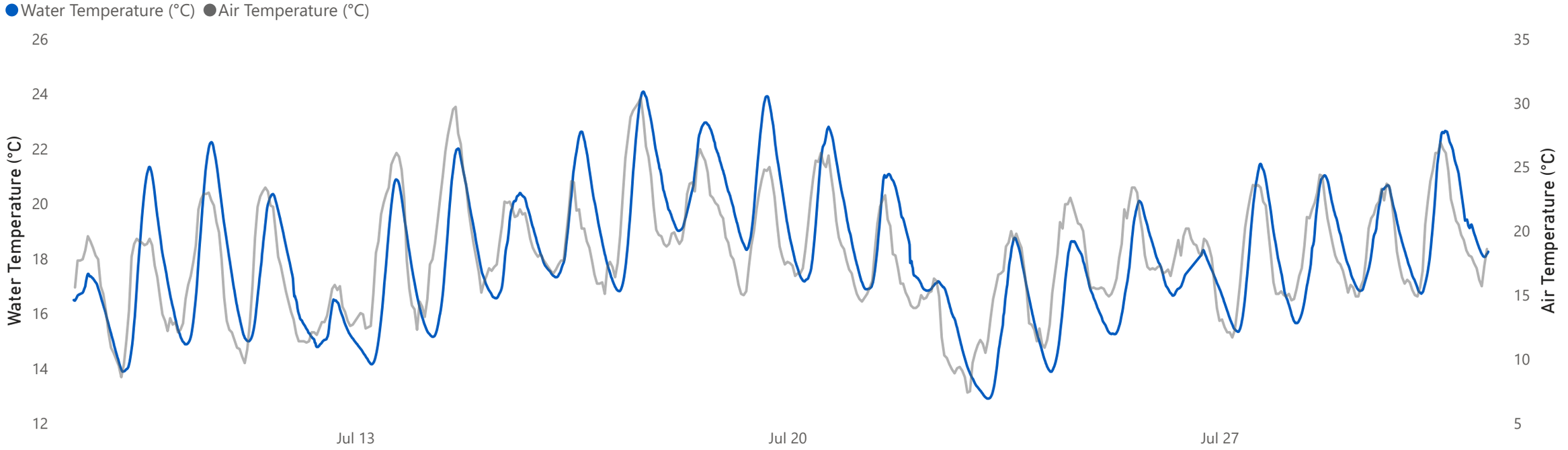
18.12	17.86	12.90	24.08
Average (°C)	Median (°C)	Minimum (°C)	Maximum (°C)

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 2025-07-08 until 2025-07-31. The minimum water temperature, 12.90°C, occurred on 2025-07-23. The maximum water temperature, 24.08°C, occurred on 2025-07-17. The average water temperature was 18.12 °C. Water temperature usually falls overnight and rises during the day, known as diurnal variation. Water temperature was relatively stable within the deployment period with a slight increase as the summer season progressed.

Water Temperature Trendline





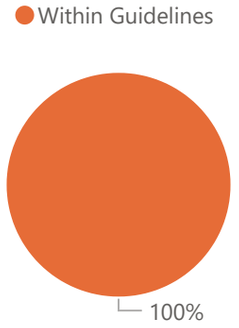
pH

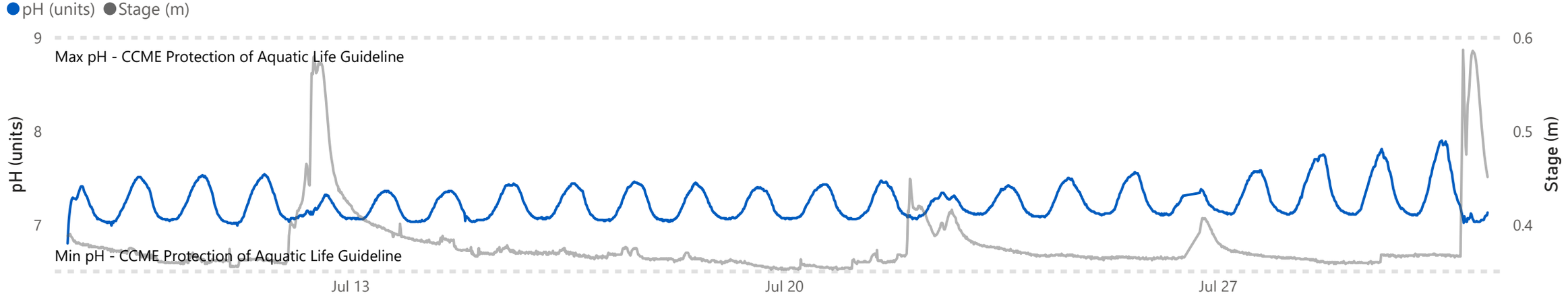
7.24	7.19	6.80	7.90
Average pH	Median pH	Minimum pH	Maximum pH

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 2025-07-08 until 2025-07-31. The minimum pH, 6.80 pH units, occurred on 2025-07-08 . The maximum pH, 7.90 pH units, occurred on 2025-07-30. Daily fluctuations are common due to changes in temperature and photosynthesizing of aquatic plants. pH was stable throughout this deployment period. A sudden decrease and stabilization in pH was observed on 2025-7-12 and on 2025-07-30 due to a significant precipitation events. All values during the deployment are within the CCME guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units).

CCME Freshwater Aquatic Life Guideline





Climate data from St. John's West Climate Station

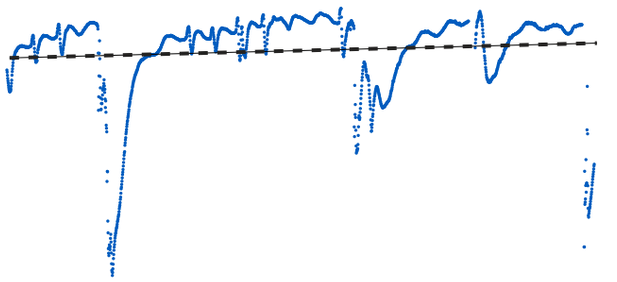
Specific Conductivity

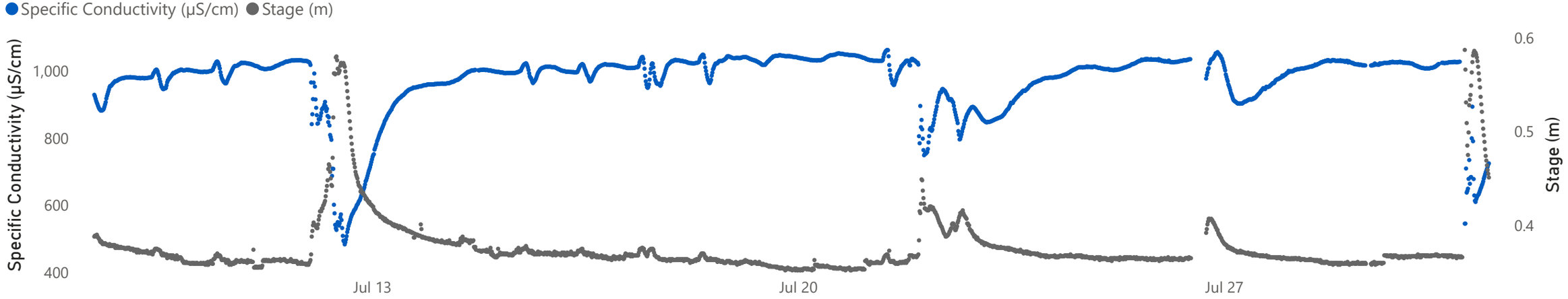
971.90	1.01K	483.80	1.06K
Average µS/cm	Median µS/cm	Minumum µS/cm	Maximum µS/cm

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 2025-07-08 until 2025-07-31. The minimum specific conductance, 483.80 µS/cm, occurred on 2025-07-12 . The maximum specific conductance, 1,063.60 µS/cm, occurred on 2025-07-21. Precipitation and specific conductivity are correlated. During a precipitation event, the amount of water in the river increases, this dilutes the solids that are present, decreasing the conductivity. The specific conductivity trend increased minimally over the deployment period. Sudden decreases and spikes were observed due to precipitation events and runoff containing high concentrations of dissolved salts, minerals and other conductive substances. This is expected as Waterford River is an urban river and highly influenced by the surrounding environment.

Specific Conductivity Trendline





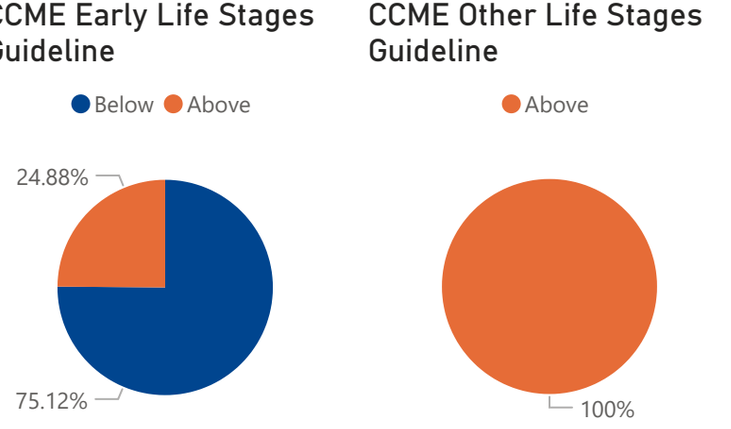
Climate data from St. John's West Climate Station

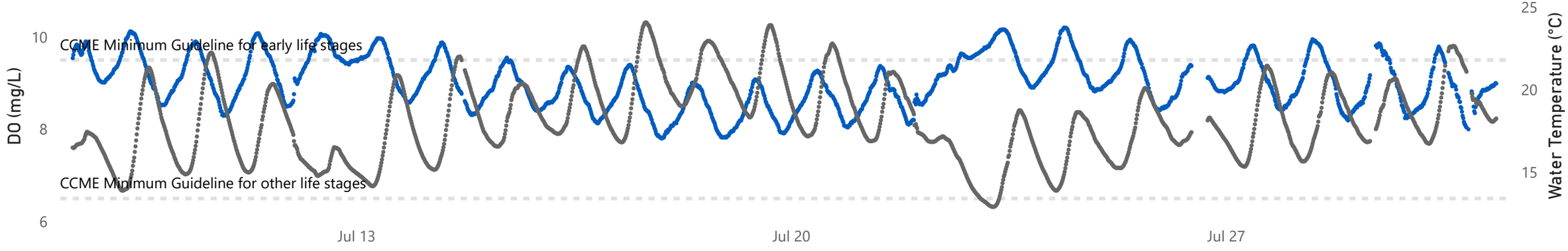
Dissolved Oxygen Concentration and Saturation

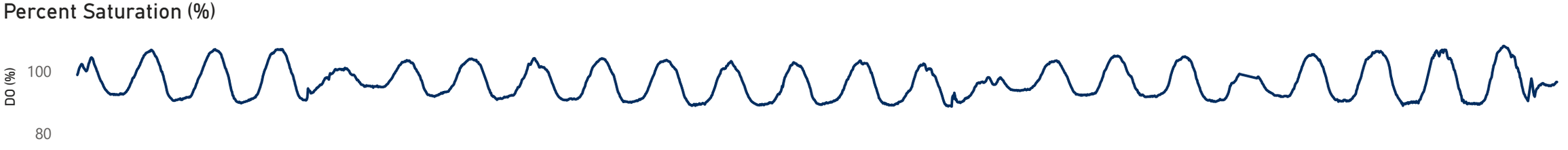
9.02	9.00	7.80	10.20
Average (mg/L)	Median (mg/L)	Minimum (mg/L)	Maximum (mg/L)

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 2025-07-08 until 2025-07-31. The minimum DO reading, 7.80 mg/L, occurred on 2025-07-17. The maximum DO reading, 10.20 mg/L, occurred on 2025-07-24. Dissolved oxygen content fluctuates diurnally and displays an inverse relationship to water temperature. Dissolved oxygen was relatively stable throughout the deployment period. As water temperature fluctuated, DO fluctuated in correlation. Dissolved oxygen concentrations stayed above the Guidelines for the Protection of Other Life Stages Guideline for the entirety of the monitoring period and was above the Guidelines for the Protection of Early Life Stages 24.88% and below the guideline 75.12% of the monitoring period.







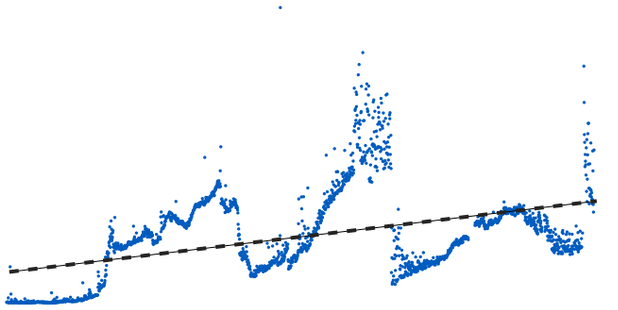
Turbidity

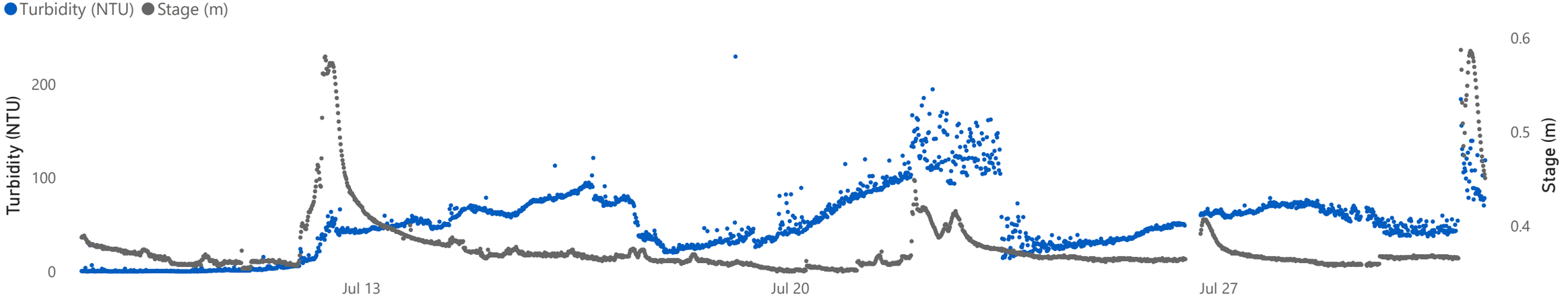
51.16	48.49	0.00	229.85
Average (NTU)	Median (NTU)	Minimum (NTU)	Maximum (NTU)

Water turbidity is characterized by the cloudiness or haziness caused by suspended particles and can significantly impact water quality. High turbidity reduces light penetration, hindering photosynthesis and affecting aquatic vegetation growth and habitat suitability. It can lead to temperature fluctuations, oxygen depletion from microbial decomposition of organic matter, and sedimentation, smothering benthic habitats and compromising biodiversity.

Turbidity data for this deployment was collected from 2025-07-08 until 2025-07-31. The minimum turbidity was 0.00 NTUs. The maximum turbidity, 229.85 NTUs, occurred on 7/19/2025 2:45:00 AM. Overall turbidity, with an average of 51.16 NTU, indicates that the accumulation of sediment and organic matter influenced statistical analysis resulting in values above historical baseline values. Turbidity spikes occurred infrequently, for short periods of time, and generally corresponded to precipitation events and subsequently an increase in stage.

Turbidity Trendline





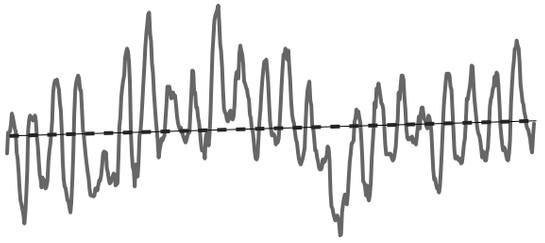
Climate data from St. John's West Climate Station

Meteorological and Hydrometric Data

*Climate data obtained from St. John's West Station

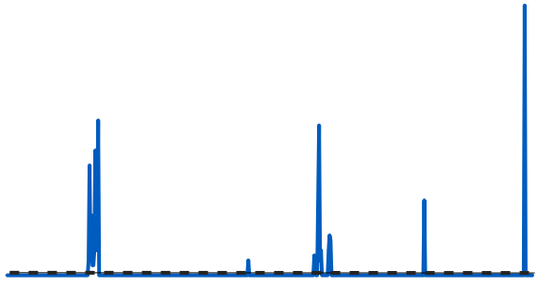
Newfoundland Labrador

Air Temperature Trendline

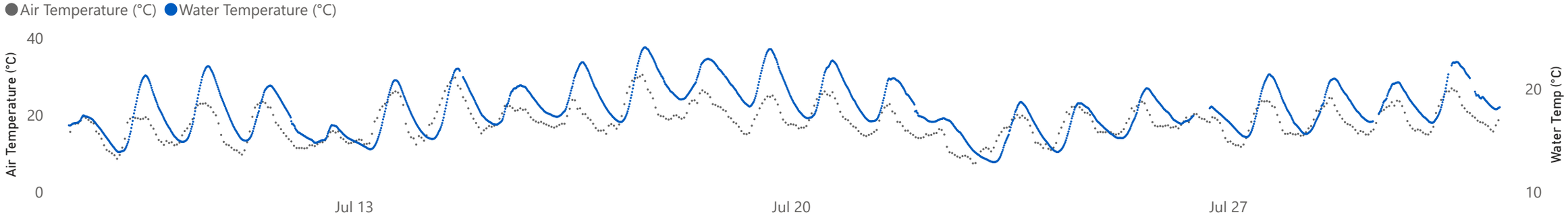


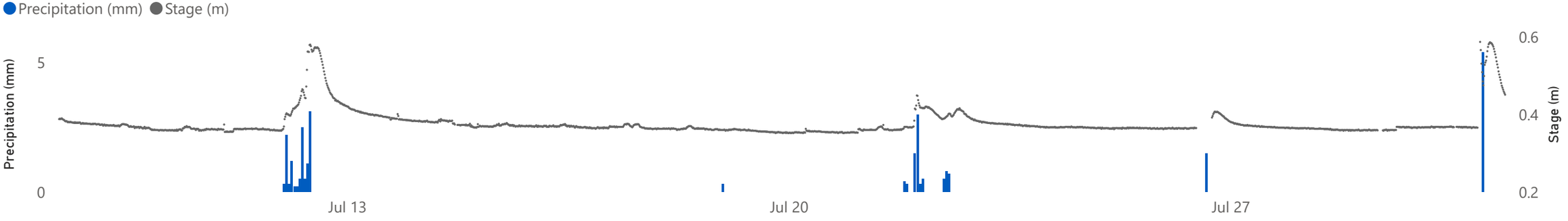
18.12	17.90
Average (°C)	Median (°C)
7.40	30.40
Minimum (°C)	Maximum (°C)

Precipitation Trendline



0.05	0.00
Average (mm/hr)	Median (mm/hr)
0.00	5.40
Minimum (mm/hr)	Maximum (mm/hr)





Conclusions

- A clean and calibrated instrument was deployed at the Waterford River at Kilbride water quality monitoring station on January 21, 2025 and removed on March 4, 2025.

- **Water Temperature** values ranged between **12.90 °C and 24.08 °C**, with an average of **18.12 °C**. Water temperature patterns reflected daily cycles and overall summer warming trends. **.**

- **pH** values remained stable, ranging from **6.80 to 7.90**, and were **100% within the CCME Guidelines for the Protection of Aquatic Life (6.5–9.0 units)** throughout the deployment period.

- **Specific Conductivity** ranged from **483.80 µS/cm to 1,063.60 µS/cm**, with an average of **971.90 µS/cm**. Conductivity fluctuations were influenced by precipitation events and runoff, typical of an urban river system. Short-term decreases were observed following rainfall, while gradual increases corresponded to reduced dilution and accumulation of dissolved ions.

- **Dissolved Oxygen (DO)** concentrations ranged from **7.80 mg/L to 10.20 mg/L**, averaging **9.02 mg/L**. DO was consistently above the **CCME Guideline for the Protection of Aquatic Life – Other Life Stages (6.5 mg/L)**. However, DO was only above the **Early Life Stages Guideline (9.5 mg/L)** for **24.88% of the deployment period**, indicating potential stress for sensitive early life stages during warmer conditions

- **Turbidity** values averaged **51.16 NTU**, ranging from **0.00 to 229.85 NTU**. Elevated turbidity events occurred sporadically, typically in response to precipitation and associated increases in stage. While average turbidity was higher than historic baseline values, spikes were short-lived and consistent with sediment inputs following rainfall.

- **QA/QC assessment** indicated that most parameters ranked as '**Good' to 'Excellent'** at both deployment and removal. Exceptions included temperature '**Fair**' and turbidity '**Poor**' at removal, likely due to insufficient acclimation or sediment accumulation in the sonde casing.

- With the exception of water quantity data (stage), all data used in the preparation of the graphs and subsequent discussion adhere to this stringent QA/QC protocol. **Water Survey of Canada** is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Appendix 1
Grab Sample Results