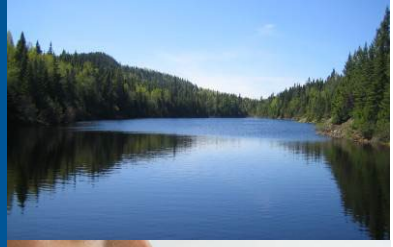
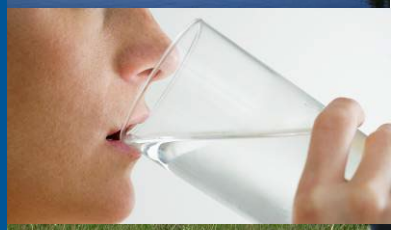



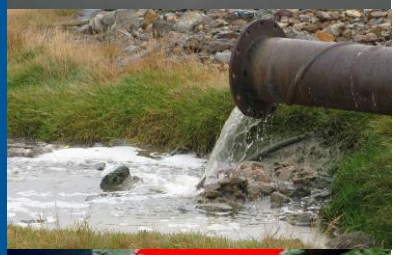


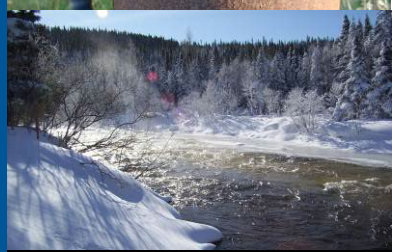

Real Time Water Quality Report

Humber River at Humber Village

Deployment Period
2024-10-08 to 2025-03-18

Newfoundland Labrador

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

General

The following report is a summary of water quality monitoring data collected in real-time at the Humber River at Humber Village Bridge station from October 8, 2024 to March 18, 2025.

Figure 1: Humber River at Humber Village Bridge Real Time Water Quality station location

This station operates year-round as part of the Provincial Real Time Water Quality (RTWQ) monitoring network. A multi-parameter sonde is deployed in the river and records parameters of interest including: temperature (°C); pH; dissolved oxygen (mg/L); specific conductivity (µS/cm); total dissolved solids (g/L) and turbidity (NTU). Staff at the Department of Environment and Climate Change (Water Resources Management Division-WRMD) monitor the data for potential environmental impacts. The sonde undergoes routine maintenance/calibration on a regular basis, after which the instrument is redeployed, generally within 24 hours.

Quality Assurance/Quality Control (QA/QC)

A routine QA/QC performance test is administered on the instrument at the beginning and end of each deployment period. The methodology of this protocol can be found in Appendix A.

The purpose is to determine the accuracy of the instrument's sensors by cross-examining its initial readings against a control sonde which is deployed at the same time to compare parameters. Depending on these readings, the sensors of each parameter receive a qualitative rank (Appendix A) based on whether readings fall within a specified threshold. This will further ensure the integrity of the data's accuracy, so that the monitoring station delivers reliable results.

With the exception of water quantity data (i.e. stage), all other data used in the preparation of graphs and subsequent discussion below adhere to the stringent QA/QC protocol. The stage data is raw data that is transmitted via satellite and published on WRMD's webpage. It has not been corrected for backwater effect. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Table 1: QA/QC water quality performance results for the beginning and end of deployment period.

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Humber River at Humber Village Bridge	October 8, 2024	Deployment	Good	Good	Poor	Excellent	Excellent
	March 18, 2025	Removal	Excellent	Fair	Marginal	Good	Good

All performance rankings at deployment were 'good' or 'excellent' with the exception of conductivity, which was 'poor'. Based on comparison to the grab sample conductivity value, the field ranked 'excellent', indicating a likely issue with the QAQC sonde.

At removal, rankings ranged from 'excellent' to 'marginal'. The marginal ranking was again likely related to the faulty conductivity sensor on the QAQC sonde.

Deployment Notes

This deployment took place over an extended period of 160 days (October 8, 2024 to March 18, 2025). The conductivity sensor on the QA/QC was later determined to be faulty.

Data Interpretation

The following interpretations for the Humber River stations will cover the following six parameters: Stage (m); (2) Temperature (°C); (3) pH; (4) Specific Conductivity (µS/cm); (5) Dissolved Oxygen (mg/L); (6) Turbidity (NTU).

Temperature

- Throughout the deployment period, water temperatures ranged between 0.12 °C and 14.22 °C, with an average temperature of 4.99 °C.
- Water temperatures gradually decreased throughout the deployment into winter before plateauing in mid-February. Water temperatures correspond with ambient air temperatures during these seasonal changes.
- Water temperature values display a natural diurnal pattern with temperatures increasing during the day and decreasing overnight. The magnitude of variation was influenced by daily air temperature fluctuations as well as precipitation events.

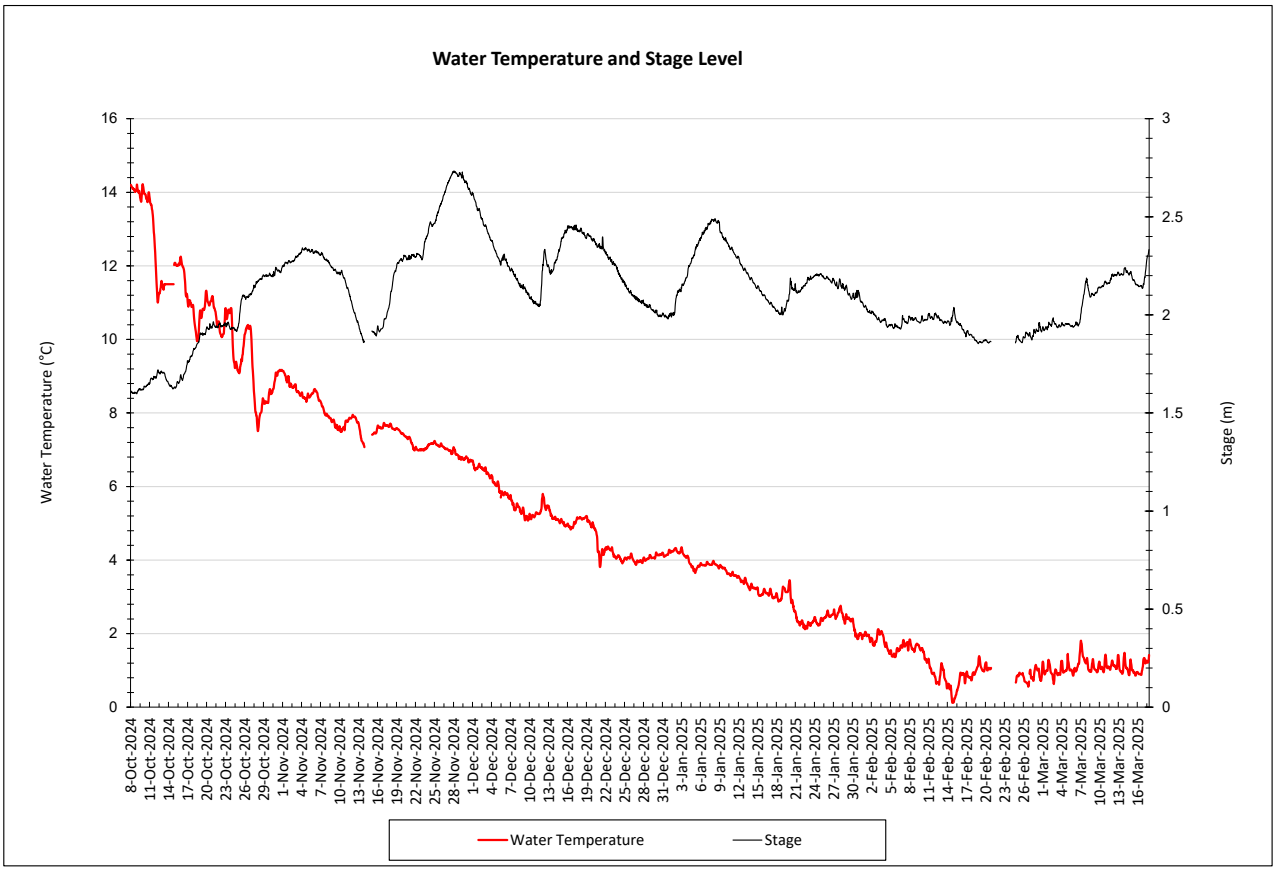

Figure 2: Water Temperature and Stage at Humber River at Humber Village Bridge

pH

- pH ranged between 6.83 and 7.25 during the deployment period, with an average of 7.11 pH units.
- The pH data was consistent mid-November onwards, but was variable for the first month of deployment. During that time, pH dropped slightly on numerous occasions before slowly rebounding to background levels. This is likely due to the addition of slightly acidic rain entering the watershed from precipitation events at this time (see Appendix).
- pH readings remained within the acceptable range for the protection of aquatic life as outlined by the Canadian Council of Ministers of the Environment (CCME) (2007) throughout the deployment.

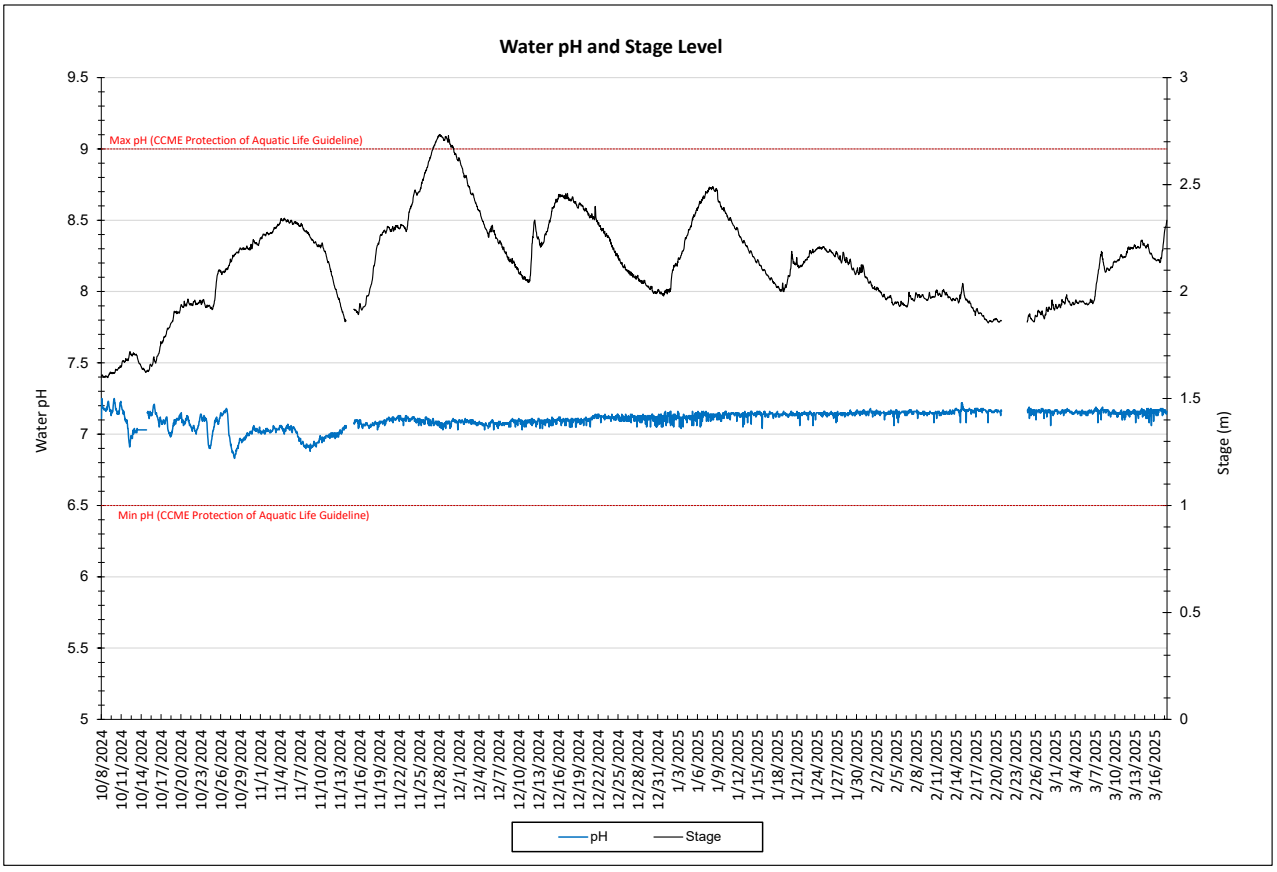

Figure 3: pH values recorded at Humber River at Humber Village Bridge

Specific Conductivity

- Throughout the deployment period, specific conductivity ranged between 40.6 µS/cm and 45.4 µS/cm, with an average of 42.3 µS/cm.
- With such a small range of values, specific conductivity was relatively stable during this deployment, but did show a slight increasing trend throughout, possibly influenced occasionally by increased road salt runoff during the winter season. The large volume of water in the river prevents large changes and ranges in specific conductivity values.

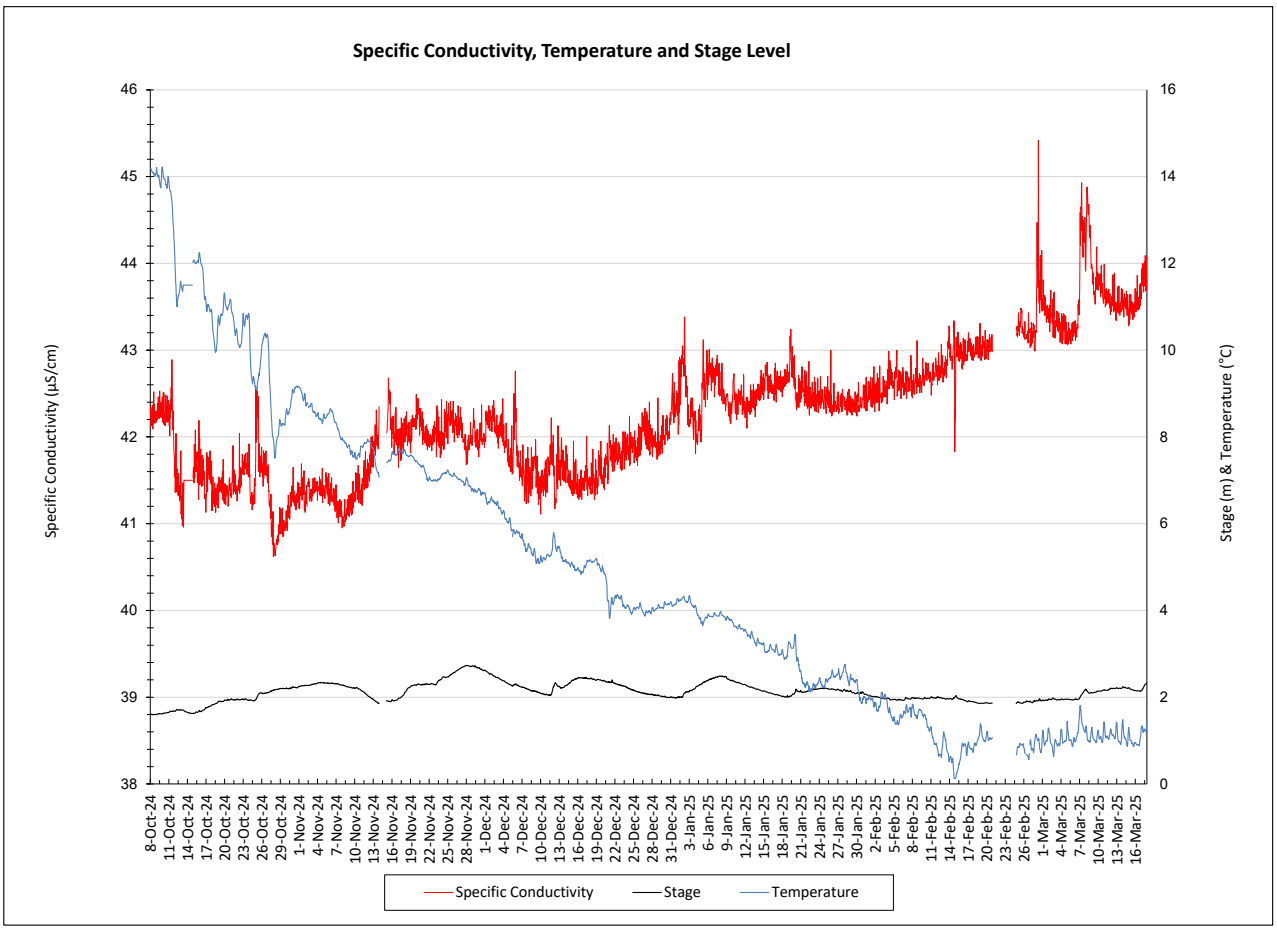

Figure 4: Specific Conductivity at Humber River at Humber Village Bridge

Dissolved Oxygen

- During the deployment period, dissolved oxygen concentrations ranged from 9.88 mg/L to 13.94 mg/L, with an average of 12.31 mg/L. Dissolved oxygen percent-saturation ranged from 92.1% to 98.7%, with an average of 95.8%.
- Dissolved oxygen is inversely related to water temperature: oxygen levels increase in lower water temperatures and decrease in higher water temperatures.
- Dissolved oxygen increased throughout the deployment before plateauing in mid-February. This is in-line with seasonal water temperatures decreases into the winter season.
- The concentrations remained above the threshold of the CCME guideline for the protection of other life stages and early life stages throughout the deployment (CCME, 2007).

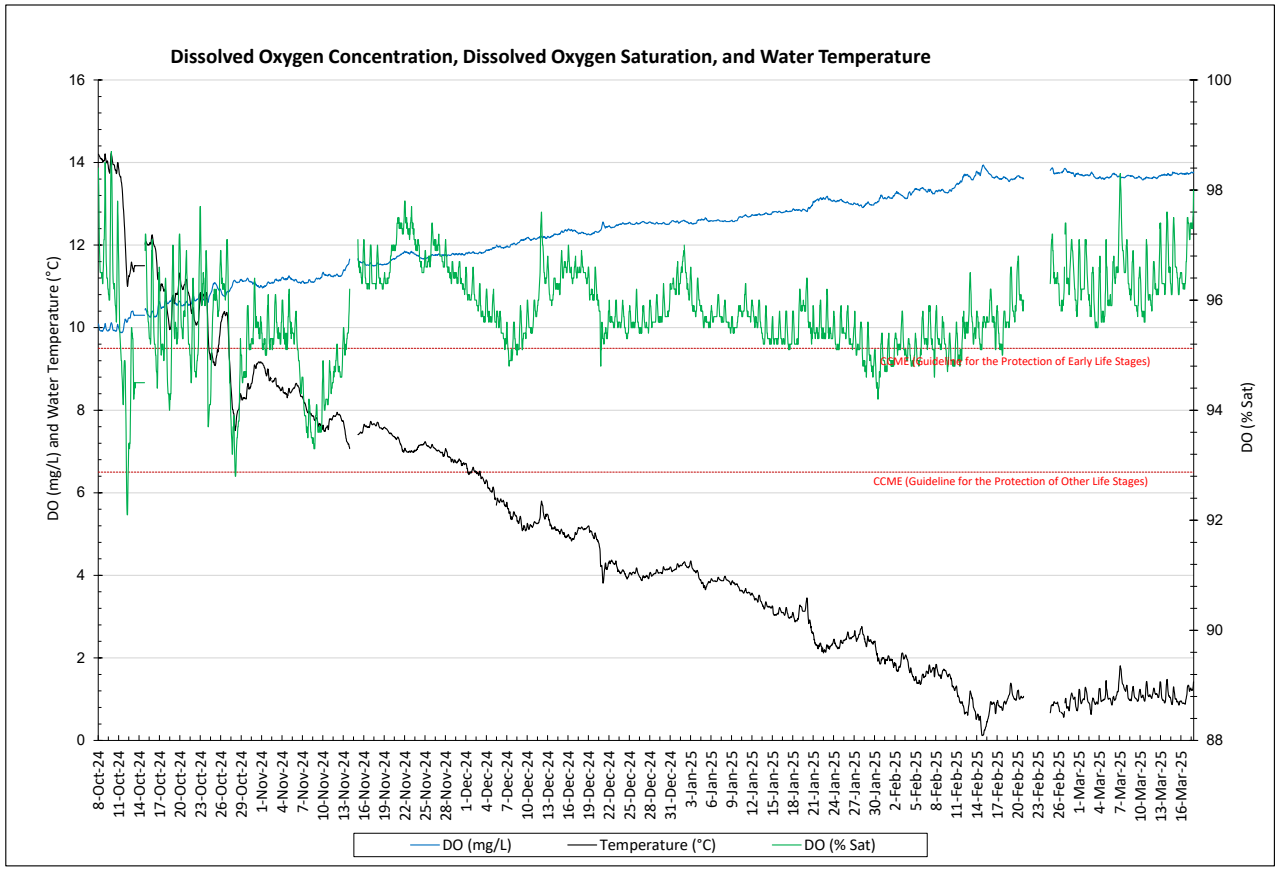

Figure 5: DO (mg/L & % saturation) with Water Temperature (°C) at Humber River at Humber Village Bridge

Turbidity & Stage

- Throughout the deployment period, turbidity ranged from 0.1 NTU to 8.2 NTU, with an average turbidity of 0.3 NTU.
- Turbidity was relatively stable throughout deployment, but was influenced by numerous stage increases which led to temporary turbidity spikes.
- Stage ranged from 1.60 m to 2.73 m, averaging at 2.13 m.

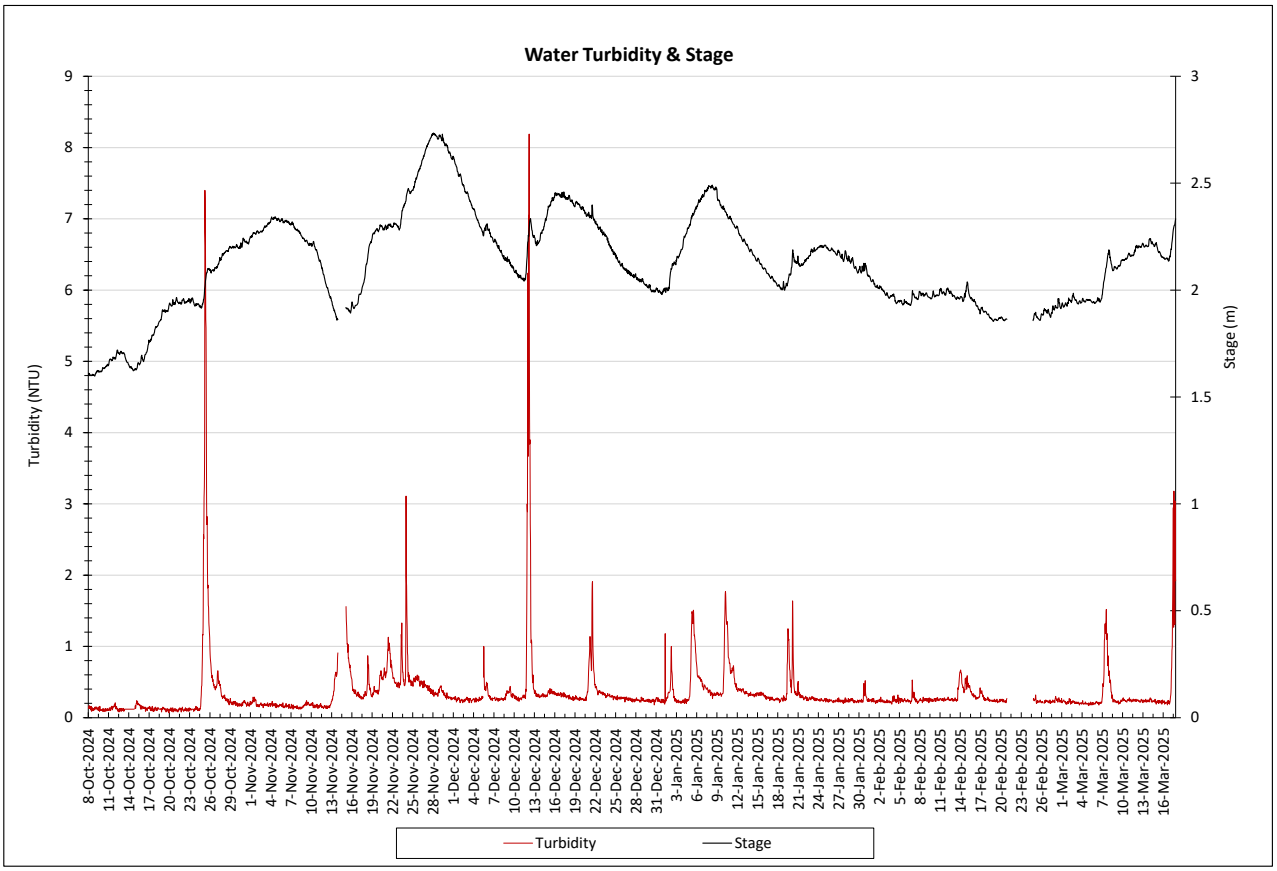

Figure 6: Turbidity & Stage at Humber River at Humber Village Bridge

Conclusions

- This deployment report summarizes the real time water quality and quantity monitoring data recorded at the Humber River at Humber Village Bridge station over a period of 160 days. No unusual events or data anomalies were evident. Visible trends were likely related to seasonal temperature changes and precipitation events.

- All parameters displayed trends typical for this waterbody at this time of year. All pH values and dissolved oxygen values were within the recommended CCME guidelines for the Protection of Aquatic Life.

Department of Environment and Climate Change
Water Resources Management Division

References

Canadian Council of Ministers of the Environment. 2007. Canadian water quality guidelines for the protection of aquatic life: Summary table. Updated December, 2007. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg. (Website: http://ceqg-rcqe.ccme.ca/download/en/222/)

APPENDIX A

Quality Assurance / Quality Control Procedures

As part of the Quality Assurance / Quality Control (QA/QC) protocol, the performance of a station's water quality instrument (i.e., field sonde) is rated at the beginning and end of its deployment period. The procedure is based on the approach used by the United States Geological Survey (Wagner *et al.* 2006)[1].

At the beginning of the deployment period, a fully cleaned and calibrated QA/QC water quality instrument (i.e., QA/QC sonde) is placed *in-situ* with the fully cleaned and calibrated field sonde. After sonde readings have stabilized, water quality parameters, as measured by both sondes, are recorded. Field sonde performance for all parameters is rated based on differences recorded by the field sonde and QA/QC sonde. If the readings from both sondes are in close agreement, the QA/QC sonde can be removed from the water. If the readings are not in close agreement, there will be attempts to reconcile the problem on site (e.g., removing air bubbles from sensors, etc.). If no fix is made, the field sonde may be removed for recalibration.

At the end of the deployment period, a fully cleaned and calibrated QA/QC sonde is once again deployed *in-situ* with the field sonde. After Sonde readings have stabilized, water quality parameters, are measured by both sondes and recorded. Field sonde performance for all parameters is rated based on differences recorded by the field sonde and QA/QC sonde.

Performance ratings are based on differences listed in the table below:

	Rating				
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

[1] Wagner, R.J., Boulger, R.W., Jr., Oblinger, C.J., and Smith, B.A., 2006, Guidelines and standard procedures for continuous water-quality monitors—Station operation, record computation, and data reporting: U.S. Geological Survey Techniques and Methods 1–D3, 51 p. + 8 attachments; accessed April 10, 2006, at *http://pubs.water.usgs.gov/tm1d3*

APPENDIX B

WRMD Climate Station – Humber Village at Humber Village Bridge