Real-Time Water Quality Deployment Report

Calibre Mining Corp: Valentine Gold Mine Network

Deployment Period
June 4th, 2024 to July 25th, 2024

Newfoundland Labrador

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

General

The Water Resources Management Division (WRMD), in collaboration with Calibre Mining Corp. (formerly Marathon Gold Corp.) maintain twelve real-time water quality (RTWQ) and water quantity monitoring stations. These stations are part of a real-time network designed to monitor, process, and share water quality and quantity data with both WRMD and Calibre Mining Corp., supporting the evaluation and management of water resources. The network also provides early detection of potential or emerging water issues, allowing for prompt response and implementation of mitigation measures. Six of these stations focus on surface water and will be addressed in this report. The remaining six stations are groundwater monitoring wells which are reported annually. The six surface water stations are located at Victoria River on Beothuk Lake, Roebucks Brook at Access Road, Valentine River Outlet, Victoria River Tributary, Victoria River Outlet, and Frozen Ear Outlet. This report covers the monitoring period from June 4, 2024, to July 25, 2024. Victoria River at Beothuk Lake and Frozen Ear Outlet are both new stations, installed on June 10, 2024, and June 11, 2024, respectively.

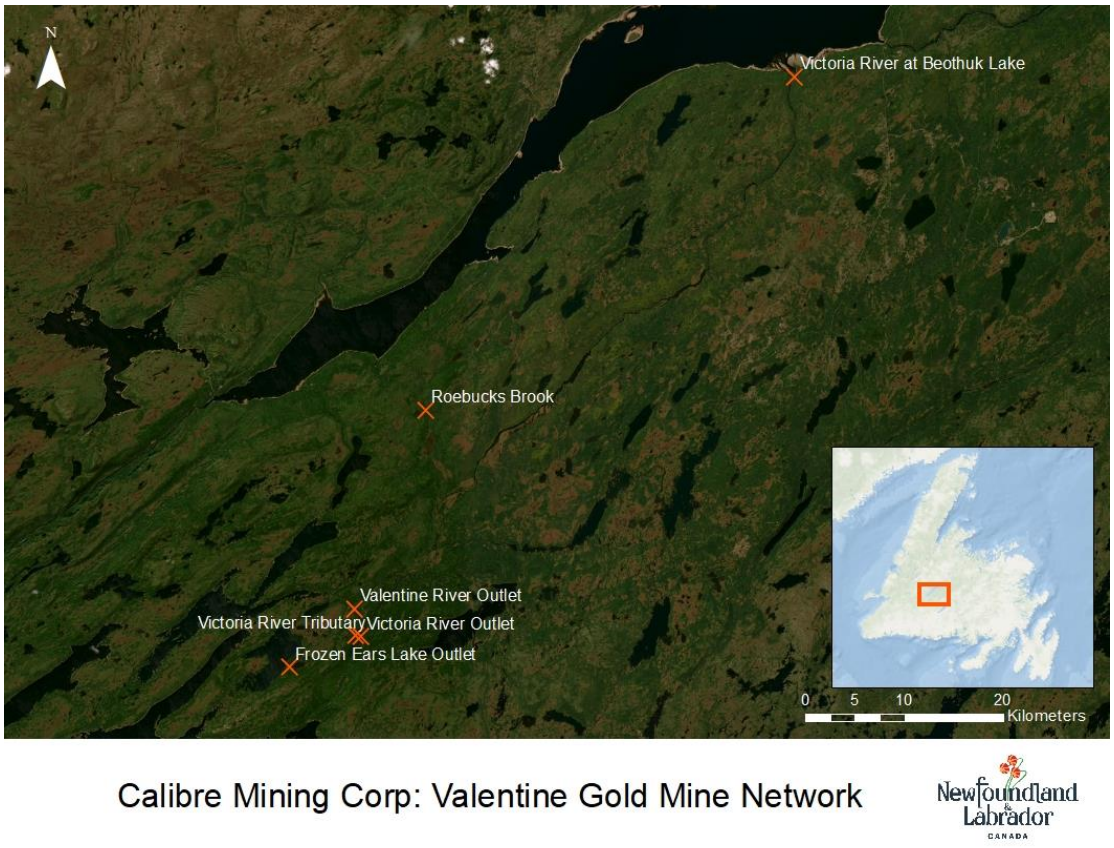


Figure 1: Location of the Calibre Mining Corp. Real Time Surface Water Quality Network (June 2024)

Quality Assurance and Quality Control

WRMD staff are responsible for maintenance and calibration of the real-time water quality monitoring equipment, as well as recording and managing the water quality data. As part of the Quality Assurance and Quality Control protocol (QA/QC), an assessment of the reliability of data recorded by an instrument is conducted at the beginning and end of the deployment period. The procedure is based on the approach used by the United States Geological Survey.

During deployment and removal, a QA/QC Sonde is temporarily deployed adjacent to the Field Sonde. 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). Values for temperature, pH, conductivity, dissolved oxygen, and turbidity are compared between the two instruments (Table 2)**.** Additionally, grab samples are collected during deployment to compare pH, specific conductivity and turbidity values between the field instrument and grab samples (Table 3).

Table 1: 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 (vs./cm)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Sp. Conductance > 35µS/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

It's important to note that the temperature sensor on any sonde is crucial. All other parameters can be categorized into subgroups: temperature-dependent, temperature-compensated, and temperature-independent. Due to the temperature sensor's placement on the sonde, the entire sonde must be at a constant temperature before the temperature sensor stabilizes. The values may take some time to reach the appropriate reading; if a reading is taken too soon, it may not accurately represent the conditions of the water body.

Table 2: Comparison rankings for Calibre Gold Corp. Surface Water Monitoring Network June 4th to July 25th, 2024

Station	**Date**	**Action**	**Comparison Ranking**				
			Temperature	**pH**	**Conductivity**	**Dissolved Oxygen**	**Turbidity**
Victoria River at Beothuk Lake	**June 10th**	**Deployment**	Excellent	Excellent	Excellent	Fair	Excellent
	July 25th	**Removal**	Excellent	Excellent	Good	Fair	Excellent
Roebucks Brook	**June 5th**	**Deployment**	Excellent	Excellent	Good	Excellent	Excellent
	July 25th	**Removal**	Excellent	Excellent	Good	Good	Excellent
Valentine River Outlet	**June 5th**	**Deployment**	Excellent	Excellent	Excellent	Excellent	Excellent
	July 25th	**Removal**	Excellent	Excellent	Excellent	Good	Excellent
Victoria River Tributary	**June 4th**	**Deployment**	Excellent	Excellent	Good	Excellent	Excellent
	July 25th	**Removal**	Excellent	Excellent	Excellent	Fair	Excellent

Victoria River Outlet	**June 5th**	**Deployment**	Excellent	Good	Excellent	Excellent	Excellent
	July 25th	**Removal**	Excellent	Excellent	Excellent	Good	Excellent
Frozen Ear Lake Outlet	**June 11th**	**Deployment**	Excellent	Excellent	Excellent	Fair	Excellent
	July 24th	**Removal**	Excellent	Excellent	Good	Fair	Excellent

- There are a few circumstances which may cause less than ideal QA/QC rankings to be obtained. These include: 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.
- At the time of deployment, the rankings at each station ranged from Excellent to Fair. The Fair rankings could be attributed to the sondes not having fully acclimated before the readings were taken. Additionally, since all the Fair rankings are related to dissolved oxygen, it's possible that the calibration of the QAQC sonde was inaccurate compared to the field sondes, leading to discrepancies in the data.
- At the time of removal, the rankings once again ranged from Excellent to Fair. The Fair rankings may have resulted from the sensors not fully acclimating to the environment before the readings were taken, or from minor discrepancies in the calibrations.

Table 3 : Grab sample vs. Field Instrument Comparison Rankings

Station	Date	Action	Grab Sample Comparison Ranking		
			pH	Conductivity	Turbidity
Victoria River at Beothuk Lake	**June 10th**	**Deployment**	Excellent	Poor	Marginal
Roebucks Brook	**June 5th**	**Deployment**	Good	Good	Good
Valentine River Outlet	**June 5th**	**Deployment**	Good	Excellent	Excellent
Victoria River Tributary	**June 4th**	**Deployment**	Excellent	Marginal	Excellent
Victoria River Outlet	**June 5th**	**Deployment**	Good	Excellent	Excellent
Frozen Ear Lake Outlet	**June 11th**	**Deployment**	Good	Marginal	Excellent

- Grab sample comparisons ranged from Excellent to Poor during deployment. Variability in results may be attributed to differences in the sampling location or depth relative to the sonde's deployment site or insufficient equilibration time for the sonde when initial field data was collected.

Hydrometric Data

Water Resources Management Division hydrometric (stage and flow) data is quality controlled on a less frequent basis than water quality data due to differences in protocols. The hydrometric data shown in this report is provisional and has not undergone quality control checks.

Data Interpretation

The following graphs and discussion illustrate water quality related events from June 4th to July 25th, 2024 at the six surface water quality/quantity real time monitoring stations in the Valentine Gold Mine Network.

The Victoria River at Beothuk Lake RTWQ station experienced significant drops in water levels during this deployment period, leading to the sonde being temporarily exposed and no longer submerged towards the end of the deployment period. This exposure resulted in erroneous and inaccurate data, which was subsequently removed from the dataset. As a result, a gap is visible in the graphs below for this station.

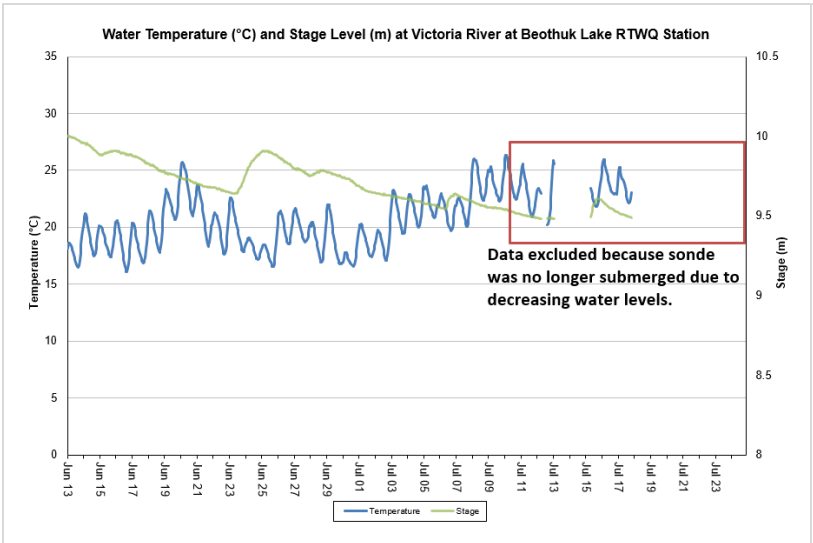
Water Temperature

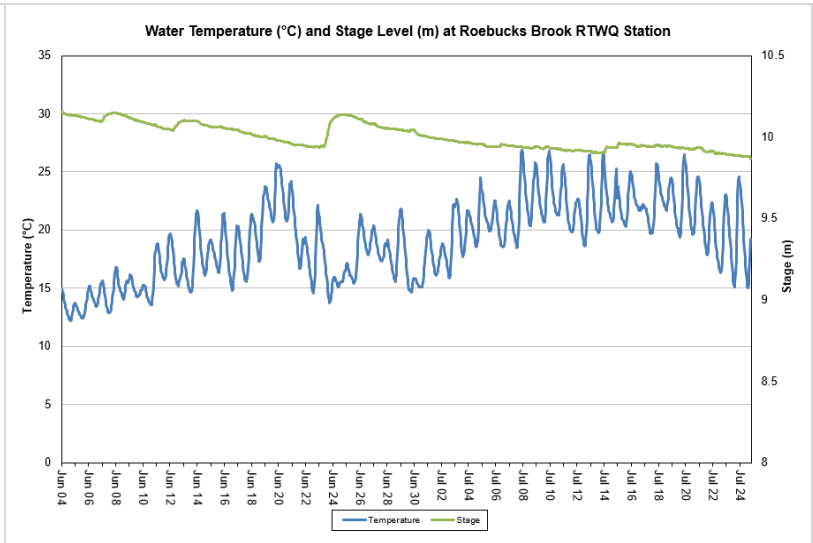
Water temperature plays a vital role in wildlife health, as many organisms rely on ambient air and water conditions to regulate their body temperatures. Moreover, water temperature affects other key parameters, such as dissolved oxygen levels and specific conductivity. As anticipated during the seasonal shift from spring to summer, water temperatures showed a steady increase over the period. A natural daily cycle was also observed, with higher temperatures during the day and lower temperatures at night (Figure 2).

Table 4: Water temperature statistics for this deployment period

Station	Water Temperature (°C)			
	Minimum	Maximum	Average	Median
Victoria River at Beothuk Lake	16.11	26.36	20.42	20.26
Roebucks Brook	12.22	26.85	19.12	19.15
Valentine River Outlet	11.83	26.57	19.28	19.43
Victoria River Tributary	11.22	27.30	18.78	18.98
Victoria River Outlet	11.47	26.66	18.45	18.31
Frozen Ear Lake Outlet	15.56	29.11	20.76	20.56

Figure 2: Water Temperature (°C) and Stage (m) at Calibre Mining Corps. Surface Water Stations





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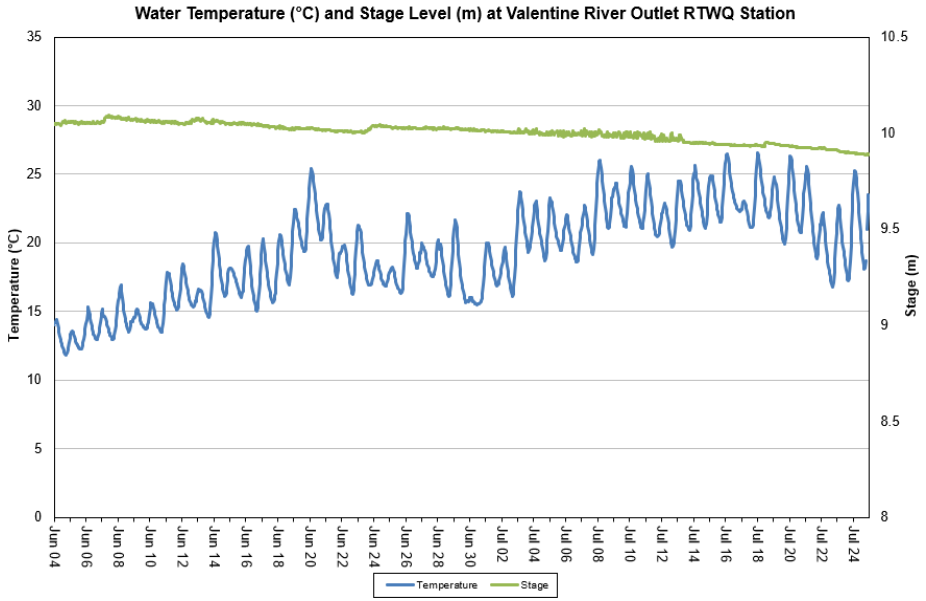

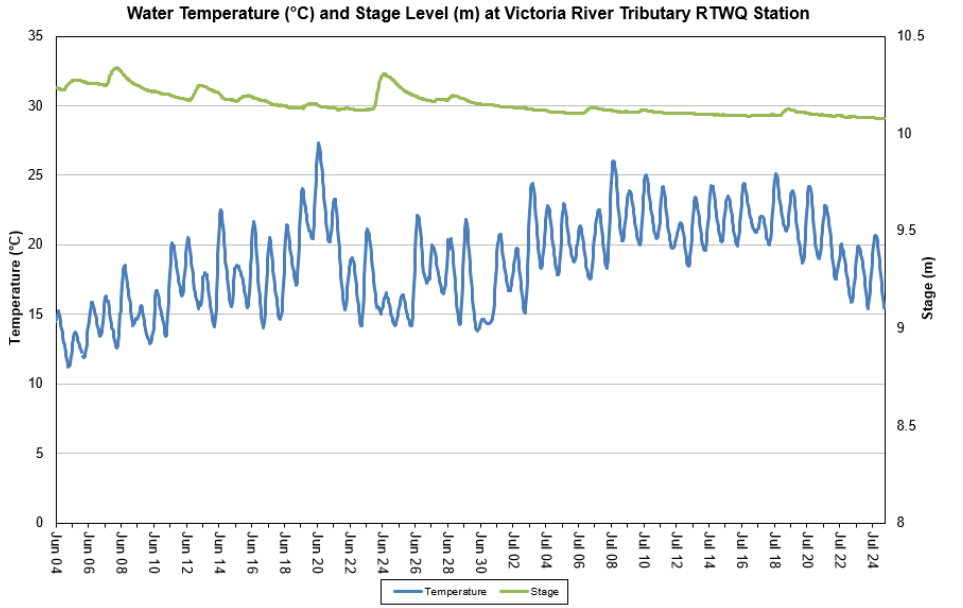

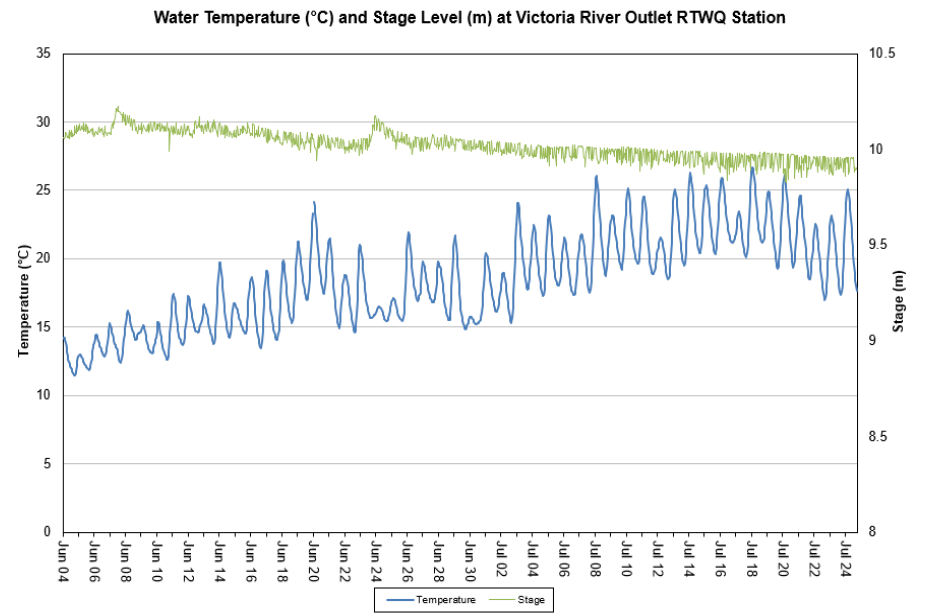

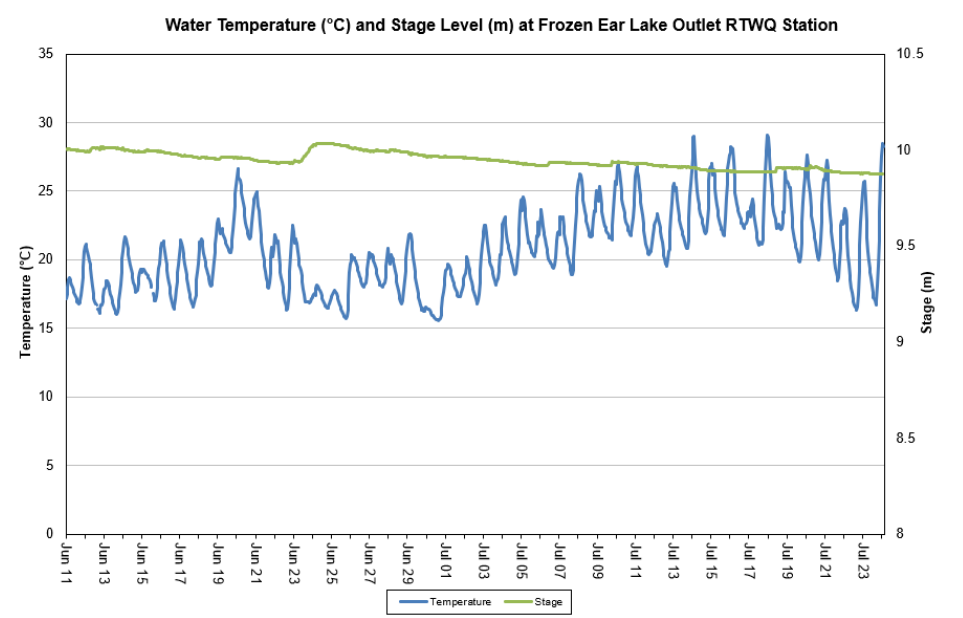

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pH

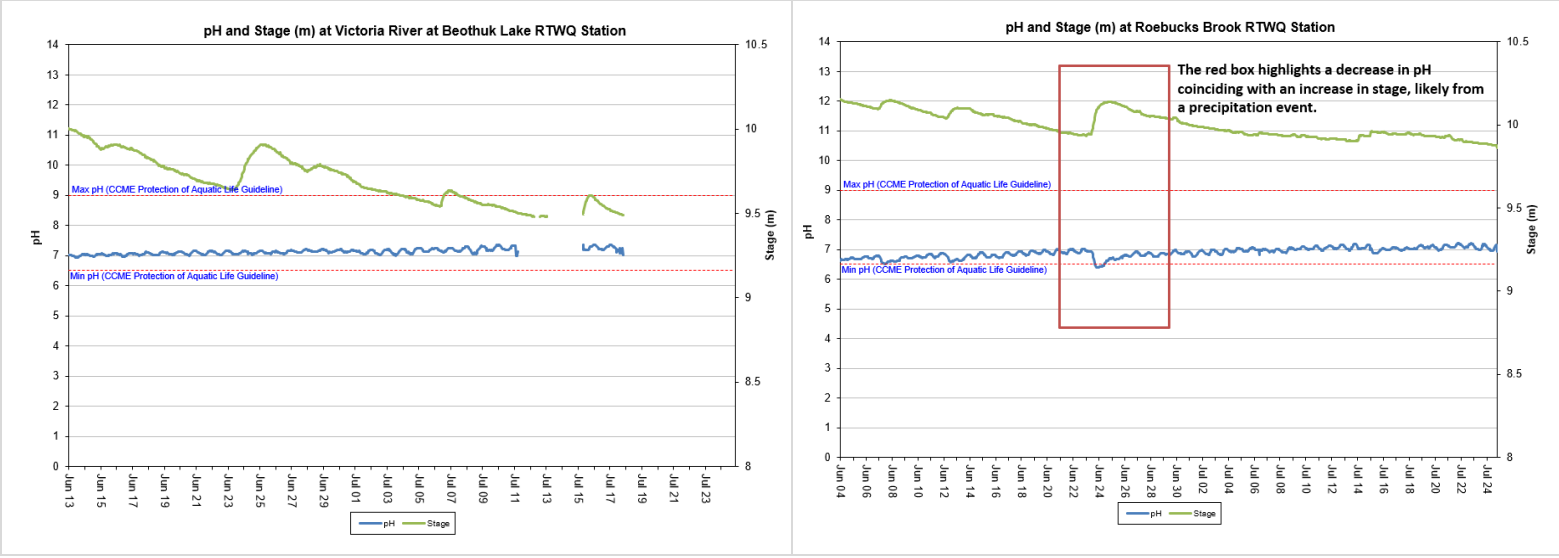
pH relates to the free hydrogen ions in water, and it is a measure of acidity in water. The Canadian Council of Ministers of the Environment (CCME) Freshwater Aquatic Life guideline provides a basis by which to judge the overall health of the brook. Their freshwater guidelines recommend a minimum pH 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.

At all six surface water monitoring stations, pH levels generally remained within the CCME guideline range. Changes in pH often correspond with increases in water levels, which are typically linked to precipitation events. Rainwater, with its naturally lower pH, temporarily dilutes the water column, causing a short-term decrease in pH. However, pH levels typically return to baseline within a few days.

Table 5: pH statistics for this deployment period

Station	pH (pH units)			
	Minimum	Maximum	Average	Median
Victoria River at Beothuk Lake	6.94	7.37	7.12	7.12
Roebucks Brook	6.39	7.23	6.90	6.92
Valentine River Outlet	6.76	7.29	6.99	6.97
Victoria River Tributary	7.25	7.83	7.60	7.62
Victoria River Outlet	6.44	6.98	6.65	6.64
Frozen Ear Lake Outlet	6.84	7.97	7.20	7.15

Figure 3: pH and Stage (m) at Calibre Mining Corp. Surface Water Stations



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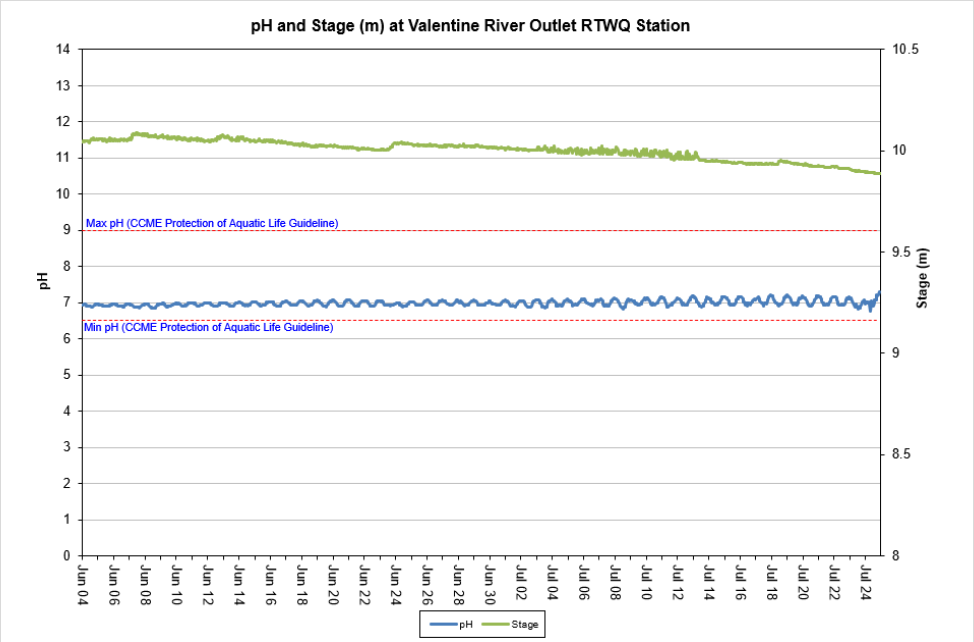

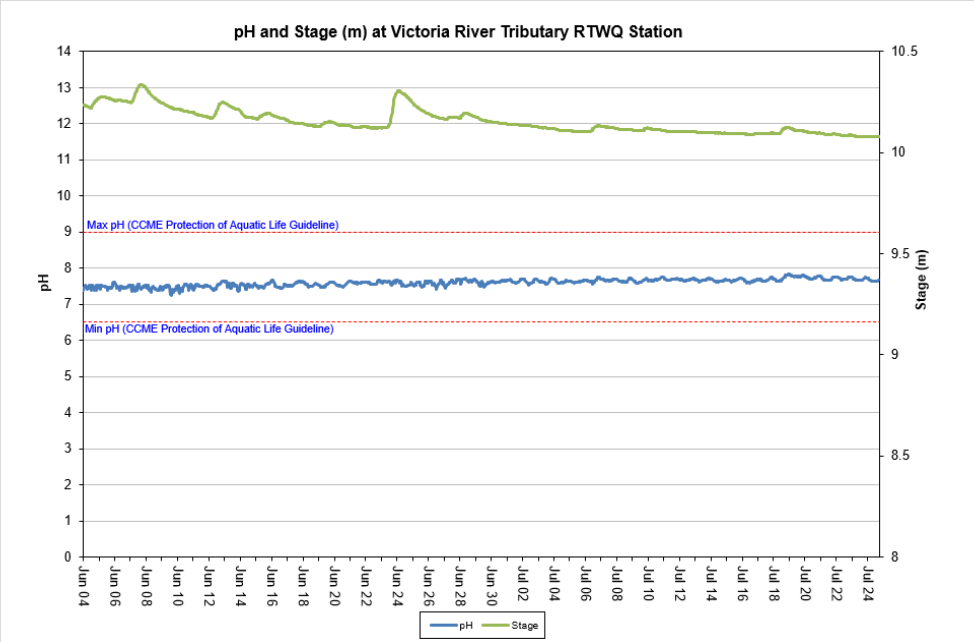

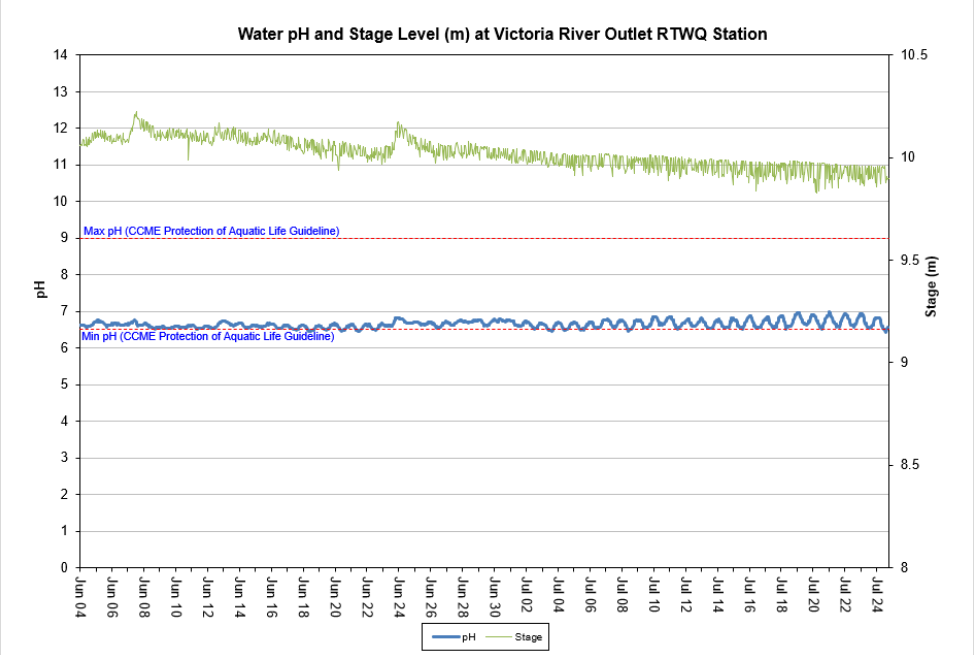

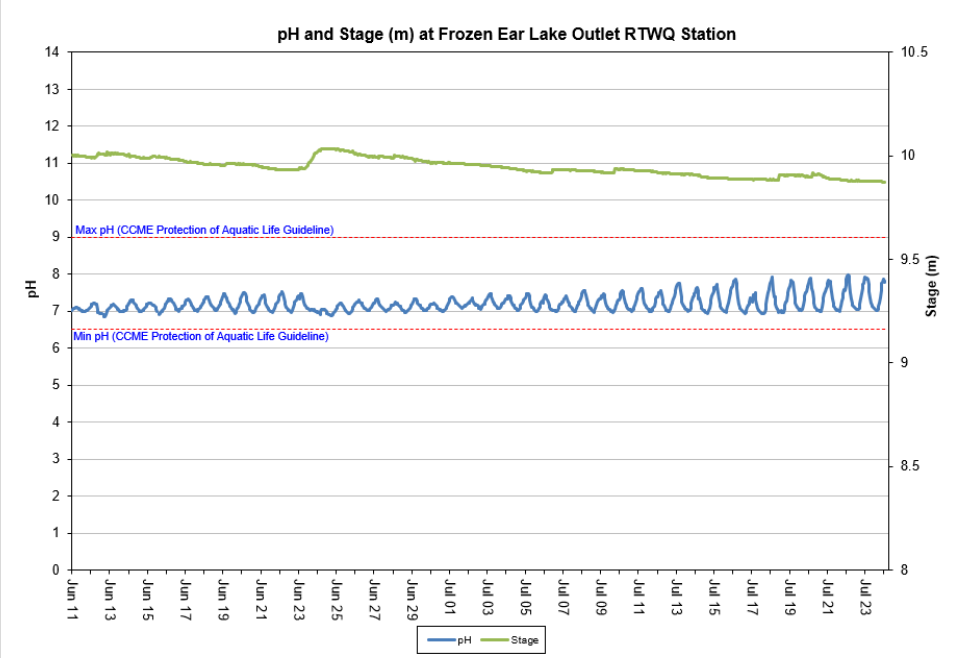

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Specific Conductivity

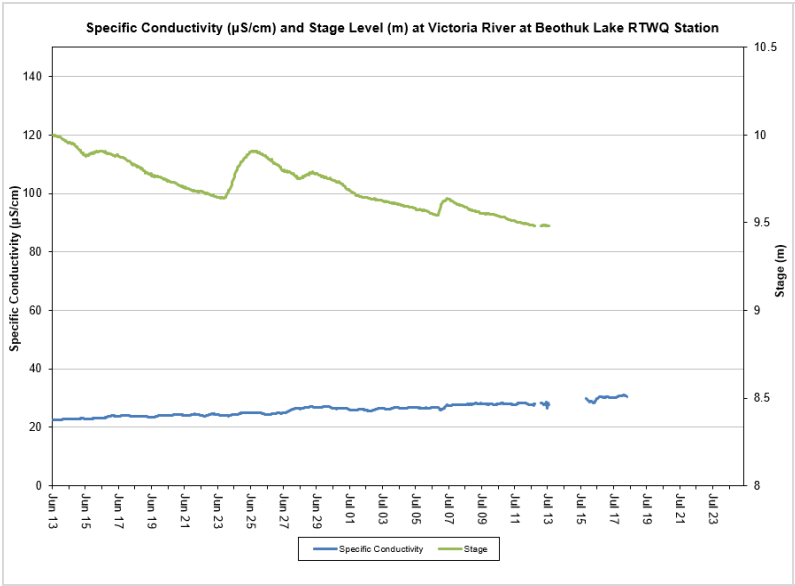
Specific conductivity is a common indicator of the concentration of dissolved ions in water, such as salts, acids, and bases. Higher concentrations of dissolved ions result in higher specific conductivity, while pure water exhibits low conductivity. Specific conductivity is often affected by precipitation. During precipitation events, rainwater can temporarily dilute the water column, resulting in a short-term decrease in conductivity. However, high precipitation events can also cause a temporary increase in conductivity if sediment from the bottom of the waterbody is disturbed around the sensor or if runoff carrying dissolved ions enters the water column.

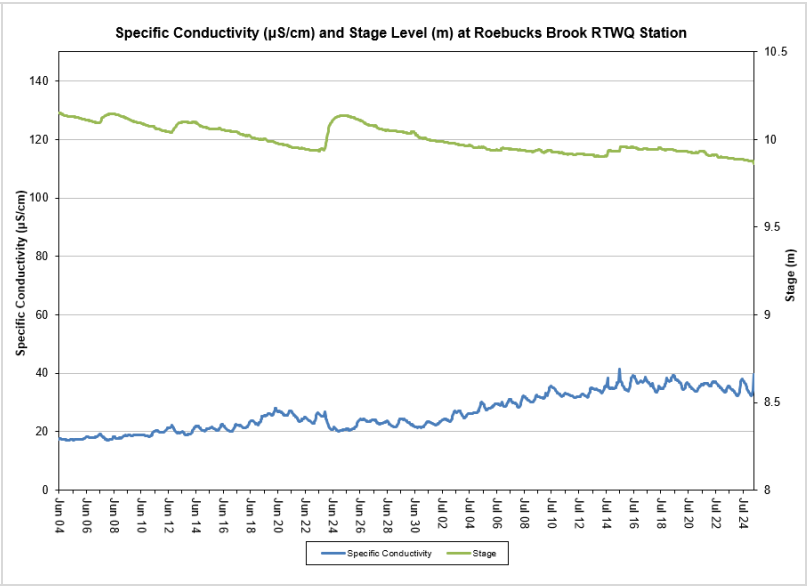
Across all six stations, conductivity data displays a slight increase as water levels decrease throughout the deployment period. This trend is attributed to rising air temperatures, which lead to water evaporation and result in a higher concentration of dissolved ions remaining in the water. Specific conductivity at all stations remained generally low and stable. The Victoria River Outlet is located near a large embankment, which likely contributes to runoff entering the waterbody close to the sonde's placement in the river. Furthermore, the sonde is positioned in a soft, muddy substrate, making it more susceptible to increased disturbance during precipitation events. This location may account for the observed spikes in conductivity during stage increases, as runoff introduces additional dissolved ions into the water column.

Table 6: Specific conductivity statistics for this deployment period

Station	Specific Conductivity (µS/cm)			
	Minimum	Maximum	Average	Median
Victoria River at Beothuk Lake	22.5	28.8	25.6	25.8
Roebucks Brook	17.1	41.5	26.6	24.8
Valentine River Outlet	22.3	26.3	24.2	24.3
Victoria River Tributary	34.2	151.9	95.8	94.2
Victoria River Outlet	21.2	42.6	26.5	26.3
Frozen Ear Lake Outlet	47.9	62.6	54.7	54.4

Figure 4: Specific Conductivity (µS/cm) and Stage (m) at Calibre Mining Corp. Surface Water Stations





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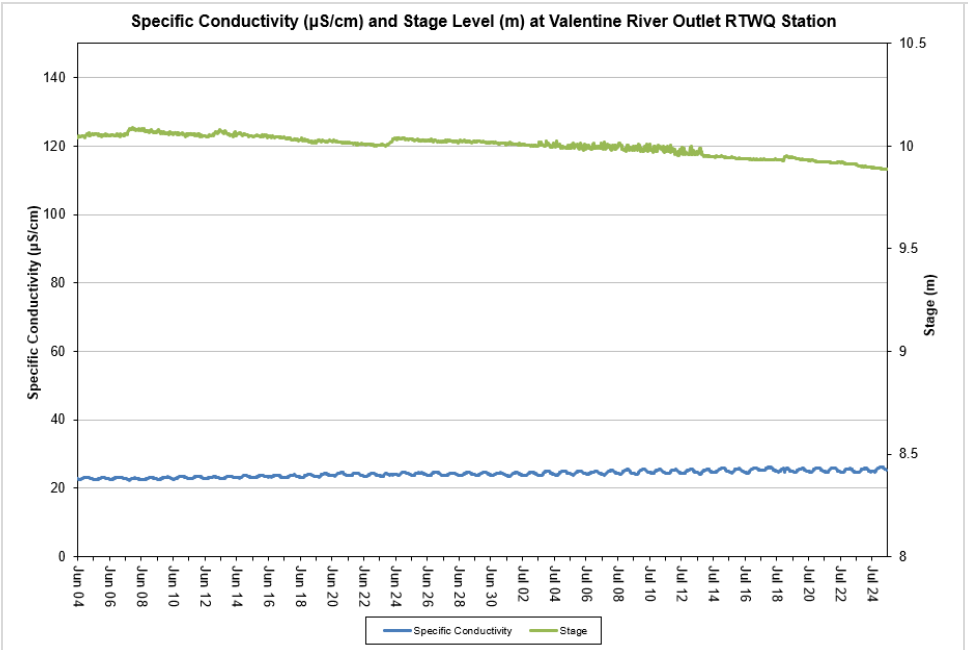

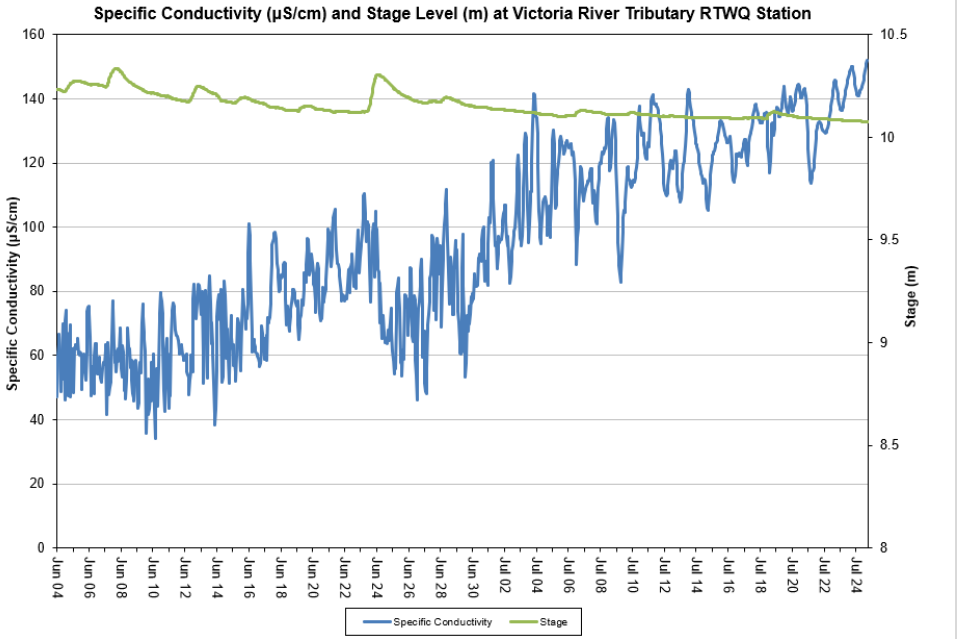

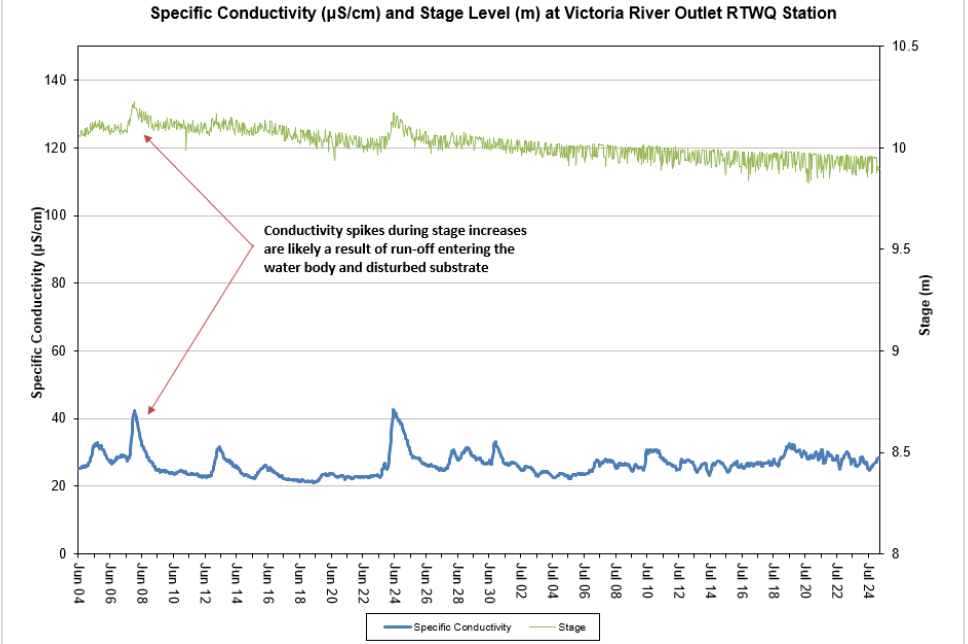

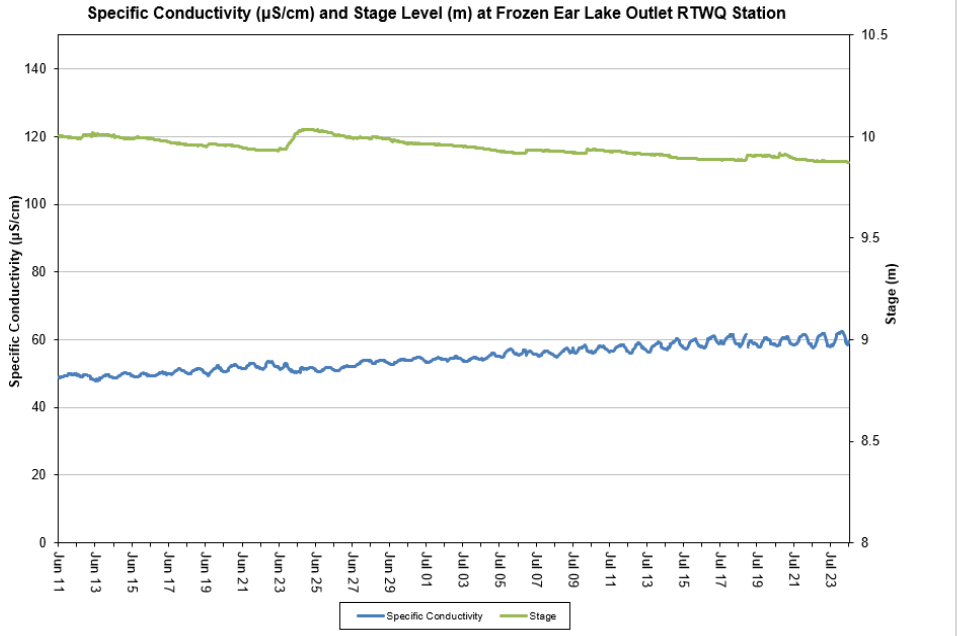

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Dissolved Oxygen

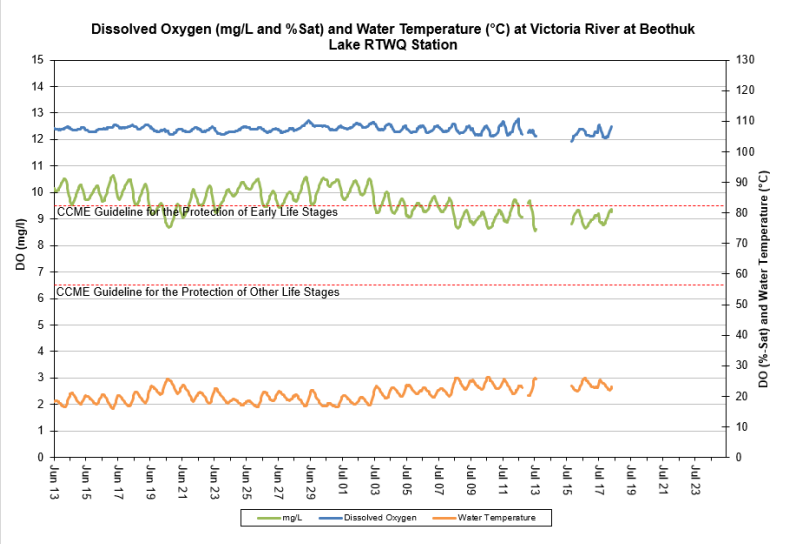
Dissolved oxygen (DO) is crucial for supporting aquatic life, and the CCME (Canadian Council of Ministers of the Environment) Freshwater Aquatic Life guidelines establish reference values to evaluate waterway health. The minimum DO guideline is 9.5 mg/L for early life stages in cold water species and 6.5 mg/L for other life stages. DO concentrations can fluctuate due to factors such as water temperature, atmospheric pressure, and the presence of other dissolved substances. Warmer water typically holds less dissolved oxygen than cooler water.

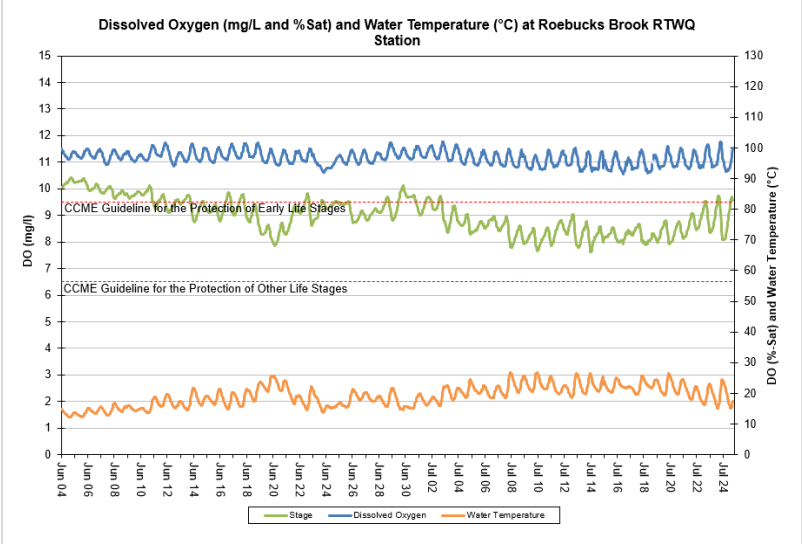
Daily variations in DO levels were observed, primarily influenced by temperature fluctuations and the respiration of aquatic plants. An evident inverse relationship was identified between DO levels and water temperature. During the deployment period, DO levels at all six stations consistently remained above the CCME guideline for the Protection of Other Life Stages but hovered around the guideline for the Protection of Early Life Stages. The Frozen Ears RTWQ station, characterized by shallow, slow-moving water, is particularly sensitive to air temperature changes. These conditions lead to significant water temperature fluctuations, driving pronounced diurnal variations in DO levels, as illustrated in the figure below.

Table 7: Dissolved Oxygen statistics for the deployment period

Station	Dissolved Oxygen (% and mg/L)							
	Minimum		Maximum		Average		Median	
	%	mg/L	%	mg/L	%	mg/L	%	mg/L
Victoria River at Beothuk Lake	105.0	8.56	110.7	10.65	107.4	9.71	107.4	9.72
Roebucks Brook	91.4	7.63	102.1	10.43	96.7	8.99	96.8	8.98
Valentine River Outlet	98.8	8.18	103.8	10.81	101.2	9.37	101.1	9.34
Victoria River Tributary	90.0	7.53	102.4	10.94	97.7	9.15	98.6	9.08
Victoria River Outlet	88.9	7.84	115.6	10.74	100.4	9.46	100.0	9.53
Frozen Ear Lake Outlet	80.1	6.92	127.6	10.72	101.7	9.11	101.0	9.28

Figure 5: Dissolved Oxygen (mg/L and %Sat) and Water Temperature (°C) at Calibre Mining Corp. Surface Water Stations





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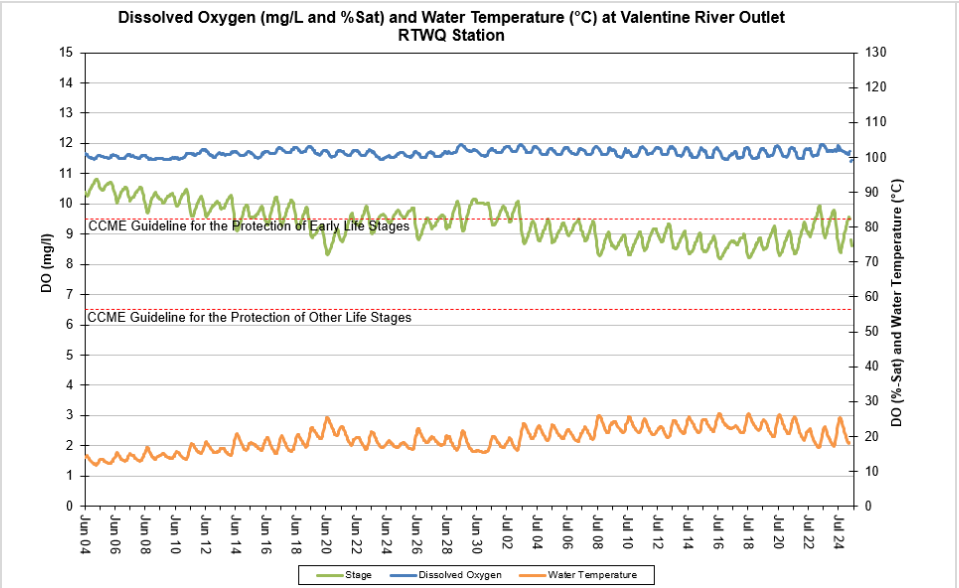

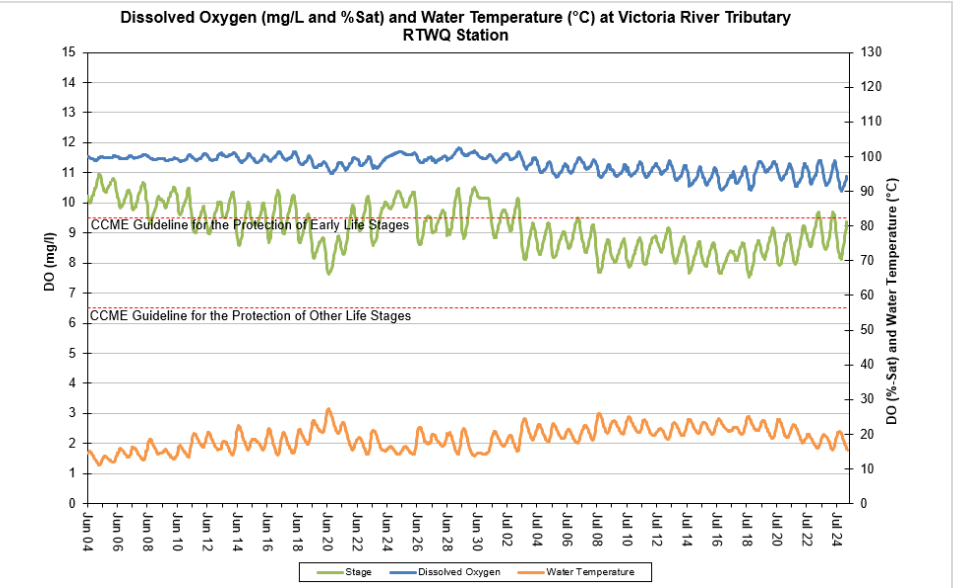

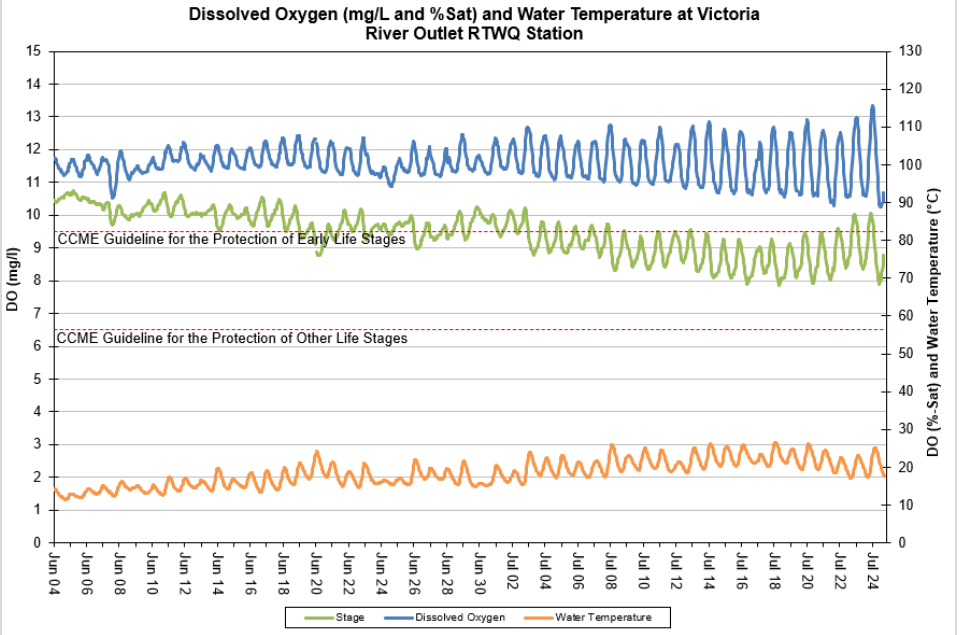

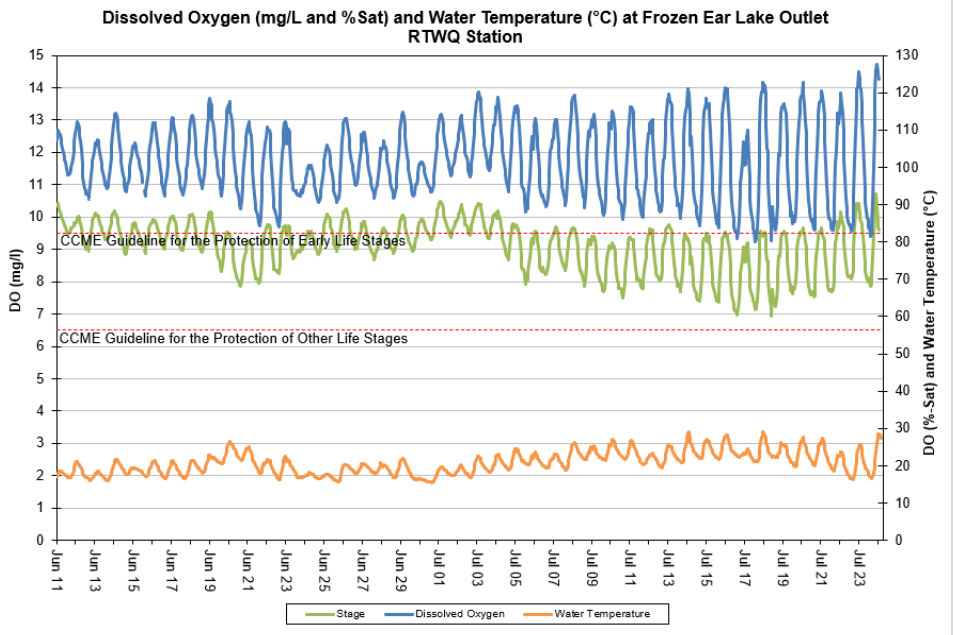

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Turbidity

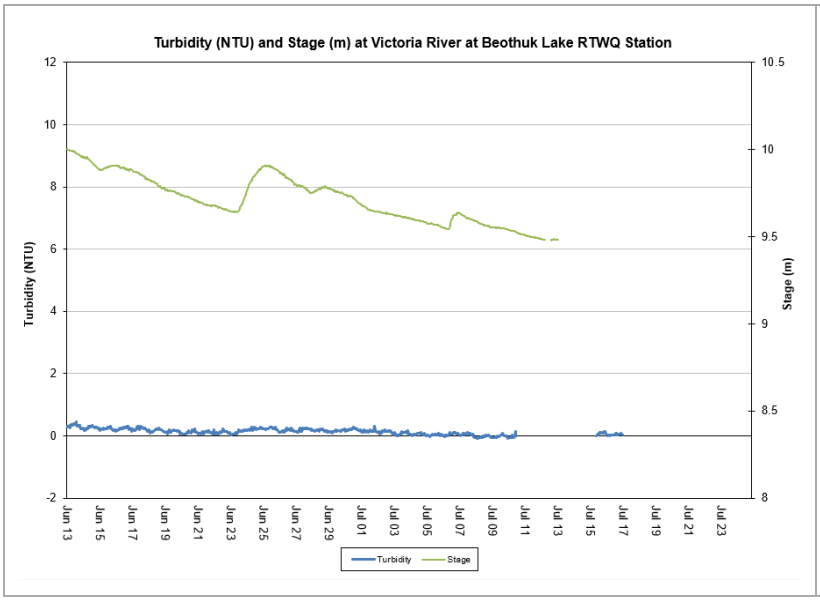
Turbidity, a measure of water cloudiness, often increases during precipitation events as runoff carries silt and debris into the waterbody. High turbidity values can reduce light penetration for aquatic plants, disrupt benthic habitats and potentially harm fish gills or damage monitoring equipment.

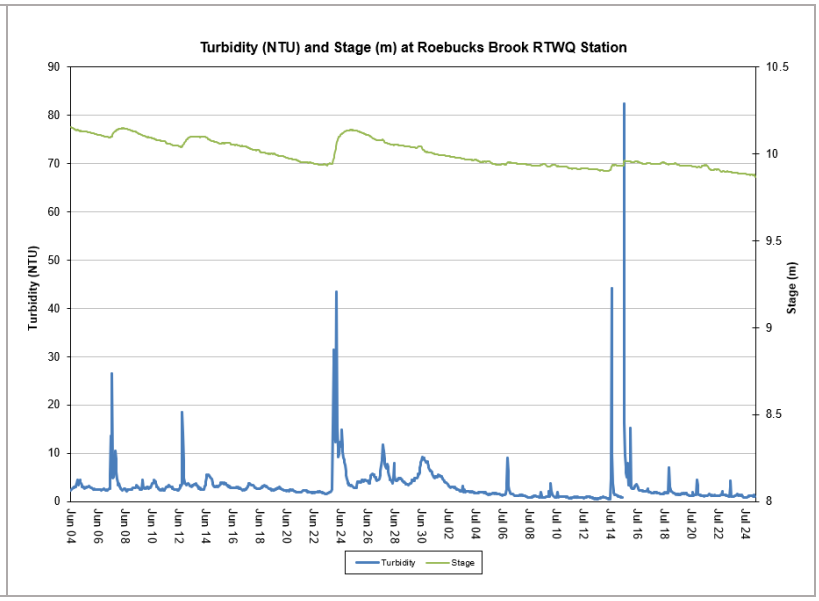
Throughout the deployment period, turbidity levels remained consistently low at all six stations, indicating clear and pristine water conditions. Negative turbidity values occur when the water being measured has lower turbidity than the zero standards used during calibration. These values were kept in the dataset to monitor trends and investigate the relationship between turbidity and stage. In general, stage increases associated with precipitation events led to turbidity spikes. A decreasing turbidity trend was also noted at several stations throughout the monitoring period. Initially, water levels were high due to frequent rainfall and precipitation events. However, as summer progressed and precipitation became less frequent, runoff decreased, and substrate disturbance diminished, leading to lower turbidity levels. Background turbidity levels are slightly higher at Roebucks Brook due to the sonde's placement downstream of a bridge crossing a dirt access road. Turbidity spikes coincide with stage increases from run-off from the access road.

Table 8: Turbidity statistics for this deployment period

Station	Turbidity (NTU)			
	Minimum	Maximum	Average	Median
Victoria River at Beothuk Lake	-0.1	0.5	0.1	0.2
Roebucks Brook	0.5	82.4	3.1	2.4
Valentine River Outlet	-0.4	1.1	-0.3	-0.3
Victoria River Tributary	0	1.5	0.4	0.3
Victoria River Outlet	-1.6	3	-0.9	-1.3
Frozen Ear Lake Outlet	0.2	9.9	2.5	1.8

Figure 6: Turbidity (NTU) and Stage (m) at the Calibre Mining Corp. Surface Water Stations





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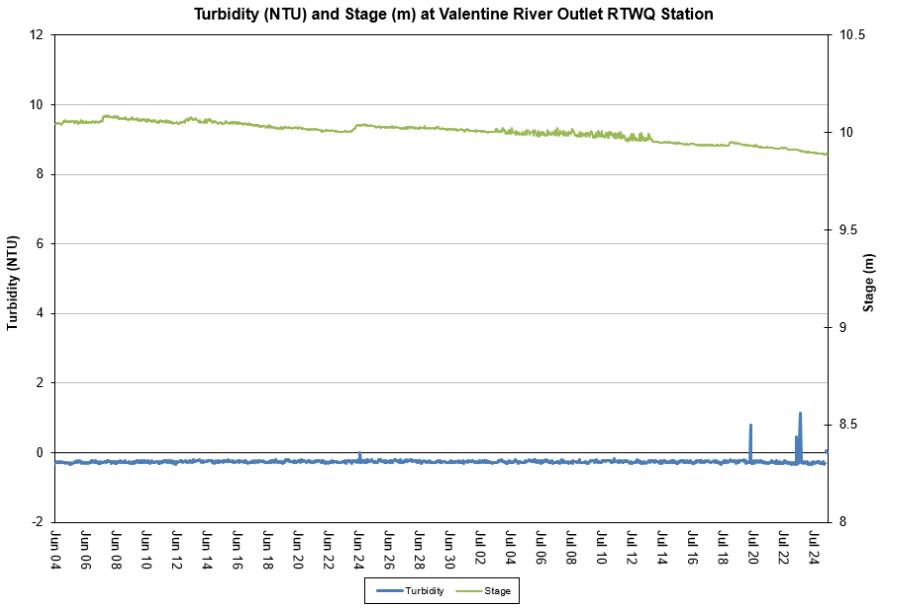
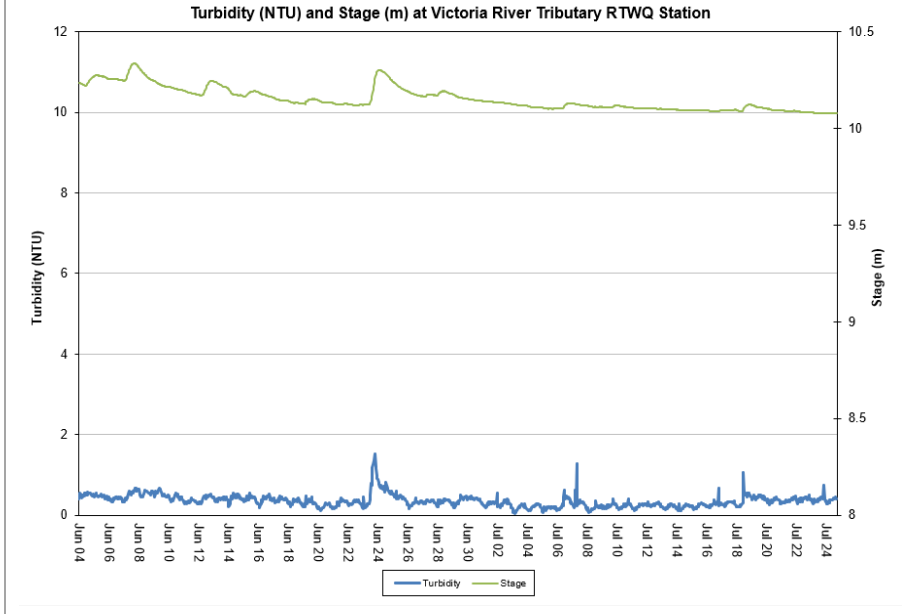
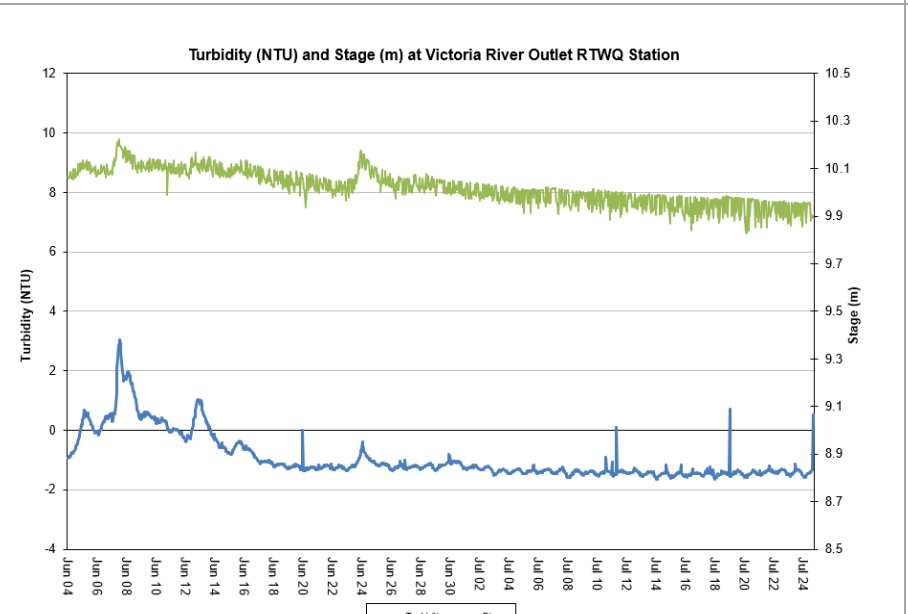
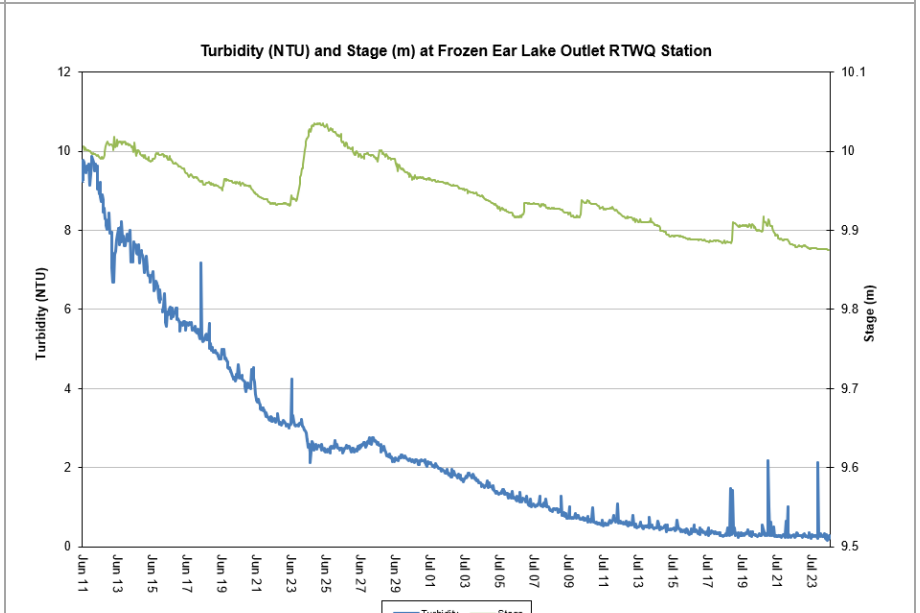
Calibre Mining, Newfoundland and Labrador









Water Resources Management Division hydrometric data is quality controlled on a less frequent basis than water quality data due to differences in protocols. The hydrometric data shown in this report is provisional and has not undergone quality control checks.

Stage and Precipitation

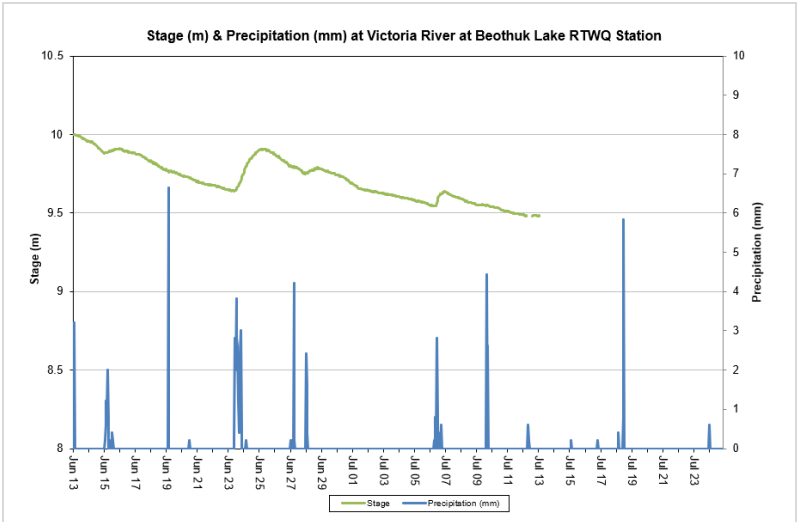
Stage provides an estimate of the water level at a monitoring station and plays a vital role in analyzing trends in water quality data, particularly for parameters such as specific conductivity, pH, and turbidity. Stage generally rises during precipitation events as rainwater and runoff enter the water column. By monitoring stage alongside precipitation events, we can better interpret our data, distinguish whether a stage increase is caused by rainfall or potential industrial activities, and assess its impact on water quality. Precipitation data was obtained from the Valentine Gold Project meteorological (MET) station, which is located on-site and maintained collaboratively by WRMD and Calibre.

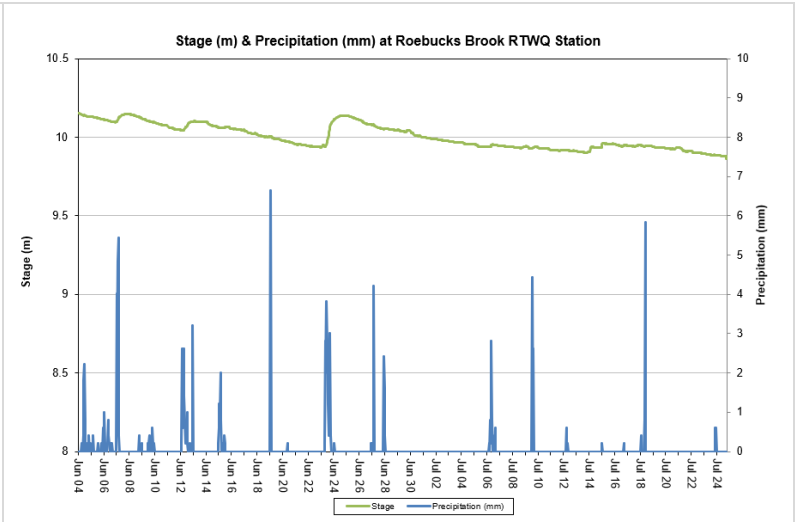
Stage at all six stations generally showed a decreasing trend over the deployment period, which is expected with the seasonal transition from spring to summer. Reduced precipitation frequency compared to spring, combined with rising air temperatures, led to higher evaporation rates and lower water levels. The figure below demonstrates the effect of precipitation events on stage, showing distinct stage spikes occurring during or shortly after rainfall.

Table 9: Stage (m) statistics from this deployment period

Station	Stage (m)			
	Minimum	Maximum	Average	Median
Victoria River at Beothuk Lake	9.48	10.00	9.71	9.70
Roebucks Brook	9.87	10.15	10	9.98
Valentine River Outlet	9.89	10.09	10.00	10.01
Victoria River Tributary	10.08	10.34	10.15	10.13
Victoria River Outlet	9.83	10.23	10.02	10.01
Frozen Ear Lake Outlet	9.88	10.04	9.95	9.94

Figure 7: Stage (m) and Precipitation (mm) at the Calibre Mining Corp. Surface Water Stations





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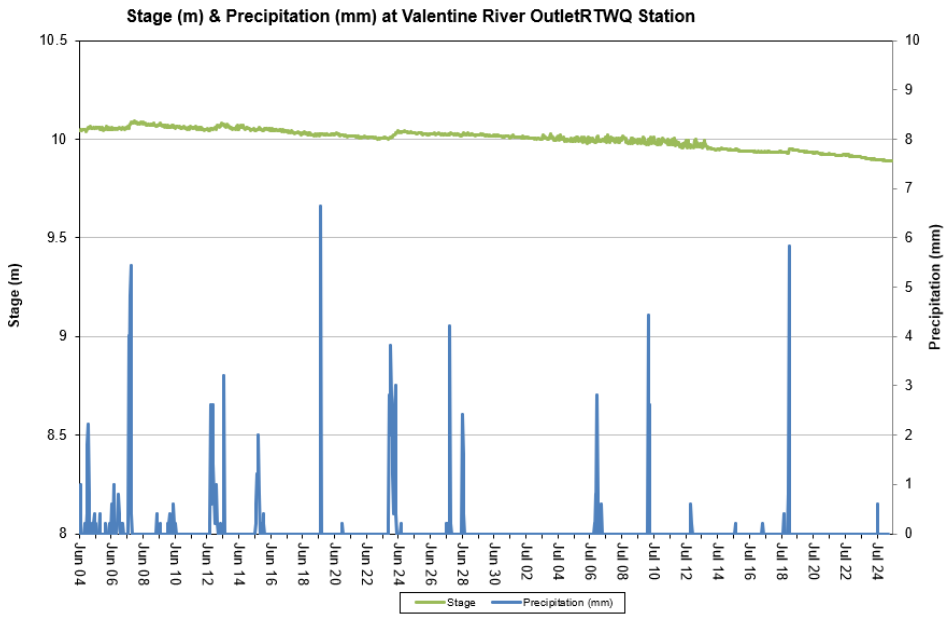
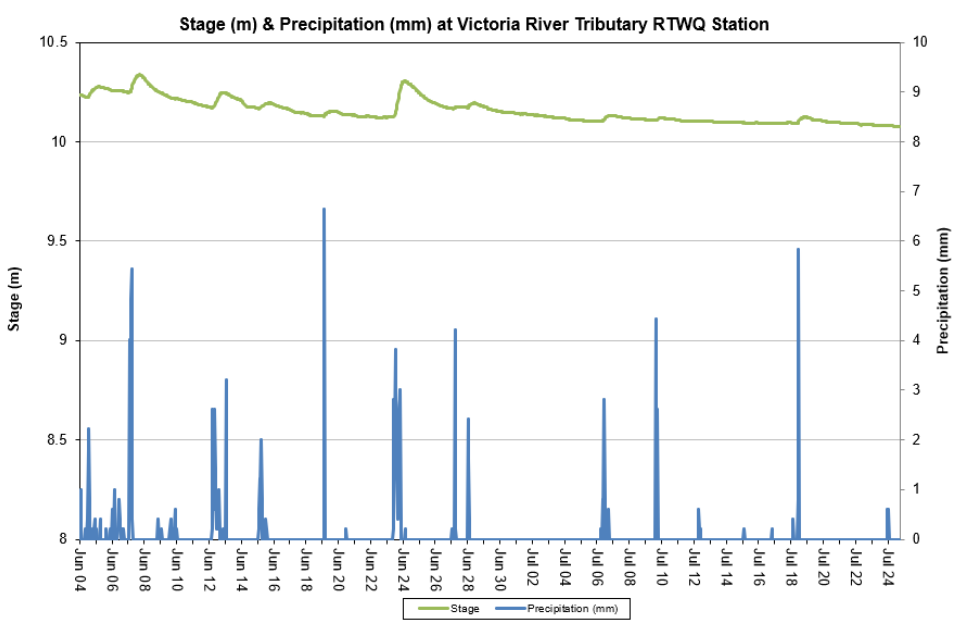
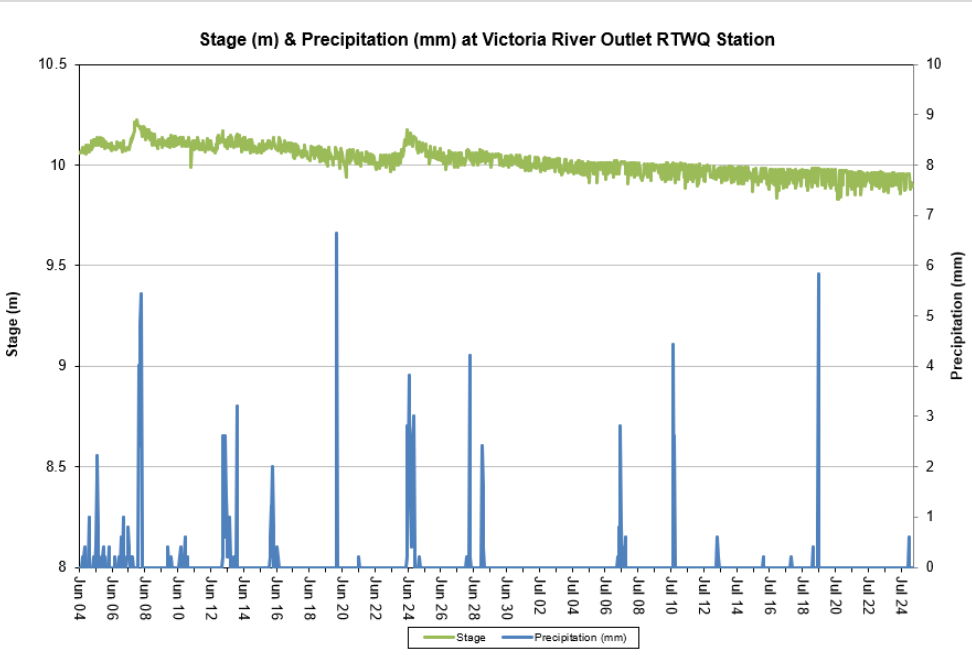
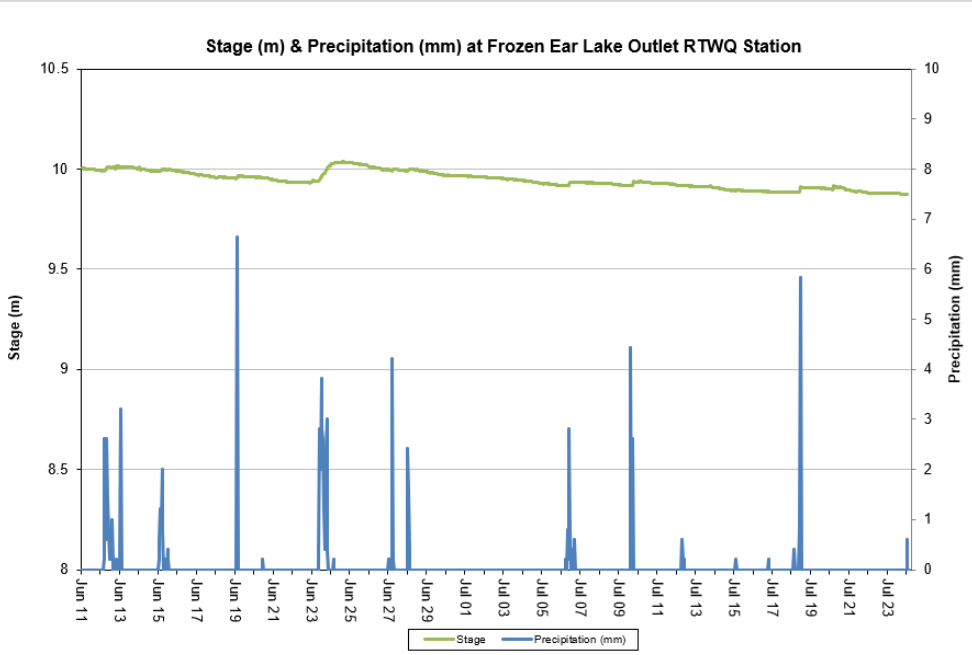








Water Resources Management Division hydrometric data is quality controlled on a less frequent basis than water quality data due to differences in protocols. The hydrometric data shown in this report is provisional and has not undergone quality control checks.

Conclusions

- Instruments were deployed between June 4-11th and removed on July 24-25th at six real-time water quality/quantity monitoring stations within the Calibre Mining: Valentine Gold Mine monitoring network. Two new water quality and quantity stations, Victoria River at Beothuk Lake, and Frozen Ear Lake Outlet, were installed at the beginning of this deployment period.
- In most cases, parameter fluctuations can be explained by weather-related events or changes in water levels.
- Water temperature generally showed an increasing trend at all stations, consistent with rising seasonal air temperatures during the transition from spring to summer.
- pH values at all six stations generally stayed within the recommended CCME Guidelines for the Protection of Aquatic Life. At Roebucks Brook and Victoria River Outlet stations, pH levels occasionally dipped below the lower guideline but did not remain low for an extended period.
- Specific conductivity showed a slight increasing trend at most stations, with expected decreases during precipitation events. Spikes at Victoria River Outlet were linked to runoff and substrate disturbance during rainfall.
- Dissolved oxygen levels at all six stations consistently remained above the CCME guideline for the Protection of Other Life Stages but hovered around the guideline for the Protection of Early Life Stages.
- The water exhibited clear conditions with consistently low turbidity values, though negative turbidity values were recorded at some stations due to calibration differences. These values were retained to explore trends, showing turbidity spikes during stage increases linked to rainfall. As summer progressed and precipitation decreased, reduced runoff and substrate disturbance led to lower turbidity levels.
- Stage levels at all stations were influenced by significant precipitation events and showed an overall decreasing trend over the deployment period.
- WRMD and Calibre Mining staff will continue collaborating to install, establish, and maintain the real-time monitoring network for the Valentine Lake gold project in central Newfoundland.

Prepared by:
Department of Environment & Climate Change
Water Resources Management Division

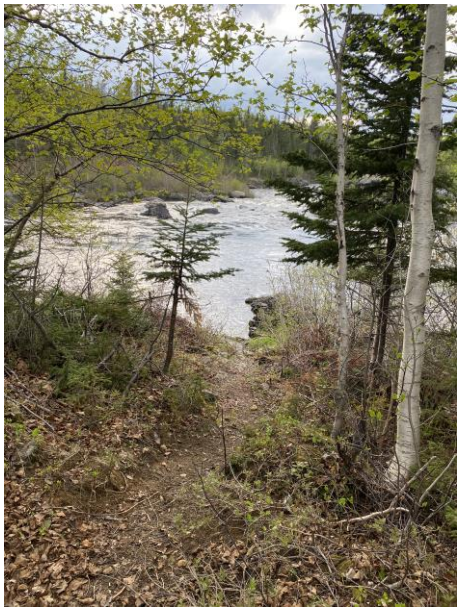
Appendix A: Real Time Surface Water Quality/Quantity Network – June 2024

Station Name	Station Number	Latitude	Longitude	Approximate Equipment Depth
Victoria River at Beothuk Lake	NF02YN0051	-56.678449	48.742910	0.5m
Roebucks Brook	NF02YN0049	-57.013102	48.544174	0.33m
Valentine River Outlet	NF02YN0048	-57.078128	48.424644	0.15m
Victoria River Tributary	NF02YN0050	-57.07692	48.40859	0.5m
Victoria River Outlet	NF02YN0047	-57.072439	48.407878	0.9m
Frozen Ear Lake Outlet	NF02YN0052	-57.136825	48.389415	0.75m

Appendix B: New Station Descriptions

Victoria River at Beothuk Lake

Station Location: Station located at the outlet of Victoria River into Beothuk Lake. Approx. 20-30m from the access road. Station positioned on the Eastern side of the river.



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Frozen Ear Lake Outlet

Station location: Located at the beginning of the outlet of Frozen Ear Lake into Valentine Lake. Station positioned on the southern edge.

Appendix C: Weather Data from Calibre Mining Corp: Valentine Gold Project Meteorological Station