

Real Time Water Quality Deployment Report
Tata Steel Minerals Canada (TSMC) - Elross Lake Network
NF03OB0039, NF03OB0042 & NF03OB0043

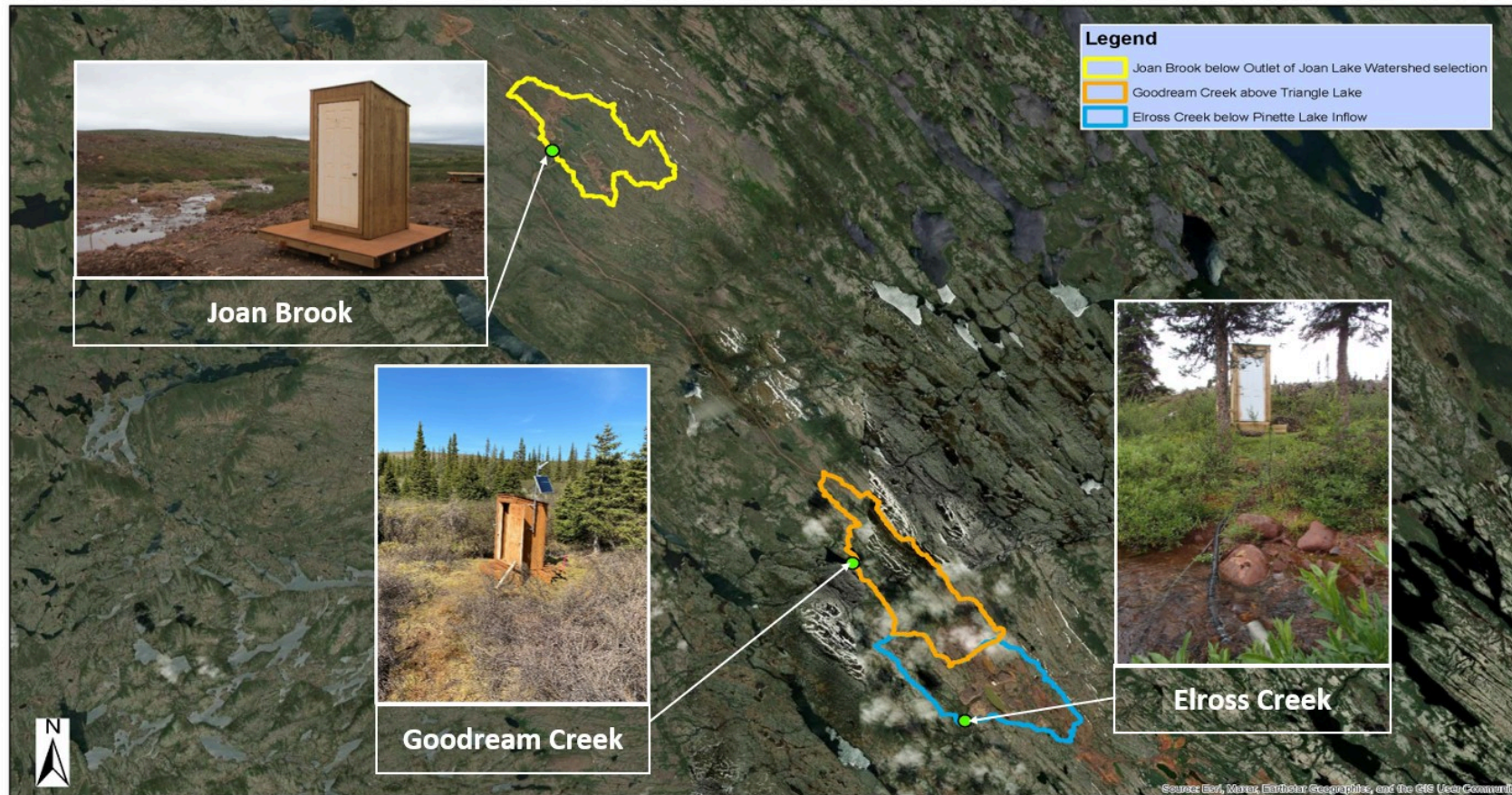
2025-06-17 to 2025-08-19



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



TATA Steel Minerals Canada (TSMC)



The Water Resources Management Division (WRMD) maintain real-time water quality and water quantity monitoring stations near the Elross Lake Iron Ore Mine area.

The purpose of these real-time stations are to monitor, process and publish real-time water quality and quantity data for waterbodies including; Elross Creek, Joan Brook and Goodream Creek.

Clean and calibrated real-time water quality monitoring instruments were deployed and removed on the following;

2025-06-17 to 2025-08-19

- Elross Creek below Pinette Lake Inflow
- Goodream Creek above Triangle Lake

2025-06-18 to 2025-09-08

- Joan Brook below Outlet of Joan Lake

Note:

1. The Joan Brook sonde instrument was removed on 2025-08-19, however redeployed on 2025-08-22 due to switch-out instrument issues.
2. Goodream Creek data is missing from June 17, 2025 to July 7, 2025 due to logfile error & ADRS set up delay.

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.

Parameter	Excellent	Good	Fair	Marginal	Poor
Dissolved oxygen	$\leq \pm 0.3$ mg/L	$\leq \pm 0.31 - 0.5$ mg/L	$\leq \pm 0.51 - 0.8$ mg/L	$\leq \pm 0.81 - 1$ mg/L	$> \pm 1$ mg/L
pH	$\leq \pm 0.2$ units	$\leq \pm 0.21 - 0.5$ units	$\leq \pm 0.51 - 0.8$ units	$\leq \pm 0.81 - 1$ units	$> \pm 1$ units
Water Temperature	$\leq \pm 0.2^\circ\text{C}$	$\leq \pm 0.21 - 0.5^\circ\text{C}$	$\leq \pm 0.51 - 0.8^\circ\text{C}$	$\leq \pm 0.81 - 1^\circ\text{C}$	$> \pm 1^\circ\text{C}$
Specific Conductance	$\leq \pm 3$ $\mu\text{S/cm}$ or $\leq \pm 3\%$, whichever is greater	$\leq \pm 3.1 - 10$ $\mu\text{S/cm}$ or $\leq \pm 3.1 - 10\%$, whichever is greater	$\leq \pm 10 - 15$ $\mu\text{S/cm}$ or $\leq \pm 10.1 - 15\%$, whichever is greater	$\leq \pm 15.1 - 20$ $\mu\text{S/cm}$ or $\leq \pm 15.1 - 20\%$, whichever is greater	$> \pm 20$ $\mu\text{S/cm}$ or $> \pm 20\%$, whichever is greater
Turbidity	$\leq \pm 2$ turbidity units or $\leq \pm 5\%$, whichever is greater	$\leq \pm 2.1 - 5$ turbidity units or $\leq \pm 5.1 - 10\%$, whichever is greater	$\leq \pm 5.1 - 8$ turbidity units or $\leq \pm 10.1 - 15\%$, whichever is greater	$\leq \pm 8.1 - 10$ turbidity units or $\leq \pm 15.1 - 20\%$, whichever is greater	$> \pm 10$ turbidity units or $> \pm 20\%$, whichever is greater

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

Station	Parameter	Deployment Rank	Grab Sample Rank	Removal Rank
Elross Creek	Dissolved Oxygen (mg/l)	Excellent		Excellent
Elross Creek	Turbidity (NTU)	Excellent	Excellent	Excellent
Elross Creek	pH	Excellent	Good	Fair
Elross Creek	Specific Conductivity ($\mu\text{S/cm}$)	Good	Excellent	Excellent
Elross Creek	Temperature ($^\circ\text{C}$)	Poor		Excellent
Goodream Creek	Specific Conductivity ($\mu\text{S/cm}$)	Excellent	Excellent	Excellent
Goodream Creek	Turbidity (NTU)	Excellent	Excellent	Excellent
Goodream Creek	pH	Excellent	Good	Excellent
Goodream Creek	Dissolved Oxygen (mg/l)	Good		Poor
Goodream Creek	Temperature ($^\circ\text{C}$)	Good		Excellent
Joan Brook	pH	Excellent	Good	Good
Joan Brook	Specific Conductivity ($\mu\text{S/cm}$)	Excellent	Good	Good
Joan Brook	Turbidity (NTU)	Fair	Fair	Excellent
Joan Brook	Dissolved Oxygen (mg/l)	Good		Poor
Joan Brook	Temperature ($^\circ\text{C}$)	Good		Poor



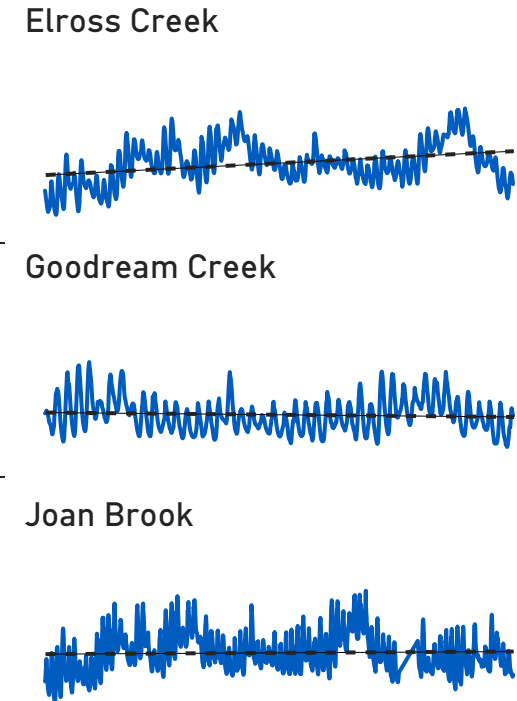
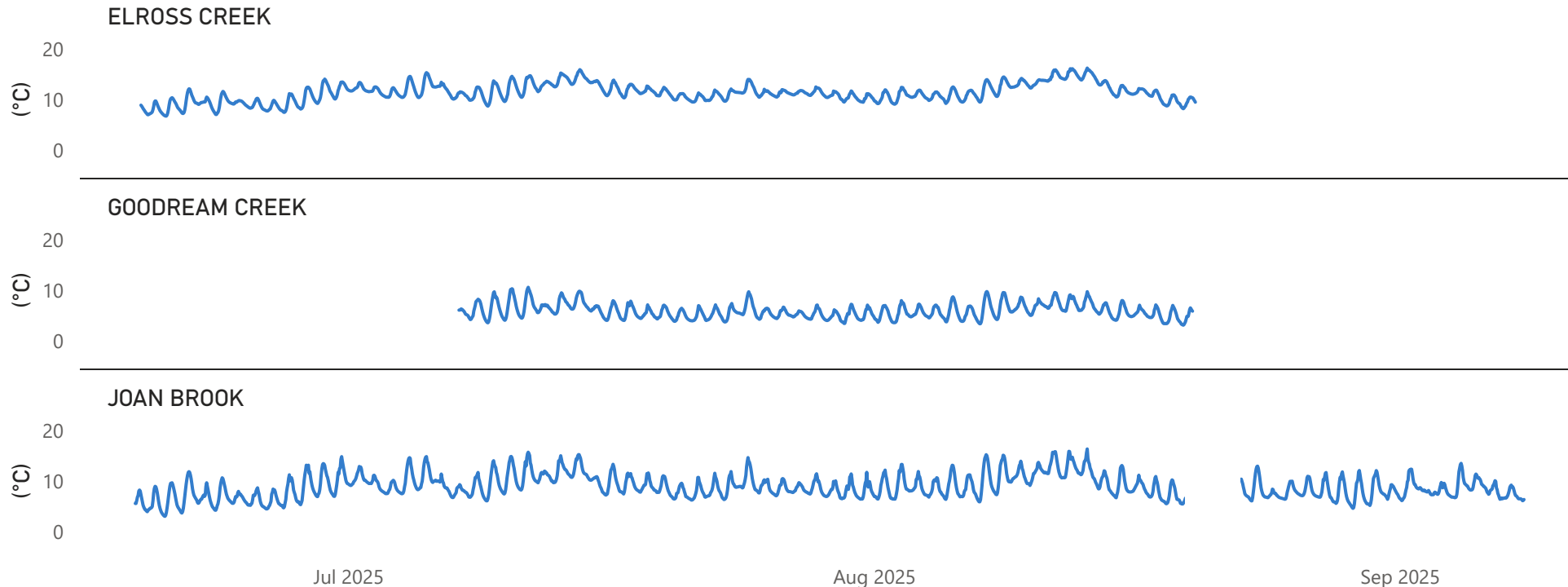
Water Temperature (°C)



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 during the monitoring period (June 17 to August 19, 2025, with Joan Brook continuing to September 8, 2025) exhibited typical summer conditions with moderate temperatures and noticeable short-term variability. Elross Creek recorded temperatures ranging from 6.71 °C to 16.21 °C, with an average of 11.33 °C, reflecting relatively stable and warmer conditions. Goodream Creek showed a wider range, from 3.09 °C to 10.58 °C, and a lower average of 5.93 °C, indicating cooler conditions and greater variability throughout the period. Joan Brook temperatures ranged from 3.01 °C to 16.34 °C, with an average of 8.95 °C, and extended into early September, capturing a slight cooling trend toward the end of the deployment. Across all sites, temperatures displayed regular diurnal fluctuations, increasing during the day and decreasing overnight, with overall patterns consistent with seasonal summer conditions transitioning toward early fall.

STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	11.33	6.71	16.21	11.25
GOODREAM CREEK	5.93	3.09	10.58	5.80
JOAN BROOK	8.95	3.01	16.34	8.62





pH



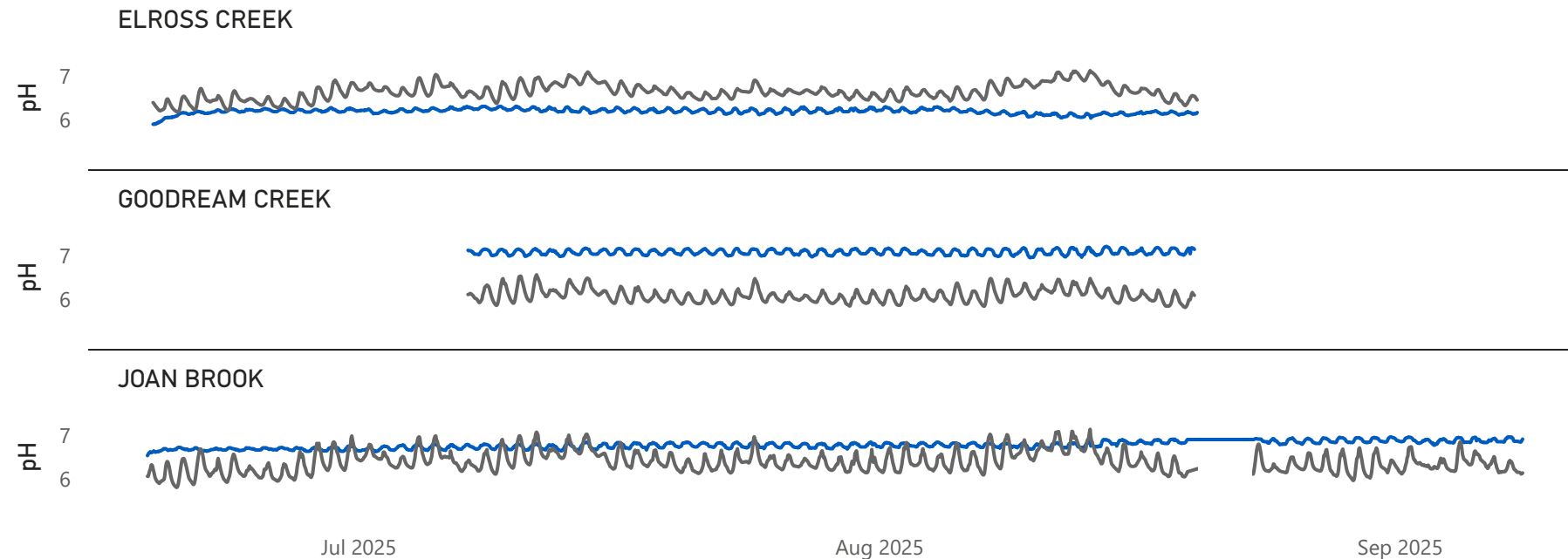
pH relates to the free hydrogen ions in water and it is a measure of acidity in water. A pH of 7 indicates a neutral pH, below 7 is considered acidic, and above 7 is considered basic. The [Canadian Council of Ministers of the Environment](#) (CCME) Freshwater Aquatic Life guideline provides a basis by 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](#).

STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	6.19	5.89	6.30	6.19
GOODREAM CREEK	7.08	6.95	7.21	7.08
JOAN BROOK	6.77	6.53	6.96	6.77

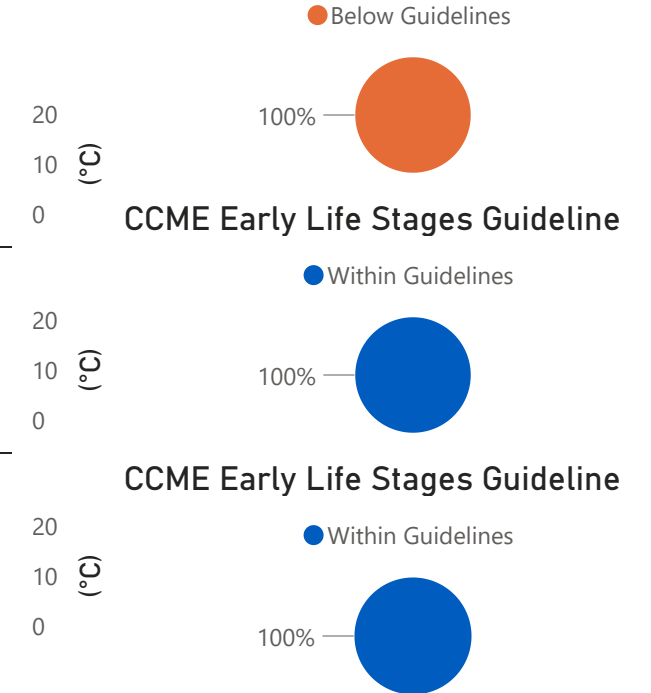
pH conditions were generally stable and within expected ranges for freshwater systems in the region. Elross Creek exhibited consistent pH values ranging from 5.89 to 6.30, with an average of 6.19, indicating slightly acidic but stable conditions; while these values fall below CCME guidelines, they are consistent with the historical baseline for this location and reflect naturally acidic conditions. Goodream Creek showed pH values between 6.95 and 7.21, with an average of 7.08, reflecting near-neutral conditions with minimal variability. Joan Brook ranged from 6.53 to 6.96, with an average of 6.77, also indicating stable, slightly acidic to neutral conditions throughout the monitoring period. Across all sites, pH displayed minor diurnal fluctuations but remained within typical natural ranges, suggesting reliable sensor performance and consistent water quality conditions.

Water pH (units) & Water Temperature (°C)

● pH ● Water Temperature (°C)



CCME Early Life Stages Guideline



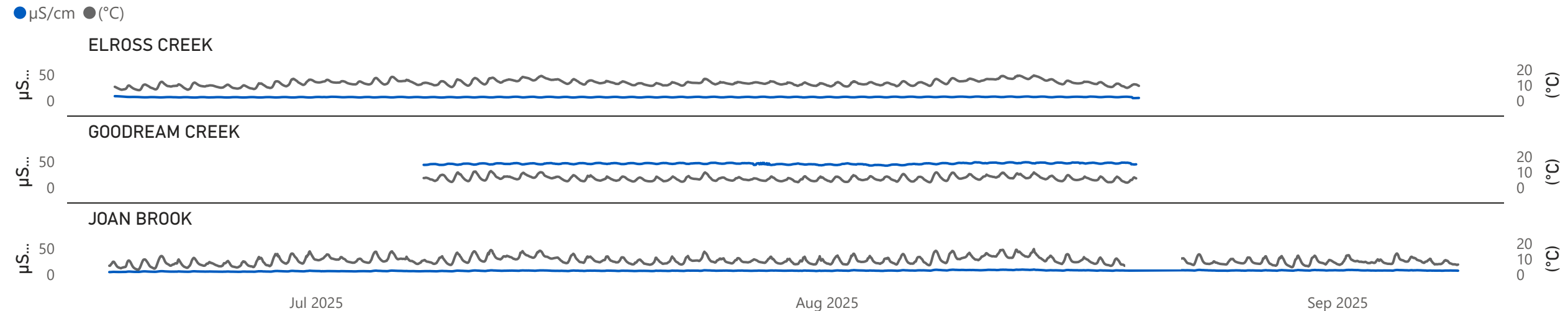
Specific Conductivity ($\mu\text{S}/\text{cm}$)

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](#).

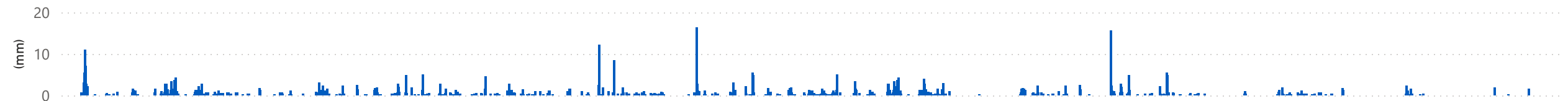
Specific conductivity during the monitoring period remained relatively stable, with distinct differences between sites reflecting local watershed characteristics. Elross Creek exhibited low conductivity values ranging from 4.71 to 8.50 $\mu\text{S}/\text{cm}$, with an average of 6.73 $\mu\text{S}/\text{cm}$, indicating very low ionic content and minimal influence from external inputs. Joan Brook showed similar low conductivity conditions, ranging from 4.42 to 9.31 $\mu\text{S}/\text{cm}$, with an average of 7.07 $\mu\text{S}/\text{cm}$, and only minor variability throughout the deployment. In contrast, Goodream Creek displayed notably higher conductivity values, ranging from 42.16 to 48.85 $\mu\text{S}/\text{cm}$, with an average of 46.00 $\mu\text{S}/\text{cm}$, suggesting a greater presence of dissolved ions, likely influenced by local geology or watershed inputs. Across all sites, conductivity exhibited minor short-term fluctuations that may be associated with precipitation events and changes in flow, but overall remained stable, indicating consistent water quality conditions during the monitoring period.

STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	6.73	4.71	8.50	6.71
GOODREAM CREEK	46.00	42.16	48.85	46.17
JOAN BROOK	7.07	4.42	9.31	7.19

Specific Conductivity ($\mu\text{S}/\text{cm}$) & Water Temperature ($^{\circ}\text{C}$)



Schefferville Precipitation (mm)



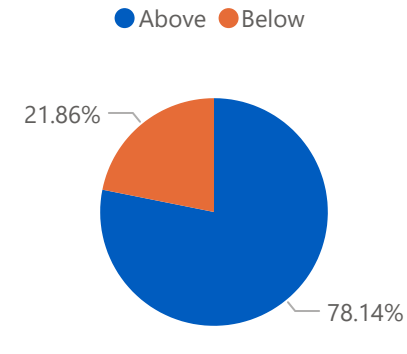
Dissolved Oxygen Concentration and Saturation



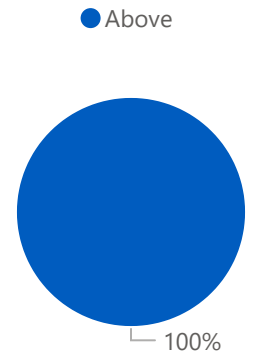
Dissolved oxygen (DO) in water is crucial for aquatic life. The [CCME \(Canadian Council of Ministers of the Environment\)](#) Freshwater Aquatic Life guidelines provide a basis by which to judge the overall health of waterways. The minimum guideline for early life stages in cold water is 9.5 mg/L and 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.

Dissolved oxygen concentrations were stable and indicative of well-oxygenated conditions across all sites. Elross Creek recorded values ranging from 7.36 to 10.34 mg/L, with an average of 9.02 mg/L, showing moderate variability and occasional values near the early life stage guideline. Goodream Creek exhibited consistently higher concentrations, ranging from 11.00 to 13.35 mg/L, with an average of 12.09 mg/L, indicating strong and stable oxygenation throughout the period. Joan Brook ranged from 9.48 to 12.60 mg/L, with an average of 11.08 mg/L, also reflecting consistently well-oxygenated conditions. Short-term fluctuations at all sites are likely associated with changes in water temperature and flow; however, most values remained above the CCME guideline for other life stages (6.5 mg/L), with the majority also meeting the early life stage guideline (9.5 mg/L), indicating generally favorable conditions for aquatic life.

CCME Early Life Stages Guideline



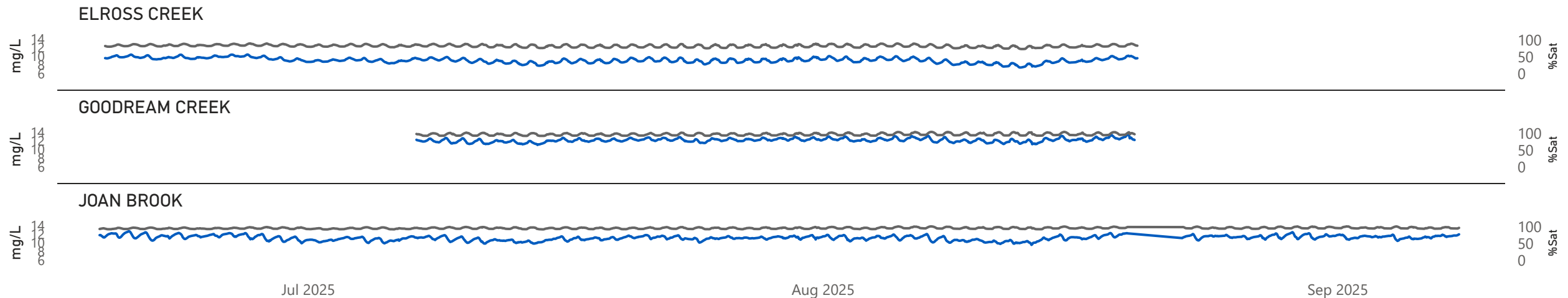
CCME Other Life Stages Guideline



STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	9.02	7.36	10.34	9.03
GOODREAM CREEK	12.09	11.00	13.35	12.09
JOAN BROOK	11.08	9.48	12.60	11.12

Dissolved Oxygen (mg/L) & % Saturation

● mg/L ● %Sat



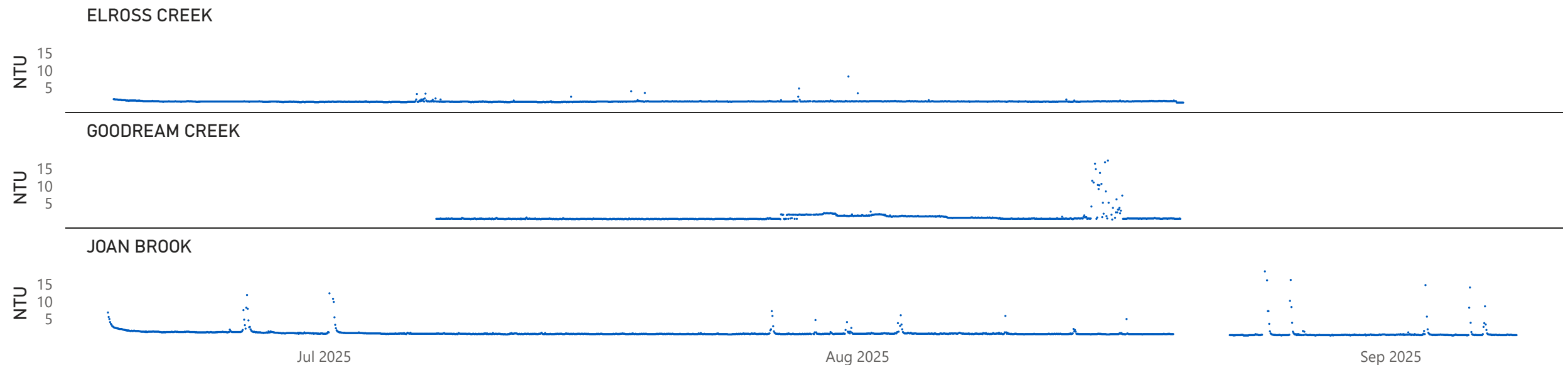
Turbidity

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 at the three stations was generally low, indicating clear baseline conditions across all sites. Elross Creek recorded turbidity values ranging from 0.60 to 8.20 NTU, with an average of 0.92 NTU, and remained relatively stable with only minor intermittent increases. Goodream Creek showed values between 0.20 and 17.40 NTU, with an average of 0.84 NTU, with occasional short-lived spikes likely associated with precipitation events and corresponding increases in flow. Joan Brook ranged from 0.10 to 18.80 NTU, with an average of 0.77 NTU, and exhibited slightly more frequent spikes throughout the monitoring period. Across all sites, turbidity remained low for the majority of the deployment, with brief, event-driven increases likely related to sediment mobilization during rainfall or higher flow conditions.

STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	0.92	0.60	8.20	0.90
GOODREAM CREEK	0.84	0.20	17.40	0.40
JOAN BROOK	0.77	0.10	18.80	0.60

Turbidity (NTU)





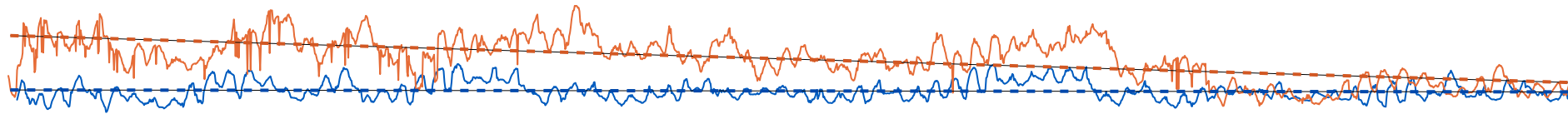
Meteorological and Hydrometric Data

*Climate data obtained from Joan Brook & Schefferville Airport Stations



Air Temperature Trendline

Joan Brook AIR_TEMP Schefferville Temp (°C)

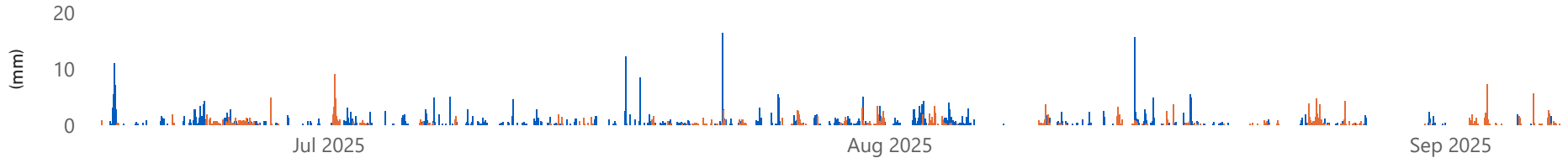


Monthly Average Air Temp (°C)

Month	Joan Brook	Schefferville A
June	9.82	11.91
July	11.75	11.89
August	11.20	10.50
September	10.44	13.55

Schefferville A Precipitation & Joan Brook Precipitation (mm)

Schefferville A Joan Brook



Monthly Total Precipitation (mm)

Month	Joan Brook	Schefferville A
June	36.82	101.50
July	96.40	223.20
August	91.59	160.90
September	40.77	3.50
Total	265.58	489.10

Stage values are determined by a vertical reference and serves as an approximation of the water level at the monitoring station.

Elross Creek Stage (m)



Goodream Creek Stage (m)



Joan Brook Stage (m)



Average Monthly Stage (m)

STAT_NAME	Month	STAGE (m)
ELROSS CREEK	June	1.10
ELROSS CREEK	July	1.06
ELROSS CREEK	August	1.06
GOODREAM CREEK	July	588.11
GOODREAM CREEK	August	588.10
JOAN BROOK	June	1.62
JOAN BROOK	July	1.57
JOAN BROOK	August	1.52
JOAN BROOK	September	1.53

Conclusions

Clean and calibrated real-time water quality monitoring instruments were deployed within the Tata Steel Minerals Canada (TSMC) – Elross Lake Network, providing continuous monitoring data for Elross Creek, Goodream Creek, and Joan Brook throughout the summer monitoring period. The deployment captured seasonal water quality and hydrologic conditions across the monitored watersheds.

- **Water Temperature** exhibited expected summer conditions with regular diurnal fluctuations and gradual seasonal cooling toward early September. Elross Creek maintained the warmest and most stable temperatures, while Goodream Creek remained cooler and more variable. Joan Brook captured transitional late-season cooling conditions extending into September.
- **pH** conditions remained generally stable throughout the deployment. Elross Creek exhibited naturally acidic conditions below the CCME guideline for early life stages; however, these values are consistent with historical baseline conditions and regional geology. Goodream Creek and Joan Brook maintained near-neutral to slightly acidic conditions with minimal variability, indicating stable water chemistry throughout the monitoring period.
- **Specific Conductivity** remained low and stable at Elross Creek and Joan Brook, indicating limited dissolved ion concentrations and minimal external influence. Goodream Creek consistently displayed higher conductivity values, likely associated with localized watershed characteristics and geological inputs. Minor fluctuations observed throughout the deployment were likely related to precipitation and flow variability.
- **Dissolved Oxygen** concentrations indicated generally well-oxygenated conditions across all monitoring sites. Goodream Creek and Joan Brook consistently maintained dissolved oxygen concentrations above CCME guidelines for the protection of aquatic life, while Elross Creek periodically approached the early life stage guideline during warmer periods. Overall, dissolved oxygen conditions remained supportive of aquatic habitat throughout the deployment.
- **Turbidity** remained low for the majority of the deployment, indicating generally clear baseline water quality conditions at all stations. Short-duration increases in turbidity at Goodream Creek and Joan Brook were likely associated with precipitation events and increased runoff resulting in temporary sediment mobilization.
- **Meteorological and Hydrometric Conditions** demonstrated that precipitation events influenced short-term fluctuations in stage and water quality conditions throughout the deployment. Water levels at Elross Creek and Joan Brook generally declined through the summer months, while Goodream Creek displayed localized responses to runoff events and precipitation inputs.

Joan Brook air temperature and precipitation patterns generally followed the same overall seasonal trends as the nearby Schefferville A climate station; however, several localized differences were observed throughout the monitoring period. Average monthly air temperatures at Joan Brook were slightly cooler than Schefferville A during June and July, . In August, Joan Brook was slightly warmer compared to Schefferville A. The data suggest that localized terrain, watershed characteristics, and site exposure likely influenced temperature variability between the two stations. Precipitation trends were also generally similar between stations, with both sites capturing the timing of regional precipitation events; however, Joan Brook consistently recorded slightly greater total precipitation throughout the monitoring period. These differences are likely associated with localized storm activity, topographic influences, and the spatial variability typical of precipitation patterns in the region.

Overall, the 2025 TSMC Elross Lake Network deployment successfully characterized summer water quality and hydrologic conditions within the monitored watersheds. The dataset provides valuable baseline environmental information to support ongoing watershed monitoring and long-term evaluation of potential mining-related influences within the region.

Appendix 1
Grab Sample Results