

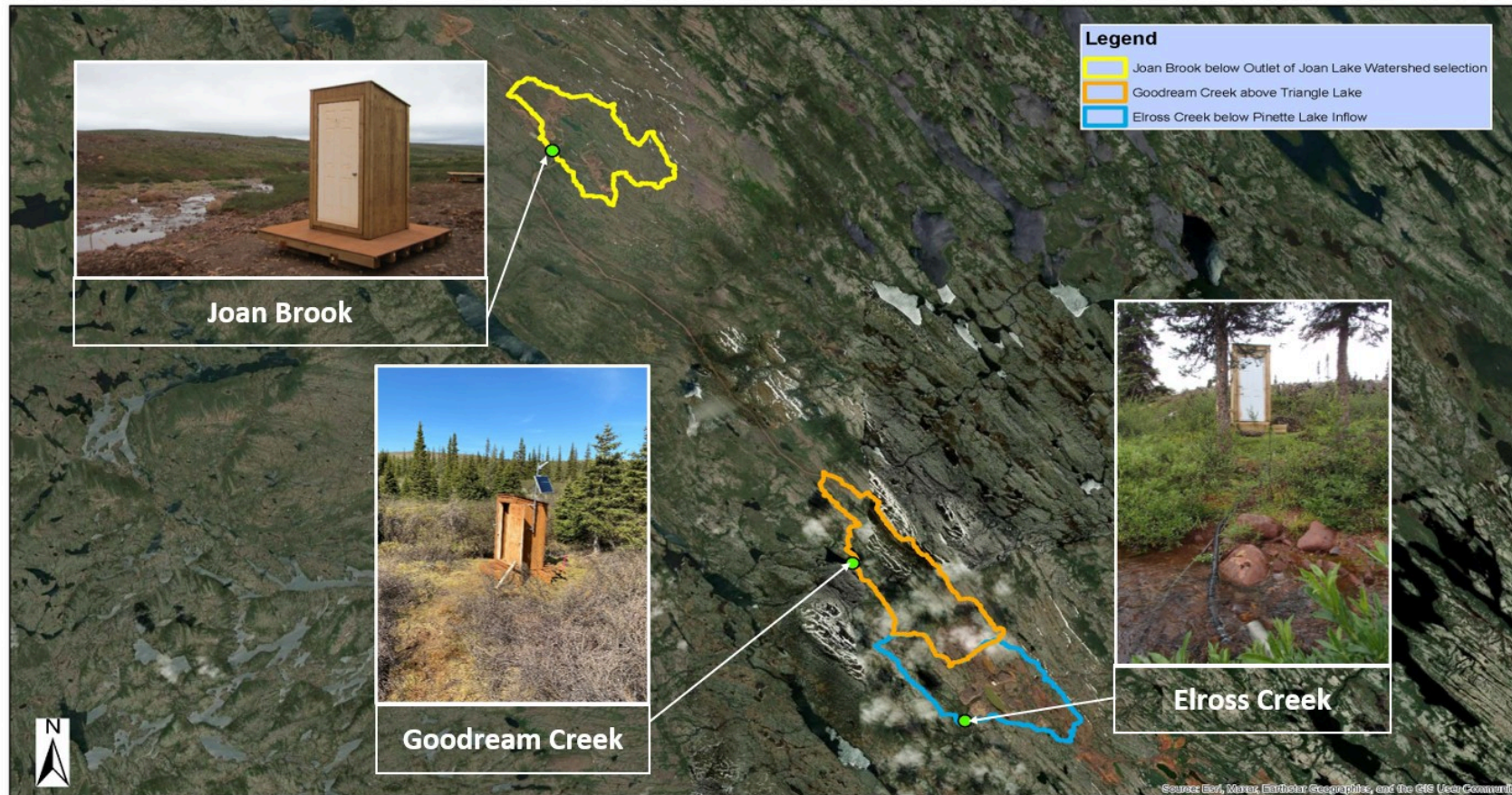
Real Time Water Quality Deployment Report
Tata Steel Minerals Canada (TSMC) - Elross Lake Network
NF03OB0039, NF03OB0042 & NF03OB0043

2025-08-19 to 2025-10-30



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;

2025-08-19 to 2025-10-29

- Elross Creek below Pinette Lake Inflow

2025-08-19 to 2025-10-30

- Goodream Creek above Triangle Lake

2025-09-08 to 2025-10-29

- 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. A freshly calibrated instrument was deployed on 2025-09-08.

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

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	DATE	PARAMETERS	DEPLOYMENT RANK	DEPLOYMENT GRAB SAMPLE RANK	REMOVAL RANK	REMOVAL GRAB SAMPLE RANK
ELROSS CREEK	Tuesday, August 19, 2025	DO (mg/L)	Excellent		Excellent	
ELROSS CREEK	Tuesday, August 19, 2025	pH	Excellent	Good	Fair	Good
ELROSS CREEK	Tuesday, August 19, 2025	Turbidity (NTU)	Excellent	Excellent	Excellent	Excellent
ELROSS CREEK	Tuesday, August 19, 2025	Sp. Conductivity	Good	Excellent	Excellent	Excellent
ELROSS CREEK	Tuesday, August 19, 2025	Temperature	Poor		Excellent	
GOODREAM CREEK	Tuesday, August 19, 2025	Turbidity (NTU)	Excellent	Excellent	Excellent	Excellent
GOODREAM CREEK	Tuesday, August 19, 2025	DO (mg/L)	Good		Fair	
GOODREAM CREEK	Tuesday, August 19, 2025	pH	Good	Fair	Good	Fair
GOODREAM CREEK	Tuesday, August 19, 2025	Sp. Conductivity	Good	Good	Good	Good
GOODREAM CREEK	Tuesday, August 19, 2025	Temperature	Good		Good	
JOAN BROOK	Monday, September 08, 2025	Sp. Conductivity	Excellent	Excellent	Excellent	Excellent
JOAN BROOK	Monday, September 08, 2025	Turbidity (NTU)	Excellent	Excellent	Excellent	Excellent
JOAN BROOK	Monday, September 08, 2025	DO (mg/L)	Good		Good	
JOAN BROOK	Monday, September 08, 2025	pH	Good	Marginal	Excellent	Excellent
JOAN BROOK	Monday, September 08, 2025	Temperature	Marginal		Excellent	



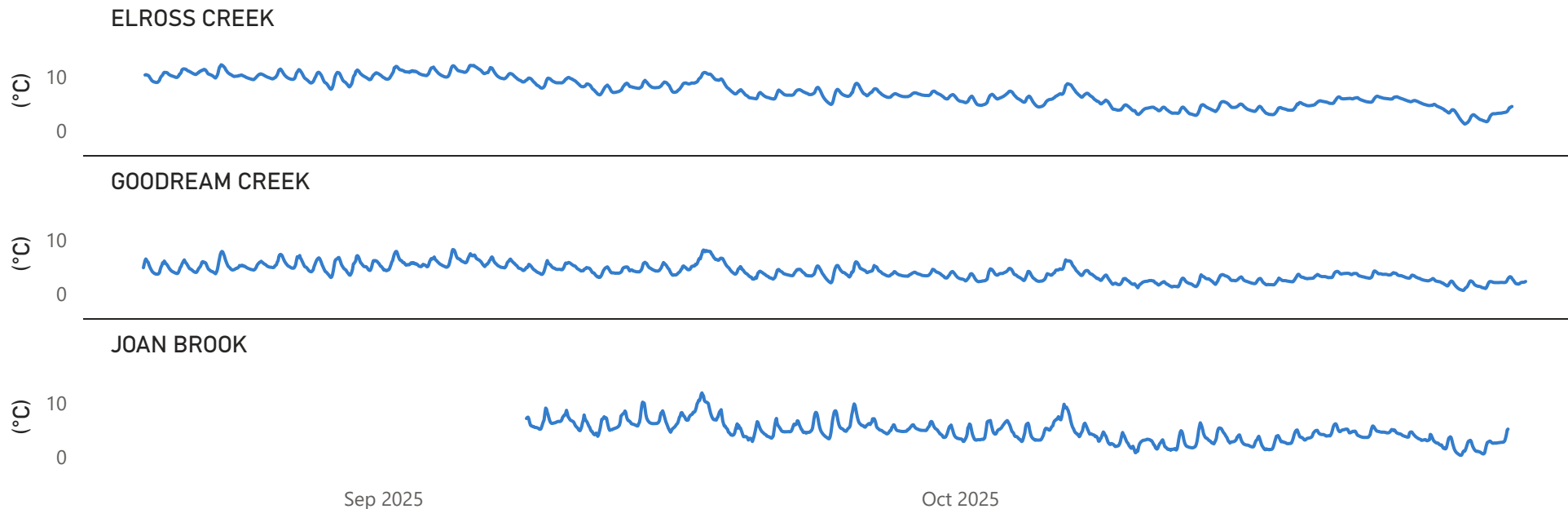
Water Temperature (°C)



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.

STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	7.29	1.21	12.34	6.98
GOODREAM CREEK	4.01	0.60	8.27	3.91
JOAN BROOK	4.68	0.30	11.99	4.63

Water temperature across Elross Creek, Goodream Creek, and Joan Brook during the monitoring period exhibited a gradual seasonal cooling trend consistent with late summer transitioning into fall conditions. Elross Creek recorded temperatures ranging from 1.21 °C to 12.34 °C, with an average of 7.29 °C, reflecting relatively stable and generally warmer conditions compared to the other sites. Goodream Creek exhibited cooler temperatures overall, ranging from 0.60 °C to 8.27 °C, with an average of 4.01 °C. Joan Brook temperatures ranged from 0.30 °C to 11.99 °C, with an average of 4.68 °C, and displayed moderate short-term variability throughout the deployment. Across all sites, temperatures showed regular diurnal fluctuations, increasing during the day and decreasing overnight, while the overall trend reflected progressive cooling toward early fall conditions.



Elross Creek

Goodream Creek

Joan Brook



pH



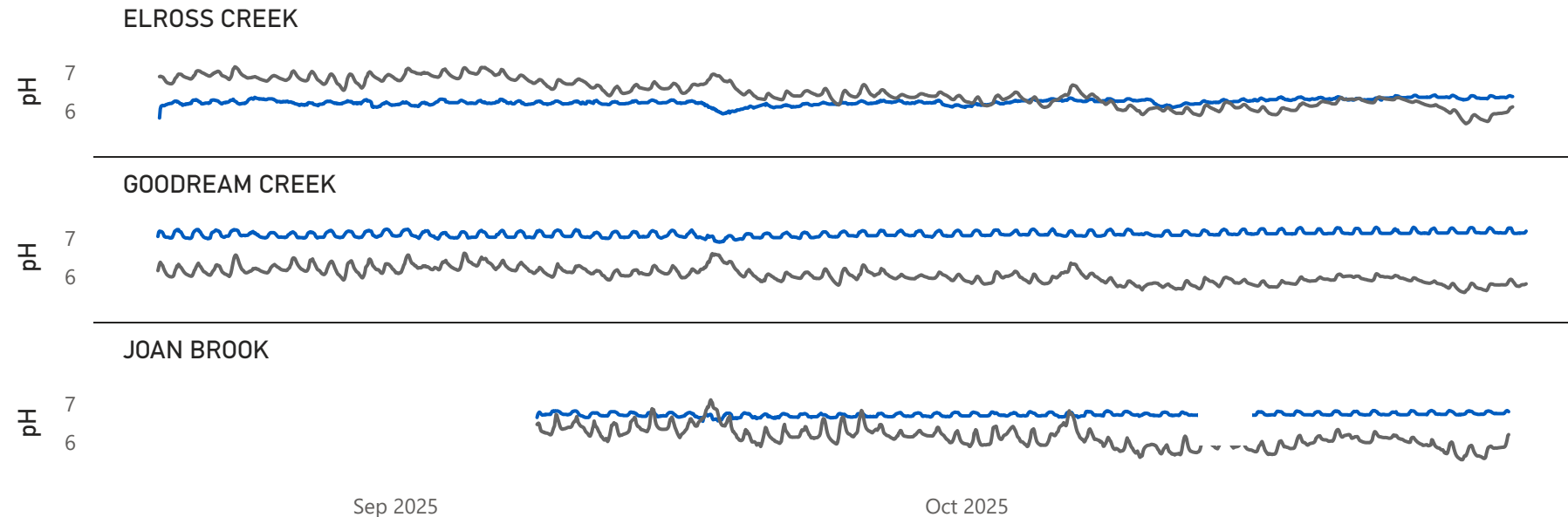
pH relates to the free hydrogen ions in water and it is a measure of acidity in water. A pH of 7 indicates a neutral pH, below 7 is considered acidic, and above 7 is considered basic. The [Canadian Council of Ministers of the Environment](#) (CCME) Freshwater Aquatic Life guideline provides a basis by 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	6.23	5.81	6.41	6.23
GOODREAM CREEK	7.10	6.89	7.28	7.11
JOAN BROOK	6.72	6.54	6.82	6.71

pH conditions at Elross Creek, Goodream Creek, and Joan Brook during the monitoring period were generally stable and within expected ranges for freshwater systems in the region. Elross Creek exhibited pH values ranging from 5.81 to 6.41, with an average of 6.23, indicating slightly acidic but consistent conditions; while these values fall below the CCME guideline range, they are consistent with the historical baseline for the system and reflect naturally acidic water chemistry. Goodream Creek recorded pH values between 6.89 and 7.28, with an average of 7.10, reflecting stable near-neutral conditions with minimal variability. Joan Brook ranged from 6.54 to 6.82, with an average of 6.72, indicating stable slightly acidic to neutral conditions throughout the deployment. Across all sites, pH displayed only minor short-term fluctuations and 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



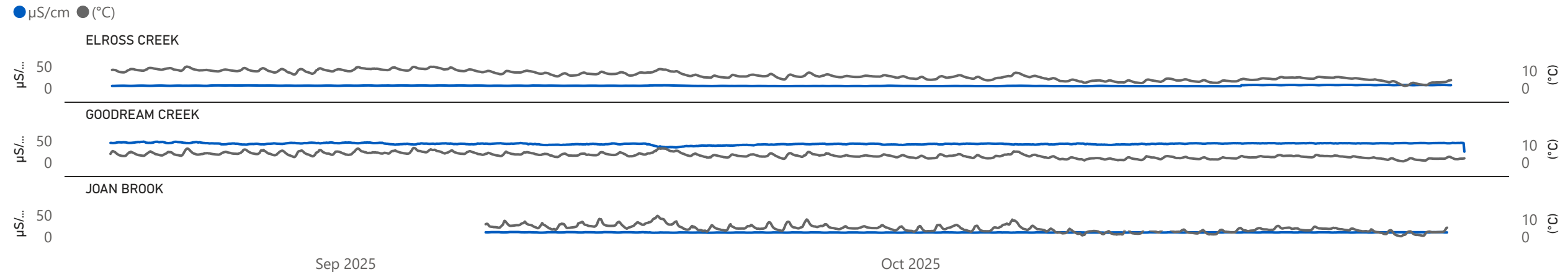
Specific Conductivity ($\mu\text{S}/\text{cm}$)

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](#).

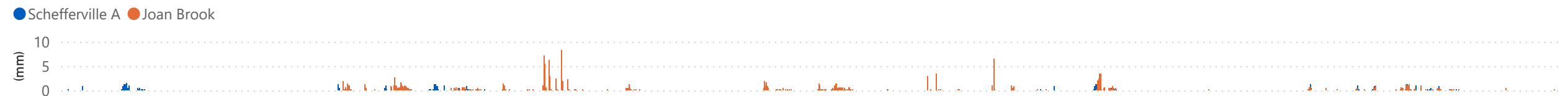
Specific conductivity during the monitoring period remained relatively stable across all three sites, with distinct differences reflecting local watershed characteristics and dissolved ion concentrations. Elross Creek exhibited low conductivity values ranging from 3.96 to 7.10 $\mu\text{S}/\text{cm}$, with an average of 5.24 $\mu\text{S}/\text{cm}$, indicating very low ionic content and minimal influence from external inputs. Joan Brook showed slightly higher but similarly stable conductivity values, ranging from 8.96 to 10.74 $\mu\text{S}/\text{cm}$, with an average of 9.83 $\mu\text{S}/\text{cm}$, suggesting consistent water chemistry throughout the deployment. In contrast, Goodream Creek displayed substantially higher conductivity values, ranging from 24.54 to 47.74 $\mu\text{S}/\text{cm}$, with an average of 42.63 $\mu\text{S}/\text{cm}$, indicating a greater concentration of dissolved ions likely influenced by local geology or watershed characteristics. Across all sites, conductivity exhibited only minor short-term fluctuations, some of which may be associated with precipitation events and changing flow conditions, but overall trends remained stable and indicative of consistent water quality conditions.

STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	5.24	3.96	7.10	5.15
GOODREAM CREEK	42.63	24.54	47.74	42.82
JOAN BROOK	9.83	8.96	10.74	9.82

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



Schefferville A & Joan Brook Precipitation (mm)



Dissolved Oxygen Concentration and Saturation

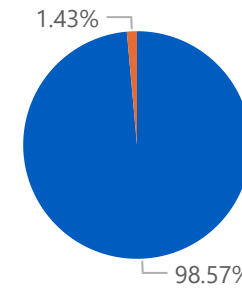


Dissolved oxygen (DO) in water is crucial for aquatic life. The [CCME \(Canadian Council of Ministers of the Environment\)](#) Freshwater Aquatic Life guidelines provide a basis by which to judge the overall health of waterways. The minimum guideline for early life stages in cold water is 9.5 mg/L and 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 remained stable and indicative of well-oxygenated conditions across all monitoring sites throughout the deployment period. Goodream Creek recorded dissolved oxygen values ranging from 10.73 to 14.25 mg/L, with an average of 12.55 mg/L, reflecting consistently high oxygen availability and minimal variability. Joan Brook exhibited similarly strong conditions, with concentrations ranging from 9.95 to 13.79 mg/L and an average of 12.07 mg/L. Elross Creek recorded values between 8.94 and 14.04 mg/L, with an average of 11.36 mg/L, showing slightly greater variability and occasional values below the CCME early life stage guideline of 9.5 mg/L. Across all sites, short-term fluctuations were likely associated with changes in water temperature and flow conditions; however, nearly all recorded values remained above both the CCME guideline for other life stages (6.5 mg/L) and the early life stage guideline, indicating favorable conditions for aquatic life throughout the monitoring period.

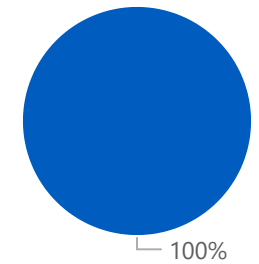
CCME Early Life Stages Guideline

● Above ● Below



CCME Other Life Stages Guideline

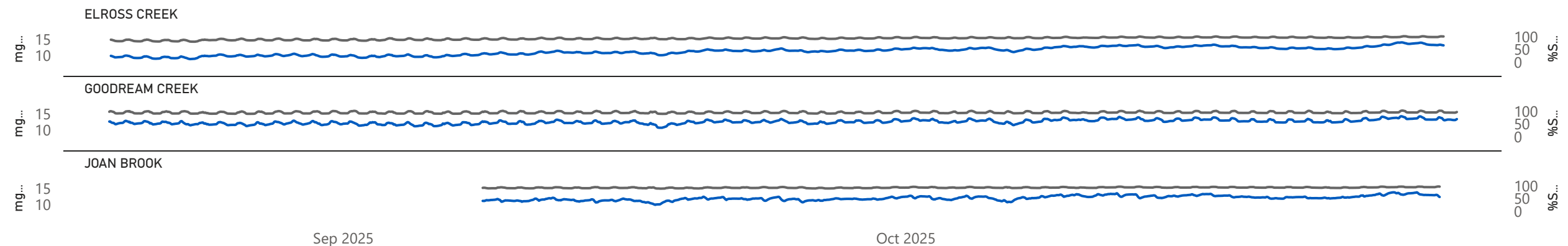
● Above



STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	11.36	8.94	14.04	11.47
GOODREAM CREEK	12.55	10.73	14.25	12.51
JOAN BROOK	12.07	9.95	13.79	12.01

Dissolved Oxygen (mg/L) & % Saturation

● mg/L ● %Sat



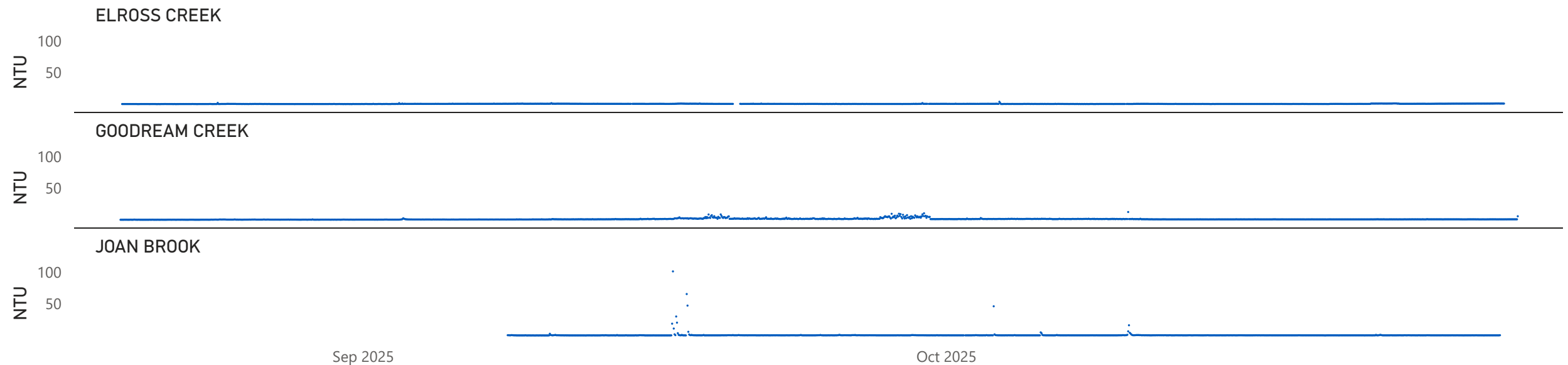
Turbidity

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 monitoring sites was generally low throughout the deployment period, indicating clear baseline water conditions for the majority of the monitoring period. Elross Creek recorded turbidity values ranging from 0.50 to 4.20 NTU, with an average of 0.82 NTU, and remained very stable with only minor intermittent increases. Goodream Creek exhibited values between 0.40 and 12.60 NTU, with an average of 1.37 NTU, showing occasional short-duration spikes likely associated with precipitation events and corresponding increases in streamflow. Joan Brook recorded turbidity values ranging from 0.20 to 101.20 NTU, with an average of 0.76 NTU, with several isolated high-magnitude spikes observed during the deployment. These elevated spikes were likely associated with short-term sediment mobilization during runoff events or temporary disturbances near the sensor. Overall, turbidity remained low and stable across all sites for most of the monitoring period, with brief event-driven increases occurring intermittently.

STAT_NAME	Average	Minimum	Maximum	Median
ELROSS CREEK	0.82	0.50	4.20	0.80
GOODREAM CREEK	1.37	0.40	12.60	1.10
JOAN BROOK	0.76	0.20	101.20	0.40

Turbidity (NTU)





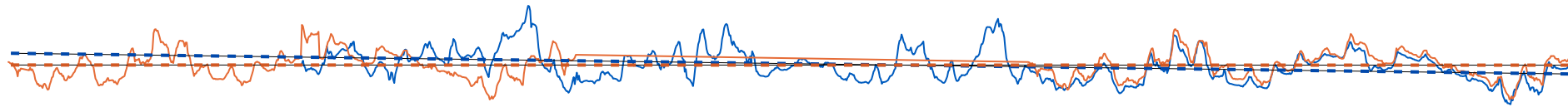
Meteorological and Hydrometric Data

*Climate data obtained from Joan Brook & Schefferville Airport Stations



Air Temperature Trendline

Joan Brook (blue) Schefferville A (orange)



Monthly Average Air Temp (°C)

Month	Schefferville A	Joan Brook
September	4.63	5.31
October	4.05	2.96
August	1.66	

Schefferville A Precipitation & Joan Brook Precipitation (mm)

Joan Brook (orange) Schefferville A (blue)



Monthly Total Precipitation (mm)

Month	Schefferville A	Joan Brook
August	10.40	
September	13.00	100.27
October	23.40	51.37
Total	46.80	151.64

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	August	1.06
ELROSS CREEK	September	1.05
ELROSS CREEK	October	1.04
GOODREAM CREEK	August	588.10
GOODREAM CREEK	September	588.12
GOODREAM CREEK	October	588.12
JOAN BROOK	September	1.74
JOAN BROOK	October	1.74

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 late summer and fall monitoring period. The deployment captured seasonal cooling trends, precipitation-driven hydrologic responses, and stable baseline water quality conditions across the monitored watersheds.

- **Water Temperature** exhibited expected seasonal cooling trends across all monitoring locations as summer transitioned into fall. Elross Creek maintained the warmest and most stable conditions, while Goodream Creek remained consistently cooler throughout the deployment. Joan Brook displayed moderate short-term variability, with all sites exhibiting regular diurnal fluctuations associated with changing air temperatures.
- **pH** conditions remained generally stable and within expected ranges for freshwater systems in the region. Elross Creek remained slightly acidic throughout the deployment and below the CCME early life stage guideline; however, these values are consistent with historical baseline conditions and regional geology. Goodream Creek maintained stable near-neutral conditions, while Joan Brook remained slightly acidic to neutral with minimal variability.
- **Specific Conductivity** remained stable throughout the deployment, reflecting distinct watershed characteristics between the monitoring sites. Elross Creek exhibited very low conductivity values indicative of minimal dissolved ion concentrations, while Joan Brook maintained slightly elevated but consistent values. Goodream Creek consistently displayed the highest conductivity levels, likely influenced by local geology and watershed inputs. Minor fluctuations were likely associated with precipitation events and changing flow conditions.
- **Dissolved Oxygen** concentrations indicated generally well-oxygenated conditions throughout the monitoring period. Goodream Creek and Joan Brook consistently remained above CCME guidelines for the protection of aquatic life, while Elross Creek periodically fell below the early life stage guideline during warmer conditions. Overall, dissolved oxygen concentrations remained supportive of aquatic habitat across all monitoring stations.
- **Turbidity** remained low for the majority of the deployment, indicating generally clear baseline water quality conditions throughout the monitoring network. Elross Creek remained highly stable with minimal variability, while Goodream Creek exhibited occasional short-duration increases associated with precipitation and runoff events. Joan Brook experienced several isolated high-magnitude turbidity spikes likely related to short-term sediment mobilization during runoff events or temporary disturbances near the monitoring sensor.
- **Meteorological and Hydrometric Conditions** demonstrated that precipitation events influenced short-term variability in stage and water quality parameters throughout the deployment. Joan Brook air temperature and precipitation trends generally followed regional conditions observed at the Schefferville A climate station; however, localized differences in both temperature and precipitation totals were observed, likely reflecting watershed characteristics, terrain, and localized storm activity. Water levels across the monitoring network remained relatively stable overall, with short-duration increases corresponding to runoff events.
- **QA/QC Results** indicate that the majority of monitored parameters performed within acceptable quality ranges throughout the deployment. Some parameters received lower QA/QC rankings at deployment or removal, particularly temperature and dissolved oxygen at select stations, likely reflecting stabilization limitations, environmental conditions, or minor sensor drift during field deployment activities.

Overall, the 2025 TSMC Elross Lake Network deployment successfully characterized late summer and fall water quality and hydrologic conditions within the monitored watersheds. The collected 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