

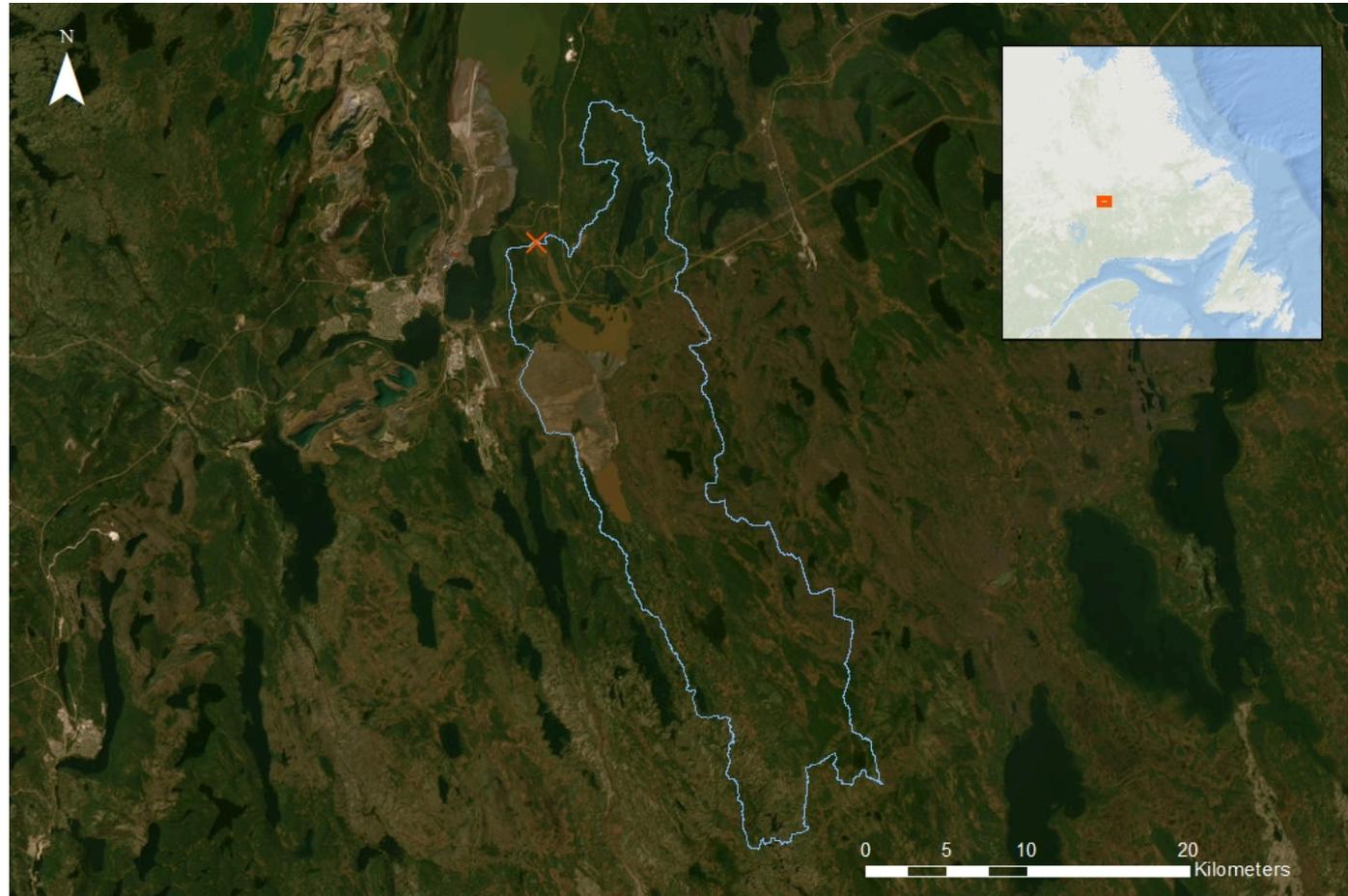
Real Time Water Quality Deployment Report Flora Creek below Trans Labrador Highway NF03OA0022

2025-07-30 to 2025-09-17



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

Flora Creek below Trans Labrador Highway



The Water Resources Management Division (WRMD), in partnership with Tacora Resources Inc. and Environment and Climate Change Canada (ECCC), maintains a real-time water quality and water quantity monitoring station at Flora Creek, downstream of the mine's tailings disposal area in Flora Lake. The real-time station allows for assessment and management of the water body. The purpose of this real-time station is to monitor, process, and publish hydrometric (water quantity) and real-time water quality data at the station.

The watershed is outlined in the figure to the left in light blue.

On July 30th, 2025, a clean and calibrated real-time water quality monitoring instrument was deployed at the station Flora Creek below TLH. The instrument was deployed for a period of 49 days and was removed on September 17th, 2025.

This was the second deployment for 2025.

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	$\leq \pm 0.3$ 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
Specific Conductance	$\leq \pm 3$ μ S/cm or $\leq \pm 3\%$, whichever is greater	$\leq \pm 3.1 - 10$ μ S/cm or $\leq \pm 3.1 - 10\%$, whichever is greater	$\leq \pm 10 - 15$ μ S/cm or $\leq \pm 10.1 - 15\%$, whichever is greater	$\leq \pm 15.1 - 20$ μ S/cm or $\leq \pm 15.1 - 20\%$, whichever is greater	$> \pm 20$ μ 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
Water Temperature	$\leq \pm 0.2^\circ$ C	$\leq \pm 0.21 - 0.5^\circ$ C	$\leq \pm 0.51 - 0.8^\circ$ C	$\leq \pm 0.81 - 1^\circ$ C	$> \pm 1^\circ$ 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	Good	
pH	Good	Good	Excellent
Specific Conductivity (μ S/cm)	Excellent	Excellent	Excellent
Temperature ($^\circ$ C)	Excellent	Excellent	
Turbidity (NTU)	Excellent	Excellent	Excellent

At deployment and removal, when compared to the QA/QC sonde, all parameters ranked either 'good' or 'excellent'.

Water Temperature

15.65
Average (°C)

15.48
Median (°C)

10.07
Minimum (°C)

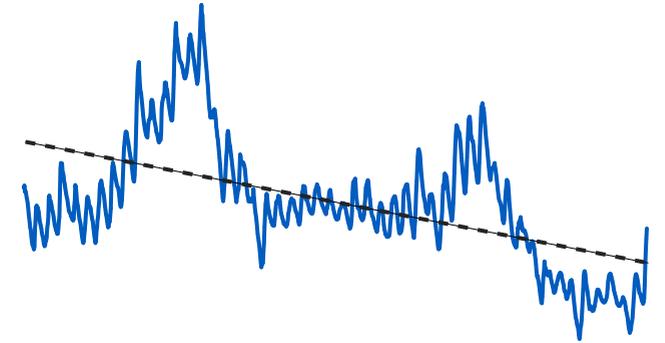
23.72
Maximum (°C)



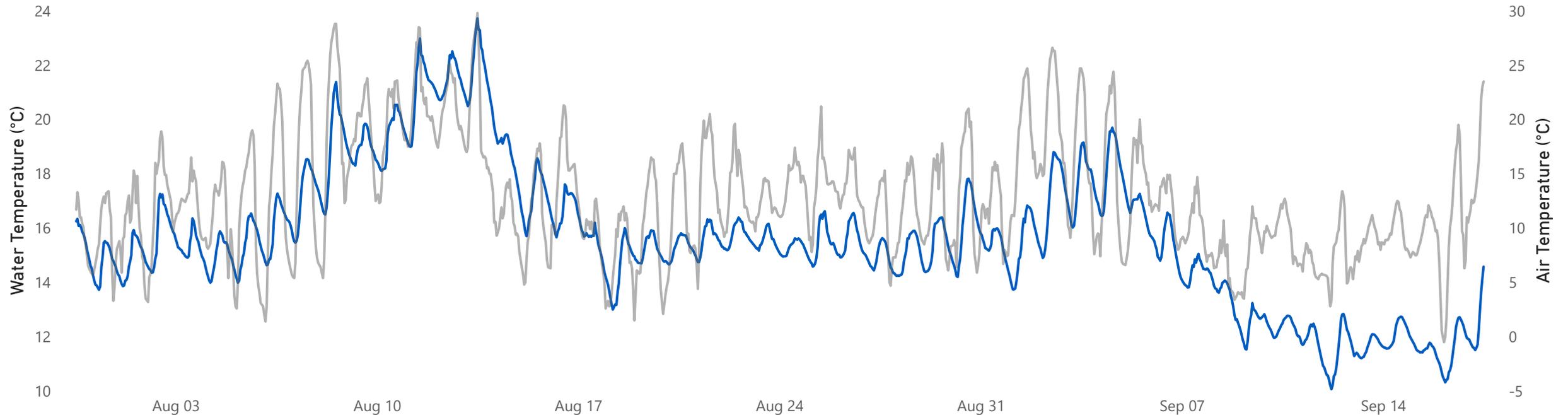
Water temperature is an important parameter for wildlife. Many organisms cannot regulate their own temperatures, and rely on surrounding air and water temperatures. Water temperature may be affected by inputs from industry or by modifying natural conditions like clearing trees and other vegetation, which 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 2025-07-30 until 2025-09-17. The minimum water temperature, 10.07°C, occurred on 2025-09-12. The maximum water temperature, 23.72°C, occurred on, 2025-08-13. Water temperature usually falls overnight and rises during the day. As displayed by the trendline, water temperature decreased during this deployment period, corresponding with decreasing air temperatures.

Water Temperature Trendline



● Water Temperature (°C) ● Air Temperature (°C)



pH

7.82
Average pH

7.82
Median pH

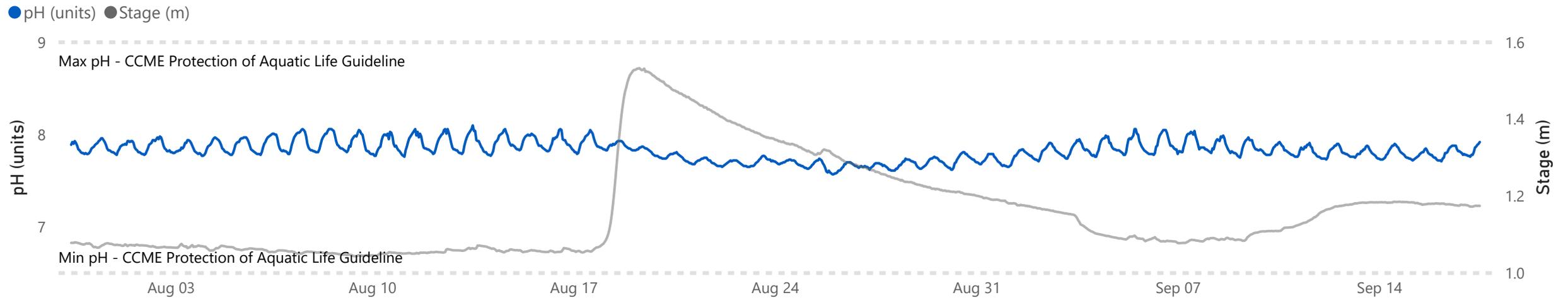
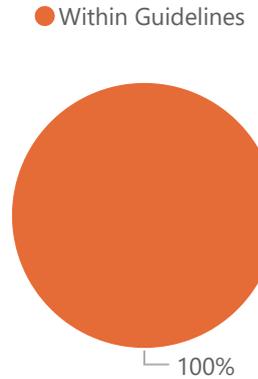
7.57
Minimum pH

8.10
Maximum pH

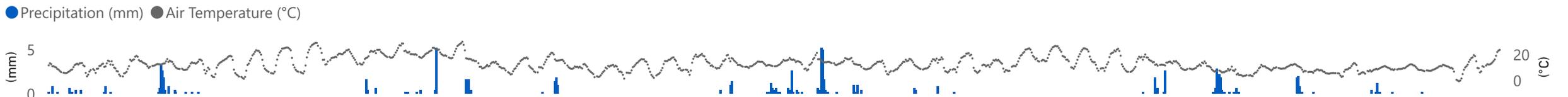


pH relates to the free hydrogen ions in water and it is a measure of acidity in water. A pH of 7 indicates a neutral pH, below 7 is considered acidic, and above 7 is considered basic. The [Canadian Council of Ministers of the Environment](#) (CCME) Freshwater Aquatic Life guideline provides a basis by 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 2025-07-30 until 2025-09-17. The minimum pH, 7.57 pH units, occurred on 2025-08-26. The maximum pH, 8.10 pH units, occurred on 2025-08-13. Daily fluctuations are common due to changes in temperature and photosynthesizing of aquatic plants. pH decreased slightly around the middle of the deployment period, due to a significant increase in stage. All values during the deployment are within the CCME guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units).



Climate data from Moosehead Lake



Specific Conductivity

72.96
Average $\mu\text{S}/\text{cm}$

72.85
Median $\mu\text{S}/\text{cm}$

71.00
Minimum $\mu\text{S}/\text{cm}$

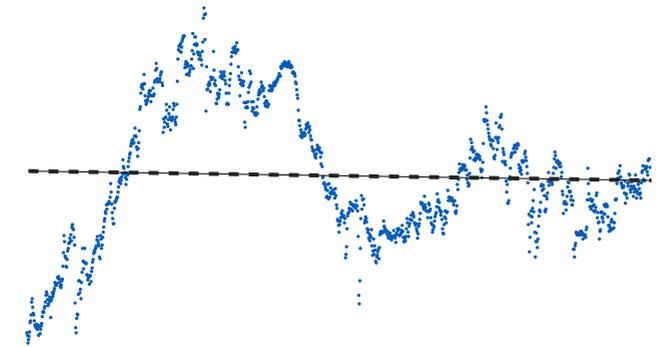
74.93
Maximum $\mu\text{S}/\text{cm}$



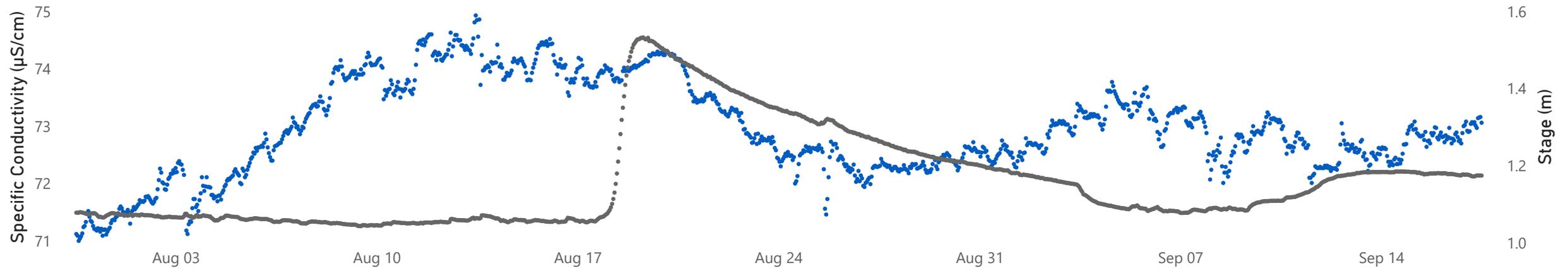
Conductivity relates to the ability of an electric charge to pass through a solution. Pure water has low conductance and water with dissolved ions has higher conductance. Specific conductance is corrected to 25°C to allow comparison across temperatures. Water parameter maps can be found on the [Water Resources Management website](#).

Specific conductance data for this deployment was collected from 2025-07-30 until 2025-09-17. The minimum specific conductance, 71.00 $\mu\text{S}/\text{cm}$, occurred on 2025-07-30. The maximum specific conductance, 74.93 $\mu\text{S}/\text{cm}$, occurred on 2025-08-13. Precipitation and specific conductivity are correlated. During a precipitation event, the amount of water in the creek increases, this dilutes the solids that are present, decreasing the conductivity. Conductivity levels increased during the first portion of the deployment period. It then decreased after a rise in stage. It increased slightly during the later portion of the deployment.

Specific Conductivity Trendline

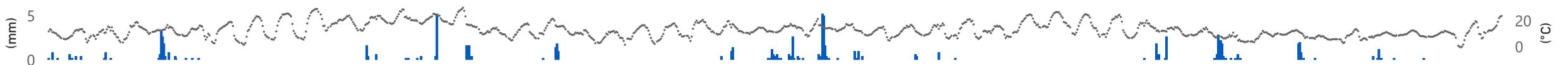


● Specific Conductivity ($\mu\text{S}/\text{cm}$) ● Stage (m)



Climate data from Moosehead Lake

● Precipitation (mm) ● Air Temperature ($^{\circ}\text{C}$)



Dissolved Oxygen Concentration and Saturation

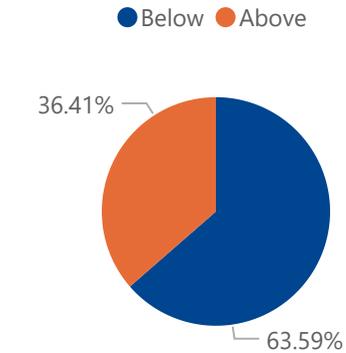
9.46 Average (mg/L)
 9.40 Median (mg/L)
 8.09 Minimum (mg/L)
 10.64 Maximum (mg/L)



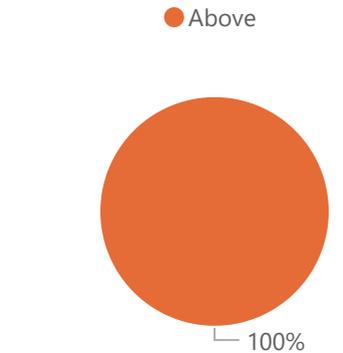
Dissolved oxygen (DO) in water is crucial for aquatic life. The [CCME \(Canadian Council of Ministers of the Environment\)](#) Freshwater Aquatic Life guidelines provide a basis by which to judge the overall health of waterways. The minimum guideline for early life stages in cold water is 9.5 mg/L and 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 2025-07-30 until 2025-09-17. The minimum DO reading, 8.09 mg/L, occurred on 2025-08-14. The maximum DO reading, 10.64 mg/L, occurred on 2025-09-12. Dissolved oxygen content fluctuates diurnally and displays an inverse relationship to water temperature. DO fluctuated over the course of the deployment period, with increases corresponding with decreases in water temperature. DO increased during the later portion of the deployment, as water temperature cooled into the fall. During this deployment period, DO levels were below the minimum CCME Guidelines for the Protection of Early Life Stages for Cold Water Biota 63.59% of the time and above the minimum guidelines for 36.41% of the time. However, DO levels were above the minimum CCME Guideline for the Protection of Other Life Stages for Cold Water Biota 100% of the time.

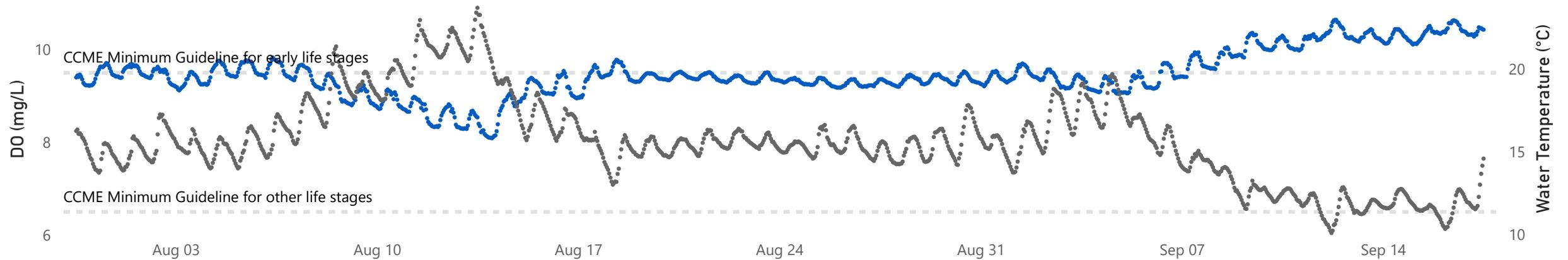
CCME Early Life Stages Guideline



CCME Other Life Stages Guideline



● DO (mg/L) ● Water Temperature (°C)



Percent Saturation (%)



Turbidity

10.94
Average (NTU)

9.40
Median (NTU)

2.10
Minimum (NTU)

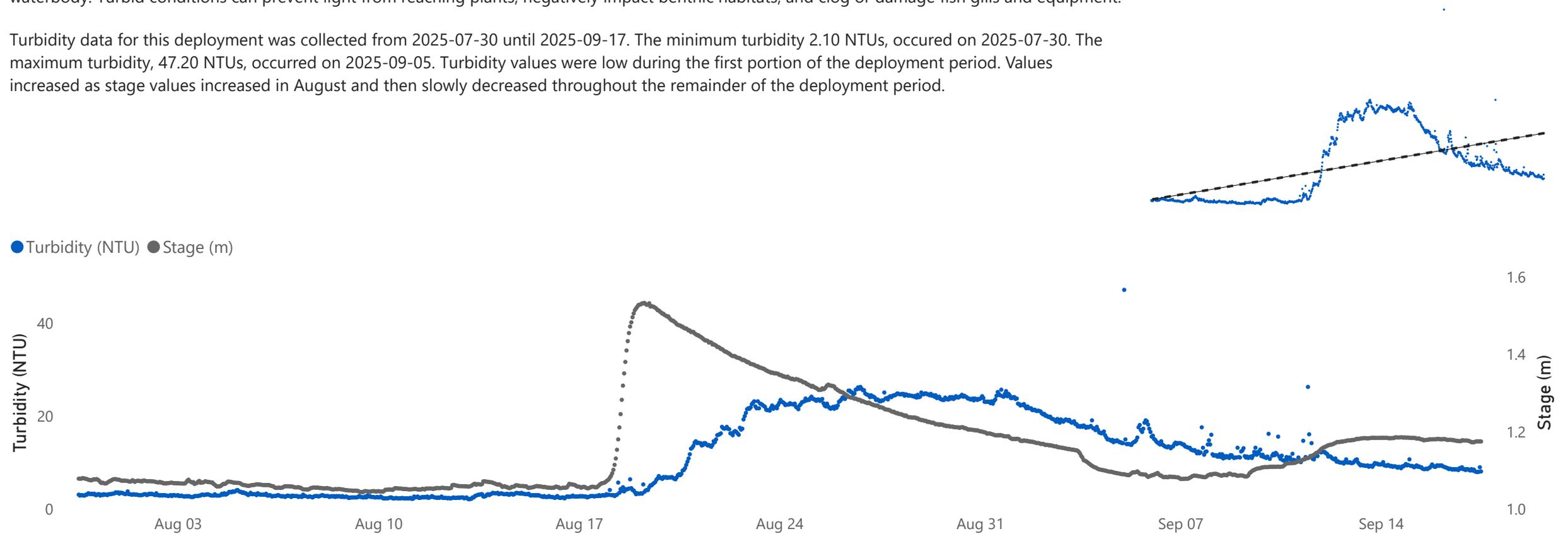
47.20
Maximum (NTU)



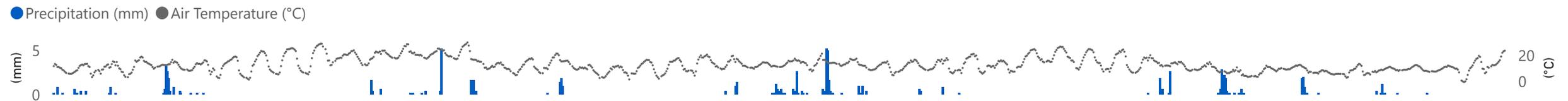
Increases in turbidity (cloudiness) are often caused by increased runoff during precipitation events. Runoff carries silt and other debris into the waterbody. Turbid conditions can prevent light from reaching plants, negatively impact benthic habitats, and clog or damage fish gills and equipment.

Turbidity data for this deployment was collected from 2025-07-30 until 2025-09-17. The minimum turbidity 2.10 NTUs, occurred on 2025-07-30. The maximum turbidity, 47.20 NTUs, occurred on 2025-09-05. Turbidity values were low during the first portion of the deployment period. Values increased as stage values increased in August and then slowly decreased throughout the remainder of the deployment period.

Turbidity Trendline

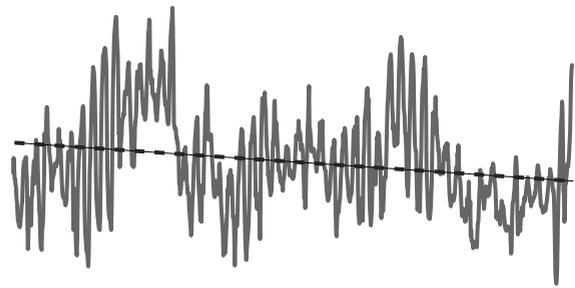


Climate data from Moosehead Lake



Meteorological and Hydrometric Data

Air Temperature Trendline



12.87

Average (°C)

12.10

Median (°C)

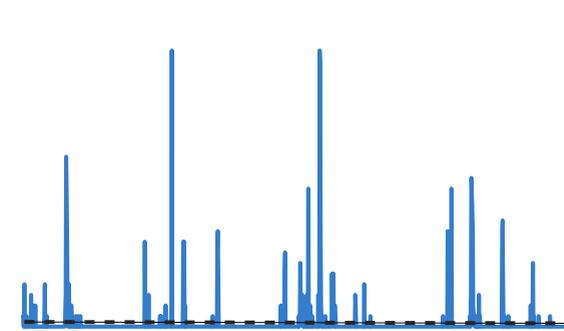
-0.50

Minimum (°C)

29.80

Maximum (°C)

Precipitation Trendline



0.08

Average (mm/hr)

0.00

Median (mm/hr)

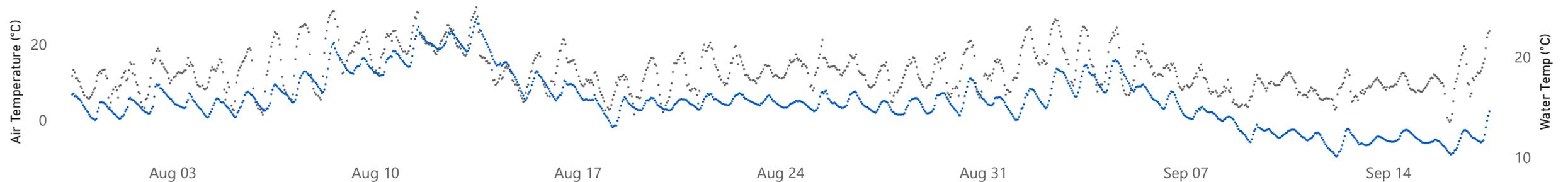
0.00

Minimum (mm/hr)

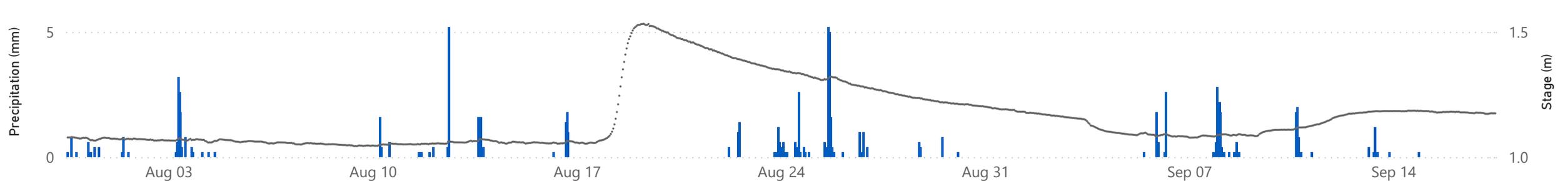
5.20

Maximum (mm/hr)

● Air Temperature (°C) ● Water Temperature (°C)



● Precipitation (mm) ● Stage (m)



Conclusions



- A clean and calibrated instrument was deployed at the Flora Creek below TLH water quality monitoring station on 2025-07-30 and removed on 2025-09-17. This was the second deployment for 2025.
- In most cases, weather related events or increases/decreases in water level explain parameter fluctuations. Almost all values recorded were within ranges as suggested by the CCME Guidelines for the Protection of Aquatic Life for pH and dissolved oxygen.
- Water temperature corresponded with ambient air temperatures, ranging between 10.07 and 23.72°C.
- pH values were all within the recommended CCME Guidelines for the Protection of Aquatic Life. pH ranged between 7.57 and 8.10.
- Conductivity levels increased during the first portion of the deployment period. It then decreased after a rise in stage. It increased slightly during the later portion of the deployment, ranging from 71.00 to 74.93 $\mu\text{S}/\text{cm}$.
- Dissolved oxygen values were above the minimum CCME Guideline for the Protection of Aquatic Life for Cold Water Biota at Other Life Stages of 6.5 mg/l. The majority of the values were below the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota at Early Life Stages of 9.5 mg/l.
- Turbidity levels were low during this deployment period. They increased after an increase in stage and then decreased steadily throughout the remainder of the deployment period. Values ranged from 2.10 to 47.20 NTU.
- Stage increased during the middle of August before gradually decreasing throughout the remainder of the deployment period.
- 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.

Report prepared by:
Maria Murphy

Appendix 1
Grab Sample Results



BUREAU
VERITAS

Bureau Veritas Job #: C594826
Report Date: 2025/08/15

NL Department of Environment, Climate Change and
Municipalities
Your P.O. #: 224006869

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ATSQ61 FLORA CREEK BELOW TLH								
Sampling Date		2025/07/30 12:55						
Matrix		W						
Sample #		2025-6314-00-SI-SP						
Registration #		SA-0000						
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	31	1.0	mg/L	N/A	2025/08/11		9984078
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	N/A	2025/08/12		9983389
Nitrate (N)	-	0.21	0.050	mg/L	N/A	2025/08/14		9984080
Total dissolved solids (calc., EC)	-	39	1.0	mg/L	N/A	2025/08/12		9984162
Inorganics								
Conductivity	-	71	1.0	uS/cm	N/A	2025/08/11	M2C	9986592
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2025/08/12	RSU	9987094
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2025/08/12	RSU	9987094
Sulphate (SO4)	-	3.7	1.0	mg/L	N/A	2025/08/12	RSU	9987094
Total Alkalinity (Total as CaCO3)	-	29	2.0	mg/L	N/A	2025/08/11	M2C	9986593
Colour	-	6.9	5.0	TCU	N/A	2025/08/13	MCN	9988226
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2025/08/11	M2C	9986594
Nitrate + Nitrite (N)	-	0.21	0.050	mg/L	N/A	2025/08/13	EMT	9988230
Nitrite (N)	-	ND	0.010	mg/L	N/A	2025/08/13	MCN	9988231
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2025/08/12	MCN	9987465
Total Nitrogen (N)	-	0.27	0.10	mg/L	N/A	2025/08/11	S6S	9986588
Dissolved Organic Carbon (C)	-	1.8	0.50	mg/L	N/A	2025/08/12	S6S	9987497
Total Organic Carbon (C)	-	2.0	0.50	mg/L	N/A	2025/08/14	S6S	9989260
pH	-	7.62		pH	N/A	2025/08/11	M2C	9986587
Total Phosphorus	-	0.004	0.004	mg/L	2025/08/13	2025/08/14	VKH	9988703
Total Suspended Solids	-	ND	1.0	mg/L	2025/08/06	2025/08/07	ISM	9983804
Turbidity	-	1.8	0.10	NTU	N/A	2025/08/14	KMC	9988776
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2025/08/11	2025/08/11	JEP	9985620
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	ND	0.0050	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Antimony (Sb)	-	ND	0.0010	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Arsenic (As)	-	ND	0.0010	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Barium (Ba)	-	0.0015	0.0010	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Boron (B)	-	ND	0.050	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Calcium (Ca)	-	6.9	0.10	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Chromium (Cr)	-	ND	0.0010	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Copper (Cu)	-	ND	0.00050	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Iron (Fe)	-	ND	0.050	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Lead (Pb)	-	ND	0.00050	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Magnesium (Mg)	-	3.4	0.10	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Manganese (Mn)	-	0.028	0.0020	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Nickel (Ni)	-	ND	0.0020	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Phosphorus (P)	-	ND	0.10	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Potassium (K)	-	0.79	0.10	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Selenium (Se)	-	ND	0.00050	mg/L	2025/08/08	2025/08/08	MTZ	9985224



BUREAU
VERITAS

Bureau Veritas Job #: C594826
Report Date: 2025/08/15

NL Department of Environment, Climate Change and
Municipalities
Your P.O. #: 224006869

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ATSQ61 FLORA CREEK BELOW TLH								
Sampling Date 2025/07/30 12:55								
Matrix W								
Sample # 2025-6314-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Sodium (Na)	-	0.85	0.10	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Strontium (Sr)	-	0.0064	0.0020	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Uranium (U)	-	ND	0.00010	mg/L	2025/08/08	2025/08/08	MTZ	9985224
Total Zinc (Zn)	-	ND	0.0050	mg/L	2025/08/08	2025/08/08	MTZ	9985224