

# Real-Time Water Quality Deployment Report

Iron Ore Company of Canada  
Labrador West Network

June 7 to  
July 13, 2023



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

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## General

- The Water Resources Management Division, in partnership with the Iron Ore Company of Canada (IOC) and Environment and Climate Change Canada (ECCC), maintain two real-time water quality (RTWQ) and water quantity stations at Wabush Lake.
- The official name of each station is *Wabush Lake at Dolomite Road* and *Wabush Lake at Lake Outlet*, hereafter referred to as the Dolomite Road station and the Julienne Narrows station.
- These stations are situated upstream (Dolomite Road) and downstream (Julienne Narrows) of the IOC tailings disposal area in Wabush Lake.
- On June 8<sup>th</sup>, 2016, an additional station was commissioned under this agreement. This station is located at *Dumbell Stream above Dumbell Lake*, hereafter referred to as Dumbell Stream.
- On June 12<sup>th</sup>, 2017 a new station was commissioned under this agreement. This station is located at *Pumphouse Stream above Drum Lake*, hereafter referred to as Pumphouse Stream.
- Water Resources Management Division staff monitor the real-time graphs regularly. They will inform IOC of any significant water quality events by email notification and by monthly deployment reports.
- On June 7<sup>th</sup>, clean and calibrated real-time water quality-monitoring instruments were deployed at three IOC stations. The instruments were deployed for a period of 35-36 days at each station. The instruments were removed on July 12<sup>th</sup> and 13<sup>th</sup>. This was the first deployment of 2023 for these stations.
- An instrument was not deployed at Pumphouse Stream in June, as site access was restricted to essential needs only.



**Figure 1: RTWQ Monitoring Stations in Labrador West**

## 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 each deployment period. The procedure is based on the approach used by the United States Geological Survey.

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 (Table 1).

**Table 1: Ranking classifications for deployment and removal**

Parameter	Rank				
	Excellent	Good	Fair	Marginal	Poor
Temperature (°C)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	<+/-1
pH (unit)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Sp. Conductance (µS/cm)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Sp. Conductance > 35 µS/cm (%)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Dissolved Oxygen (mg/L) (% Sat)	<=+/-0.3	>+/-0.3 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Turbidity <40 NTU (NTU)	<=+/-2	>+/-2 to 5	>+/-5 to 8	>+/-8 to 10	>+/-10
Turbidity > 40 NTU (%)	<=+/-5	>+/-5 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20

- It should be noted that the temperature sensor on any sonde is the most important. All other parameters can be broken down into three groups: temperature dependent, temperature compensated and temperature independent. Because the temperature sensor is not isolated from the rest of the sonde, the entire sonde must be at the same temperature before the 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.
- Deployment and removal comparison rankings for the IOC water quality stations deployed between June 7 and July 12-13, 2023 are summarized in Table 2.

Table 2: QA/QC comparison rankings for IOC stations between June 7 and July 12-13, 2023.

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Dolomite Road	Jun 7, 2023	Deployment	Good	Good	Excellent	Good	Good
	Jul 13, 2023	Removal	Marginal	Excellent	Good	Excellent	Excellent
Julienne Narrows	Jun 7, 2023	Deployment	Excellent	Good	Excellent	Good	Marginal
	Jul 13, 2023	Removal	Good	Excellent	Good	Excellent	Good
Dumbell Stream	Jun 7, 2023	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	Jul 12, 2023	Removal	Excellent	Good	Good	Excellent	Excellent

▪ **Dolomite Road**

At deployment, all parameters ranked either ‘excellent’ or ‘good’.

At removal, all parameters except temperature ranked either ‘good’ or ‘excellent’. Temperature ranked ‘marginal’. The field instrument read a value of 21.08°C, while the QA/QC instrument read a value of 21.90 °C.

▪ **Julienne Narrows**

At deployment, all parameters except turbidity ranked either ‘excellent’ or ‘good’. Turbidity ranked ‘marginal’. The field instrument read a value of 14.7 NTU, while the QA/QC instrument read a value of 24.6 NTU. If the field instrument is compared to the QA/QC grab sample, the ranking is ‘fair’. The turbidity value of the QA/QC sample was 9.3 NTU.

At removal, all parameters ranked either ‘excellent’ or ‘good’.

▪ **Dumbell Stream**

At deployment and removal, all parameters ranked either ‘excellent’ or ‘good’.

- 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 or more of the sensors.

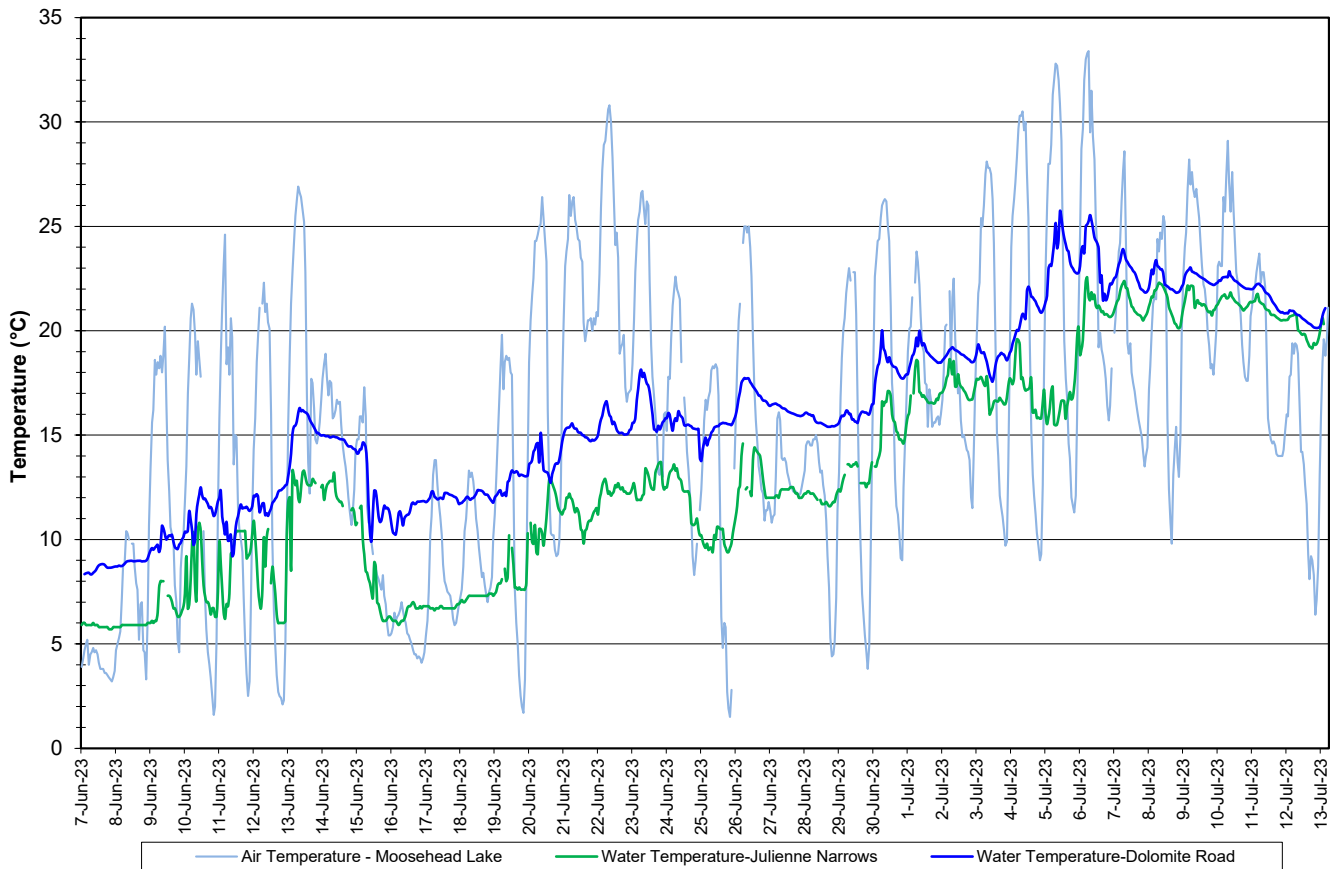
## Data Interpretation

- The following graphs and discussion illustrate water quality-related events from June 7 to July 12-13, 2023 at the IOC RTWQ monitoring stations in Labrador West.
- With the exception of water quantity data (Stage and Flow), all data used in the preparation of the graphs and subsequent discussion below 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.

### Wabush Lake Network

- Water temperature ranged from 8.33 to 25.71°C at Dolomite Road and 5.70 to 22.56°C at Julienne Narrows during this deployment period (Figure 2).
- Water temperature at both stations increased during this deployment period, as water temperature warmed into summer. Water temperature corresponded to increases/decreases in ambient air temperature trends (Figure 2).

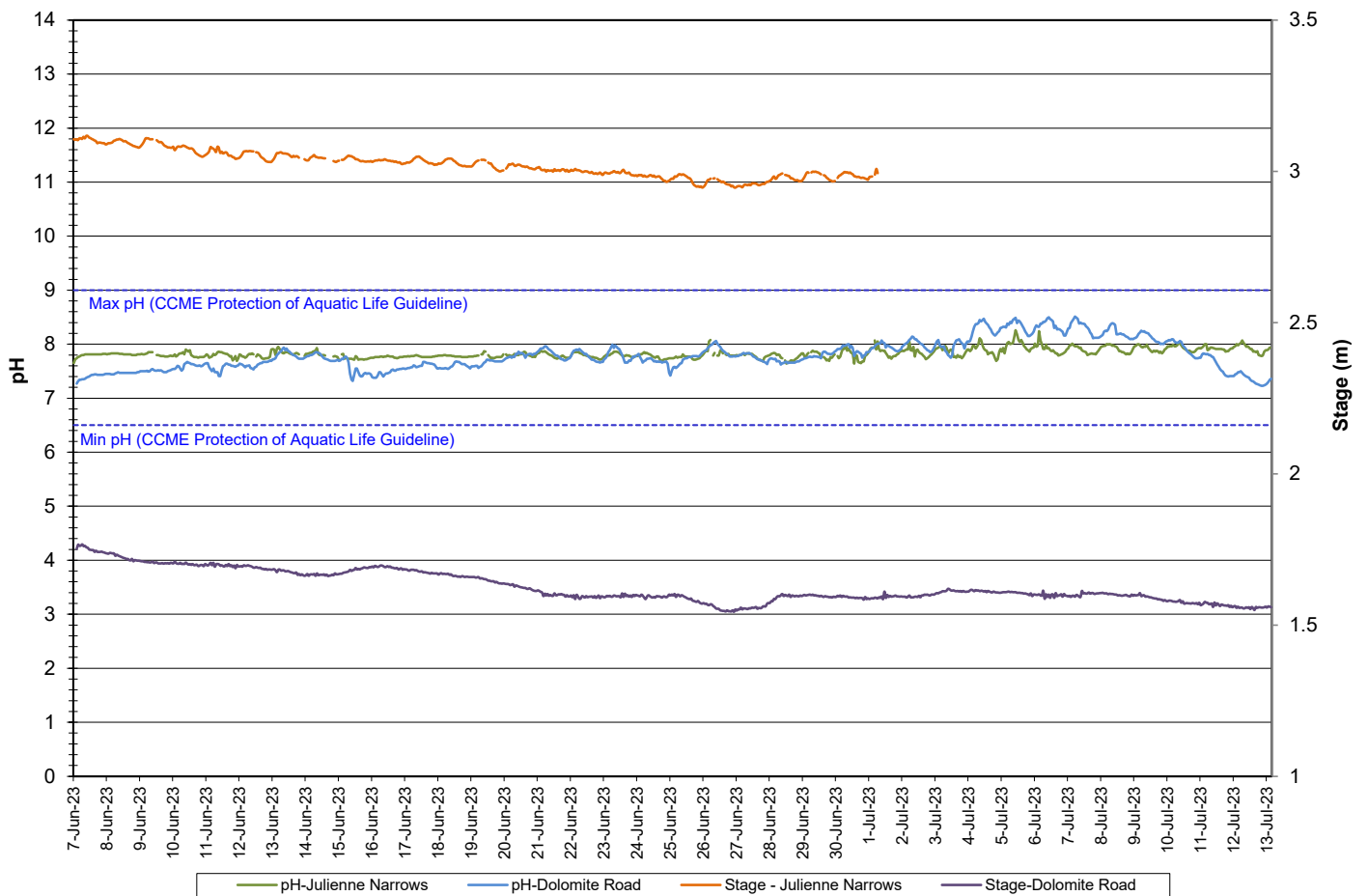
**Water and Air Temperature : Wabush Lake Network  
June 7 to July 13, 2023**



**Figure 2: Water and Air Temperature - Wabush Lake network  
(Weather data collected from climate station near Moosehead Lake)**

- pH ranges from 7.23 to 8.51 pH units at Dolomite Road, and from 7.64 to 8.26 pH units at Julienne Narrows throughout the deployment period (Figure 3). The median pH is 7.75 and 7.81 units respectively.
- At Julienne Narrows and Dolomite Road, all values during the deployment are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units). pH fluctuates slightly throughout the day and night.
- pH increases slightly at Dolomite Road during the first week of July, then gradually decreases.
- With the exception of water quantity data (Stage and Flow), 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.

**Water pH and Stage: Wabush Lake Network  
June 7 to July 13, 2023**

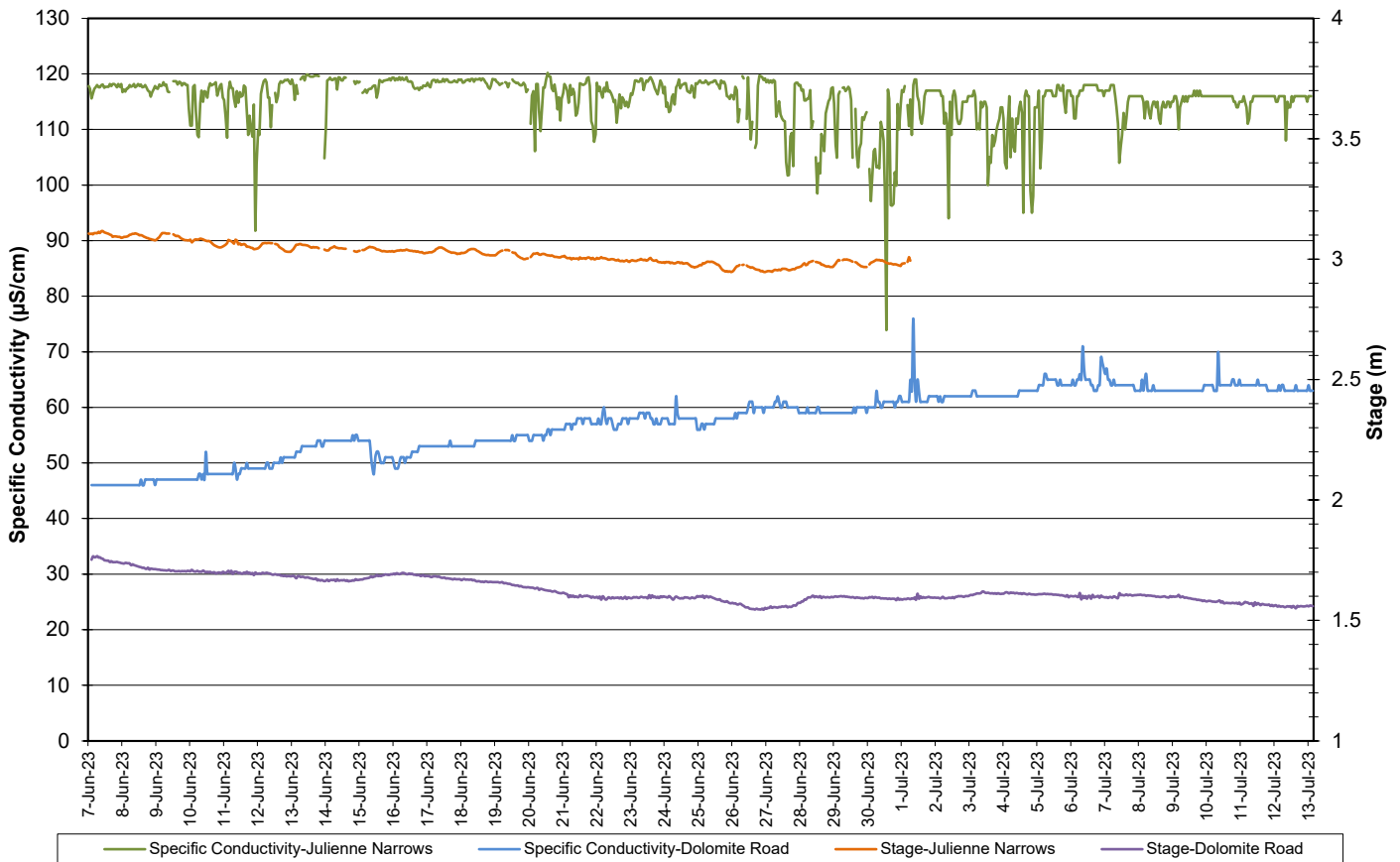


**Figure 3: Water pH and Stage– Wabush Lake network**



- Specific conductivity ranged from 46.0 to 76.0  $\mu\text{S}/\text{cm}$  at Dolomite Road and from 73.9 to 120.2  $\mu\text{S}/\text{cm}$  at Julienne Narrows throughout the deployment period (Figure 4).
- Daily fluctuations are evident at the Julienne Narrows station. This can be attributed to varying contributions of iron ore tailings deposited into Wabush Lake upstream of Julienne Narrows and downstream of Dolomite Road. This can also explain the difference in specific conductivity levels between the two stations, as conductance values are generally higher at Julienne Narrows.
- Specific conductivity values at Julienne Narrows trended slightly downwards, while values at Dolomite Road increased.
- With the exception of water quantity data (Stage and Flow), 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.

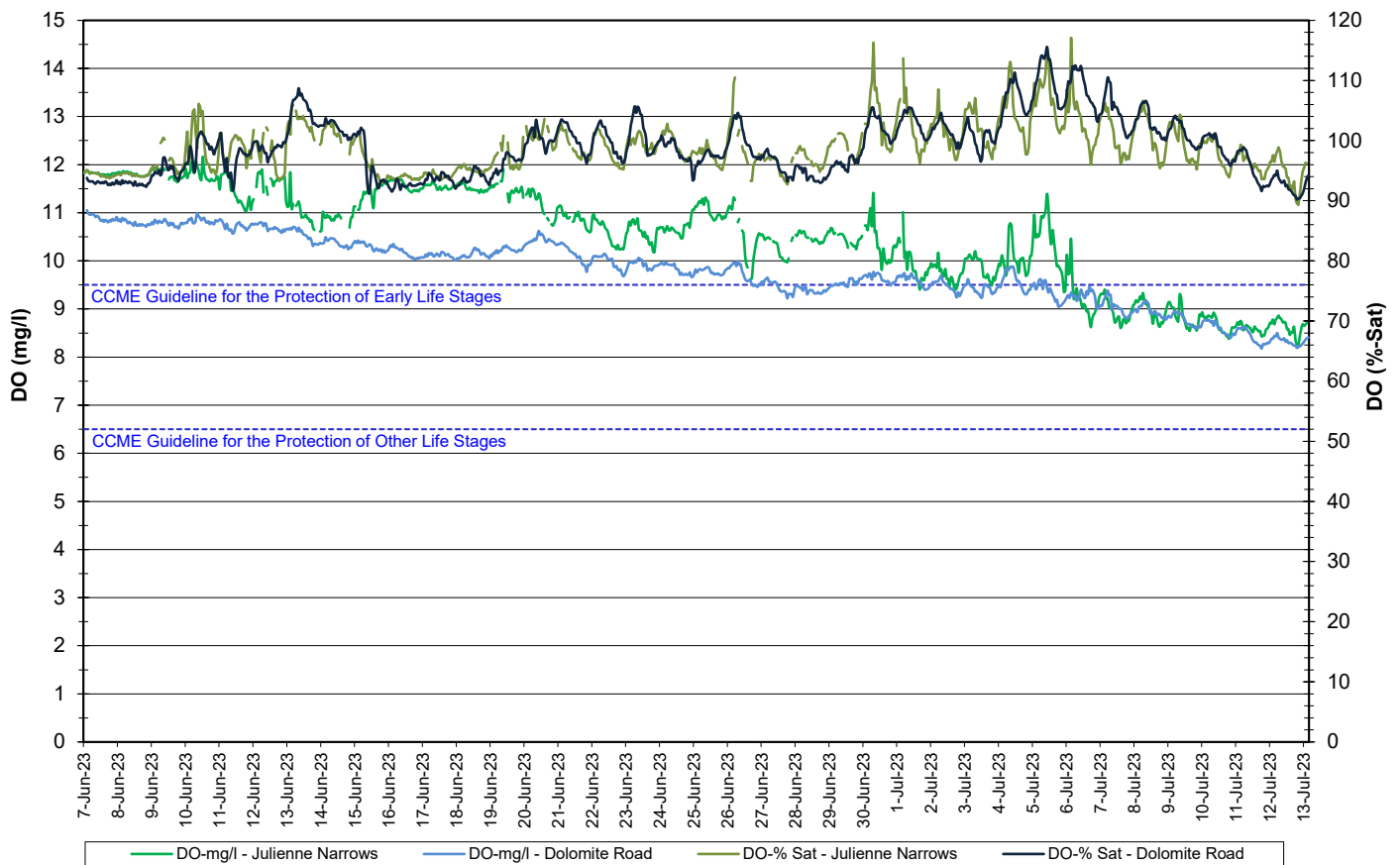
**Specific Conductivity and Stage: Wabush Lake Network  
June 7 to July 13, 2023**



**Figure 4: Specific Conductivity and Stage – Wabush Lake network**

- At the Dolomite Road station, the saturation of dissolved oxygen ranged from 90.2 to 115.5% while the dissolved oxygen content ranged from 8.18 to 11.05 mg/l with a median value of 9.82 mg/l (Figure 5).
- At the Julienne Narrows station, the saturation of dissolved oxygen ranged from 92.7 to 117.1% while the dissolved oxygen content ranged from 8.38 to 12.16 mg/l with a median value of 10.70 mg/l (Figure 5).
- All values recorded at Julienne Narrows and Dolomite Road were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Other Life Stages of 6.5 mg/l. The majority of the values were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Early Life Stages of 9.5 mg/l. The guidelines are indicated in blue on Figure 5.
- Dissolved oxygen decreased gradually over the course of the remainder of the deployment period due to increasing water temperatures. Dissolved oxygen fluctuated daily with decreases observed at night.

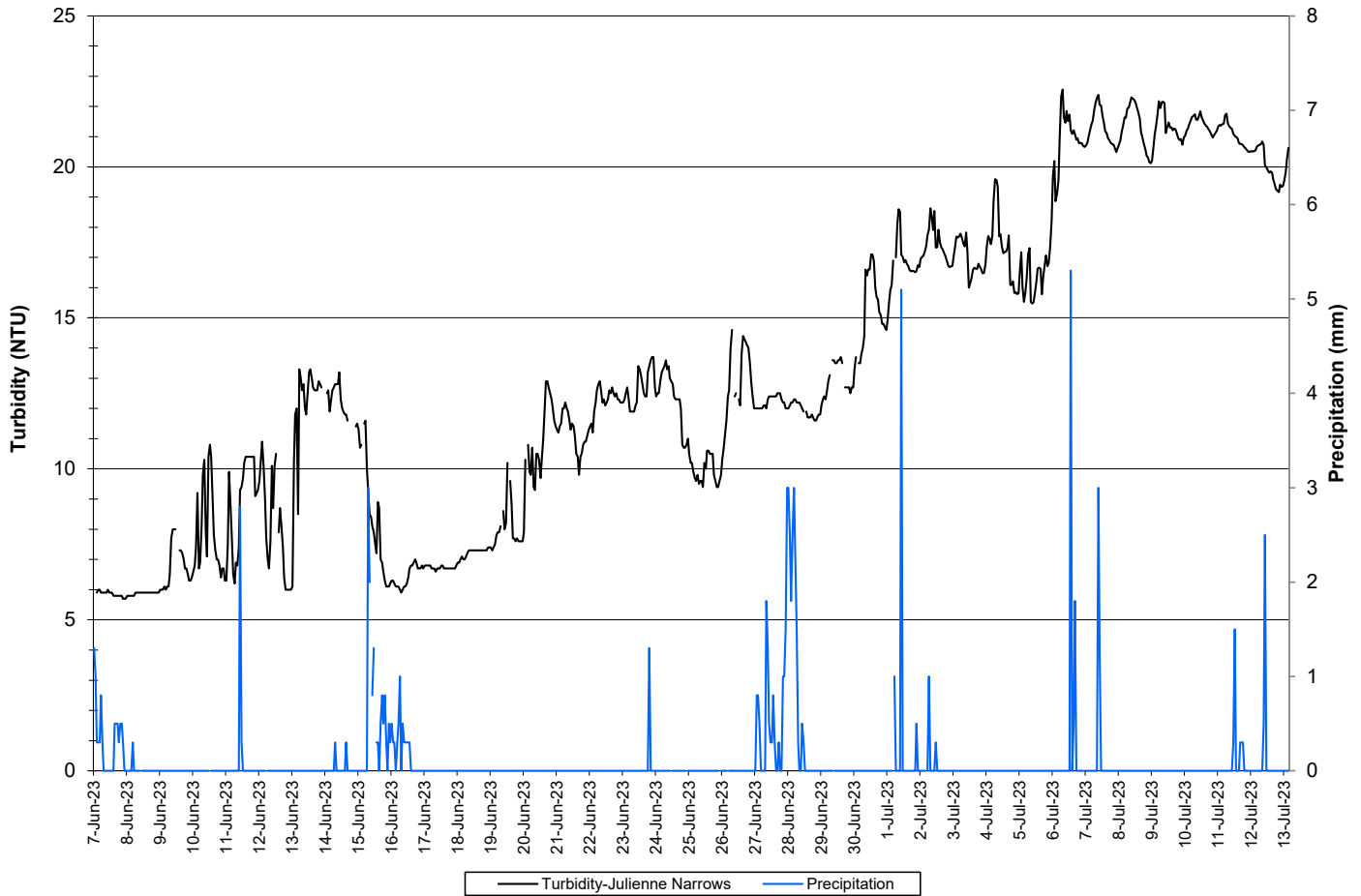
**Dissolved Oxygen and Percent Saturation : Wabush Lake Network  
June 7 to July 13, 2023**



**Figure 5: Dissolved Oxygen and Percent Saturation – Wabush Lake Network**

- At the Julienne Narrows station, turbidity values range from 0.0 NTU to 22.9 NTU throughout the deployment period (Figure 6). The median value was 1.0 NTU, indicating low background turbidity levels.
- Overall, turbidity values increased during this deployment period.

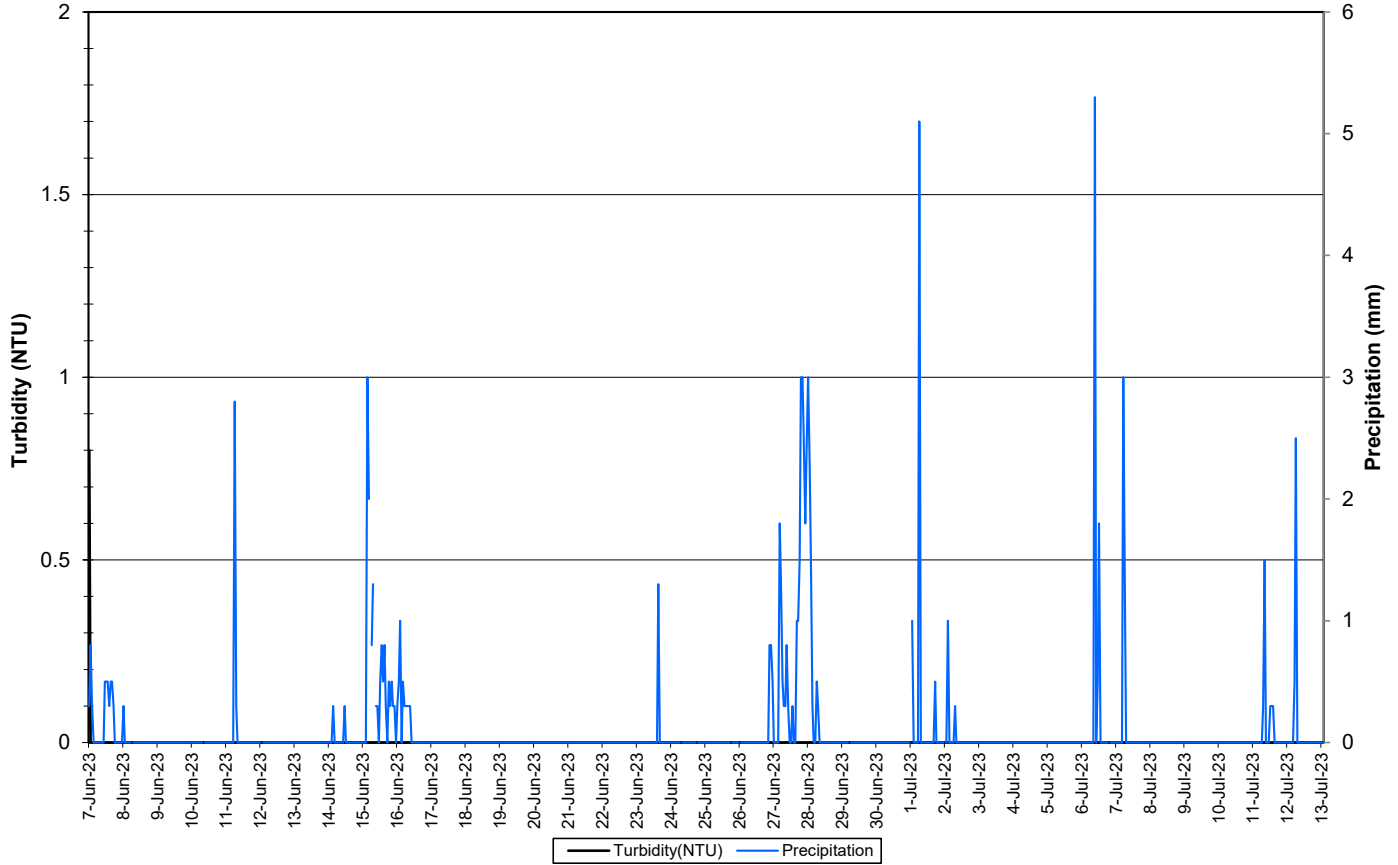
**Water Turbidity and Precipitation: Julienne Narrows  
June 7 to July 13, 2023**



**Figure 6: Turbidity and Precipitation – Julienne Narrows  
(Weather data collected from climate station near Moosehead Lake)**

- At the Dolomite Road station, turbidity values range from 0.0 NTU to 0.8 NTU throughout the deployment period (Figure 7). The median value was 0.0 NTU.

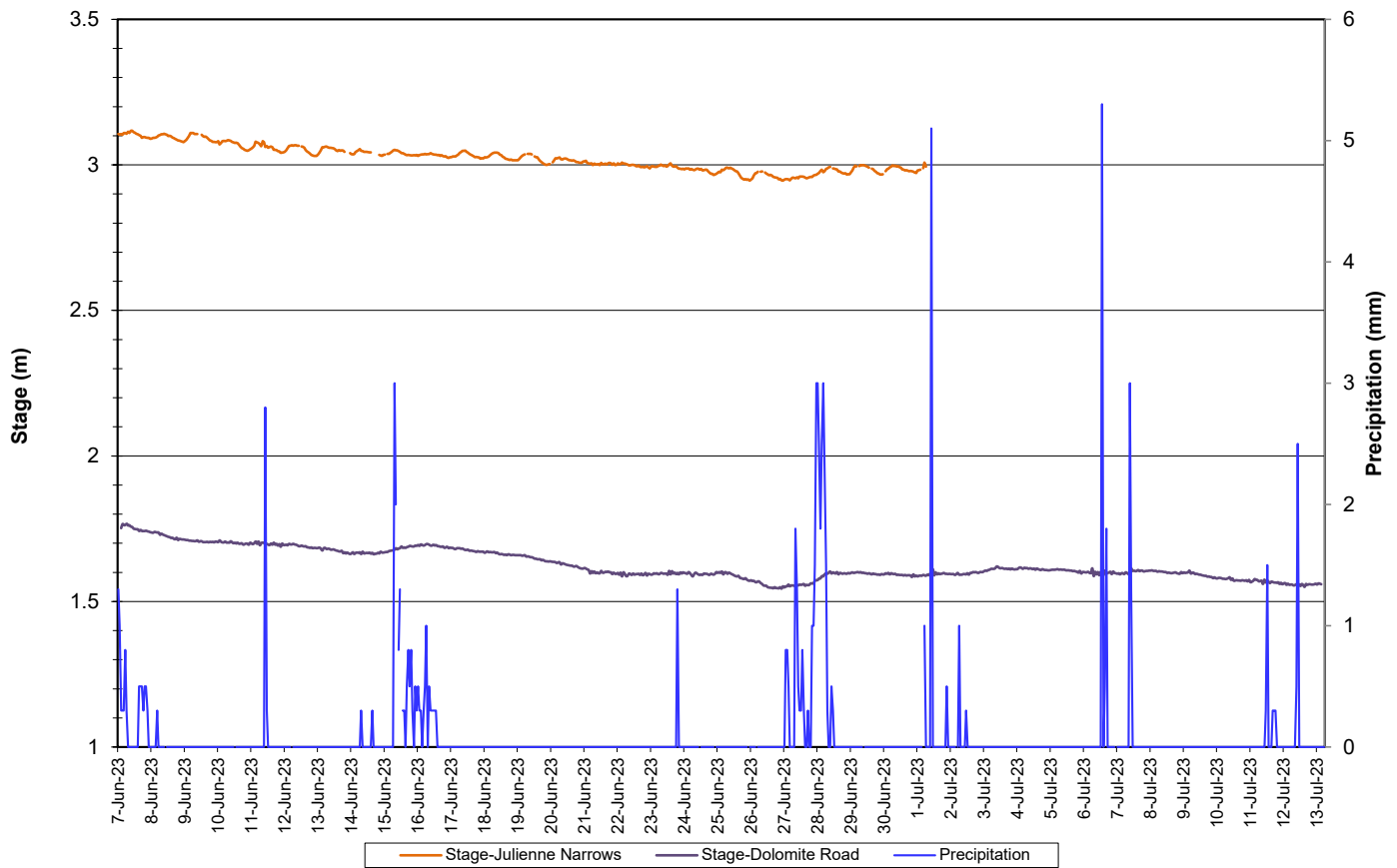
**Turbidity and Precipitation : Dolomite Road  
June 7 to July 13, 2023**



**Figure 7: Turbidity and Precipitation – Dolomite Road  
(Weather data collected from climate station near Moosehead Lake)**

- Stage and precipitation are graphed below to show the relationship between rainfall and water level at Dolomite Road and Julienne Narrows (Figure 8).
- Stage decreased at both Julienne Narrows and Dolomite Road during this deployment period. There is a portion of data missing from Julienne Narrows.
- With the exception of water quantity data (Stage and Flow), 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.

**Stage and Precipitation: Wabush Lake Network  
June 7 to July 13, 2023**

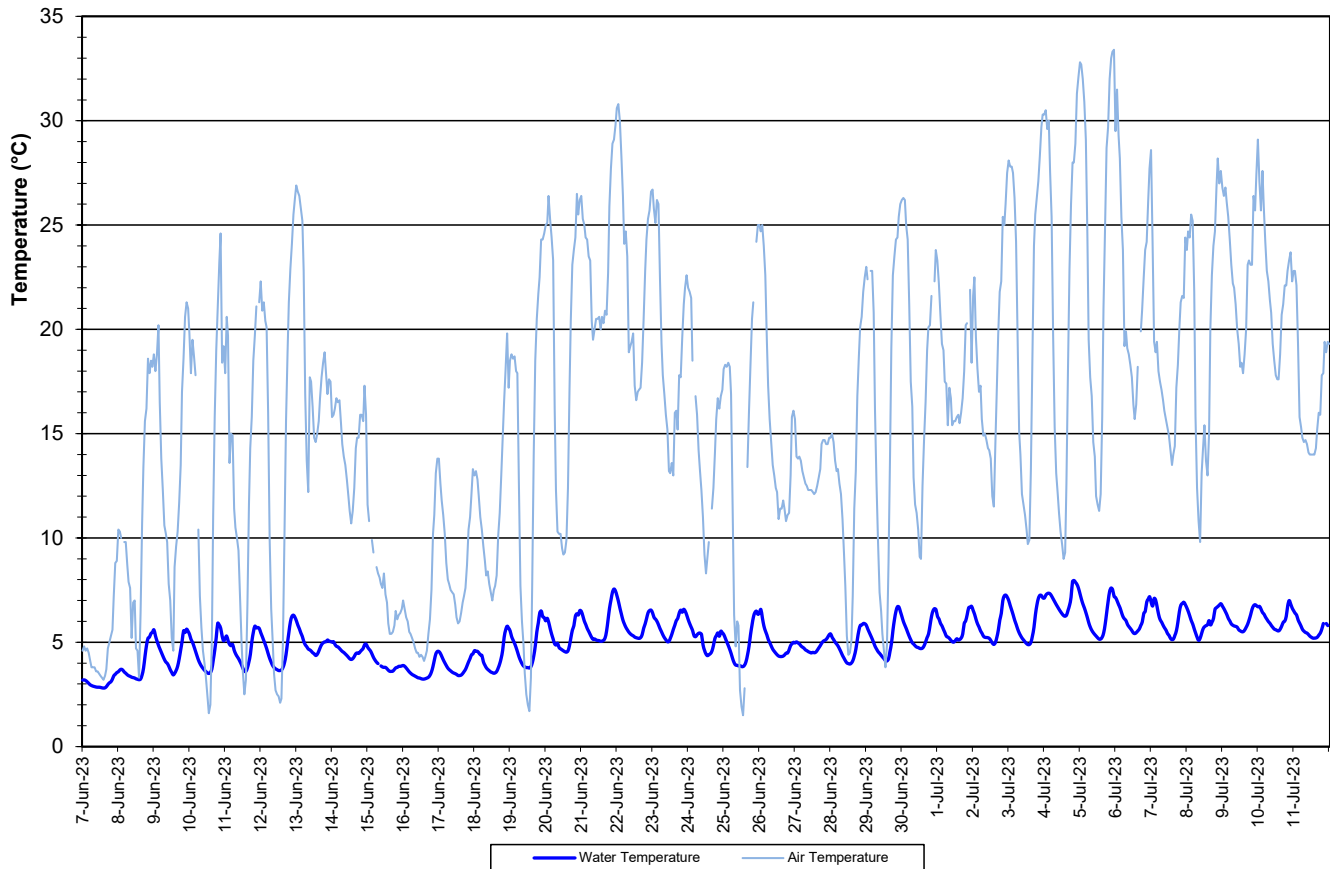


**Figure 8: Stage and Precipitation – Wabush Lake Network  
(Weather data collected at climate station located near Moosehead Lake)**

**Dumbell Stream**

- Water temperature ranged from 2.81 to 7.96°C during this deployment period (Figure 9).
- Water temperature fluctuated within a small range during this deployment period. Water temperature at Dumbell Stream is typically much lower than other stations (Figure 9).

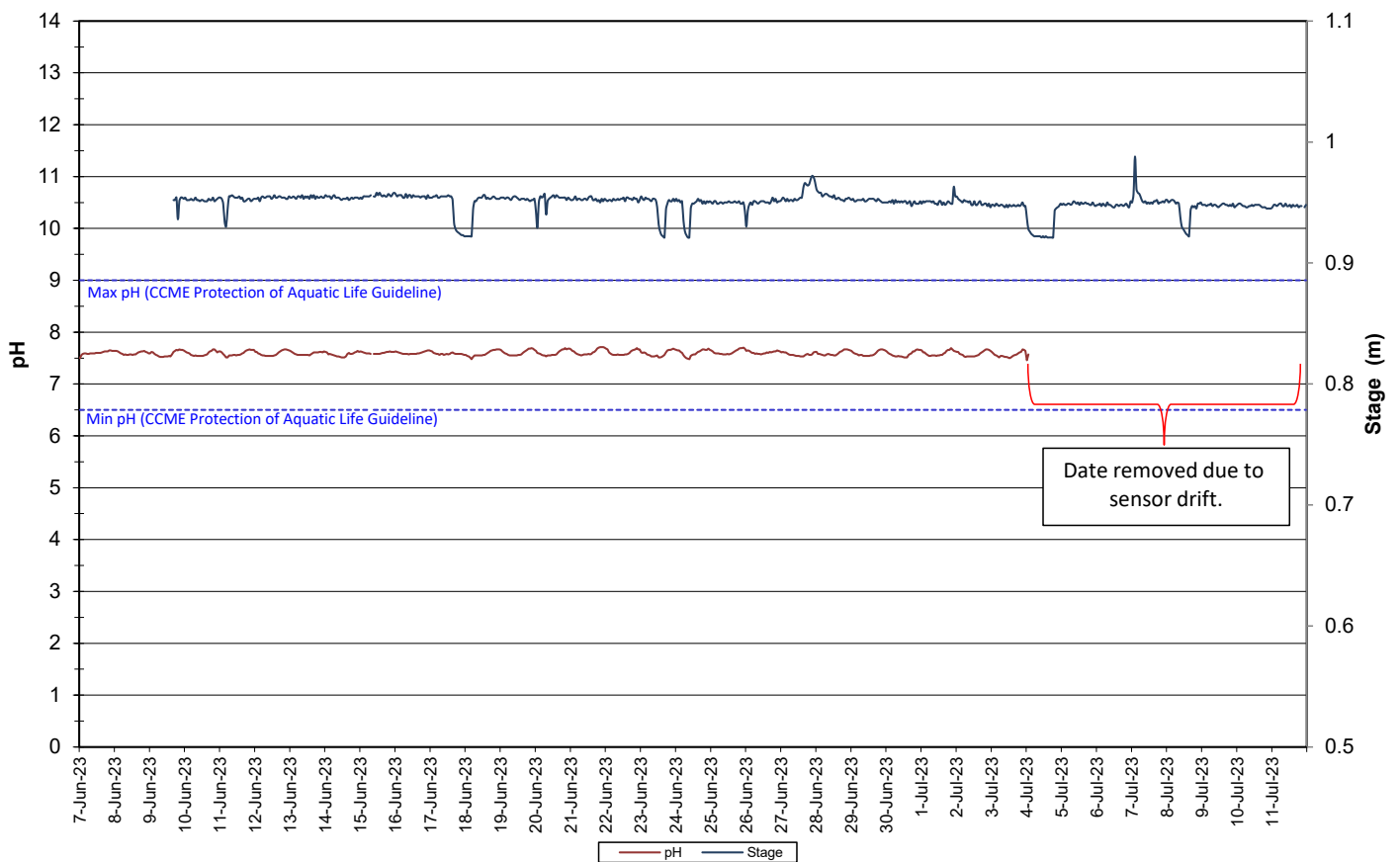
**Water and Air Temperature : Dumbell Stream above Dumbell Lake  
June 7 to July 12, 2023**



**Figure 9: Water and Air Temperature – Dumbell Stream  
(Weather data collected from climate station near Moosehead Lake)**

- pH ranged from 7.46 to 7.71 pH units (Figure 10). The median pH was 7.58.
- All values are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units). pH fluctuates slightly throughout the day and night.
- A portion of the data was removed due to sensor drift.
- With the exception of water quantity data (Stage and Flow), 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.

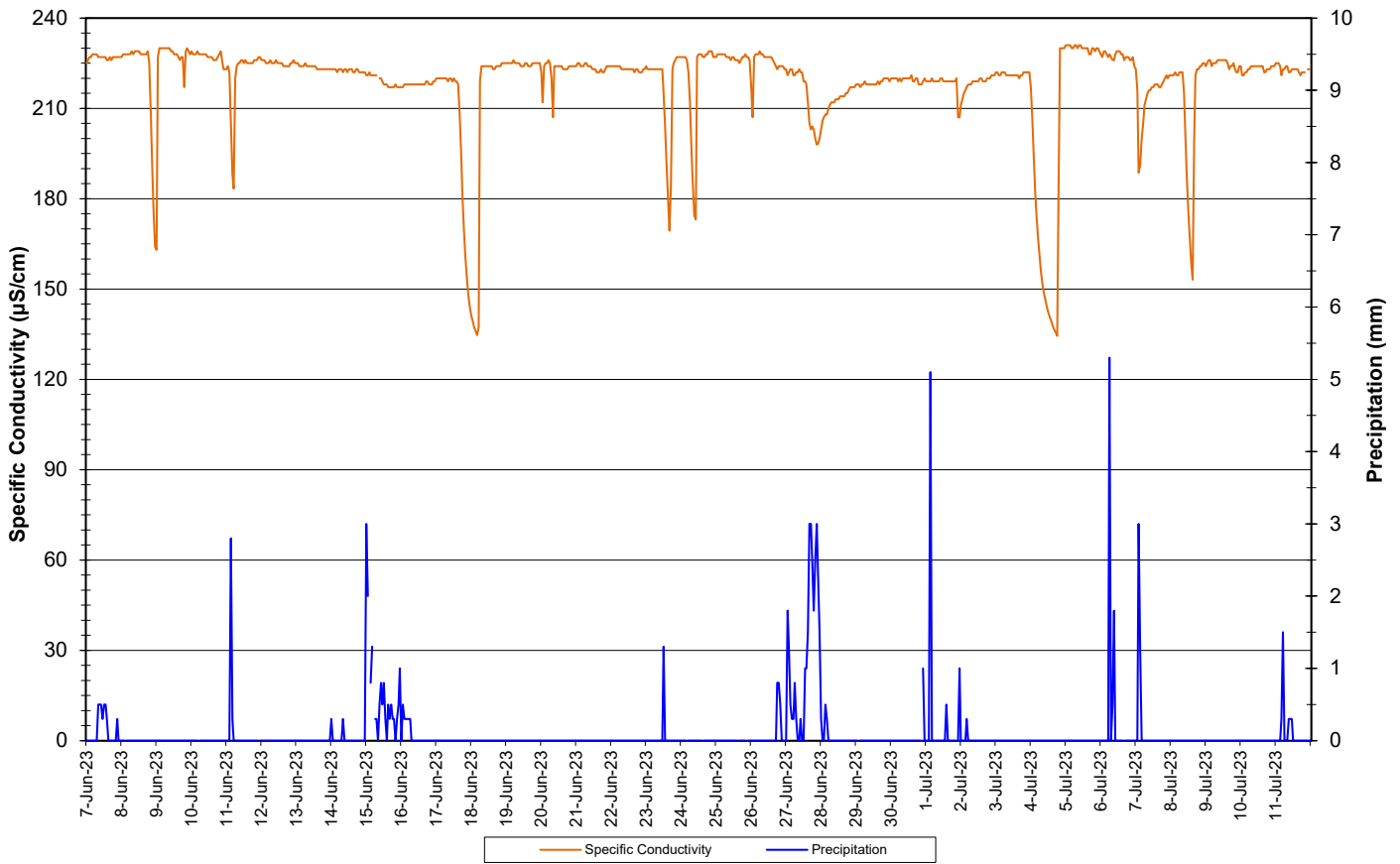
**Water pH and Stage : Dumbell Stream above Dumbell Lake  
June 7 to July 12, 2023**



**Figure 10: Water pH and Stage – Dumbell Stream**

- Specific conductivity ranged from 134.4 to 231.0  $\mu\text{S}/\text{cm}$ , throughout the deployment period (Figure 11).
- Overall, specific conductivity fluctuated slightly over the deployment period, with periodic decreases occurring infrequently.
- With the exception of water quantity data (Stage and Flow), 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.

**Specific Conductivity of Water and Precipitation: Dumbell Stream above Dumbell Lake  
June 7 to July 12, 2023**



**Figure 11: Specific conductivity and stage – Dumbell Stream  
(Weather data collected from climate station near Moosehead Lake)**



- The saturation of dissolved oxygen ranged from 89.6% to 93.7% while the dissolved oxygen content ranged from 10.87 to 12.58 mg/l with a median value of 11.70 mg/l (Figure 12).
- All values recorded at Dumbell Stream were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Other Life Stages of 6.5 mg/l, and the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Early Life Stages of 9.5 mg/l. The guidelines are indicated in blue on Figure 12.
- Overall, dissolved oxygen decreased slightly over this deployment period. Dissolved oxygen fluctuated daily with decreases observed at night.

Dissolved Oxygen Concentration and Saturation : Dumbell Stream at Dumbell Lake  
June 7 to July 12, 2023

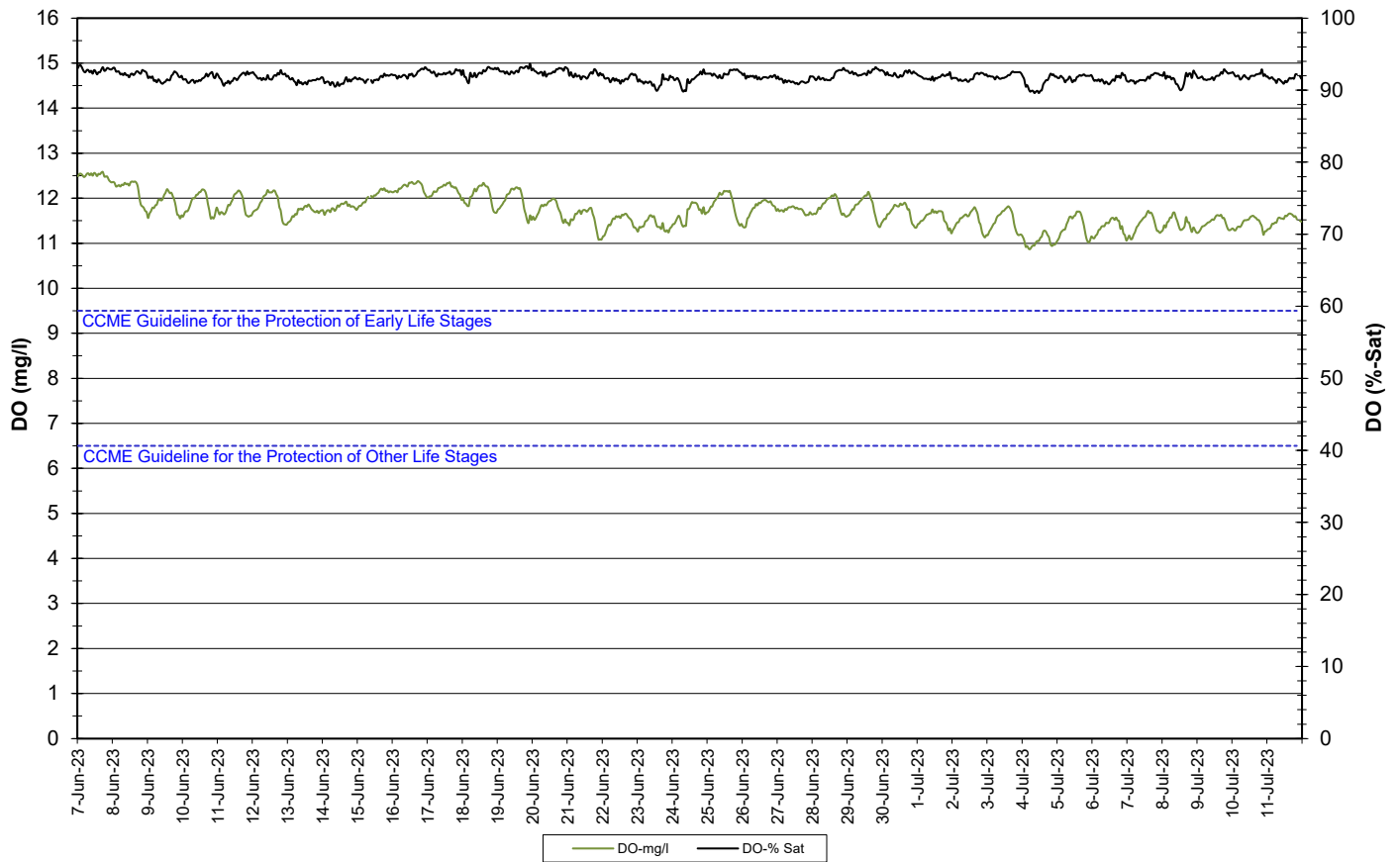
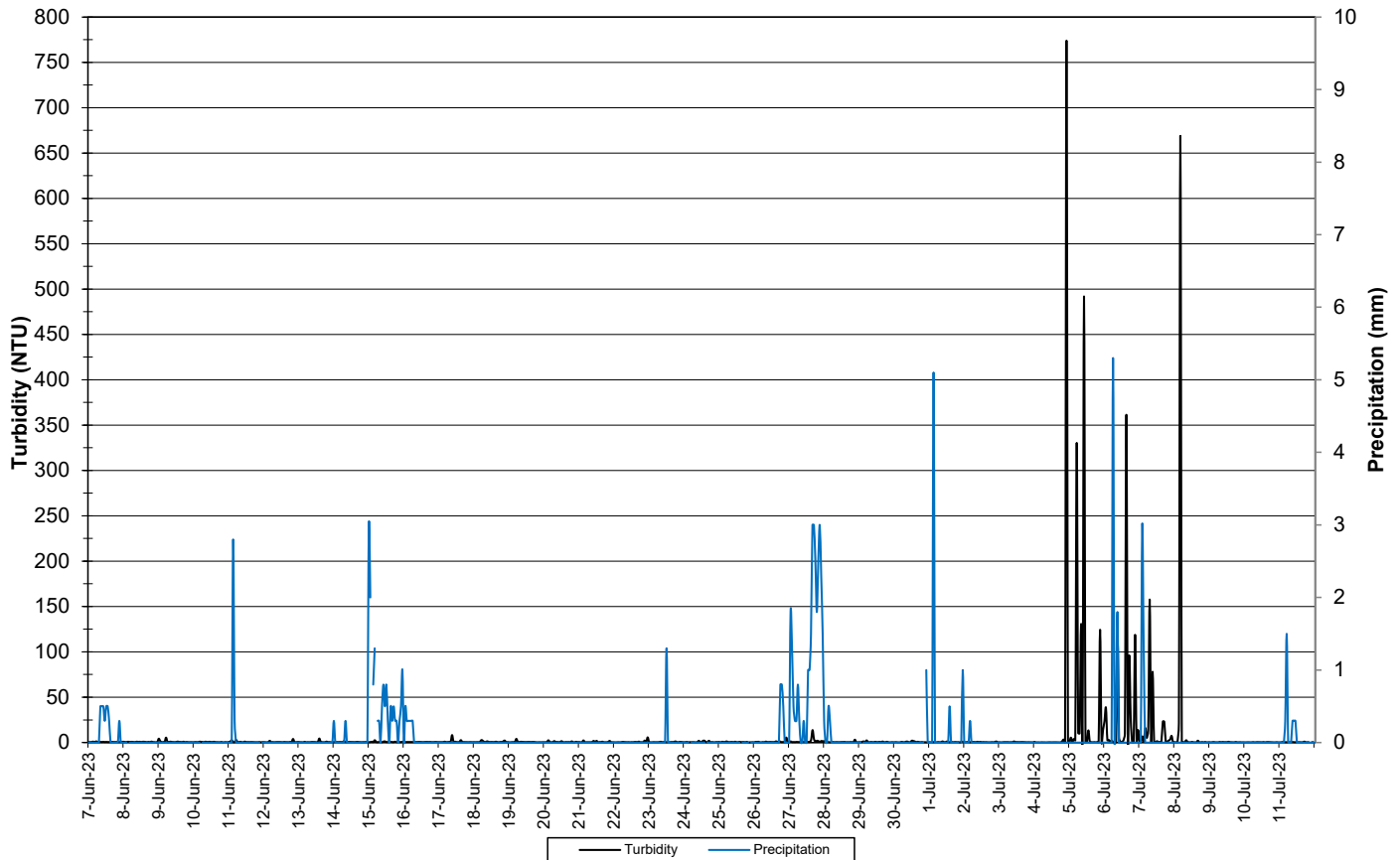


Figure 12: Dissolved oxygen – Dumbell Stream

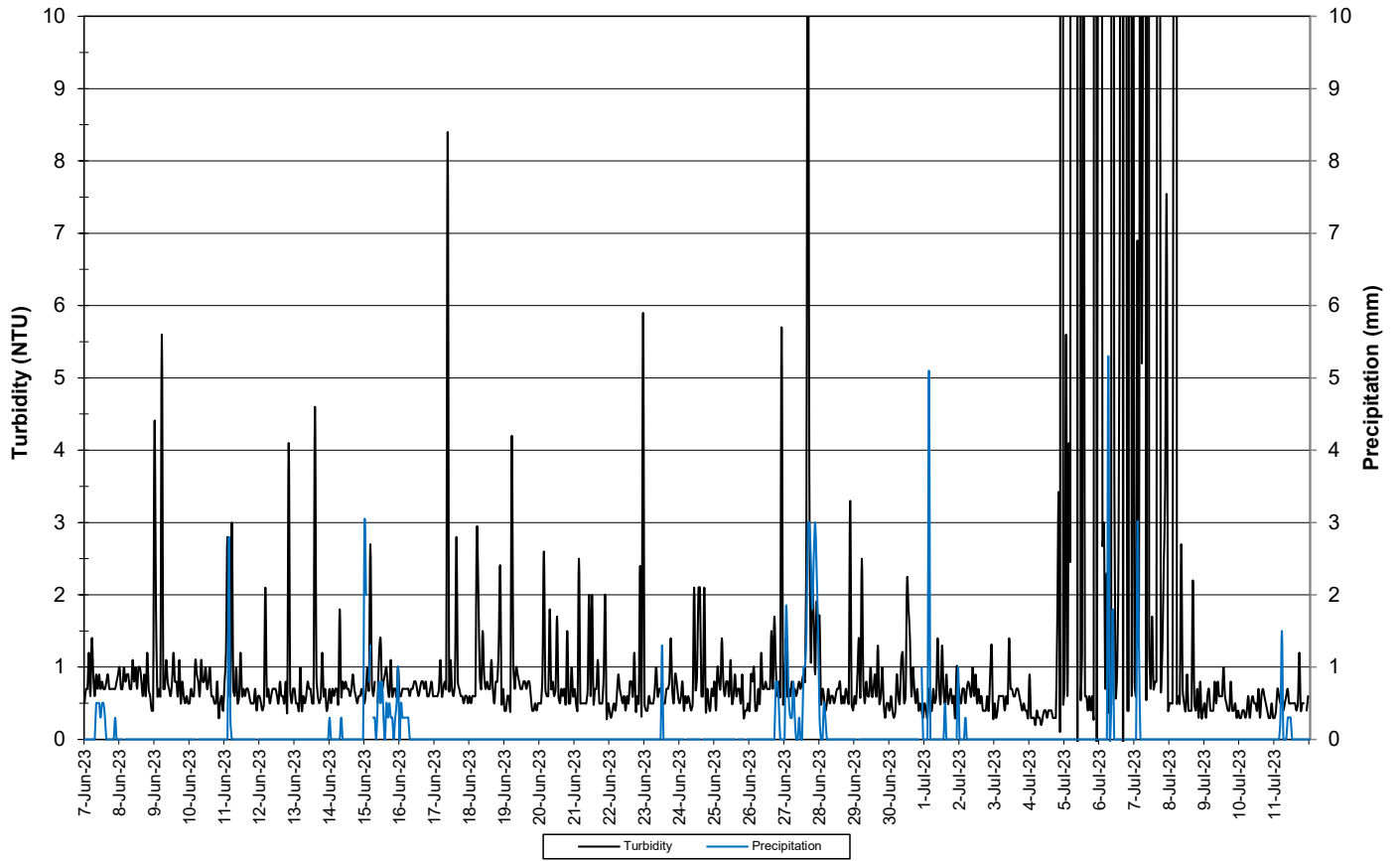
- Turbidity values ranged from 0.0 NTU to 774.0 NTU throughout the deployment period (Figure 13a). The median value was 0.6 NTU, indicating low background turbidity levels overall.
- There was a significant spike in turbidity values July 5<sup>th</sup> until July 8<sup>th</sup>. This could be due to a number of different reasons.
- Graph 13b is included to give a better view of the background turbidity levels.

**Water Turbidity and Precipitation : Dumbell Stream above Dumbell Lake  
June 7 to July 12, 2023**



**Figure 13a: Turbidity and Precipitation – Dumbell Stream  
(Weather data collected from climate station near Moosehead Lake)**

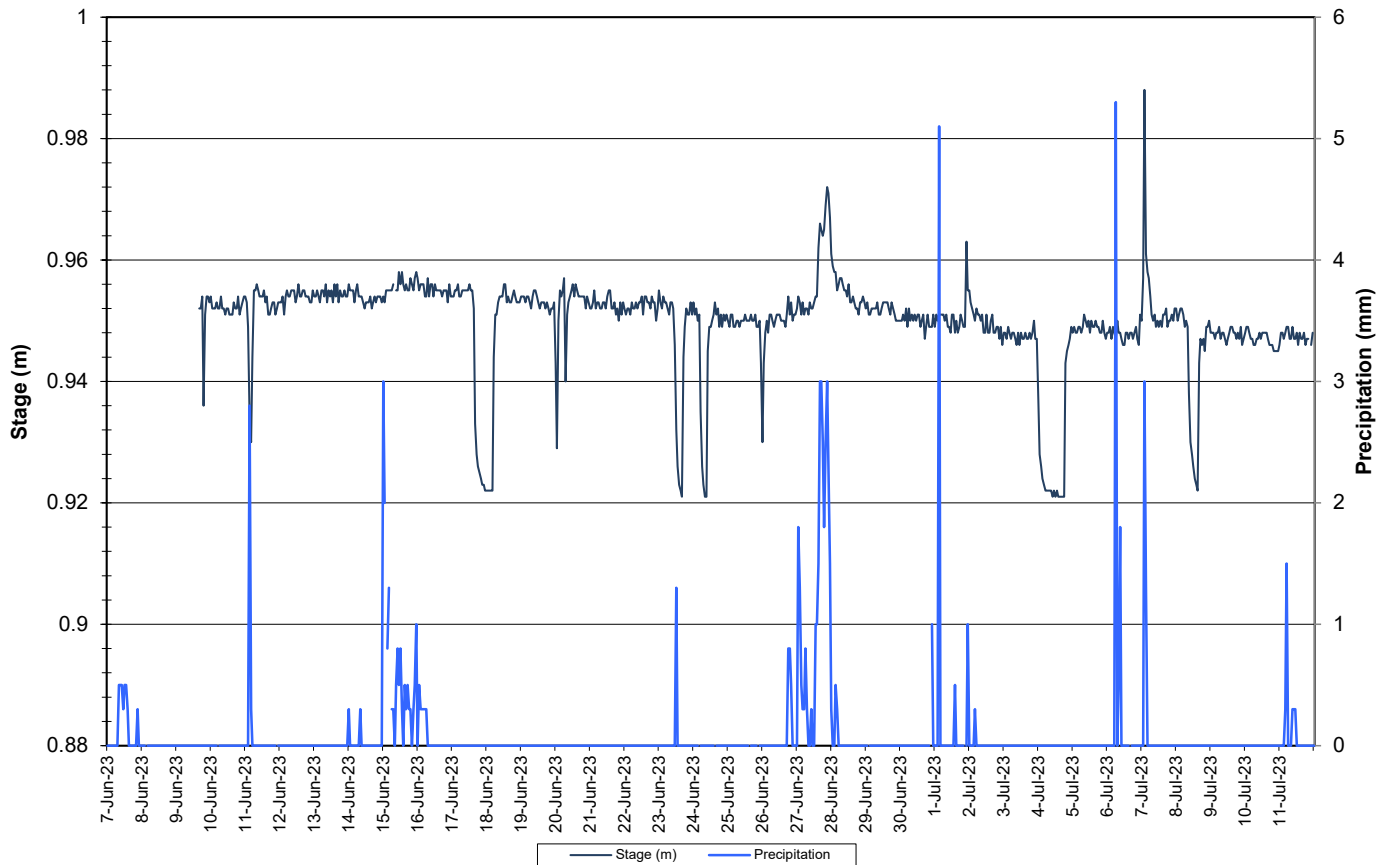
**Water Turbidity <10 NTU and Precipitation : Dumbell Stream above Dumbell Lake  
June 7 to July 12, 2023**



**Figure 13b: Turbidity <10 NTU and Precipitation – Dumbell Stream  
(Weather data collected from climate station near Moosehead Lake)**

- Stage and precipitation are graphed below to show the relationship between rainfall and water level at Dumbell Stream (Figure 14).
- With the exception of water quantity data (Stage and Flow), 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.

**Stage and Precipitation: Dumbell Stream  
June 7 to July 12, 2023**



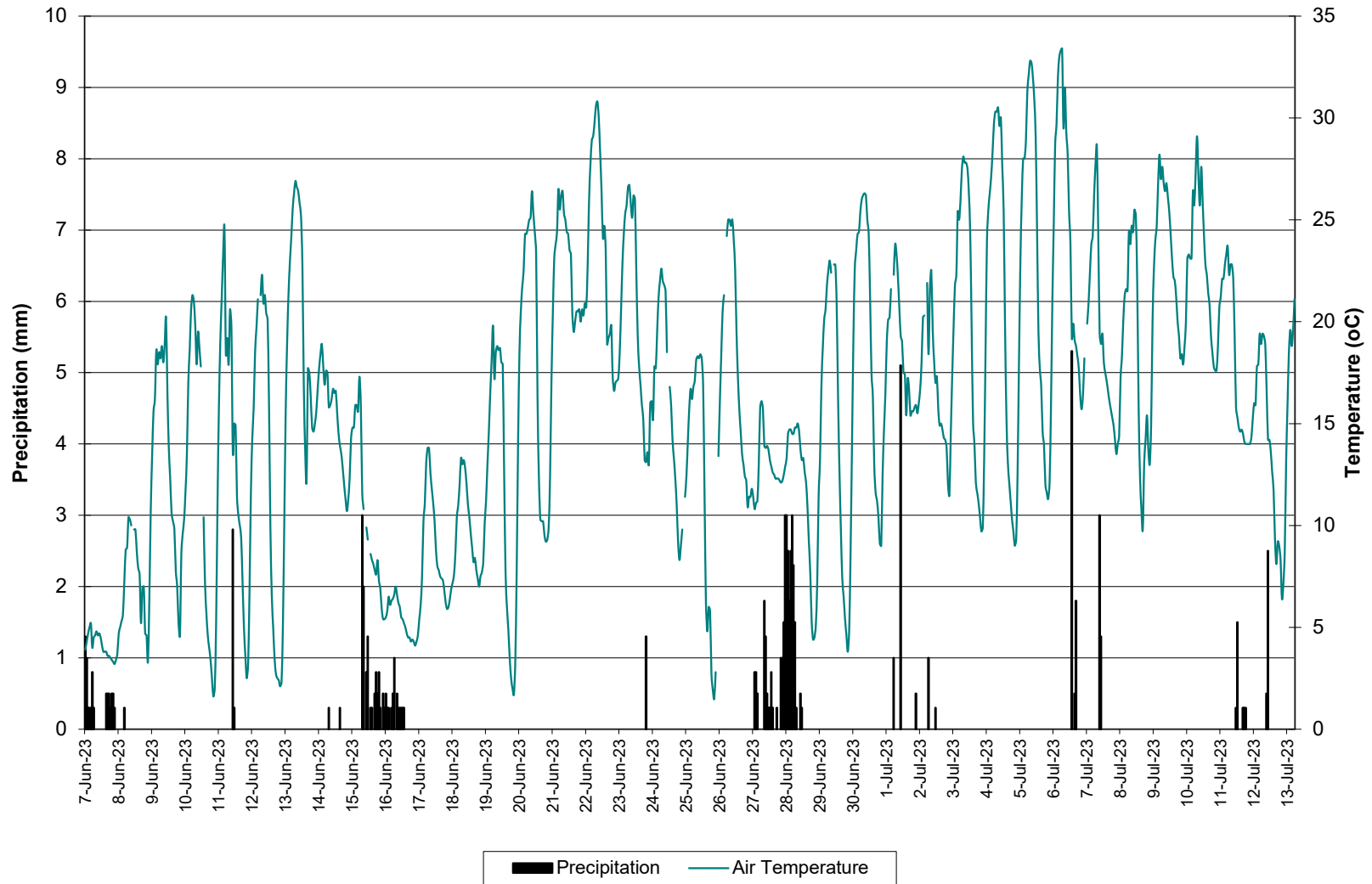
**Figure 14: Stage and Precipitation – Dumbell Stream  
(Weather data collected from climate station near Moosehead Lake)**

## Conclusions

- Instruments were deployed on June 7<sup>th</sup>, 2023, and removed by July 13<sup>th</sup>, 2023, except for the instrument at Pumphouse Stream. This was the first deployment period for this season.
- In most cases, precipitation events or increases/decreases in water level could be used to explain the data fluctuations. Most 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 air temperature at all stations. Temperature ranged between 2.81 and 25.71°C at these stations during deployment.
- All pH values were within the recommended CCME Guidelines for the Protection of Aquatic Life. pH ranged between 7.23 and 8.51. Fluctuations were noted between day and night. The pH sensor at dumbbell stream experienced sensor drift, thus a small portion of data was removed.
- Specific conductivity differed between the two Wabush Lake stations. This can be attributed to varying concentrations of iron ore tailings deposited between the stations. Specific conductivity ranged from 46.0 µs/cm to 120.2 µs/cm at the Wabush Lake stations and 134.4 to 231.0 µs/cm at Dumbell Stream.
- At all three stations, all 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. When dissolved oxygen values are compared to the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota at Early Life Stages of 9.5 mg/L, the majority of values at Julienne Narrows, Dolomite Road and all of the values at Dumbell Stream, were above the guideline.
- Turbidity at Dolomite Road and Julienne Narrows ranged from 0.4 to 65.7 NTU.
- Turbidity at Dumbell Stream ranged from 0.0 NTU to 22.9 NTU.
- Julienne Narrows and Dolomite Road, stage decreased during the deployment period.
- At Dumbell Stream, stage decreased slightly over the course of the deployment period. There were occasional drops in the stage data; these decreases may not be accurate.
- With the exception of of water quantity data (Stage and Flow), 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.

## Appendix 1

**Air Temperature and Precipitation: Moosehead Lake, NL  
June 7 to July 13, 2023**



Appendix 2  
QA/QC Grab Sample Results



**BUREAU  
VERITAS**

Bureau Veritas Job #: C3H0137  
Report Date: 2023/06/28

NL Department of Environment, Climate Change and  
Municipalities

Site Location: LABRADOR

Your P.O. #: 220028978-9

Sampler Initials: MM

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
WBS582 JULIENNE NARROWS								
Sampling Date		2023/06/07 10:30						
Matrix		W						
Sample #		2023-6304-00-SI-SP						
Registration #		SA-0000						
<b>RESULTS OF ANALYSES OF WATER</b>								
<b>Calculated Parameters</b>								
Hardness (CaCO3)	-	61	1.0	mg/L	N/A	2023/06/23		8722303
Nitrate (N)	-	0.68	0.050	mg/L	N/A	2023/06/21		8722227
Total dissolved solids (calc., EC)	-	73	1.0	mg/L	N/A	2023/06/16		8722338
<b>Inorganics</b>								
Conductivity	-	130	1.0	uS/cm	N/A	2023/06/15	NGI	8727590
Chloride (Cl-)	-	1.7	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Sulphate (SO4)	-	3.7	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Total Alkalinity (Total as CaCO3)	-	54	2.0	mg/L	N/A	2023/06/15	NGI	8727593
Colour	-	16	5.0	TCU	N/A	2023/06/20	TGO	8737879
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2023/06/15	NGI	8727594
Total Kjeldahl Nitrogen (TKN)	-	0.21	0.10	mg/L	2023/06/22	2023/06/23	RTY	8746431
Nitrate + Nitrite (N)	-	0.68	0.050	mg/L	N/A	2023/06/21	TGO	8737875
Nitrite (N)	-	ND	0.010	mg/L	N/A	2023/06/20	TGO	8736712
Nitrogen (Ammonia Nitrogen)	-	0.051	0.050	mg/L	N/A	2023/06/22	TGO	8745758
Dissolved Organic Carbon (C)	-	2.9	0.50	mg/L	N/A	2023/06/15	CPP	8729203
Total Organic Carbon (C)	-	2.7	0.50	mg/L	N/A	2023/06/20	CPP	8736659
pH	-	7.89		pH	N/A	2023/06/15	NGI	8727592
Total Phosphorus	-	0.016	0.004	mg/L	2023/06/22	2023/06/23	SPC	8746738
Total Suspended Solids	-	4.4	1.0	mg/L	2023/06/13	2023/06/15	RMK	8721816
Turbidity	-	9.3	0.10	NTU	N/A	2023/06/21	NGI	8737994
<b>MERCURY BY COLD VAPOUR AA (WATER)</b>								
<b>Metals</b>								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2023/06/19	2023/06/20	SGK	8736613
<b>ELEMENTS BY ICP/MS (WATER)</b>								
<b>Metals</b>								
Total Aluminum (Al)	-	0.032	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Antimony (Sb)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Arsenic (As)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Barium (Ba)	-	0.0022	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Boron (B)	-	ND	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Calcium (Ca)	-	14	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Chromium (Cr)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Copper (Cu)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Iron (Fe)	-	0.39	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Lead (Pb)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Magnesium (Mg)	-	6.0	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747400





BUREAU  
VERITAS

Bureau Veritas Job #: C3H0137  
Report Date: 2023/06/28

NL Department of Environment, Climate Change and  
Municipalities

Site Location: LABRADOR

Your P.O. #: 220028978-9

Sampler Initials: MM

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
WBS582 JULIENNE NARROWS								
Sampling Date 2023/06/07 10:30								
Matrix W								
Sample # 2023-6304-00-SI-SP								
Registration # SA-0000								
<b>ELEMENTS BY ICP/MS (WATER)</b>								
<b>Metals</b>								
Total Manganese (Mn)	-	0.10	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Nickel (Ni)	-	ND	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Phosphorus (P)	-	ND	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Potassium (K)	-	1.2	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Selenium (Se)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Sodium (Na)	-	1.5	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Strontium (Sr)	-	0.018	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Uranium (U)	-	0.00014	0.00010	mg/L	2023/06/23	2023/06/23	BCZ	8747400
Total Zinc (Zn)	-	0.052	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747400



BUREAU  
VERITAS

Bureau Veritas Job #: C3H0137  
Report Date: 2023/06/28

NL Department of Environment, Climate Change and  
Municipalities  
Site Location: LABRADOR  
Your P.O. #: 220028978-9  
Sampler Initials: MM

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
WBS583 DOLOMITE ROAD								
Sampling Date		2023/06/07 11:40						
Matrix		W						
Sample #		2023-6305-00-SI-SP						
Registration #		SA-0000						
<b>RESULTS OF ANALYSES OF WATER</b>								
<b>Calculated Parameters</b>								
Hardness (CaCO3)	-	24	1.0	mg/L	N/A	2023/06/26		8722303
Nitrate (N)	-	0.14	0.050	mg/L	N/A	2023/06/28		8722227
Total dissolved solids (calc., EC)	-	29	1.0	mg/L	N/A	2023/06/17		8722338
<b>Inorganics</b>								
Conductivity	-	52	1.0	uS/cm	N/A	2023/06/16	NGI	8731153
Dup. Conductivity	-	52	1.0	uS/cm	N/A	2023/06/16	NGI	8731153
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Sulphate (SO4)	-	2.0	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Total Alkalinity (Total as CaCO3)	-	22	2.0	mg/L	N/A	2023/06/16	NGI	8731160
Dup. Total Alkalinity (Total as CaCO3)	-	22	2.0	mg/L	N/A	2023/06/16	NGI	8731160
Colour	-	38	5.0	TCU	N/A	2023/06/27	TGO	8752826
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2023/06/16	NGI	8731161
Dup. Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2023/06/16	NGI	8731161
Total Kjeldahl Nitrogen (TKN)	-	0.22	0.10	mg/L	2023/06/22	2023/06/23	RTY	8746431
Nitrate + Nitrite (N)	-	0.14	0.050	mg/L	N/A	2023/06/27	TGO	8752801
Nitrite (N)	-	ND	0.010	mg/L	N/A	2023/06/27	TGO	8752762
Nitrogen (Ammonia Nitrogen)	-	0.050	0.050	mg/L	N/A	2023/06/22	TGO	8745758
Dissolved Organic Carbon (C)	-	4.8	0.50	mg/L	N/A	2023/06/15	CPP	8729203
Dup. Dissolved Organic Carbon (C)	-	4.8	0.50	mg/L	N/A	2023/06/15	CPP	8729203
Total Organic Carbon (C)	-	5.1	0.50	mg/L	N/A	2023/06/15	CPP	8727523
pH	-	7.47		pH	N/A	2023/06/16	NGI	8731158
Dup. pH	-	7.50		pH	N/A	2023/06/16	NGI	8731158
Total Phosphorus	-	0.014	0.004	mg/L	2023/06/22	2023/06/23	SPC	8746738
Total Suspended Solids	-	5.2	1.0	mg/L	2023/06/13	2023/06/15	RMK	8721816
Turbidity	-	2.7	0.10	NTU	N/A	2023/06/26	KMC	8747885
Dup. Turbidity	-	2.8	0.10	NTU	N/A	2023/06/26	KMC	8747885
<b>MERCURY BY COLD VAPOUR AA (WATER)</b>								
<b>Metals</b>								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2023/06/19	2023/06/20	SGK	8736613
<b>ELEMENTS BY ICP/MS (WATER)</b>								
<b>Metals</b>								
Total Aluminum (Al)	-	0.051	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup. Total Aluminum (Al)	-	0.052	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Antimony (Sb)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup. Total Antimony (Sb)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Arsenic (As)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup. Total Arsenic (As)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406



BUREAU  
VERITAS

Bureau Veritas Job #: C3H0137  
Report Date: 2023/06/28

NL Department of Environment, Climate Change and  
Municipalities

Site Location: LABRADOR

Your P.O. #: 220028978-9

Sampler Initials: MM

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
WBS583 DOLOMITE ROAD								
Sampling Date		2023/06/07 11:40						
Matrix		W						
Sample #		2023-6305-00-SI-SP						
Registration #		SA-0000						
<b>ELEMENTS BY ICP/MS (WATER)</b>								
<b>Metals</b>								
Total Barium (Ba)	-	0.0079	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Barium (Ba)	-	0.0079	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Boron (B)	-	ND	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Boron (B)	-	ND	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Cadmium (Cd)	-	ND	0.000010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Calcium (Ca)	-	5.6	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Calcium (Ca)	-	5.4	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Chromium (Cr)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Chromium (Cr)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Copper (Cu)	-	0.00068	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Copper (Cu)	-	0.00054	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Iron (Fe)	-	0.31	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Iron (Fe)	-	0.29	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Lead (Pb)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Lead (Pb)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Magnesium (Mg)	-	2.4	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Magnesium (Mg)	-	2.4	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Manganese (Mn)	-	0.089	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Manganese (Mn)	-	0.088	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Nickel (Ni)	-	ND	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Nickel (Ni)	-	ND	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Phosphorus (P)	-	ND	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Phosphorus (P)	-	ND	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Potassium (K)	-	0.79	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Potassium (K)	-	0.79	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Selenium (Se)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Selenium (Se)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Sodium (Na)	-	0.72	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Sodium (Na)	-	0.71	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Strontium (Sr)	-	0.012	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Strontium (Sr)	-	0.011	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Uranium (U)	-	ND	0.00010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Uranium (U)	-	ND	0.00010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Zinc (Zn)	-	ND	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Dup.Total Zinc (Zn)	-	ND	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747406



BUREAU  
VERITAS

Bureau Veritas Job #: C3H0137  
Report Date: 2023/06/28

NL Department of Environment, Climate Change and  
Municipalities

Site Location: LABRADOR

Your P.O. #: 220028978-9

Sampler Initials: MM

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
WBS585 DUMBELL STREAM								
Sampling Date		2023/06/07 15:40						
Matrix		W						
Sample #		2023-6307-00-SI-SP						
Registration #		SA-0000						
<b>RESULTS OF ANALYSES OF WATER</b>								
<b>Calculated Parameters</b>								
Hardness (CaCO3)	-	100	1.0	mg/L	N/A	2023/06/26		8722303
Nitrate (N)	-	17	1.0	mg/L	N/A	2023/06/21		8722227
Total dissolved solids (calc., EC)	-	140	1.0	mg/L	N/A	2023/06/16		8722338
<b>Inorganics</b>								
Conductivity	-	250	1.0	uS/cm	N/A	2023/06/15	NGI	8727590
Chloride (Cl-)	-	2.7	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Dup.Chloride (Cl-)	-	2.7	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Dup.Bromide (Br-)	-	ND	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Sulphate (SO4)	-	9.6	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Dup.Sulphate (SO4)	-	9.8	1.0	mg/L	N/A	2023/06/19	LKH	8732150
Total Alkalinity (Total as CaCO3)	-	30	2.0	mg/L	N/A	2023/06/15	NGI	8727593
Colour	-	ND	5.0	TCU	N/A	2023/06/20	TGO	8737879
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2023/06/15	NGI	8727594
Total Kjeldahl Nitrogen (TKN)	-	ND(1)	0.50	mg/L	2023/06/22	2023/06/23	RTY	8746431
Nitrate + Nitrite (N)	-	17	1.0	mg/L	N/A	2023/06/21	TGO	8737875
Nitrite (N)	-	0.075	0.010	mg/L	N/A	2023/06/20	TGO	8736712
Nitrogen (Ammonia Nitrogen)	-	0.093	0.050	mg/L	N/A	2023/06/22	TGO	8745758
Dissolved Organic Carbon (C)	-	0.83	0.50	mg/L	N/A	2023/06/15	CPP	8729203
Total Organic Carbon (C)	-	0.82	0.50	mg/L	N/A	2023/06/15	CPP	8729190
pH	-	7.59		pH	N/A	2023/06/15	NGI	8727592
Total Phosphorus	-	0.009	0.004	mg/L	2023/06/22	2023/06/23	SPC	8746738
Total Suspended Solids	-	6.2	1.0	mg/L	2023/06/13	2023/06/15	RMK	8721816
Turbidity	-	0.48	0.10	NTU	N/A	2023/06/21	NGI	8737994
<b>MERCURY BY COLD VAPOUR AA (WATER)</b>								
<b>Metals</b>								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2023/06/19	2023/06/20	SGK	8736613
<b>ELEMENTS BY ICP/MS (WATER)</b>								
<b>Metals</b>								
Total Aluminum (Al)	-	0.026	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Antimony (Sb)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Arsenic (As)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Barium (Ba)	-	0.0050	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Boron (B)	-	ND	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Calcium (Ca)	-	24	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Chromium (Cr)	-	ND	0.0010	mg/L	2023/06/23	2023/06/23	BCZ	8747406

(1) Due to a high concentration of NOx, the sample required dilution. The detection limit was adjusted accordingly.



BUREAU  
VERITAS

Bureau Veritas Job #: C3H0137  
Report Date: 2023/06/28

NL Department of Environment, Climate Change and  
Municipalities

Site Location: LABRADOR

Your P.O. #: 220028978-9

Sampler Initials: MM

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
WBS585 DUMBELL STREAM								
Sampling Date 2023/06/07 15:40								
Matrix W								
Sample # 2023-6307-00-SI-SP								
Registration # SA-0000								
<b>ELEMENTS BY ICP/MS (WATER)</b>								
<b>Metals</b>								
Total Copper (Cu)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Iron (Fe)	-	0.080	0.050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Lead (Pb)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Magnesium (Mg)	-	11	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Manganese (Mn)	-	0.0089	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Nickel (Ni)	-	ND	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Phosphorus (P)	-	ND	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Potassium (K)	-	2.0	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Selenium (Se)	-	ND	0.00050	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Sodium (Na)	-	1.1	0.10	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Strontium (Sr)	-	0.030	0.0020	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Uranium (U)	-	ND	0.00010	mg/L	2023/06/23	2023/06/23	BCZ	8747406
Total Zinc (Zn)	-	ND	0.0050	mg/L	2023/06/23	2023/06/23	BCZ	8747406