Real-Time Water Quality Deployment Report

Iron Ore Company of Canada
Labrador West Network

June 18 to
July 25, 2024

Newfoundland Labrador

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

Contents

General

- The Water Resources Management Division, in partnership with the Iron Ore Company of Canada (IOC) and Environment and Climate Change Canada (ECCC), maintain a network of real-time water quality (RTWQ) and water quantity stations in Labrador West.
- There are two stations located on 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 8th, 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 12th, 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.
- On November 19th, 2023, a new station was commissioned under this agreement. This station is located at an *Unnamed Tributary above Fraggle Rock Lake* hereafter referred to as Fraggle Rock.
- 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.
- Between June 18th and 19th, clean and calibrated real-time water quality-monitoring instruments were deployed at three IOC stations. The instruments were deployed between 35-37 days at each station. The instruments were removed between July 23rd and 25th. This was the first deployment of the 2024 season for these stations. Instruments were not deployed at Julienne Narrows or Fraggle Rock, due to the unavailability of transportation.

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

	Rank				
Parameter	**Excellent**	**Good**	**Fair**	**Marginal**	**Poor**
Temperature (°C)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	<+/-1
pH (unit)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Sp. Conductance (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 18-19 and July 23-25 are summarized in Table 2.

Table 2: QA/QC comparison rankings for IOC stations between June 18-19 and July 23-25.

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Dolomite Road	Jun 18, 2024	Deployment	N/A	Excellent	Excellent	N/A	Excellent
	Jul 25, 2024	Removal	Excellent	Excellent	Excellent	Good	Excellent
Dumbell Stream	Jun 18, 2024	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	Jul 23, 2024	Removal	Excellent	Fair	Excellent	Excellent	Excellent
Pumphouse Stream	Jun 19, 2024	Deployment	Good	Excellent	Excellent	Excellent	Good
	Jul 24, 2024	Removal	Excellent	Good	Excellent	Excellent	Excellent

- There are a few circumstances which may cause less than ideal QA/QC rankings to be obtained. These include: the placement of the QA/QC sonde in relation to the field sonde; the amount of time each sonde was given to stabilize before readings were recorded; and deteriorating performance of one or more of the sensors.

Deployment

- All parameters at Dumbell Stream and Pumphouse Stream ranked either 'excellent' or 'good'.
- Due to the absence of QA/QC sonde readings, the field instrument at Dolomite Road was ranked against the QA/QC grab sample. Parameters that could be ranked were ranked as 'excellent'.

Removal

- At Dolomite Road and Pumphouse Stream, all parameters ranked either 'excellent' or 'good'.
- At Dumbell Stream, all parameters except pH ranked 'excellent'. When compared to the QA/QC sonde, pH ranked 'fair'. The field instrument read a value of 7.83, while the QA/QC instrument read a value of 7.32.

Data Interpretation

- The following graphs and discussion illustrate water quality-related events from June 18-19 to July 23-25, 2024 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 14.20 to 20.30°C at Dolomite Road during this deployment period (Figure 2).
- Water temperature decreased slightly until the end of July, it then increased over the remainder of the deployment period, in response to warming air temperatures in the summer season. Water temperature corresponded to increases/decreases in ambient air temperature trends (Figure 2).

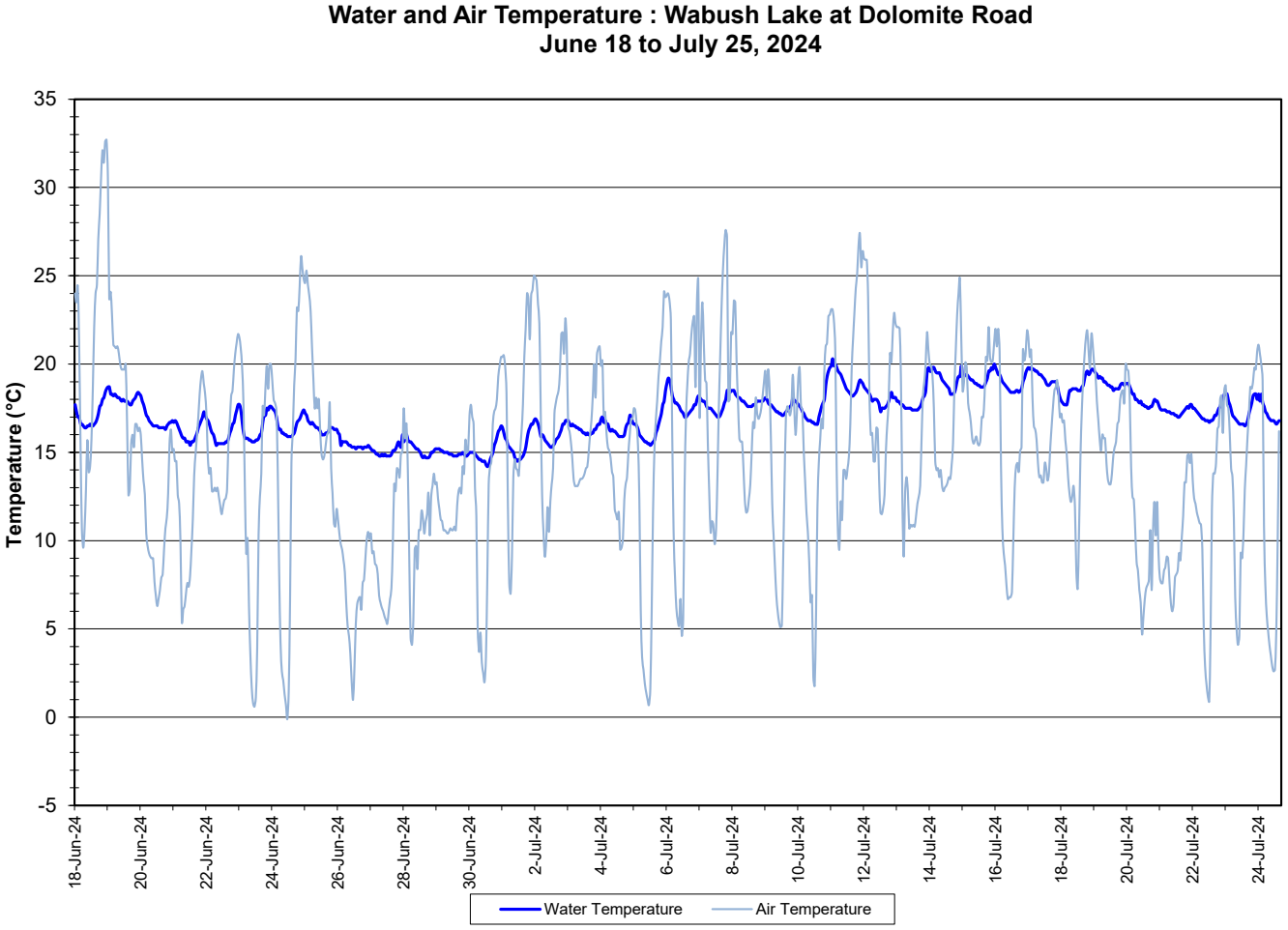

Figure 2: Water and Air Temperature – Dolomite Road

(Weather data collected from climate station near Moosehead Lake)

- pH ranges from 7.39 to 8.09 pH units at Dolomite Road, throughout the deployment period (Figure 3). The median pH is 7.64.
- All values at Dolomite Road during the deployment period 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 and increases slightly at the end of the deployment period.
- 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.

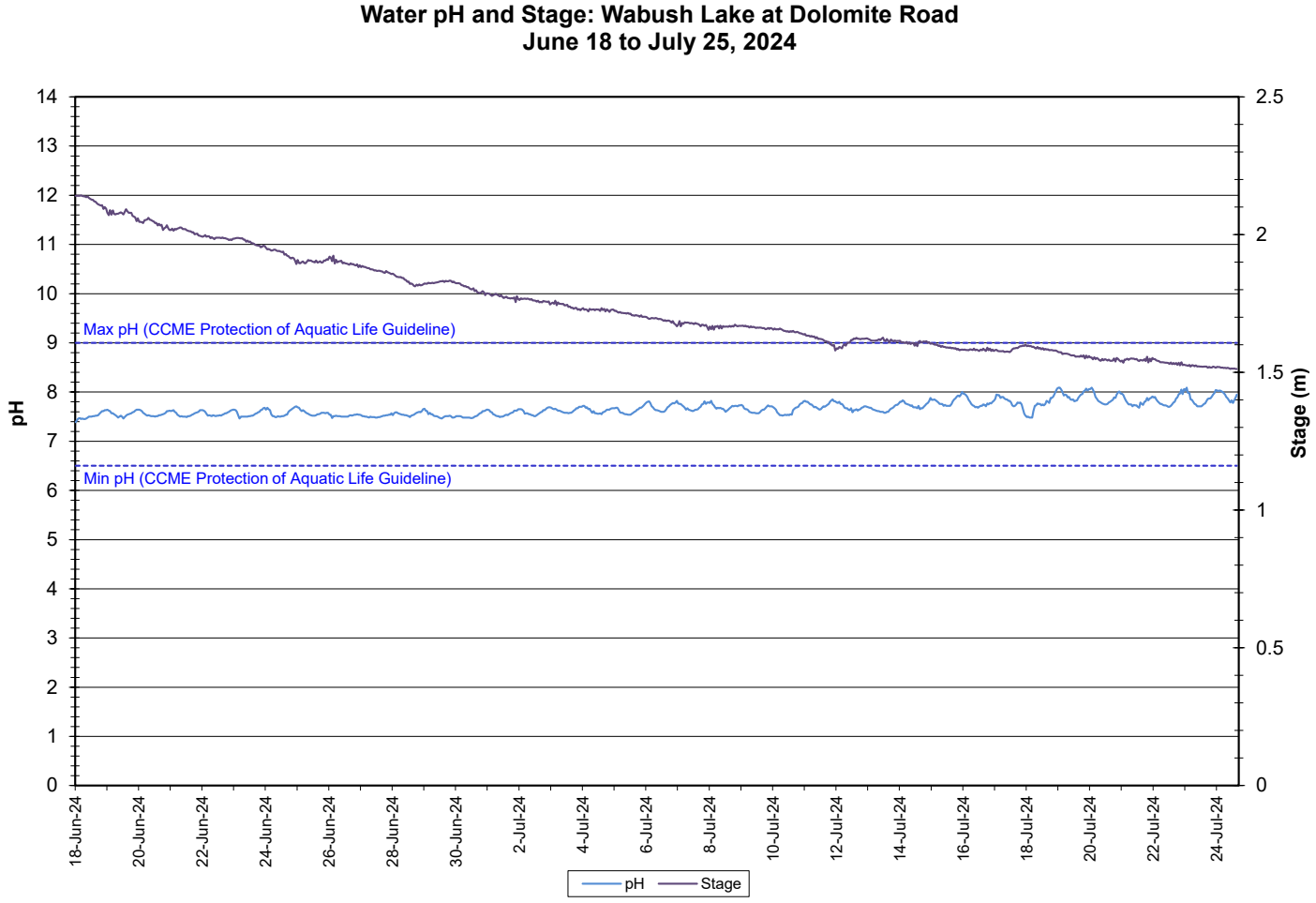

Figure 3: Water pH and Stage – Dolomite Road

- Specific conductivity ranged from 46.1 to 71.1 µs/cm at Dolomite Road, increasing over the course of the deployment period (Figure 4)
- 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.

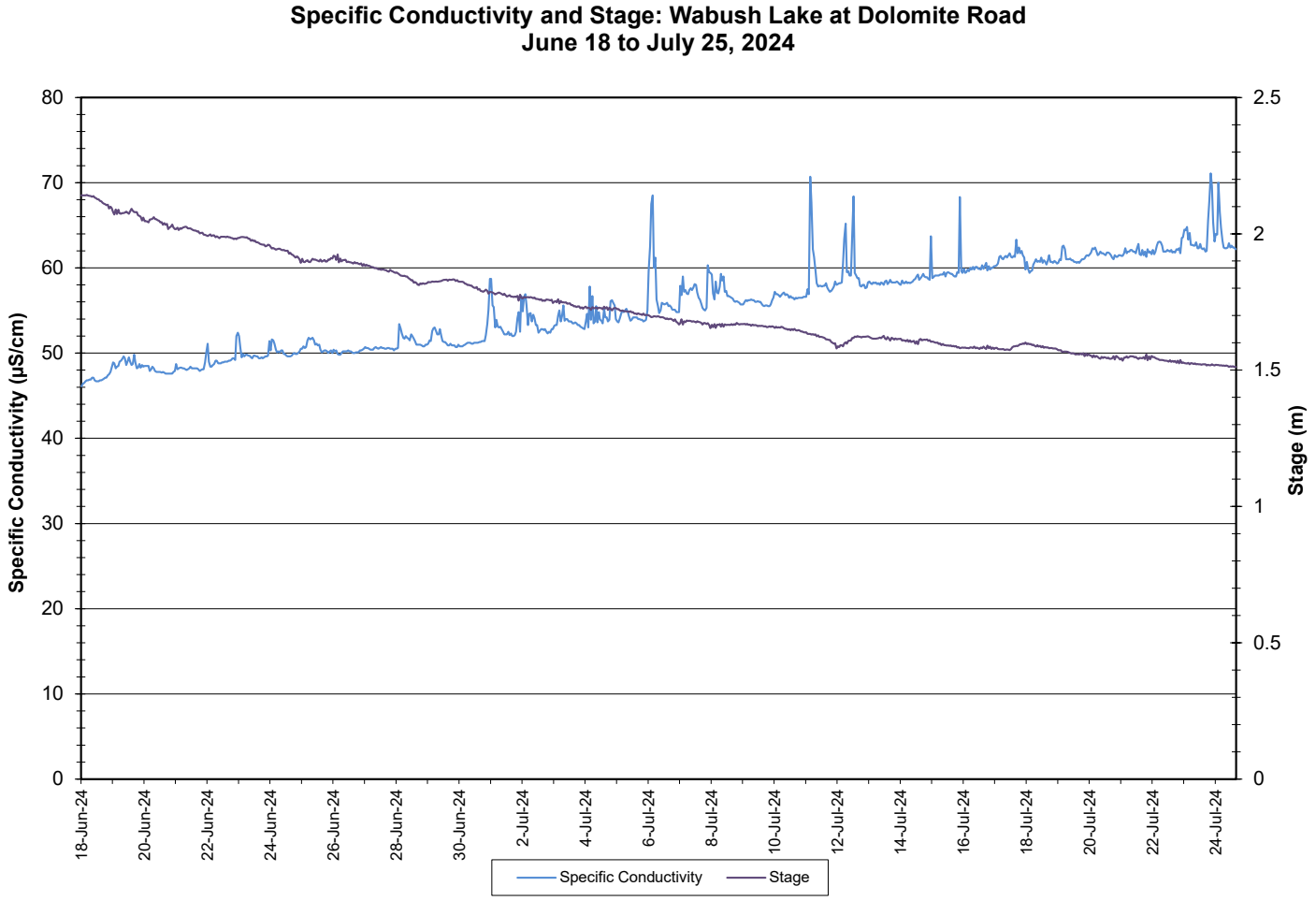

Figure 4: Specific Conductivity and Stage – Dolomite Road

- At the Dolomite Road station, the saturation of dissolved oxygen ranged from 92.3 to 107.9% while the dissolved oxygen content ranged from 8.86 to 10.01 mg/l with a median value of 9.51 mg/l (Figure 5).
- All values recorded at 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, while most of the values were below 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 levels show an inverse relationship to water temperature levels.

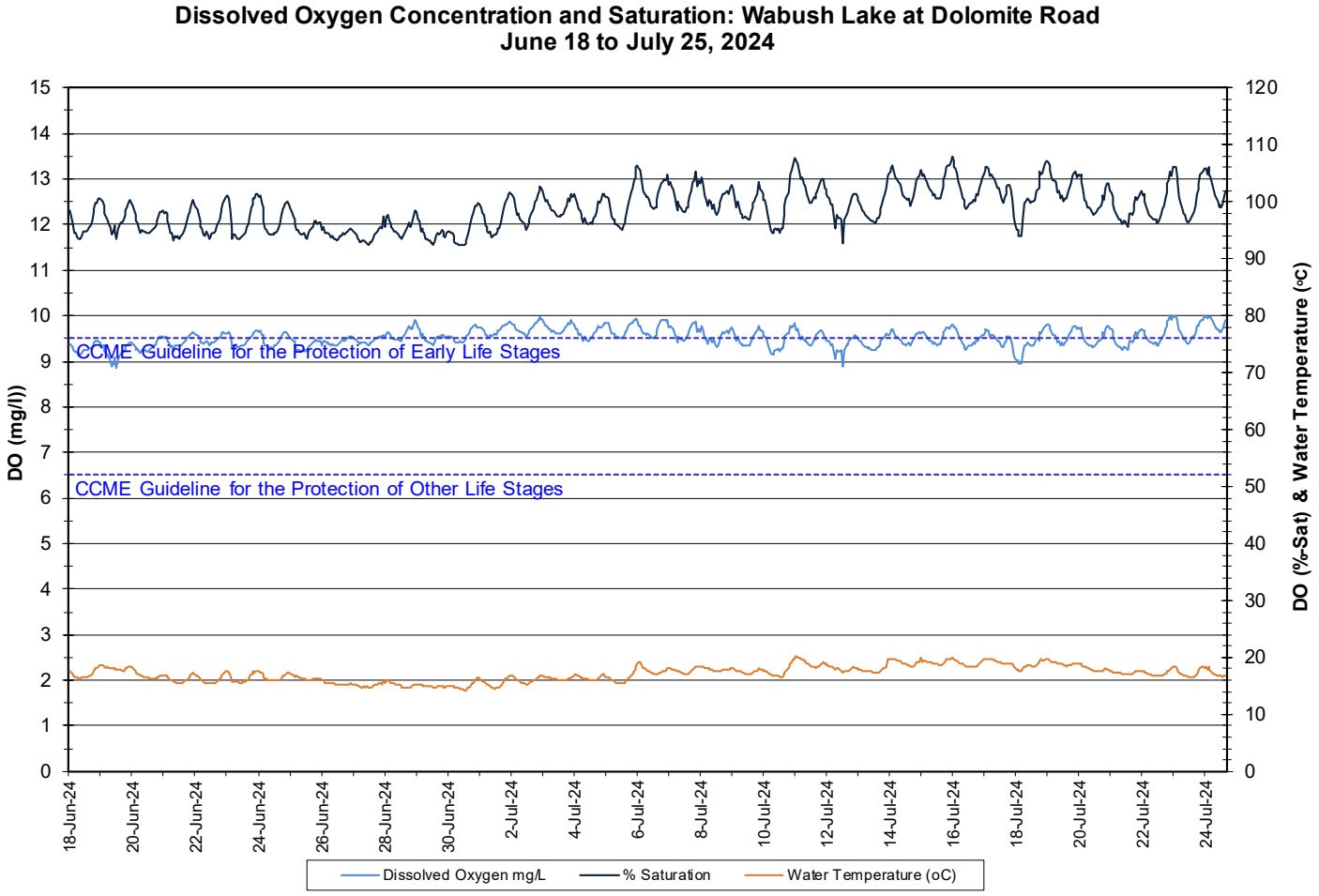

Figure 5: Dissolved Oxygen and Percent Saturation – Dolomite Road

- At the Dolomite Road station, turbidity values ranged between 0.9 and 13.9 NTU (Figure 6). Background turbidity values were very low, with small spikes noted for short periods of time.

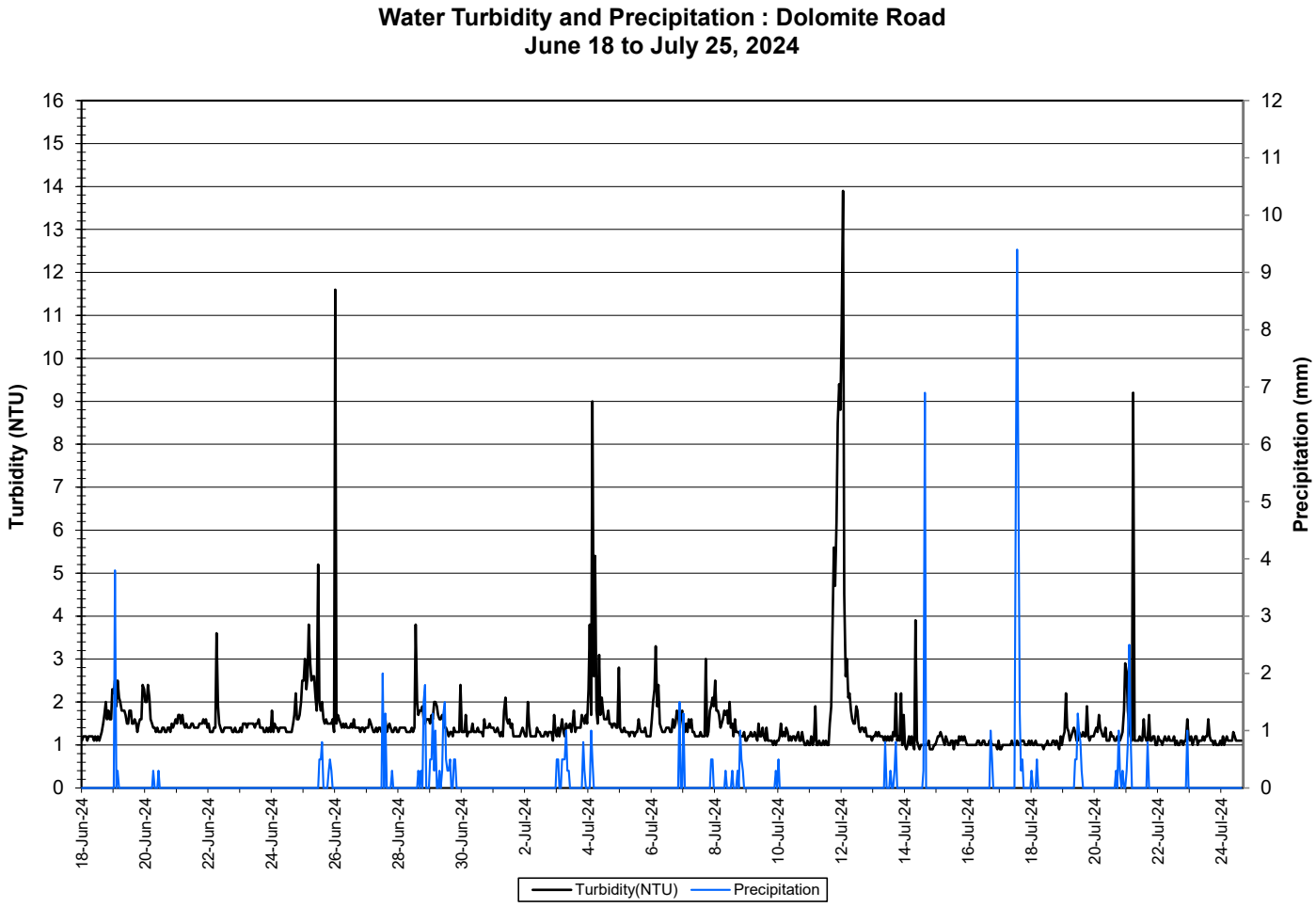

Figure 6: Turbidity and Precipitation – Dolomite Road

(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 (Figure 7). Stage decreased during this deployment period.
- 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.

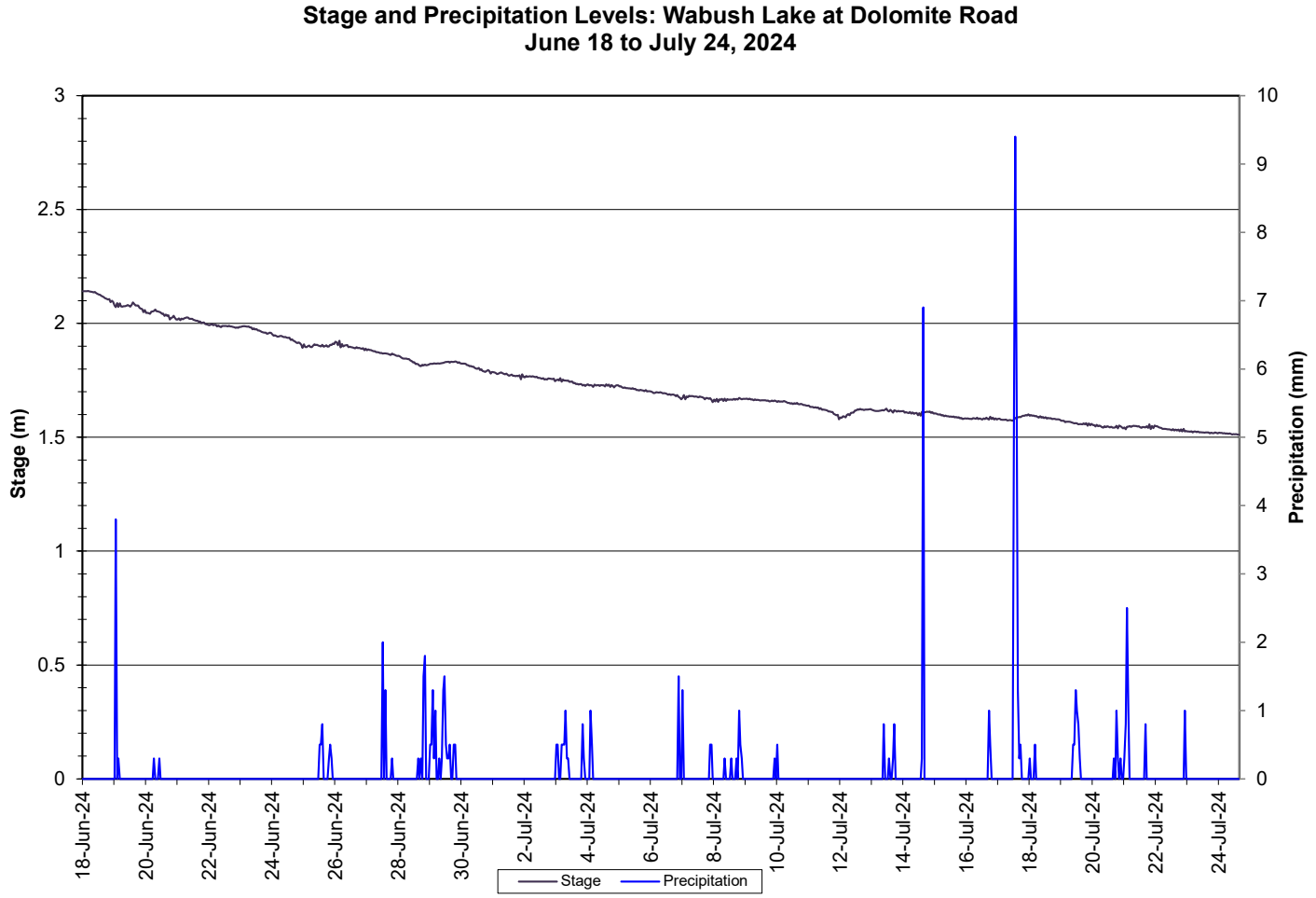

Figure 7: Stage and Precipitation – Dolomite Road

(Weather data collected at climate station located near Moosehead Lake)

Dumbell Stream

- Water temperature ranged from 3.49 to 8.65ºC during this deployment period (Figure 8).
- Water temperature fluctuated within a small range during this deployment period, with a slight decreasing trend, overall. Water temperature at Dumbell Stream is typically much lower than other stations (Figure 8).

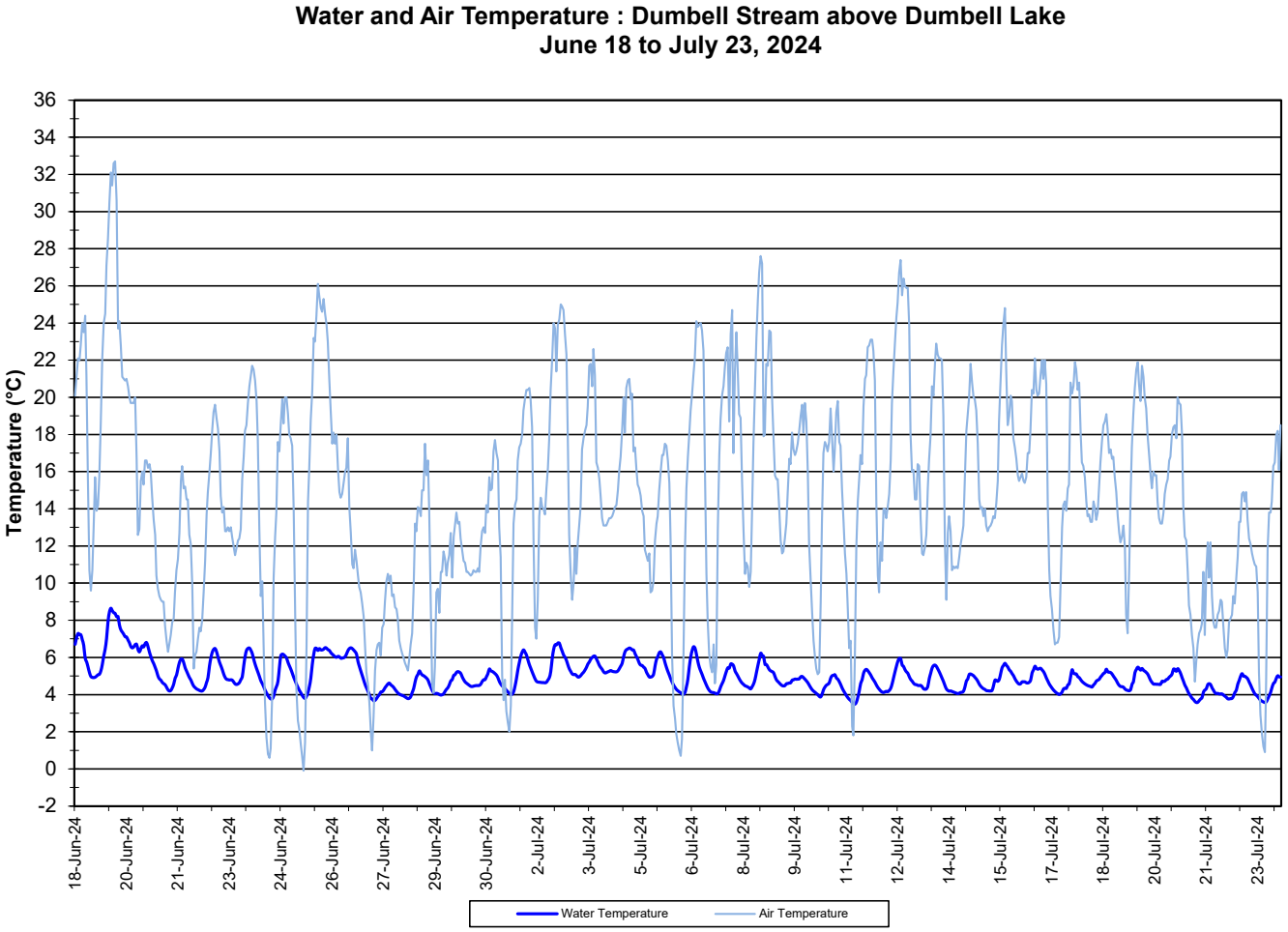

Figure 8: Water and Air Temperature – Dumbell Stream

(Weather data collected from climate station near Moosehead Lake)

- pH ranged from 7.36 to 7.96 pH units (Figure 9). The median pH was 7.83.
- 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.
- 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.

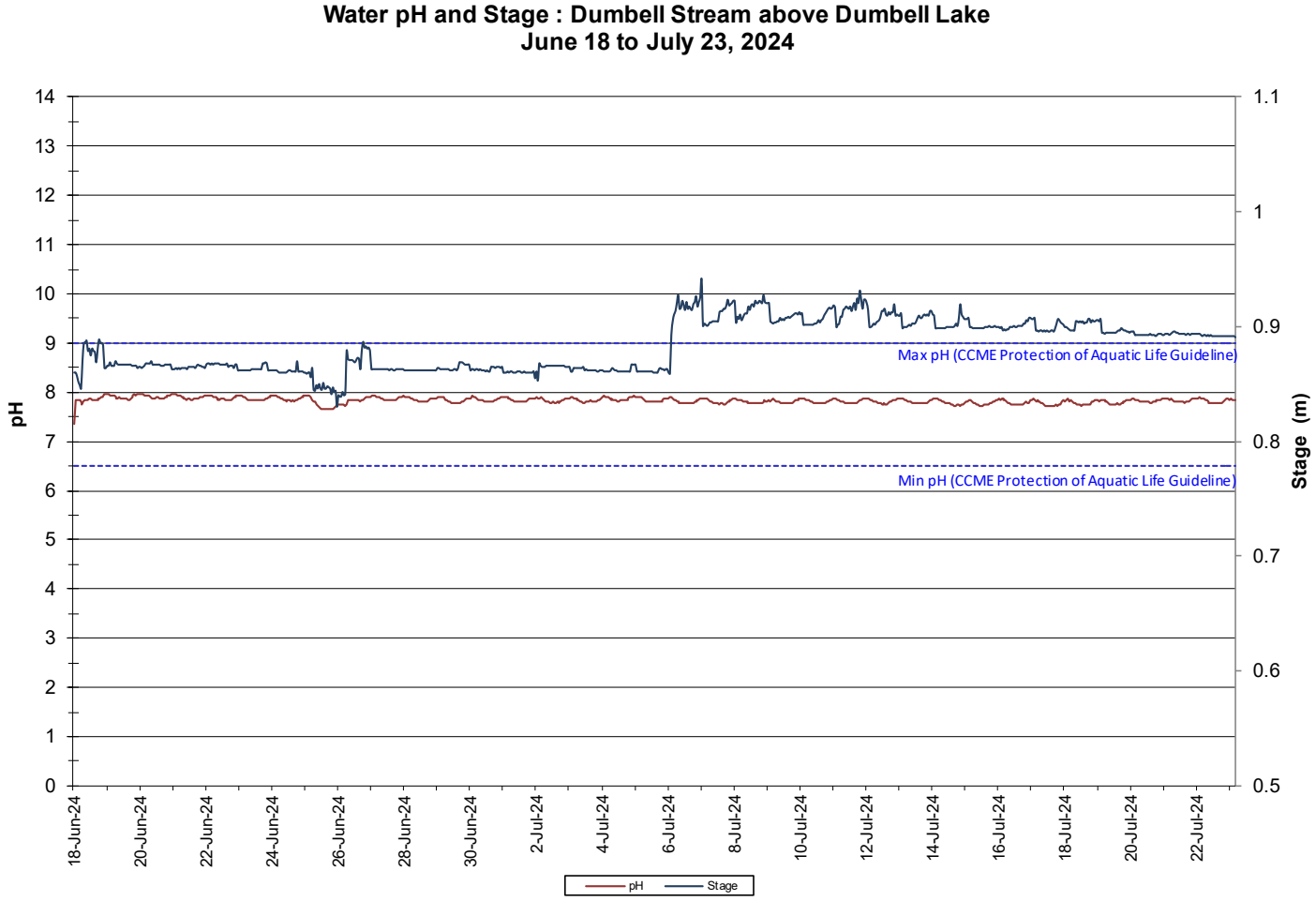

Figure 9: Water pH and Stage – Dumbell Stream

- Specific conductivity ranged from 124.2 to 299.4 µs/cm, throughout the deployment period (Figure 10).
- Specific conductivity decreased after some precipitation events. There was a substantial decrease at the same time as an increase in stage. It remained at this level for the rest of the deployment period.
- 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.

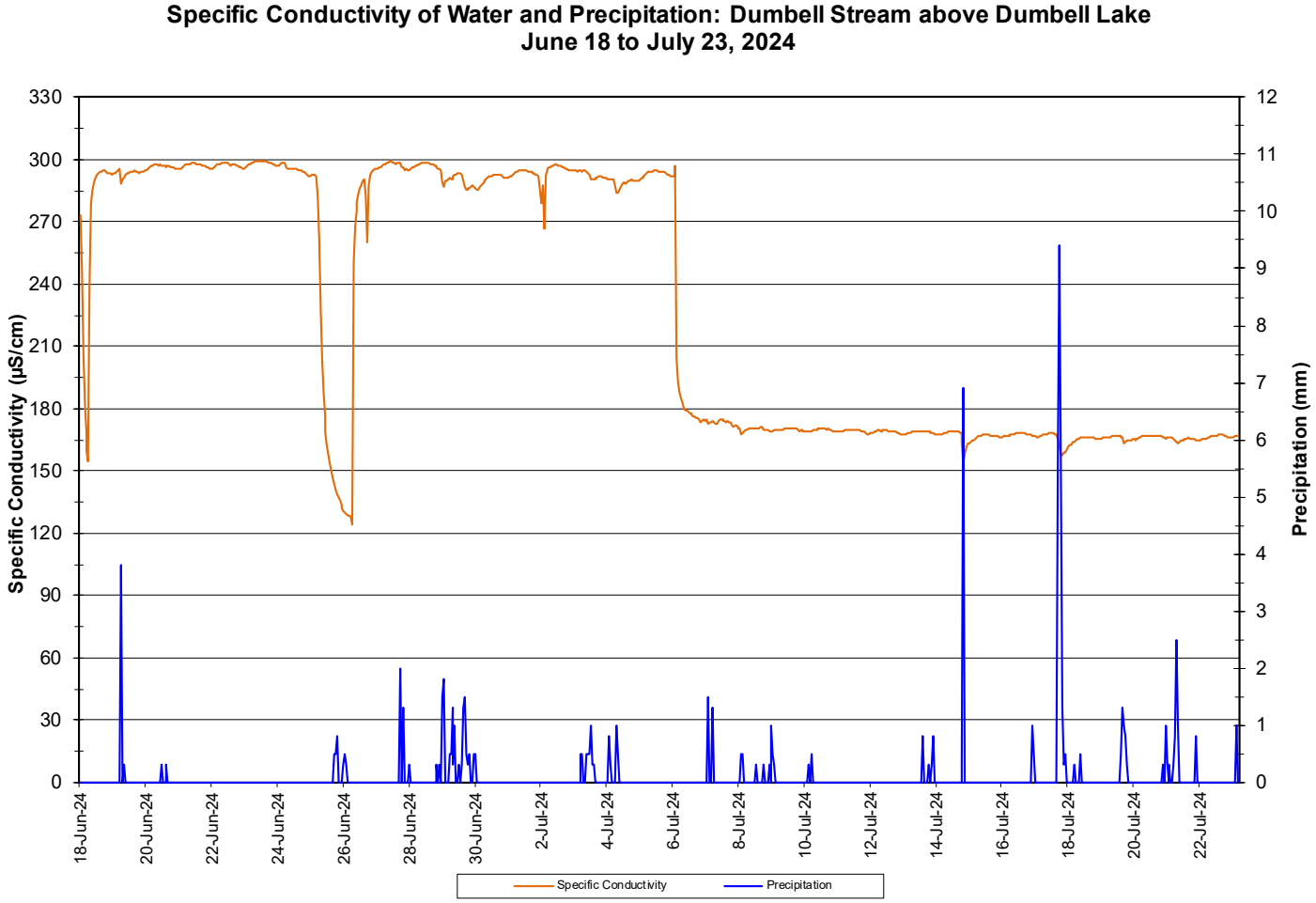

Figure 10: Specific conductivity and stage – Dumbell Stream

(Weather data collected from climate station near Moosehead Lake)

- The saturation of dissolved oxygen ranged from 92.0% to 97.8% while the dissolved oxygen content ranged from 11.13 to 12.86 mg/l with a median value of 12.28 mg/l (Figure 11).
- 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/. The guidelines are indicated in blue on Figure 12.
- Overall, dissolved oxygen increased slightly over this deployment period. Dissolved oxygen fluctuated daily with decreases observed at night.

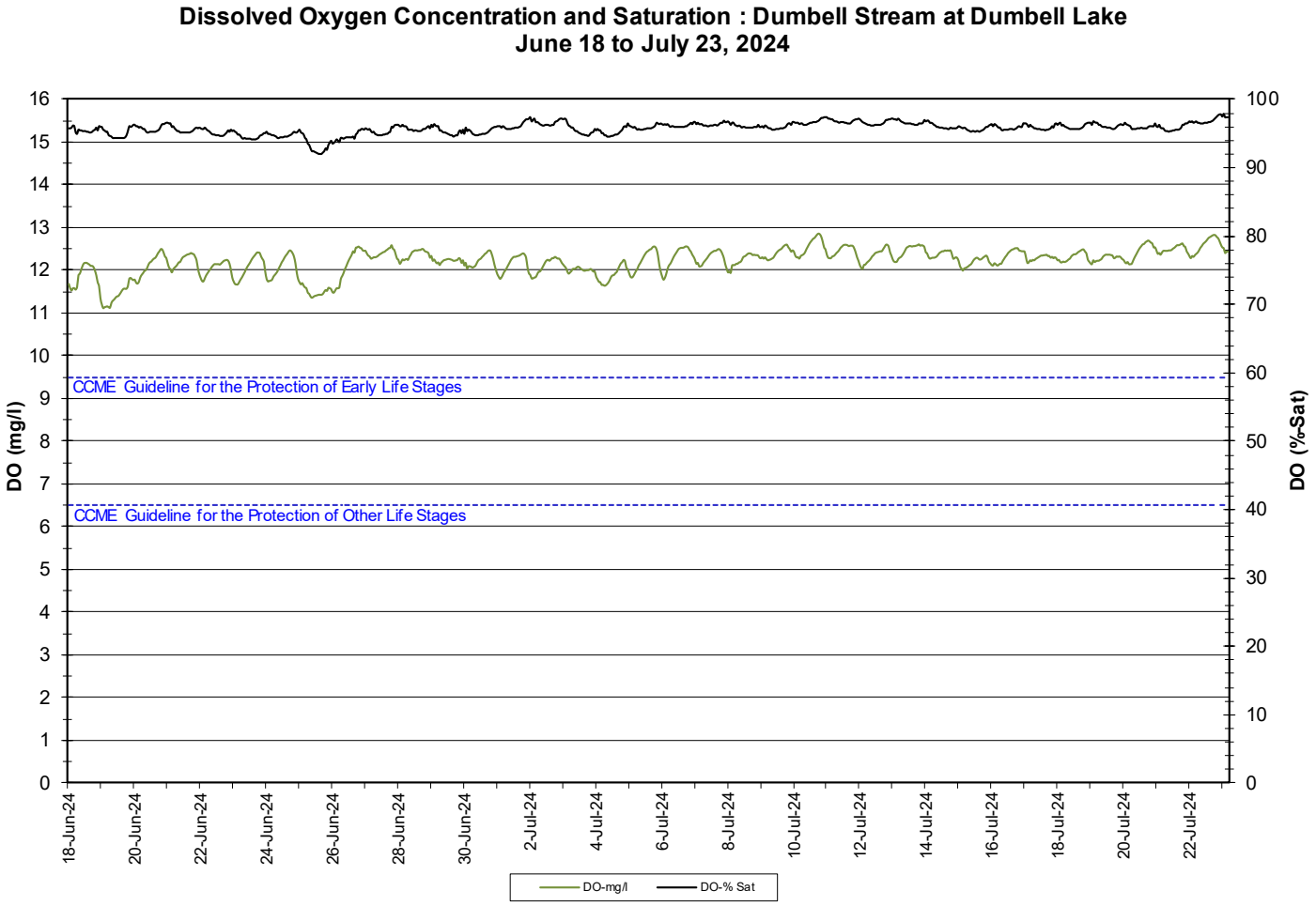

Figure 11: Dissolved oxygen – Dumbell Stream

- Turbidity values ranged between 0.2 and 14.6 NTU throughout the deployment period (Figure 12). Turbidity levels at this station are generally low. Large spikes occurred for short periods of time when there were fluctuations in stage.

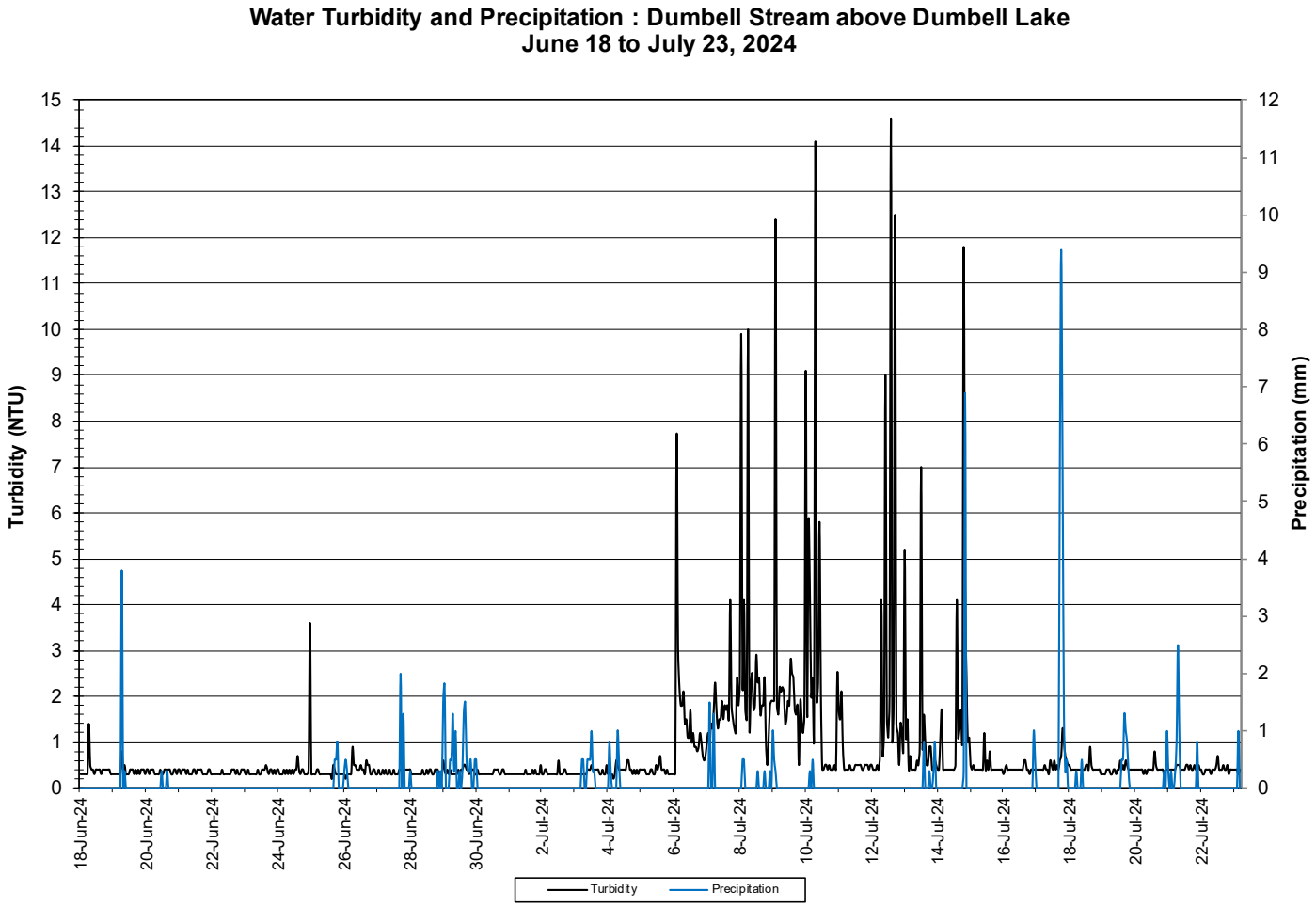

Figure 12: Turbidity and Precipitation – Dumbell Stream

(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 13).
- Stage increased on July 6th; it decreased slightly over the remainder of the deployment period.
- 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.

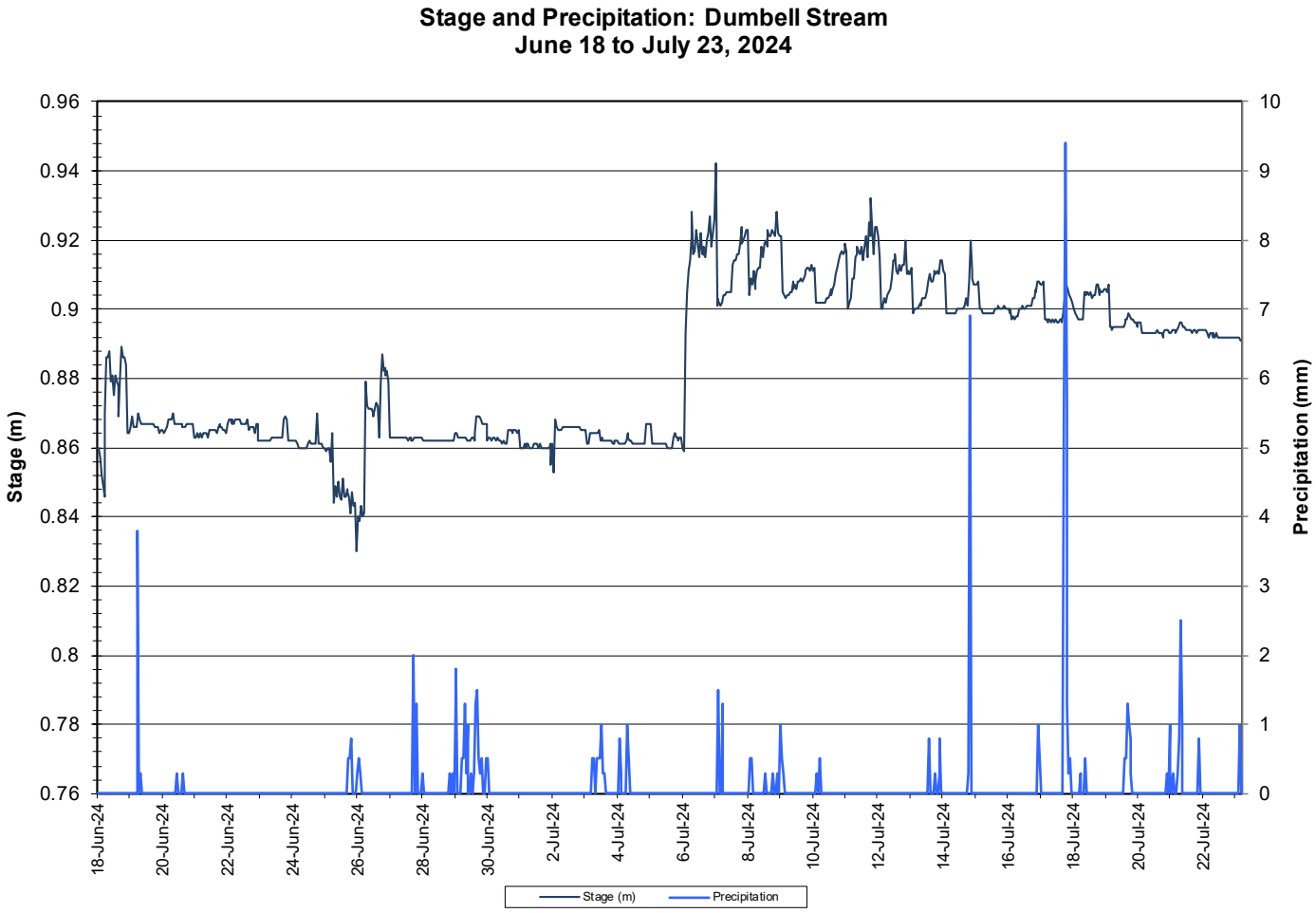

Figure 13: Stage and Precipitation – Dumbell Stream

(Weather data collected from climate station near Moosehead Lake)

Pumphouse Stream

- Water temperature ranged from 11.10 to 19.50°C during this deployment period (Figure 15).
- Fluctuations in water temperature corresponded with increases and decreases in ambient air temperature. (Figure 14).

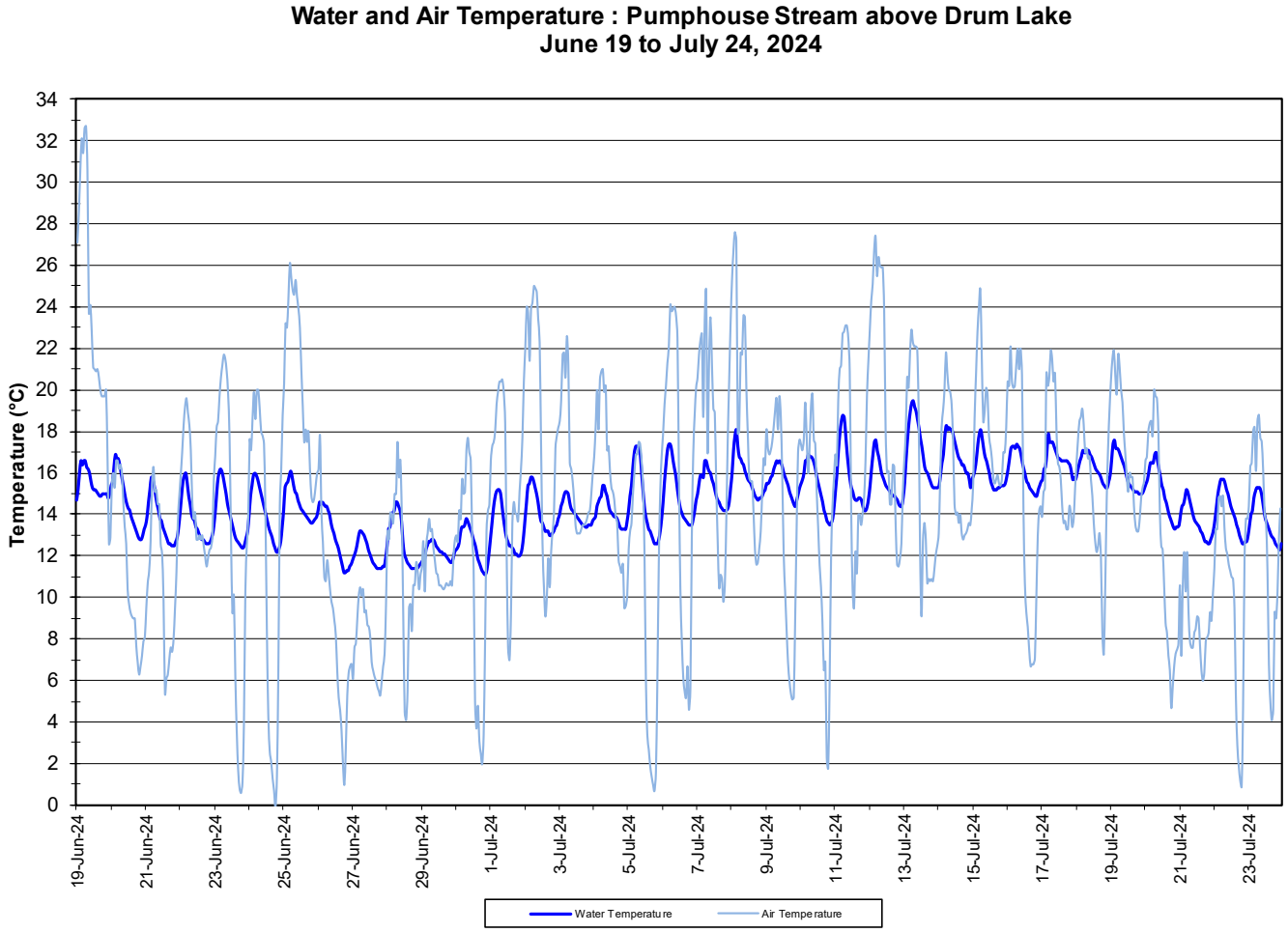

Figure 14: Water and Air Temperature – Pumphouse Stream

(Weather data collected from climate station near Moosehead Lake)

- pH ranged from 7.53 to 7.88 pH units (Figure 15). The median pH was 7.77.
- There are noticeable decreases in pH, corresponding with increases in stage. They are identified on the graph in red.
- All values during the deployment are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units).
- 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.

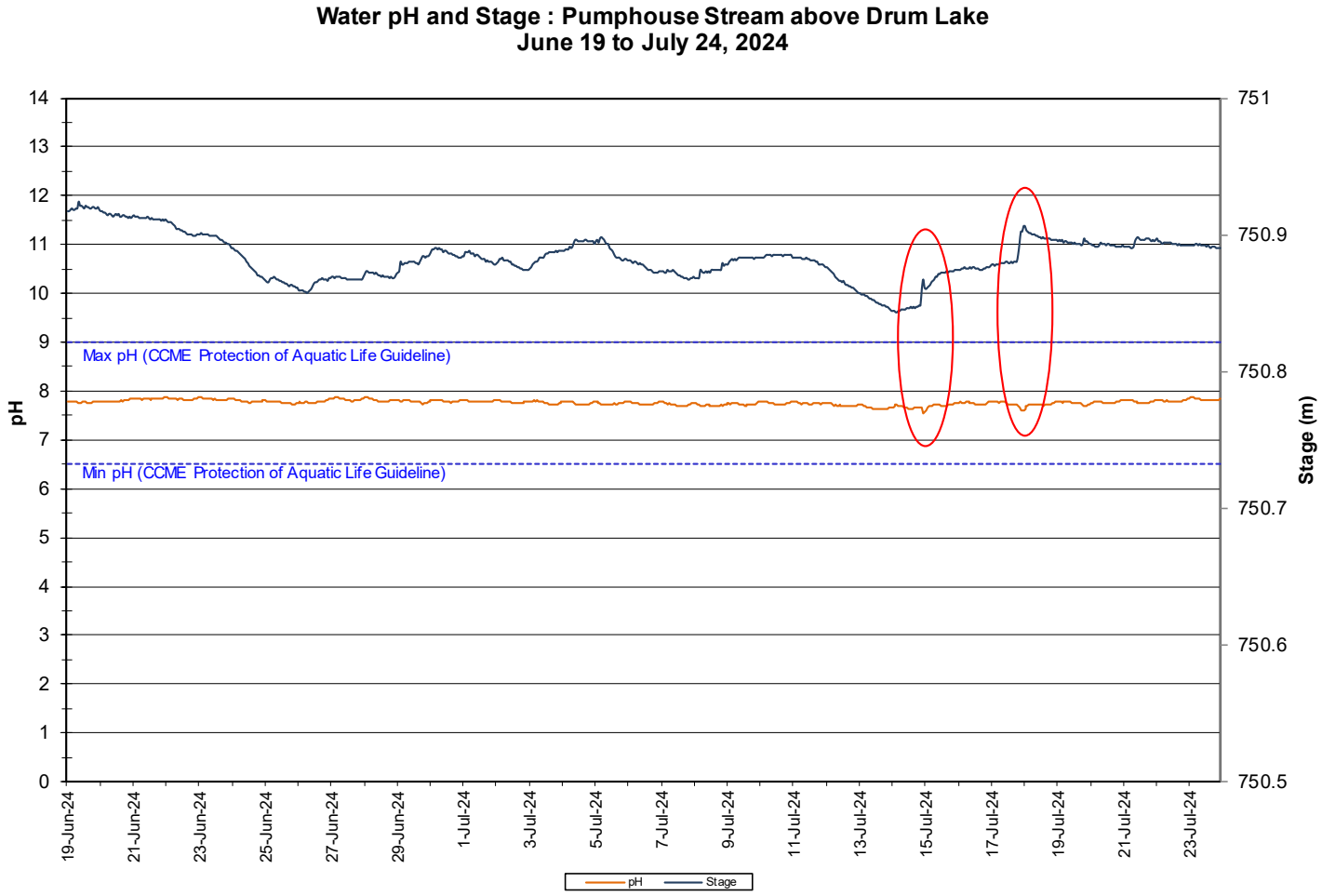

Figure 15: Water pH and Stage – Pumphouse Stream

- Specific conductivity ranged from 538.4 to 630.6 µs/cm, throughout the deployment period (Figure 16).
- The majority of decreases in specific conductivity correspond to increases in stage. As more water is added to the system from precipitation, the solids in the water are diluted, decreasing conductivity. Some correlations are identified on the graph in red.
- 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.

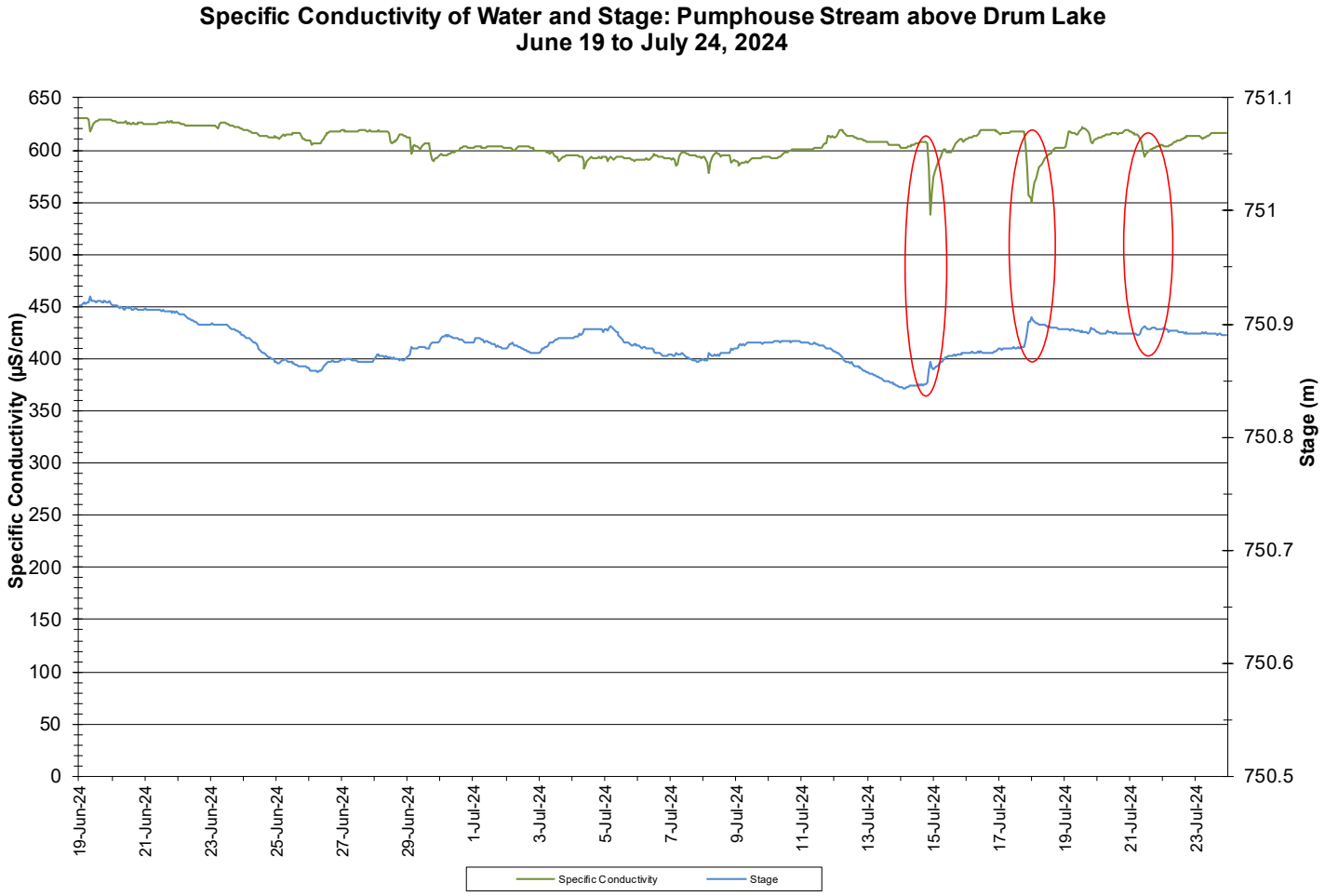

Figure 16: Specific Conductivity and Stage – Pumphouse Stream

(Weather data collected from climate station near Moosehead Lake)

- The saturation of dissolved oxygen ranged from 65.5 to 82.5% while the dissolved oxygen ranged from 6.29 to 8.44 mg/l with a median value of 7.60 mg/l (Figure 17).
- Dissolved oxygen increased slightly at the end of this deployment period, due to decreasing water temperatures.
- Most values recorded at Pumphouse 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. All the values were below the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Early Life Stages of 9.5 mg/. The guidelines are indicated in blue on Figure 17.

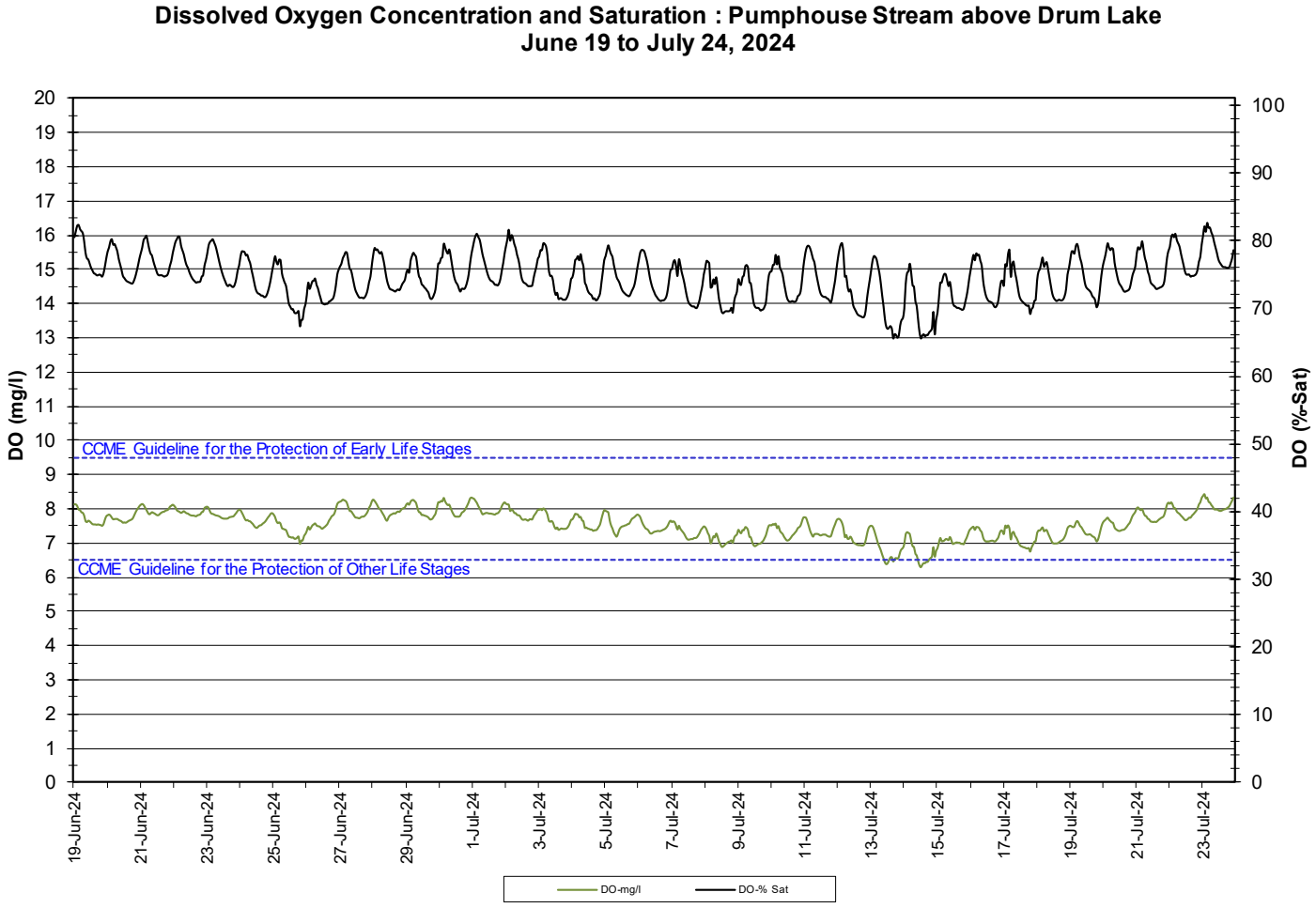

Figure 17: Dissolved Oxygen – Pumphouse Stream

- Turbidity values range from 1.2 NTU to 9.2 NTU throughout the deployment period (Figure 18). The median value was 1.8 NTU, indicating low background turbidity levels.
- Turbidity spikes occur infrequently and for short periods of time.

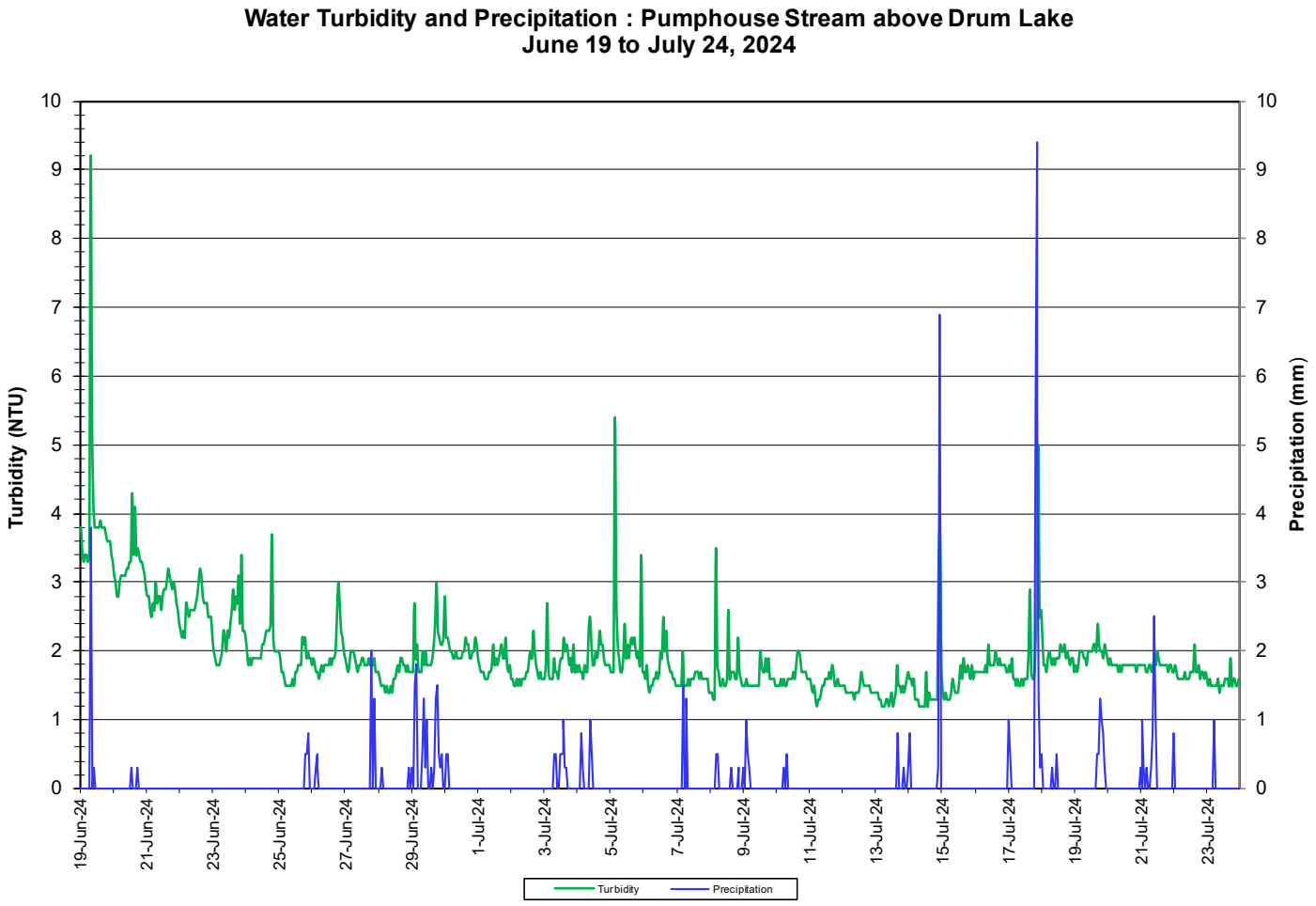

Figure 18: Turbidity and Precipitation – Pumphouse Stream

(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 Pumphouse Stream (Figure 19).
- Stage fluctuated at this station with spikes in level after precipitation events.
- 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.

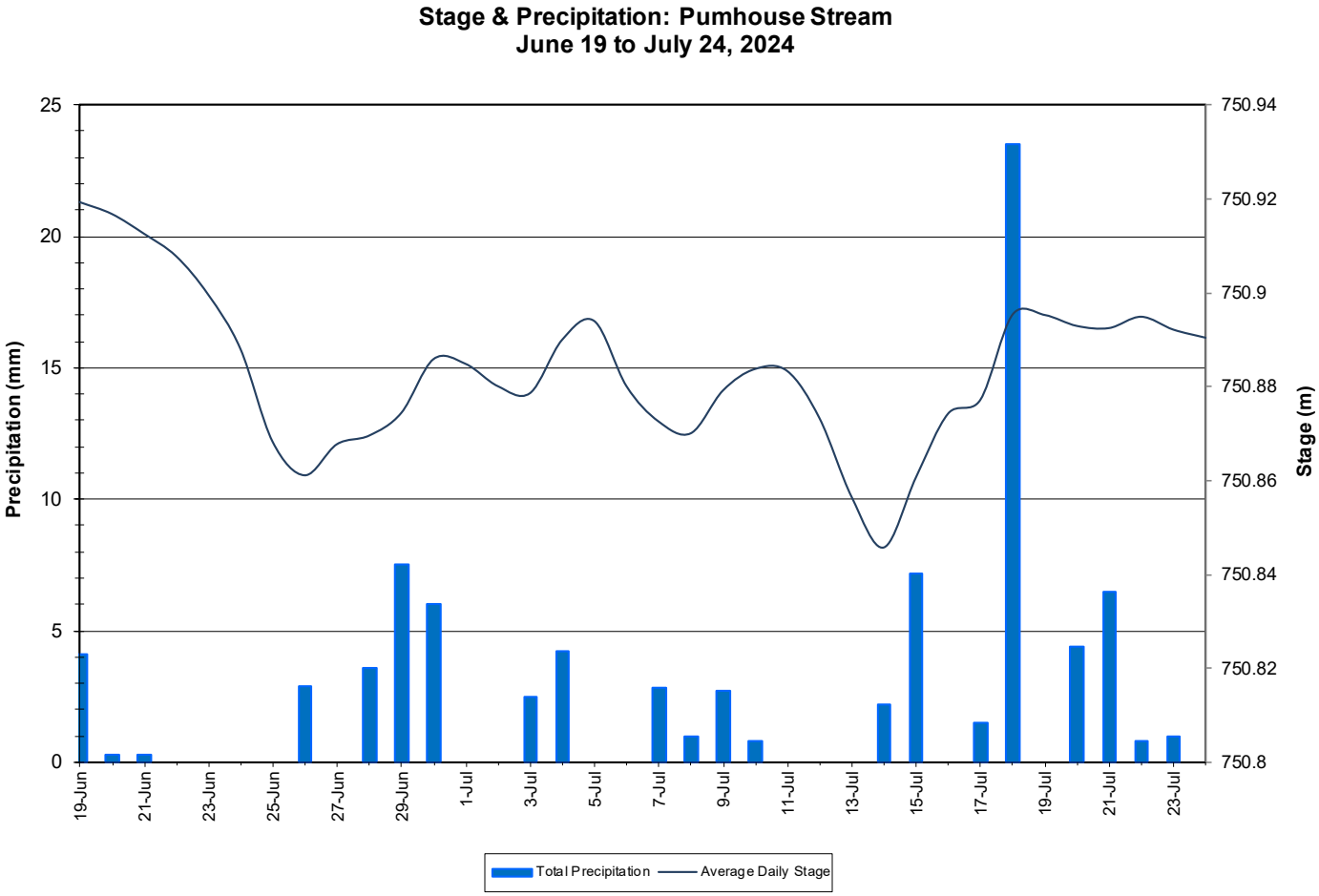

Figure 19: Stage and Precipitation – Pumphouse Stream

(Weather data collected from climate station near Moosehead Lake)

Conclusions

- Instruments were deployed on June 18th-19th, 2024, and removed by July 25th, 2024. This was the first deployment of the 2024 season. Instruments were not deployed at Julienne Narrows or Fraggle Rock due to unavailability of transportation.
- 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 3.49 and 20.30^{o}C at these stations during deployment.
- All pH values were within the recommended CCME Guidelines for the Protection of Aquatic Life. pH ranged between 7.36 and 8.09. Fluctuations were noted between day and night.
- Specific conductivity ranged from 46.1 µs/cm to 71.1 µs/cm at the Dolomite Road, 124.4 µs/cm to 299.4 µs/cm at Dumbell Stream and 538.4 to 630.6 µs/cm at Pumphouse Stream.
- At Dolomite Road and Dumbell Stream, 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. Pumphouse Stream had values there were below this guideline. 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, all the values at Dumbell Stream were above the guideline, most of the values at Dolomite Road were below the guideline and all of the values at Pumphouse stream were below the guideline.
- Turbidity at Dolomite Road ranged from 0.9 to 13.9 NTU, 0.2 to 14.6 NTU at Dumbell Stream, and 1.2 to 9.2 NTU at Pumphouse Stream.
- Stage at Dolomite Road decreased. It increased on July 6th at Dumbell Stream and then gradually decreased. At Pumphouse Stream, stage showed increases after precipitation events.
- 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.

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Water Resources Management Division
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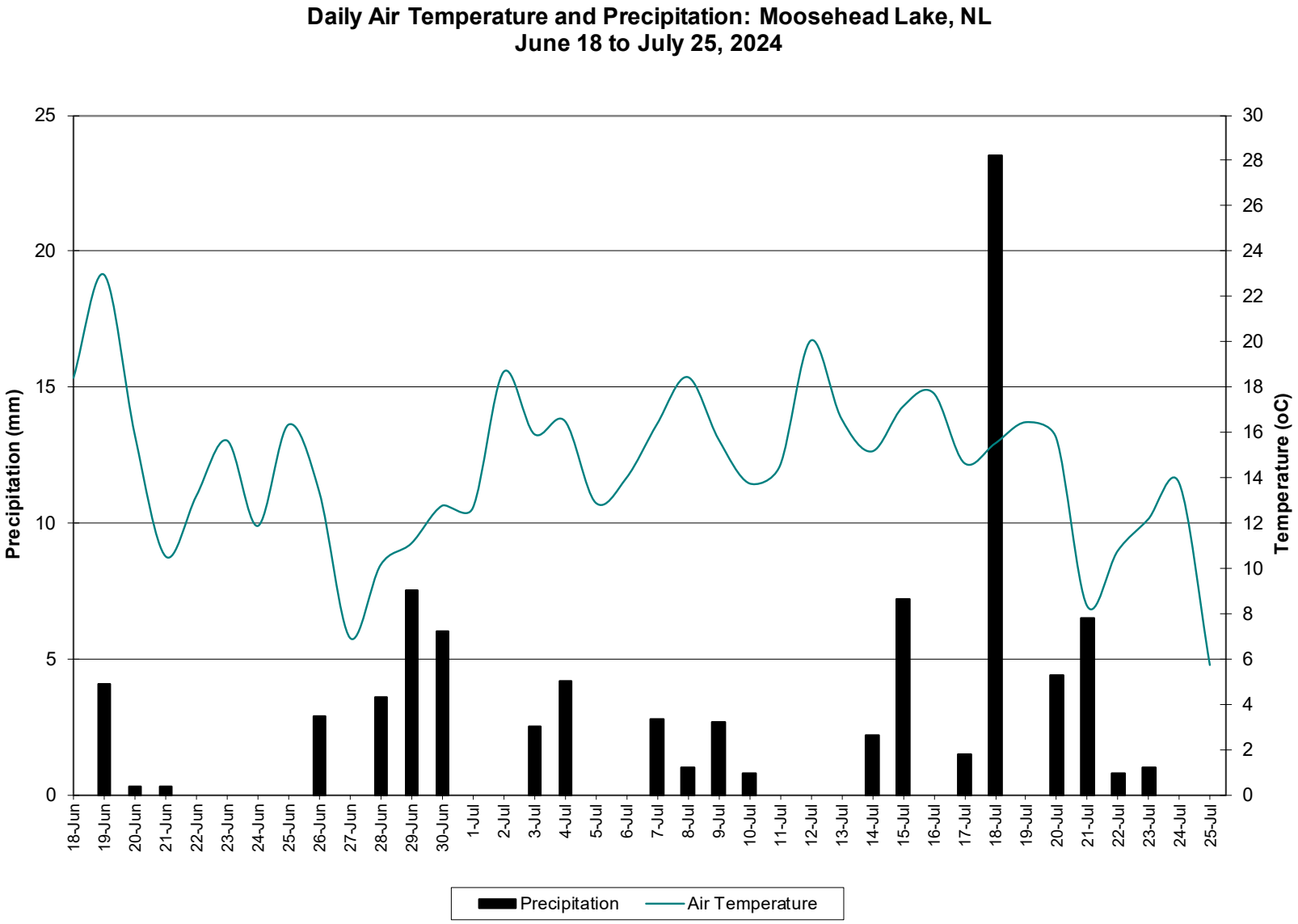
Appendix 1


Daily Air Temperature and Precipitation: Moosehead Lake, NL
June 18 to July 25, 2024
Precipitation (mm)
Temperature (oC)
0
5
10
15
20
25
0
2
4
6
8
10
12
14
16
18
20
22
24
26
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23-Jul
24-Jul
25-Jul
Precipitation
Air Temperature

Appendix 2
QA/QC Grab Sample Results

Bureau Veritas Job #: C4J3706
Report Date: 2024/07/08

NL Department of Environment, Climate Change and Municipalities
Site Location: LABRADOR
Your P.O. #: 220028978-13

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZOE824 DOLOMITE ROAD Sampling Date 2024/06/18 17:00 Matrix W Sample # 2024-6303-00-SI-SP Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	22	1.0	mg/L	N/A	2024/07/05		9482138
Nitrate (N)	-	0.096	0.050	mg/L	N/A	2024/07/05		9480597
Total dissolved solids (calc., EC)	-	26	1.0	mg/L	N/A	2024/07/05		9483091
Inorganics								
Conductivity	-	46	1.0	uS/cm	N/A	2024/07/04	LJV	9493798
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Sulphate (SO4)	-	1.7	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Total Alkalinity (Total as CaCO3)	-	21	2.0	mg/L	N/A	2024/07/04	LJV	9493799
Colour	-	41	5.0	TCU	N/A	2024/07/04	EMT	9493754
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/04	LJV	9493797
Total Kjeldahl Nitrogen (TKN)	-	0.27	0.10	mg/L	2024/07/02	2024/07/04	RTY	9490349
Nitrate + Nitrite (N)	-	0.096	0.050	mg/L	N/A	2024/07/04	EMT	9493756
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/04	EMT	9493757
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/03	MCN	9491506
Dissolved Organic Carbon (C)	-	5.3	0.50	mg/L	N/A	2024/07/03	MKY	9491167
Total Organic Carbon (C)	-	5.5	0.50	mg/L	N/A	2024/07/03	MKY	9489413
pH	-	7.45		pH	N/A	2024/07/04	LJV	9493796
Total Phosphorus	-	ND	0.004	mg/L	2024/07/02	2024/07/03	SPC	9490436
Total Suspended Solids	-	1.4	1.0	mg/L	2024/06/28	2024/07/04	DME	9485823
Turbidity	-	1.1	0.10	NTU	N/A	2024/07/05	LJV	9496464
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/02	2024/07/03	SPY	9488955
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.045	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Aluminum (Al)	-	0.046	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Barium (Ba)	-	0.0085	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Barium (Ba)	-	0.0085	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Boron (B)	-	ND	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Boron (B)	-	ND	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Calcium (Ca)	-	5.2	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418

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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZOE824 DOLOMITE ROAD								
Sampling Date 2024/06/18 17:00								
Matrix W								
Sample # 2024-6303-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Dup.Total Calcium (Ca)	-	5.0	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Copper (Cu)	-	0.00071	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Copper (Cu)	-	0.00069	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Iron (Fe)	-	0.069	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Iron (Fe)	-	0.065	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Magnesium (Mg)	-	2.1	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Magnesium (Mg)	-	2.1	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Manganese (Mn)	-	0.022	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Manganese (Mn)	-	0.021	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Potassium (K)	-	0.73	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Potassium (K)	-	0.71	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Sodium (Na)	-	0.63	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Sodium (Na)	-	0.62	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Strontium (Sr)	-	0.011	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Strontium (Sr)	-	0.011	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Total Zinc (Zn)	-	0.011	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496418
Dup.Total Zinc (Zn)	-	0.011	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496418

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Bureau Veritas Job #: C4J3706
Report Date: 2024/07/08

NL Department of Environment, Climate Change and Municipalities
Site Location: LABRADOR
Your P.O. #: 220028978-13

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZOE823 DUMBELL STREAM								
Sampling Date 2024/06/18 12:45								
Matrix W								
Sample # 2024-6302-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	120	1.0	mg/L	N/A	2024/07/05		9482138
Nitrate (N)	-	18	1.5	mg/L	N/A	2024/07/05		9480597
Total dissolved solids (calc., EC)	-	160	1.0	mg/L	N/A	2024/07/05		9483091
Inorganics								
Conductivity	-	290	1.0	uS/cm	N/A	2024/07/04	LJV	9493798
Chloride (Cl-)	-	3.1	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Sulphate (SO4)	-	17	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Total Alkalinity (Total as CaCO3)	-	39	2.0	mg/L	N/A	2024/07/04	LJV	9493799
Colour	-	ND	5.0	TCU	N/A	2024/07/04	EMT	9493754
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/04	LJV	9493797
Total Kjeldahl Nitrogen (TKN)	-	ND(1)	0.50	mg/L	2024/07/02	2024/07/04	RTY	9490349
Nitrate + Nitrite (N)	-	18	1.5	mg/L	N/A	2024/07/04	EMT	9493756
Nitrite (N)	-	0.024	0.010	mg/L	N/A	2024/07/04	EMT	9493757
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/03	MCN	9491506
Dissolved Organic Carbon (C)	-	0.63	0.50	mg/L	N/A	2024/07/04	MKY	9493814
Dup.Dissolved Organic Carbon (C)	-	0.55	0.50	mg/L	N/A	2024/07/04	MKY	9493814
Total Organic Carbon (C)	-	0.89	0.50	mg/L	N/A	2024/07/03	MKY	9489413
pH	-	7.73		pH	N/A	2024/07/04	LJV	9493796
Total Phosphorus	-	ND	0.004	mg/L	2024/07/02	2024/07/03	SPC	9490436
Total Suspended Solids	-	ND	1.0	mg/L	2024/06/28	2024/07/04	DME	9485823
Turbidity	-	ND	0.10	NTU	N/A	2024/07/05	LJV	9496464
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/02	2024/07/03	SPY	9488955
Dup.Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/02	2024/07/03	SPY	9488955
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.013	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Barium (Ba)	-	0.0071	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Boron (B)	-	ND	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Calcium (Ca)	-	29	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Iron (Fe)	-	ND	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496416

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

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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZOE823 DUMBELL STREAM Sampling Date 2024/06/18 12:45 Matrix W Sample # 2024-6302-00-SI-SP Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Magnesium (Mg)	-	12	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Manganese (Mn)	-	0.0030	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Potassium (K)	-	2.1	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Sodium (Na)	-	1.3	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Strontium (Sr)	-	0.039	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496416

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Bureau Veritas Job #: C4J3706
Report Date: 2024/07/08

NL Department of Environment, Climate Change and Municipalities
Site Location: LABRADOR
Your P.O. #: 220028978-13

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZOE825 PUMPHOUSE STREAM								
Sampling Date 2024/06/18 10:30								
Matrix W								
Sample # 2024-6304-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	230	1.0	mg/L	N/A	2024/07/05		9482138
Nitrate (N)	-	30	2.5	mg/L	N/A	2024/07/05		9480597
Total dissolved solids (calc., EC)	-	360	1.0	mg/L	N/A	2024/07/05		9483091
Inorganics								
Conductivity	-	650	1.0	uS/cm	N/A	2024/07/04	LJV	9493798
Chloride (Cl-)	-	6.5	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Sulphate (SO4)	-	46	1.0	mg/L	N/A	2024/07/03	LKH	9489026
Total Alkalinity (Total as CaCO3)	-	120	2.0	mg/L	N/A	2024/07/04	LJV	9493799
Colour	-	9.7	5.0	TCU	N/A	2024/07/04	EMT	9493754
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/04	LJV	9493797
Total Kjeldahl Nitrogen (TKN)	-	15(2)	1.0	mg/L	2024/07/02	2024/07/04	RTY	9490349
Nitrate + Nitrite (N)	-	31	2.5	mg/L	N/A	2024/07/04	EMT	9493756
Nitrite (N)	-	0.52	0.020	mg/L	N/A	2024/07/04	EMT	9493757
Nitrogen (Ammonia Nitrogen)	-	16(2)	0.50	mg/L	N/A	2024/07/03	MCN	9491506
Dissolved Organic Carbon (C)	-	1.0	0.50	mg/L	N/A	2024/07/03	MKY	9491167
Total Organic Carbon (C)	-	3.2	0.50	mg/L	N/A	2024/07/03	MKY	9491385
pH	-	7.93		pH	N/A	2024/07/04	LJV	9493796
Total Phosphorus	-	0.004	0.004	mg/L	2024/07/02	2024/07/03	SPC	9490436
Total Suspended Solids	-	8.8	1.0	mg/L	2024/06/28	2024/07/04	DME	9485823
Turbidity	-	1.3	0.10	NTU	N/A	2024/07/05	LJV	9496464
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/02	2024/07/03	SPY	9488955
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.026	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Barium (Ba)	-	0.030	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Boron (B)	-	ND	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Calcium (Ca)	-	54	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Copper (Cu)	-	0.0019	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Iron (Fe)	-	0.19	0.050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Magnesium (Mg)	-	23	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416

(2) TKN < NH4: Both values fall within acceptable RPD limits for duplicates and are likely equivalent.

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Bureau Veritas Job #: C4J3706
Report Date: 2024/07/08

NL Department of Environment, Climate Change and Municipalities
Site Location: LABRADOR
Your P.O. #: 220028978-13

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZOE825 PUMPHOUSE STREAM								
Sampling Date 2024/06/18 10:30								
Matrix W								
Sample # 2024-6304-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Manganese (Mn)	-	0.25	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Potassium (K)	-	4.0	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Sodium (Na)	-	2.5	0.10	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Strontium (Sr)	-	0.13	0.0020	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Uranium (U)	-	0.00059	0.00010	mg/L	2024/07/05	2024/07/05	MTZ	9496416
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/05	2024/07/05	MTZ	9496416

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