Real-Time Water Quality Deployment Report

Iron Ore Company of Canada
Labrador West Network

June 15 to
July 29, 2021

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 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 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.
- 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 15th and 16th, real-time water quality monitoring instruments were deployed at the four IOC stations. The instruments were deployed for a period of 43 days at each station. The instruments were removed on July 28th and 29th. This was the first deployment of 2021 for these stations.

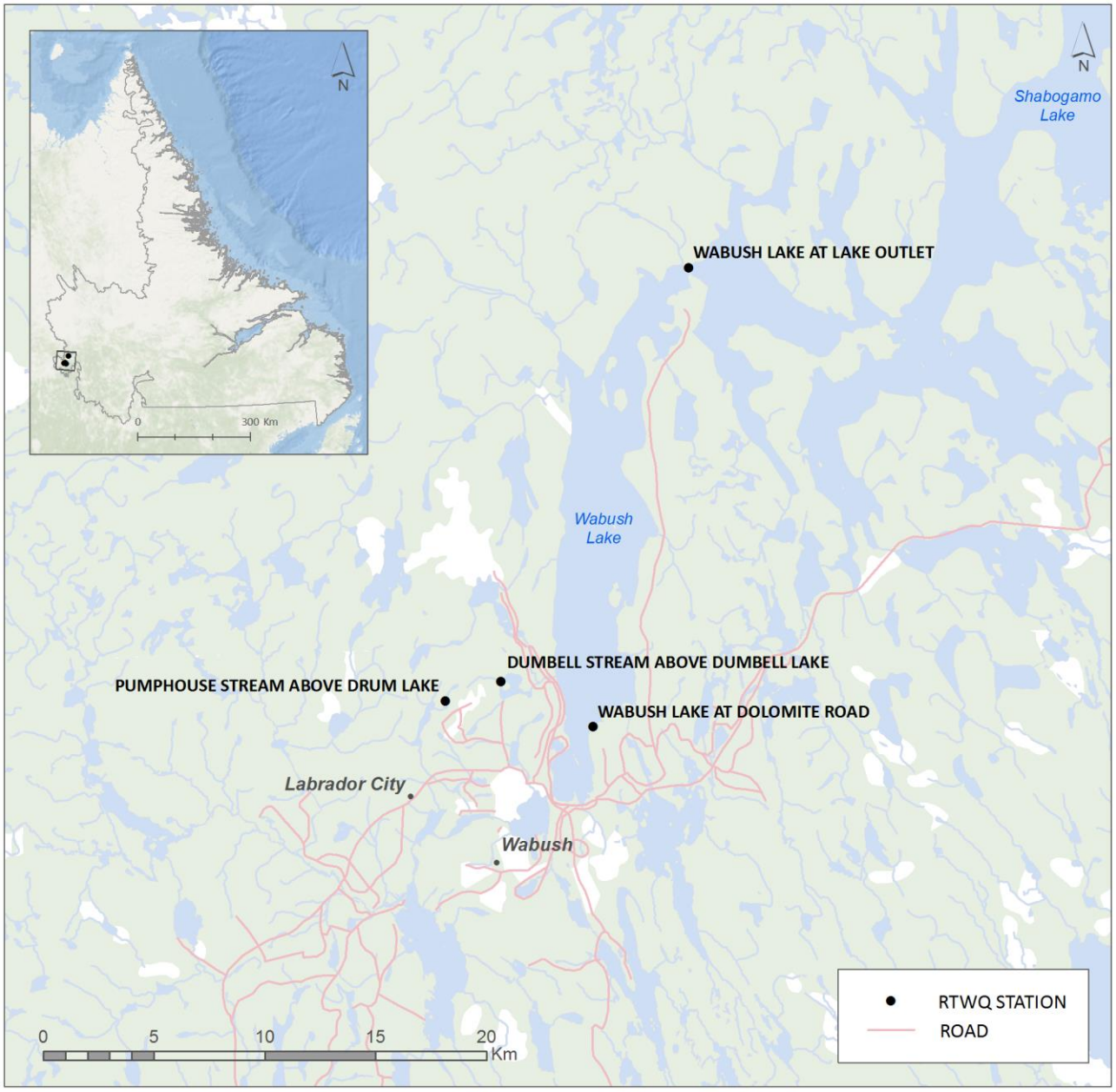

Figure 1: RTWQ Monitoring Stations in Labrador West

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 15-16 and July 28-29 are summarized in Table 2.

Table 2: QA/QC comparison rankings for IOC stations between June 15-16 and July 28-29, 2021.

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Dolomite Road	Jun 15, 2021	Deployment	Good	Excellent	Excellent	Good	Excellent
	Jul 28, 2021	Removal	Good	Excellent	Good	Good	Excellent
Julienne Narrows	Jun 15, 2021	Deployment	Good	Excellent	Excellent	Excellent	Good
	Jul 28, 2021	Removal	Excellent	Excellent	Excellent	Excellent	Excellent
Dumbell Stream	Jun 15, 2021	Deployment	Good	Excellent	Excellent	Good	Excellent
	Jul 28, 2021	Removal	Good	Good	Excellent	Good	Excellent
Pumphouse Stream	Jun 16, 2021	Deployment	Excellent	Excellent	Excellent	Excellent	Excellent
	Jul 29, 2021	Removal	Fair	Good	Excellent	Good	Excellent

- **Dolomite Road**

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

- **Julienne Narrows**

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

- **Dumbell Stream**

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

- **Pumphouse Stream**

  At deployment, all parameters ranked 'excellent'.

  At removal, all parameters except for temperature ranked either 'excellent' or 'good'. Temperature ranked 'fair'. The field instrument read a value of 5.02°C, while the QA/QC instrument read a value of 5.55°C.

- 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 15-16 to July 28-29, 2021 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 10.00 to 21.50°C at Dolomite Road and 6.3 to 19.9°C at Julienne Narrows during this deployment period (Figure 2).
- Water temperature increased during this deployment period, which corresponds with increasing ambient air temperature into summer (Figure 2).

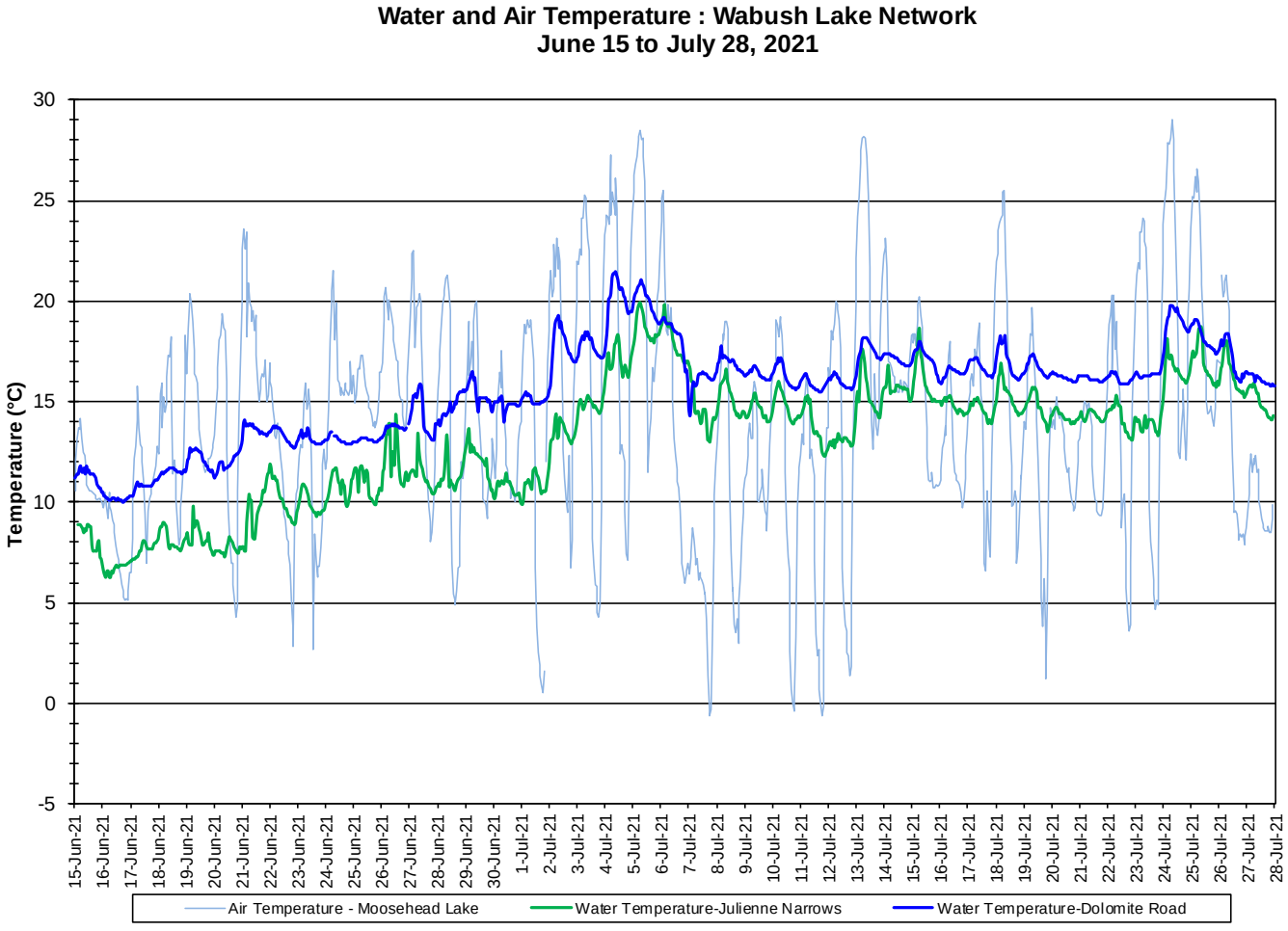

Figure 2: Water and Air Temperature - Wabush Lake network

(Weather data collected from climate station near Moosehead Lake)

- pH ranges from 7.14 to 7.82 pH units at Dolomite Road, and from 7.50 to 8.27 pH units at Julienne Narrows throughout the deployment period (Figure 3). The median pH is 7.46 and 7.79 units respectively.
- 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.
- 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.

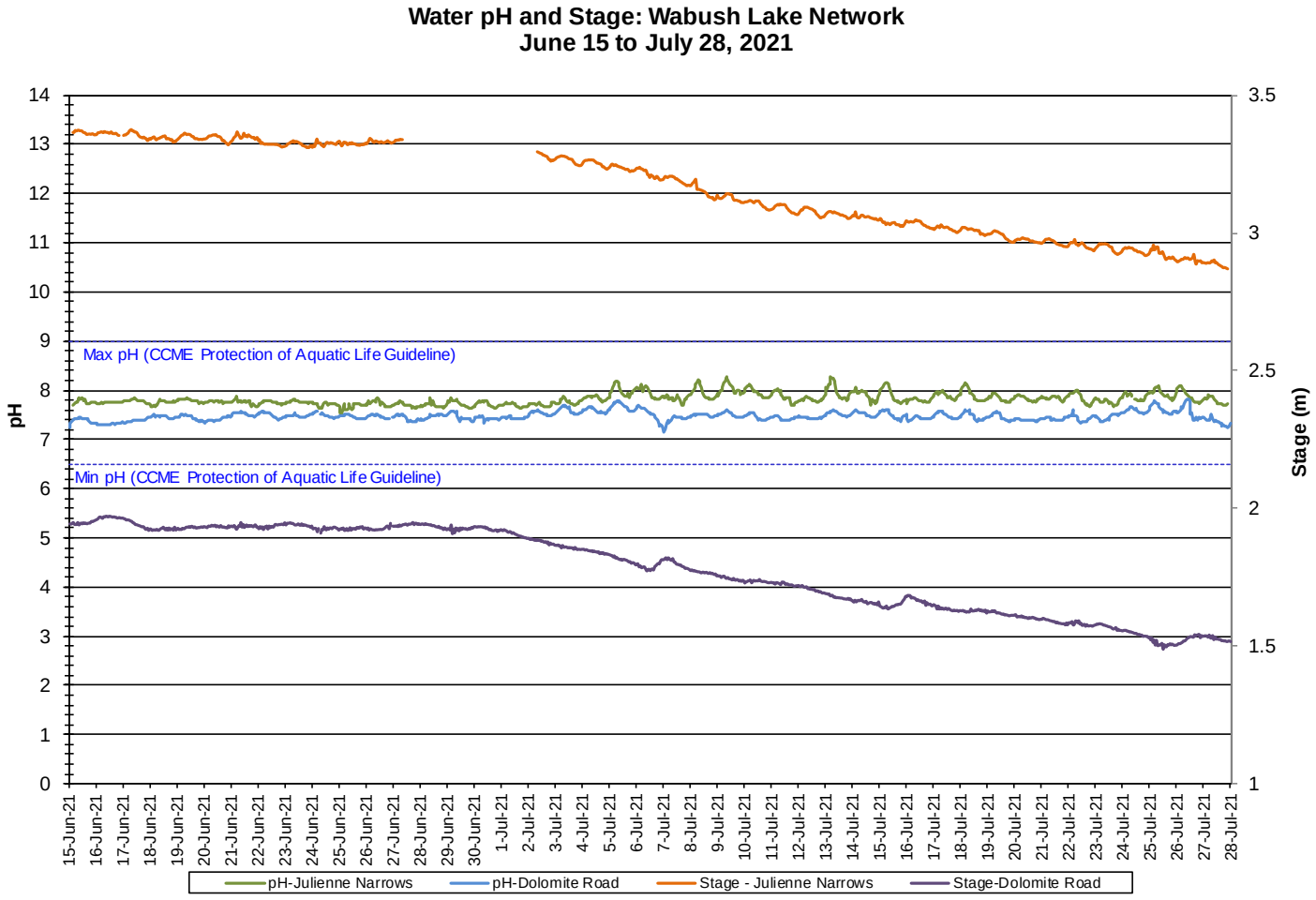

Figure 3: Water pH and Stage– Wabush Lake network

- Specific conductivity ranged from 42.1 to 73.1 µs/cm at Dolomite Road and from 57.8 to 107.3 µs/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 conductance increases at Dolomite Road 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.

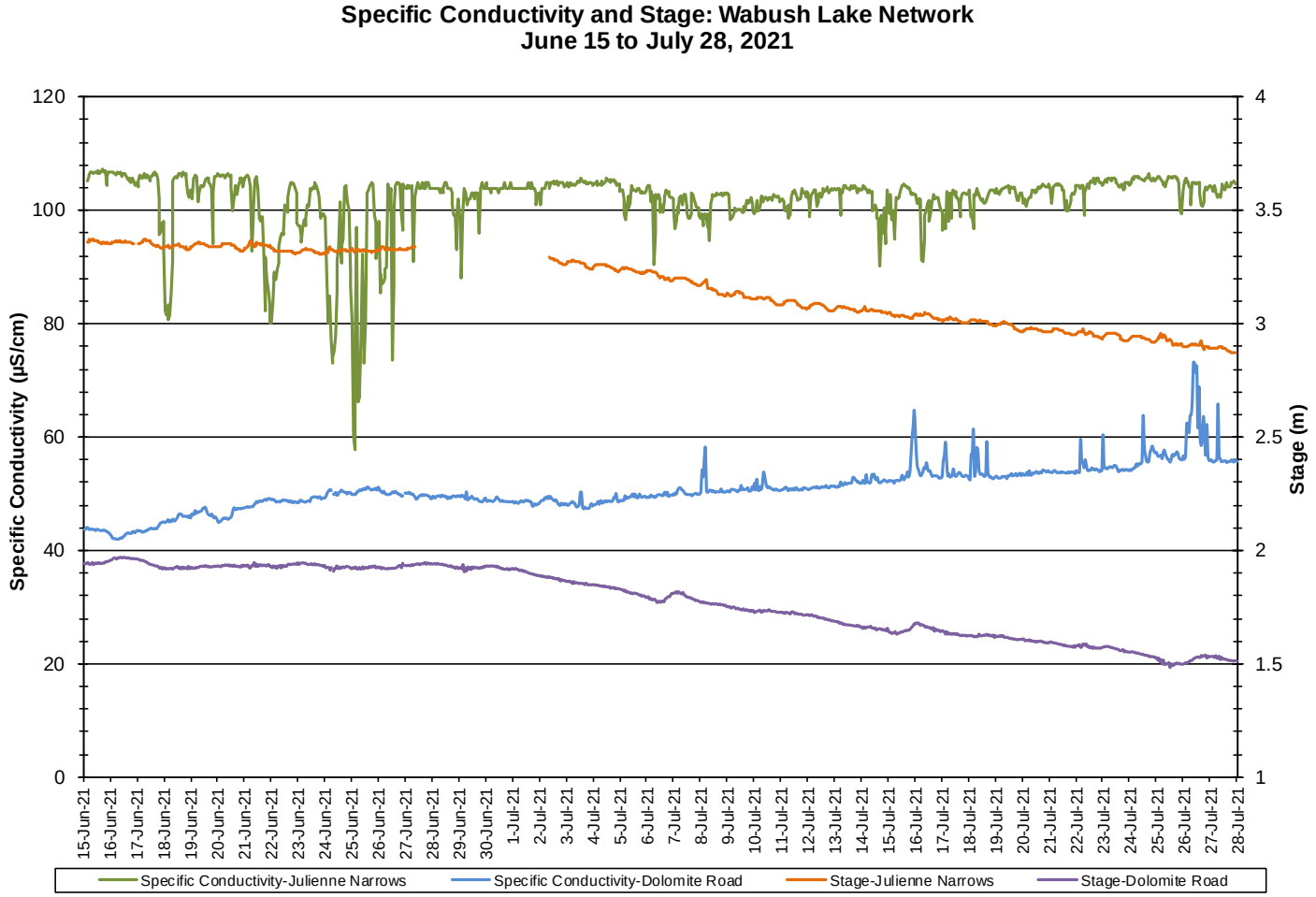

Figure 4: Specific Conductivity and Stage – Wabush Lake network

- At the Dolomite Road station, the saturation of dissolved oxygen ranged from 88.4 to 110.2% while the dissolved oxygen content ranged from 8.75 to 10.68 mg/l with a median value of 9.40 mg/l (Figure 5).
- At the Julienne Narrows station, the saturation of dissolved oxygen ranged from 89.9 to 113.9% while the dissolved oxygen content ranged from 9.00 to 11.69 mg/l with a median value of 10.24 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 values at Julienne Narrows were above the CCME Guideline for the Protection of Aquatic Life for Cold Water Biota of Early Life Stages of 9.5 mg/l, while half of the values at Dolomite Road were below. The guidelines are indicated in blue on Figure 5.
- Dissolved oxygen decreased at both stations over the course of this deployment period, as water temperature increased. Dissolved oxygen fluctuated daily with decreases observed at night.

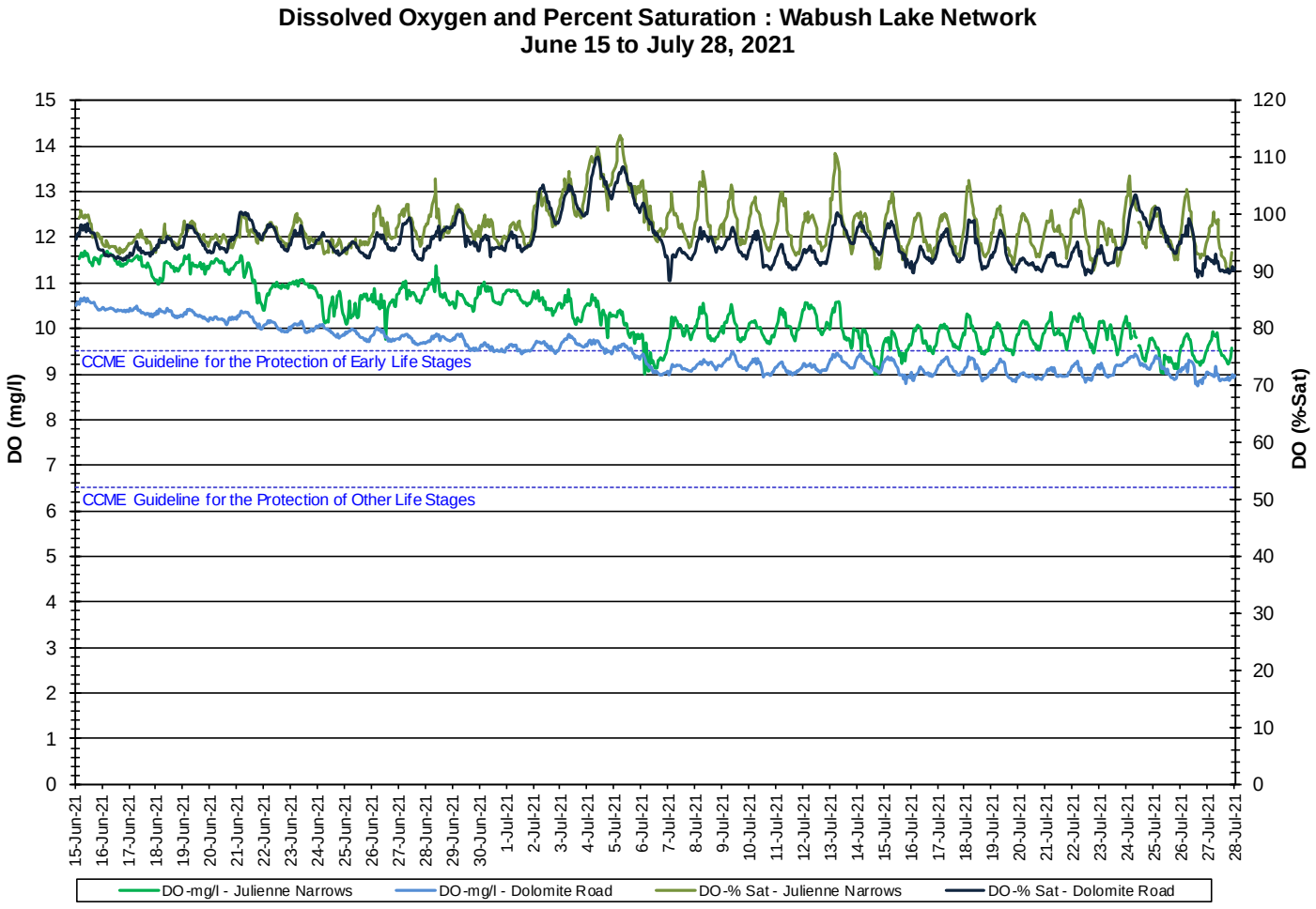

Figure 5: Dissolved Oxygen and Percent Saturation – Wabush Lake Network

- At the Julienne Narrows station, turbidity values range from 0.0 to 61.5 NTU throughout the deployment period (Figure 6). The median value was 0.0 NTU.
- In some instances, turbidity spikes can be attributed to precipitation events.

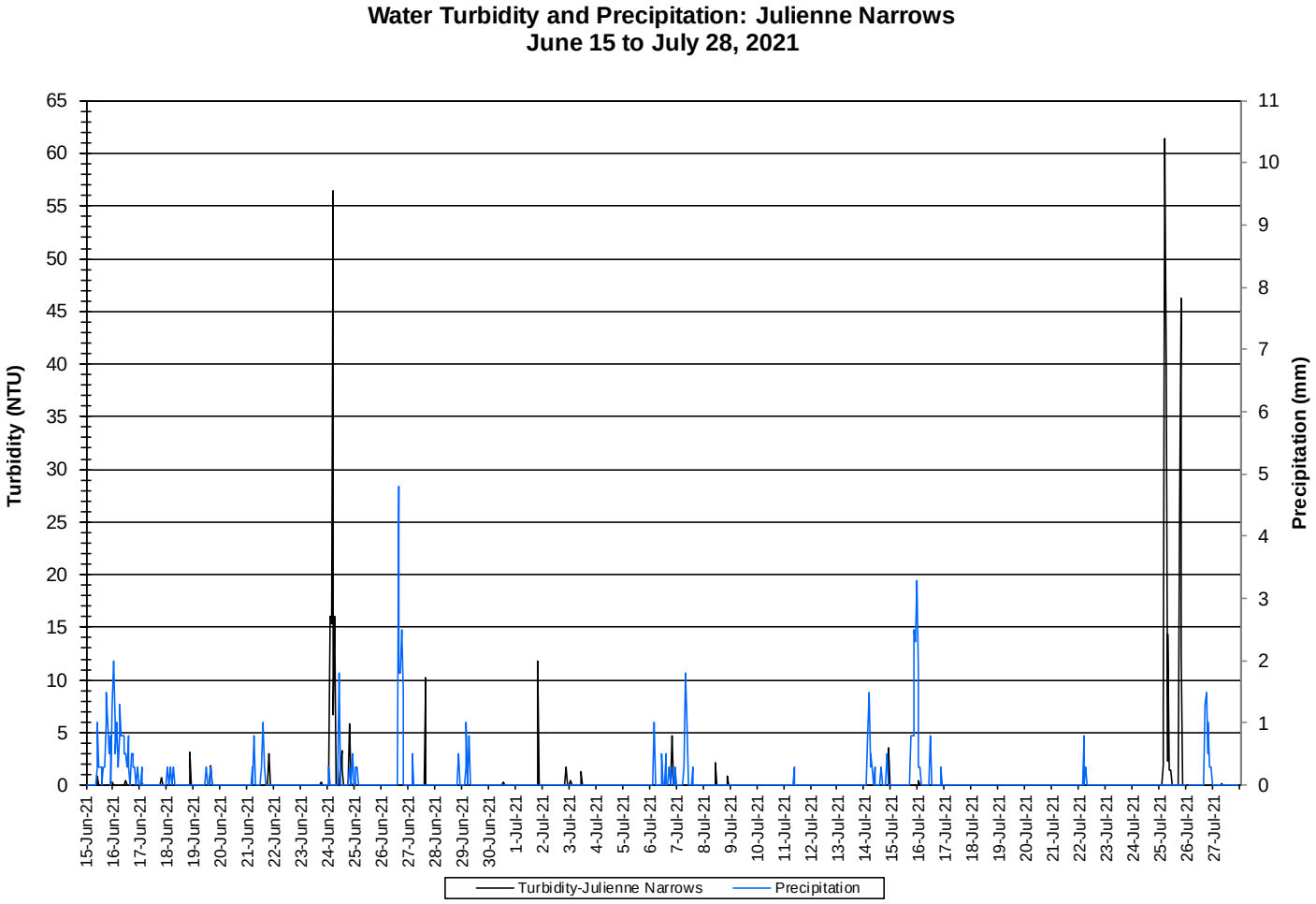

Figure 6: Turbidity and Precipitation – Julienne Narrows
(Weather data collected from climate station near Moosehead Lake)

- At the Dolomite Road station, turbidity values range from 0.0 NTU to 4.1 NTU throughout the deployment period (Figure 7). The median value was 0.0 NTU.

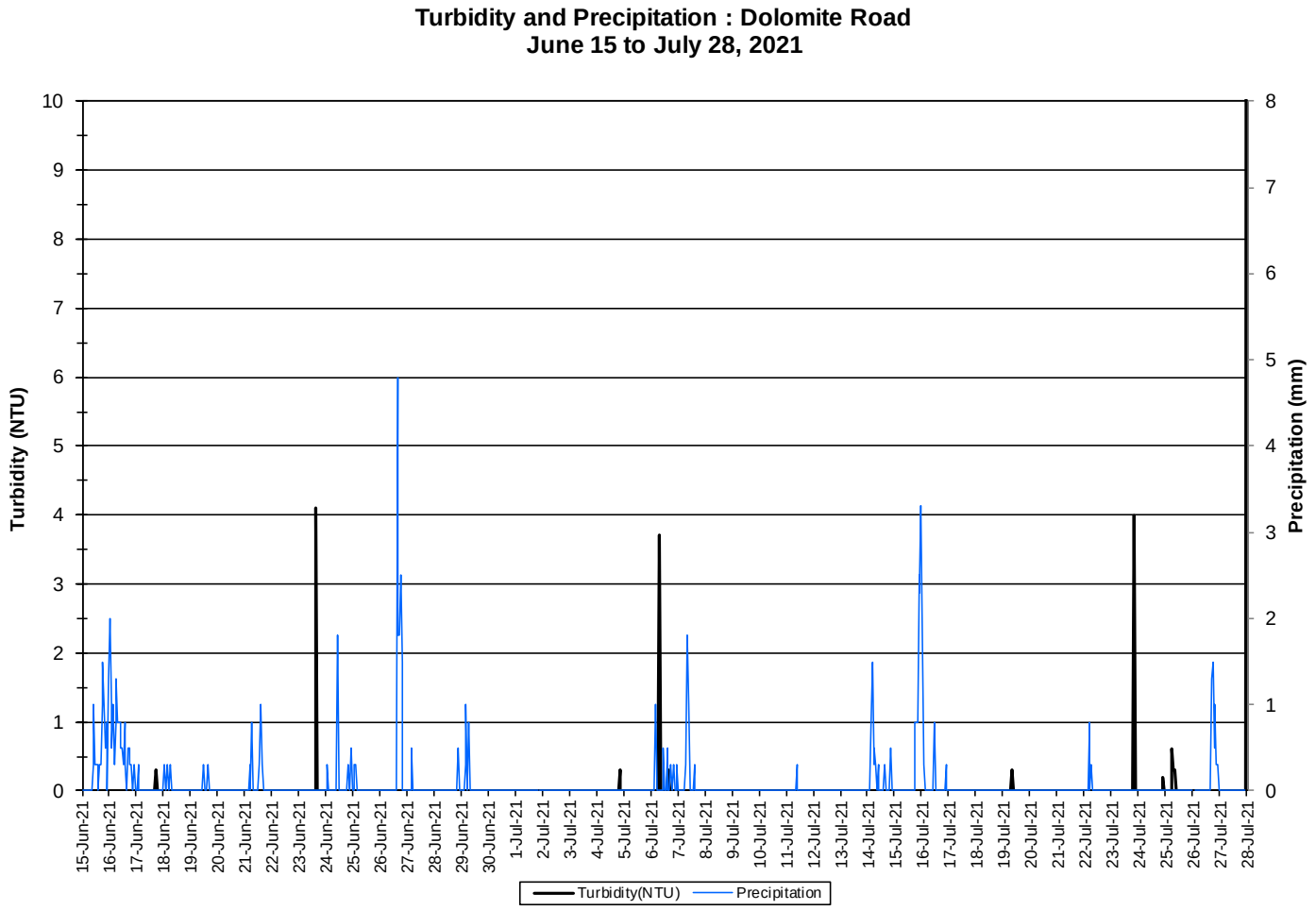

Figure 7: Turbidity and Precipitation – Dolomite Road

(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, over the course of his 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.

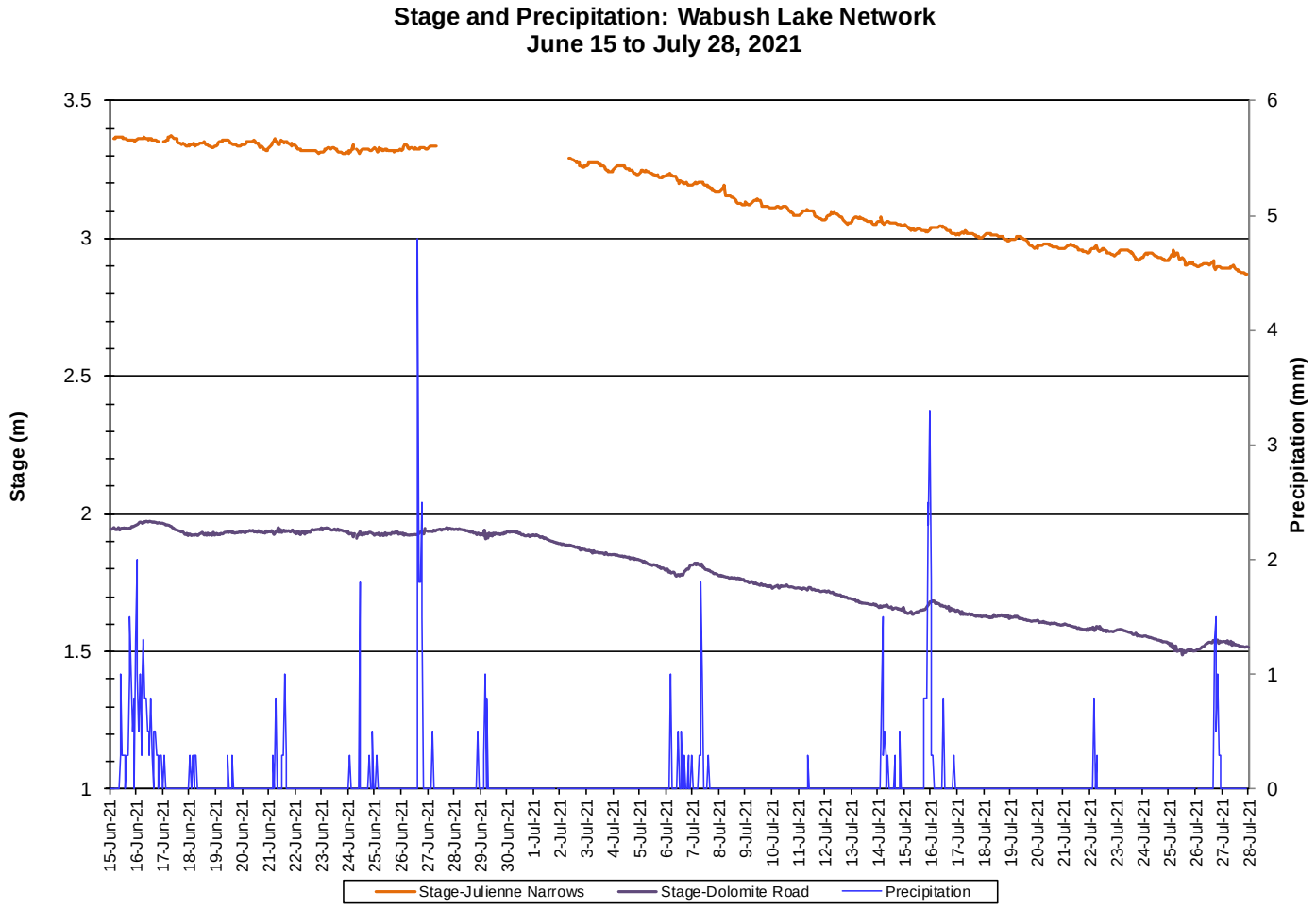

Figure 8: Stage and Precipitation – Wabush Lake Network
(Weather data collected at climate station located near Moosehead Lake)

Dumbell Stream

- Water temperature ranged from 2.69 to 6.30°C during this deployment period (Figure 9).
- Water temperature increased slightly at the end of this deployment period. Water temperature at Dumbell Stream is much lower than other stations (Figure 9).

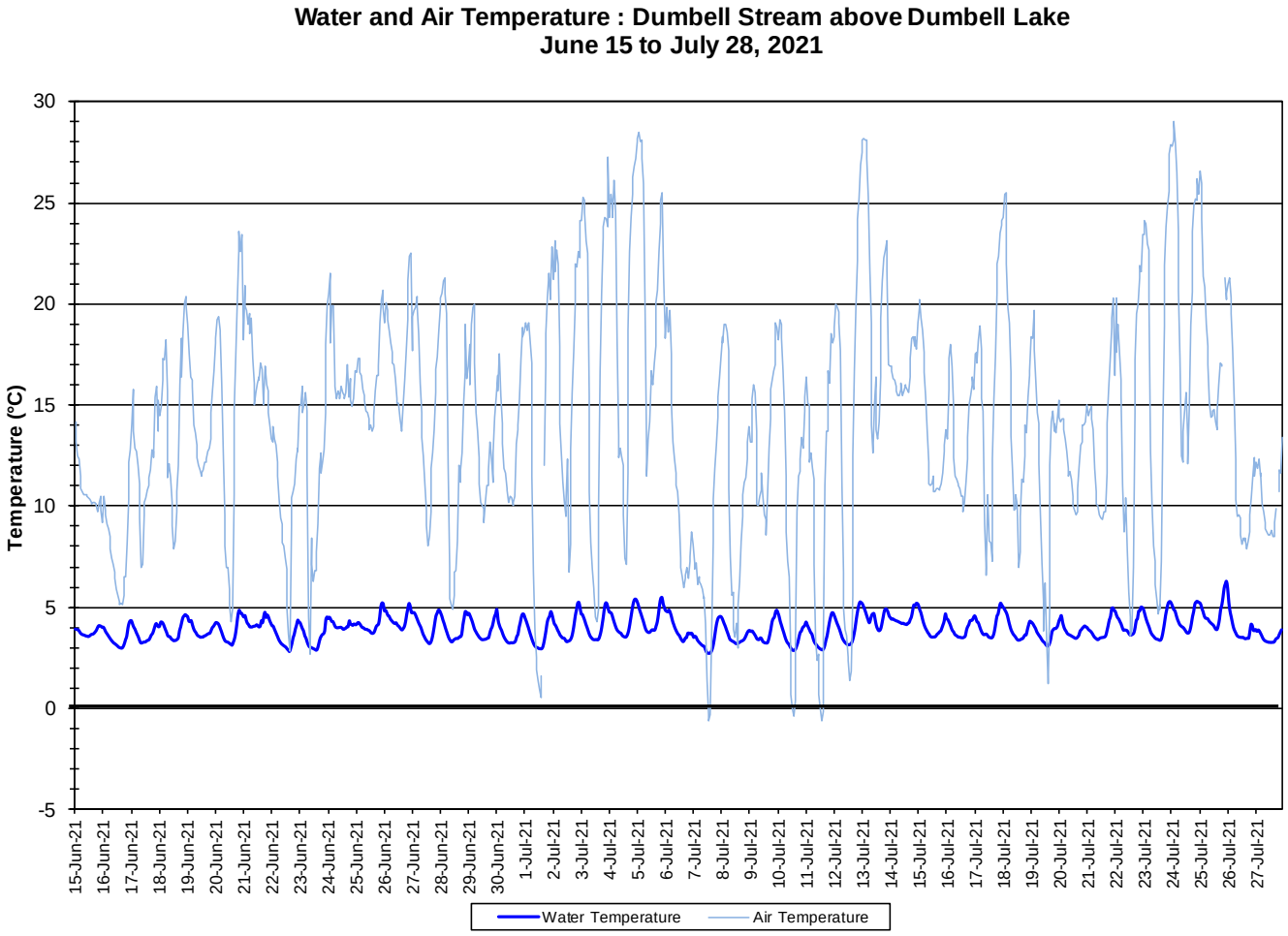

Figure 9: Water and Air Temperature – Dumbell Stream

(Weather data collected from climate station near Moosehead Lake)

- pH ranged from 7.32 to 7.77 pH units (Figure 10). The median pH was 7.55.
- 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.

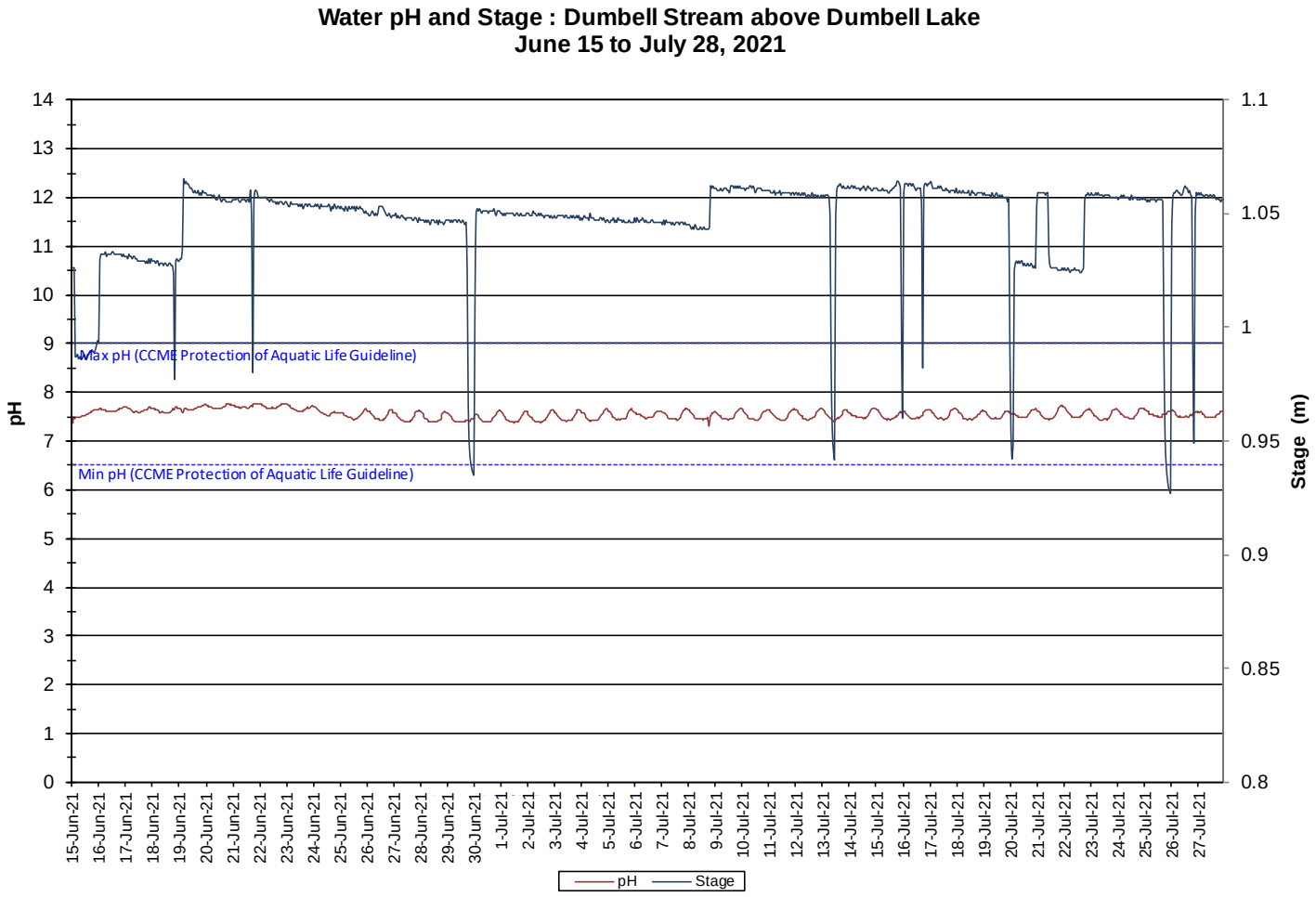

Figure 10: Water pH and Stage – Dumbell Stream

- Specific conductivity ranged from 84.7 to 181.2 µs/cm, throughout the deployment period (Figure 11).
- Specific conductivity fluctuates over the course of the deployment period, with periodic decreases noted during or after precipitation events as the system is temporarily diluted. Some of these occurrences are noted 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.

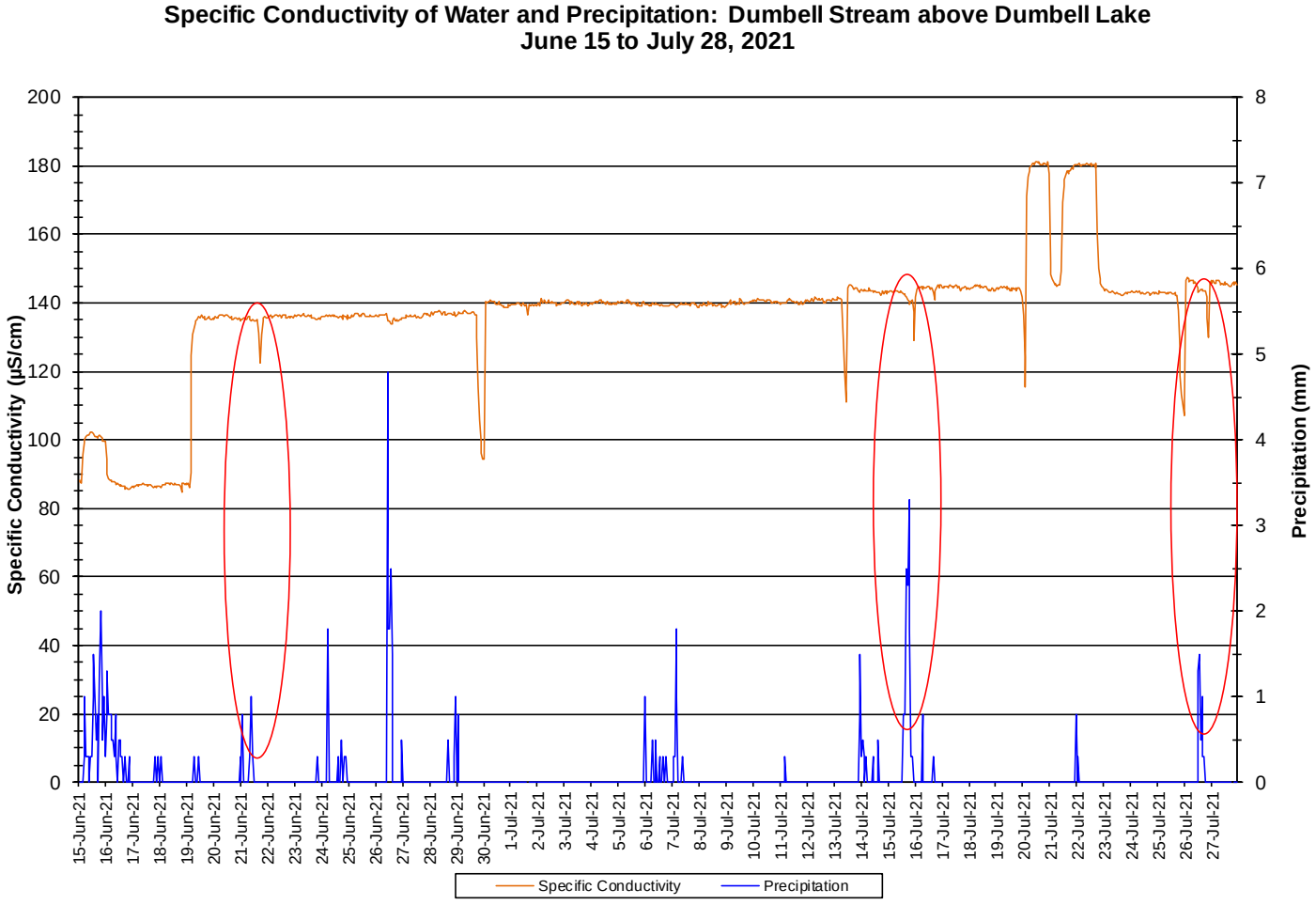

Figure 11: Specific conductivity and stage – Dumbell Stream

- The saturation of dissolved oxygen ranged from 90.5 to 94.2% while the dissolved oxygen content ranged from 11.37 to 12.66 mg/l with a median value of 12.19 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/. The guidelines are indicated in blue on Figure 12.
- Dissolved oxygen was relatively stable throughout this deployment period.
- Dissolved oxygen fluctuated daily with decreases observed at night.

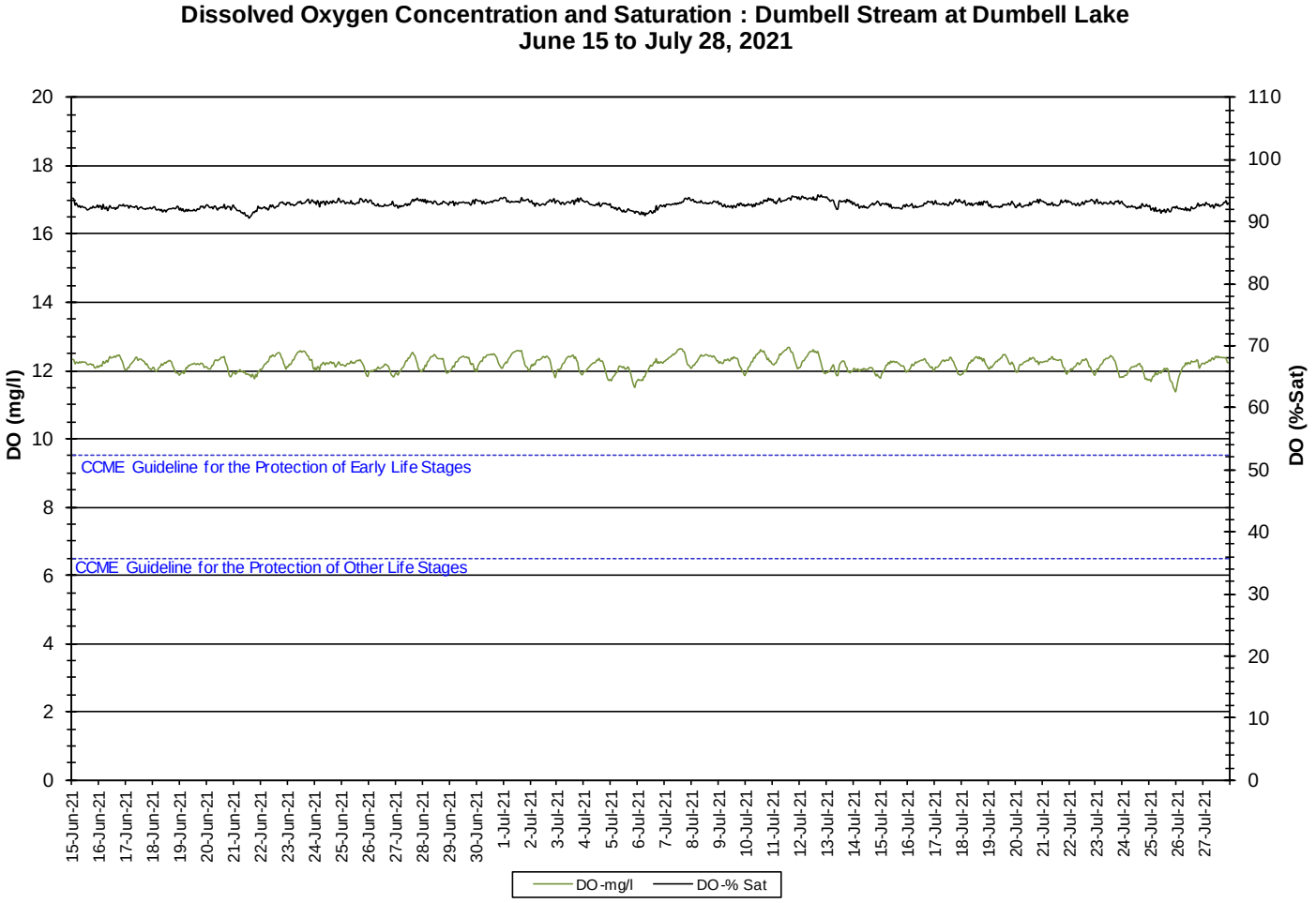

Figure 12: Dissolved oxygen – Dumbell Stream

- Turbidity values ranged from 0.4 NTU to 14.7 NTU, throughout the deployment period (Figure 13). The median value was 0.9 NTU.

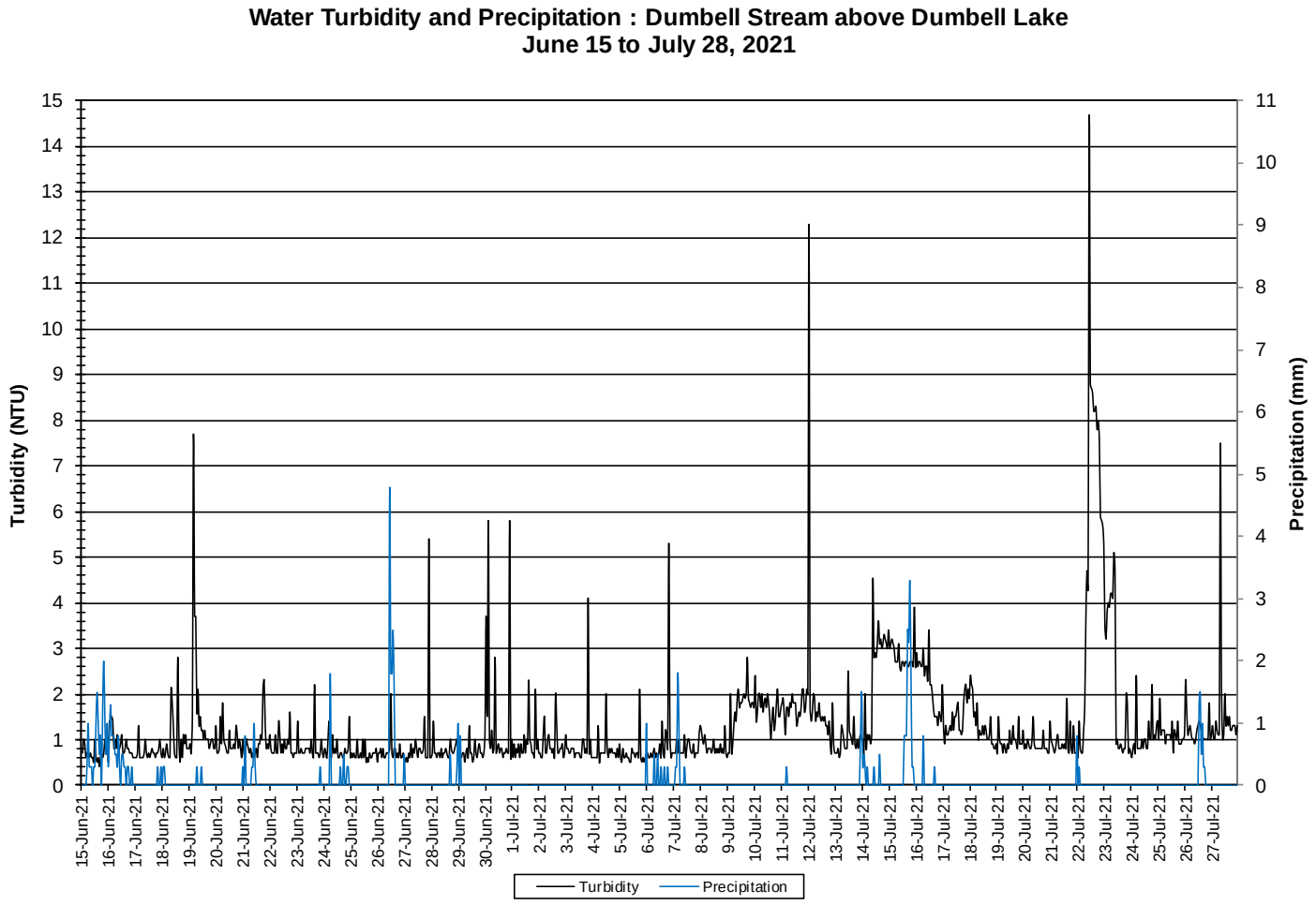

Figure 13: Turbidity and Precipitation – Dumbell Stream

(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 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.

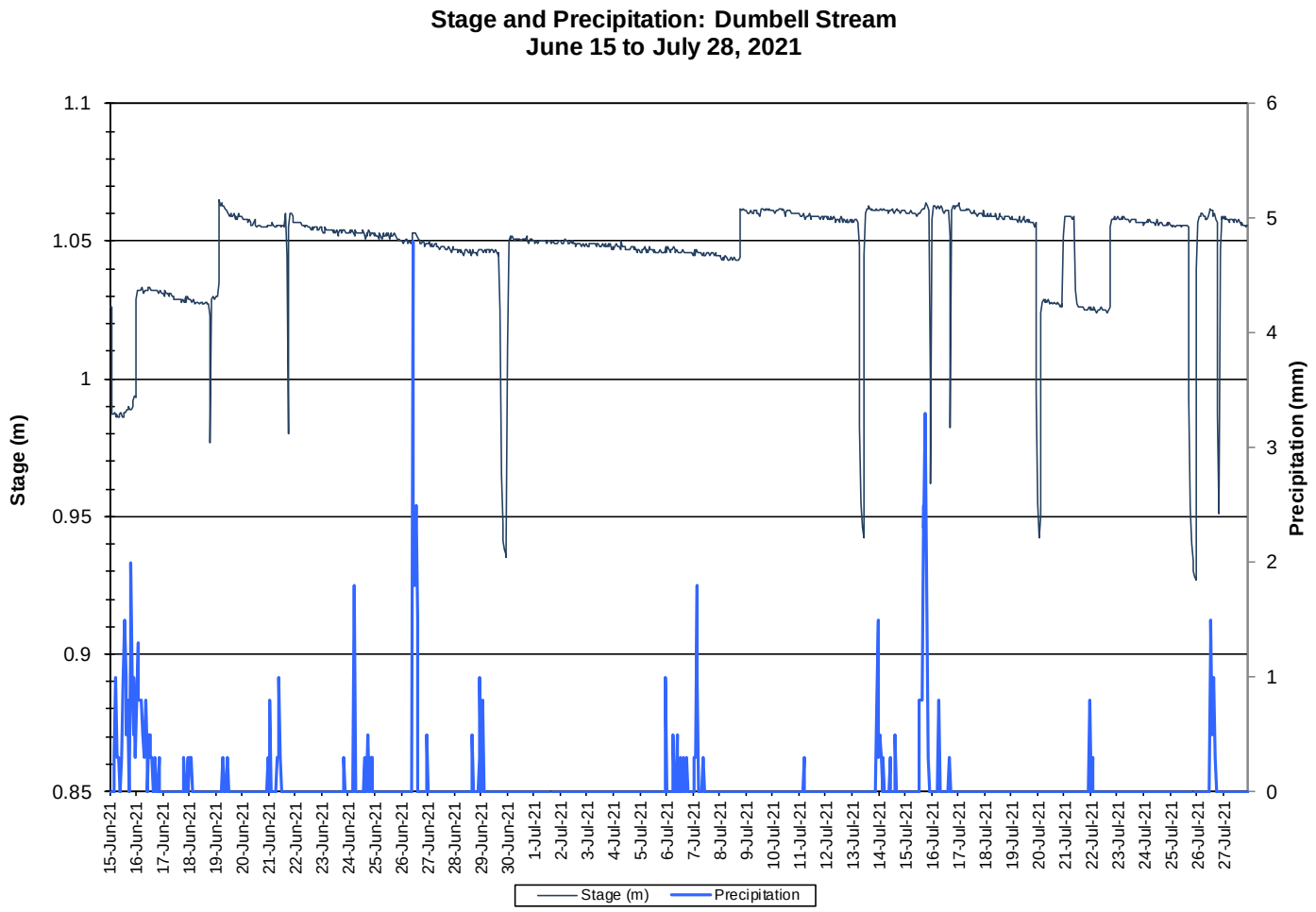

Figure 14: Stage and Precipitation – Dumbell Stream

(Weather data collected from climate station near Moosehead Lake)

Pumphouse Stream

- Water temperature ranged from 3.50 to 19.00°C during this deployment period (Figure 15).
- Water temperature fluctuated over the course of this deployment period, corresponding to ambient air temperatures (Figure 15).

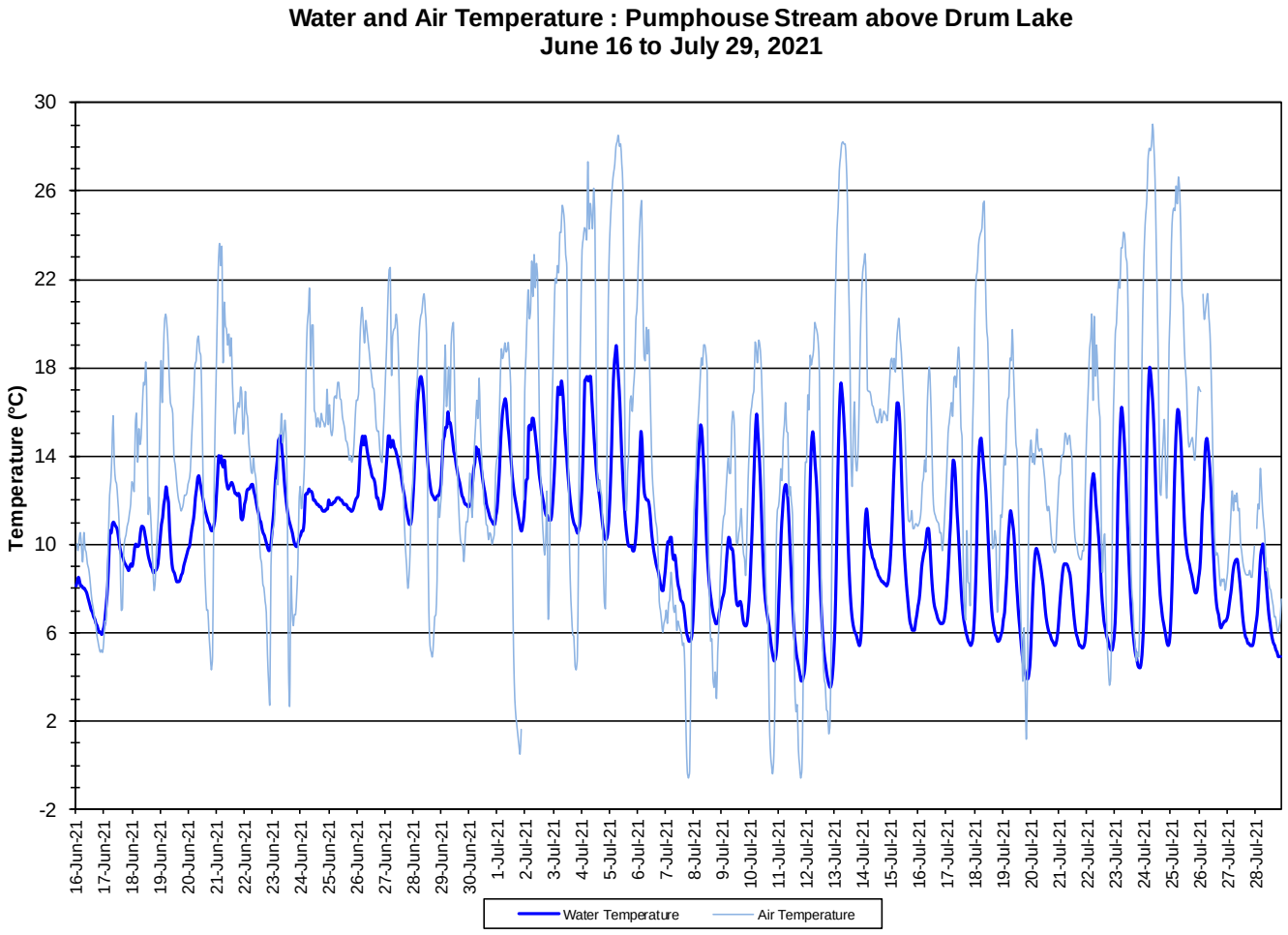

Figure 15: Water and Air Temperature – Pumphouse Stream

(Weather data collected from climate station near Moosehead Lake)

- pH ranged from 7.00 to 7.92 pH units (Figure 16). The median pH was 7.70.
- 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 and decreases after stage increases.
- 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.

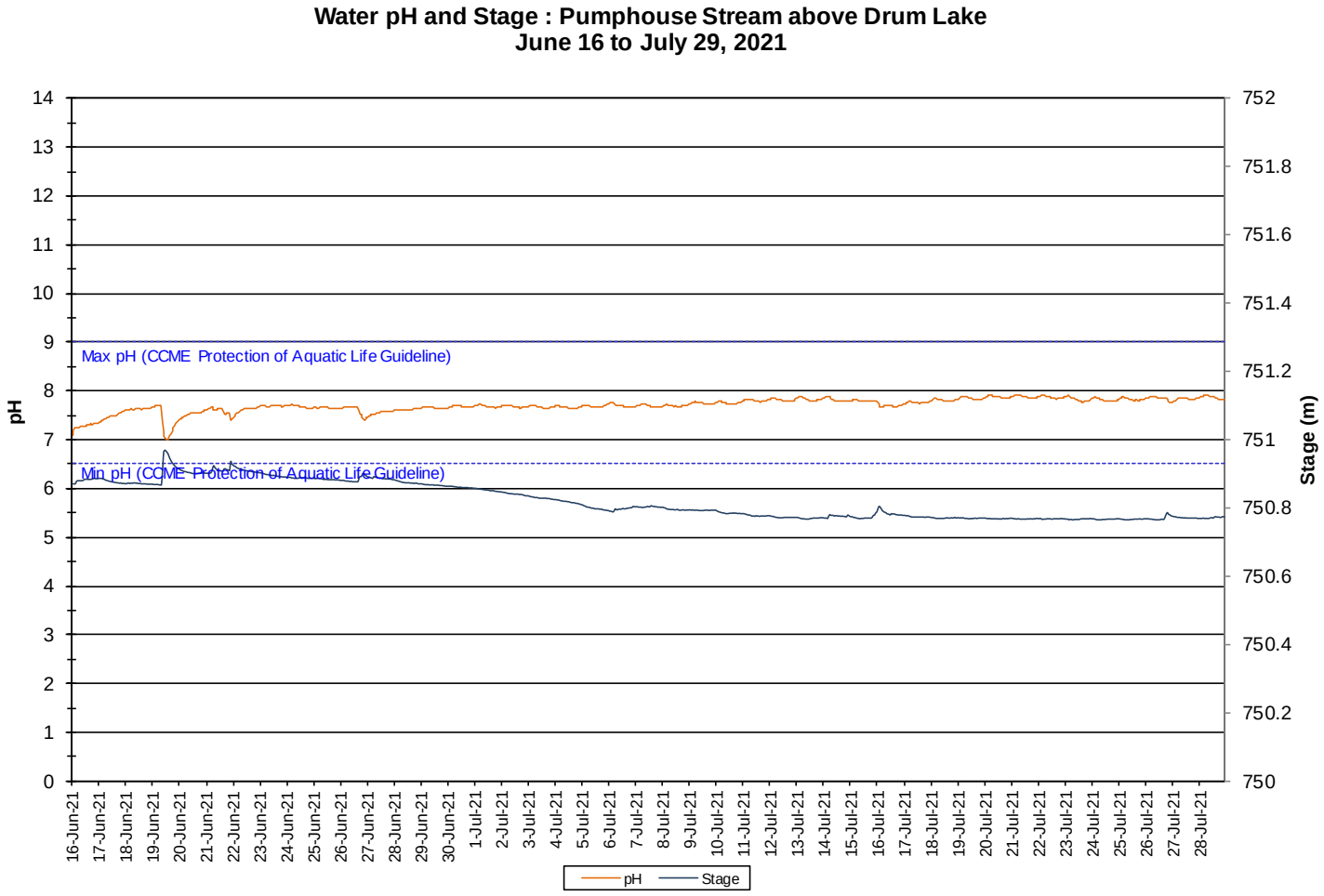

Figure 16: Water pH and Stage – Pumphouse Stream

- Specific conductivity ranged from 68.8 to 316.0 µs/cm, throughout the deployment period (Figure 17).
- 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.

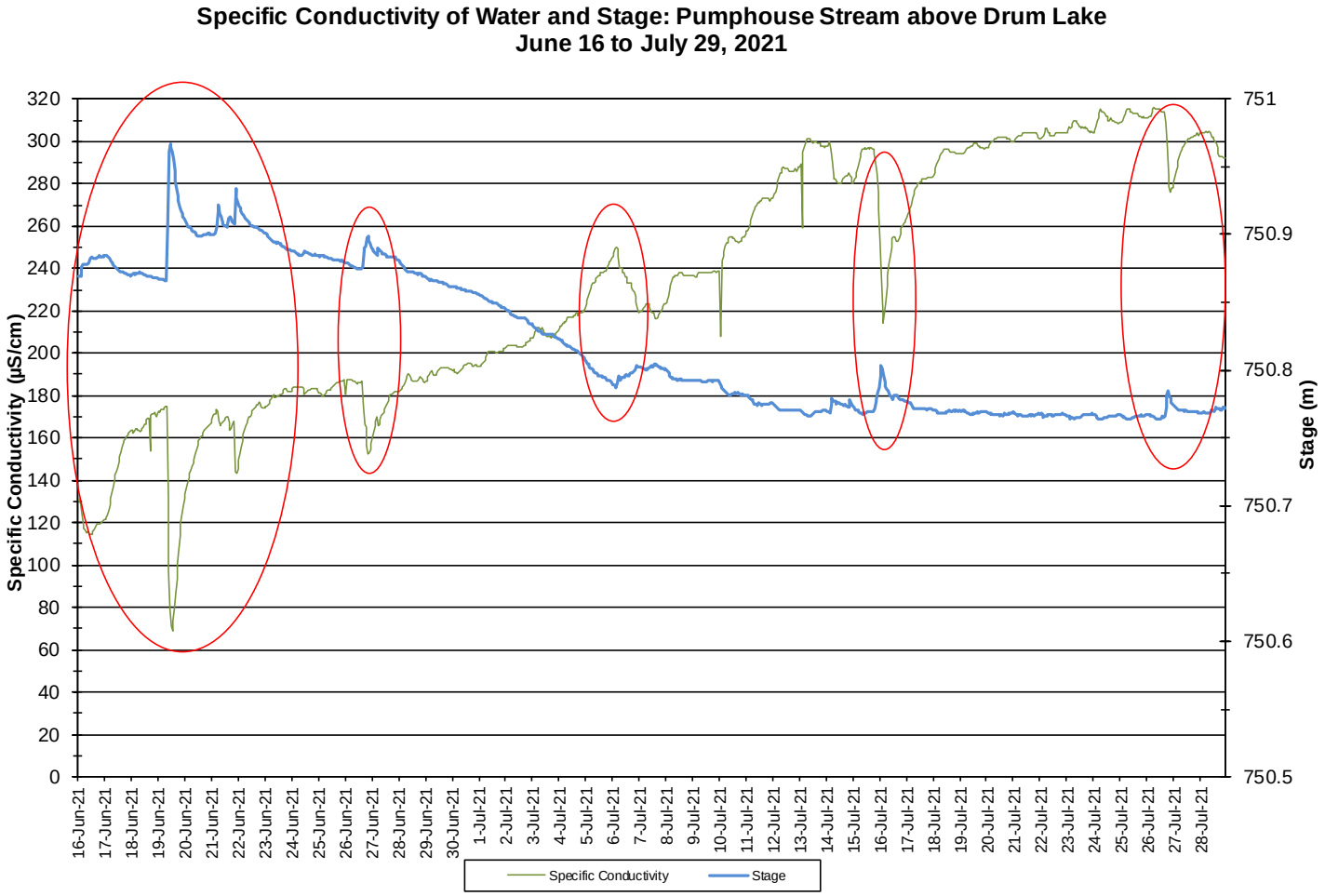

Figure 17: Specific Conductivity and Stage – Pumphouse Stream

(Weather data collected from climate station near Moosehead Lake)

- The saturation of dissolved oxygen ranged from 77.1 to 97.3% while the dissolved oxygen ranged from 8.31 to 11.09 mg/l with a median value of 9.43 mg/l (Figure 18).
- All 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. The majority of values were above 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 18.
- Dissolved oxygen values increased during the second week of July as water temperature decreased.
- Dissolved oxygen fluctuated daily with decreases observed at night.

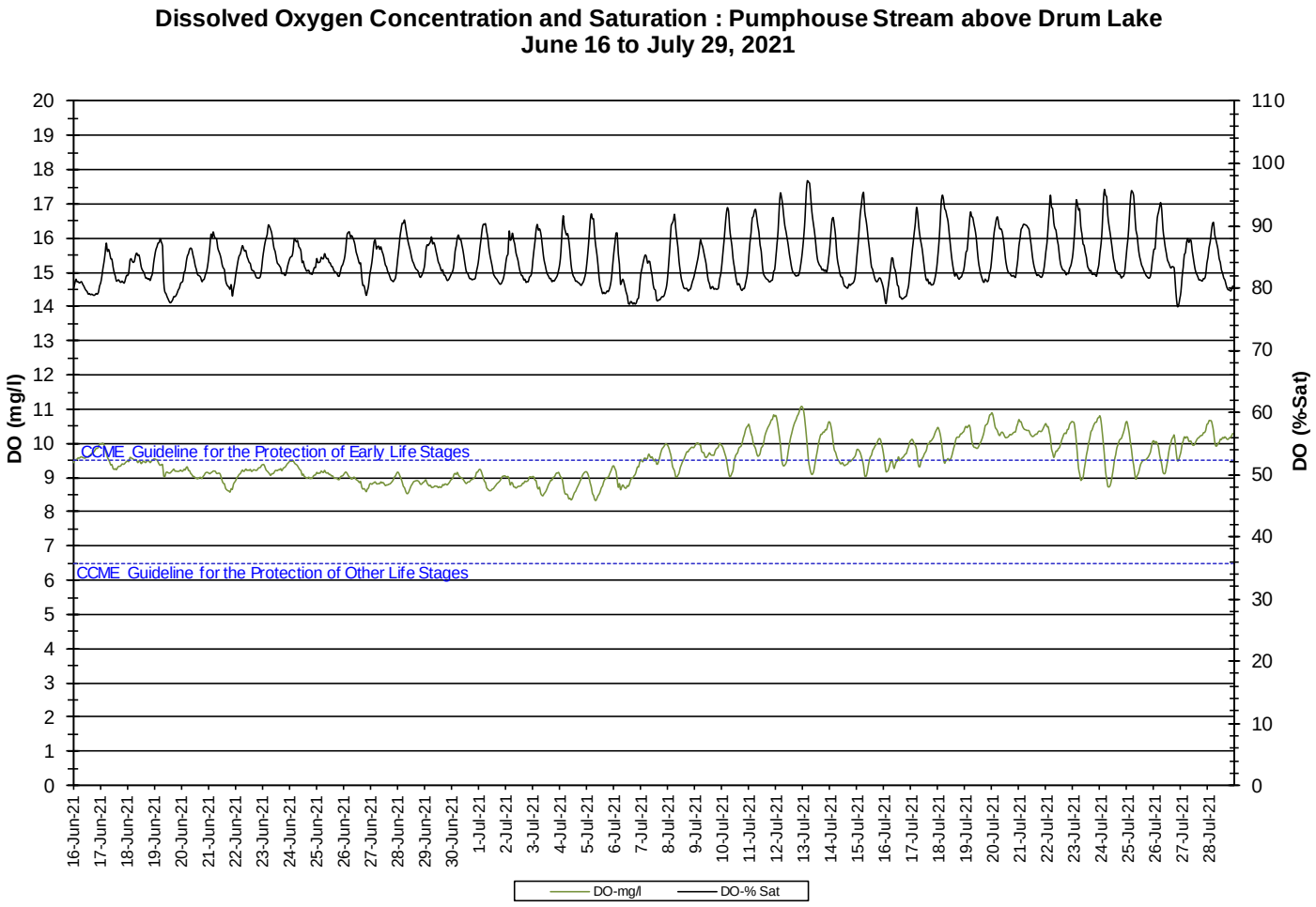

Figure 18: Dissolved Oxygen – Pumphouse Stream

- Turbidity values range from 0.0 to 36.0 NTU throughout the deployment period (Figure 19). The median value was 0.0 NTU.
- In some instances, turbidity spikes can be attributed to precipitation events.

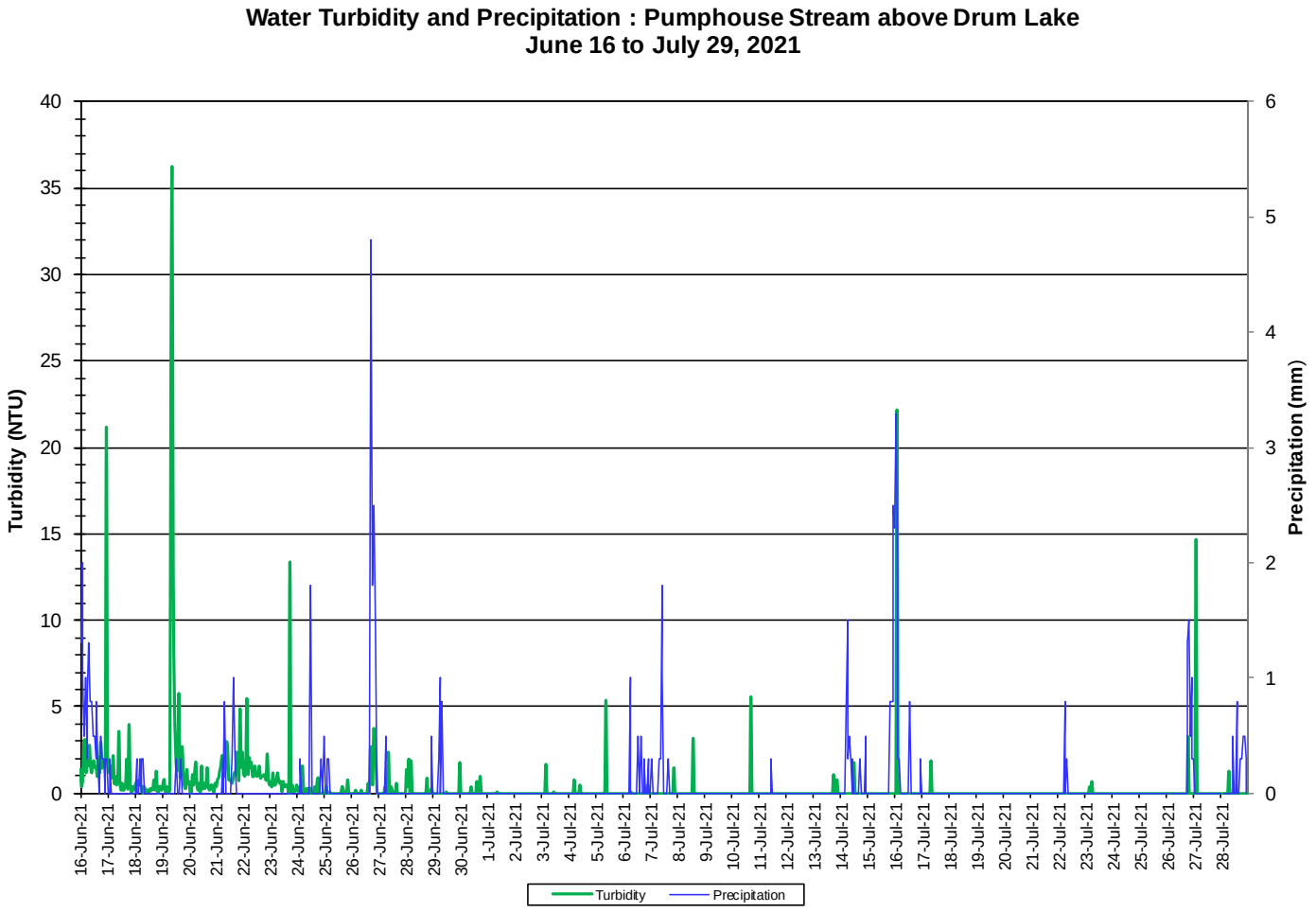

Figure 19: Turbidity and Precipitation – Pumphouse Stream
(Weather data collected from climate station near Moosehead Lake)

- Stage and precipitation are graphed below to show the relationship between rainfall and water level at Pumphouse Stream (Figure 20).
- Stage decreased over the course of this deployment period, with increases noted 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.

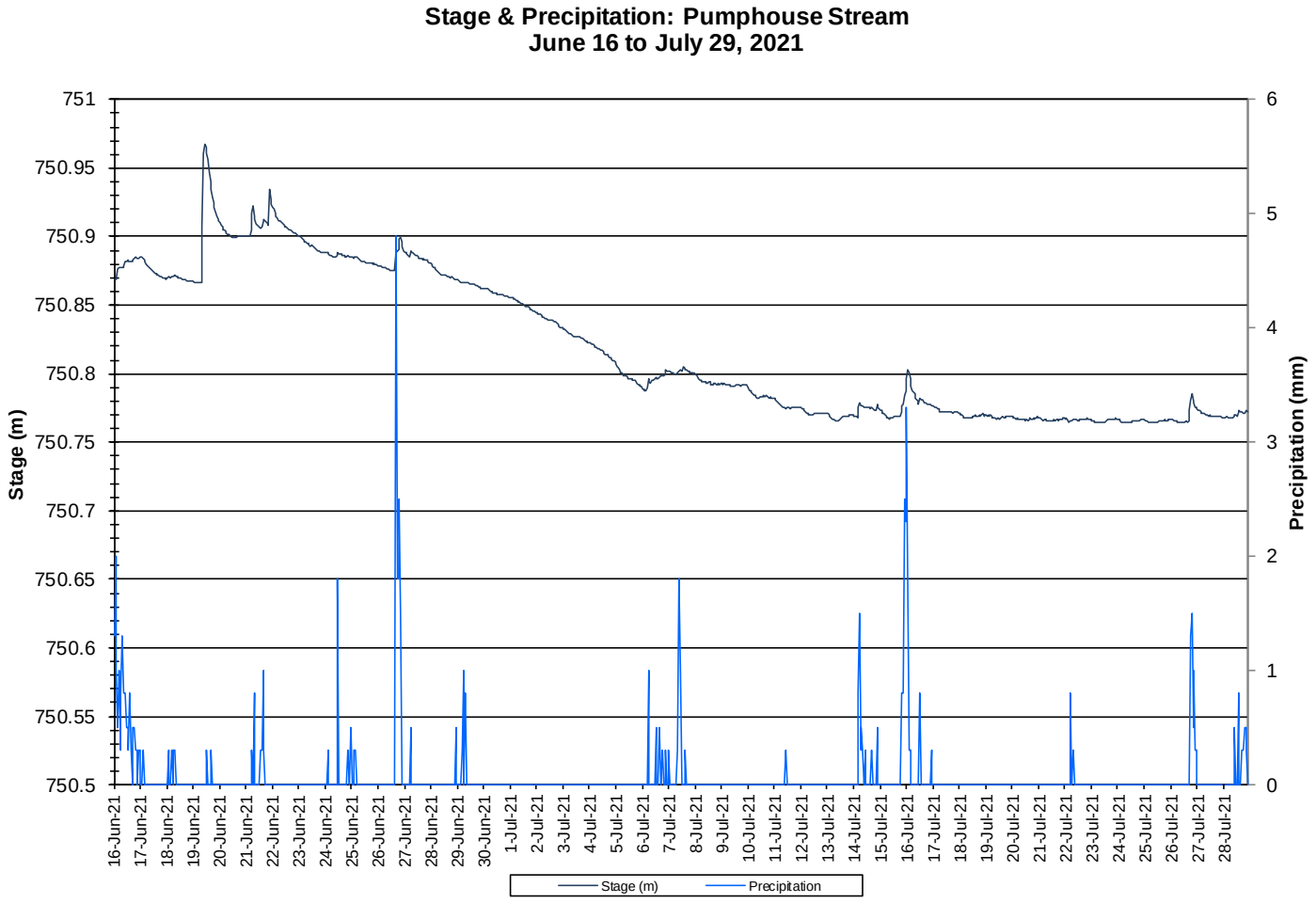

Figure 20: Stage and Precipitation – Pumphouse Stream

(Weather data collected from climate station near Moosehead Lake)

Conclusions

- Instruments were deployed on June 15th and 16th and removed by July 29, 2021. This was the first deployment period for this season.
- In most cases, precipitation events or increase/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 typically ranged between 2.69 and 21.50°C at these stations.
- All of the pH values were within the recommended CCME Guidelines for the Protection of Aquatic Life. pH ranged between 7.00 and 8.27. Fluctuations were noted between day and night.
- 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 42.1 µs/cm to 107.3 µs/cm at the Wabush Lake stations, 84.7 to 181.2 µs/cm at Dumbell Stream and 68.8 to 316.0 µs/cm at Pumphouse Stream.
- At all four 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 the values were above this guideline.
- At Pumphouse Stream, there are noticeable decreases in pH and conductivity, and increases in stage and turbidity around the 19th of June, this is likely caused by a number of days with high precipitation.
- Turbidity at Dolomite Road and Julienne Narrows ranged from 0.0 to 61.5 NTU.
- Turbidity at Dumbell Stream ranged from 0.4 to 14.7 NTU.
- Turbidity at Pumphouse Stream ranged from 0.0 to 36.0 NTU.
- At Julienne Narrows and Dolomite Road stage decreased.
- At Dumbell Stream, stage increased during the first week of deployment and again during the second week of July. There were occasional decreases; these decreases may not be accurate.
- At Pumphouse Stream, stage generally decreased with periodic 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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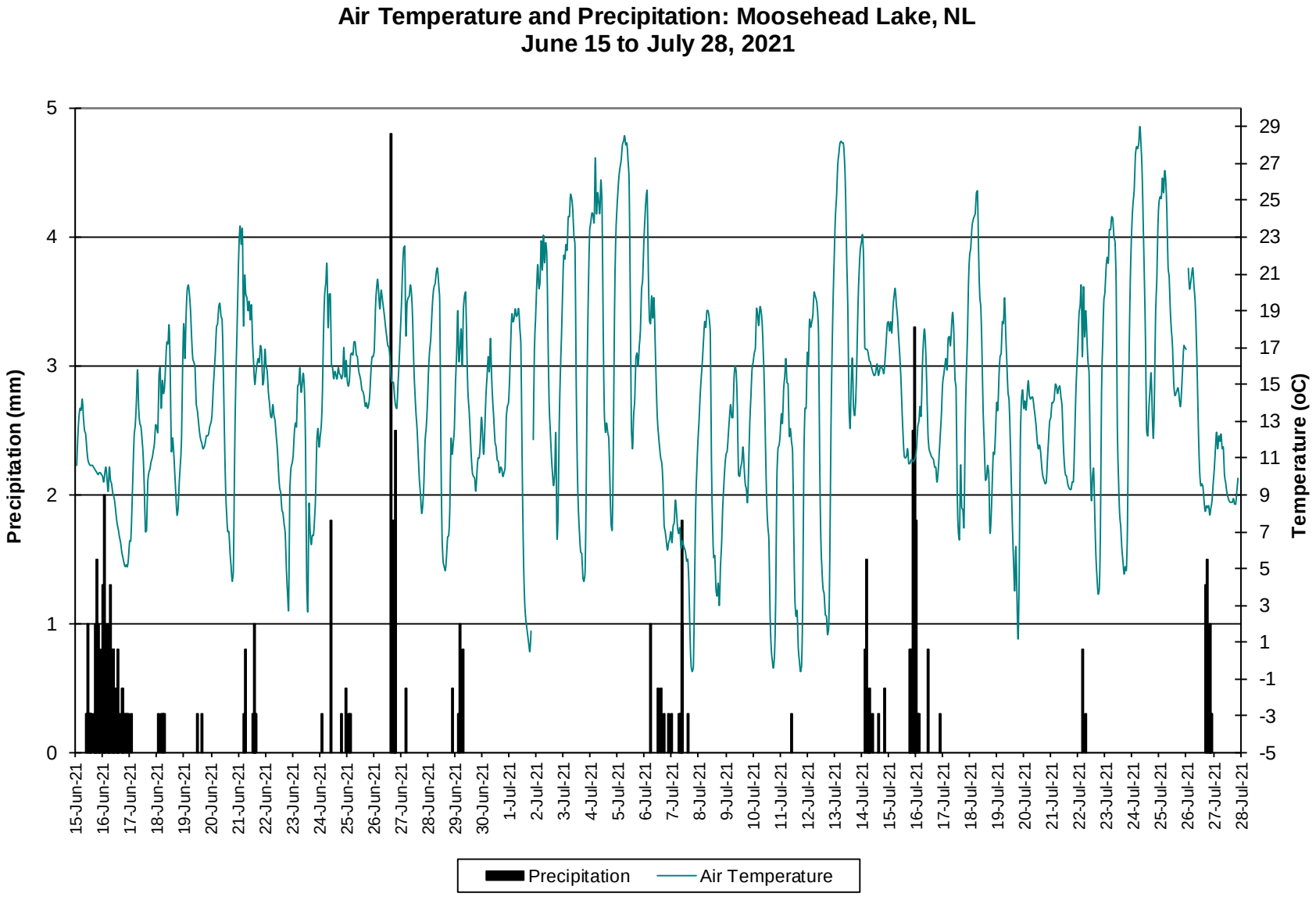
Appendix 1


Air Temperature and Precipitation: Moosehead Lake, NL
June 15 to July 28, 2021
Precipitation (mm)
Temperature (oC)
0
1
2
3
4
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-5
-3
-1
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28-Jul-21
Precipitation
Air Temperature

Appendix 2
QA/QC Grab Sample Results

BV Labs Job #: C1H1197
Report Date: 2021/06/30

NL Department of Environment, Climate Change and Municipalities
Your P.O. #: 220028978-2

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ649 JULIENNE NARROWS								
Sampling Date 2021/06/15 10:05								
Matrix W								
Sample # 2021-6308-00-SI-SP								
Registration # WS-S-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	50	1.0	mg/L	N/A	2021/06/29		7421568
Nitrate (N)	-	0.45	0.050	mg/L	N/A	2021/06/25		7421572
Total dissolved solids (calc., EC)	-	60	1.0	mg/L	N/A	2021/06/28		7422207
Inorganics								
Conductivity	-	110	1.0	uS/cm	N/A	2021/06/28	SHW	7432549
Chloride (Cl-)	-	1.7	1.0	mg/L	N/A	2021/06/28	FD	7431007
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2021/06/28	FD	7431007
Sulphate (SO4)	-	3.7	1.0	mg/L	N/A	2021/06/28	FD	7431007
Total Alkalinity (Total as CaCO3)	-	53	5.0	mg/L	N/A	2021/06/24	MCN	7424462
Colour	-	11	5.0	TCU	N/A	2021/06/25	MCN	7424483
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2021/06/28	SHW	7432553
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2021/06/25	2021/06/25	MJ1	7429564
Nitrate + Nitrite (N)	-	0.45	0.050	mg/L	N/A	2021/06/24	MCN	7424486
Nitrite (N)	-	ND	0.010	mg/L	N/A	2021/06/24	MCN	7424488
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2021/06/24	MCN	7426774
Dissolved Organic Carbon (C)	-	2.7	0.50	mg/L	N/A	2021/06/26	KMC	7428999
Total Organic Carbon (C)	-	2.9	0.50	mg/L	N/A	2021/06/28	NGI	7432667
pH	-	7.85		pH	N/A	2021/06/28	SHW	7432552
Total Phosphorus	-	0.005	0.004	mg/L	2021/06/25	2021/06/25	SSV	7429506
Total Suspended Solids	-	2.6	1.0	mg/L	2021/06/22	2021/06/24	MKX	7422381
Turbidity	-	2.8	0.10	NTU	N/A	2021/06/24	SHW	7426549
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2021/06/28	2021/06/28	NHU	7429793
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.022	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Antimony (Sb)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Arsenic (As)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Barium (Ba)	-	0.0019	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Boron (B)	-	ND	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Calcium (Ca)	-	12	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Chromium (Cr)	-	0.0097	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Copper (Cu)	-	0.00075	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Iron (Fe)	-	0.14	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Lead (Pb)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Magnesium (Mg)	-	4.9	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Manganese (Mn)	-	0.033	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Nickel (Ni)	-	0.0051	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496

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BV Labs Job #: C1H1197
Report Date: 2021/06/30

NL Department of Environment, Climate Change and Municipalities
Your P.O. #: 220028978-2

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ649 JULIENNE NARROWS Sampling Date 2021/06/15 10:05 Matrix W Sample # 2021-6308-00-SI-SP Registration # WS-S-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Phosphorus (P)	-	ND	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Selenium (Se)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Sodium (Na)	-	1.5	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Strontium (Sr)	-	0.016	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Uranium (U)	-	0.00012	0.00010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Zinc (Zn)	-	ND	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496

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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ650 DOLOMITE ROAD								
Sampling Date 2021/06/15 10:50								
Matrix W								
Sample # 2021-6309-00-SI-SP								
Registration # WS-S-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	21	1.0	mg/L	N/A	2021/06/29		7421568
Nitrate (N)	-	0.063	0.050	mg/L	N/A	2021/06/25		7421572
Total dissolved solids (calc., EC)	-	25	1.0	mg/L	N/A	2021/06/28		7422207
Inorganics								
Conductivity	-	44	1.0	uS/cm	N/A	2021/06/28	SHW	7432549
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2021/06/28	FD	7431007
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2021/06/28	FD	7431007
Sulphate (SO4)	-	1.7	1.0	mg/L	N/A	2021/06/28	FD	7431007
Total Alkalinity (Total as CaCO3)	-	22	5.0	mg/L	N/A	2021/06/24	MCN	7424462
Colour	-	29	5.0	TCU	N/A	2021/06/25	MCN	7424483
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2021/06/28	SHW	7432553
Total Kjeldahl Nitrogen (TKN)	-	0.15	0.10	mg/L	2021/06/25	2021/06/25	MJ1	7429564
Nitrate + Nitrite (N)	-	0.063	0.050	mg/L	N/A	2021/06/24	MCN	7424486
Nitrite (N)	-	ND	0.010	mg/L	N/A	2021/06/24	MCN	7424488
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2021/06/24	MCN	7426774
Dissolved Organic Carbon (C)	-	4.2	0.50	mg/L	N/A	2021/06/26	KMC	7429002
Total Organic Carbon (C)	-	4.1	0.50	mg/L	N/A	2021/06/28	NGI	7432667
pH	-	7.45		pH	N/A	2021/06/28	SHW	7432552
Total Phosphorus	-	0.008	0.004	mg/L	2021/06/25	2021/06/25	SSV	7429506
Total Suspended Solids	-	1.0	1.0	mg/L	2021/06/22	2021/06/24	MKX	7422381
Turbidity	-	1.1	0.10	NTU	N/A	2021/06/24	SHW	7426549
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2021/06/28	2021/06/28	NHU	7429793
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.053	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Antimony (Sb)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Arsenic (As)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Barium (Ba)	-	0.0077	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Boron (B)	-	ND	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Calcium (Ca)	-	5.0	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Chromium (Cr)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Copper (Cu)	-	0.00065	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Iron (Fe)	-	0.081	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Lead (Pb)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Magnesium (Mg)	-	2.0	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Manganese (Mn)	-	0.019	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Nickel (Ni)	-	ND	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496

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BV Labs Job #: C1H1197
Report Date: 2021/06/30

NL Department of Environment, Climate Change and Municipalities
Your P.O. #: 220028978-2

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ650 DOLOMITE ROAD Sampling Date 2021/06/15 10:50 Matrix W Sample # 2021-6309-00-SI-SP Registration # WS-S-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Phosphorus (P)	-	ND	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Selenium (Se)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Sodium (Na)	-	0.66	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Strontium (Sr)	-	0.011	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Uranium (U)	-	ND	0.00010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Zinc (Zn)	-	ND	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496

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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ652 DUMBELL STREAM								
Sampling Date 2021/06/15 15:40								
Matrix W								
Sample # 2021-6311-00-SI-SP								
Registration # WS-S-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	41	1.0	mg/L	N/A	2021/06/29		7421568
Nitrate (N)	-	3.5	0.25	mg/L	N/A	2021/06/29		7421572
Total dissolved solids (calc., EC)	-	50	1.0	mg/L	N/A	2021/06/28		7422207
Inorganics								
Conductivity	-	89	1.0	uS/cm	N/A	2021/06/28	SHW	7432549
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2021/06/28	FD	7431007
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2021/06/28	FD	7431007
Sulphate (SO4)	-	1.5	1.0	mg/L	N/A	2021/06/28	FD	7431007
Total Alkalinity (Total as CaCO3)	-	32	5.0	mg/L	N/A	2021/06/29	EMT	7429238
Colour	-	ND	5.0	TCU	N/A	2021/06/29	EMT	7429247
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2021/06/28	SHW	7432553
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2021/06/25	2021/06/25	MJ1	7429564
Nitrate + Nitrite (N)	-	3.5	0.25	mg/L	N/A	2021/06/28	EMT	7429251
Nitrite (N)	-	ND	0.010	mg/L	N/A	2021/06/28	EMT	7429252
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2021/06/24	MCN	7426774
Dissolved Organic Carbon (C)	-	0.51	0.50	mg/L	N/A	2021/06/26	KMC	7429002
Total Organic Carbon (C)	-	ND	0.50	mg/L	N/A	2021/06/28	NGI	7432667
pH	-	7.65		pH	N/A	2021/06/28	SHW	7432552
Total Phosphorus	-	ND	0.004	mg/L	2021/06/25	2021/06/25	SSV	7429506
Total Suspended Solids	-	1.4	1.0	mg/L	2021/06/22	2021/06/24	MKX	7422381
Turbidity	-	1.3	0.10	NTU	N/A	2021/06/24	SHW	7426551
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2021/06/28	2021/06/28	NHU	7429793
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.013	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Antimony (Sb)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Arsenic (As)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Barium (Ba)	-	0.0028	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Boron (B)	-	ND	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Calcium (Ca)	-	9.3	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Chromium (Cr)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Copper (Cu)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Iron (Fe)	-	ND	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Lead (Pb)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Magnesium (Mg)	-	4.3	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Manganese (Mn)	-	0.0060	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Nickel (Ni)	-	ND	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496

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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ652 DUMBELL STREAM								
Sampling Date 2021/06/15 15:40								
Matrix W								
Sample # 2021-6311-00-SI-SP								
Registration # WS-S-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Phosphorus (P)	-	ND	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Selenium (Se)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Sodium (Na)	-	0.51	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Strontium (Sr)	-	0.0088	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Uranium (U)	-	ND	0.00010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Zinc (Zn)	-	ND	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496

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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ653 PUMPHOUSE STREAM								
Sampling Date 2021/06/16 09:20								
Matrix W								
Sample # 2021-6312-00-SI-SP								
Registration # WS-S-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	67	1.0	mg/L	N/A	2021/06/29		7421568
Nitrate (N)	-	1.8	0.050	mg/L	N/A	2021/06/29		7421572
Total dissolved solids (calc., EC)	-	74	1.0	mg/L	N/A	2021/06/28		7422207
Inorganics								
Conductivity	-	130	1.0	uS/cm	N/A	2021/06/28	SHW	7432549
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2021/06/28	FD	7431007
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2021/06/28	FD	7431007
Sulphate (SO4)	-	7.6	1.0	mg/L	N/A	2021/06/28	FD	7431007
Total Alkalinity (Total as CaCO3)	-	53	5.0	mg/L	N/A	2021/06/29	EMT	7429238
Colour	-	33	5.0	TCU	N/A	2021/06/29	EMT	7429247
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2021/06/28	SHW	7432553
Total Kjeldahl Nitrogen (TKN)	-	0.15	0.10	mg/L	2021/06/25	2021/06/25	MJ1	7429564
Nitrate + Nitrite (N)	-	1.8	0.050	mg/L	N/A	2021/06/28	EMT	7429251
Nitrite (N)	-	ND	0.010	mg/L	N/A	2021/06/28	EMT	7429252
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2021/06/24	MCN	7426774
Dissolved Organic Carbon (C)	-	4.4	0.50	mg/L	N/A	2021/06/26	KMC	7429002
Total Organic Carbon (C)	-	5.1	0.50	mg/L	N/A	2021/06/28	NGI	7432667
pH	-	7.60		pH	N/A	2021/06/28	SHW	7432552
Total Phosphorus	-	0.026	0.004	mg/L	2021/06/25	2021/06/25	SSV	7429506
Total Suspended Solids	-	13	2.0	mg/L	2021/06/22	2021/06/24	MKX	7422381
Turbidity	-	6.0	0.10	NTU	N/A	2021/06/24	SHW	7426551
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2021/06/28	2021/06/28	NHU	7429793
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.19	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Antimony (Sb)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Arsenic (As)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Barium (Ba)	-	0.013	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Boron (B)	-	ND	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Cadmium (Cd)	-	0.000012	0.000010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Calcium (Ca)	-	17	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Chromium (Cr)	-	ND	0.0010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Copper (Cu)	-	0.00073	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Iron (Fe)	-	0.45	0.050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Lead (Pb)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Magnesium (Mg)	-	6.1	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Manganese (Mn)	-	0.084	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Nickel (Ni)	-	ND	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496

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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
PWZ653 PUMPHOUSE STREAM								
Sampling Date 2021/06/16 09:20								
Matrix W								
Sample # 2021-6312-00-SI-SP								
Registration # WS-S-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Phosphorus (P)	-	ND	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Selenium (Se)	-	ND	0.00050	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Sodium (Na)	-	0.43	0.10	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Strontium (Sr)	-	0.015	0.0020	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Uranium (U)	-	0.00012	0.00010	mg/L	2021/06/28	2021/06/28	BAN	7432496
Total Zinc (Zn)	-	0.0058	0.0050	mg/L	2021/06/28	2021/06/28	BAN	7432496

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