Real-Time Water Quality Deployment Report

Lower Churchill River Network

July 10/11 to
August 21/22, 2024

Newfoundland Labrador

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

Contents

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Real Time Water Quality Monitoring

- Staff with the Department of Environment and Climate Change monitor real-time water quality data on a regular basis.
- This deployment report discusses water quality related events occurring at four stations on the Lower Churchill River: Churchill River below Metchin River, Churchill River above Grizzle Rapids, Churchill River below Muskrat Falls and Churchill River at English Point.
- Real-time water quality monitoring instruments were deployed at Churchill River below Metchin River and below Muskrat Falls on July 10th. Instruments were deployed at Churchill River above Grizzle Rapids and at English Point on July 11th.
- The instrument at Churchill River below Metchin River was removed on August 21st, for a deployment period of 42 days. Instruments at Churchill River above Grizzle Rapids, below Muskrat Falls and at English Point were all removed on August 22nd, for deployment periods of 42, 43 and 42 days, respectively.

Quality Assurance and Quality Control

- As part of the Quality Assurance and Quality Control protocol (QA/QC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of the deployment period. This procedure is based on the approach used by the United States Geological Survey.
- At deployment and removal, a QA/QC instrument is temporarily deployed alongside the field instrument. 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 instrument and QA/QC instrument at deployment and at removal, a qualitative statement is made on the data quality (Table 1).

Table 1: Instrument Performance 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 > 35µS/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 instrument 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 instrument, the entire instrument 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 Lower Churchill River stations deployed from July 10/11 to August 21/22, 2024 are summarized in Table 2.

Table 2: Comparison rankings for Lower Churchill River stations July 10/11 to August 21/22, 2024

Churchill River Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Below Metchin River	July 10, 2024	Deployment	Excellent	Good	Excellent	Excellent	Excellent
	August 21, 2024	Removal	Excellent	Good	Excellent	Good	Excellent
Above Grizzle Rapids	July 11, 2024	Deployment	Excellent	Good	Excellent	Good	Excellent
	August 22, 2024	Removal	Excellent	Good	Excellent	Excellent	Excellent
Below Muskrat Falls	July 10, 2024	Deployment	Excellent	Good	Excellent	Excellent	Good
	August 22, 2024	Removal	Excellent	Good	Excellent	Excellent	Excellent
At English Point	July 11, 2024	Deployment	Excellent	Good	Excellent	Excellent	Excellent
	August 22, 2024	Removal	Excellent	Excellent	Excellent	Good	Excellent

- **Churchill River below Metchin River**
  - At deployment, all parameters ranked as either ‘excellent’ or ‘good’.
  - At removal, all parameters ranked as either ‘excellent’ or ‘good’.
- **Churchill River above Grizzle Rapids**
  - At deployment, all parameters ranked as either ‘excellent’ or ‘good’.
  - At removal, all parameters ranked as either ‘excellent’ or ‘good'.
- **Churchill River below Muskrat Falls**
  - At deployment, all parameters ranked as either ‘excellent’ or ‘good’.
  - At removal, all parameters ranked as either ‘excellent’ or ‘good’.
- **Churchill River at English Point**
  - At deployment, all parameters ranked as either ‘excellent’ or ‘good’.
  - At removal, all parameters ranked as either ‘excellent’ or ‘good’.

Data Interpretation

- The following graphs and discussion illustrate water quality related events occurring from July 10/11 to August 21/22, 2024 on the Lower Churchill River Network.
- With the exception of water quantity data (stage & flow), all data used in the preparation of the graphs and subsequent discussion below adhere to stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

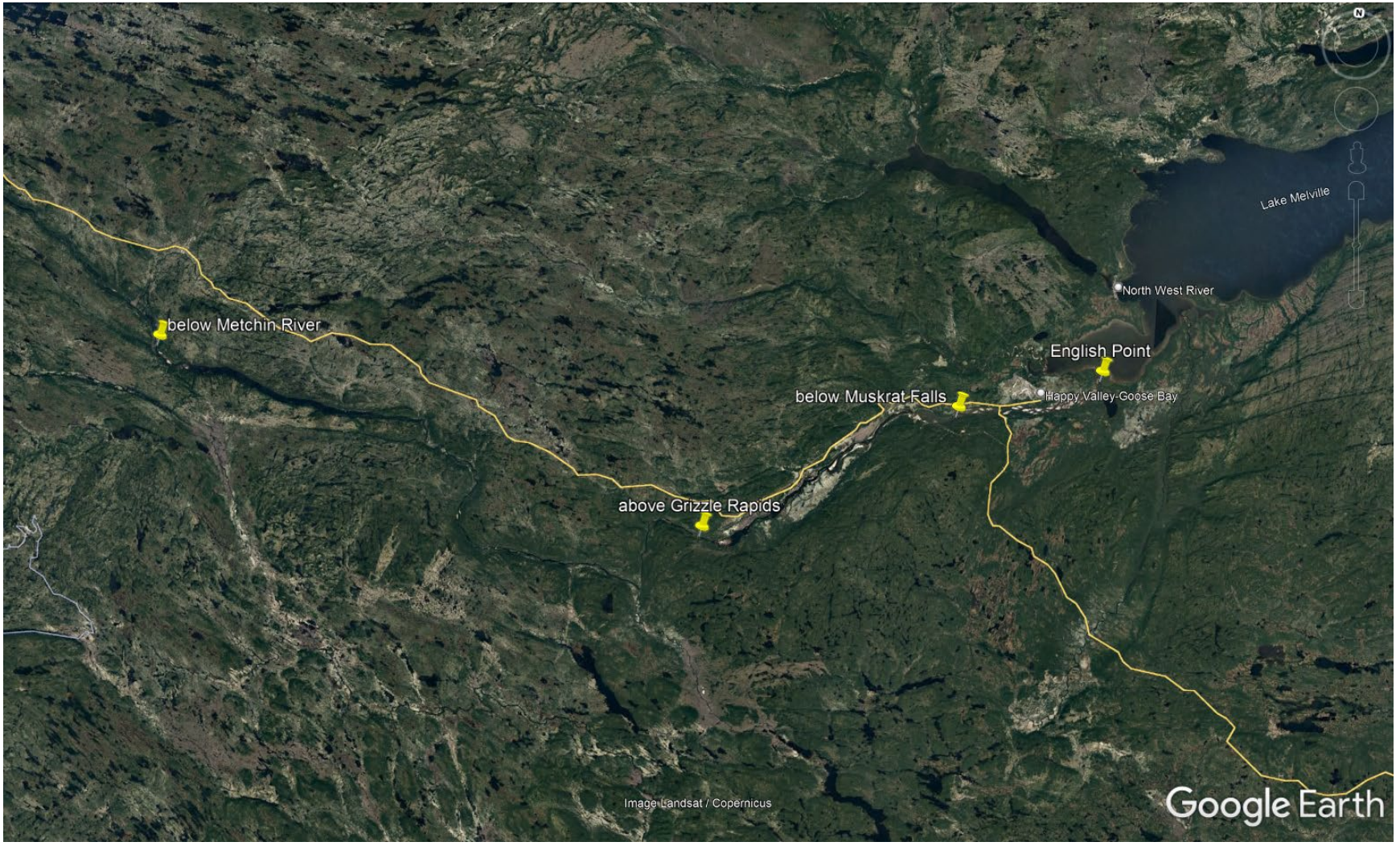

Figure 1: Lower Churchill Network of Real-Time Water Quality Stations

Churchill River below Metchin River

Water Temperature

- Over the deployment period, water temperature ranged from 16.6°C to 20.4°C, with a median value of 18.0°C (Figure 2). Air temperature data was obtained from the Metchin River near TLH Weather Station.
- Water temperature was slightly increasing over the course of deployment, which is to be expected as air temperatures were also slowly increasing across the summer season. Water temperature data exhibits a diurnal pattern as expected, and closely correlates with ambient air temperatures.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

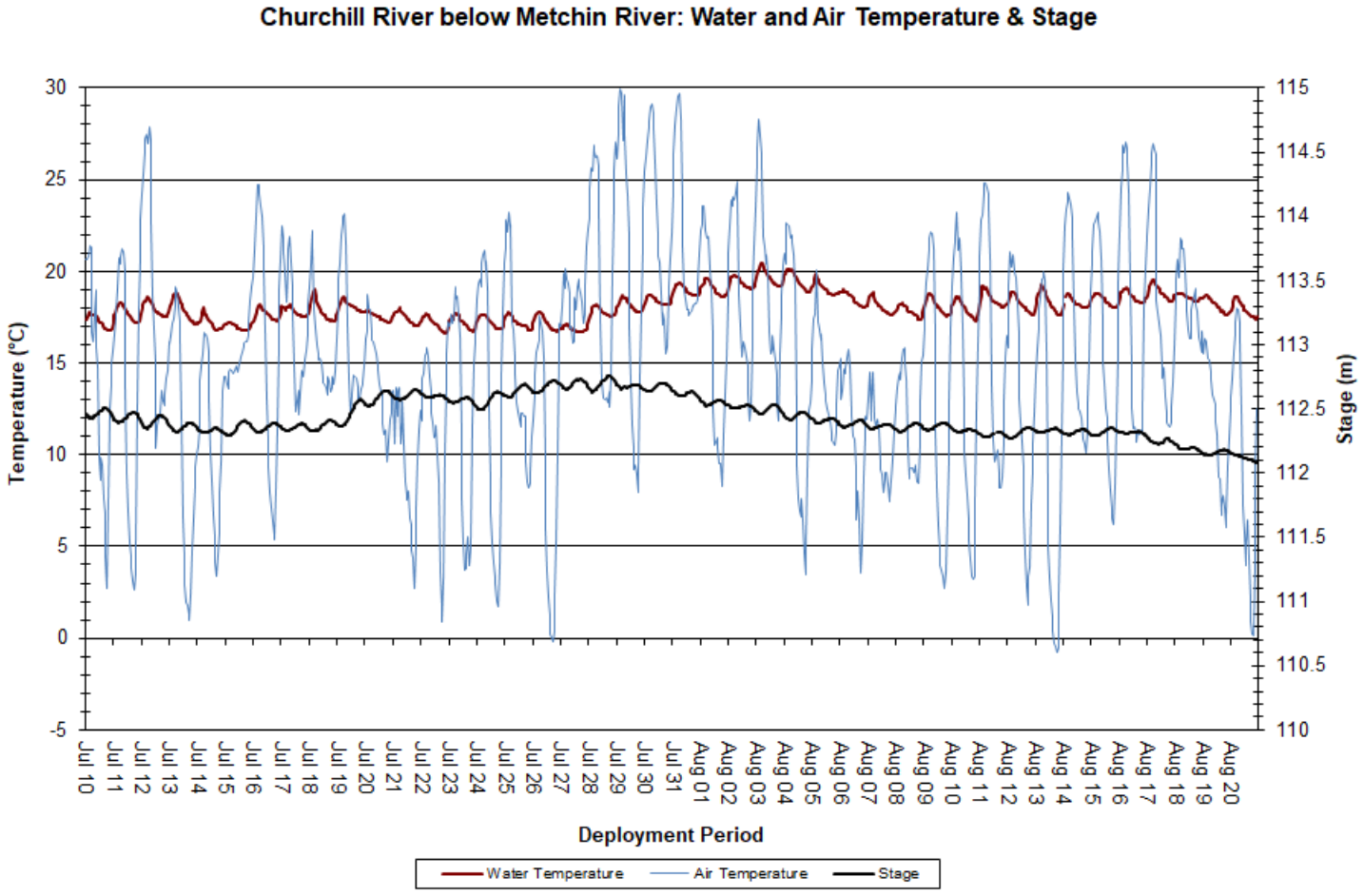

Figure 2: Water and Air Temperature & Stage at Churchill River below Metchin River

pH

- Over the deployment period, pH values ranged from 6.63 to 7.26 pH units, with a median value of 6.92 (Figure 3).
- pH values were quite stable over the course of deployment, remaining within the CCME's Guidelines for the Protection of Aquatic Life for the duration of the deployment period.
- Photosynthesis uses up hydrogen molecules; this causes the concentration of hydrogen ions to decrease, which in turn causes pH to increase. For this reason, pH may be higher during daylight hours and during the growing season when photosynthesis is at a maximum. This is illustrated by the diurnal fluctuations in pH values (Figure 3).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

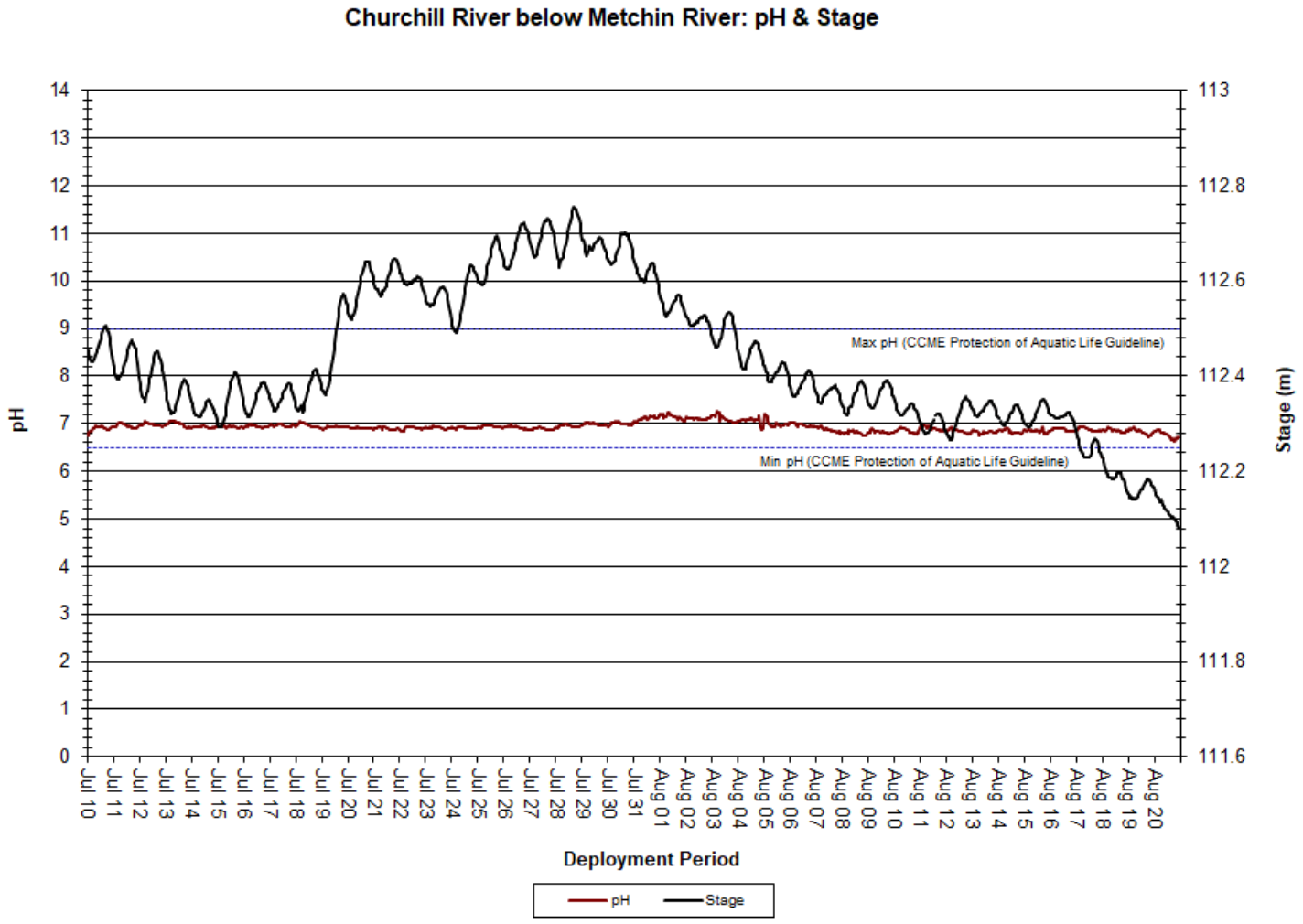

Figure 3: pH & Stage at Churchill River below Metchin River

Specific Conductivity

- Over the deployment period, specific conductivity ranged from 22.7µS/cm to 46.0µS/cm, with a median value of 24.1µS/cm (Figure 4).
- The relationship between conductivity and stage is generally inversed. When stage levels increase, specific conductivity levels decrease as the increased amount of water in the river system dilutes solids that are present. This relationship is somewhat evident in the graph below (Figure 4).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

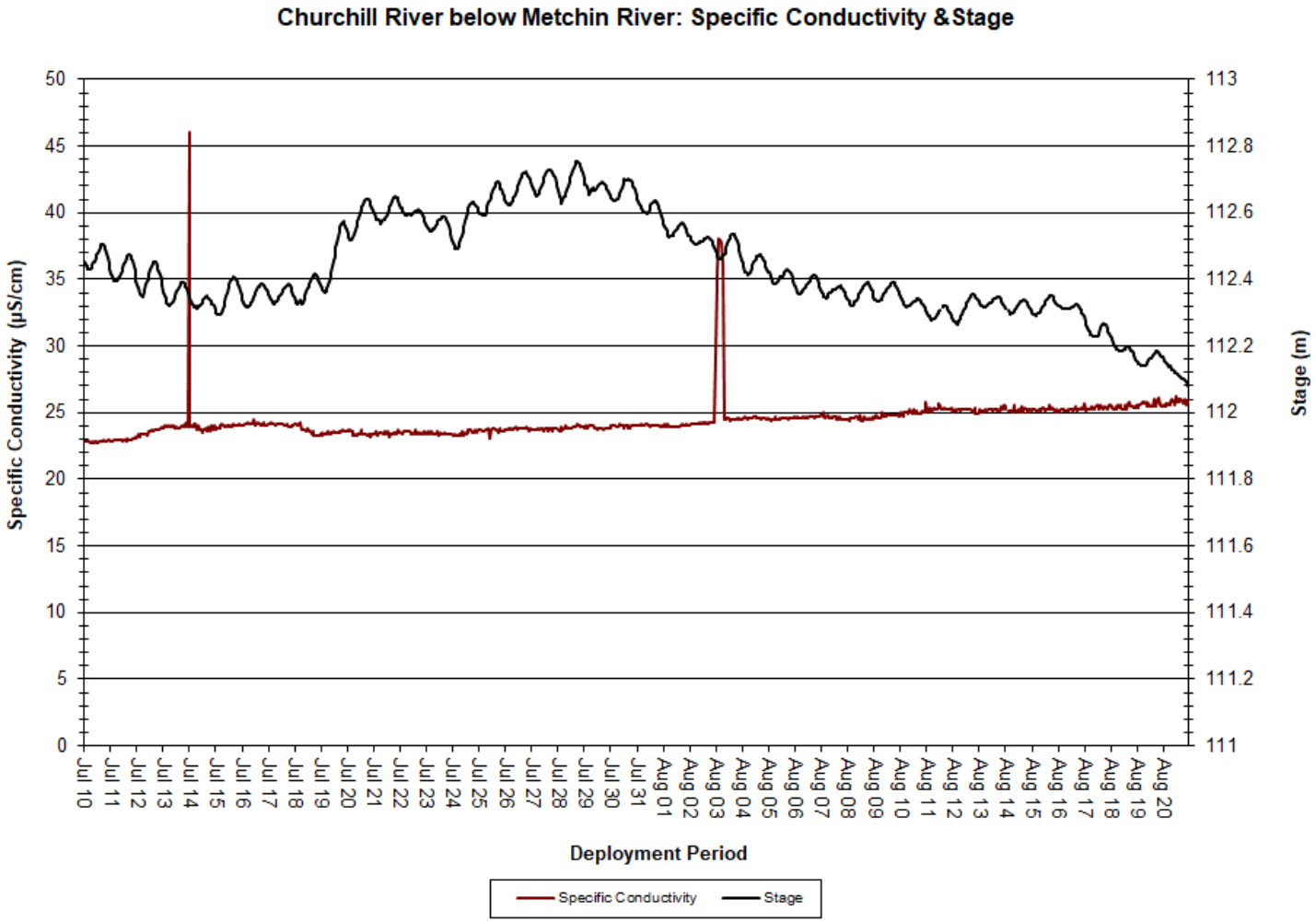

Figure 4: Specific Conductivity & Stage at Churchill River below Metchin River

Dissolved Oxygen

- Over the deployment period, dissolved oxygen content ranged from 8.55mg/L to 9.21mg/L, with a median value of 8.84mg/L. Saturation of dissolved oxygen ranged from 90.3% to 98.6%, with a median value of 93.5% (Figure 5).
- There is an evident relationship between water temperature and dissolved oxygen. Over the deployment period, dissolved oxygen levels were slowly decreasing as water temperatures were slowly increasing. Dissolved oxygen also follows a diurnal pattern as water temperatures rise and fall under the influence of ambient air temperatures. Generally, dissolved oxygen levels are higher in a waterbody during cooler temperatures.
- Dissolved oxygen levels were below the CCME's Guideline for the Protection of Early Life Stages for the duration of deployment, which is to be expected. Dissolved oxygen levels remained above the CCME's Guideline for the Protection of Other Life Stages for the duration of deployment.

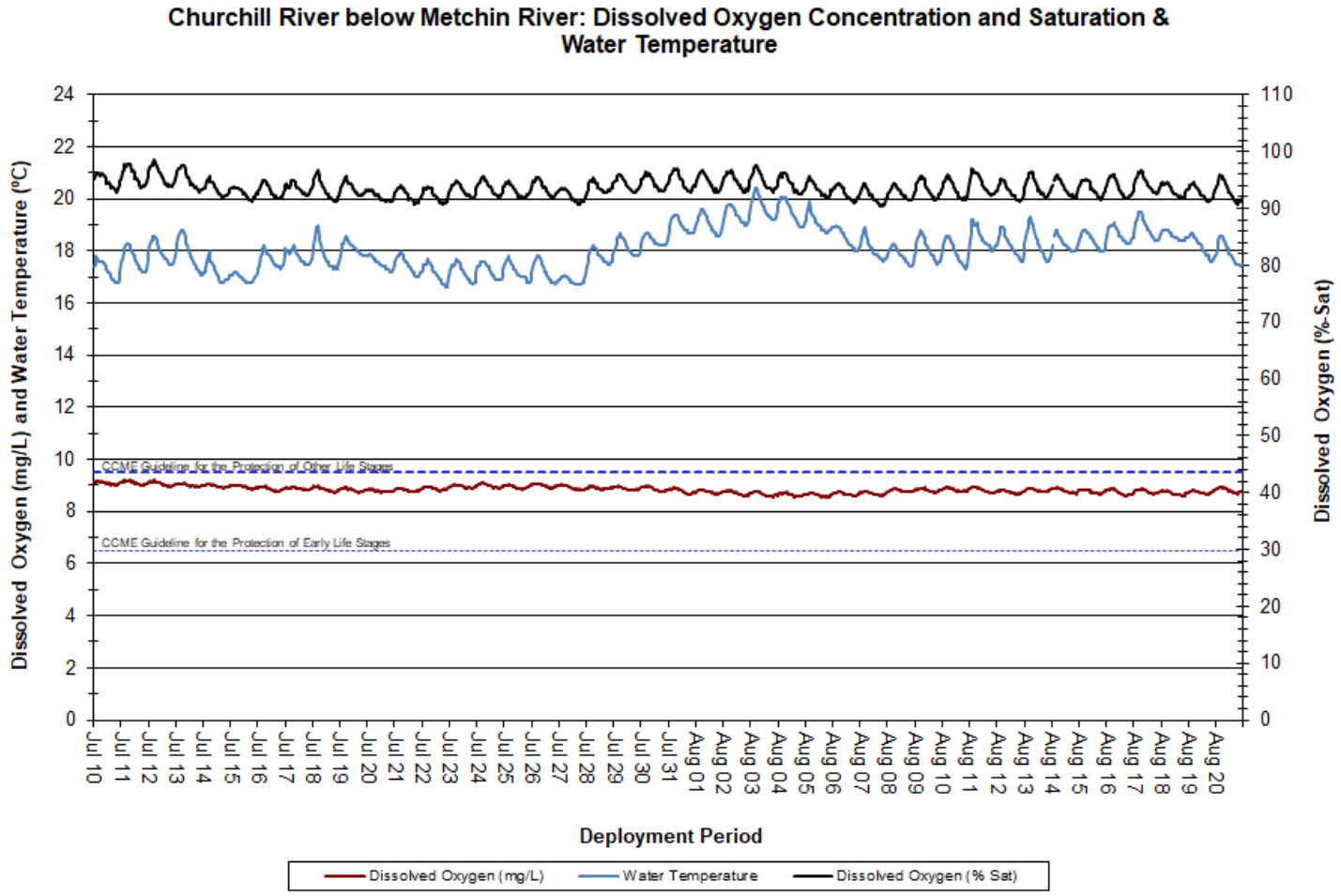

Figure 5: Dissolved Oxygen & Water Temperature at Churchill River below Metchin River

Turbidity

- Over the deployment period, turbidity ranged from 0 NTU to 51.7 NTU, with a median value of 3.1 NTU (Figure 6). A median value of 3.1 NTU indicates a low level of natural background turbidity in the waterbody. Precipitation data was obtained from the Metchin River near TLH Weather Station.
- This station is located at a wide and deep section of the Churchill River and therefore turbidity levels are typically less susceptible to precipitation events as compared to other areas.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

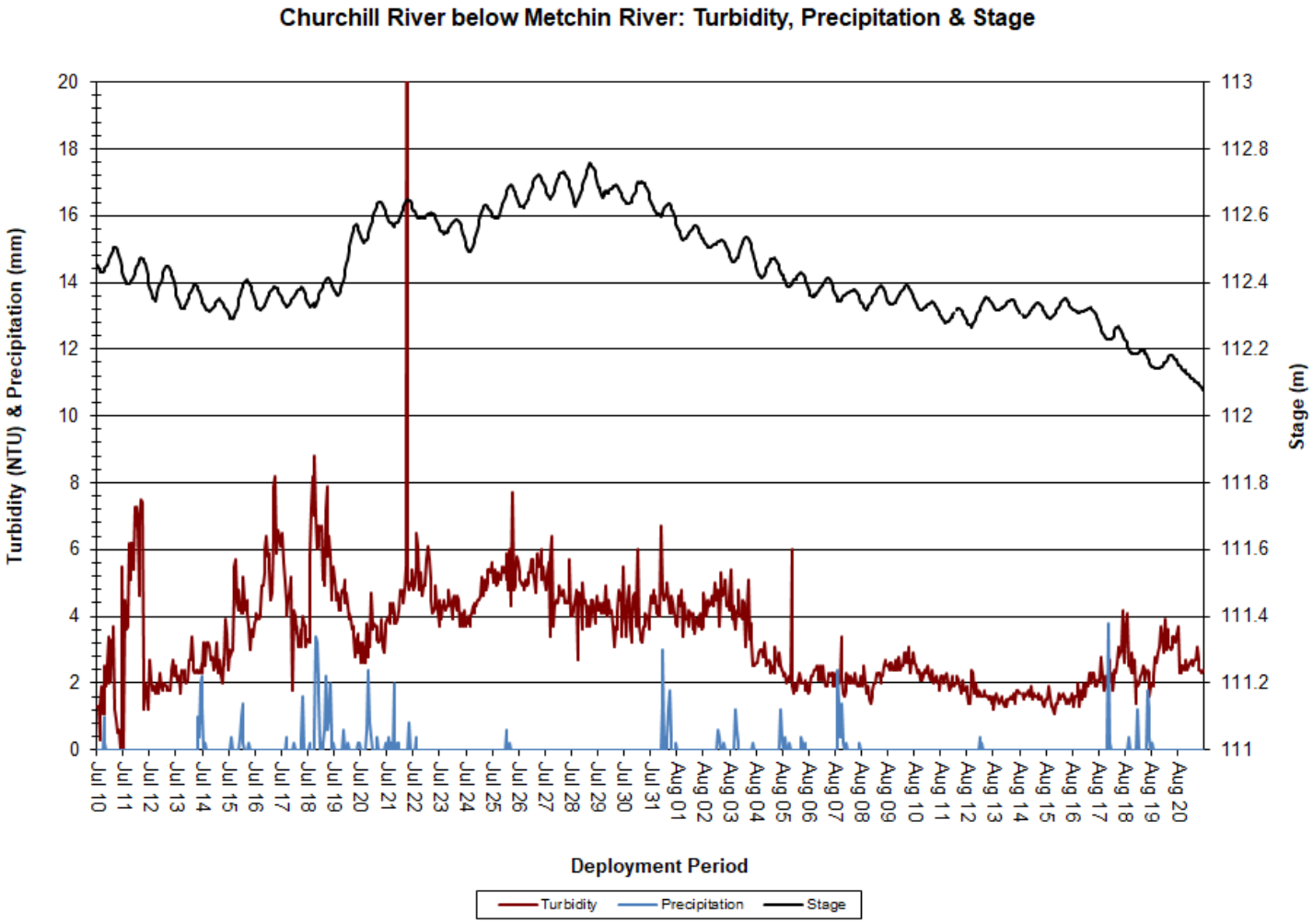

Figure 6: Turbidity, Precipitation & Stage at Churchill River below Metchin River

Stage and Flow

- Over the deployment period, stage levels ranged from 112.079m to 112.756m, with a median value of 112.394m. Flow ranged from 923.413m^3/s to 1191.245m^3/s, with a median value of 1060.064m^3/s (Figure 7). Precipitation data was obtained from the Metchin River near TLH Weather Station.
- Stage and flow increased and then decreased over the course of deployment. Precipitation events across the same period somewhat correlate with increases in both stage and flow (Figure 8).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

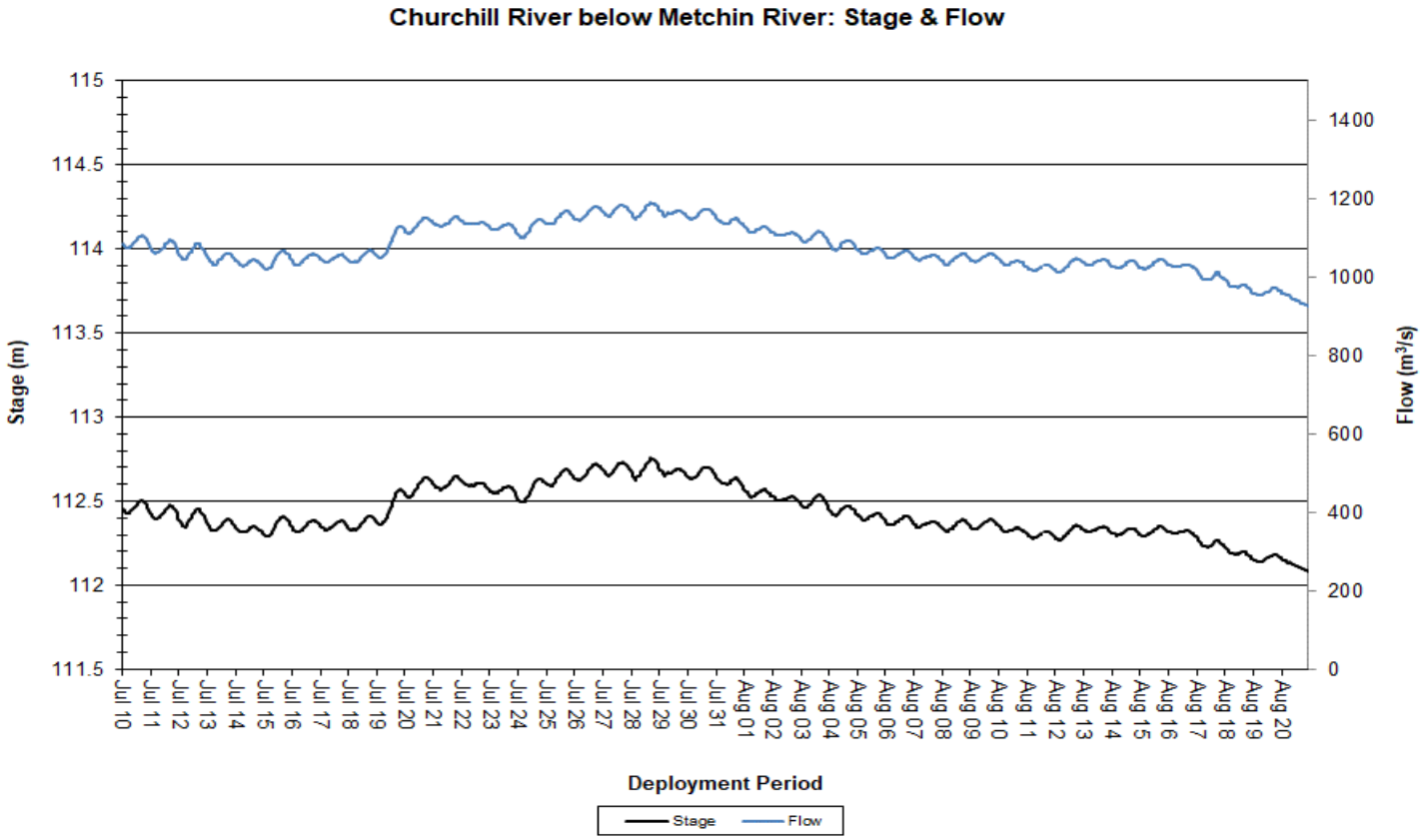

Figure 7: Stage & Flow at Churchill River below Metchin River

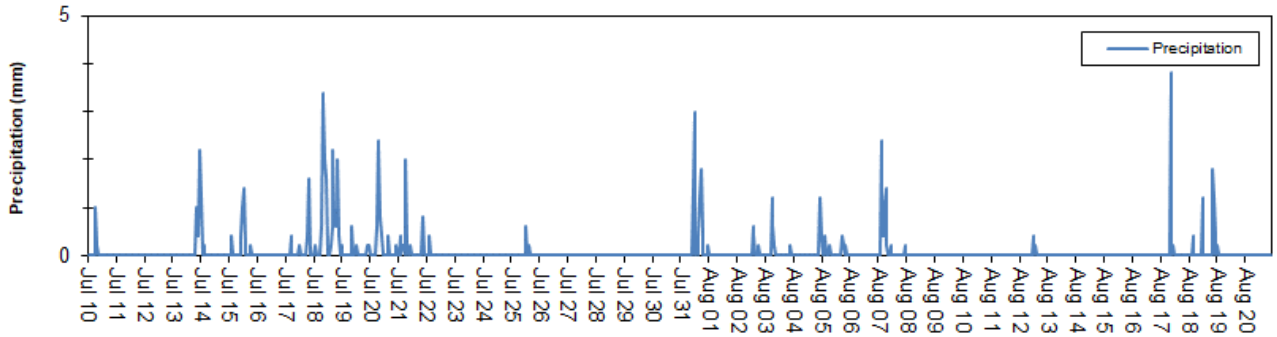

Figure 8: Precipitation at Churchill River below Metchin River

Churchill River above Grizzle Rapids

Water Temperature

- Over the deployment period, water temperature ranged from 16.1°C to 20.6°C, with a median value of 18.2°C (Figure 9). Air temperature data was obtained from the Metchin River near TLH Weather Station.
- Water temperature slowly increased through July and then stabilized. This trend is to be expected as air temperatures followed a similar trend through the summer season. Water temperature data exhibits a diurnal pattern, and closely correlates with ambient air temperatures.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

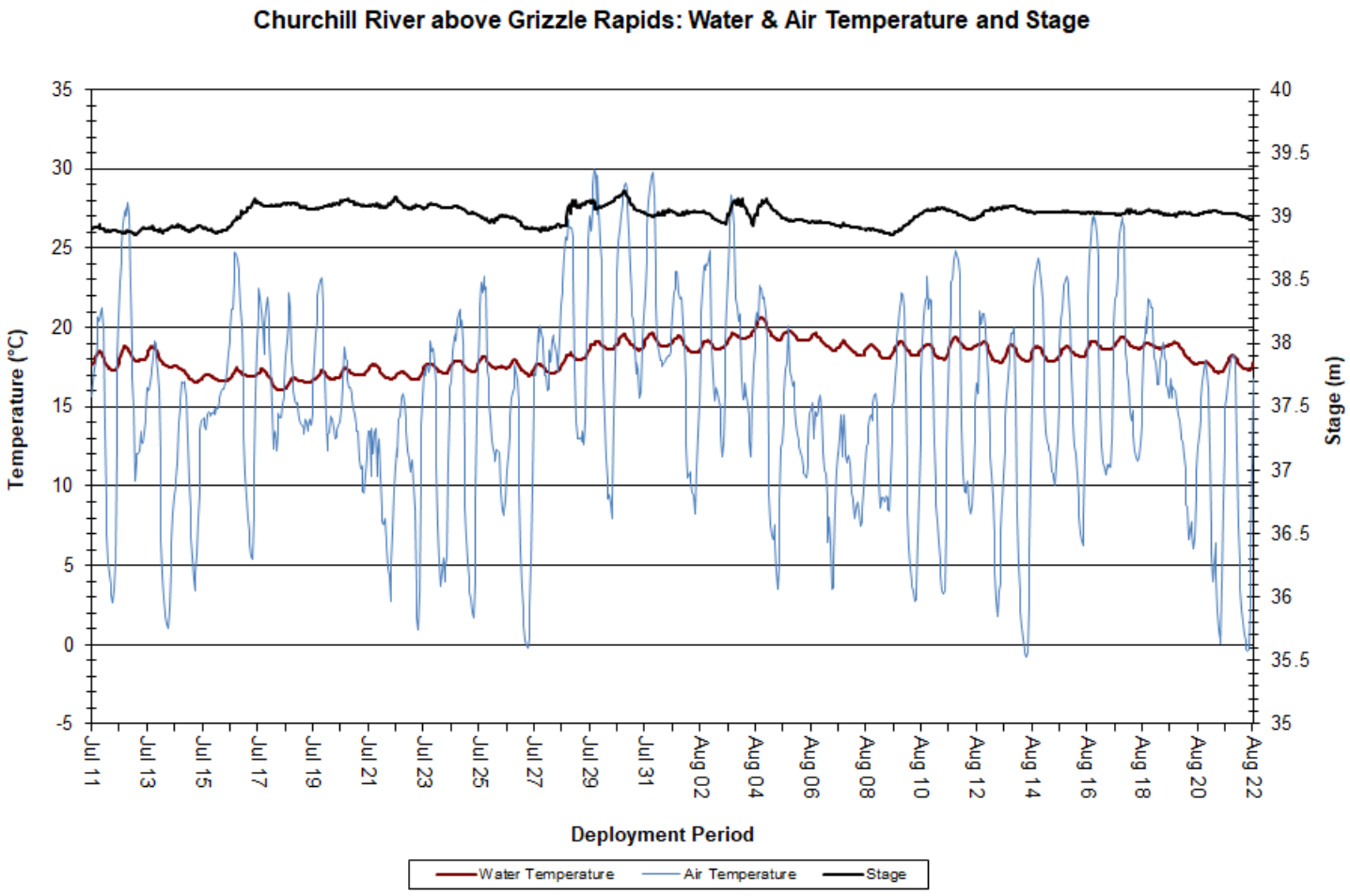

Figure 9: Water and Air Temperature & Stage at Churchill River above Grizzle Rapids

pH

- Over the deployment period, pH values ranged from 6.69 pH units to 7.05 pH units, with a median value of 6.86 (Figure 10).
- pH values were quite stable and remained within the CCME's Guidelines for the Protection of Aquatic Life for the duration of deployment.
- Photosynthesis uses up hydrogen molecules; this causes the concentration of hydrogen ions to decrease, which in turn causes pH to increase. For this reason, pH may be higher during daylight hours and during the growing season when photosynthesis is at a maximum. This is illustrated by the diurnal fluctuations in pH values (Figure 10).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

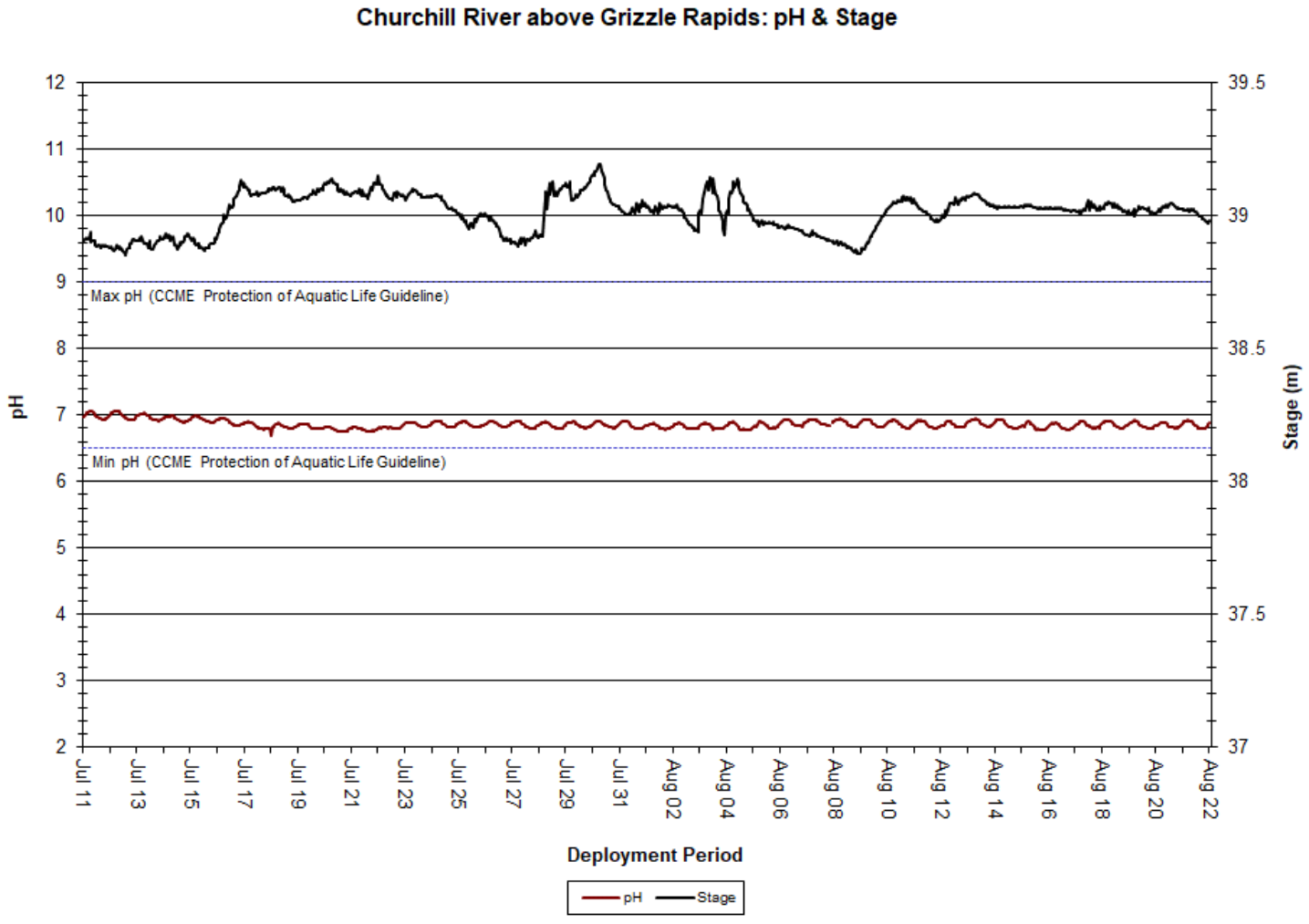

Figure 10: pH & Stage at Churchill River above Grizzle Rapids

Specific Conductivity

- Over the deployment period, specific conductivity ranged from 16.6µS/cm to 23.5µS/cm, with a median of 21.0µS/cm (Figure 11).
- The relationship between conductivity and stage is generally inversed. When stage levels increase, specific conductivity levels generally decrease as the increased amount of water in the river system dilutes solids that are present. This relationship is only somewhat evident in the graph below, likely because this station is located at a deep and wide section of the Churchill River and other factors in the water column influence conductivity levels.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

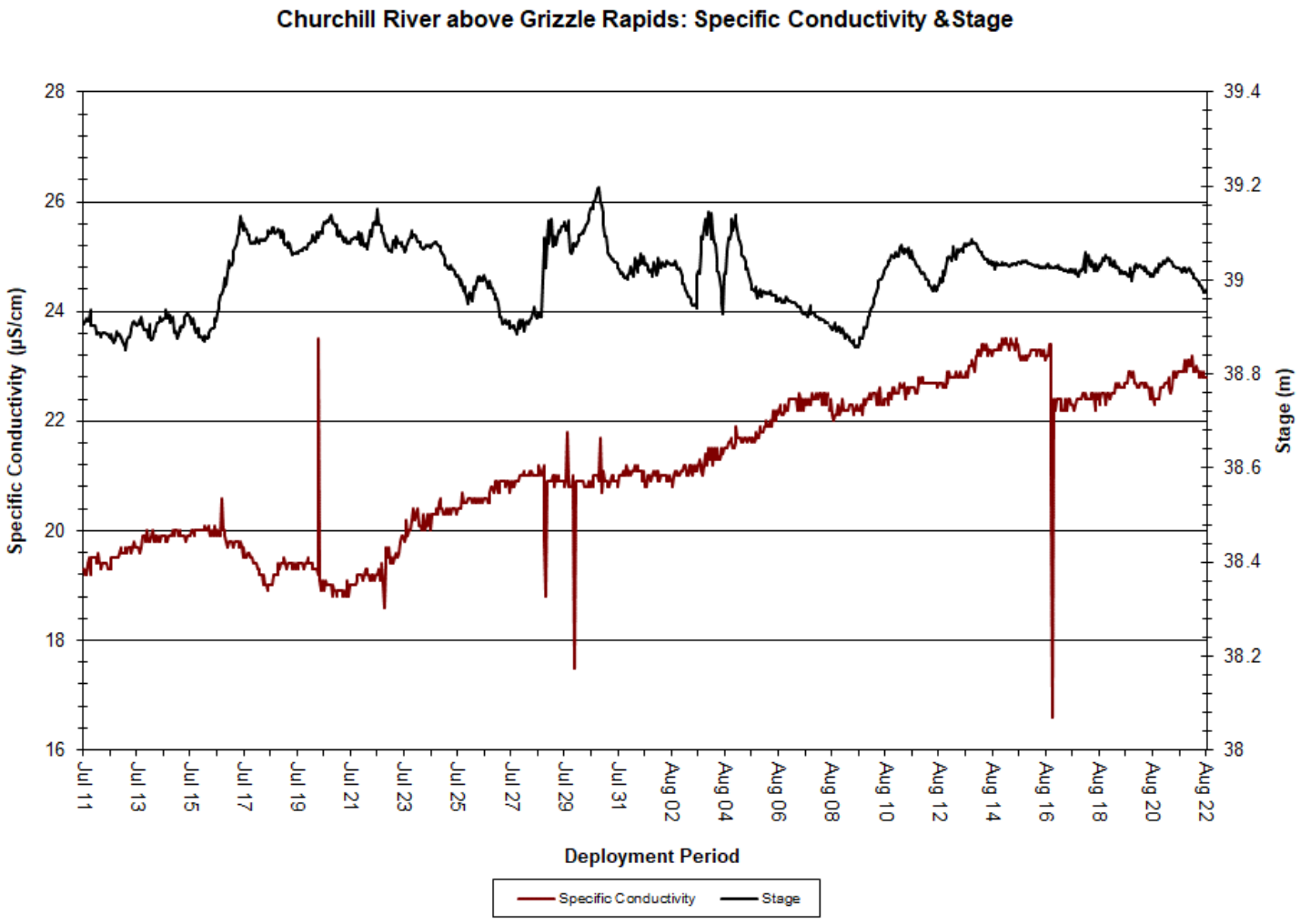

Figure 11: Specific Conductivity & Stage at Churchill River above Grizzle Rapids

Dissolved Oxygen

- Over the deployment period, dissolved oxygen content ranged from 8.82mg/L to 9.44mg/L, with a median value of 9.14mg/L. Saturation of dissolved oxygen ranged from 94.1% saturation to 100.8% saturation, with a median value of 96.5% (Figure 12).
- There is an evident relationship between water temperature and dissolved oxygen. Over the deployment period, dissolved oxygen levels gradually decreased as water temperatures increased through the summer. Dissolved oxygen also follows a diurnal pattern as water temperatures rise and fall under the influence of ambient air temperatures. Generally, dissolved oxygen levels are higher in a waterbody during cooler temperatures.
- Dissolved oxygen levels were below the CCME's Guideline for the Protection of Early Life Stages for the duration of the deployment period. Dissolved oxygen levels were above the CCME's Guideline for the Protection of Other Life Stages for the duration of deployment.

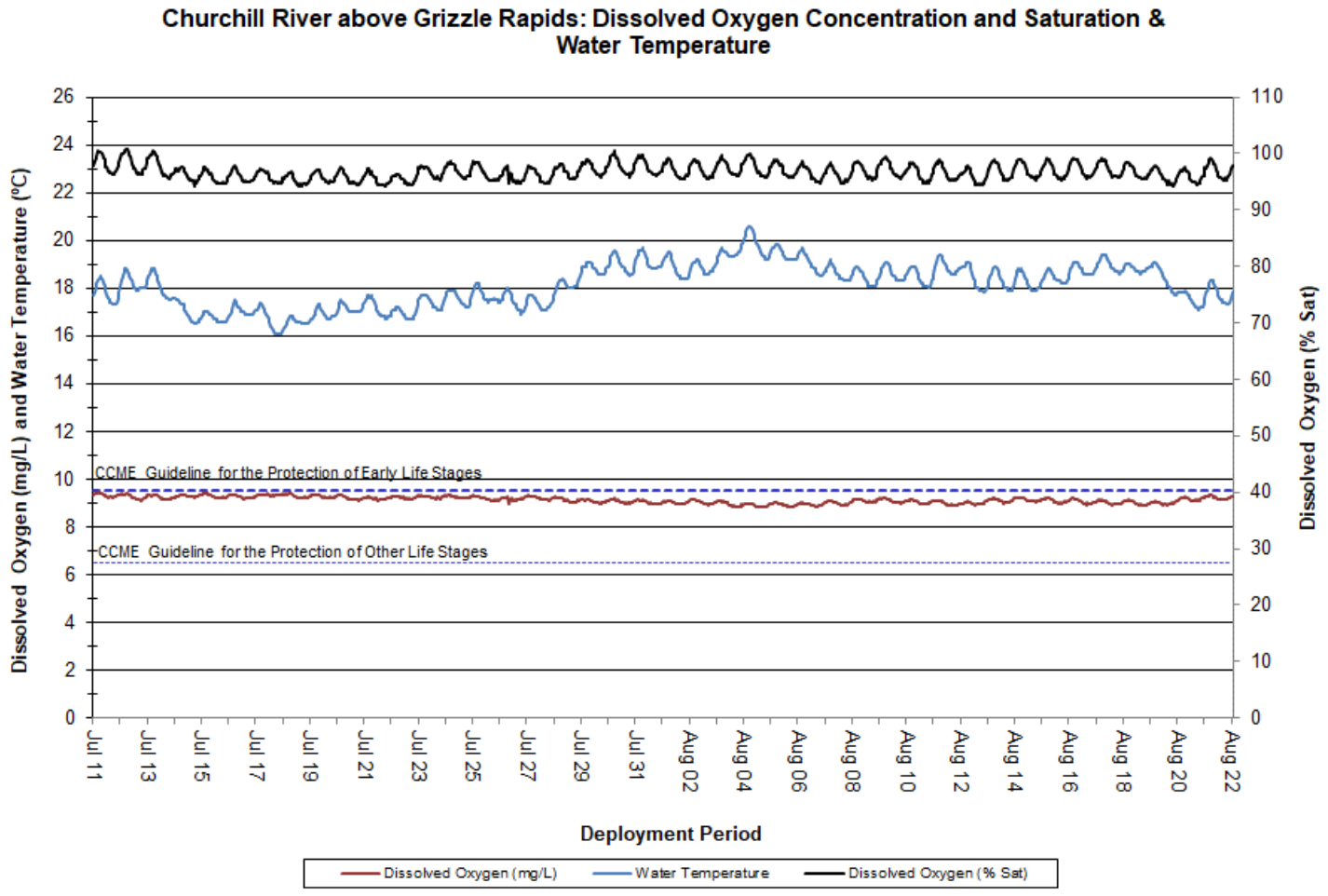

Figure 12: Dissolved Oxygen & Water Temperature at Churchill River above Grizzle Rapids

Turbidity

- Over the deployment period, turbidity remained unchanged at 0 NTU (Figure 13), which indicates a very low level of natural background turbidity in the waterbody. Precipitation data was obtained from the Metchin River at TLH Weather Station.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

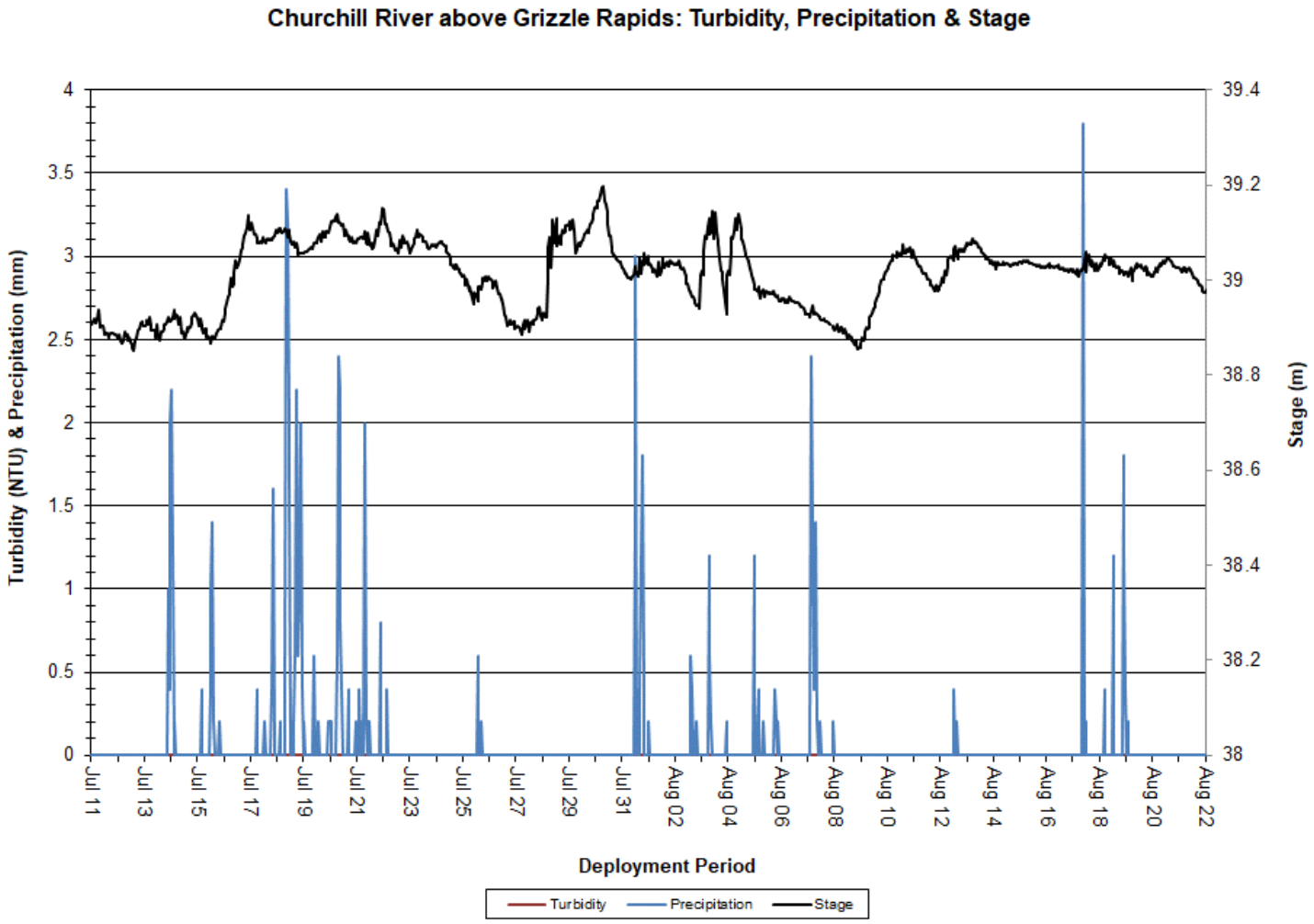

Figure 13: Turbidity, Precipitation & Stage at Churchill River above Grizzle Rapids

Stage

- Over the deployment period, stage ranged from 38.852m to 39.197m, with a median value of 39.027m (Figure 14). Precipitation data was obtained from the Metchin River near TLH Weather Station.
- Stage was somewhat variable across the deployment period, with precipitation events often correlating with increases in stage (Figure 14).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

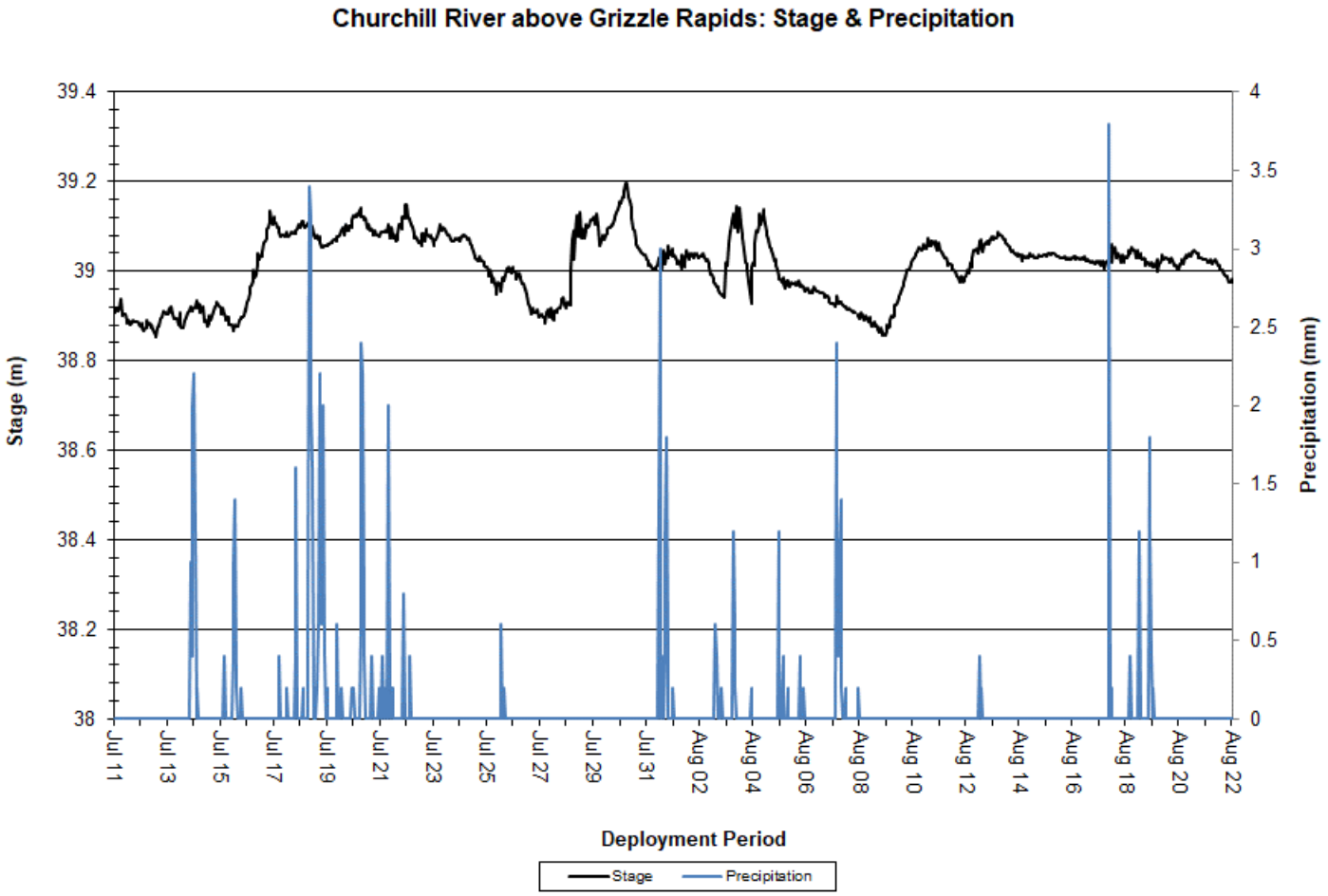

Figure 14: Stage & Precipitation at Churchill River above Grizzle Rapids

Churchill River below Muskrat Falls

Water Temperature

- Over the deployment period, water temperature ranged from 15.5°C to 20.2°C, with a median value of 18.0°C (Figure 15). Air temperature data was obtained from the Muskrat Falls MET Station.
- Water temperature increased at the beginning of deployment and then stabilized. This is to be expected as ambient air temperatures followed a similar trend. Water temperatures closely correlate with ambient air temperatures, fluctuating to a much lesser extent.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

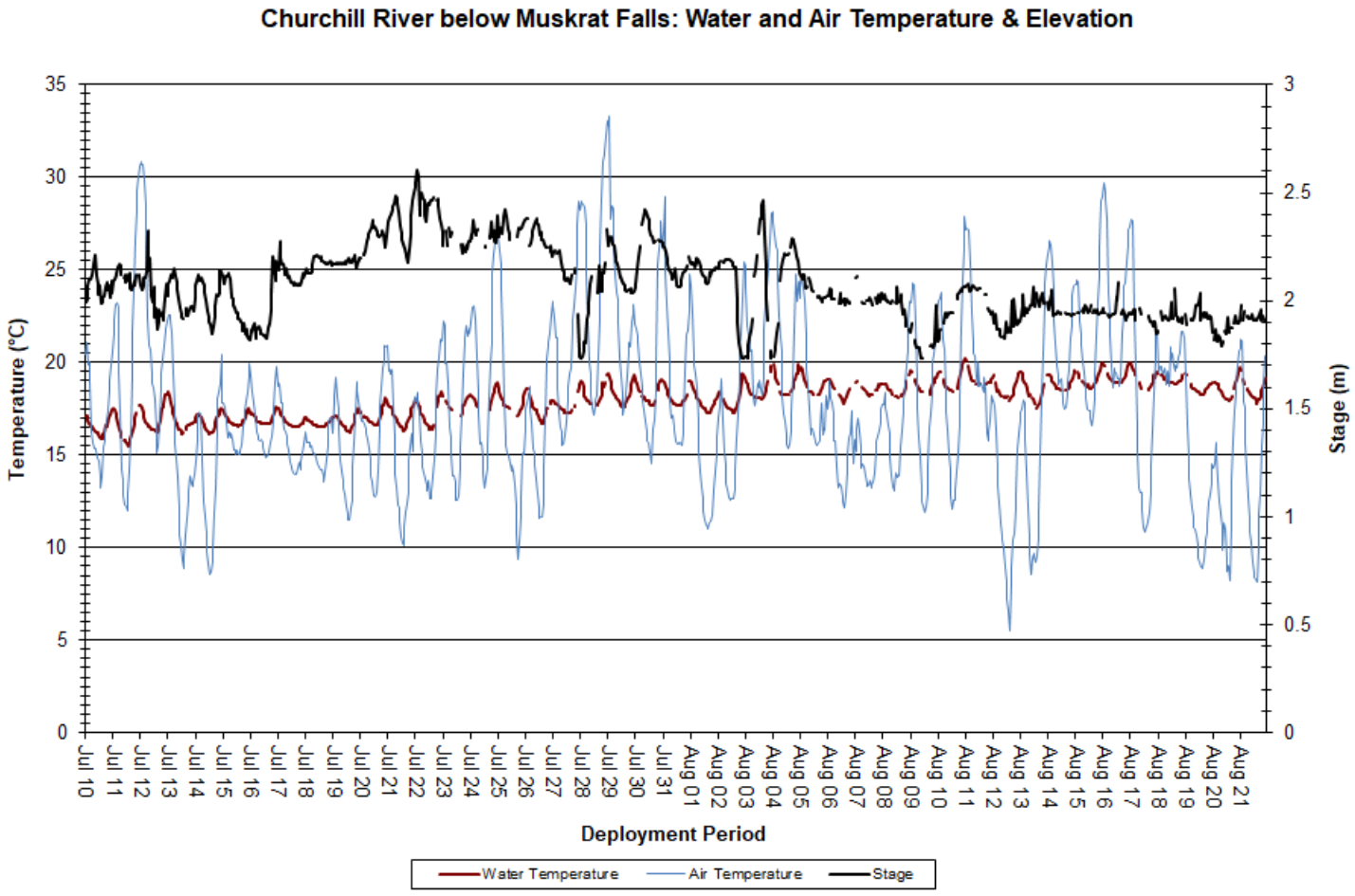

Figure 15: Water and Air Temperature & Stage at Churchill River below Muskrat Falls

pH

- Over the deployment period, pH ranged from 6.36 pH units to 6.94 pH units, with a median value of 6.61 (Figure 16).
- pH values were relatively stable over the course of deployment and remained within the CCME's Guidelines for the Protection of Aquatic Life for the majority of the deployment period (Figure 16).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

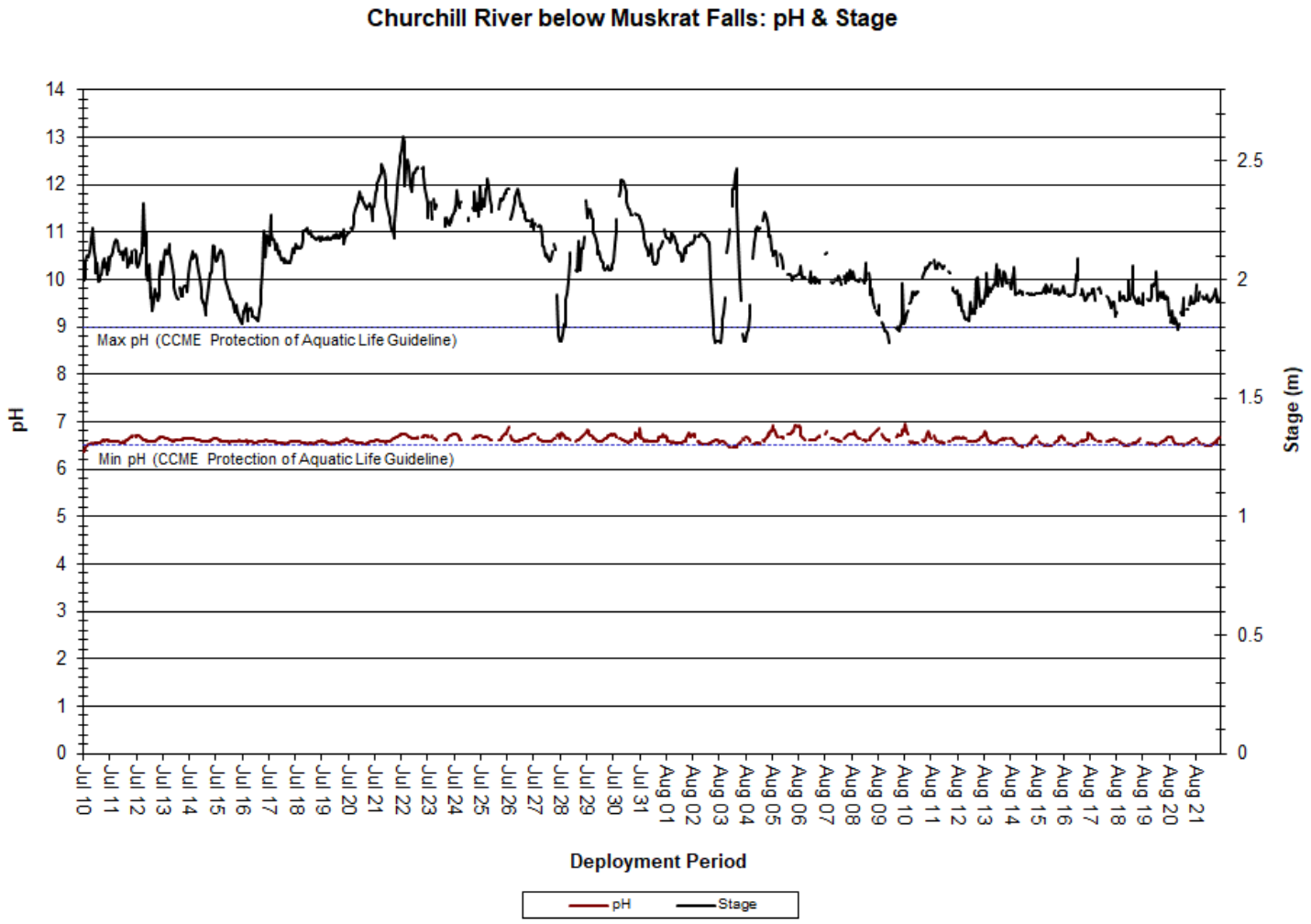

Figure 16: pH & Stage at Churchill River below Muskrat Falls

Specific Conductivity

- Over the deployment period, specific conductivity ranged from 17.7µS/cm to 22.7µS/cm, with a median value of 20.4µS/cm (Figure 17).
- The relationship between conductivity and stage is generally inversed. When stage decreases, specific conductivity increases as the decreased amount of water in the river system concentrates solids that are present, and vice versa. This relationship is only somewhat evident in the graph below, likely because this station is located at a deep and wide section of the Churchill River and other factors in the water column influence conductivity levels (Figure 17).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

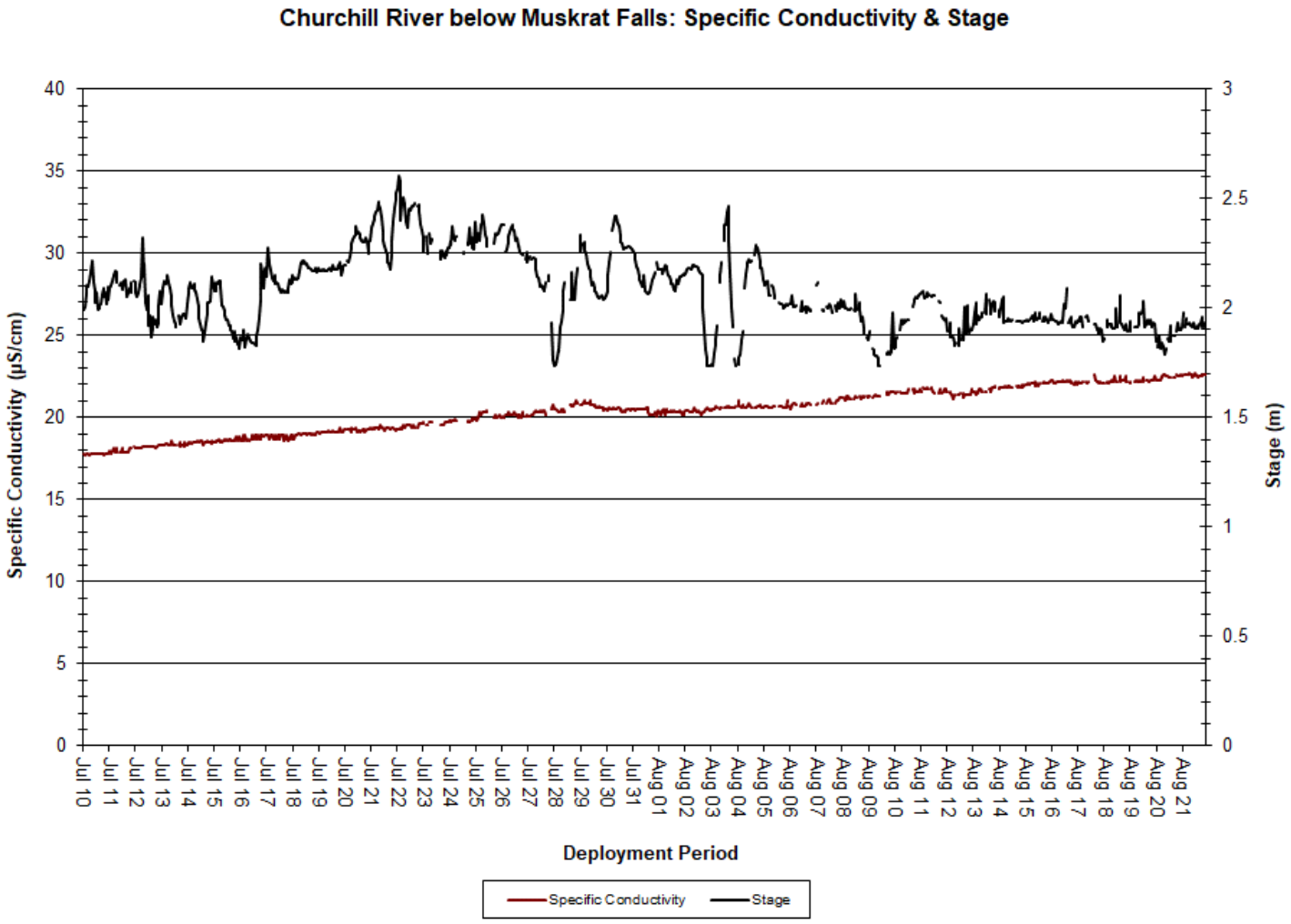

Figure 17: Specific Conductivity & Stage at Churchill River below Muskrat Falls

Dissolved Oxygen

- Over the deployment period, dissolved oxygen concentration ranged from 8.34mg/L to 9.46mg/L, with a median value of 8.86mg/L. Saturation of dissolved oxygen ranged from 88.5% to 99.8%, with a median value of 93.3% (Figure 18).
- Dissolved oxygen and water temperature exhibit an inverse relationship: as one parameter increases, the other decreases, and vice versa. Dissolved oxygen levels slowly decreased over the course of deployment. This is to be expected since water temperatures were increasing over the same period. Dissolved oxygen also follows a diurnal pattern as water temperatures rise and fall under the influence of ambient air temperatures.
- Dissolved oxygen levels were below the CCME's Guideline for the Protection of Early Life Stages, and above the CCME's Guideline for the Protection of Other Life Stages, for the duration of deployment.

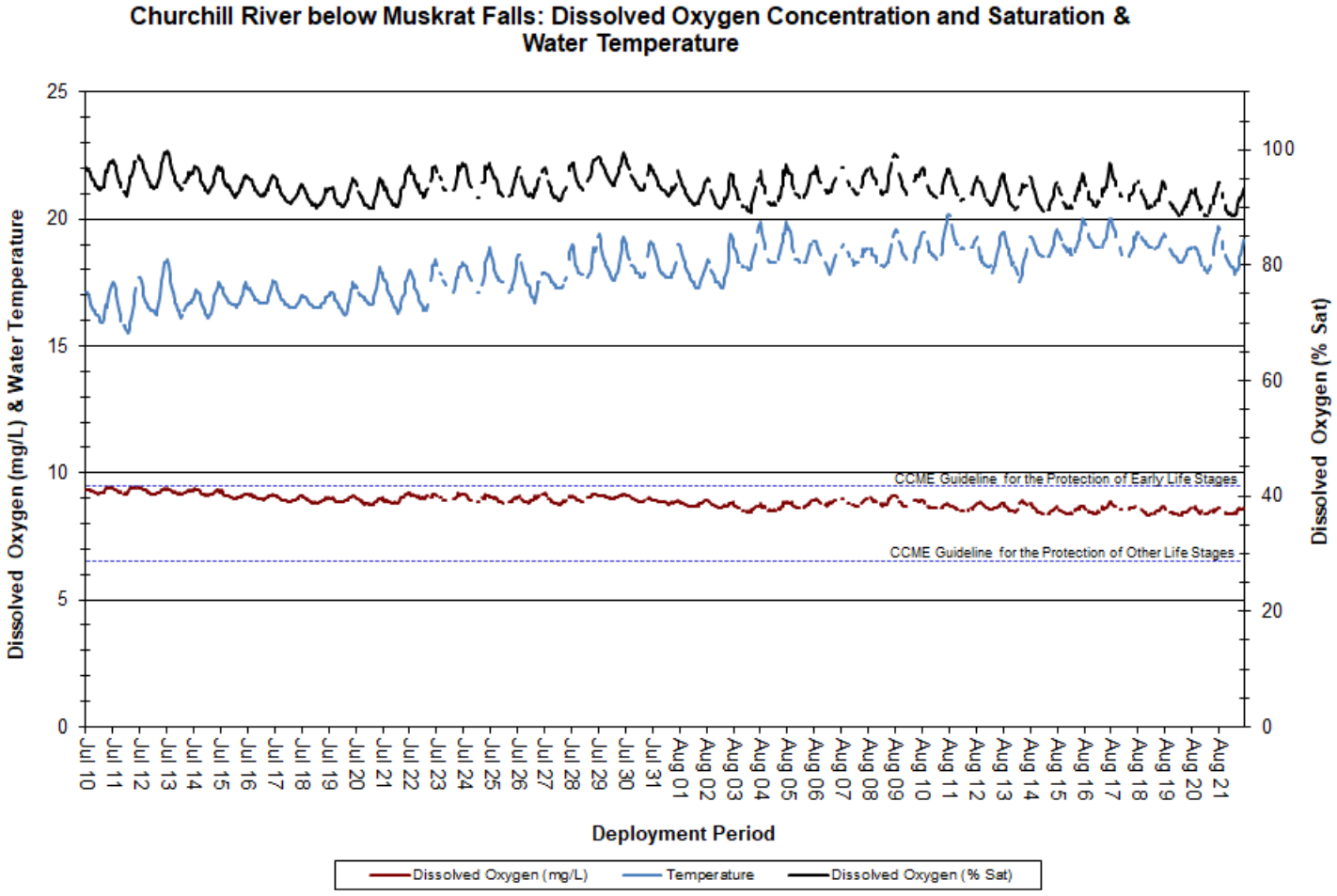

Figure 18: Dissolved Oxygen & Water Temperature at Churchill River below Muskrat Falls

Turbidity

- Over the deployment period, turbidity ranged from 0 NTU to 128.9 NTU, with a median value of 0 NTU. A median value of 0 NTU indicates a very low level of natural background turbidity in the waterbody, which is typical of this station. Precipitation data was obtained from the Muskrat Falls MET Station.
- There was some correlation between turbidity events and precipitation events across the deployment period (Figure 19). Turbidity levels are often quite variable at this station, and do not always correlate with precipitation events given that this station is located on a wide and deep section of the Churchill River.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

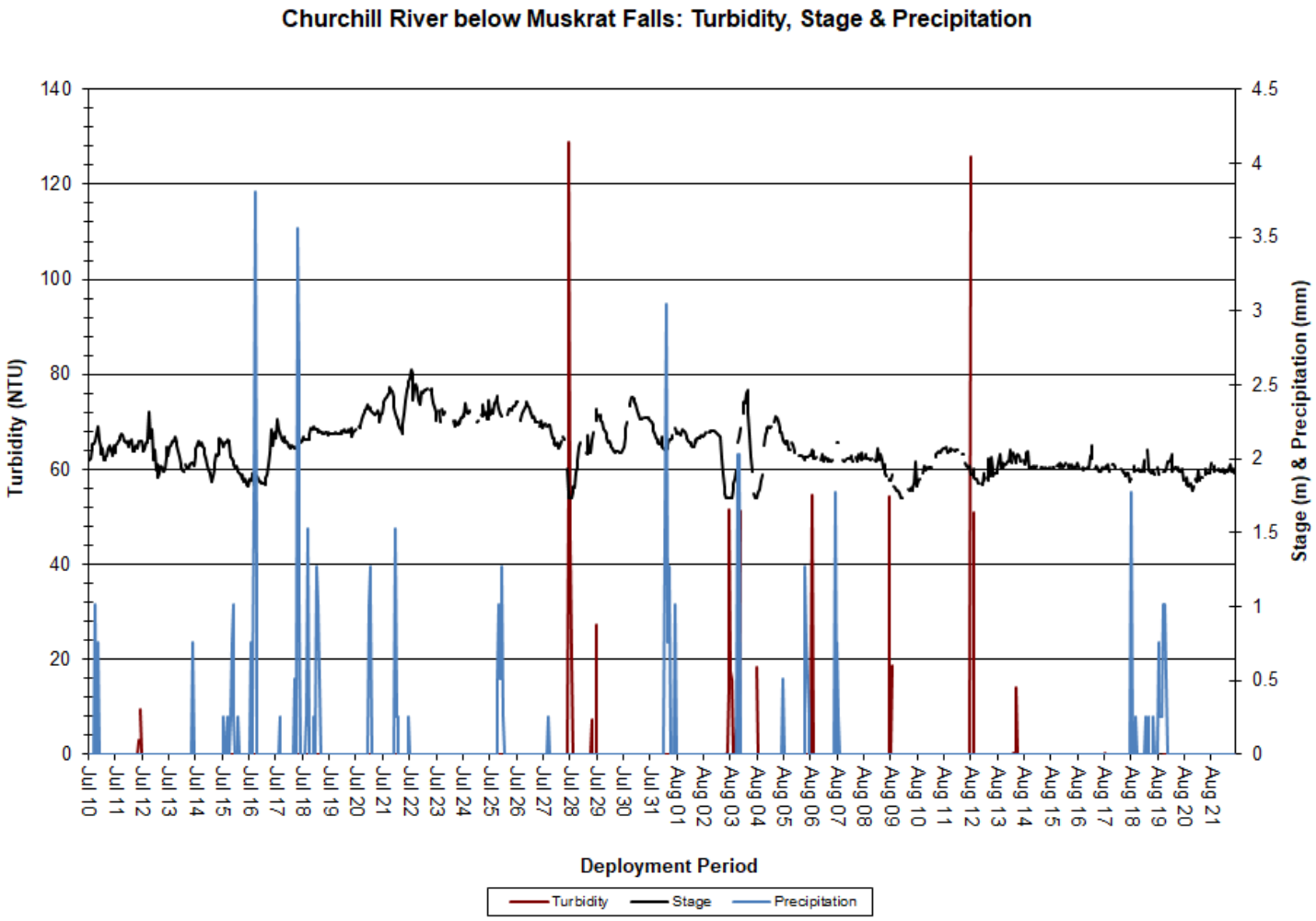

Figure 19: Turbidity, Precipitation & Stage at Churchill River below Muskrat Falls

Stage & Flow

- Over the deployment period, stage ranged from 1.733m to 2.603m, with a median value of 2.061m. Flow ranged from 813.893m^3/s to 1582.867m^3/s, with a median value of 1082.341m^3/s (Figure 20). Precipitation data was obtained from the Muskrat Falls MET Station.
- Stage and flow were slightly variable over the course of deployment, and somewhat correlated with precipitation events. This is partly related to the fact that this station is located on a very wide section of the Churchill River and therefore not as easily influenced by smaller precipitation events. Stage and flow at this station are also influenced by upstream activities at the Muskrat Falls hydroelectric project.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

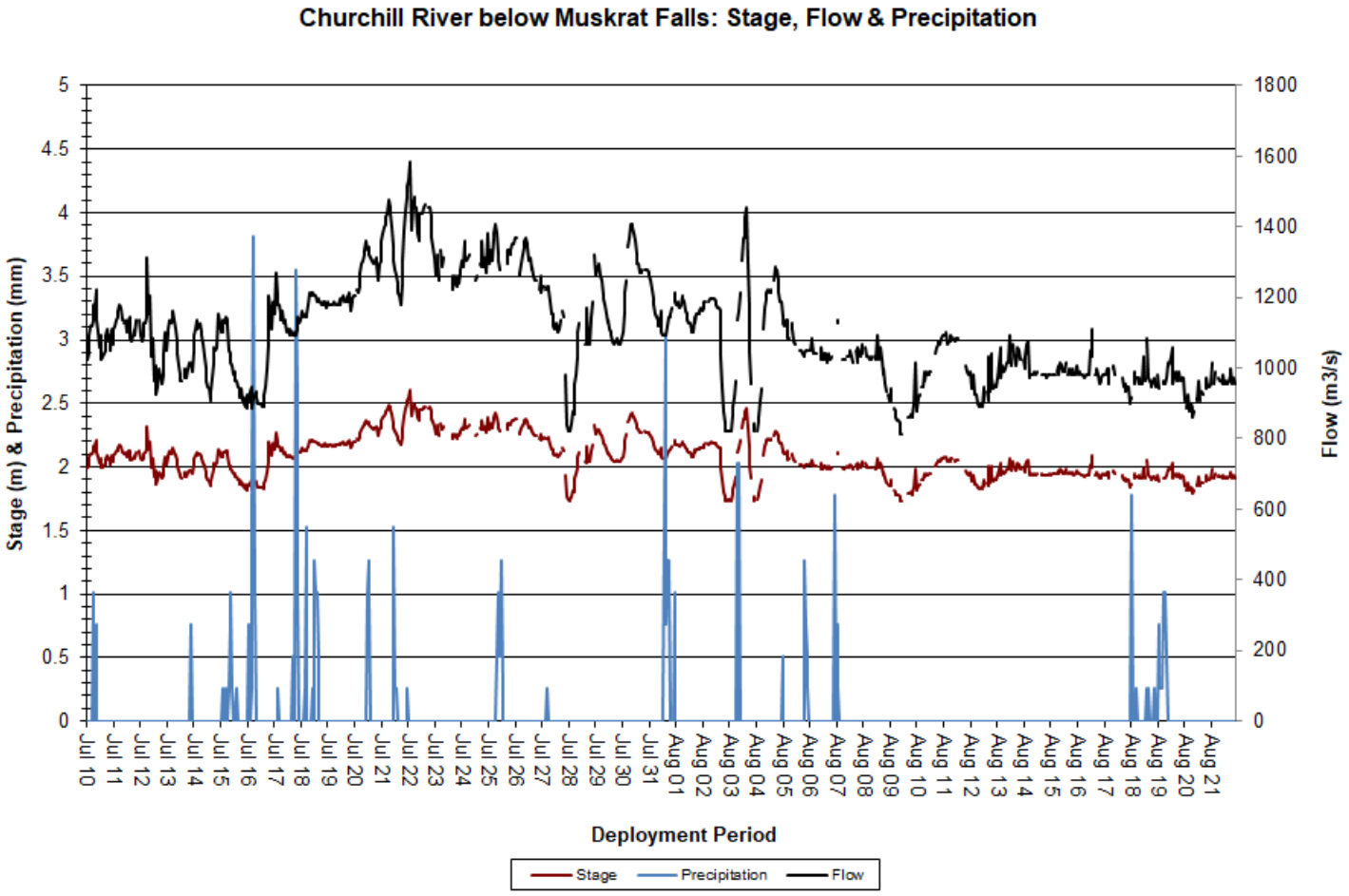

Figure 20: Stage, Flow & Precipitation at Churchill River below Muskrat Falls

Chlorophyll

- Over the deployment period, chlorophyll ranged from 0ug/L to 26.99ug/L, with a median value of 21.36ug/L (Figure 21).
- Chlorophyll is found within living cells of photosynthetic organisms like phytoplankton and cyanobacteria. The amount of chlorophyll found in water can be used to understand the general biological health of an ecosystem. Chlorophyll can also be used to identify algal bloom events and is an indicator of nutrient loading in ecosystems.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

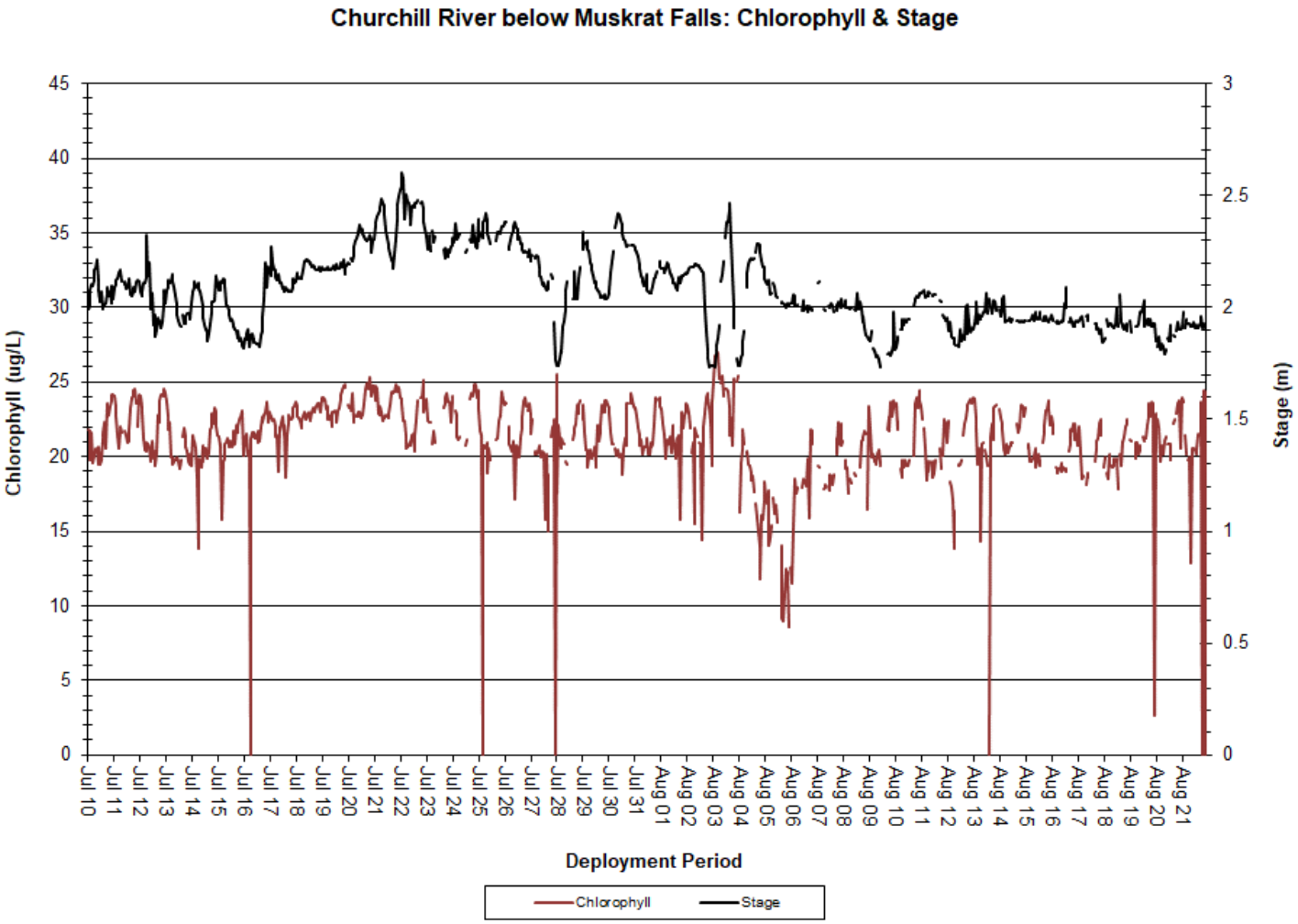

Figure 21: Chlorophyll & Stage at Churchill River below Muskrat Falls

Churchill River at English Point

Water Temperature

- Water temperature ranged from 15.9°C to 22.5°C, with a median value of 18.6°C (Figure 22). Air temperature data was obtained from the Mud Lake Road Weather Station.
- Water temperature increased slightly through July, after which it stabilized for the remainder of deployment. Water temperatures closely correlated with ambient air temperatures, which followed a similar trend across the same period.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

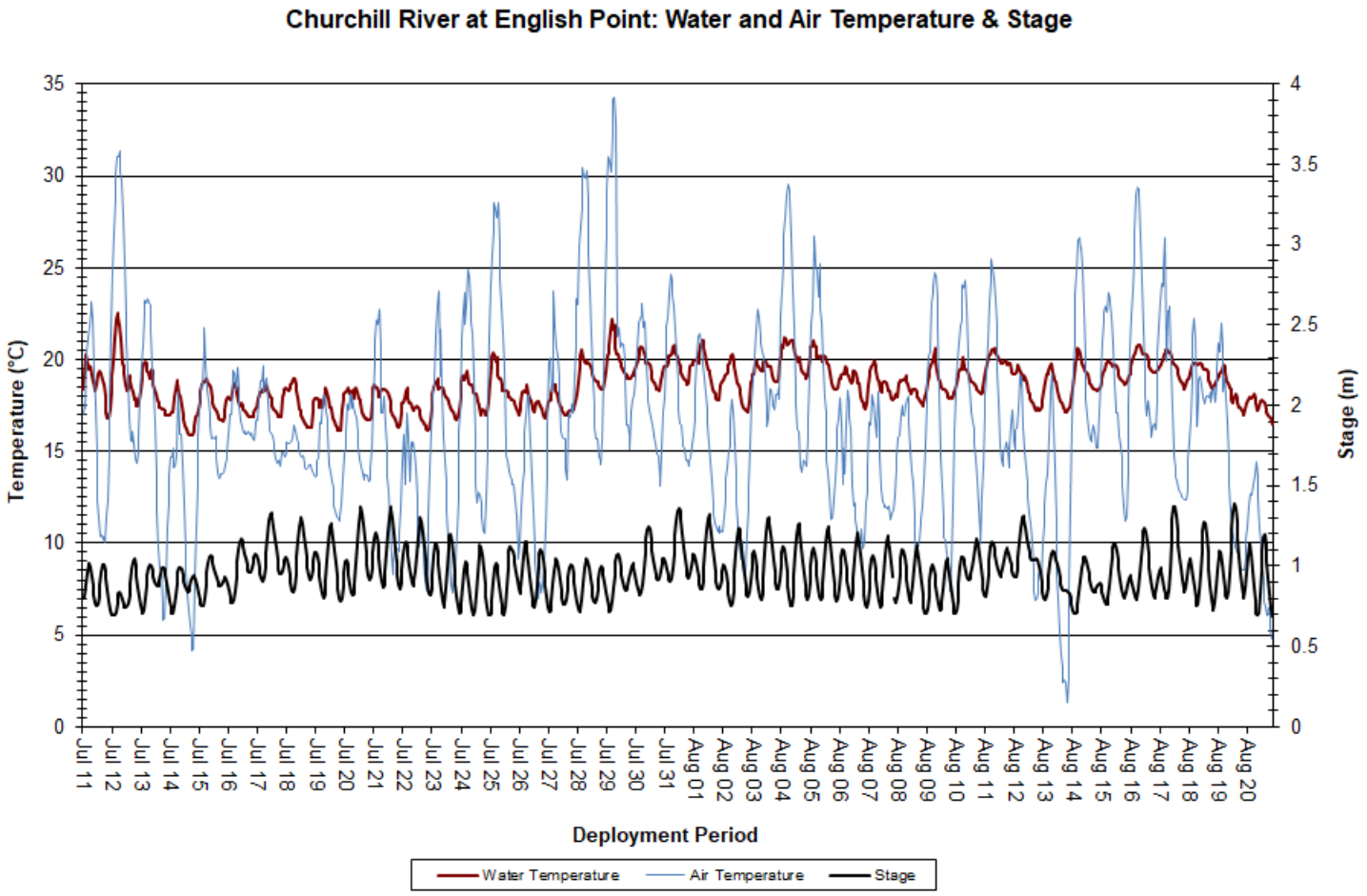

Figure 22: Water and Air Temperature & Stage at Churchill River at English Point

pH

- Over the deployment period, pH ranged from 6.54 pH units to 7.78 pH units, with a median value of 7.07 (Figure 23).
- pH values were relatively stable over the course of deployment, remaining within the CCME's Guidelines for the Protection of Aquatic Life for the duration of deployment.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

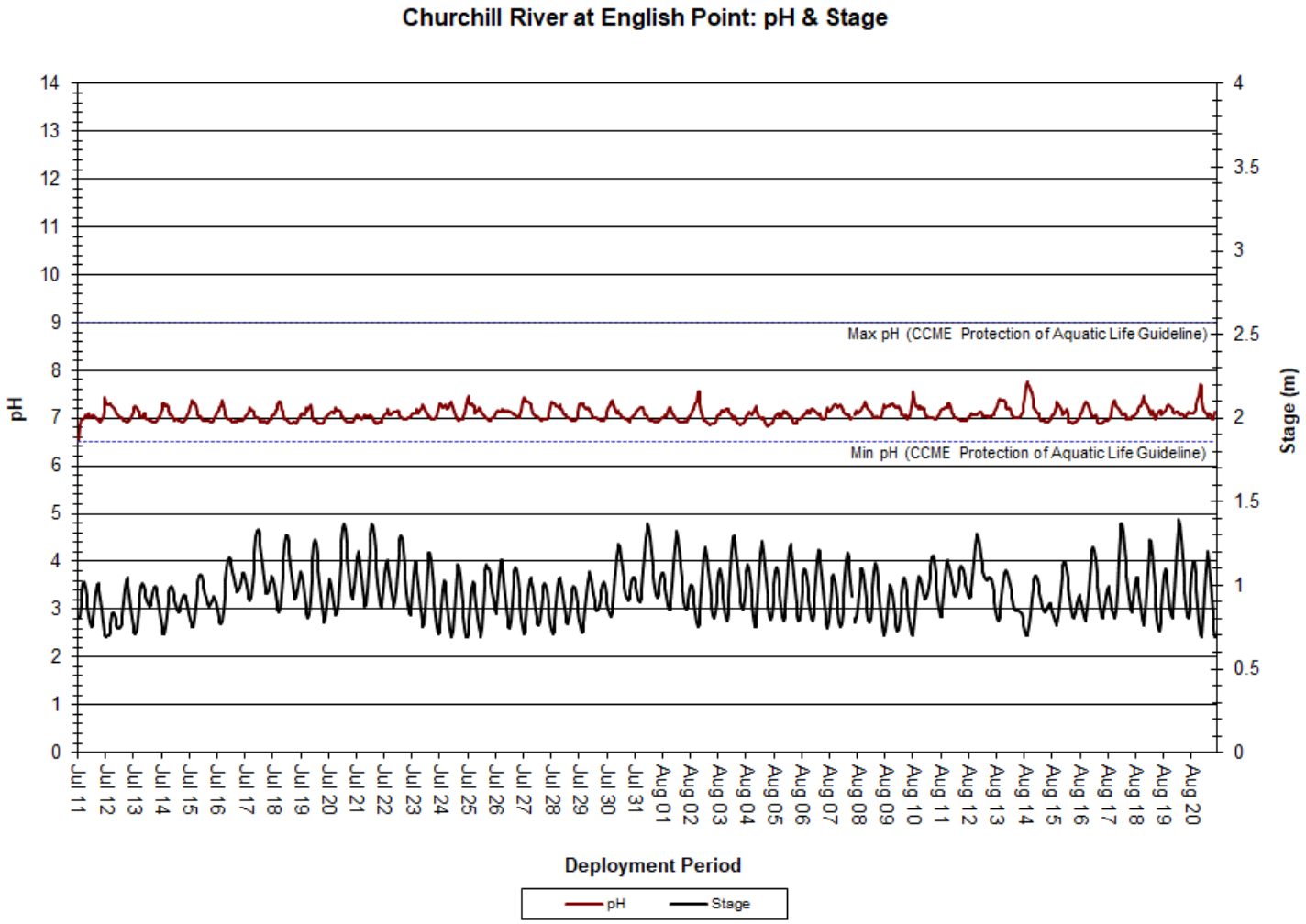

Figure 23: pH & Stage at Churchill River at English Point

Specific Conductivity

- Over the deployment period, specific conductivity ranged from 22.74µS/cm to 65.33µs/cm, with a median value of 32.18µS/cm (Figure 24).
- Specific conductivity fluctuates considerably at this location due to the tidal influences of the Atlantic Ocean on Lake Melville. As the tide comes in, specific conductivity increases as dissolved solids and salinity increase, and vice versa as the tide goes out. This increase and decrease in specific conductivity and stage occurs twice daily. This pattern is generally consistent throughout the deployment period (Figure 23).
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

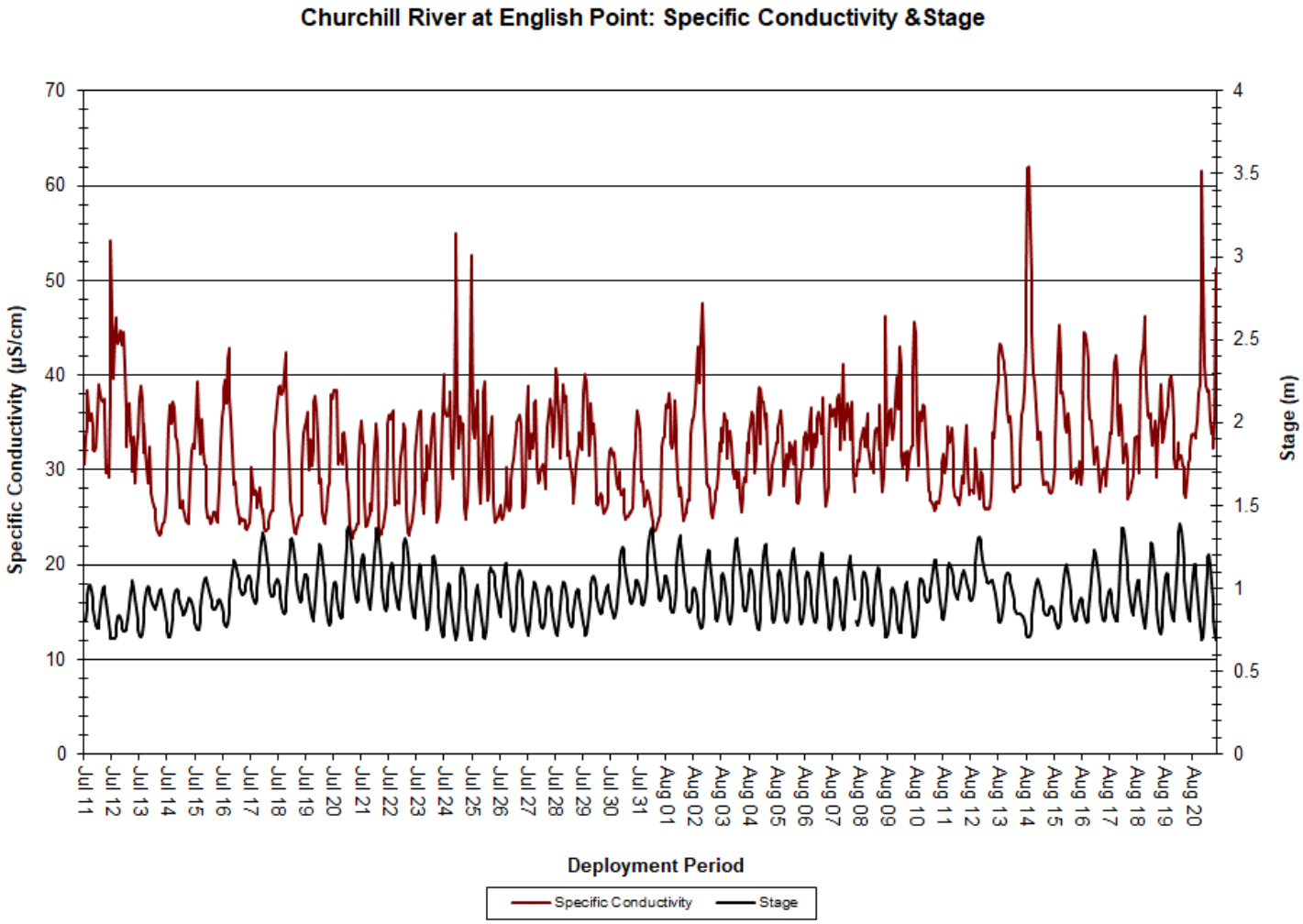

Figure 24: Specific Conductivity & Stage at Churchill River at English Point

Dissolved Oxygen

- Over the deployment period, dissolved oxygen concentration ranged from 8.87mg/L to 10.41mg/L, with a median value of 9.46mg/L. Saturation of dissolved oxygen ranged from 93.8% to 111.0% saturation, with a median value of 101.0% (Figure 25).
- There is an evident relationship between water temperature and dissolved oxygen. As water temperatures increased slightly over the deployment period, dissolved oxygen levels decreased slightly. Dissolved oxygen levels also follow a diurnal pattern as water temperatures rise and fall under the influence of ambient air temperatures. Generally, dissolved oxygen levels are higher in a waterbody during cooler temperatures.
- Dissolved oxygen levels hovered above and below the CCME's Guideline for the Protection of Early Life Stages for the duration of deployment. Dissolved oxygen levels were above the CCME's Guideline for the Protection of Other Life Stages for the duration of deployment (Figure 25).

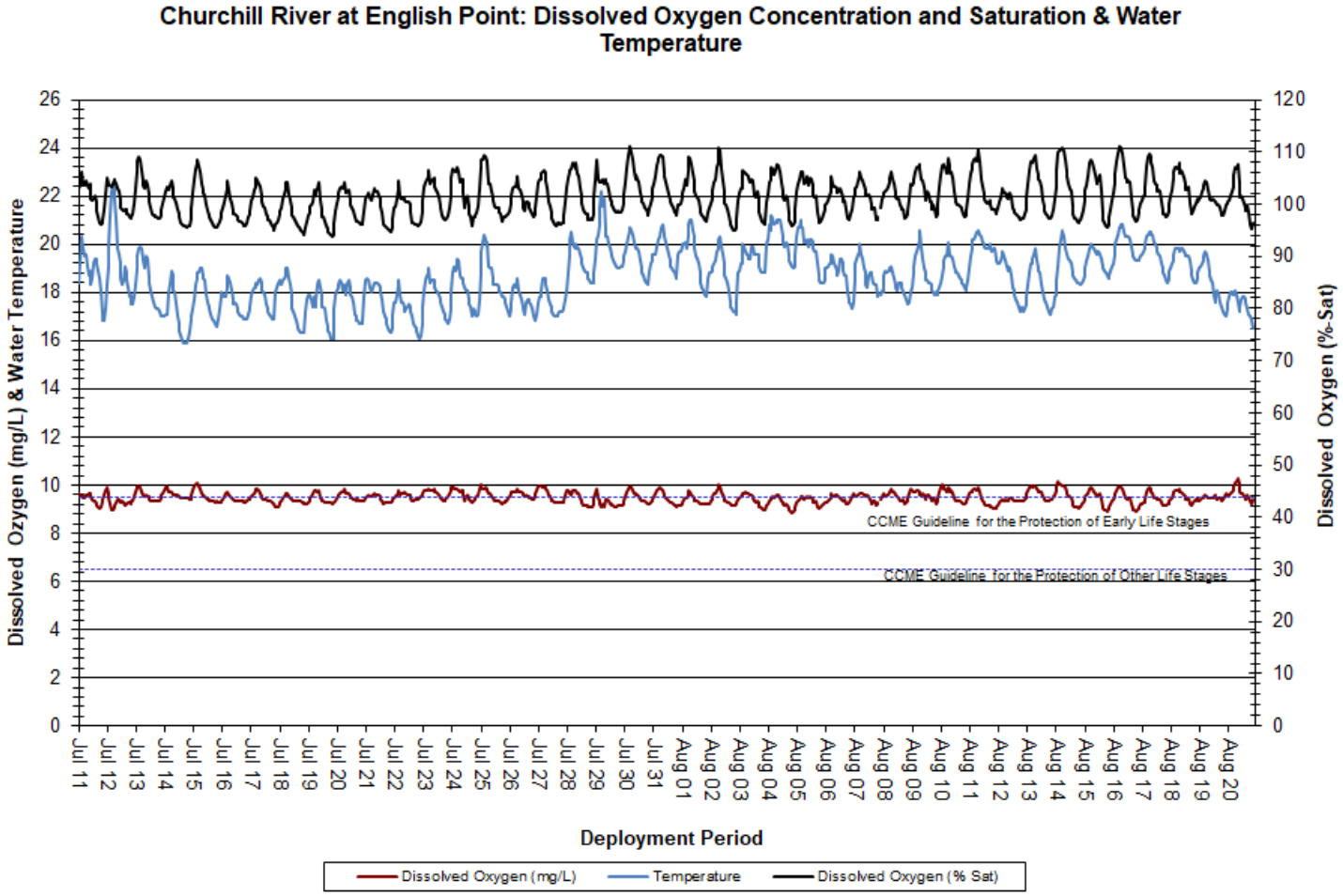

Figure 25: Dissolved Oxygen & Water Temperature at Churchill River at English Point

Turbidity

- Over the deployment period, turbidity ranged from 1.6 NTU to 97.8 NTU, with a median value of 3.1 NTU (Figure 26). A median value of 3.1 NTU indicates a low level of background turbidity. Precipitation data was obtained from the Muskrat Falls MET Station.
- Turbidity events generally correlate with precipitation events, as these can increase the presence of suspended material in water. High winds and tidal influences can also contribute to turbidity events at this station by disturbing sediment from the riverbed (Figure 26). Wind speed data was obtained from the Mud Lake Road Weather Station.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

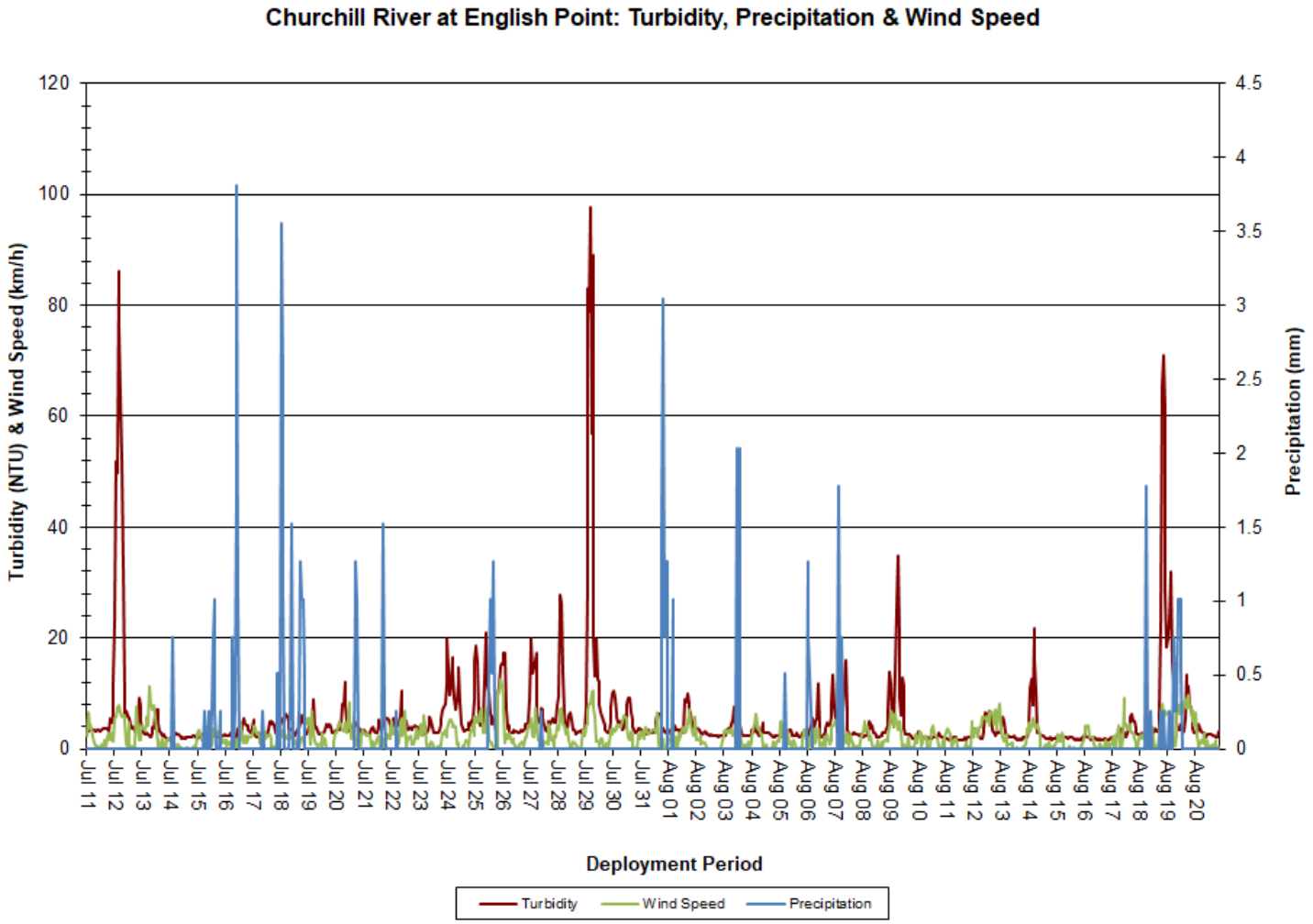

Figure 26: Turbidity, Precipitation & Wind Speed at Churchill River at English Point

Stage

- Over the deployment period, stage ranged from 0.69m to 1.392m, with a median value of 0.95m (Figure 27). Precipitation data was obtained from the Muskrat Falls MET Station.
- Stage fluctuates considerably at this location due to the tidal influences of the Atlantic Ocean. This pattern is consistent over the deployment period. Increases in stage often correlate with precipitation events.
- Water Survey of Canada (Environment and Climate Change Canada) is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

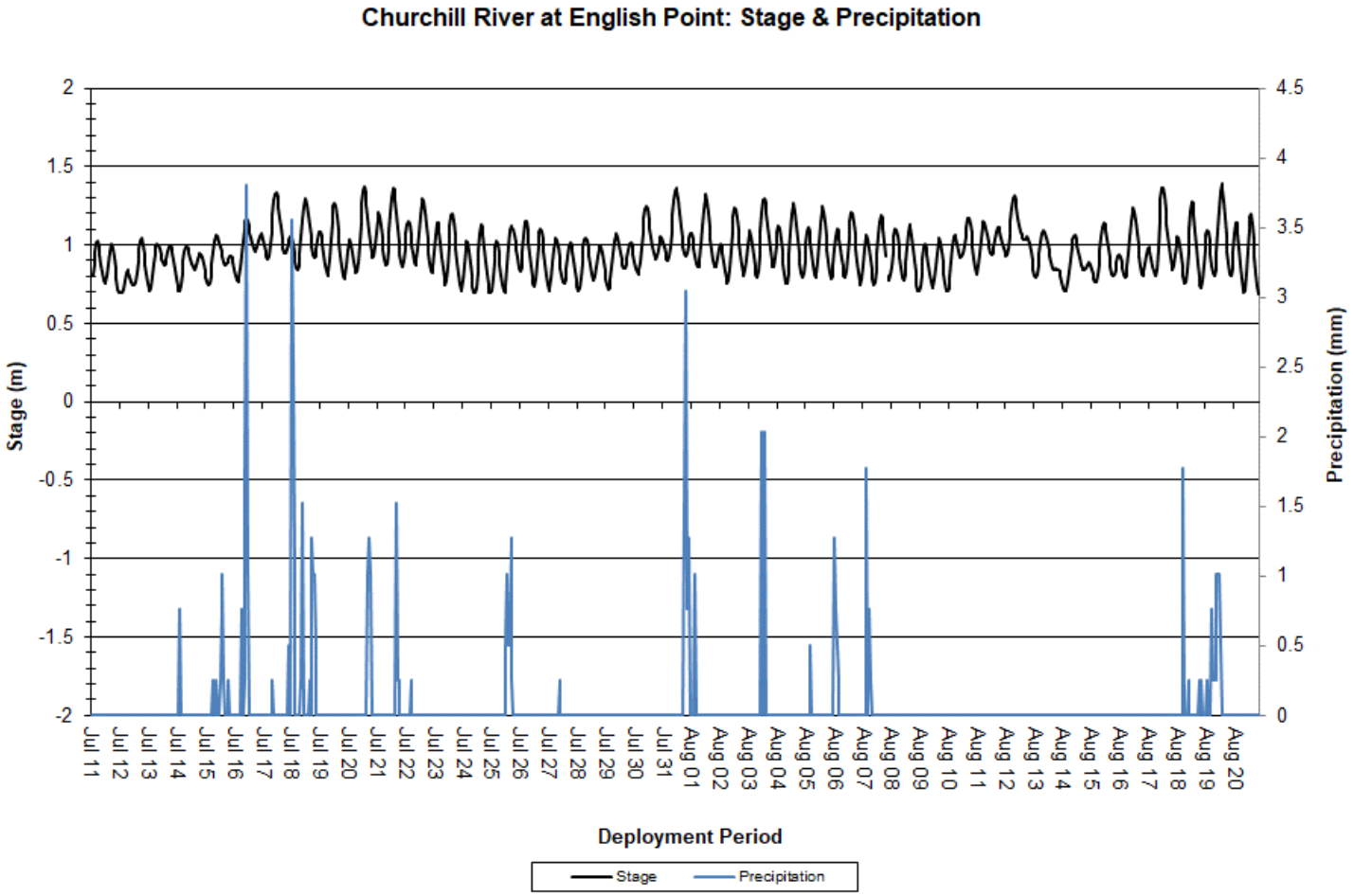

Figure 27: Stage & Precipitation at Churchill River at English Point

Conclusions

- Instruments at four water quality monitoring stations on the Lower Churchill River were deployed from July 10/11 through August 21/22, 2024.
- Water temperature was generally increasing at all stations over the course of deployment. This is to be expected based on ambient air temperature trends during the same period through July and August.
- pH was relatively stable at all stations over the course of deployment. pH was within the CCME's Guidelines for the Protection of Aquatic Life for the duration of deployment at Churchill River below Metchin River, above Grizzle Rapids, and at English Point, and for the majority of deployment at Churchill River below Muskrat Falls.
- Specific conductivity was generally stable or increasing over the course of deployment at all stations. Since English Point is influenced by tides in Lake Melville, specific conductivity values at the Churchill River at English Point station had a much wider range, which is comparable to other deployments at this location.
- Dissolved oxygen levels slowly decreased over the course of deployment at all stations as water temperatures increased through the summer. Dissolved oxygen levels are generally higher in water at cooler temperatures. Dissolved oxygen levels fell below the CCME's Guideline for the Protection of Early Life Stages at some point during deployment at all stations. Dissolved oxygen levels were above the CCME's Guideline for the Protection of Other Life Stages for the duration of deployment at all stations.
- Turbidity events occurred at three stations and were generally related to precipitation, wind or tidal events. In all cases, turbidity values returned to background levels following each observed event.

References

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APPENDIX A

Water Parameter Description

Water Parameter Description

Dissolved Oxygen - The amount of Dissolved Oxygen (DO) (mg/l or % saturation) in the water is vital to aquatic organisms for their survival. The concentration of DO is affected by such things as water temperature, water depth and flow (e.g., aeration by rapids, riffles etc.), consumption by aerobic organisms, consumption by inorganic chemical reactions, consumption by plants during darkness, and production by plants during the daylight (USGS, 2017).

Flow - Flow (m3/s) is a measure of how quickly a volume of water is displaced in streams, rivers, and other channels.

pH - pH is a measure of the relative amount of free hydrogen and hydroxyl ions in water. pH is an important indicator of chemically changing water, and determines the solubility and biological availability of nutrients and heavy metals in the water (USGS, 2017).

Specific conductivity - Specific conductivity (µs/cm) is a measure of water's ability to conduct electricity, with values normalized to a water temperature of 25°C. Specific conductance indicates the concentration of dissolved solids (such as salts) in the water, which can affect the growth and reproduction of aquatic life. Specific conductivity is affected by rainfall events, the composition of inflowing tributaries and their associated geology, saline inflow (e.g., road salt), agricultural run-off and industrial inputs (Fondriest Environmental Inc, 2016).

Stage - Stage (m) is the elevation of the water surface and is often used as a surrogate for the more difficult to measure flow.

Temperature - Essential to the measurement of most water quality parameters, temperature (°C) controls most aquatic processes. Water temperature is influenced by such things as ambient air temperature, solar radiation, meteorological events, industrial effluence, wastewater, inflowing tributaries, as well as water body size and depth. In turn, water temperature has an influence on the metabolic rates and biological activity of aquatic organisms (Fondriest Environmental Inc, 2016b).

Total Dissolved Solids - Total Dissolved Solids (TDS) (g/l) is a measure of alkaline salts dissolved in water or in fine suspension and can affect the growth and reproduction of aquatic life. It is affected by rainfall events, the composition of inflowing tributaries and their associated geology, saline inflow (e.g., road salt), agricultural run-off and industrial inputs (Swenson and Baldwin, 1965).

Turbidity - Turbidity (NTU) is a measure of the translucence of water and indicates the amount of suspended material in the water. Turbidity is caused by any substance that makes water cloudy (e.g., soil erosion, micro-organisms, vegetation, chemicals, etc.) and can correspond to precipitation events, high stage, and floating debris near the sensor (Swenson and Baldwin 1965).

APPENDIX B

Grab Sample Results

Bureau Veritas Job #: C4L5529
Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP719 CR BELOW MR								
Sampling Date 2024/07/10 11:15								
Matrix W								
Sample # 2024-6305-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	11	1.0	mg/L	N/A	2024/07/17		9516599
Nitrate (N)	-	ND	0.050	mg/L	N/A	2024/07/19		9516603
Total dissolved solids (calc., EC)	-	14	1.0	mg/L	N/A	2024/07/18		9516891
Inorganics								
Conductivity	-	25	1.0	uS/cm	N/A	2024/07/17	LJV	9519207
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Total Alkalinity (Total as CaCO3)	-	12	2.0	mg/L	N/A	2024/07/17	LJV	9519208
Colour	-	16	5.0	TCU	N/A	2024/07/18	EMT	9522023
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/17	LJV	9519209
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/19	2024/07/22	RTY	9527003
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2024/07/18	EMT	9522025
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/18	EMT	9522026
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/18	MCN	9522132
Dissolved Organic Carbon (C)	-	3.4	0.50	mg/L	N/A	2024/07/17	MKY	9519235
Total Organic Carbon (C)	-	3.6	0.50	mg/L	N/A	2024/07/17	MKY	9519541
pH	-	7.12		pH	N/A	2024/07/17	LJV	9519205
Total Phosphorus	-	ND	0.004	mg/L	2024/07/19	2024/07/23	SPC	9527086
Total Suspended Solids	-	1.6	1.0	mg/L	2024/07/17	2024/07/18	DME	9519296
Turbidity	-	1.2	0.10	NTU	N/A	2024/07/18	LJV	9522111
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/16	2024/07/17	JEP	9516917
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.028	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Barium (Ba)	-	0.0090	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Boron (B)	-	ND	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Calcium (Ca)	-	2.8	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Copper (Cu)	-	0.0010	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Iron (Fe)	-	0.094	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Magnesium (Mg)	-	0.91	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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Bureau Veritas Job #: C4L5529
Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP719 CR BELOW MR								
Sampling Date 2024/07/10 11:15								
Matrix W								
Sample # 2024-6305-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Manganese (Mn)	-	0.017	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Potassium (K)	-	0.31	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Sodium (Na)	-	0.65	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Strontium (Sr)	-	0.013	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Zinc (Zn)	-	0.0096	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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Bureau Veritas Job #: C4L5529
Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP721 CR ABOVE GR								
Sampling Date 2024/07/11 10:00								
Matrix W								
Sample # 2024-6307-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	9.0	1.0	mg/L	N/A	2024/07/17		9516599
Nitrate (N)	-	ND	0.050	mg/L	N/A	2024/07/19		9516603
Total dissolved solids (calc., EC)	-	12	1.0	mg/L	N/A	2024/07/18		9516891
Inorganics								
Conductivity	-	22	1.0	uS/cm	N/A	2024/07/17	LJV	9519214
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Total Alkalinity (Total as CaCO3)	-	8.7	2.0	mg/L	N/A	2024/07/17	LJV	9519213
Colour	-	22	5.0	TCU	N/A	2024/07/18	EMT	9522023
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/17	LJV	9519215
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/19	2024/07/22	RTY	9527003
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2024/07/18	EMT	9522025
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/18	EMT	9522026
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/18	MCN	9522130
Dup.Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/18	MCN	9522130
Dissolved Organic Carbon (C)	-	3.8	0.50	mg/L	N/A	2024/07/17	MKY	9519235
Total Organic Carbon (C)	-	4.1	0.50	mg/L	N/A	2024/07/17	MKY	9519814
pH	-	7.09		pH	N/A	2024/07/17	LJV	9519211
Total Phosphorus	-	ND	0.004	mg/L	2024/07/19	2024/07/23	SPC	9527086
Total Suspended Solids	-	1.4	1.0	mg/L	2024/07/17	2024/07/18	DME	9519296
Turbidity	-	1.2	0.10	NTU	N/A	2024/07/18	LJV	9522111
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/17	2024/07/18	JEP	9520306
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.035	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Barium (Ba)	-	0.0080	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Boron (B)	-	ND	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Calcium (Ca)	-	2.4	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Copper (Cu)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Iron (Fe)	-	0.096	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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Bureau Veritas Job #: C4L5529
Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP721 CR ABOVE GR								
Sampling Date 2024/07/11 10:00								
Matrix W								
Sample # 2024-6307-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Magnesium (Mg)	-	0.75	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Manganese (Mn)	-	0.0092	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Potassium (K)	-	0.28	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Sodium (Na)	-	0.60	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Strontium (Sr)	-	0.013	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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Bureau Veritas Job #: C4L5529
Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP720 CR BELOW MF								
Sampling Date 2024/07/10 16:30								
Matrix W								
Sample # 2024-6306-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	8.4	1.0	mg/L	N/A	2024/07/17		9516599
Nitrate (N)	-	ND	0.050	mg/L	N/A	2024/07/19		9516603
Total dissolved solids (calc., EC)	-	11	1.0	mg/L	N/A	2024/07/18		9516891
Inorganics								
Conductivity	-	19	1.0	uS/cm	N/A	2024/07/17	LJV	9519214
Dup.Conductivity	-	20	1.0	uS/cm	N/A	2024/07/17	LJV	9519214
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Total Alkalinity (Total as CaCO3)	-	5.5	2.0	mg/L	N/A	2024/07/17	LJV	9519213
Dup.Total Alkalinity (Total as CaCO3)	-	7.2	2.0	mg/L	N/A	2024/07/17	LJV	9519213
Colour	-	29	5.0	TCU	N/A	2024/07/18	EMT	9522023
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/17	LJV	9519215
Dup.Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/17	LJV	9519215
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/19	2024/07/22	RTY	9527003
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2024/07/18	EMT	9522025
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/18	EMT	9522026
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/18	MCN	9522132
Dissolved Organic Carbon (C)	-	4.2	0.50	mg/L	N/A	2024/07/17	MKY	9519553
Dup.Dissolved Organic Carbon (C)	-	4.2	0.50	mg/L	N/A	2024/07/17	MKY	9519553
Total Organic Carbon (C)	-	5.0	0.50	mg/L	N/A	2024/07/17	MKY	9519814
pH	-	6.92		pH	N/A	2024/07/17	LJV	9519211
Dup.pH	-	6.92		pH	N/A	2024/07/17	LJV	9519211
Total Phosphorus	-	ND	0.004	mg/L	2024/07/19	2024/07/23	SPC	9527086
Total Suspended Solids	-	6.8	1.0	mg/L	2024/07/17	2024/07/18	DME	9519296
Turbidity	-	2.5	0.10	NTU	N/A	2024/07/18	LJV	9522111
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/16	2024/07/18	JEP	9520306
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.11	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Barium (Ba)	-	0.0083	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Boron (B)	-	ND	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Calcium (Ca)	-	2.2	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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Bureau Veritas Job #: C4L5529
Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP720 CR BELOW MF								
Sampling Date 2024/07/10 16:30								
Matrix W								
Sample # 2024-6306-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Copper (Cu)	-	0.00060	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Iron (Fe)	-	0.21	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Magnesium (Mg)	-	0.72	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Manganese (Mn)	-	0.0079	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Potassium (K)	-	0.33	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Sodium (Na)	-	0.66	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Strontium (Sr)	-	0.012	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Zinc (Zn)	-	0.038	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP722 CR @ EP								
Sampling Date 2024/07/11 11:45								
Matrix W								
Sample # 2024-6308-00-SI-SP								
Registration # SA-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	10	1.0	mg/L	N/A	2024/07/17		9516599
Nitrate (N)	-	ND	0.050	mg/L	N/A	2024/07/19		9516603
Total dissolved solids (calc., EC)	-	17	1.0	mg/L	N/A	2024/07/19		9516891
Inorganics								
Conductivity	-	31	1.0	uS/cm	N/A	2024/07/18	LJV	9519214
Chloride (Cl-)	-	2.3	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Sulphate (SO4)	-	1.2	1.0	mg/L	N/A	2024/07/18	LKH	9521636
Total Alkalinity (Total as CaCO3)	-	6.9	2.0	mg/L	N/A	2024/07/18	LJV	9519213
Colour	-	43	5.0	TCU	N/A	2024/07/18	EMT	9522023
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2024/07/18	LJV	9519215
Total Kjeldahl Nitrogen (TKN)	-	ND	0.10	mg/L	2024/07/19	2024/07/22	RTY	9527003
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2024/07/18	EMT	9522025
Nitrite (N)	-	ND	0.010	mg/L	N/A	2024/07/18	EMT	9522026
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2024/07/18	MCN	9522130
Dissolved Organic Carbon (C)	-	4.3	0.50	mg/L	N/A	2024/07/17	MKY	9519235
Total Organic Carbon (C)	-	4.4	0.50	mg/L	N/A	2024/07/17	MKY	9519819
pH	-	7.03		pH	N/A	2024/07/17	LJV	9519211
Total Phosphorus	-	0.016	0.004	mg/L	2024/07/19	2024/07/23	SPC	9527086
Total Suspended Solids	-	4.2	1.0	mg/L	2024/07/17	2024/07/18	DME	9519296
Turbidity	-	7.4	0.10	NTU	N/A	2024/07/18	LJV	9522111
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2024/07/17	2024/07/18	JEP	9520306
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.27	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Antimony (Sb)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Arsenic (As)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Barium (Ba)	-	0.010	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Boron (B)	-	ND	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Calcium (Ca)	-	2.4	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Chromium (Cr)	-	ND	0.0010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Copper (Cu)	-	0.00098	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Iron (Fe)	-	0.40	0.050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Lead (Pb)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Magnesium (Mg)	-	0.99	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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Report Date: 2024/07/24

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

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
ZSP722 CR @ EP								
Sampling Date 2024/07/11 11:45								
Matrix W								
Sample # 2024-6308-00-SI-SP								
Registration # SA-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Manganese (Mn)	-	0.015	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Nickel (Ni)	-	ND	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Phosphorus (P)	-	ND	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Potassium (K)	-	0.49	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Selenium (Se)	-	ND	0.00050	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Sodium (Na)	-	2.3	0.10	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Strontium (Sr)	-	0.017	0.0020	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Uranium (U)	-	ND	0.00010	mg/L	2024/07/16	2024/07/16	MTZ	9517474
Total Zinc (Zn)	-	ND	0.0050	mg/L	2024/07/16	2024/07/16	MTZ	9517474

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