Real-Time Water Quality Deployment Report

Lower Churchill River Network

May 29 to July 10, 2018

Newfoundland Labrador

Government of Newfoundland & Labrador
Department of Municipal Affairs & Environment
Water Resources Management Division

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Real Time Water Quality Monitoring

- Staff members with the Department of Municipal Affairs & Environment monitor real-time water quality data on a regular basis.
- This deployment report discusses water quality related events occurring at two stations on the Lower Churchill River: Churchill River below Muskrat Falls and Churchill River at English Point.
- On May 29, 2018, real-time water quality monitoring instruments were deployed at the Churchill River below Muskrat Falls and Churchill River at English Point stations for a period of 42 days.
- The stations above Grizzle Rapids and below Metchin River were not deployed due to inaccessibility. These sites consistently experience heavy ice build-up that does not abate until late spring.
- The station at above Muskrat Falls was not able to be deployed during this deployment period. This station was relocated in October 2016 as it was situated in the flood zone of the Muskrat Falls Reservoir and needed to be moved back to ensure the station did not flood as the reservoir water levels were raised (as was planned in the fall of 2016). However, due to unforeseen issues, water levels were raised and decreased again. As a result, the newly located above Muskrat Falls station is now situated approximately 650 feet from the edge of the reservoir (i.e. at current water levels) making it impractical to install monitoring equipment. Additionally, safety requirements with regards to working in and around the reservoir for the Muskrat Falls project further hindered the ability to deploy the instrument at this station.

Quality Assurance and Quality Control

- As part of the Quality Assurance and Quality Control protocol (QA/QC), an assessment of the reliability of data recorded by an instrument is made at the beginning and end of the deployment period. The procedure is based on the approach used by the United States Geological Survey.
- 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 dependant, 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 May 29 to July 10, 2018 are summarized in Table 2.

Table 2: Comparison rankings for Lower Churchill River stations, May 29 to July 10, 2018

Churchill River Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Below Muskrat Falls	May 29, 2018	Deployment	Fair	Excellent	Excellent	Good	Good
	July 10, 2018	Removal	Good	Good	Excellent	Good	Good
English Point	May 29, 2018	Deployment	Good	Excellent	Fair	Excellent	Fair
	July 10, 2018	Removal	Excellent	Good	Excellent	Excellent	Poor
Above Grizzle Rapids	Not deployed	Deployment	N/A	N/A	N/A	N/A	N/A
	Not deployed	Removal	N/A	N/A	N/A	N/A	N/A
Below Metchin River	Not deployed	Deployment	N/A	N/A	N/A	N/A	N/A
	Not deployed	Removal	N/A	N/A	N/A	N/A	N/A
Above Muskrat Falls	Not deployed	Deployment	N/A	N/A	N/A	N/A	N/A
	Not deployed	Removal	N/A	N/A	N/A	N/A	N/A

- **Churchill River below Muskrat Falls**
  - At deployment, pH and conductivity were 'excellent', dissolved oxygen and turbidity were 'good', while temperature was 'fair'.
  - At removal, conductivity was 'excellent', while all other parameters were 'good'.
- **Churchill River at English Point**
  - At deployment, pH and dissolved oxygen were 'excellent', temperature was 'good', while conductivity and turbidity were 'fair'.
  - At removal, temperature, conductivity and dissolved oxygen were 'excellent', pH was 'good', while turbidity was 'poor'. This observed discrepancy may have been caused by sediment build-up on the field sonde.

Data Interpretation

- The following graphs and discussion illustrate water quality related events occurring from May 29 to July 10, 2018 at the Churchill River below Muskrat Falls and Churchill River at English Point sites.
- With the exception of water quantity data (stage & flow), all data used in the preparation of 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.
- The above Grizzle Rapids and below Metchin River stations were inaccessible due to spring ice.
- The above Muskrat Falls station was inaccessible due to having been moved a significant distance from the water (i.e. outside of flood zone) and due to safety concerns associated with working in and around the reservoir.

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

Churchill River below Muskrat Falls

Water Temperature

- Over the deployment period, water temperature ranged from 1.20°C to 12.80°C, with a median value of 5.70°C (Figure 2).
- Water temperature gradually increased over the course of the deployment period. This warming trend is to be expected as air temperatures warmed into the spring and summer months. Air temperature data was obtained from the Muskrat Falls MET 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.

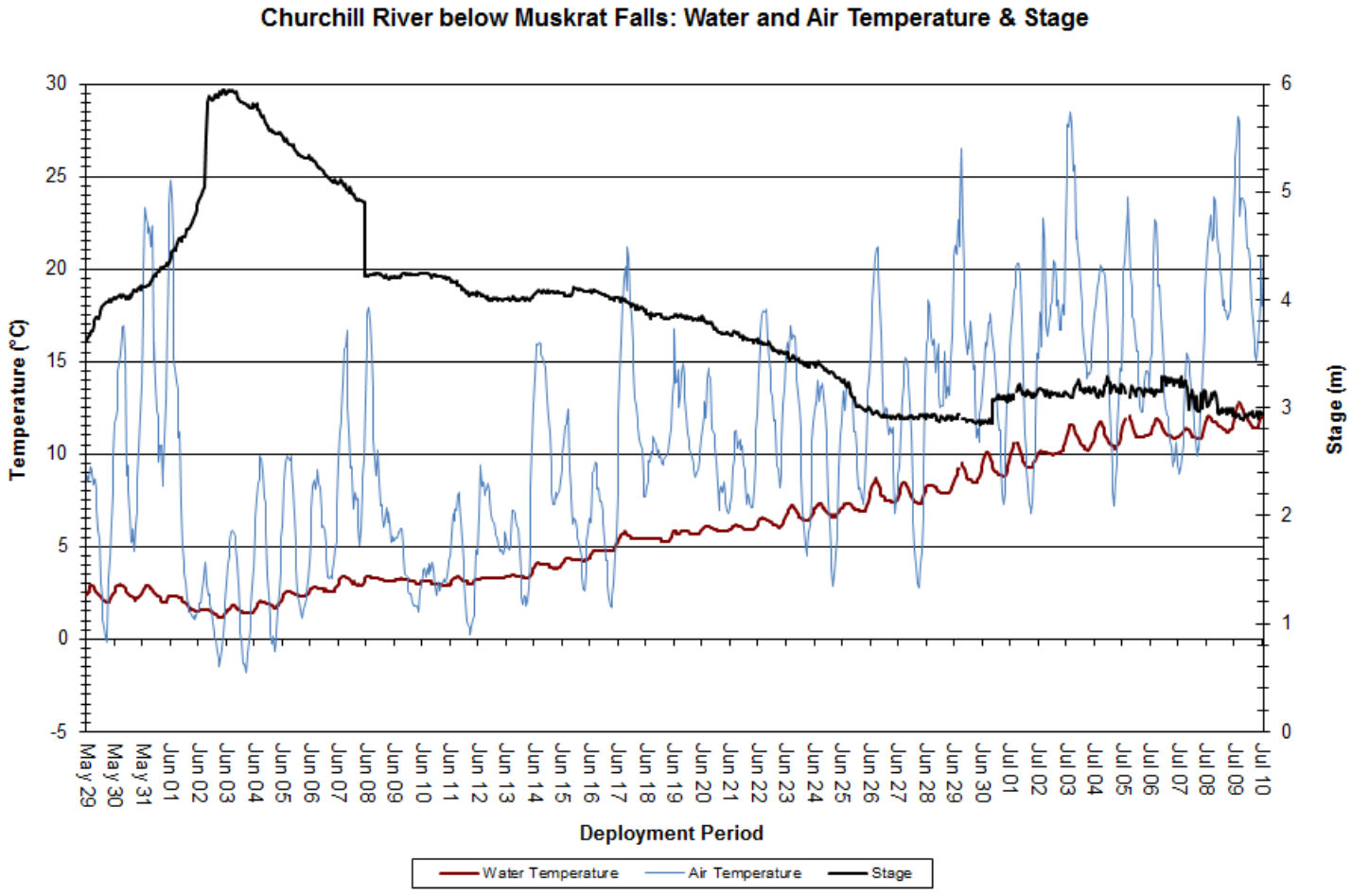

Figure 2: Water and Air Temperature & Stage at Churchill River below Muskrat Falls

pH

- Over the deployment period, pH ranged from 6.07 pH units to 6.41 pH units, with a median value of 6.19 (Figure 3).
- pH values were relatively stable and remained below the CCME's Minimum Guideline 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.

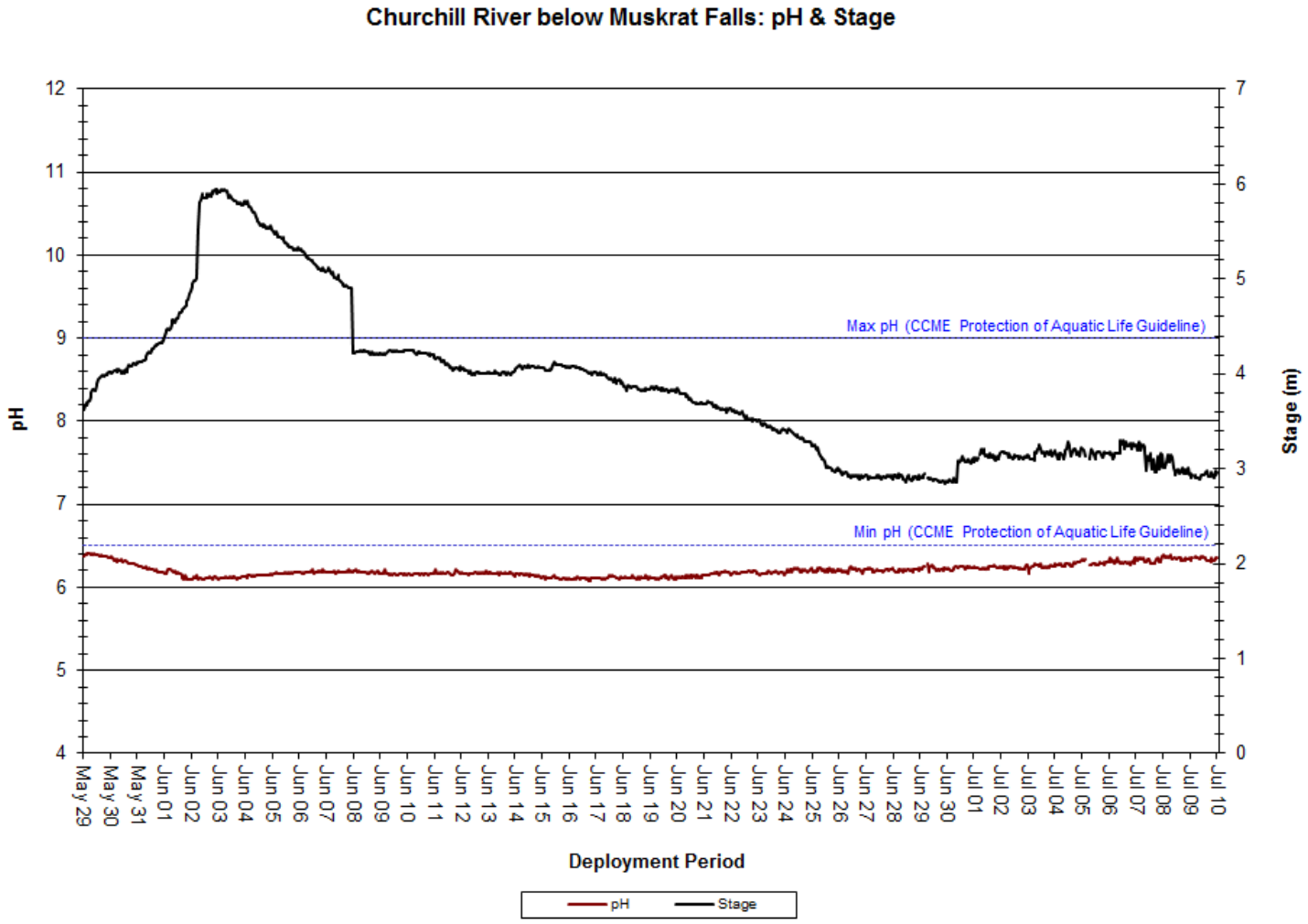

Figure 3: pH & Stage at Churchill River below Muskrat Falls

Specific Conductivity

- Over the deployment period, specific conductivity ranged from 8.8µS/cm to 13.8µS/cm, with a median value of 11.5µS/cm (Figure 4).
- The relationship between conductivity and stage is generally inversed. When stage level rises, specific conductivity levels drop in response as increased amounts of water in the river system dilute solids that are present. This relationship is evident in the graph below.
- 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.

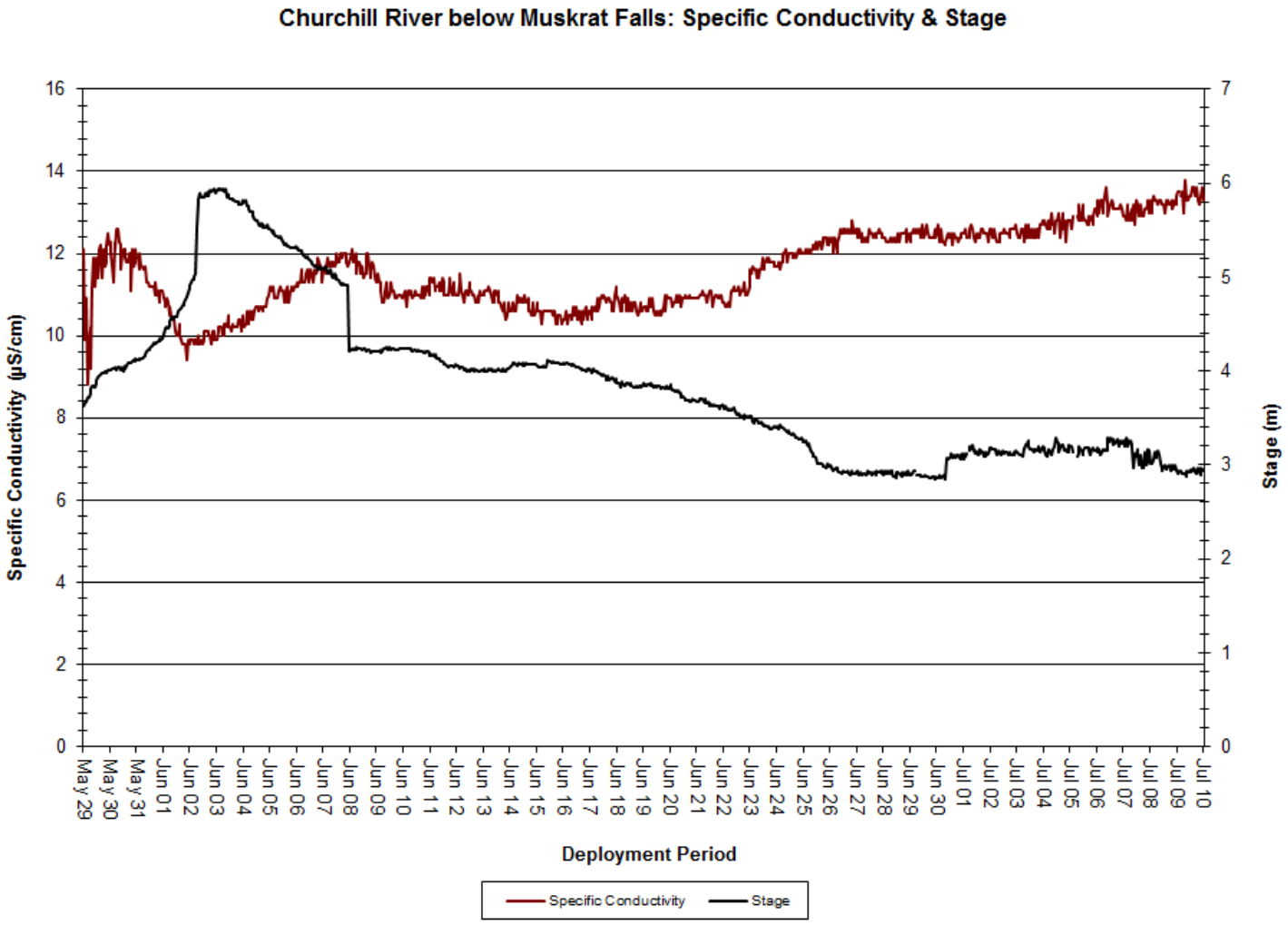

Figure 4: Specific Conductivity & Stage at Churchill River below Muskrat Falls

Dissolved Oxygen

- Over the deployment period, dissolved oxygen content ranged from 11.67mg/L to 17.58mg/L, with a median value of 14.53mg/L. Saturation of dissolved oxygen ranged from 105.5% saturation to 128.1% saturation, with a median value of 116.4% (Figure 5).
- Water temperature and dissolved oxygen generally exhibit an inverse relationship: as one parameter increases, the other decreases. Over the deployment period, dissolved oxygen levels slowly decreased as water temperatures increased into the summer season.
- Dissolved oxygen levels remained above the CCME's Guidelines for the Protection of Early Life Stages and Other Life Stages for the duration of the deployment period.

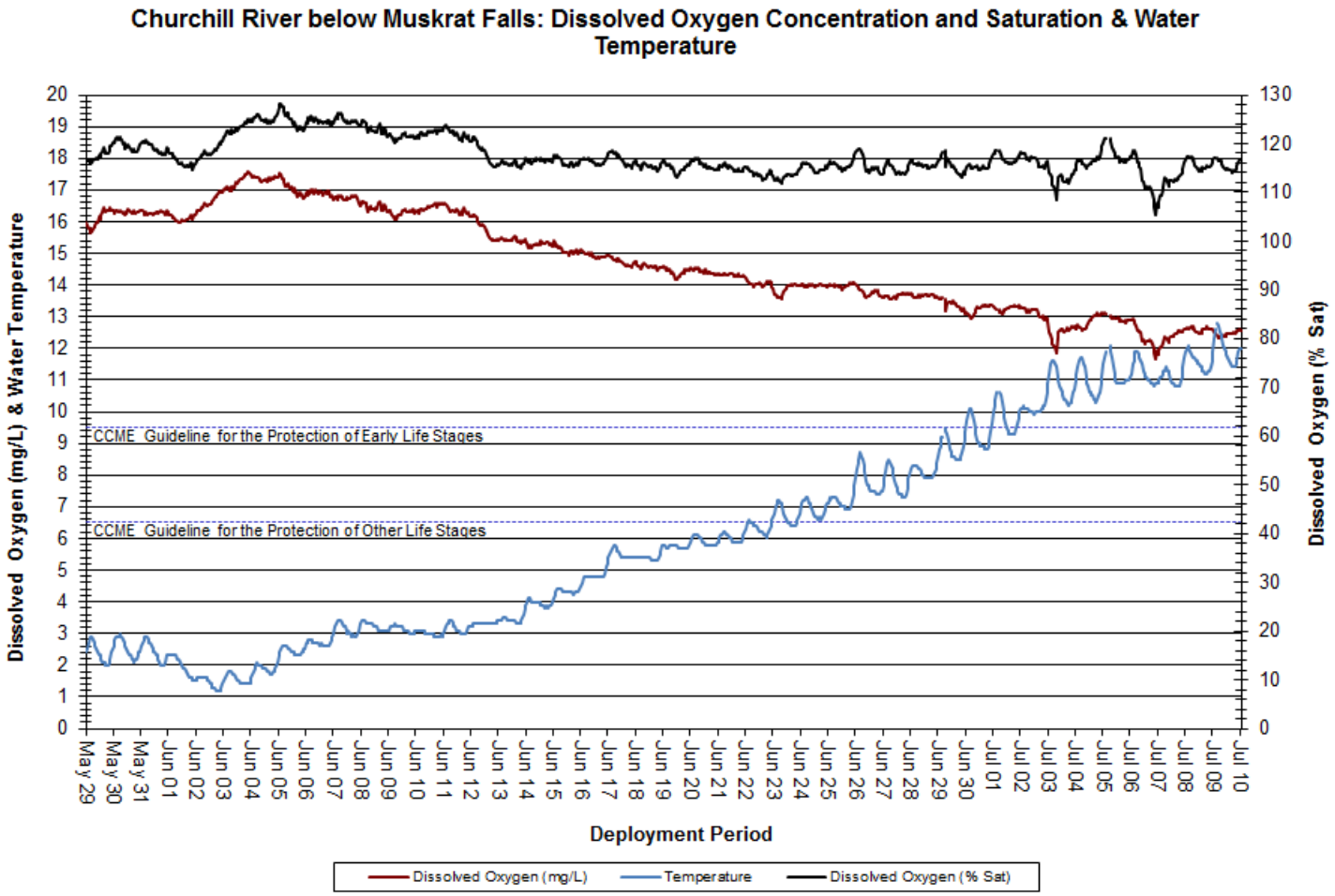

Figure 5: Dissolved Oxygen & Water Temperature at Churchill River below Muskrat Falls

Turbidity

- Over the deployment period, turbidity ranged from 1.6NTU to 39.9NTU, with a median value of 4.7NTU (Figure 6). A median value of 4.7NTU indicates that there was a small level of background turbidity at this station.

- The majority of turbidity events during deployment correlated with increases in stage and precipitation events (Figure 6), as precipitation can increase the presence of suspended material in the water. Turbidity levels at this station can also be increased by high winds, which serve to stir up sediment from the river bed.

- The observed turbidity increase from June 1st through June 4th is likely attributable not only to a precipitation event, but also to an erosion event at the Muskrat Falls worksite upstream of this 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.

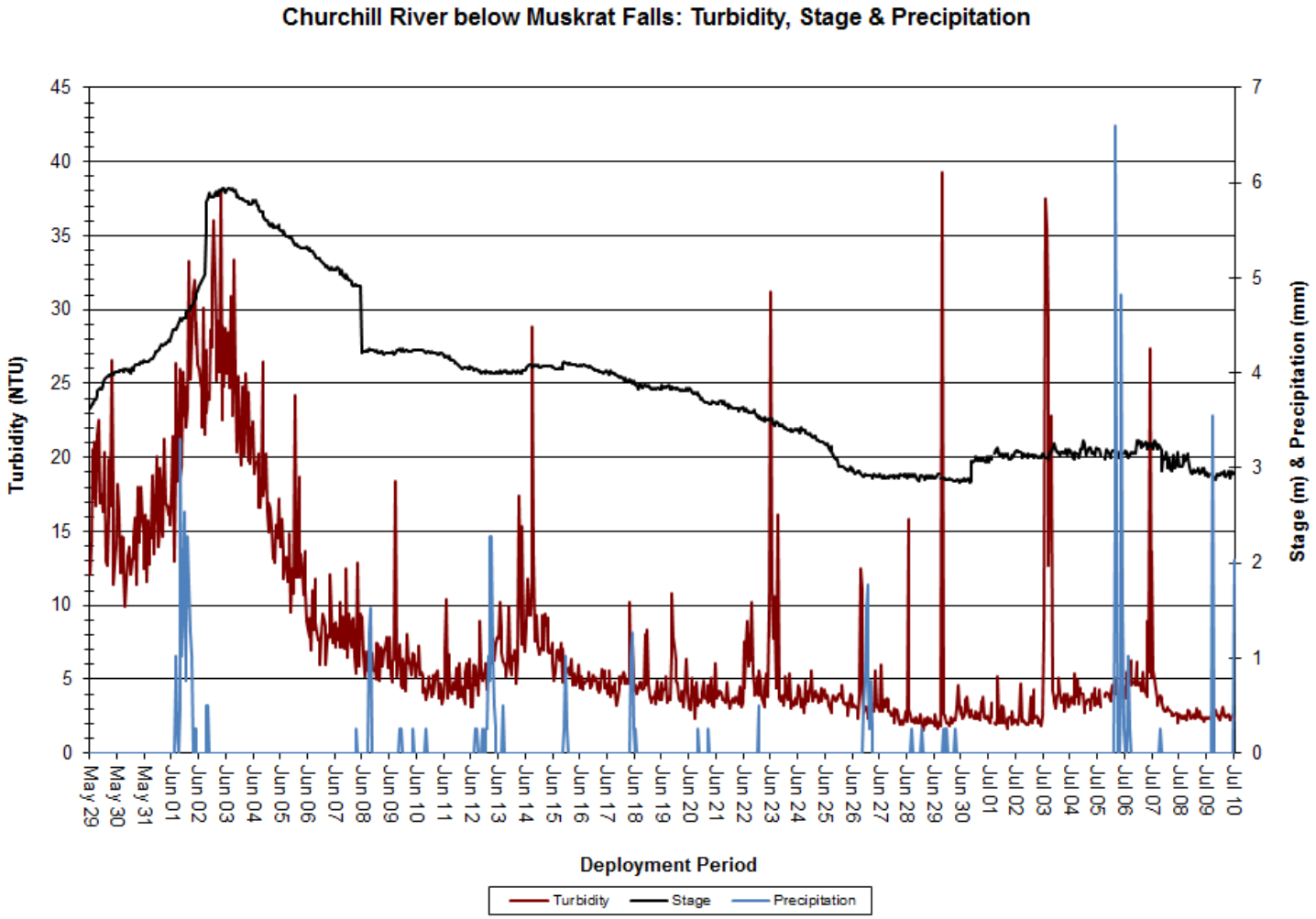

Figure 6: Turbidity, Stage & Precipitation at Churchill River below Muskrat Falls

Stage and Precipitation

- Over the deployment period, stage levels ranged from 2.84m to 5.94m, with a median value of 3.84m (Figure 7). Precipitation data was obtained from the Muskrat Falls Weather Station.
- Stage was quite variable across the deployment period. As expected, precipitation events correlate with many increases in stage.
- 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.

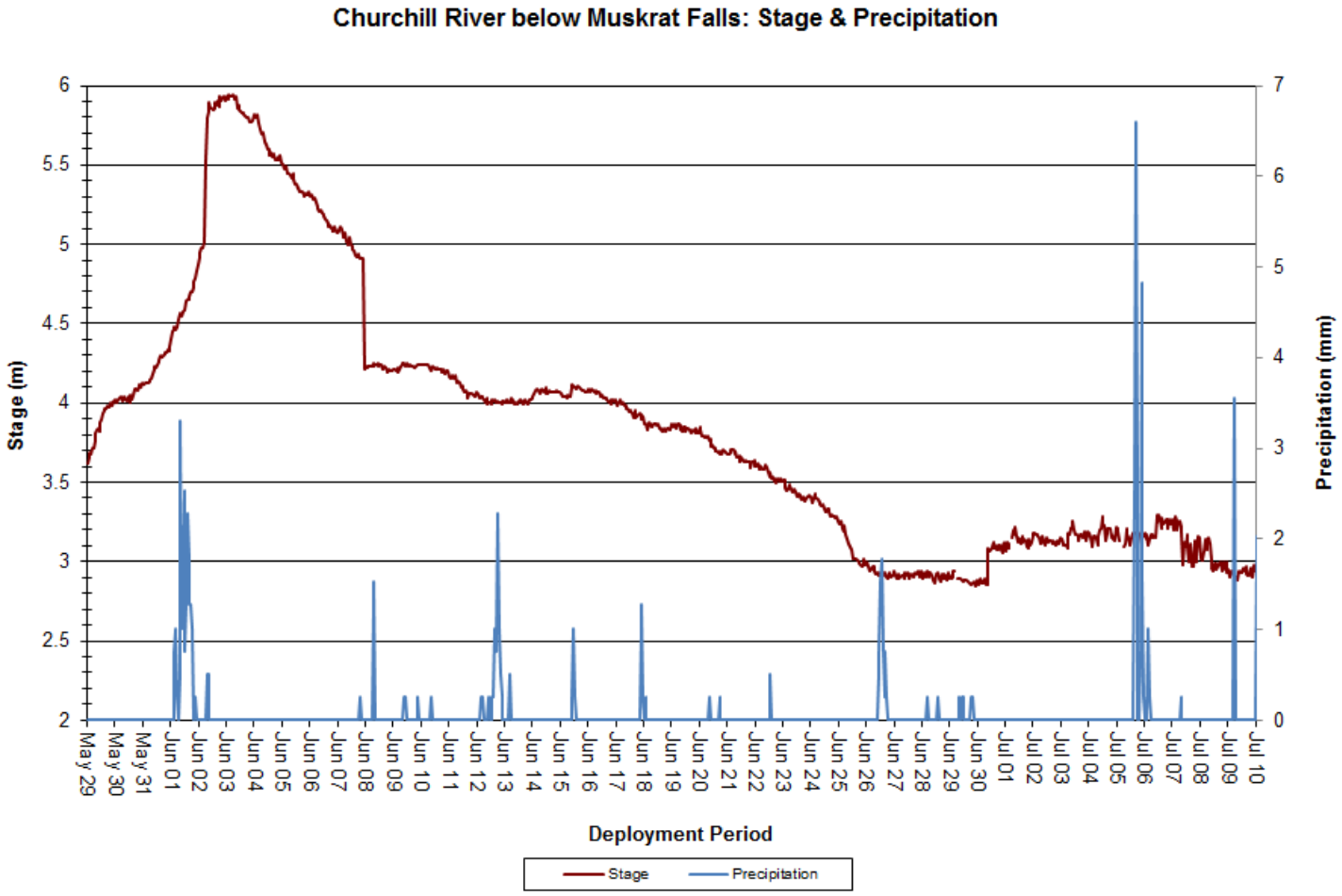

Figure 7: Stage & Precipitation (Muskrat Falls Weather Station) at Churchill River below Muskrat Falls

Chlorophyll

- Over the deployment period, chlorophyll ranged from 1.86ug/L to 3.12ug/L, with a median value of 2.39ug/L (Figure 8).
- 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.

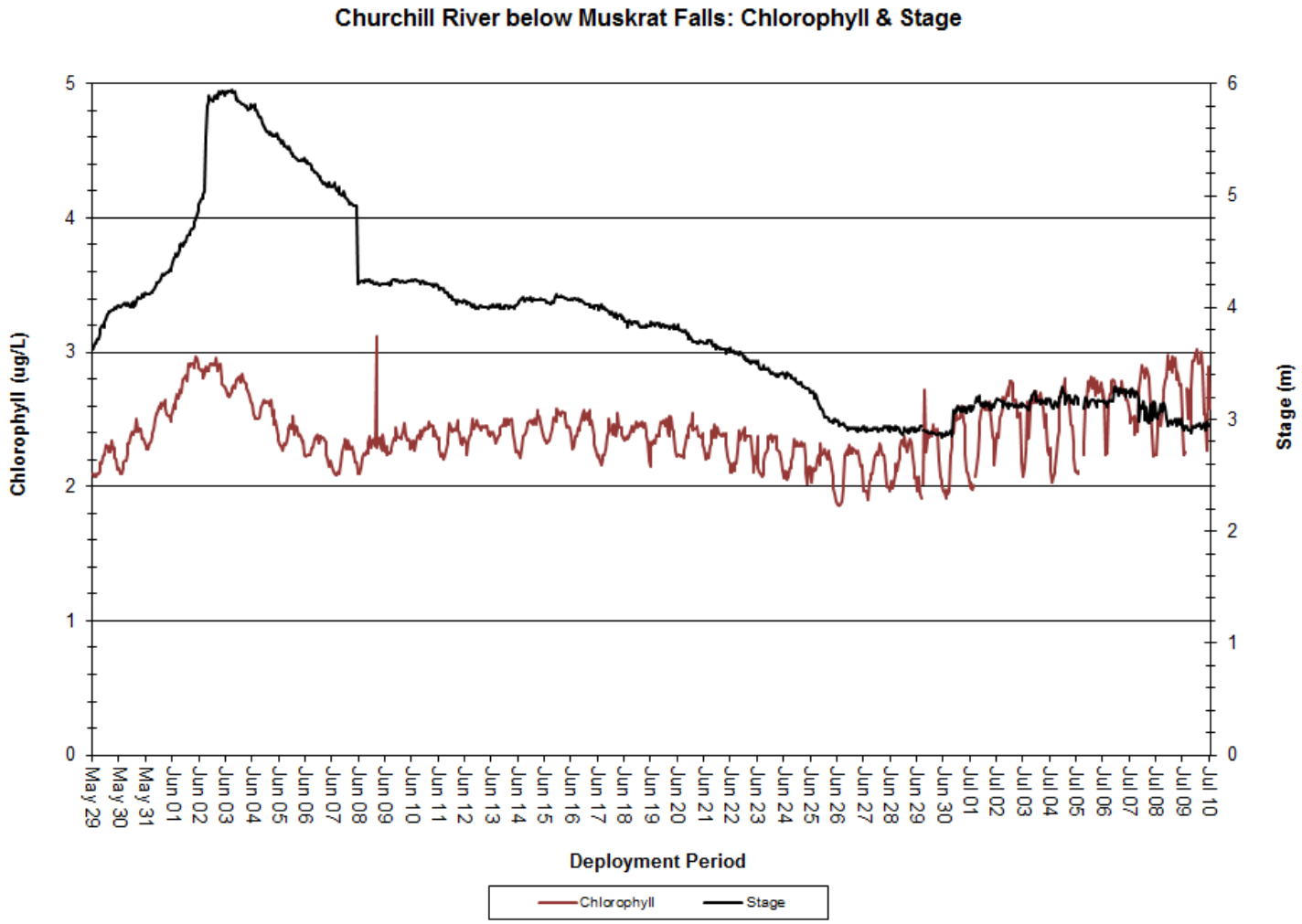

Figure 8: Chlorophyll & Stage at Churchill River below Muskrat Falls

Churchill River at English Point

Water Temperature

- Over the deployment period, water temperature ranged from 1.20°C to 15.50°C, with a median value of 6.60°C (Figure 9). Air temperature data was obtained from the Muskrat Falls Weather Station.
- Water temperature gradually increased over the course of deployment, a trend that is expected as air temperatures also increased into the summer months. Water temperatures closely correlate 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.

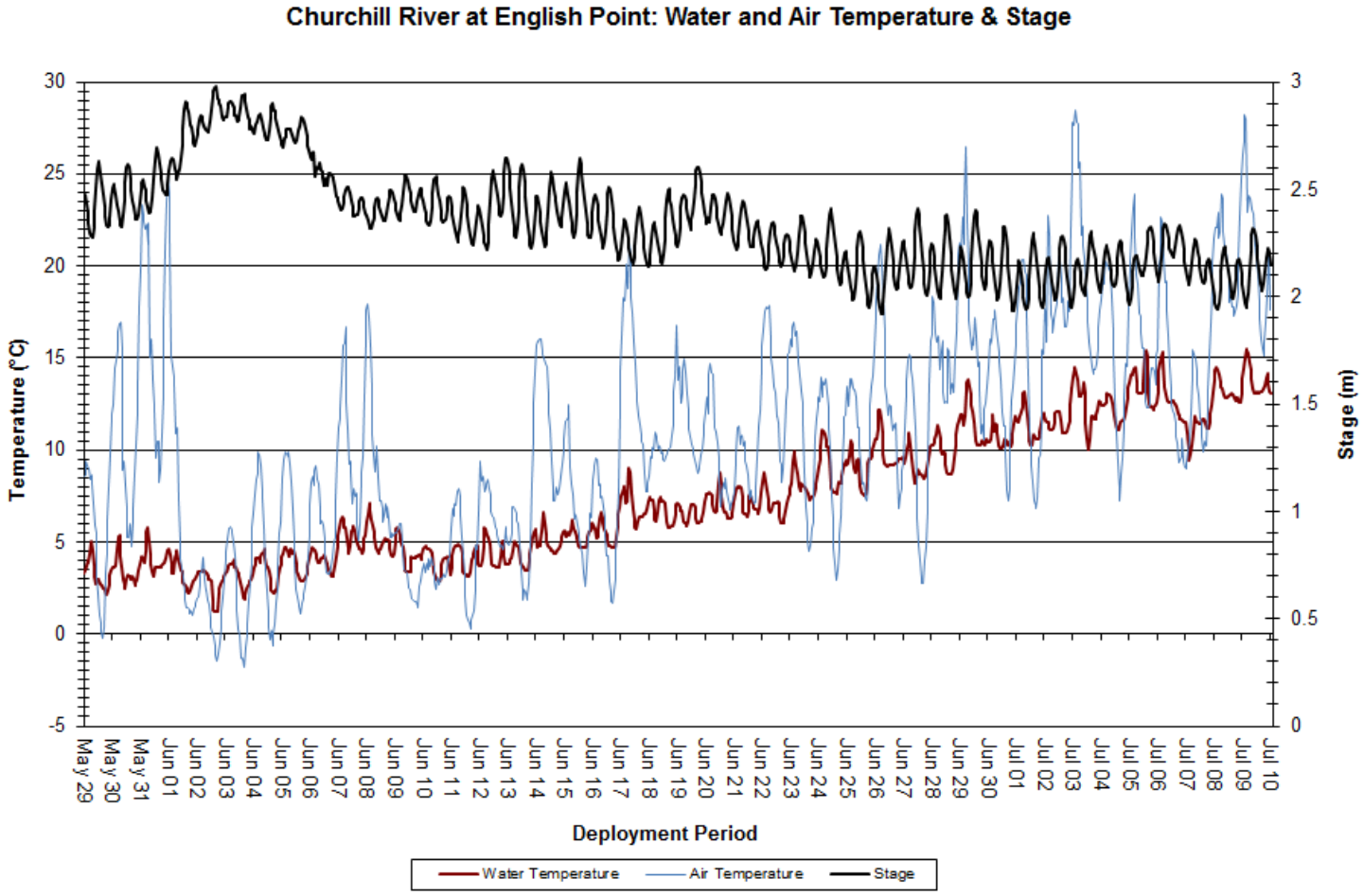

Figure 9: Water and Air Temperature & Stage at Churchill River at English Point

pH

- pH ranged from 5.67 pH units to 6.47 pH units, with a median value of 6.27 (Figure 10).
- pH values remained below the CCME's Minimum Guideline for the Protection of Aquatic Life for the duration of deployment. This may be due to large influxes of freshwater from spring melt.
- 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.

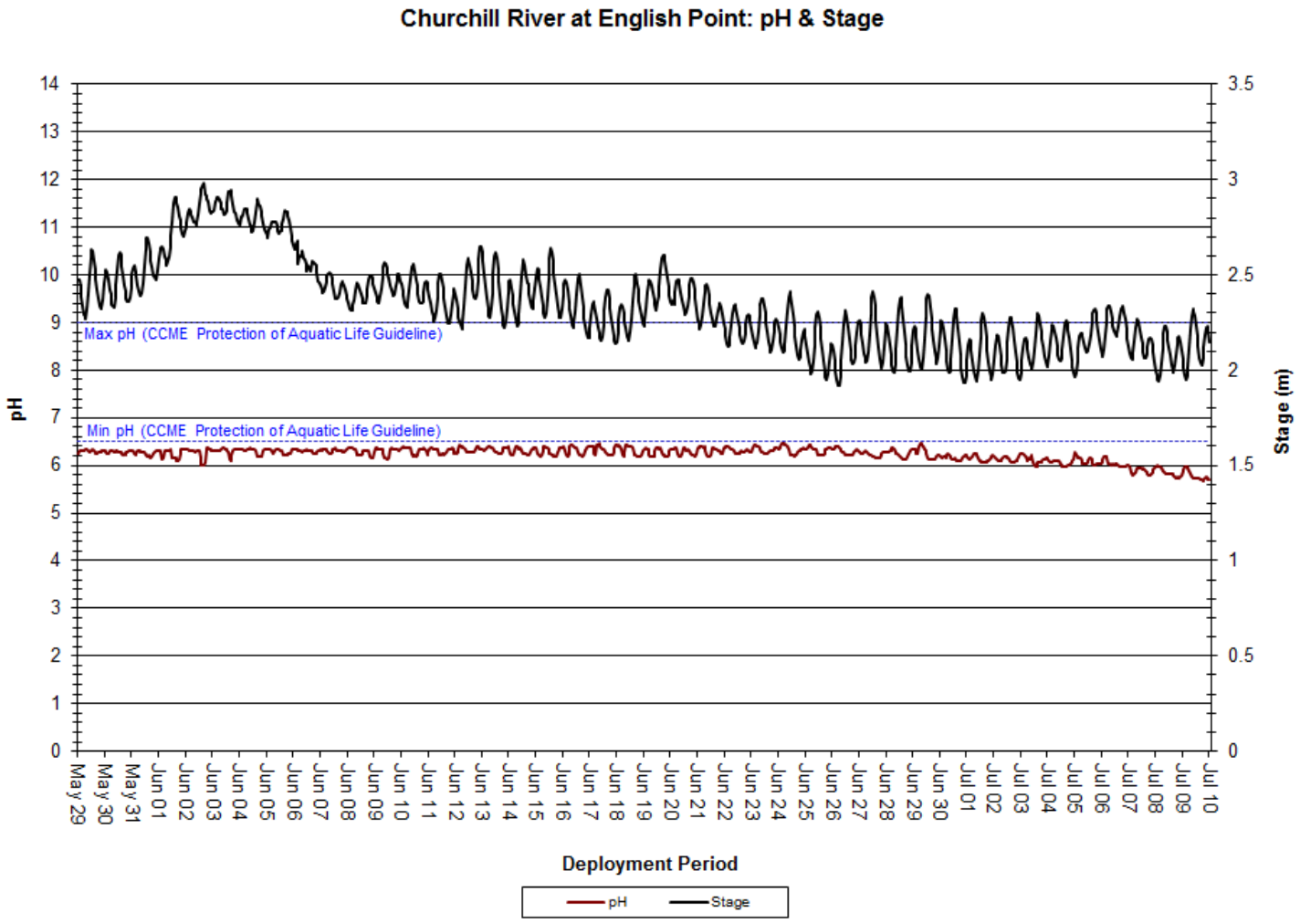

Figure 10: pH & Stage at Churchill River at English Point

Specific Conductivity

- Over the deployment period, specific conductivity ranged from 9.4µS/cm to 43.9µs/cm, with a median value of 27.7µS/cm (Figure 11).
- 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 11).
- 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.

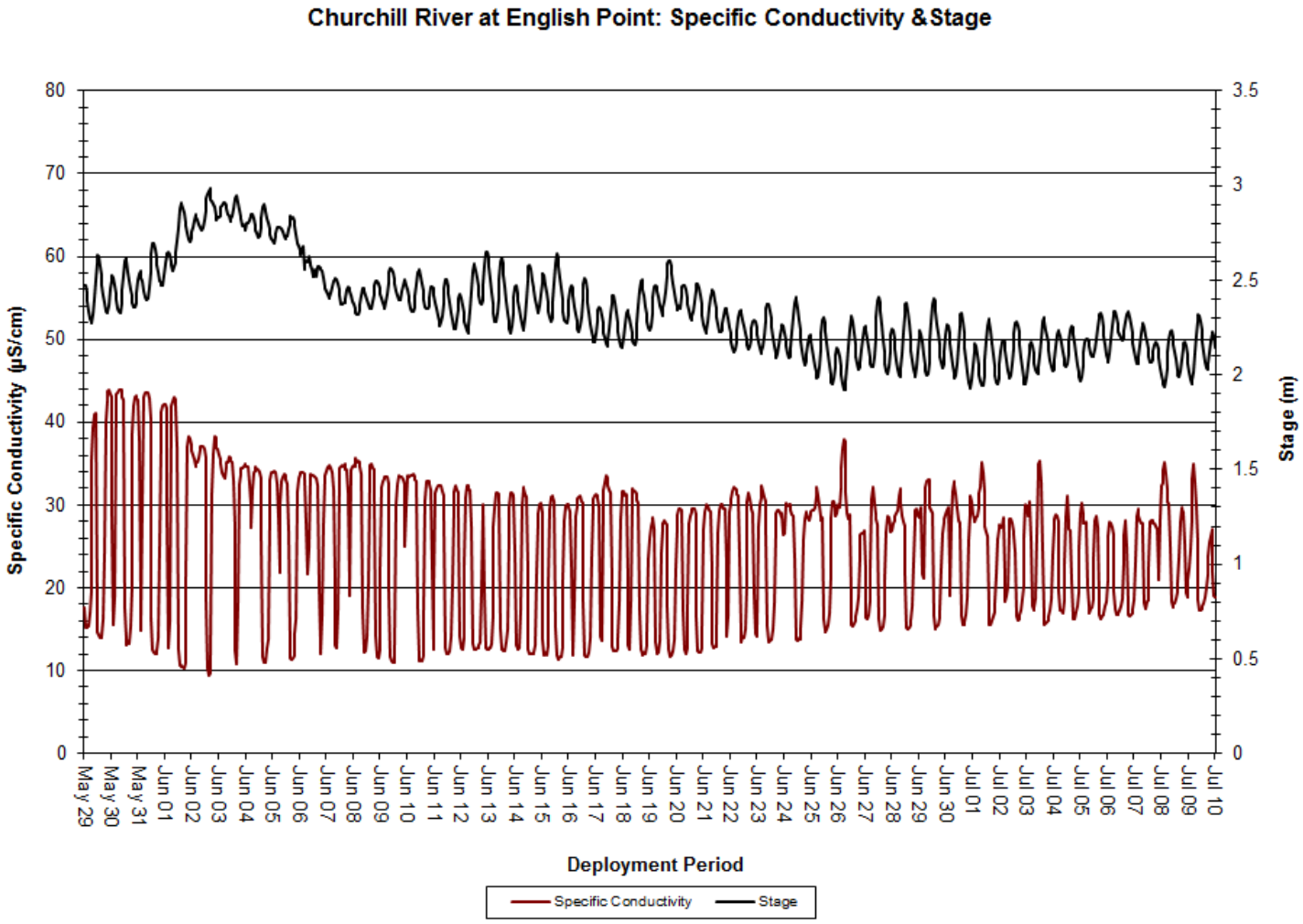

Figure 11: Specific Conductivity & Stage at Churchill River at English Point

Dissolved Oxygen

- Over the deployment period, dissolved oxygen concentration ranged from 10.23mg/L to 15.48mg/L, with a median value of 11.82mg/L. Saturation of dissolved oxygen ranged from 80.0% to 115.8%, with a median value of 102.3% (Figure 12).
- There is an evident relationship between water temperature and dissolved oxygen. As water temperatures increased over the deployment period, dissolved oxygen levels slowly decreased. Dissolved oxygen levels also follow a diurnal pattern as water temperature rises and falls under the influence of ambient air temperature. Generally, dissolved oxygen levels are higher in a waterbody during cooler temperatures.
- Dissolved oxygen levels remained above the CCME's Guideline for the Protection of Early Life Stages for the duration of deployment (Figure 12). This is to be expected considering the cooler water temperatures observed over the deployment period.

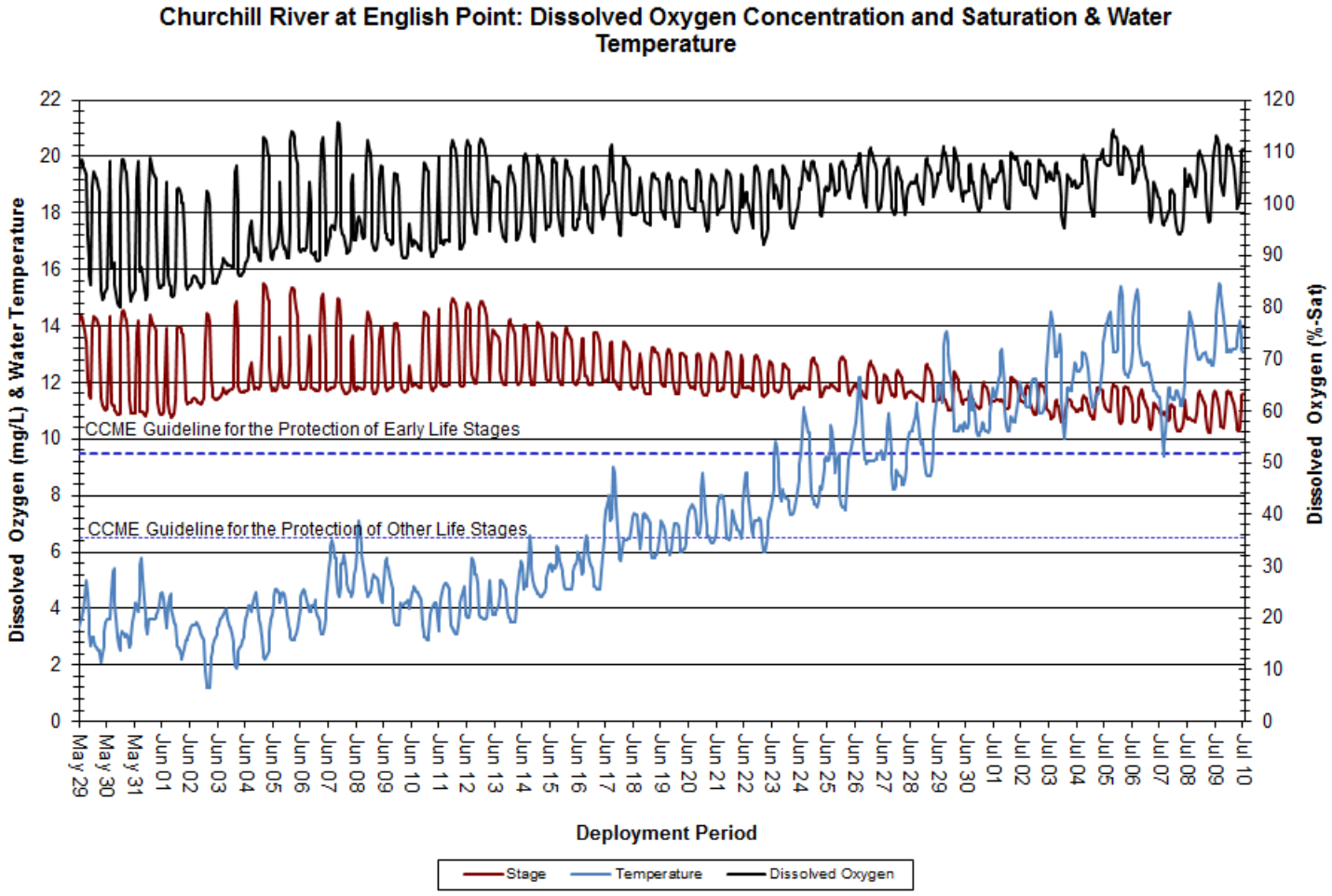

Figure 12: Dissolved Oxygen & Water Temperature at Churchill River at English Point

Turbidity

- Over the deployment period, turbidity ranged from 0.0NTU to 129.9NTU, with a median value of 15.4NTU (Figure 13).
- A median value of 15.4NTU indicates a significant level of background turbidity; while this is not unusual at this site, there may have been sediment build-up around the field sonde from June 20th onward that attributed to higher-than-expected turbidity levels. This is further supported by the observation that after June 20th, turbidity levels failed to return to baseline levels as they did during the first half of deployment.
- Turbidity events often correlate with increases in stage and precipitation events, as precipitation can increase the presence of suspended material in the water column (Figure 13). High winds can also increase turbidity levels at this station by stirring up sediment from the river bed.
- 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.

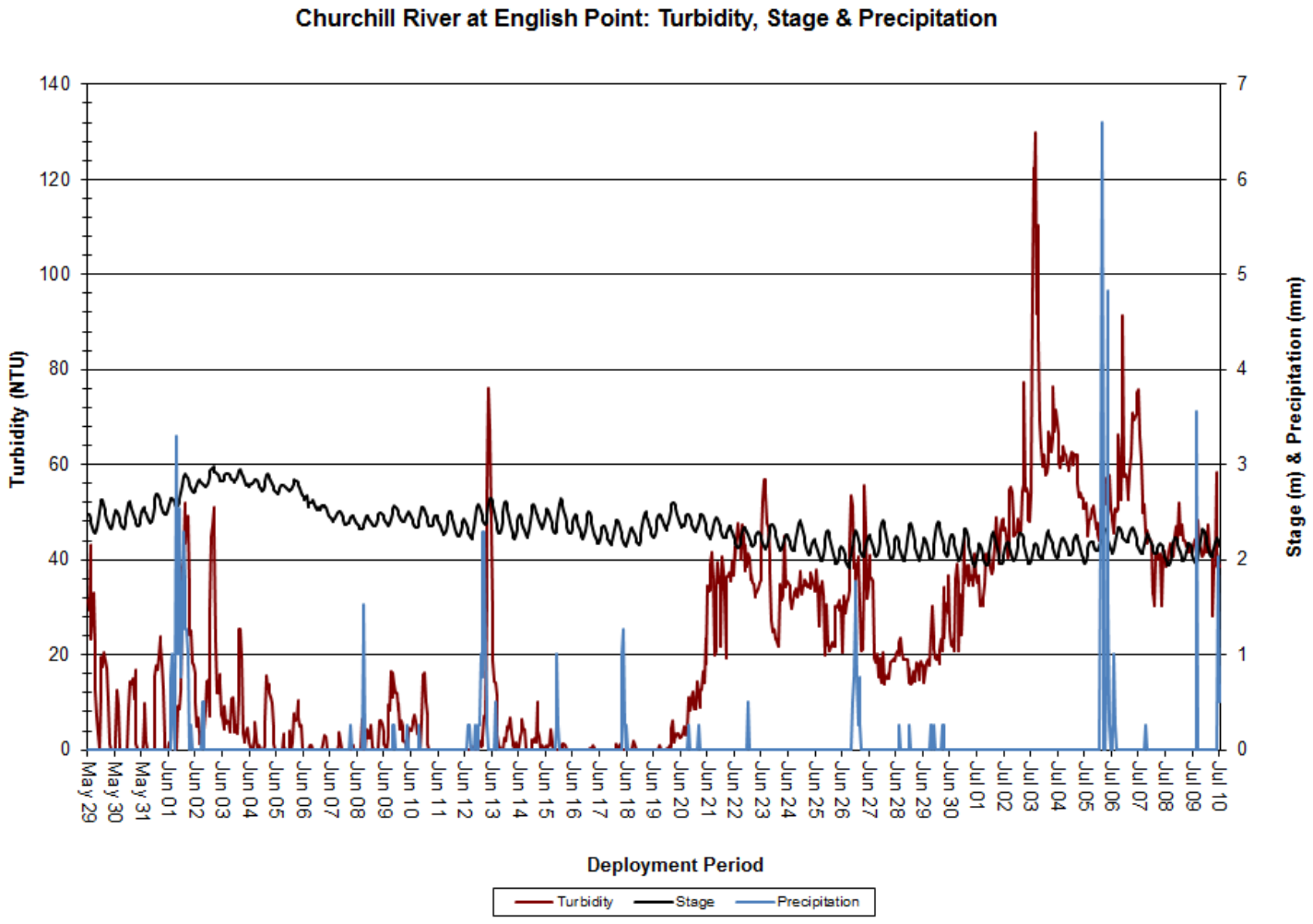

Figure 13: Turbidity, Stage & Precipitation at Churchill River at English Point

Stage

- Over the deployment period, stage ranged from 1.92m to 2.98m, with a median value of 2.32m (Figure 14). Precipitation data was obtained from the Muskrat Falls Weather Station.
- Stage fluctuates at this location due to the tidal influences of the Atlantic Ocean. As such, precipitation events are less easily correlated with increases in stage; however, the relationship between the two still exists and is evident in the graph below, particularly on June 2nd (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.

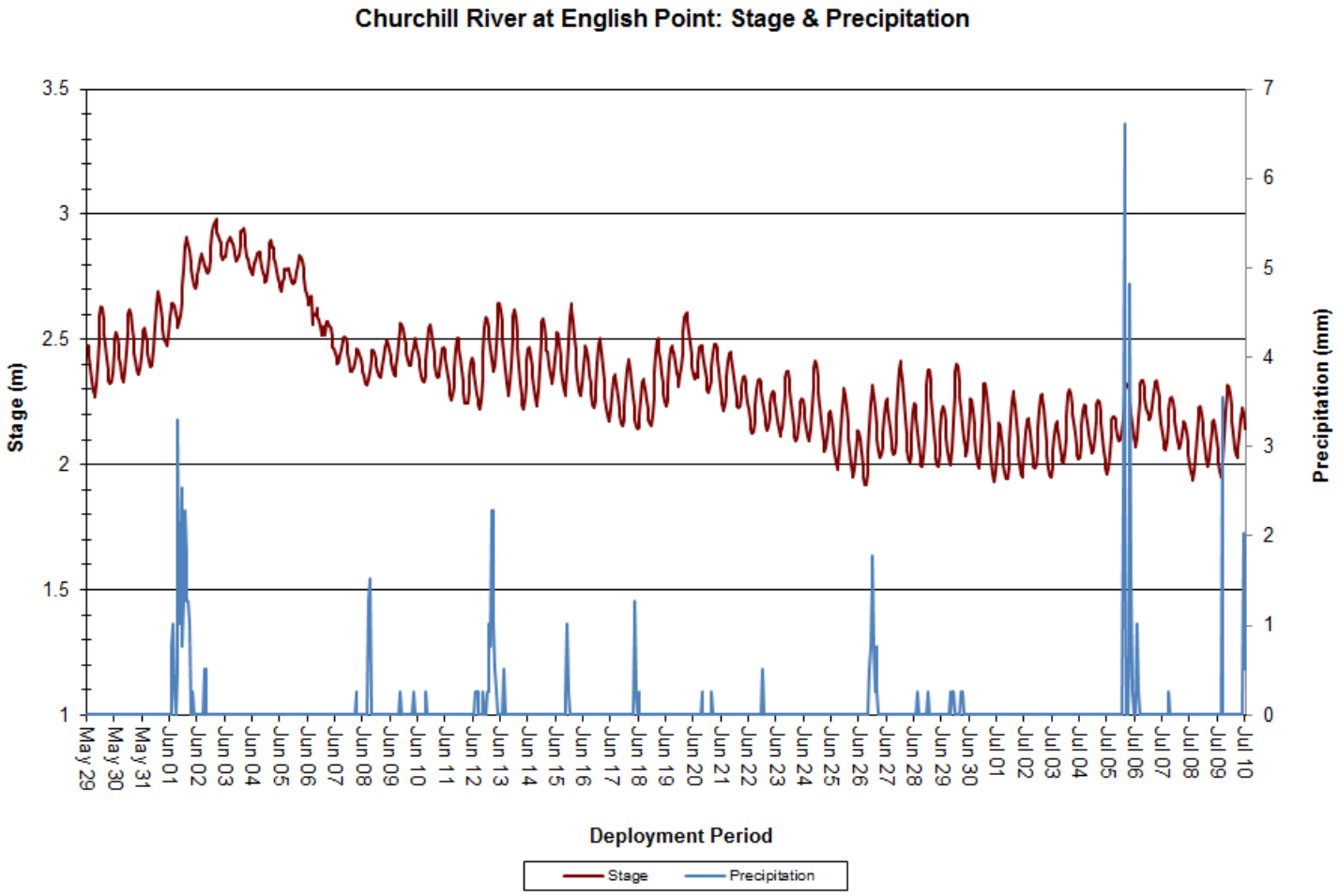

Figure 14: Stage & Precipitation at Churchill River at English Point

Conclusions

- Instruments were deployed at the Churchill River below Muskrat Falls and Churchill River at English Point water quality monitoring stations on the Lower Churchill River from May 29th to July 10th, 2018. The stations above Grizzle Rapids and below Metchin River could not be deployed due to seasonal conditions. The station above Muskrat Falls could not be deployed due to location and accessibility concerns.
- Water temperature was increasing at both stations throughout the deployment period due to the increasing ambient air temperatures in the region during the same period.
- pH was stable at both stations; however, pH levels remained below the CCME's Minimum Guideline for the Protection of Aquatic Life for the duration of deployment.
- Specific conductivity levels showed some variation at Churchill River below Muskrat Falls, demonstrating an expected inverse relationship with stage. This relationship was less evident at Churchill River at English Point due to tidal influences from the Atlantic Ocean, which cause significant fluctuation in conductivity levels.
- Dissolved oxygen concentrations were generally decreasing at both stations throughout the deployment period. This is to be expected as water temperatures increased with the change from spring to summer.
- Turbidity data at both stations showed several turbidity events related to precipitation. There is known consistent background turbidity at both of these stations due to high levels of sediment.

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

REPORT OF ANALYSIS

Lab Report Number: 1808732

Cient:	Department of Environment	**COC Number:**	831753
Attention:	Ms. Tara Clinton	**Date Reported:**	2018-06-13
Client Project:		**Date Submitted:**	2018-06-01
Purchase Order:	2180014302	**Sample Matrix:**	Water

LAB ID	Supply / Description	Client Sample ID	Sample Date
1362357	WS-S-0000 CR below MF	2018-6300-00-SI-SP	2018-05-28

Sample comment:

Turbidity was analysed past recomended holding time.

Report comment:

ANALYTE	UNIT	MRL	RESULT
Alkalinity as CaCO3	mg/L	5	6
Bromide	mg/L	0.25	<0.25
Chloride	mg/L	1	<1
Colour	TCU	2	44
Conductivity	uS/cm	5	17
Dissolved Organic Carbon	mg/L	0.5	6.2
Fluoride	mg/L	0.10	<0.10
Hardness as CaCO3	mg/L	1	5
N-NH3 (Ammonia)	mg/L	0.02	0.11
N-NO2 (Nitrite)	mg/L	0.10	<0.10
N-NO3 (Nitrate)	mg/L	0.10	<0.10
pH		1.00	7.00
Sulphate	mg/L	1	<1
Total Dissolved Solids (COND - CALC)	mg/L	1	11
Total Kjeldahl Nitrogen	mg/L	0.1	0.2
Total Organic Carbon	mg/L	0.5	5.7
Total Phosphorus	mg/L	0.002	0.016
Turbidity	NTU	0.1	5.6

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at http://www.cala.ca/scopes/2602.pdf.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

APPROVAL: Sarah Horner

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Client Project:		**Date Submitted:**	2018-06-01
Purchase Order:	2180014302	**Sample Matrix:**	Water

LAB ID	Supply / Description	Client Sample ID	Sample Date	ANALYTE	UNIT	MRL	RESULT
1362357	WS-S-0000 CR below MF	2018-6300-00-SI-SP	2018-05-28	Aluminum	mg/L	0.01	0.35
				Antimony	mg/L	0.0005	<0.0005
				Arsenic	mg/L	0.001	<0.001
				Barium	mg/L	0.01	0.01
				Boron	mg/L	0.01	<0.01
				Calcium	mg/L	1	2
				Cadmium	mg/L	0.0001	<0.0001
				Chromium	mg/L	0.001	<0.001
				Copper	mg/L	0.001	0.001
				Iron	mg/L	0.03	0.53
				Lead	mg/L	0.001	<0.001
				Magnesium	mg/L	1	<1
				Manganese	mg/L	0.01	0.02
				Mercury	mg/L	0.0001	<0.0001
				Nickel	mg/L	0.005	<0.005
				Potassium	mg/L	1	<1
				Selenium	mg/L	0.001	<0.001
				Sodium	mg/L	2	<2

Sample comment:

Turbidity was analysed past recomended holding time.

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at http://www.cala.ca/scopes/2602.pdf.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

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Client Project:		**Date Submitted:**	2018-06-01
Purchase Order:	2180014302	**Sample Matrix:**	Water

LAB ID	Supply / Description	Client Sample ID	Sample Date	ANALYTE	UNIT	MRL	RESULT
1362357	WS-S-0000	2018-6300-00-SI-SP	2018-05-28	Strontium	mg/L	0.001	0.011
	CR below MF			Uranium	mg/L	0.001	<0.001
				Zinc	mg/L	0.01	<0.01
				Total Suspended Solids	mg/L	2	22

Sample comment:
Turbidity was analysed past recomended holding time.

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at http://www.cala.ca/scopes/2602.pdf.
Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

APPROVAL: Sarah Horner

REPORT OF ANALYSIS

Lab Report Number: **1808732**

Cient:	Department of Environment	**COC Number:**	831753
Attention:	Ms. Tara Clinton	**Date Reported:**	2018-06-13
Client Project:		**Date Submitted:**	2018-06-01
Purchase Order:	2180014302	**Sample Matrix:**	Water

LAB ID	Supply / Description	Client Sample ID	Sample Date
1362358	WS-S-0000 CR @ English Point	2018-6302-00-SI-SP	2018-05-28

Sample comment:

Turbidity was analysed past recomended holding time.

Report comment:

ANALYTE	UNIT	MRL	RESULT
Alkalinity as CaCO3	mg/L	5	12
Bromide	mg/L	0.25	<0.25
Chloride	mg/L	1	6
Colour	TCU	2	66
Conductivity	uS/cm	5	49
Dissolved Organic Carbon	mg/L	0.5	7.0
Fluoride	mg/L	0.10	<0.10
Hardness as CaCO3	mg/L	1	9
N-NH3 (Ammonia)	mg/L	0.02	0.13
N-NO2 (Nitrite)	mg/L	0.10	<0.10
N-NO3 (Nitrate)	mg/L	0.10	<0.10
pH		1.00	7.22
Sulphate	mg/L	1	1
Total Dissolved Solids (COND - CALC)	mg/L	1	32
Total Kjeldahl Nitrogen	mg/L	0.1	0.2
Total Organic Carbon	mg/L	0.5	6.8
Total Phosphorus	mg/L	0.002	0.025
Turbidity	NTU	0.1	12.2

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APPROVAL: Sarah Horner

REPORT OF ANALYSIS

Lab Report Number: **1808732**

Cient:	Department of Environment	**COC Number:**	831753
Attention:	Ms. Tara Clinton	**Date Reported:**	2018-06-13
Client Project:		**Date Submitted:**	2018-06-01
Purchase Order:	2180014302	**Sample Matrix:**	Water

LAB ID	Supply / Description	Client Sample ID	Sample Date	ANALYTE	UNIT	MRL	RESULT
1362358	WS-S-0000 CR @ English Point	2018-6302-00-SI-SP	2018-05-28	Aluminum	mg/L	0.01	0.33
				Antimony	mg/L	0.0005	<0.0005
				Arsenic	mg/L	0.001	<0.001
				Barium	mg/L	0.01	0.01
				Boron	mg/L	0.01	<0.01
				Calcium	mg/L	1	2
				Cadmium	mg/L	0.0001	<0.0001
				Chromium	mg/L	0.001	<0.001
				Copper	mg/L	0.001	0.001
				Iron	mg/L	0.03	0.94
				Lead	mg/L	0.001	<0.001
				Magnesium	mg/L	1	1
				Manganese	mg/L	0.01	0.03
				Mercury	mg/L	0.0001	<0.0001
				Nickel	mg/L	0.005	<0.005
				Potassium	mg/L	1	<1
				Selenium	mg/L	0.001	<0.001
				Sodium	mg/L	2	4

Sample comment:

Turbidity was analysed past recomended holding time.

Report comment:

Eurofins (Ottawa) is accredited for specific parameters by CALA. The scope can be viewed at http://www.cala.ca/scopes/2602.pdf.
Results relate only to the parameters tested on the samples submitted.
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APPROVAL: Sarah Horner

REPORT OF ANALYSIS

Lab Report Number: 1808732

Cient:	Department of Environment	**COC Number:**	831753
Attention:	Ms. Tara Clinton	**Date Reported:**	2018-06-13
Client Project:		**Date Submitted:**	2018-06-01
Purchase Order:	2180014302	**Sample Matrix:**	Water

LAB ID	Supply / Description	Client Sample ID	Sample Date	ANALYTE	UNIT	MRL	RESULT
1362358	WS-S-0000	2018-6302-00-SI-SP	2018-05-28	Strontium	mg/L	0.001	0.018
	CR @ English Point			Uranium	mg/L	0.001	<0.001
				Zinc	mg/L	0.01	<0.01
				Total Suspended Solids	mg/L	2	12

Sample comment:

Turbidity was analysed past recomended holding time.

Report comment:

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Results relate only to the parameters tested on the samples submitted.
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APPROVAL: Sarah Horner