



Real-Time Water Quality Deployment Report

Voisey's Bay Network

July 16 to August 6, 2022



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

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Real Time Water Quality Monitoring

Staff with the Department of Environment and Climate Change monitor the real-time web pages regularly.

This deployment report discusses water quality related events occurring at four stations in the Voisey's Bay Network: Reid Brook at Outlet to Reid Pond; Camp Pond Brook below Camp Pond; Tributary to Reid Brook; and Reid Brook below Tributary.

On July 16, 2022, Vale Environment staff deployed real-time water quality monitoring instruments at the four real-time stations in the Voisey's Bay network. Instruments were removed by Vale Environment Staff on August 6, 2022. This was the first deployment for the 2022 season.

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 adjacent to 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 about the data quality (Table 1).

Table 1: Ranking classifications for deployment and removal

Parameter	Rank				
	Excellent	Good	Fair	Marginal	Poor
Temperature (oC)	<=+/-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 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 Voisey's Bay Network stations are summarized in Table 2.

Table 2: Comparison rankings for Voisey's Bay Network stations

Station Voisey's Bay	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Reid Brook at Outlet	July 16	Deployment	Good	Good	Excellent	Excellent	Excellent
	August 6	Removal	Poor	Good	Excellent	Excellent	Fair
Camp Pond Brook	July 16	Deployment	Excellent	Fair	Excellent	Excellent	Good
	August 6	Removal	Excellent	Excellent	Excellent	Excellent	Excellent
Reid Brook below Tributary	July 16	Deployment	Good	Fair	Excellent	Excellent	Poor
	August 6	Removal	Excellent	Excellent	Excellent	Excellent	Poor
Tributary to Reid Brook	July 16	Deployment	Excellent	Good	Excellent	Fair	Poor
	August 6	Removal	Excellent	Good	Good	Marginal	Poor

Reid Brook at Outlet of Reid Pond

- At deployment, all parameters ranked as either 'excellent' or 'good'.
- At removal, conductivity and dissolved oxygen were 'excellent', pH was 'good', turbidity was 'fair', and temperature was 'poor'. This discrepancy may be due to the QA/QC sonde not being given sufficient time to acclimate or not being placed in close enough proximity to the field sonde.

Camp Pond Brook below Camp Pond

- At deployment, all parameters ranked as either 'excellent' or 'good' with the exception of pH, which was 'fair'. This is likely due to the QA/QC sonde not being given sufficient time to acclimate; this is supported by an 'excellent' comparison rating between the field sonde and grab sample.
- At removal, all parameters ranked as 'excellent'.

Reid Brook below Tributary

- At deployment, conductivity and dissolved oxygen were 'excellent', temperature was 'good', pH was 'fair', while turbidity was 'poor'.
- At removal, all parameters ranked as 'excellent' with the exception of turbidity, which was 'poor'. A turbidity ranking of 'poor' at both deployment and removal most likely indicates a calibration error with the field sonde.

Tributary to Reid Brook

- At deployment, temperature and conductivity were 'excellent', pH was 'good', dissolved oxygen was 'fair', which turbidity was 'poor'.
- At removal, temperature was 'excellent', pH and conductivity were 'good', dissolved oxygen was 'marginal', which turbidity was 'poor'. A turbidity ranking of 'poor' at both deployment and removal most likely indicates a calibration error with the field sonde.

It is important to note that, in general, there are several conditions under which a less than ideal QA/QC ranking may be obtained. These include, but are not limited to: placement of the QA/QC sonde in relation to the field sonde; the amount of time each sonde is given to stabilize before readings are recorded; and deteriorating performance of one or more of the sensors.

Data Interpretation

The following graphs and discussion illustrate significant water quality-related events from July 16th to August 6th, 2022 in the Voisey's Bay Real-Time Water Quality Monitoring Network.

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 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: Voisey's Bay Network Station Locations

Reid Brook at Outlet of Reid Pond

Water Temperature

Over the deployment period, water temperature ranged from 6.83°C to 14.37°C, with a median value of 12.04°C (Figure 2). As evidenced in the graph below, air temperature fluctuates to a much greater extent each day compared to water temperature. Air temperature data was obtained from the Voisey's Bay airstrip weather station.

Water temperature was variable over the course of the deployment period, similar to air temperature. This water body takes longer to acclimate to changes in temperature as it has a much larger surface area compared to the brooks at the other RTWQ stations in this network.

Please note the stage data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

Reid Brook at Outlet of Reid Pond: Water and Air Temperature & Stage

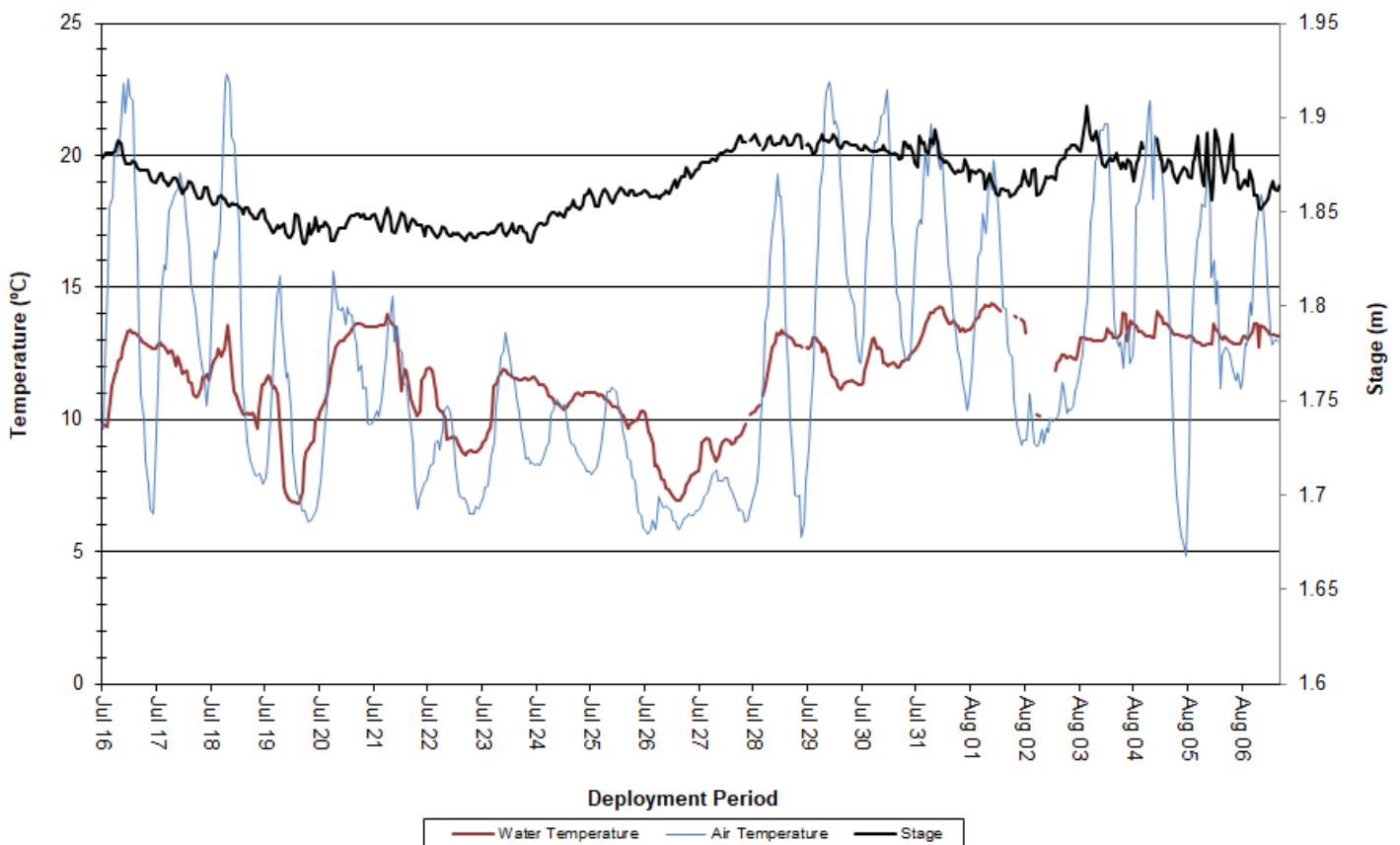


Figure 2: Water and Air Temperature & Stage at Reid Brook at Outlet of Reid Pond

pH

Over the deployment period, pH values ranged from 6.10 pH units to 6.85 pH units, with a median value of 6.70 pH units (Figure 3).

pH levels were within the CCME's Guidelines for the Protection of Aquatic Life for the majority of the deployment period.

Please note the stage data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

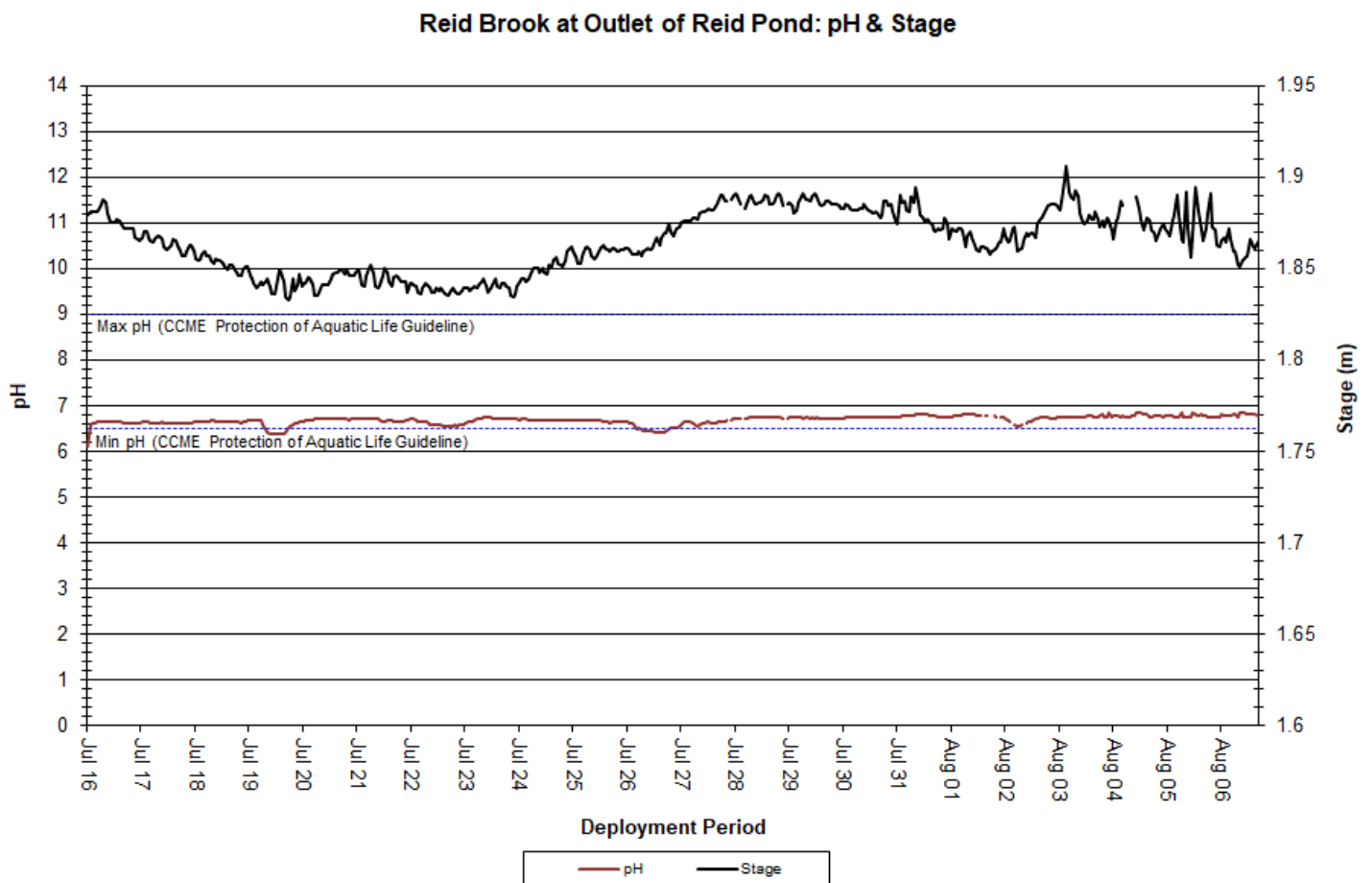


Figure 3: pH & Stage at Reid Brook at Outlet of Reid Pond

Specific Conductivity

Over the deployment period, specific conductivity levels ranged from 10.8 μ S/cm to 11.5 μ S/cm, with a median value of 11.1 μ S/cm. Conductivity at Reid Brook remained very stable across the deployment period. This is to be expected as this water body is pristine in nature and is far removed from any anthropogenic disturbances that could affect water quality.

The relationship between conductivity and stage level is generally inversed. When stage levels decrease, specific conductivity levels increase, as the decreased amount of water in the river system concentrates the solids that are present. Similarly, as stage levels rise, conductivity levels will dip in response. This relationship is not as evident at Reid Brook as it is at other stations in the Voisey's Bay network (Figure 4).

Please note the stage data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

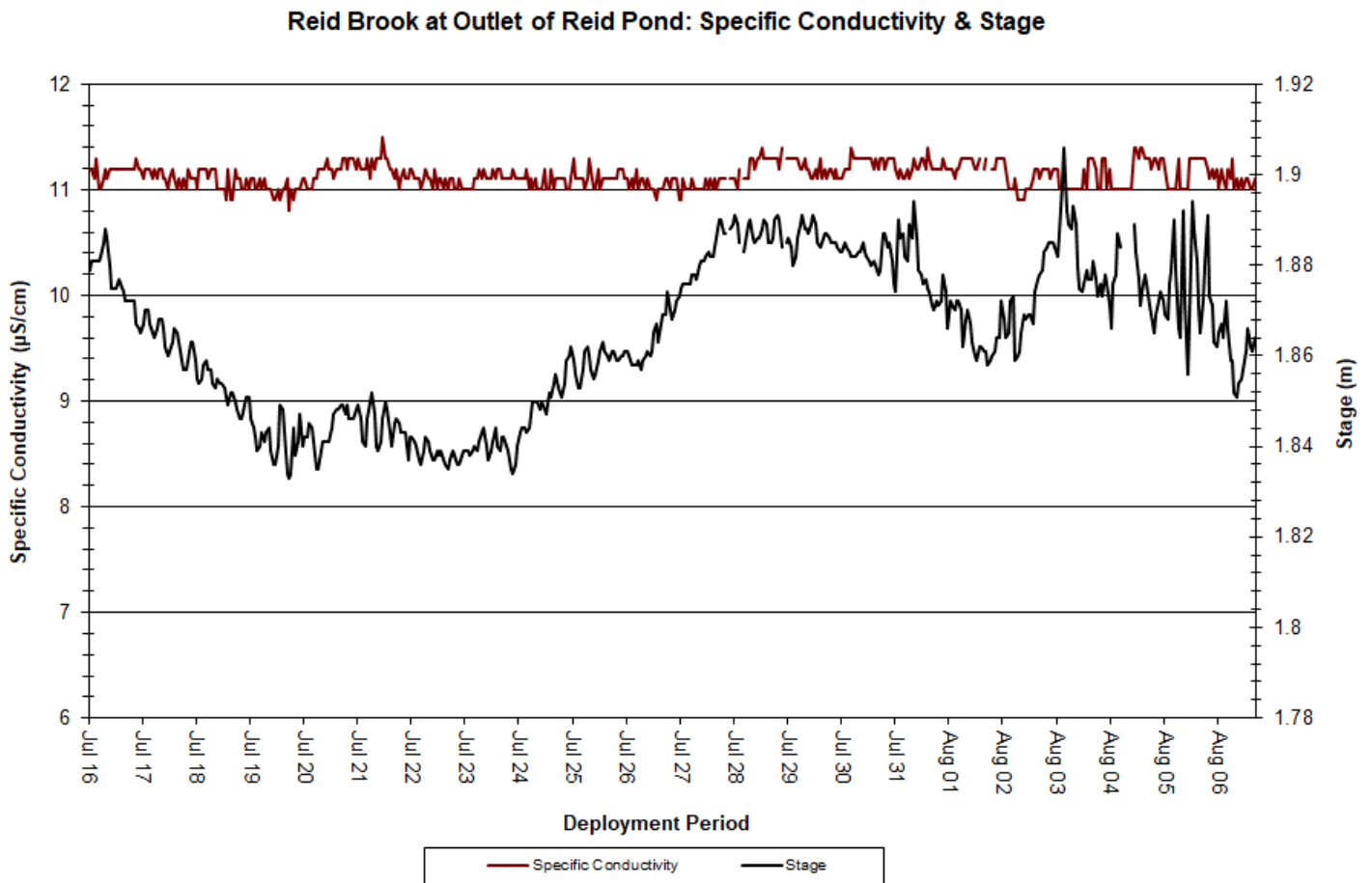


Figure 4: Specific Conductivity & Stage at Reid Brook at Outlet of Reid Pond

Dissolved Oxygen

Over the deployment period, dissolved oxygen concentration levels ranged from 10.33mg/L to 11.97mg/L, with a median value of 11.11mg/L. Percent saturation levels for dissolved oxygen ranged from 98.1% saturation to 108.9% saturation, with a median value of 103.3% saturation (Figure 5).

The water quality instrument measures dissolved oxygen concentration (mg/L) with a dissolved oxygen probe. The instrument then calculates percent saturation (% Sat) taking into account water temperature.

Dissolved oxygen concentration values remained above the CCME's Guidelines for the Protection of Early Life Stages (9.5 mg/L) and Other Life Stages (6.5 mg/L) for the duration of deployment. Dissolved oxygen concentrations were somewhat variable across the deployment period; this is not unexpected given that water temperatures were also variable over the same period. Dissolved oxygen concentrations are generally higher in water at lower temperatures, and vice versa.

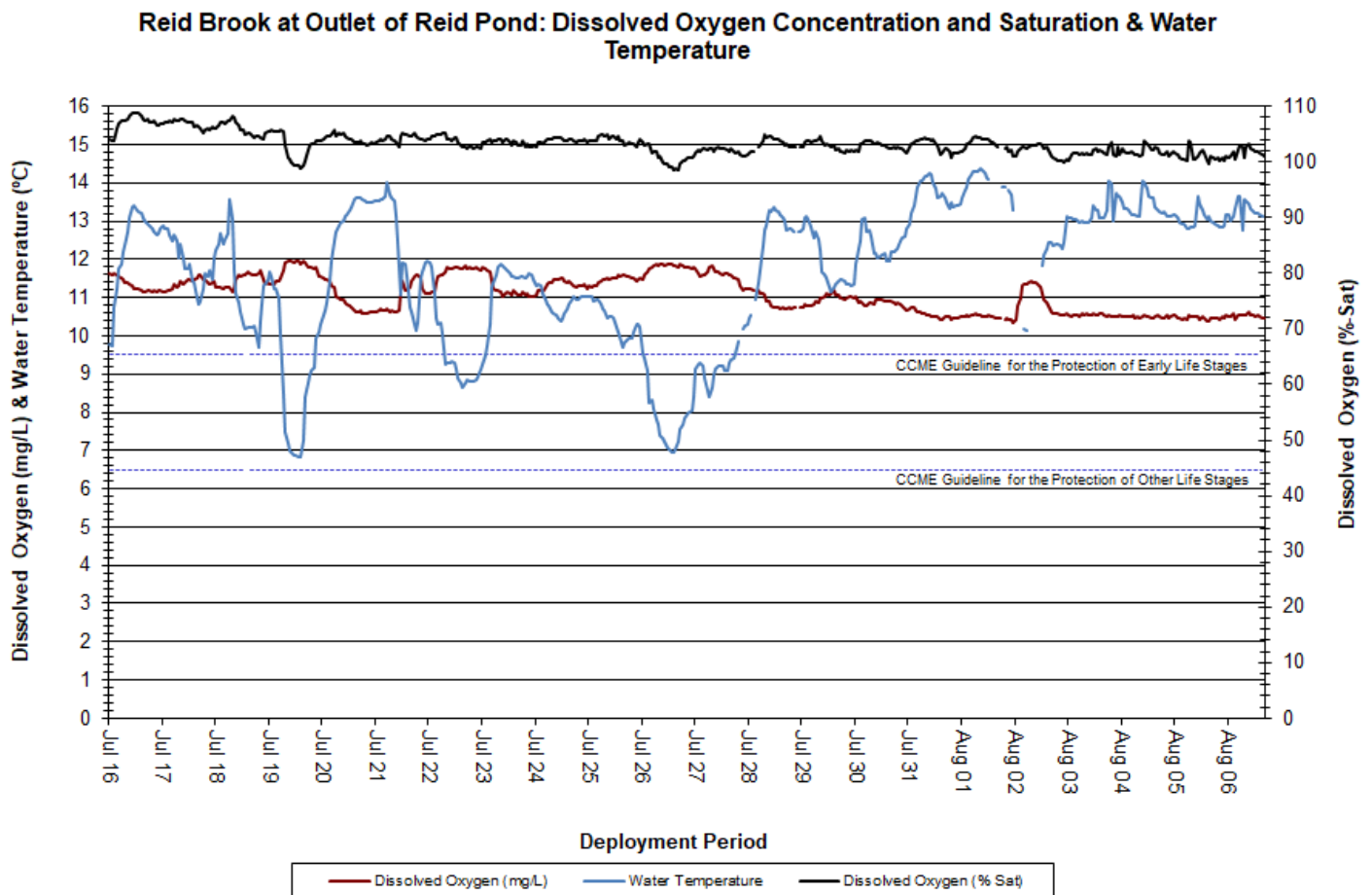


Figure 5: Dissolved Oxygen Concentration and Saturation & Water Temperature at Reid Brook at Outlet of Reid Pond

Turbidity

Over the deployment period, turbidity levels ranged from 0NTU to 3000NTU, with a median value of 7.75NTU (Figure 6). This indicates that there was some background turbidity at this station during deployment. While a low level of turbidity is not unusual at this station, higher sustained turbidity levels towards the end of deployment may indicate sediment build-up around the sensor.

All water bodies have a natural level of turbidity. A significant increase in turbidity is of concern when monitoring water quality. Higher turbidity readings would normally be expected during heavy rainfall or runoff events. Generally, turbidity levels increase for a short period of time and then return to within a baseline range. Turbidity values can also increase when there is a decrease in water level, which causes natural material in the water body to become concentrated.

It is not unusual for this station to see very little variability in turbidity levels, as it is pristine in nature and far removed from anthropogenic influences that may affect water quality.

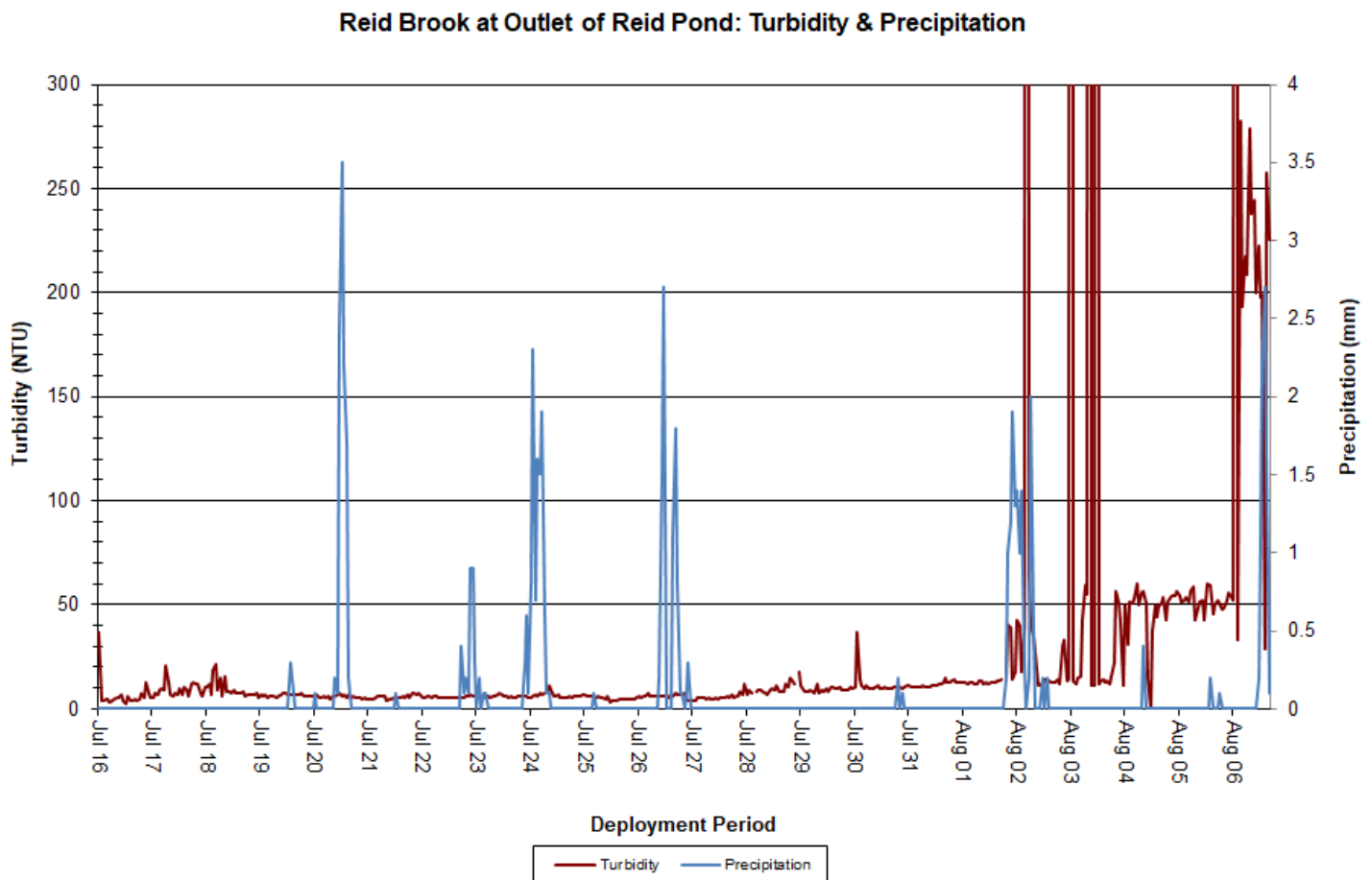


Figure 6: Turbidity & Precipitation at Reid Brook at Outlet of Reid Pond

Stage, Flow & Precipitation

Stage is an important parameter, as it provides an estimate of water level at a station and can explain some of the events that are occurring with other parameters (e.g. specific conductivity, DO, and turbidity). Stage will generally increase during rainfall events (Figure 7) and during any surrounding snow or ice melt; however, direct snowfall will not cause a significant increase in stage.

Over the deployment period, stage values ranged from 1.833m to 1.906m, with a median value of 1.865m. Flow values ranged from 1.595m³/s to 2.299m³/s, with a median value of 1.919m³/s. Precipitation data was obtained from the Voisey's Bay airstrip weather station (Figure 7).

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

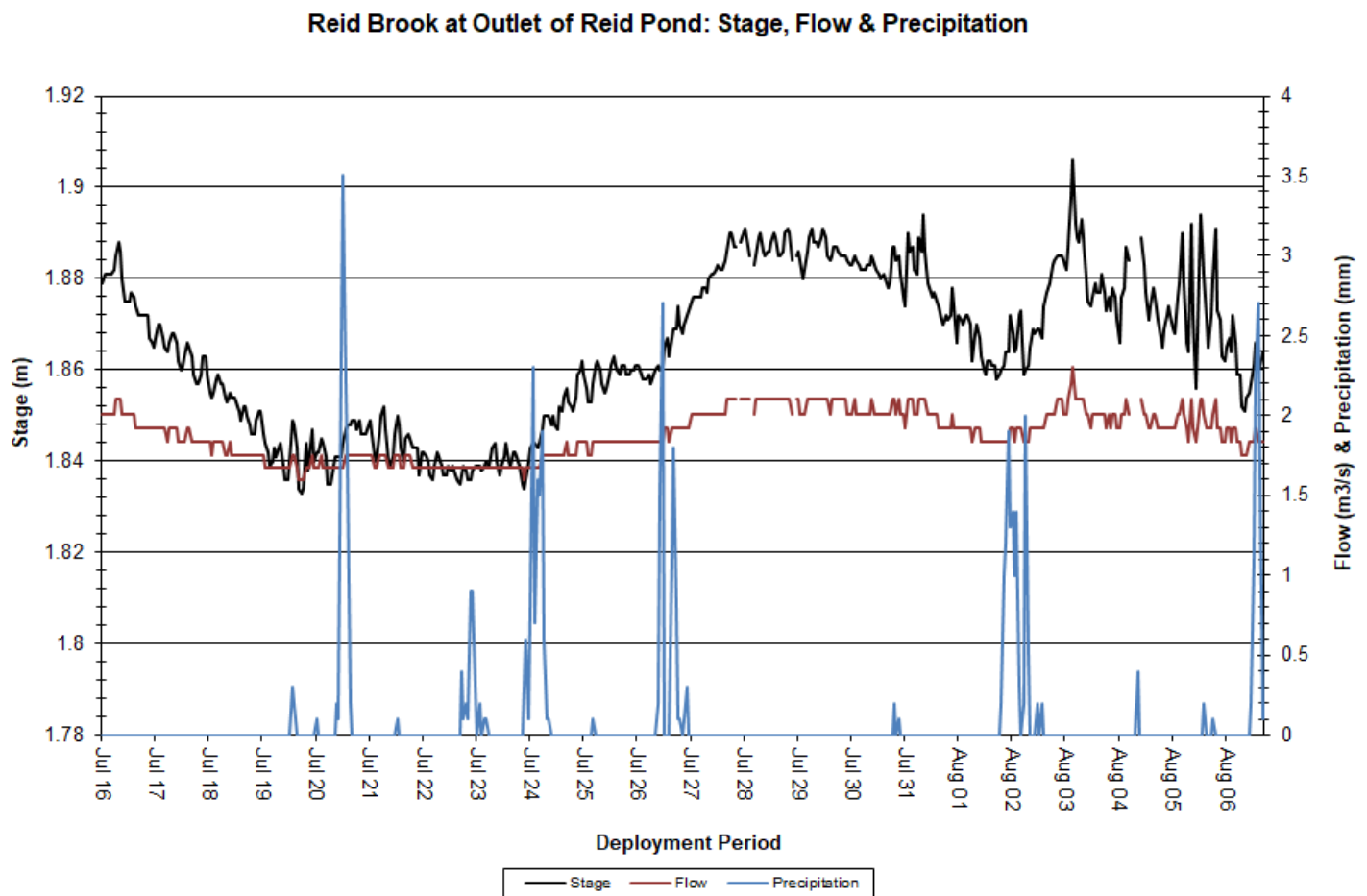


Figure 7: Stage, Flow & Precipitation at Reid Brook at Outlet of Reid Pond

Camp Pond Brook below Camp Pond

Water Temperature

Over the deployment period, water temperature ranged from 10.19°C to 18.69°C, with a median value of 15.22°C (Figure 8).

Water temperature at this station displays diurnal variations. Water temperature was variable over the course of deployment, and correlated closely with air temperatures across the same period (Figure 8). Air temperature data was obtained from the Voisey's Bay airstrip weather station.

Camp Pond Brook is sensitive to changes in ambient air temperature and fluctuates considerably depending on the weather and time of day. This station typically has the highest water temperatures and greatest fluctuations when compared to the other stations in the network.

Please note the stage data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

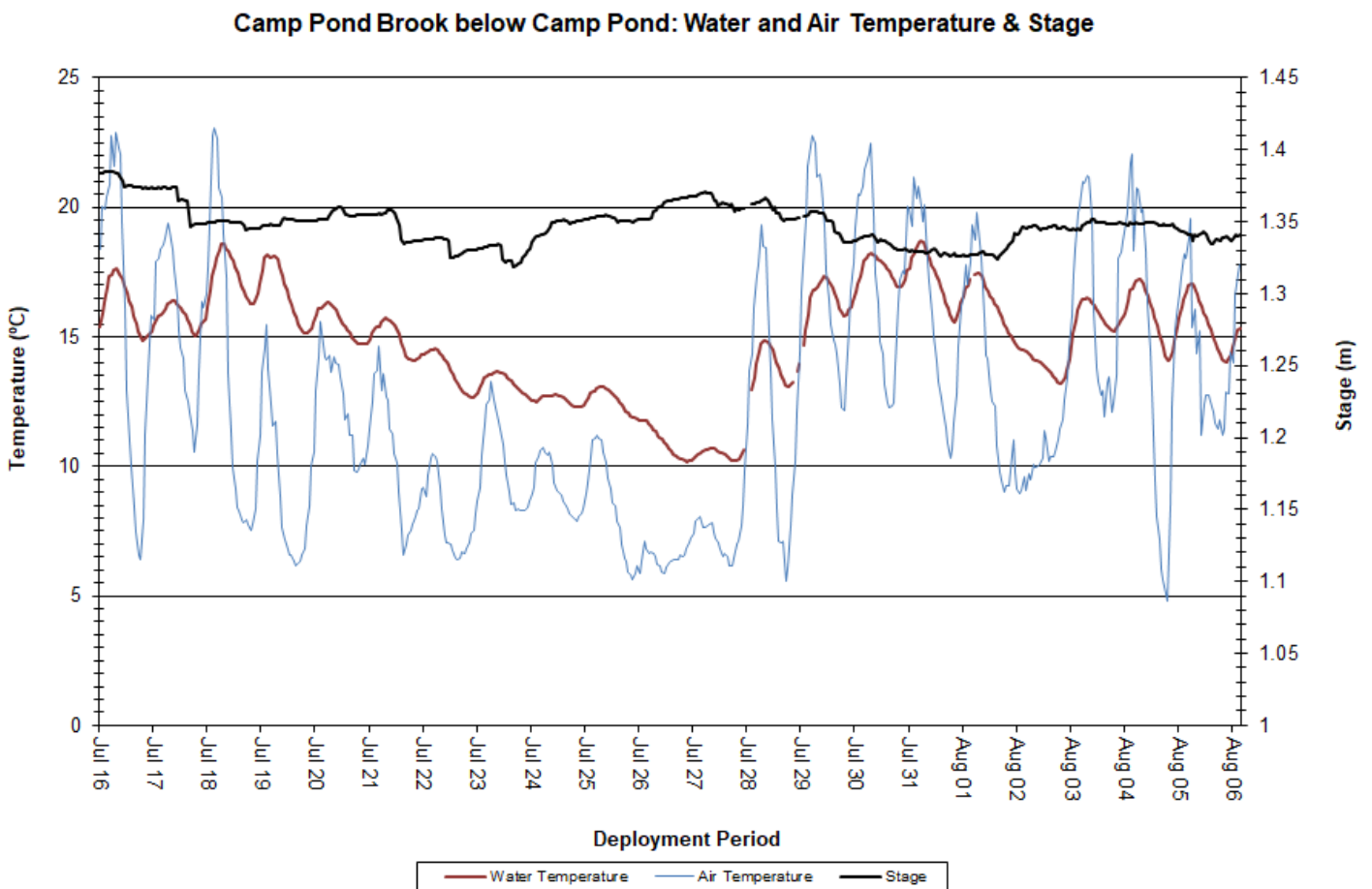


Figure 8: Water and Air Temperature & Stage at Camp Pond Brook below Camp Pond

pH

Over the deployment period, pH values ranged from 6.87 pH units to 7.25 pH units, with a median value of 7.04 pH units (Figure 9).

pH levels were relatively 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.

Natural events such as rainfall and snow melt will alter the pH of a brook for a period of time - pH levels will decrease slightly during and after high stage levels. This is a natural process.

Please note the stage data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

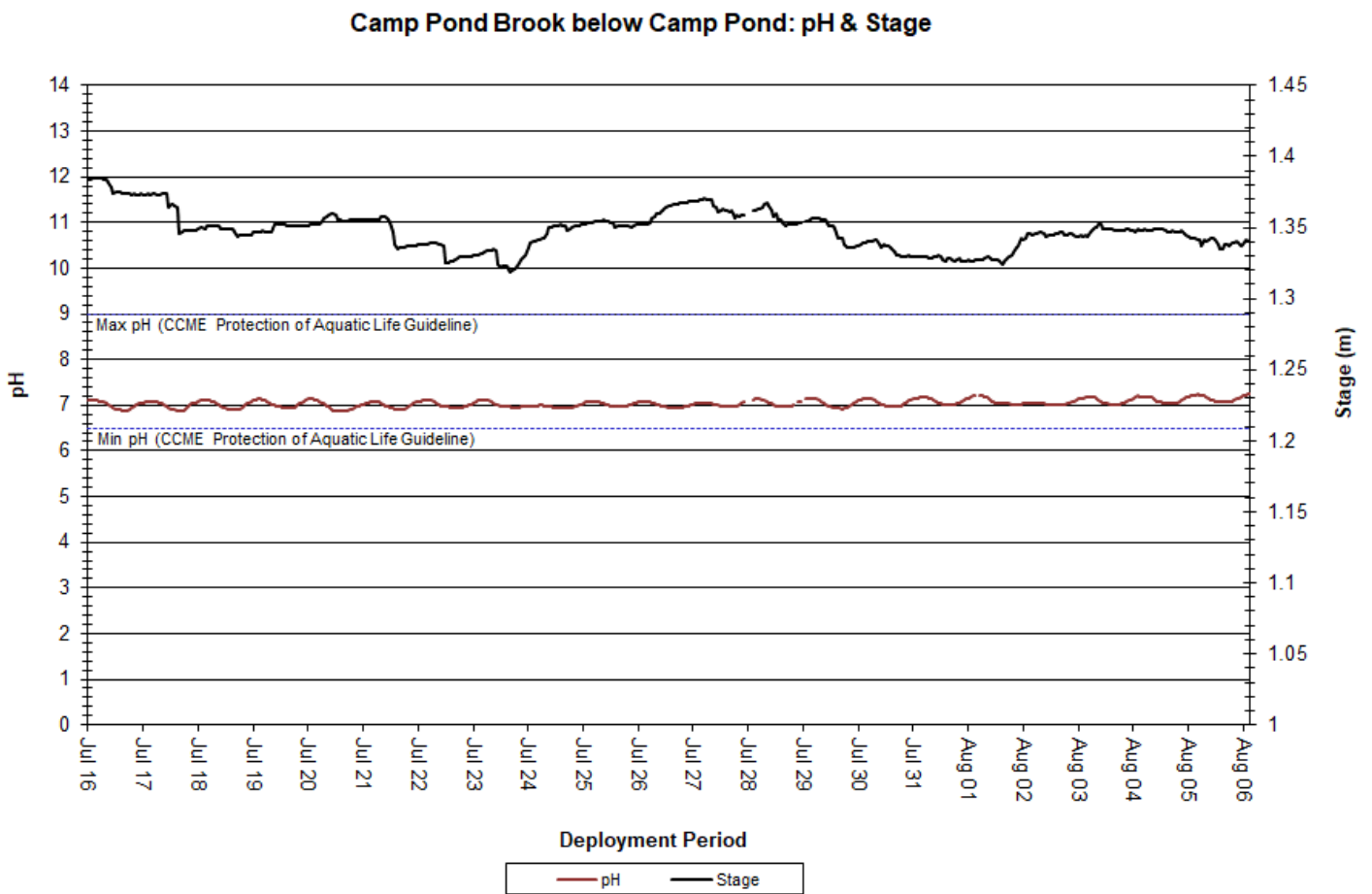


Figure 9: pH & Stage at Camp Pond Brook below Camp Pond

Specific Conductivity

Over the deployment period, specific conductivity ranged from 36.6 μ S/cm to 66.7 μ S/cm, with a median value of 43.4 μ S/cm (Figure 10).

Conductivity levels were variable but slowly increasing across the deployment period as stage gradually decreased. A decrease in water level generally serves to concentrate suspended materials in the water column, in turn increasing specific conductivity (Figure 10). Sudden increases in stage also typically correspond with sudden temporary increases in specific conductivity at this station, which is evident in the graph below.

Please note the stage data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

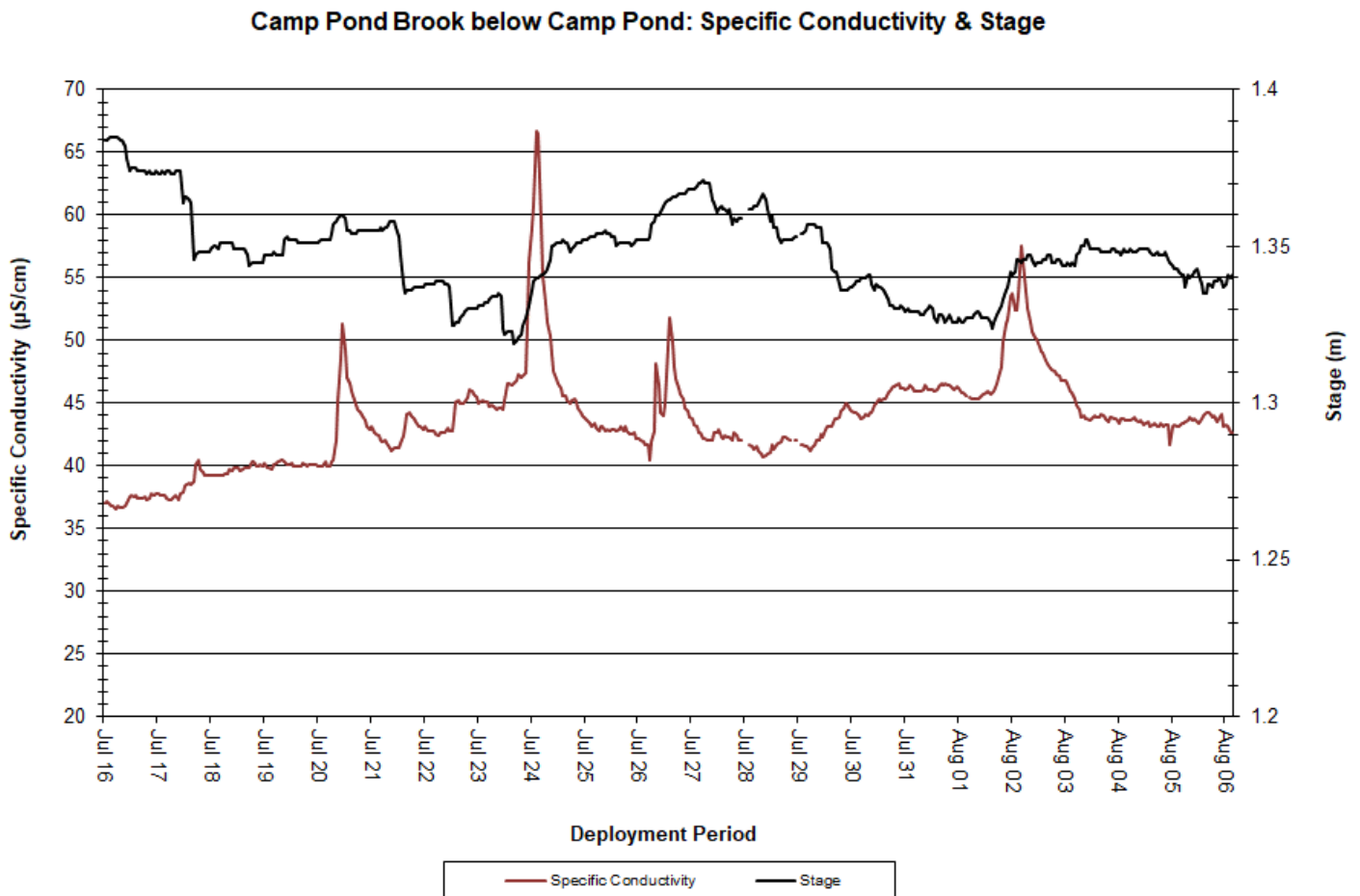


Figure 10: Specific Conductivity & Stage at Camp Pond Brook below Camp Pond

Dissolved Oxygen

Over the deployment period, dissolved oxygen concentration ranged from 8.36mg/L to 10.67mg/L, with a median value of 9.39mg/L. Saturation of dissolved oxygen ranged from 88.8% saturation to 102.5% saturation, with a median value of 93.8% (Figure 11).

Dissolved oxygen concentrations were variable but relatively stable across the deployment period, as water temperatures followed a similar trend. This observation is to be expected as water temperature directly influences the level of dissolved oxygen present in the water column; as water temperatures increase, dissolved oxygen concentrations decrease, and vice versa.

Dissolved oxygen concentrations were below the CCME's Guideline for the Protection of Early Life Stages for much of the deployment period. Instances where dissolved oxygen concentrations rose above the Guideline correlated closely with periods of cooler water temperatures, which is to be expected. Dissolved oxygen concentrations remained above the CCME's Guideline for the Protection of Other Life Stages for the duration of deployment (Figure 11).

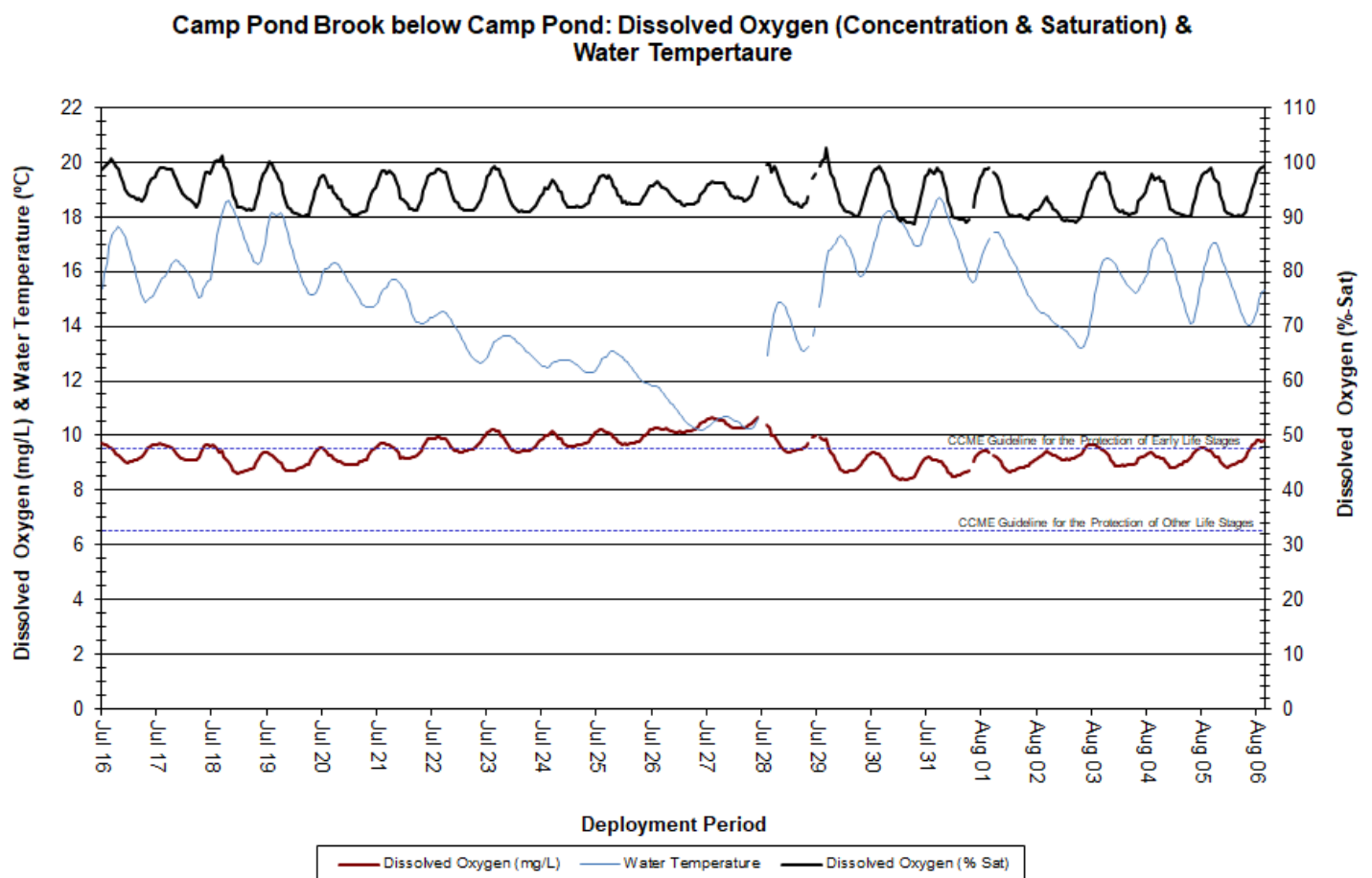


Figure 11: Dissolved Oxygen & Water Temperature at Camp Pond Brook below Camp Pond

Turbidity

Over the deployment period, turbidity ranged from 0.5NTU to 43.1NTU, with a median value of 1.0NTU (Figure 12). A median value of 1.0NTU indicates that there was a very low level of natural background turbidity at this station.

Higher turbidity levels are commonly observed at this station and are likely attributable to precipitation events and subsequent runoff entering Camp Pond Brook (Figure 12). Precipitation data was obtained from the Voisey's Bay airstrip weather station.

Camp Pond Brook below Camp Pond: Turbidity & Precipitation

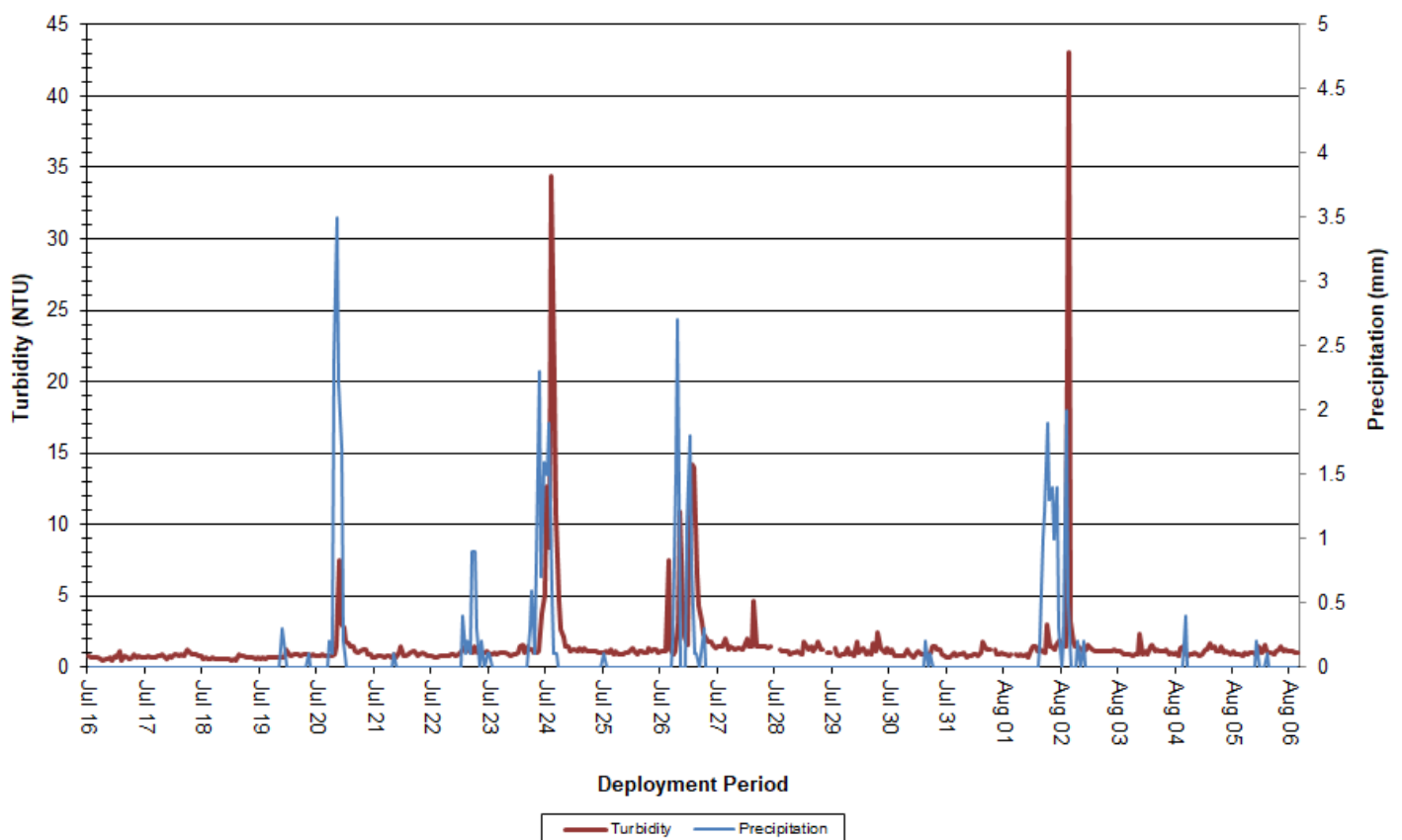


Figure 12: Turbidity & Precipitation at Camp Pond Brook below Camp Pond

Stage, Flow and Precipitation

Over the deployment period, stage values ranged from 1.319m to 1.385m, with a median value of 1.348m. Stream flow values ranged from 0.164m³/s to 0.369m³/s, with a median value of 0.235m³/s. Precipitation data was obtained from the Voisey's Bay airstrip weather station (Figure 13).

Stage generally decreased across the deployment period. Many increases in stage were observed across the deployment period and can be attributed to observed rainfall events (Figure 13).

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

Camp Pond Brook below Camp Pond: Stage, Flow & Precipitation

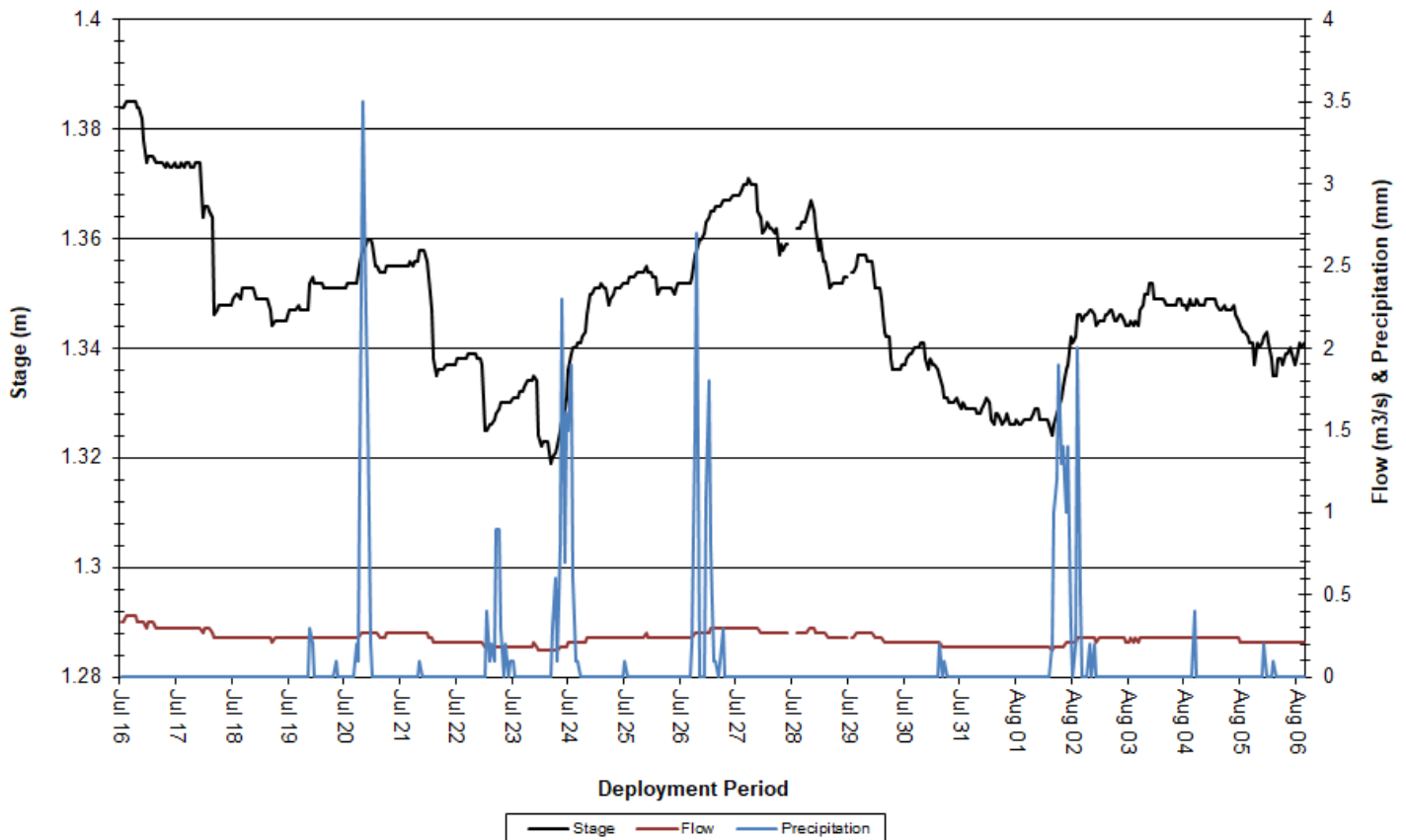


Figure 13: Stage, Flow & Precipitation at Camp Pond Brook below Camp Pond

Reid Brook below Tributary

Water Temperature

Over the deployment period, water temperature ranged from 8.61°C to 16.03°C, with a median value of 12.15°C (Figure 14).

Water temperature at this station displays diurnal variations, and was variable but generally stable across the deployment period. This is to be expected as air temperatures exhibited a similar trend (Figure 14). Air temperature data was obtained from the Voisey's Bay airstrip weather station.

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

Reid Brook below Tributary: Water and Air Temperature & Stage



Figure 14: Water and Air Temperature & Stage at Reid Brook below Tributary

pH

Over the deployment period, pH ranged from 6.92 pH units to 7.33 pH units, with a median value of 7.12 (Figure 15).

pH was within the CCME's Guidelines for the Protection of Aquatic Life for the duration of the deployment period.

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

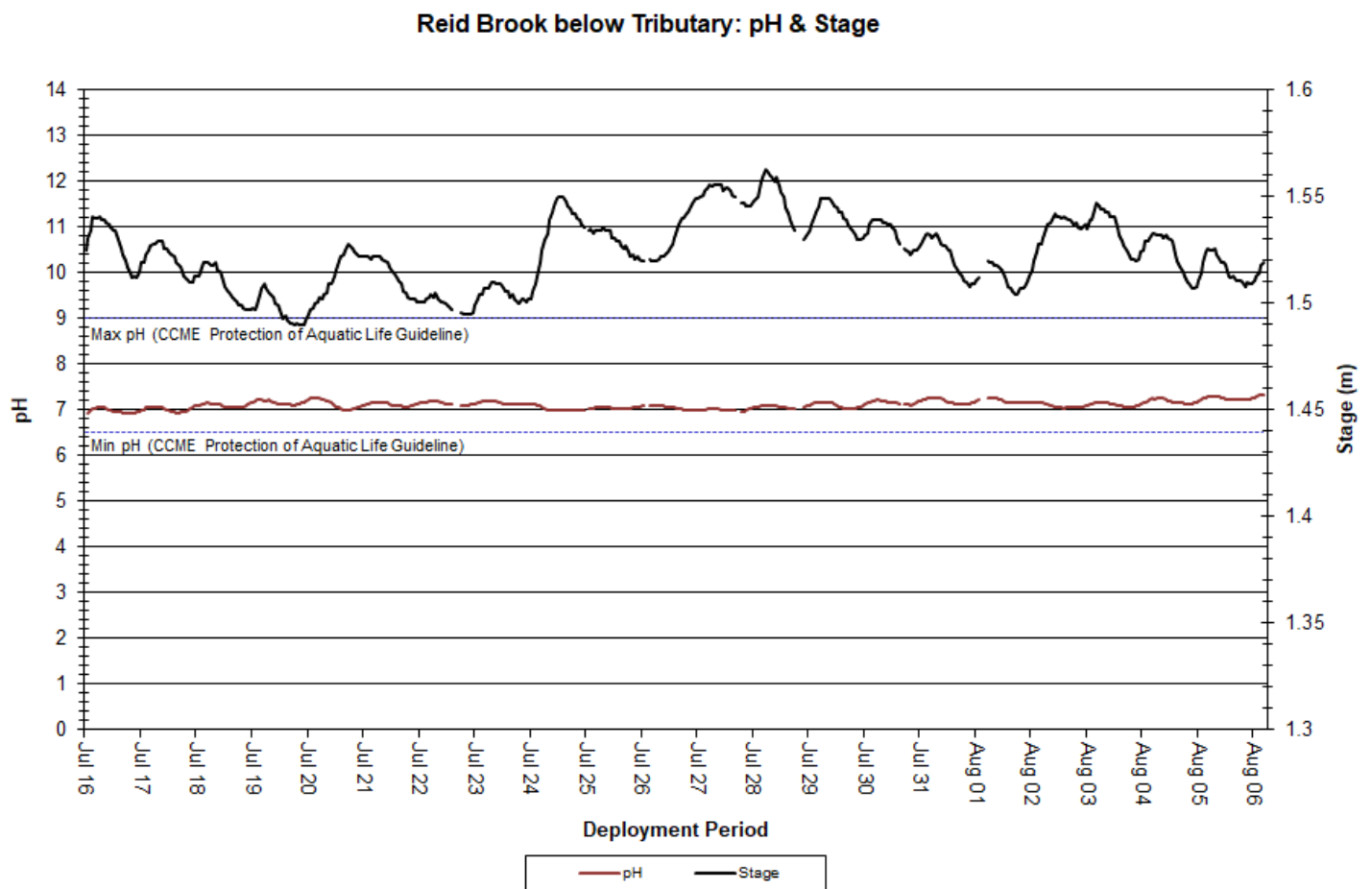


Figure 15: pH & Stage at Reid Brook below Tributary

Specific Conductivity

Over the deployment period, specific conductivity ranged from 29.6 μ S/cm to 39.4 μ S/cm, with a median value of 34.4 μ S/cm (Figure 16).

Specific conductivity generally increased over the course of the deployment period (Figure 16).

Specific conductivity and stage generally exhibit an inverse relationship: as one parameter increases, the other decreases. Increasing specific conductivity levels and corresponding decreasing water levels are characteristic of this station at this time of year.

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

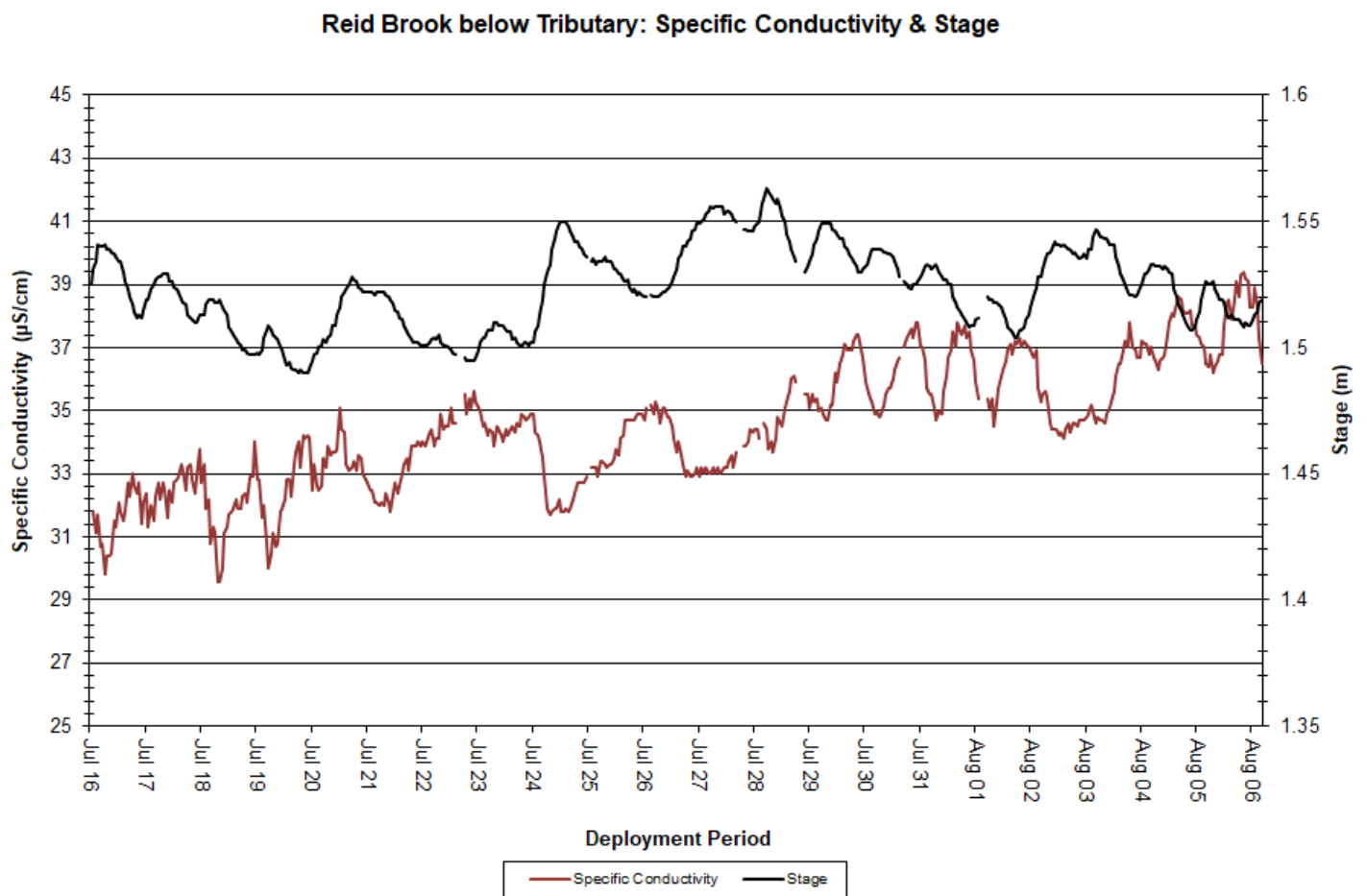


Figure 16: Specific Conductivity & Stage at Reid Brook below Tributary

Dissolved Oxygen

Over the deployment period, dissolved oxygen concentration ranged from 9.61mg/L to 11.42mg/L, with a median value of 10.44mg/L. The saturation of dissolved oxygen ranged from 95.5% saturation to 102.8% saturation, with a median value of 98.3% (Figure 17).

Dissolved oxygen concentrations remained above the CCME's Guidelines for the Protection of Early and Other Life Stages for the duration of deployment. Dissolved oxygen concentrations were fairly consistent over the course of deployment. Water temperature and dissolved oxygen concentration generally exhibit an inverse relationship.

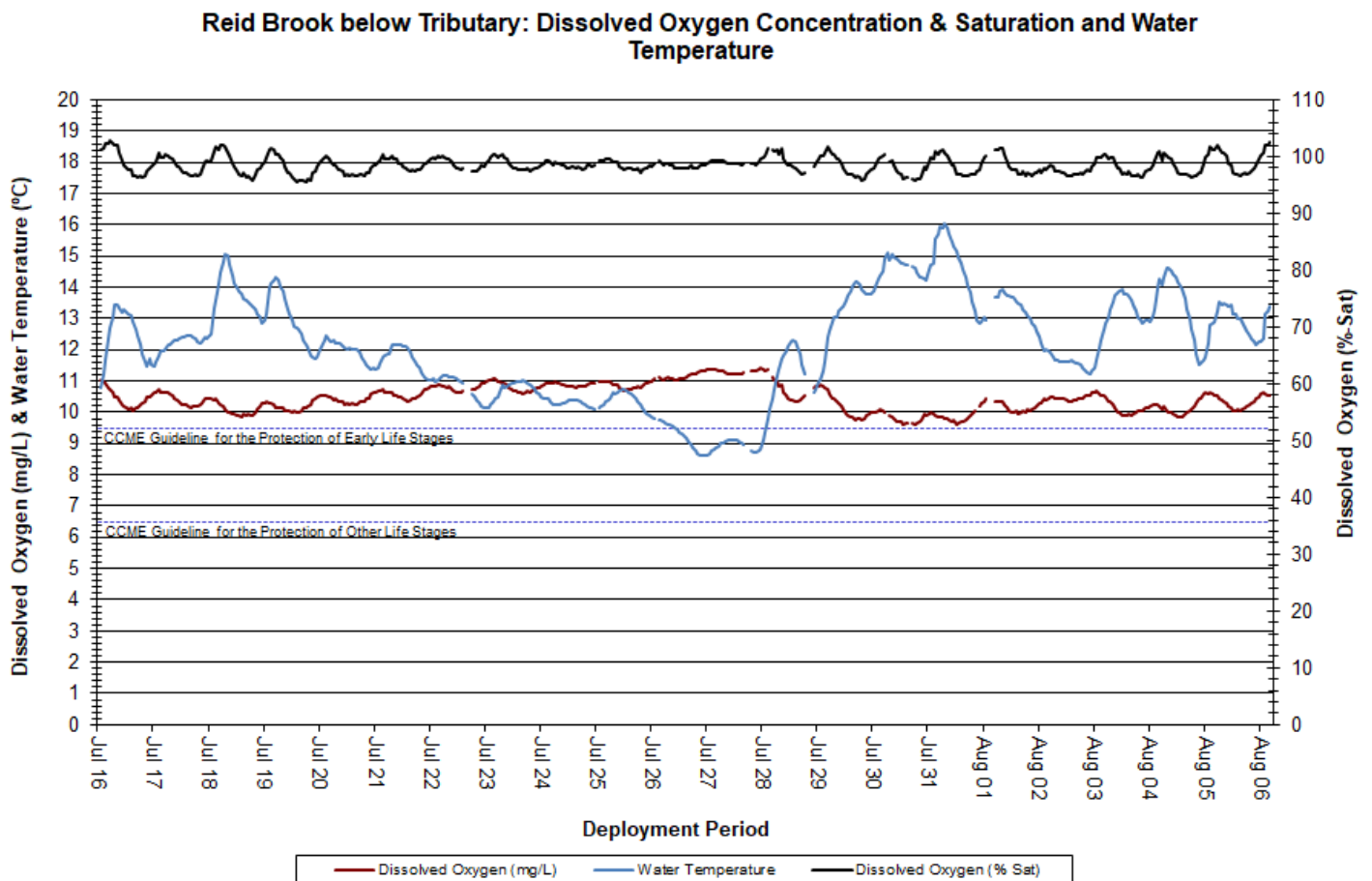


Figure 17: Dissolved Oxygen & Water Temperature at Reid Brook below Tributary

Turbidity

Over the deployment period, turbidity remained stable at 100 NTU (Figure 18). This is most likely due to a calibration error with the turbidity sensor.

Precipitation data was obtained from the Voisey's Bay airstrip weather station.

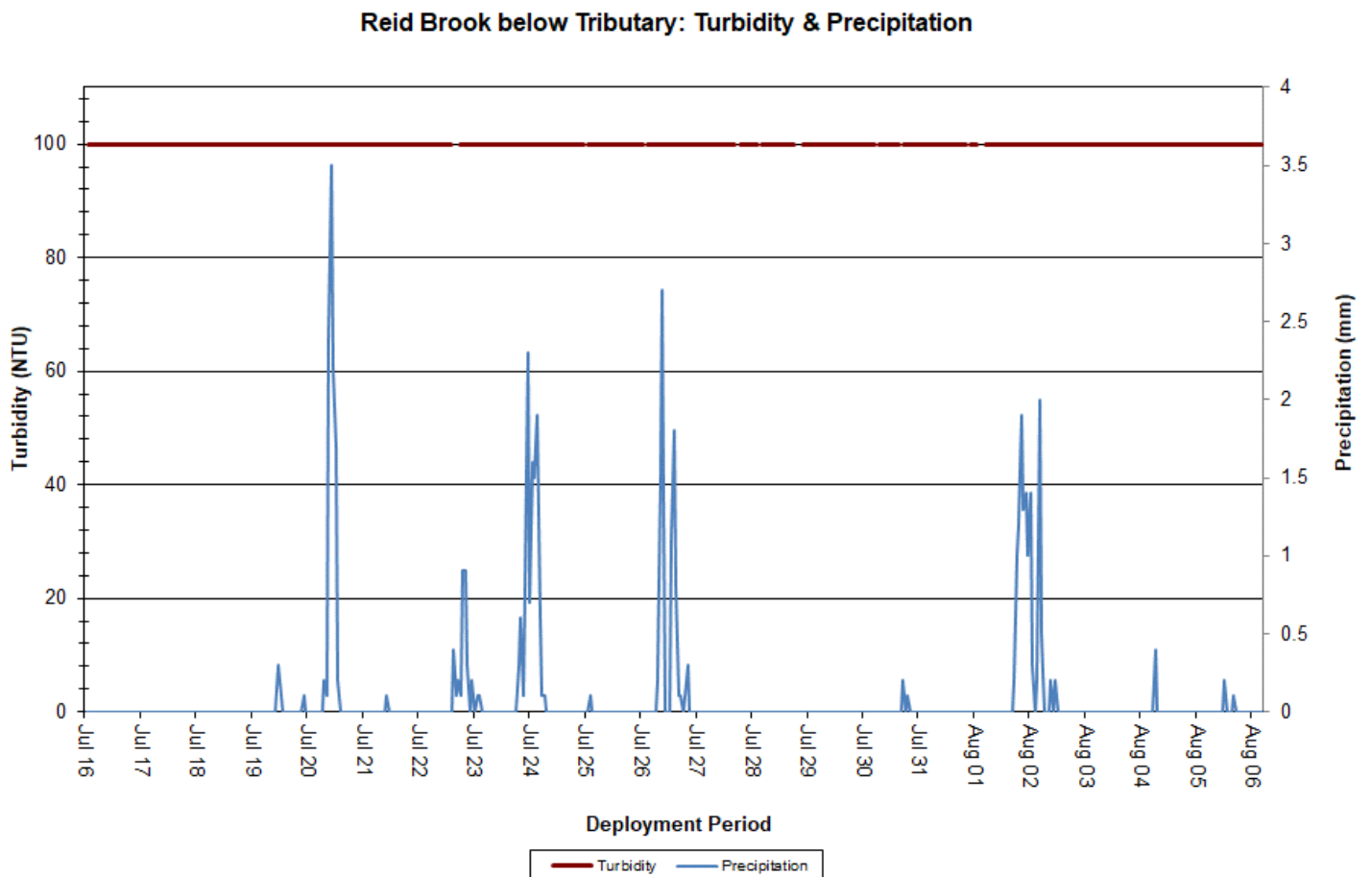


Figure 18: Turbidity & Precipitation at Reid Brook below Tributary

Stage and Flow

Over the deployment period, stage values ranged from 1.49m to 1.563m, with a median value of 1.523m. Stream flow values ranged from 2.122m³/s to 3.435m³/s, with a median value of 2.645m³/s. Precipitation data was obtained from the Voisey's Bay airstrip weather station (Figure 19).

Stage and flow were variable across the deployment period. Increases in both stage and flow were generally attributable to observed rainfall events (Figure 19).

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

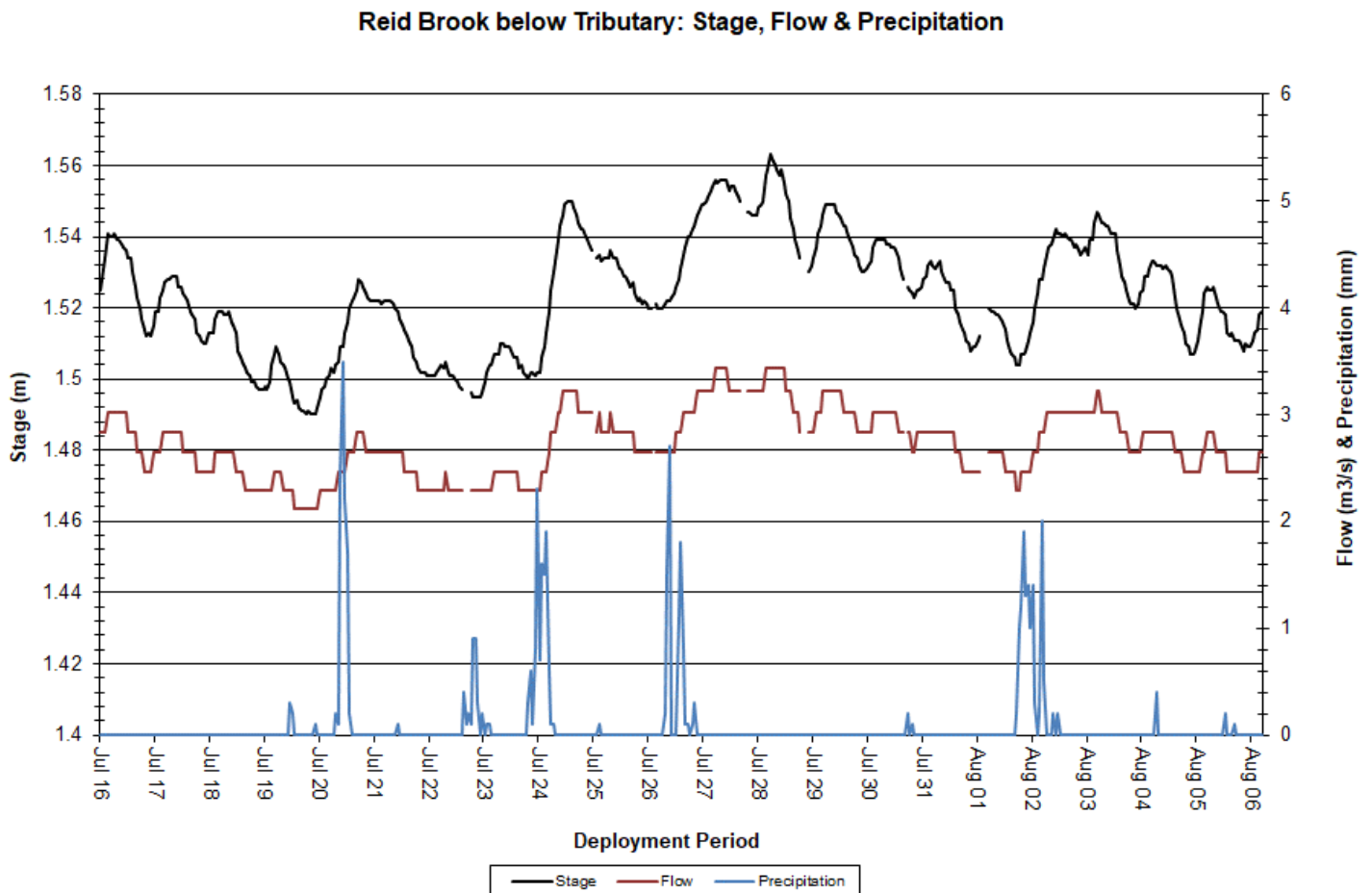


Figure 19: Stage, Flow & Precipitation at Reid Brook below Tributary

Tributary to Reid Brook

Water Temperature

Over the deployment period, water temperature ranged from 8.5°C to 15.1°C, with a median value of 11.8°C (Figure 20). Streams and brooks are sensitive to changes in the ambient air temperature, thus water temperature will fluctuate considerably depending on the weather and the time of day. Air temperature fluctuates to a greater extent compared to water temperature. Air temperature data was obtained from the Voisey's Bay airstrip weather station.

Water temperature data displays a natural diurnal pattern. Water temperatures were variable but generally stable over the course of deployment, and correlated closely with ambient air temperatures.

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

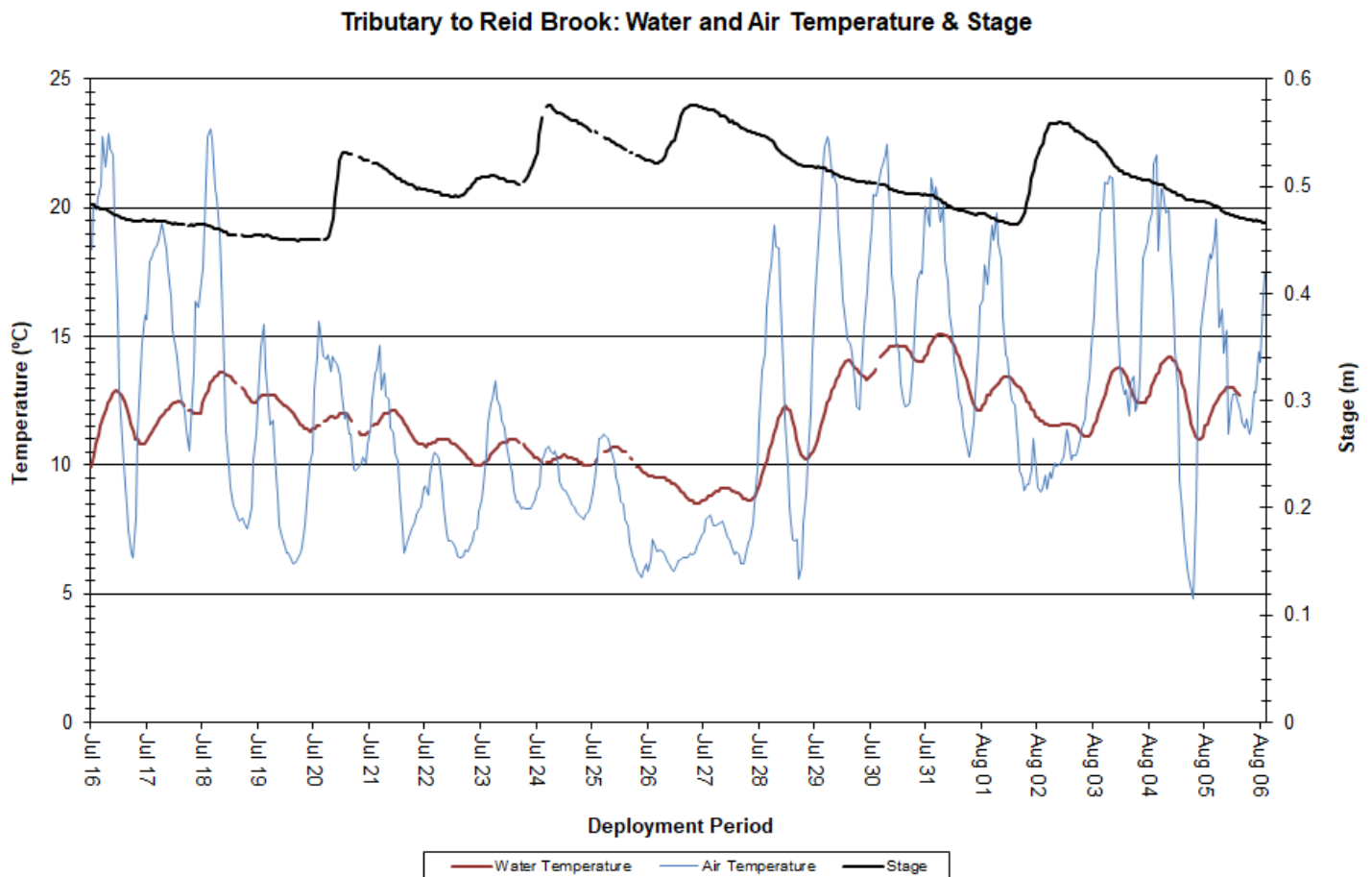


Figure 20: Water and Air Temperature & Stage at Tributary to Reid Brook

pH

Over the deployment period, pH ranged from 6.86 pH units to 7.24 pH units, with a median value of 7.04 (Figure 21).

pH values were within the CCME's Guidelines for the Protection of Aquatic Life for the duration of the deployment period.

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

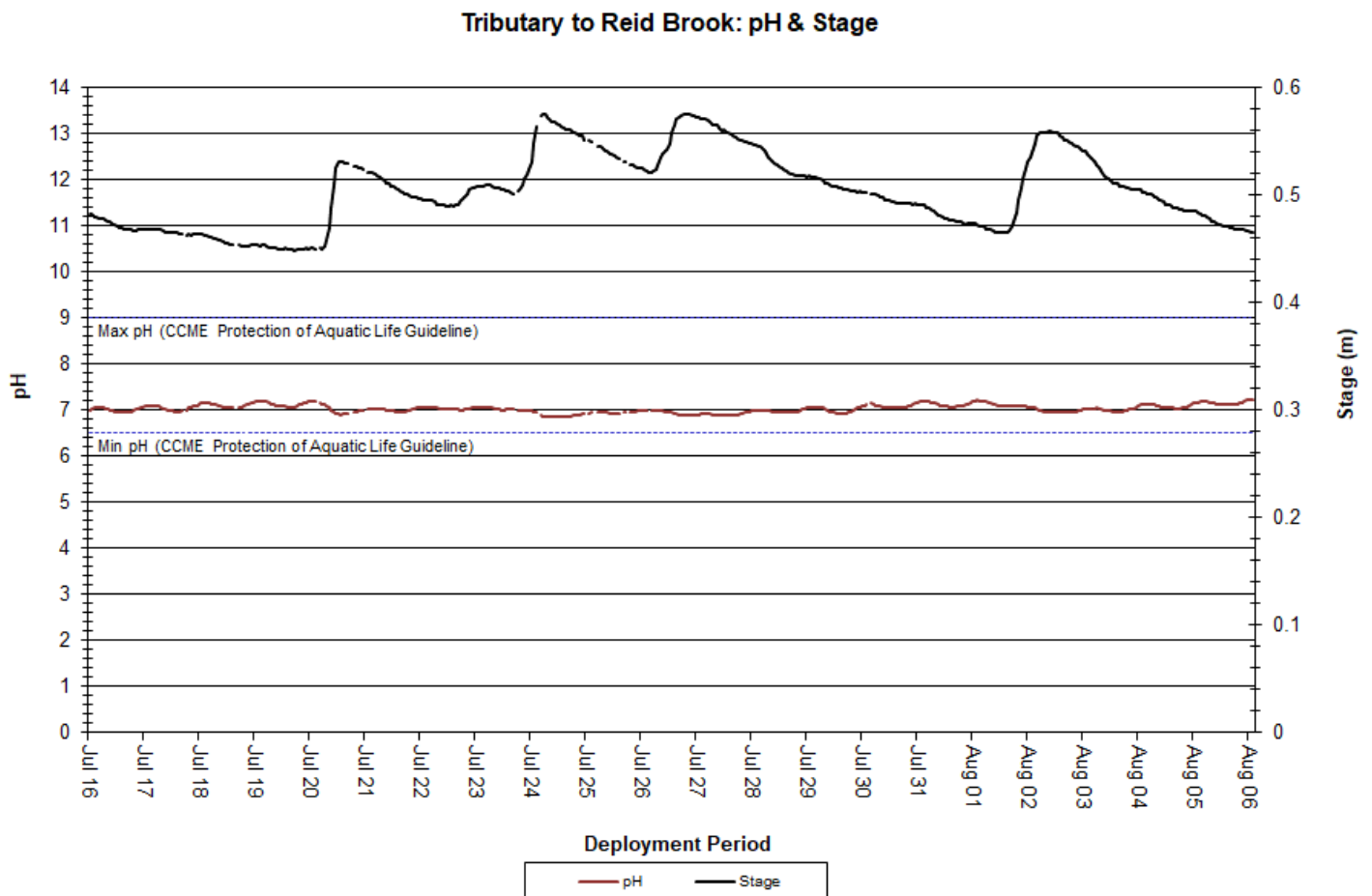


Figure 21: pH & Stage at Tributary to Reid Brook

Specific Conductivity

Over the deployment period, specific conductivity ranged from 30.5 μ S/cm to 38.7 μ S/cm, with a median value of 34.7 μ S/cm (Figure 22).

Specific conductivity and stage generally exhibit an inverse relationship: as one parameter increases, the other decreases. This relationship is clearly evident in the graph below.

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

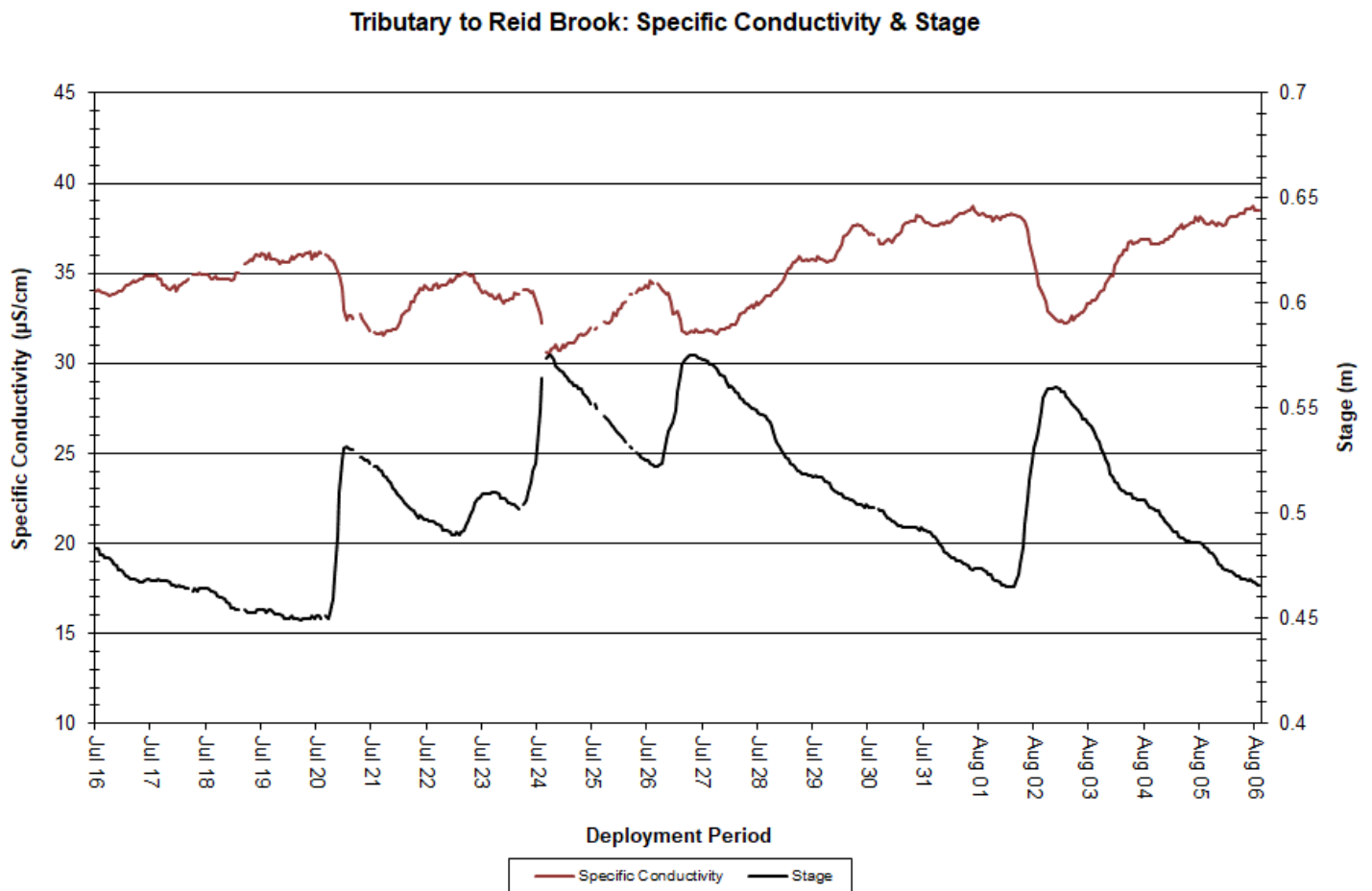


Figure 22: Specific Conductivity & Stage at Tributary to Reid Brook

Dissolved Oxygen

Over the deployment period, dissolved oxygen concentration ranged from 8.94mg/L to 10.63mg/L, with a median value of 9.76mg/L. The saturation of dissolved oxygen ranged from 89.1% saturation to 94.5% saturation, with a median value of 91.2% (Figure 23).

Dissolved oxygen levels remained above the CCME's Guidelines for the Protection of Early and Other Life Stages for the majority of the deployment period. Instances where dissolved oxygen concentrations fell below the CCME's Guideline for the Protection of Early Life Stages correlate closely with warmer water temperatures, which is to be expected.

Dissolved oxygen concentration displays a diurnal pattern. During nightfall, dissolved oxygen levels are higher as cooler temperatures allow for more DO to be stored in the water column. During the day, dissolved oxygen levels are lower. This is a result of warmer water temperatures and photosynthesis by aquatic plants, which decrease dissolved oxygen levels in the water column.

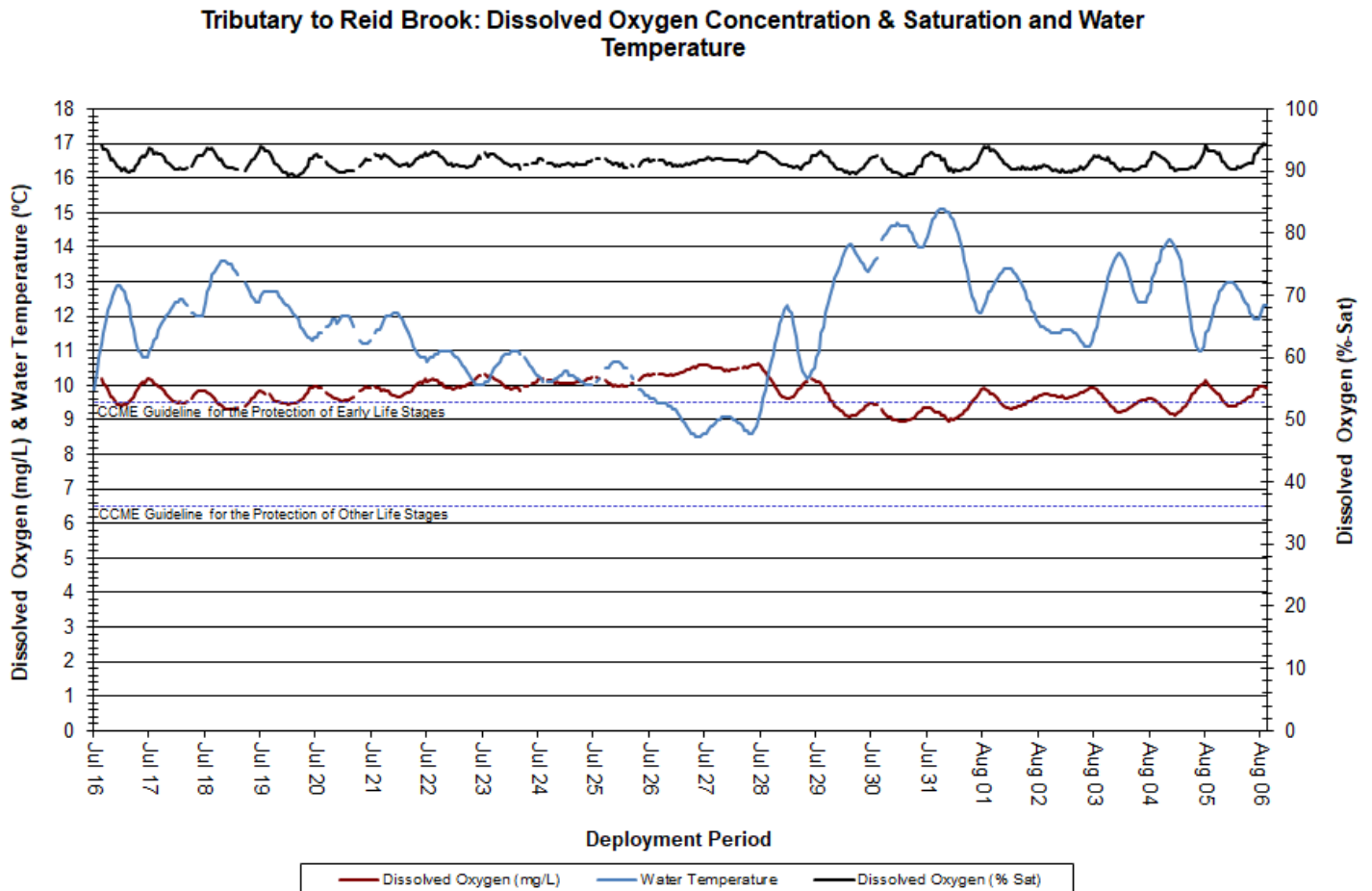


Figure 23: Dissolved Oxygen & Water Temperature at Tributary to Reid Brook

Turbidity

Over the deployment period, turbidity remained stable at 100 NTU (Figure 24). This is most likely due to a calibration error with the turbidity sensor.

Precipitation data was obtained from the Voisey's Bay airstrip weather station (Figure 24).

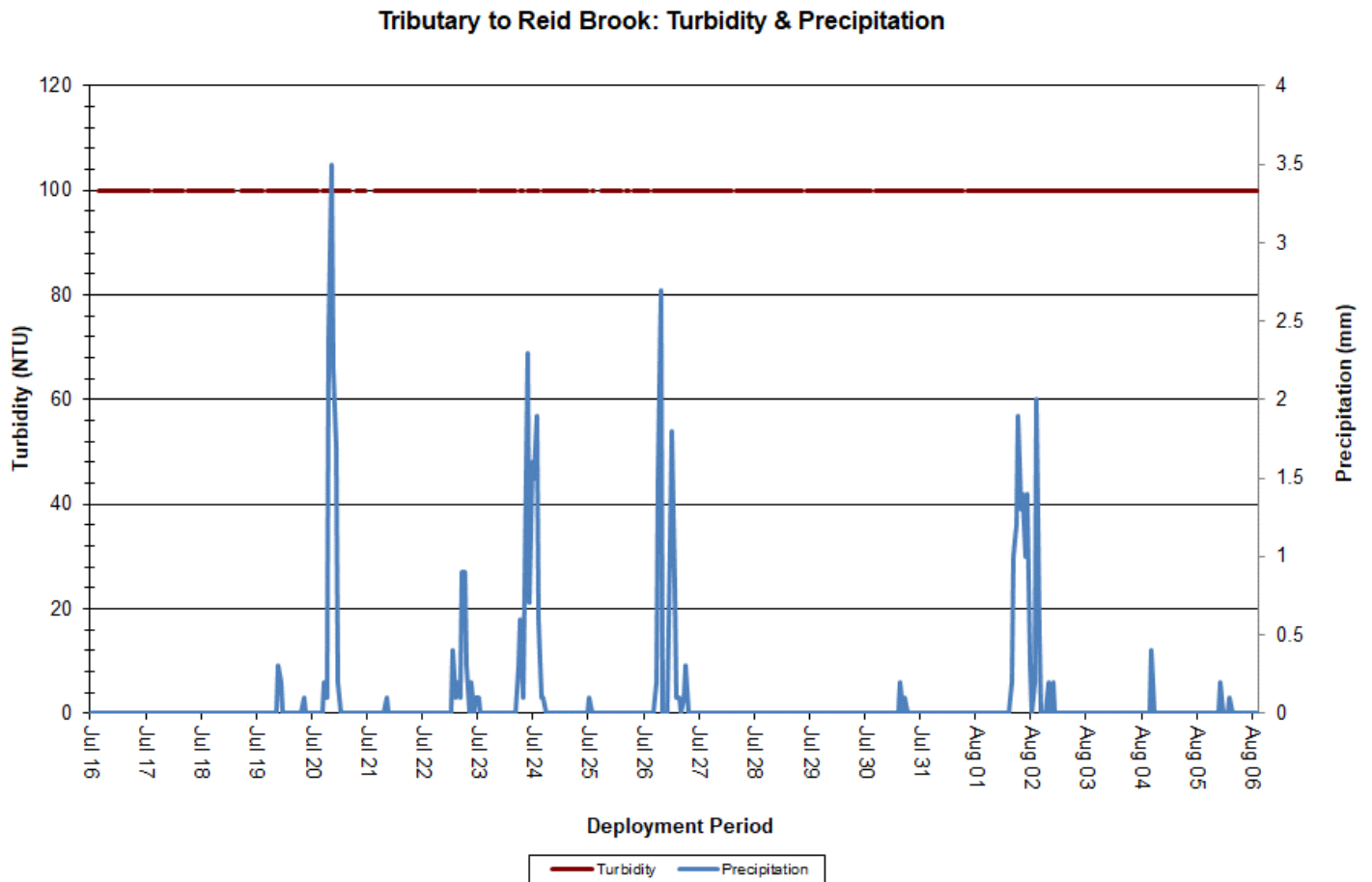


Figure 24: Turbidity & Precipitation at Tributary to Reid Brook

Stage and Flow

Over the deployment period, stage values ranged from 0.449m to 0.575m, with a median value of 0.503m. Stream flow values ranged from 0.098m³/s to 0.281m³/s, with a median value of 0.136m³/s. Precipitation data was obtained from the Voisey's Bay airstrip weather station (Figure 25).

Stage and flow were variable across the deployment period. Increases in both stage and flow were generally attributable to observed rainfall events (Figure 19).

Please note the stage and flow data used below is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request to WSC.

Tributary to Reid Brook: Stage, Flow & Precipitation

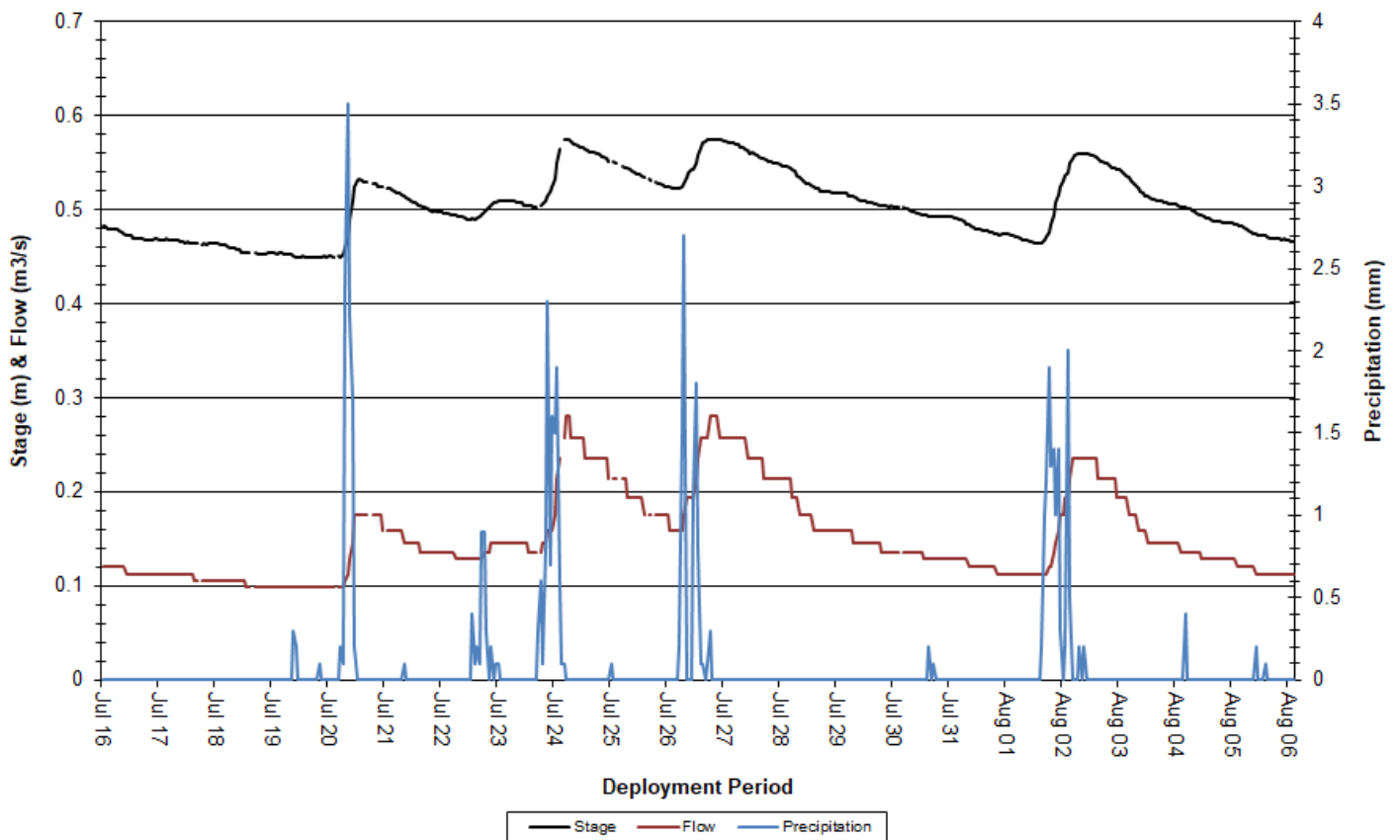


Figure 25: Stage, Flow & Precipitation at Tributary to Reid Brook

Conclusions

Water temperatures across all stations ranged from a minimum of 6.83°C at Reid Brook at Outlet of Reid Pond to a maximum of 18.69°C at Camp Pond Brook below Camp Pond. Overall, water temperature was increasing, but generally stable, across the network. Stations at Camp Pond Brook, Tributary to Reid Brook, and Reid Brook below Tributary are more sensitive to changes in ambient air temperatures as these sites are brooks with continuously moving water. In contrast, Reid Brook at Outlet of Reid Pond is a large pond with a high surface area and deeper, slower-moving water.

pH values across all stations ranged from a minimum of 6.10pH units at Reid Brook at Outlet of Reid Pond to a maximum of 7.33pH units at Reid Brook below Tributary. pH values at all stations were relatively consistent across the deployment period.

Specific conductivity across all stations ranged from a minimum of 10.8µS/cm at Reid Brook at Outlet of Reid Pond to a maximum of 66.7µS/cm at Camp Pond Brook below Camp Pond. Conductivity values at Reid Brook at Outlet of Reid Pond were the lowest across the network. Camp Pond Brook below Camp Pond had the highest median value at 43.4µS/cm.

Dissolved oxygen levels across all stations ranged from a minimum of 8.36mg/L at Camp Pond Brook below Camp Pond to a maximum of 11.97mg/L at Reid Brook at Outlet of Reid Pond. Dissolved oxygen is generally decreasing at this time of year and varies diurnally as water temperature is greatly affected by ambient air temperature. Dissolved oxygen levels remained above the CCME's Guidelines for the Protection of Other Life Stages at all stations for the majority of deployment. Instances where dissolved oxygen concentrations fell below the CCME's Guidelines for the Protection of Early Life Stages correlated closely with warmer water temperatures.

Turbidity levels across all stations ranged from a minimum of 0 NTU to a maximum of 3000 NTU, both at Reid Brook at Outlet of Reid Pond. Turbidity levels showed natural increases and decreases generally corresponding to precipitation events at two stations. Turbidity levels at Tributary to Reid Brook and Reid Brook below Tributary were inaccurate for the duration of deployment, likely due to a calibration error.

Air temperature and precipitation data were obtained from the Voisey's Bay weather station, which is located at the airstrip. This data appears to be accurate and no modifications were made.

Overall, the changes in water quality parameters over the course of this deployment can be explained by natural events. Camp Pond Brook below Camp Pond does have the potential for anthropogenic influences as the site is the closest to the inhabited area. It is important to note that during a change (a decrease or increase) in water quality, change only occurs for a short period of time and then water quality parameters return to baseline.

References

- Canadian Council of Ministers of the Environment. (2014) "Canadian water quality guidelines for the protection of aquatic life" Canadian Council of Ministers of the Environment. Retrieved from: http://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/index.html
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- OTT Hydromet (2017) "Hydrolab" Retrieved from: <http://www.ott.com/en-us/products/water-quality-2/hydrolab-ds5x-multiparameter-data-sonde-855/>
- Mike Sader (2017) "Turbidity Measurement: A Simple, Effective Indicator of Water Quality Change". OTT Hydromet. Retrieved from <http://www.ott.com/en-us/products/download/turbidity-white-paper/>
- Swanson, H.A., and Baldwin, H.L., (1965) "A Primer on Water Quality" U.S. Geological Survey. Retrieved from: <http://ga.water.usgs.gov/edu/characteristics.html>

APPENDIX A: Comparison Graphs

Water Temperature at Real-Time Water Quality Monitoring Stations

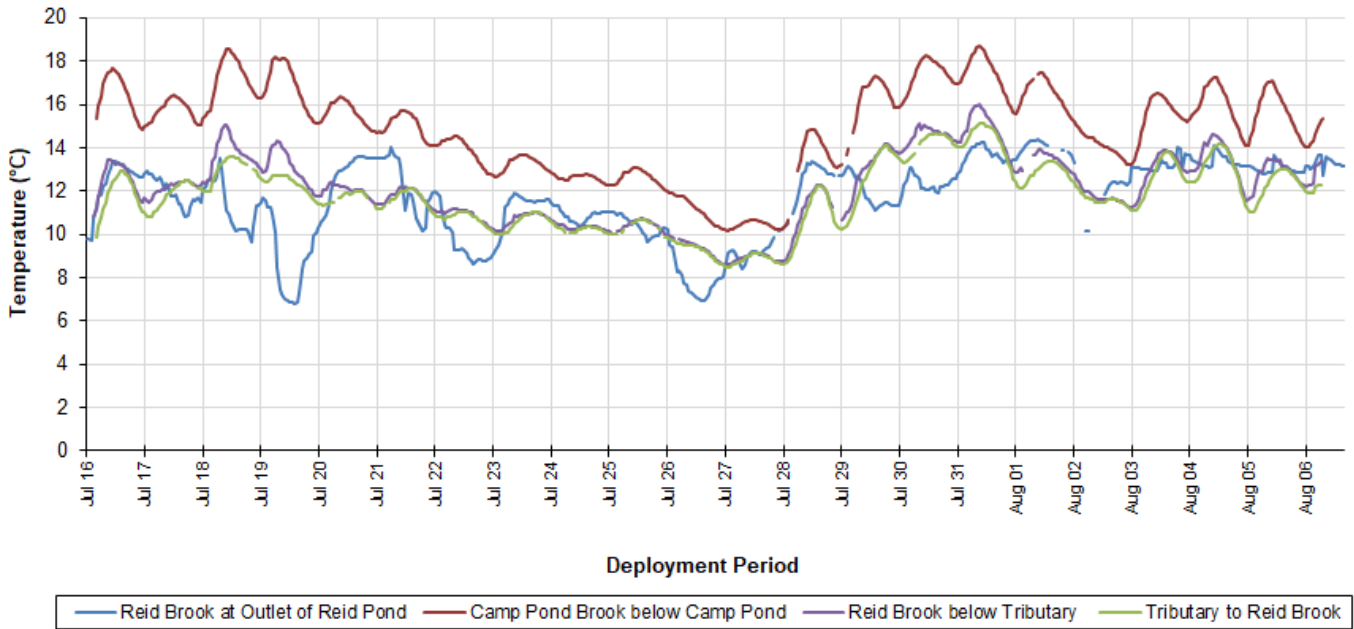


Figure A1: Comparison of Water Temperature (°C) between all Real-Time Stations in Voisey's Bay.

pH at Real-Time Water Quality Monitoring Stations

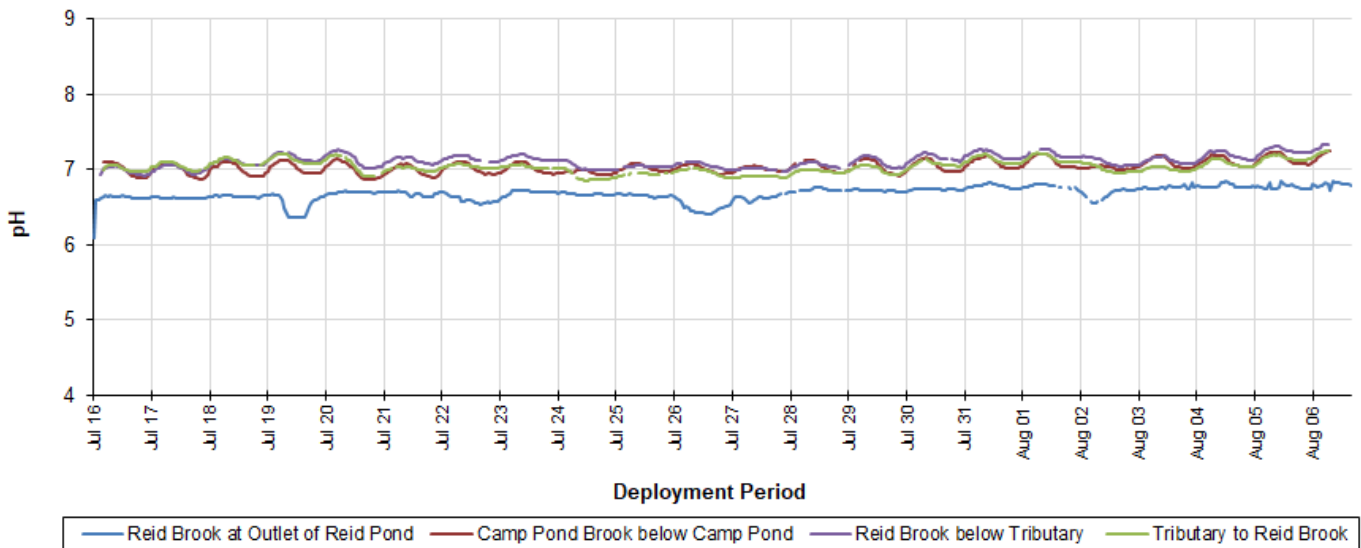


Figure A2: Comparison of pH between all Real-Time Stations in Voisey's Bay.

Specific Conductivity at Real-Time Water Quality Monitoring Stations

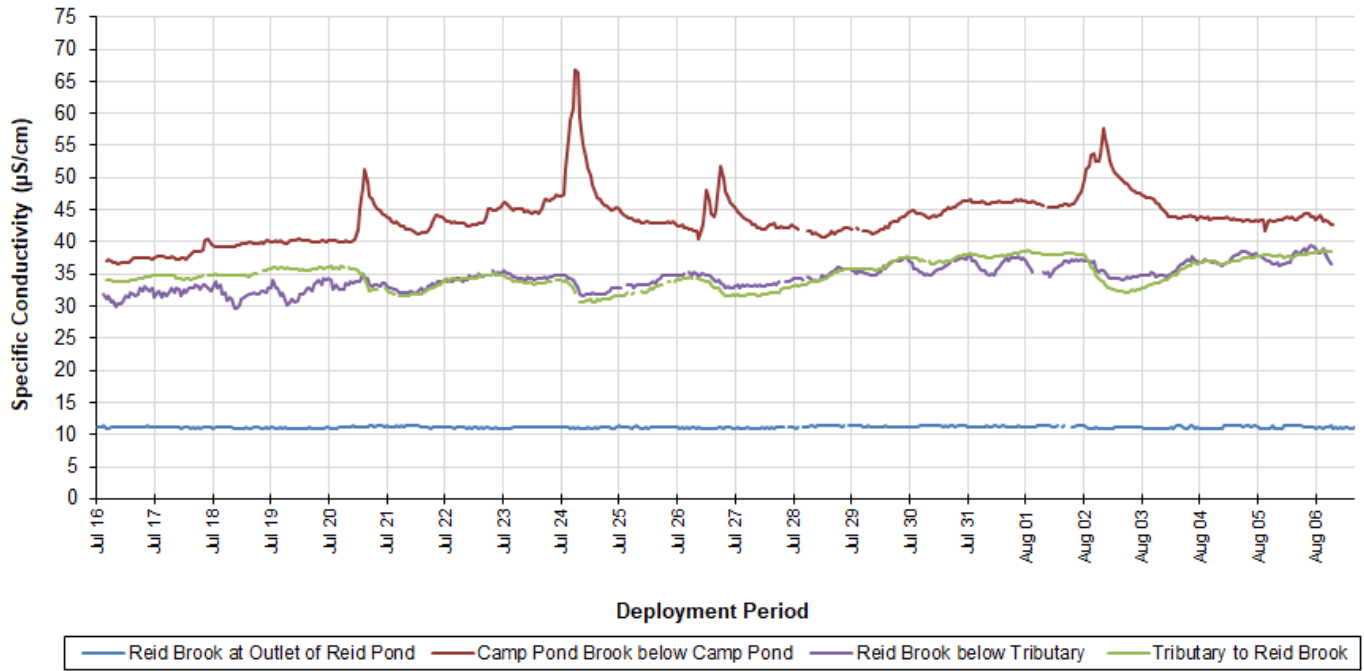


Figure A3: Comparison of Specific Conductivity (µS/cm) between all Real-Time Stations in Voisey's Bay.

Dissolved Oxygen Concentration at Real-Time Water Quality Monitoring Stations

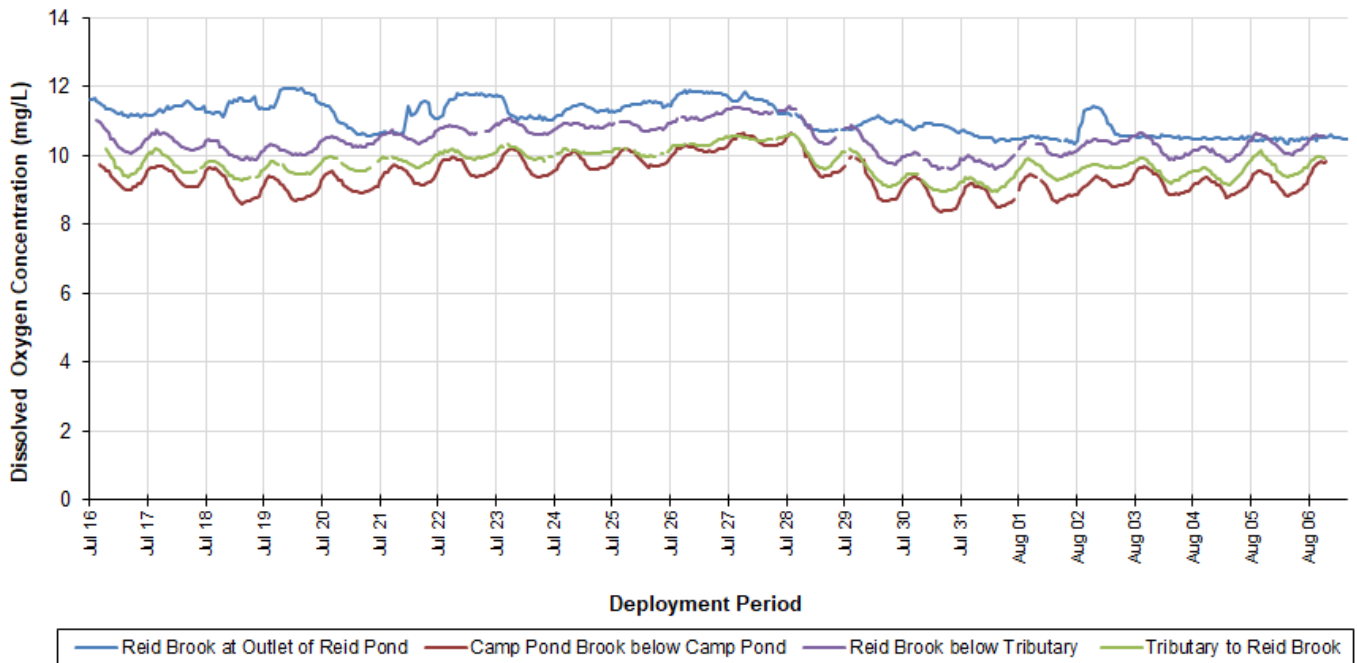


Figure A4: Comparison of Dissolved Oxygen (mg/L) between all Real-Time Stations in Voisey's Bay.

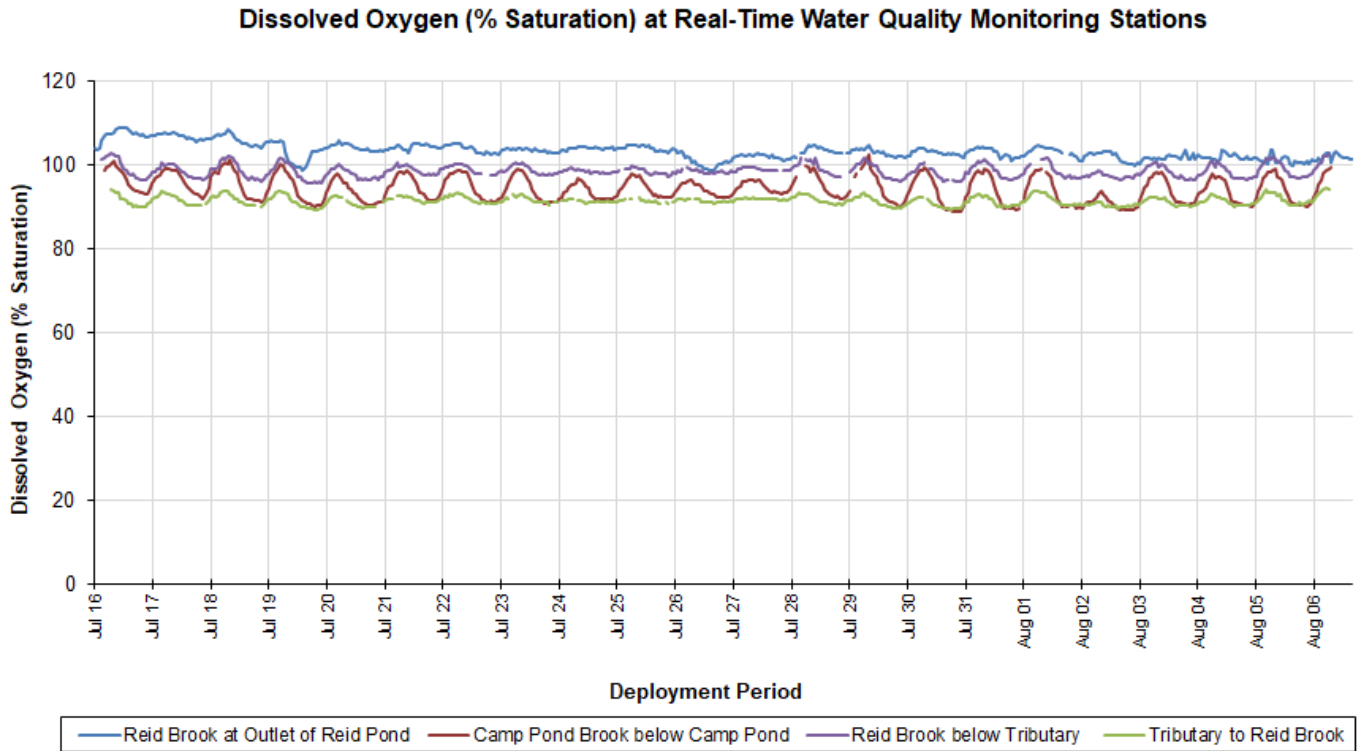


Figure A5: Comparison of Dissolved Oxygen (% Sat) between all Real-Time Stations in Voisey's Bay.

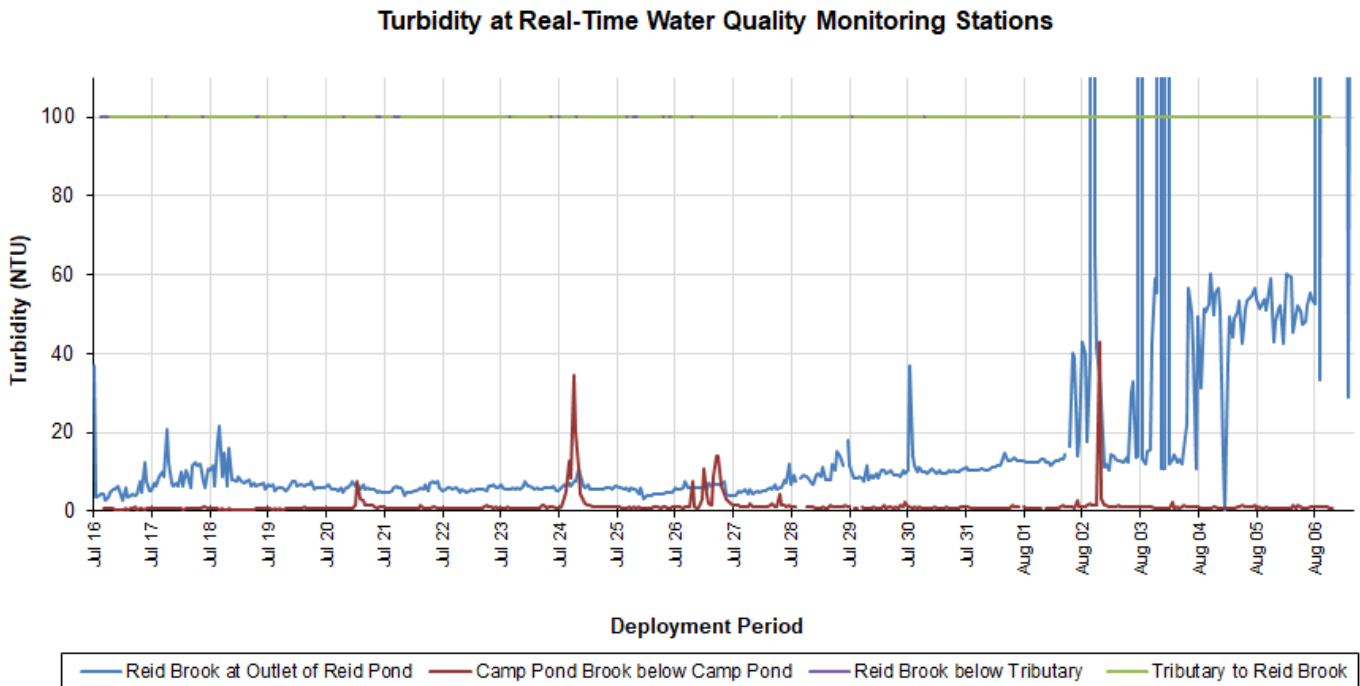


Figure A6: Comparison of Turbidity (NTU) between all Real-Time Stations in Voisey's Bay.

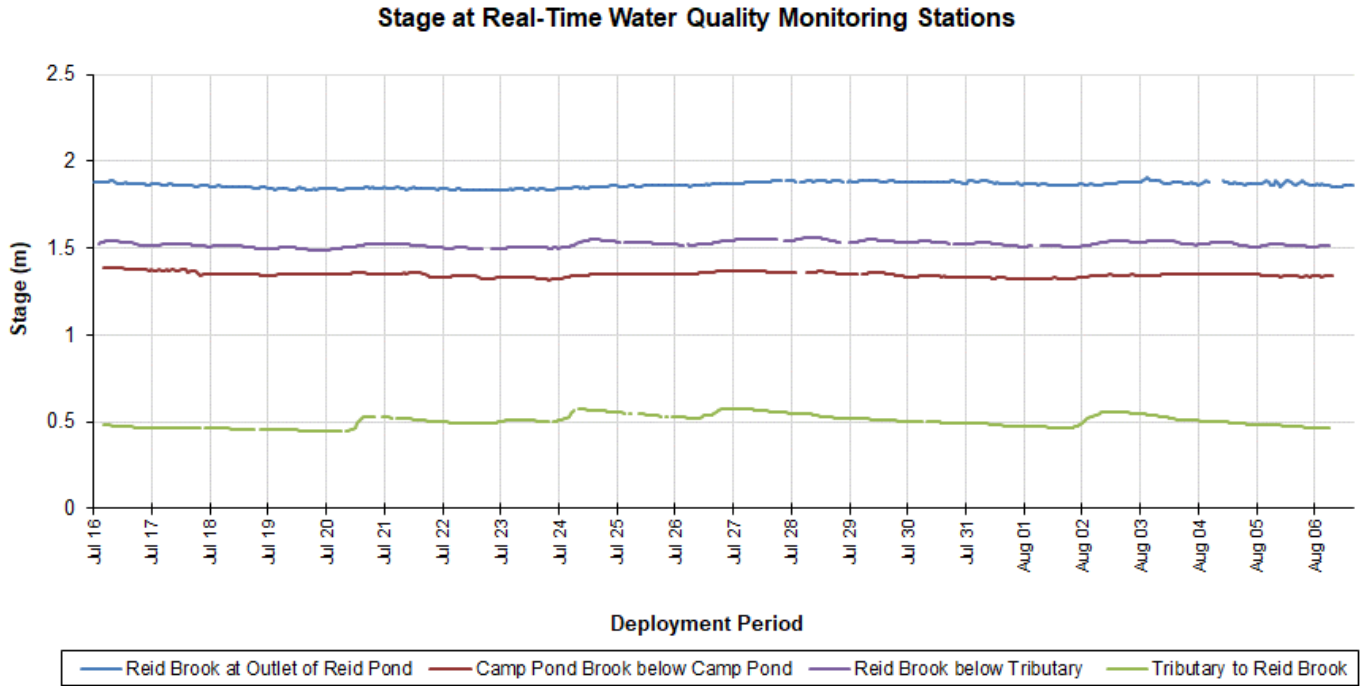


Figure A7: Comparison of Stage (m) between all Real-Time Stations in Voisey's Bay. Please note that stage data is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data.

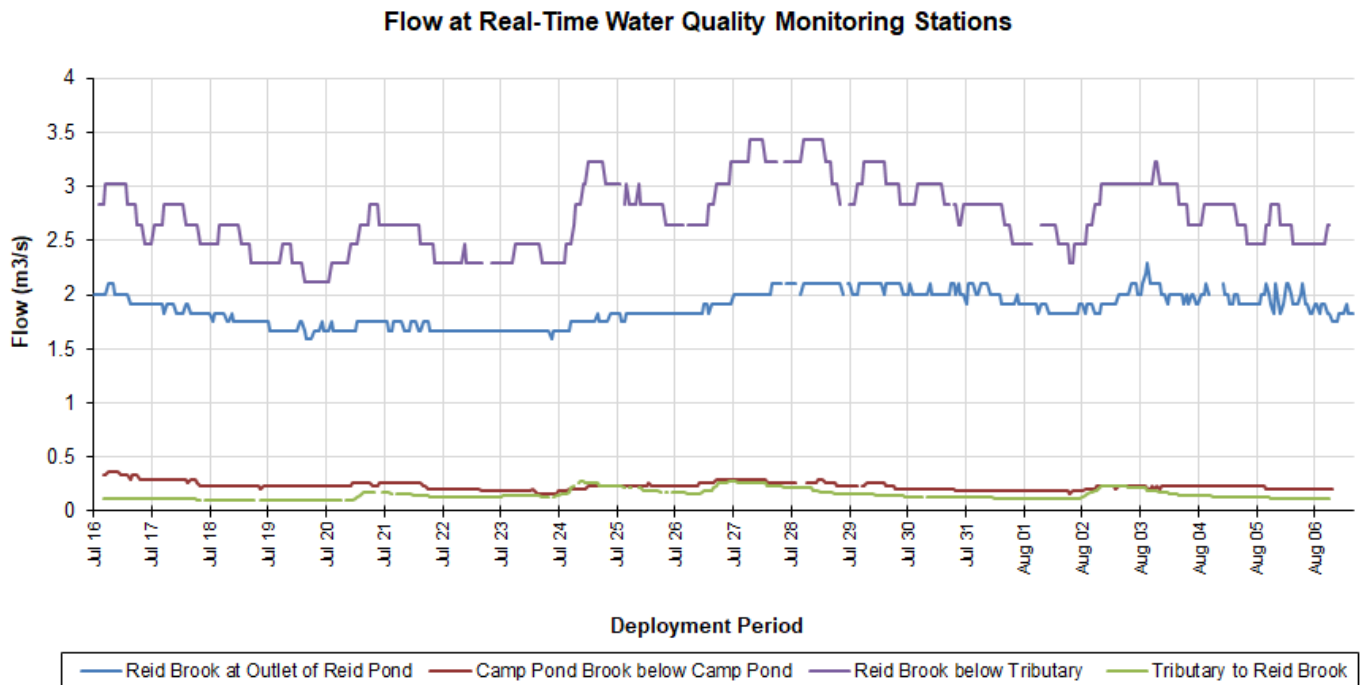


Figure A8: Comparison of Flow (m³/s) between all Real-Time Stations in Voisey's Bay. Please note that flow data is raw data. It has not been corrected for backwater effect. WSC is responsible for QA/QC of water quantity data.

APPENDIX B: Water Parameter Description

Dissolved Oxygen: The amount of Dissolved Oxygen (DO) (mg/L or % saturation) in the water is vital to the survival of aquatic organisms. 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 (CCME 2014).

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 the measure of hydrogen ion activity and affects: (i) the availability of nutrients to aquatic life; (ii) the concentration of biochemical substances dissolved in water; (iii) the efficiency of hemoglobin in the blood of vertebrates; and (iv) the toxicity of pollutants. Changes in pH can be attributed to industrial effluence, saline inflows or aquatic organisms involved in the photosynthetic cycling of CO₂ (CCME 2014).

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 (Swanson and Baldwin 1965).

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 processes and dynamics of limnology. 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 (OTT Hydromet 2017).

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 (CCME 2014; Swanson 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 (Sadar, 2017).

APPENDIX C: Grab Sample Results



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Bureau Veritas Job #: C2K4335
Report Date: 2022/08/05

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Your P.O. #: 220028978-6

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS818 REID BROOK AT OUTLET OF REID POND								
Sampling Date		2022/07/19						
Matrix		W						
Sample #		2022-1821-00-SI-SP						
Registration #		WS-S-0000						
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	3.9	1.0	mg/L	N/A	2022/08/04		8121819
Nitrate (N)	-	0.053	0.050	mg/L	N/A	2022/07/29		8121822
Total dissolved solids (calc., EC)	-	7.3	1.0	mg/L	N/A	2022/07/26		8122431
Inorganics								
Conductivity	-	13	1.0	uS/cm	N/A	2022/07/25	NGI	8128275
Chloride (Cl-)	-	ND	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Sulphate (SO4)	-	ND	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Total Alkalinity (Total as CaCO3)	-	4.5	2.0	mg/L	N/A	2022/07/25	NGI	8128279
Colour	-	6.2	5.0	TCU	N/A	2022/07/29	EMT	8135235
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2022/07/25	NGI	8128282
Total Kjeldahl Nitrogen (TKN)	-	0.16	0.10	mg/L	2022/07/26	2022/07/28	MJ1	8131491
Nitrate + Nitrite (N)	-	0.067	0.050	mg/L	N/A	2022/07/29	EMT	8135237
Nitrite (N)	-	0.014	0.010	mg/L	N/A	2022/07/28	EMT	8135238
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2022/07/26	EMT	8128865
Dissolved Organic Carbon (C)	-	2.1	0.50	mg/L	N/A	2022/07/26	JHH	8128532
Total Organic Carbon (C)	-	2.1	0.50	mg/L	N/A	2022/07/25	JHH	8128249
pH	-	6.68		pH	N/A	2022/07/25	NGI	8128277
Total Phosphorus	-	ND	0.004	mg/L	2022/07/26	2022/07/29	SSV	8131457
Total Suspended Solids	-	1.8	1.0	mg/L	2022/07/22	2022/07/26	A1M	8125389
Turbidity	-	2.0	0.10	NTU	N/A	2022/07/27	NGI	8133071
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2022/07/26	2022/07/26	FJO	8128219
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.049	0.0050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Antimony (Sb)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Arsenic (As)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Barium (Ba)	-	0.0022	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Boron (B)	-	ND	0.050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Calcium (Ca)	-	1.2	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Chromium (Cr)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Copper (Cu)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Iron (Fe)	-	ND	0.050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Lead (Pb)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Magnesium (Mg)	-	0.23	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Manganese (Mn)	-	ND	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188



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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS818 REID BROOK AT OUTLET OF REID POND								
Sampling Date		2022/07/19						
Matrix		W						
Sample #		2022-1821-00-SI-SP						
Registration #		WS-S-0000						
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Nickel (Ni)	-	ND	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Phosphorus (P)	-	ND	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Potassium (K)	-	ND	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Selenium (Se)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Sodium (Na)	-	0.68	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Strontium (Sr)	-	0.0042	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Uranium (U)	-	ND	0.00010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Zinc (Zn)	-	ND	0.0050	mg/L	2022/08/02	2022/08/03	JHY	8142188



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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS843 CAMP POND BROOK BELOW CAMP POND Sampling Date 2022/07/19 Matrix W Sample # 2022-1822-00-SI-SP Registration # WS-S-0000								
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	12	1.0	mg/L	N/A	2022/08/04		8121819
Nitrate (N)	-	ND	0.050	mg/L	N/A	2022/07/29		8121822
Total dissolved solids (calc., EC)	-	21	1.0	mg/L	N/A	2022/07/26		8122431
Inorganics								
Conductivity	-	38	1.0	uS/cm	N/A	2022/07/25	NGI	8128275
Chloride (Cl-)	-	2.5	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Sulphate (SO4)	-	4.2	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Total Alkalinity (Total as CaCO3)	-	8.0	2.0	mg/L	N/A	2022/07/25	NGI	8128279
Colour	-	22	5.0	TCU	N/A	2022/07/29	EMT	8135235
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2022/07/25	NGI	8128282
Total Kjeldahl Nitrogen (TKN)	-	0.12	0.10	mg/L	2022/07/26	2022/07/28	MJ1	8131491
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2022/07/29	EMT	8135237
Nitrite (N)	-	0.011	0.010	mg/L	N/A	2022/07/28	EMT	8135238
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2022/07/26	EMT	8128865
Dissolved Organic Carbon (C)	-	4.5	0.50	mg/L	N/A	2022/07/27	JHH	8130867
Total Organic Carbon (C)	-	3.7	0.50	mg/L	N/A	2022/07/25	JHH	8128249
pH	-	6.96		pH	N/A	2022/07/25	NGI	8128277
Total Phosphorus	-	ND	0.004	mg/L	2022/07/26	2022/07/29	SSV	8131457
Total Suspended Solids	-	7.4	1.0	mg/L	2022/07/22	2022/07/26	A1M	8125389
Turbidity	-	3.0	0.10	NTU	N/A	2022/07/27	NGI	8133071
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2022/07/26	2022/07/26	FJO	8128219
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.046	0.0050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Antimony (Sb)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Arsenic (As)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Barium (Ba)	-	0.0055	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Boron (B)	-	ND	0.050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Calcium (Ca)	-	3.2	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Chromium (Cr)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Copper (Cu)	-	0.0030	0.00050	mg/L	2022/08/04	2022/08/04	JHY	8146729
Total Iron (Fe)	-	0.17	0.050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Lead (Pb)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Magnesium (Mg)	-	0.90	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Manganese (Mn)	-	0.0070	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188



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Bureau Veritas Job #: C2K4335
Report Date: 2022/08/05

NL Department of Environment, Climate Change and
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Your P.O. #: 220028978-6

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS843 CAMP POND BROOK BELOW CAMP POND Sampling Date 2022/07/19 Matrix W Sample # 2022-1822-00-SI-SP Registration # WS-S-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Nickel (Ni)	-	0.017	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Phosphorus (P)	-	ND	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Potassium (K)	-	0.56	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Selenium (Se)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Sodium (Na)	-	2.0	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Strontium (Sr)	-	0.018	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Uranium (U)	-	ND	0.00010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Zinc (Zn)	-	ND	0.0050	mg/L	2022/08/02	2022/08/03	JHY	8142188



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Bureau Veritas Job #: C2K4335
Report Date: 2022/08/05

NL Department of Environment, Climate Change and
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Your P.O. #: 220028978-6

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS844 REID BROOK BELOW TRIBUTARY								
Sampling Date		2022/07/19						
Matrix		W						
Sample #		2022-1823-00-SI-SP						
Registration #		WS-S-0000						
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	11	1.0	mg/L	N/A	2022/08/04		8121819
Nitrate (N)	-	ND	0.050	mg/L	N/A	2022/07/29		8121822
Total dissolved solids (calc., EC)	-	20	1.0	mg/L	N/A	2022/07/26		8122431
Inorganics								
Conductivity	-	35	1.0	uS/cm	N/A	2022/07/25	NGI	8128275
Chloride (Cl-)	-	2.6	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Sulphate (SO4)	-	2.9	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Total Alkalinity (Total as CaCO3)	-	8.5	2.0	mg/L	N/A	2022/07/25	NGI	8128279
Colour	-	27	5.0	TCU	N/A	2022/07/29	EMT	8135235
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2022/07/25	NGI	8128282
Total Kjeldahl Nitrogen (TKN)	-	0.15	0.10	mg/L	2022/07/26	2022/07/28	MJ1	8131491
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2022/07/29	EMT	8135237
Nitrite (N)	-	0.012	0.010	mg/L	N/A	2022/07/28	EMT	8135238
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2022/07/26	EMT	8128865
Dissolved Organic Carbon (C)	-	4.2	0.50	mg/L	N/A	2022/07/26	JHH	8128532
Total Organic Carbon (C)	-	3.9	0.50	mg/L	N/A	2022/07/25	JHH	8128249
pH	-	6.99		pH	N/A	2022/07/25	NGI	8128277
Total Phosphorus	-	ND	0.004	mg/L	2022/07/26	2022/07/29	SSV	8131457
Total Suspended Solids	-	8.4	1.0	mg/L	2022/07/22	2022/07/26	A1M	8125389
Turbidity	-	1.4	0.10	NTU	N/A	2022/07/27	NGI	8133071
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2022/07/26	2022/07/26	FJO	8128219
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.11	0.0050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Antimony (Sb)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Arsenic (As)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Barium (Ba)	-	0.0050	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Boron (B)	-	ND	0.050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Calcium (Ca)	-	2.9	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Chromium (Cr)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Copper (Cu)	-	0.0011	0.00050	mg/L	2022/08/04	2022/08/04	JHY	8146729
Total Iron (Fe)	-	0.29	0.050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Lead (Pb)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Magnesium (Mg)	-	0.83	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Manganese (Mn)	-	0.0056	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Nickel (Ni)	-	0.0070	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188



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VERITAS

Bureau Veritas Job #: C2K4335
Report Date: 2022/08/05

NL Department of Environment, Climate Change and
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Your P.O. #: 220028978-6

Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS844 REID BROOK BELOW TRIBUTARY								
Sampling Date		2022/07/19						
Matrix		W						
Sample #		2022-1823-00-SI-SP						
Registration #		WS-S-0000						
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Phosphorus (P)	-	ND	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Potassium (K)	-	0.42	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Selenium (Se)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Sodium (Na)	-	2.3	0.10	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Strontium (Sr)	-	0.016	0.0020	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Uranium (U)	-	ND	0.00010	mg/L	2022/08/02	2022/08/03	JHY	8142188
Total Zinc (Zn)	-	ND	0.0050	mg/L	2022/08/02	2022/08/03	JHY	8142188



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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS853 TRIBUTARY TO REID BROOK								
Sampling Date		2022/07/19						
Matrix		W						
Sample #		2022-1824-00-SI-SP						
Registration #		WS-S-0000						
RESULTS OF ANALYSES OF WATER								
Calculated Parameters								
Hardness (CaCO3)	-	12	1.0	mg/L	N/A	2022/08/04		8121819
Nitrate (N)	-	ND	0.050	mg/L	N/A	2022/07/29		8121822
Total dissolved solids (calc., EC)	-	21	1.0	mg/L	N/A	2022/07/26		8122431
Inorganics								
Conductivity	-	38	1.0	uS/cm	N/A	2022/07/25	NGI	8128275
Chloride (Cl-)	-	3.0	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Bromide (Br-)	-	ND	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Sulphate (SO4)	-	3.7	1.0	mg/L	N/A	2022/07/26	SUR	8129970
Total Alkalinity (Total as CaCO3)	-	8.3	2.0	mg/L	N/A	2022/07/25	NGI	8128279
Colour	-	31	5.0	TCU	N/A	2022/07/29	EMT	8135235
Dissolved Fluoride (F-)	-	ND	0.10	mg/L	N/A	2022/07/25	NGI	8128282
Total Kjeldahl Nitrogen (TKN)	-	0.12	0.10	mg/L	2022/07/26	2022/07/28	MJ1	8131491
Nitrate + Nitrite (N)	-	ND	0.050	mg/L	N/A	2022/07/29	EMT	8135237
Nitrite (N)	-	0.012	0.010	mg/L	N/A	2022/07/28	EMT	8135238
Nitrogen (Ammonia Nitrogen)	-	ND	0.050	mg/L	N/A	2022/07/26	EMT	8128865
Dissolved Organic Carbon (C)	-	4.4	0.50	mg/L	N/A	2022/07/26	JHH	8128529
Total Organic Carbon (C)	-	4.6	0.50	mg/L	N/A	2022/07/25	JHH	8128242
pH	-	6.99		pH	N/A	2022/07/25	NGI	8128277
Total Phosphorus	-	ND	0.004	mg/L	2022/07/26	2022/07/29	SSV	8131457
Total Suspended Solids	-	6.0	1.0	mg/L	2022/07/22	2022/07/26	A1M	8125389
Turbidity	-	2.3	0.10	NTU	N/A	2022/07/27	NGI	8133071
MERCURY BY COLD VAPOUR AA (WATER)								
Metals								
Total Mercury (Hg)	-	ND	0.000013	mg/L	2022/07/26	2022/07/26	FJO	8128219
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Aluminum (Al)	-	0.12	0.0050	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Antimony (Sb)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Arsenic (As)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Barium (Ba)	-	0.0059	0.0010	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Boron (B)	-	ND	0.050	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Cadmium (Cd)	-	ND	0.000010	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Calcium (Ca)	-	3.3	0.10	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Chromium (Cr)	-	ND	0.0010	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Copper (Cu)	-	0.0015	0.00050	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Iron (Fe)	-	0.63	0.050	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Lead (Pb)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Magnesium (Mg)	-	0.96	0.10	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Manganese (Mn)	-	0.011	0.0020	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Nickel (Ni)	-	0.0087	0.0020	mg/L	2022/08/02	2022/08/03	EPU	8141956



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Sample Details/Parameters	A	Result	RDL	UNITS	Extracted	Analyzed	By	Batch
TFS853 TRIBUTARY TO REID BROOK								
Sampling Date 2022/07/19								
Matrix W								
Sample # 2022-1824-00-SI-SP								
Registration # WS-S-0000								
ELEMENTS BY ICP/MS (WATER)								
Metals								
Total Phosphorus (P)	-	ND	0.10	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Potassium (K)	-	0.39	0.10	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Selenium (Se)	-	ND	0.00050	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Sodium (Na)	-	2.4	0.10	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Strontium (Sr)	-	0.019	0.0020	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Uranium (U)	-	ND	0.00010	mg/L	2022/08/02	2022/08/03	EPU	8141956
Total Zinc (Zn)	-	ND	0.0050	mg/L	2022/08/02	2022/08/03	EPU	8141956