

Real-Time Water Quality Deployment Report

Minipi River below Minipi Lake

August 8 to
September 14, 2013



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

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General

- Department of Environment and Conservation staff monitors the real-time web pages regularly.
- This deployment report discusses water quality related events occurring at the station on Minipi River below Minipi Lake.
- On August 8, 2013, a real-time water quality monitoring instrument was deployed at the station on the Minipi River below Minipi Lake. The instrument was deployed for a period of 37 days. The instrument was removed on September 14.

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 Sonde is temporarily deployed along side the Field Sonde. Values for temperature, pH, conductivity, dissolved oxygen and turbidity are compared between the two instruments. Based on the degree of difference between parameters recorded by the Field Sonde and QA/QC Sonde at deployment and at removal, a qualitative statement is made on the data quality (Table 1).

Table 1: Ranking classifications for deployment and removal

Parameter	Rank				
	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 ($\mu\text{S}/\text{cm}$)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Sp. Conductance > 35 $\mu\text{S}/\text{cm}$ (%)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Dissolved Oxygen (mg/L) (% Sat)	<=+/-0.3	>+/-0.3 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Turbidity <40 NTU (NTU)	<=+/-2	>+/-2 to 5	>+/-5 to 8	>+/-8 to 10	>+/-10
Turbidity > 40 NTU (%)	<=+/-5	>+/-5 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20

- It should be noted that the temperature sensor on any sonde is the most important. All other parameters can be broken down into three groups: temperature dependant, temperature compensated and temperature independent. Because the temperature sensor is not isolated from the rest of the sonde the entire sonde must be at the same temperature before the sensor will stabilize. The values may take some time to climb to the appropriate reading; if a reading is taken too soon it may not accurately portray the water body.

Minipi River below Minipi Lake, Newfoundland and Labrador

- Deployment and removal comparison rankings for the station on Minipi River deployed between August 8 and September 14, 2013 is summarized in Table 2.

Table 2: Comparison rankings for Minipi River station August 8 – September 14, 2013.

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Minipi River	August 8, 2013	Deployment	Excellent	Marginal	Excellent	Excellent	Excellent
	Sept 14, 2013	Removal	Excellent	N/A	Excellent	Excellent	Excellent

- At the Minipi River station, all parameters but pH ranked either 'marginal', 'good' or 'excellent' at deployment and removal. pH could not be ranked due to the failure of the pH sensor on the QA/QC sonde.

Data Interpretation

- The following graphs and discussion illustrate water quality-related events from August 8 to September 14 at the station on Minipi River below Minipi Lake.
- With the exception of water quantity data (stage), all data used in the preparation of the graphs and subsequent discussion below adhere to this stringent QA/QC protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Minipi River below Minipi Lake

- Water temperature ranged from 10.85 to 19.03°C during this deployment period (Figure 1).
- Water temperature decreased throughout the deployment period, this was expected due to the decreasing ambient air temperature during this time. (Figure 2).

Water Temperature : Minipi River below Minipi Lake
August 8 to September 14, 2013

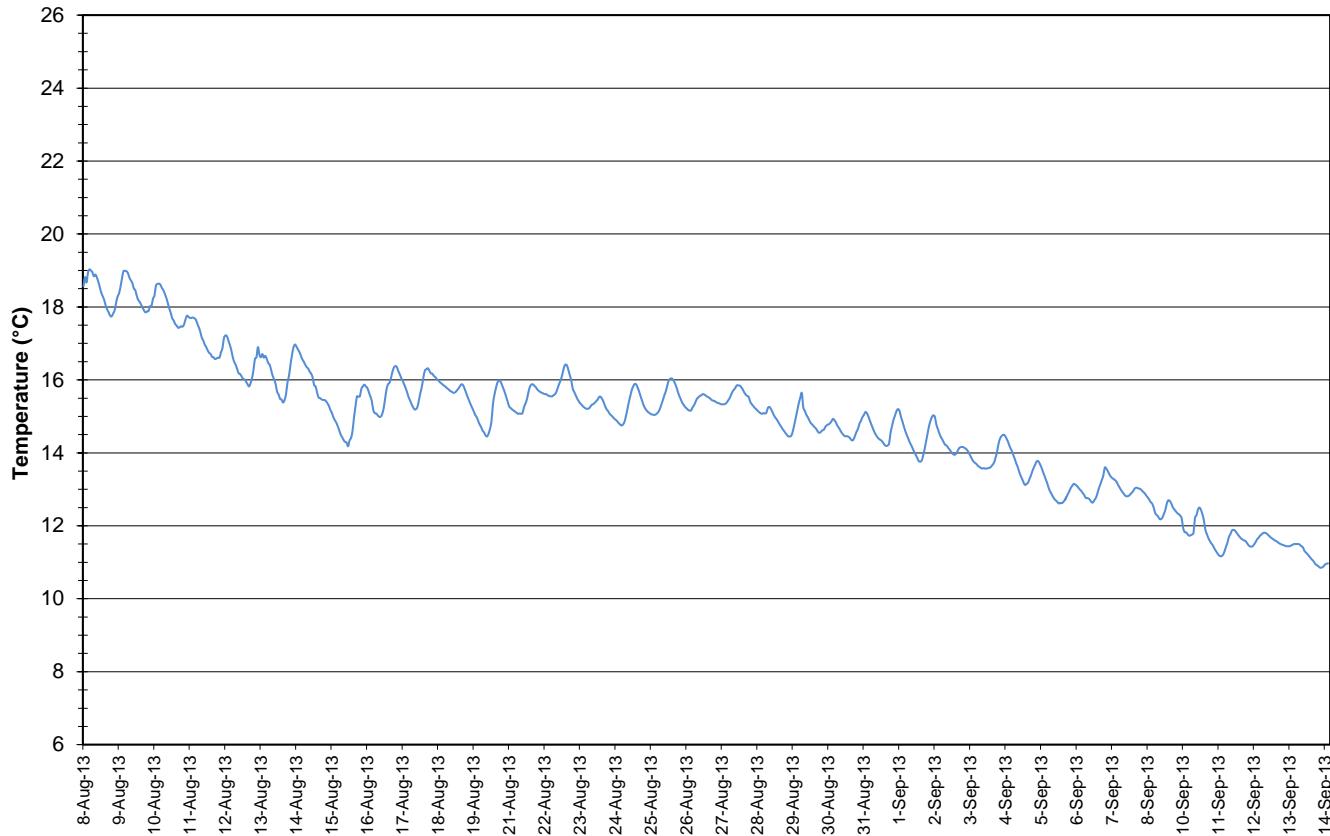


Figure 1: Water temperature at Minipi River below Minipi Lake

Average Daily Air and Water Temperature: Minipi River below Minipi Lake
August 8 to September 14, 2013

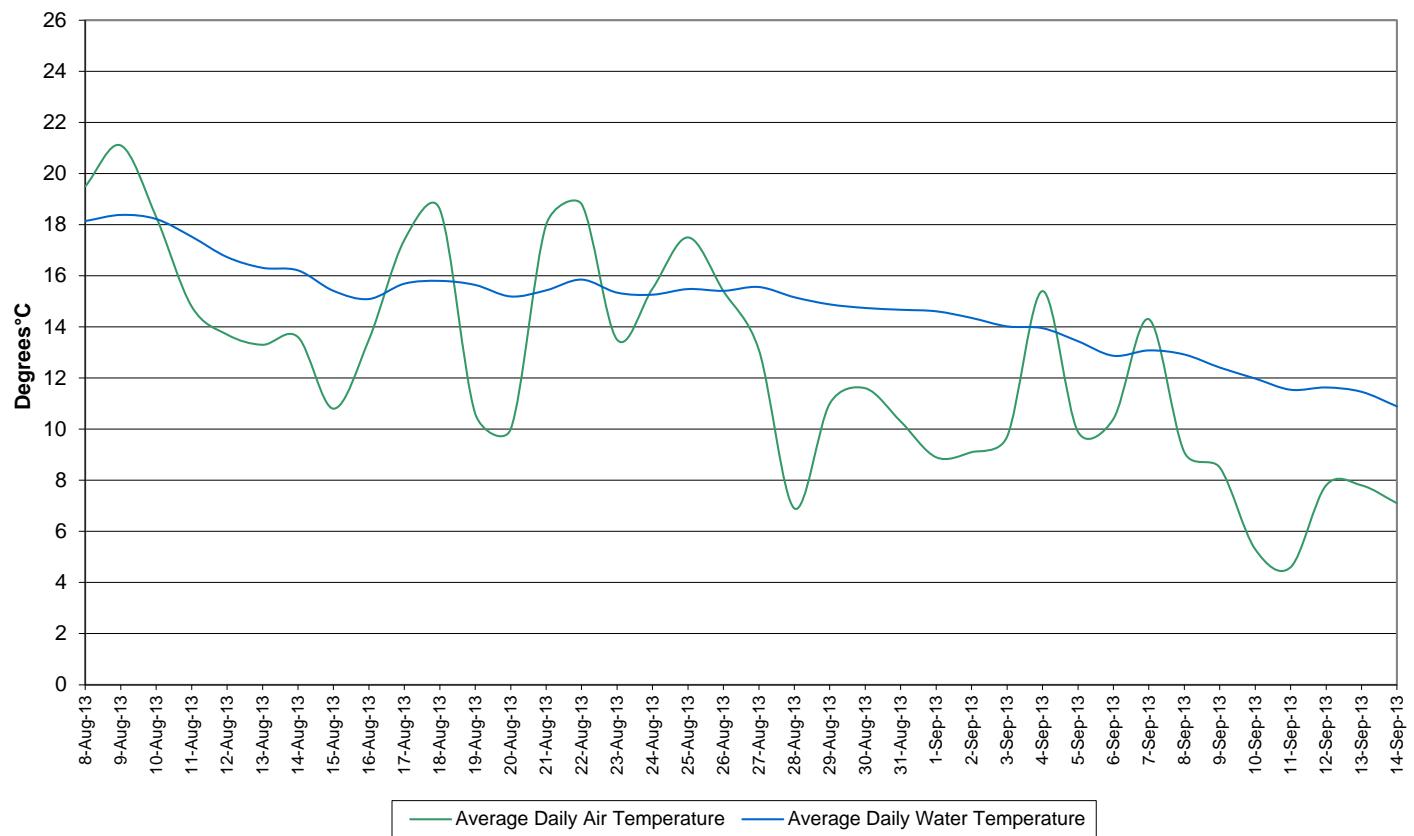


Figure 2: Average daily air and water temperatures at Minipi River below Minipi Lake
(Weather data collected at Goose Bay)

Minipi River below Minipi Lake, Newfoundland and Labrador

- pH ranges between 6.74 and 7.09 pH units throughout the deployment period (Figure 3). The average pH is 6.94 units.
- All values during the deployment are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units). pH fluctuates slightly during the day and night.

Water pH : Minipi River below Minipi Lake
August 8 to September 14, 2013

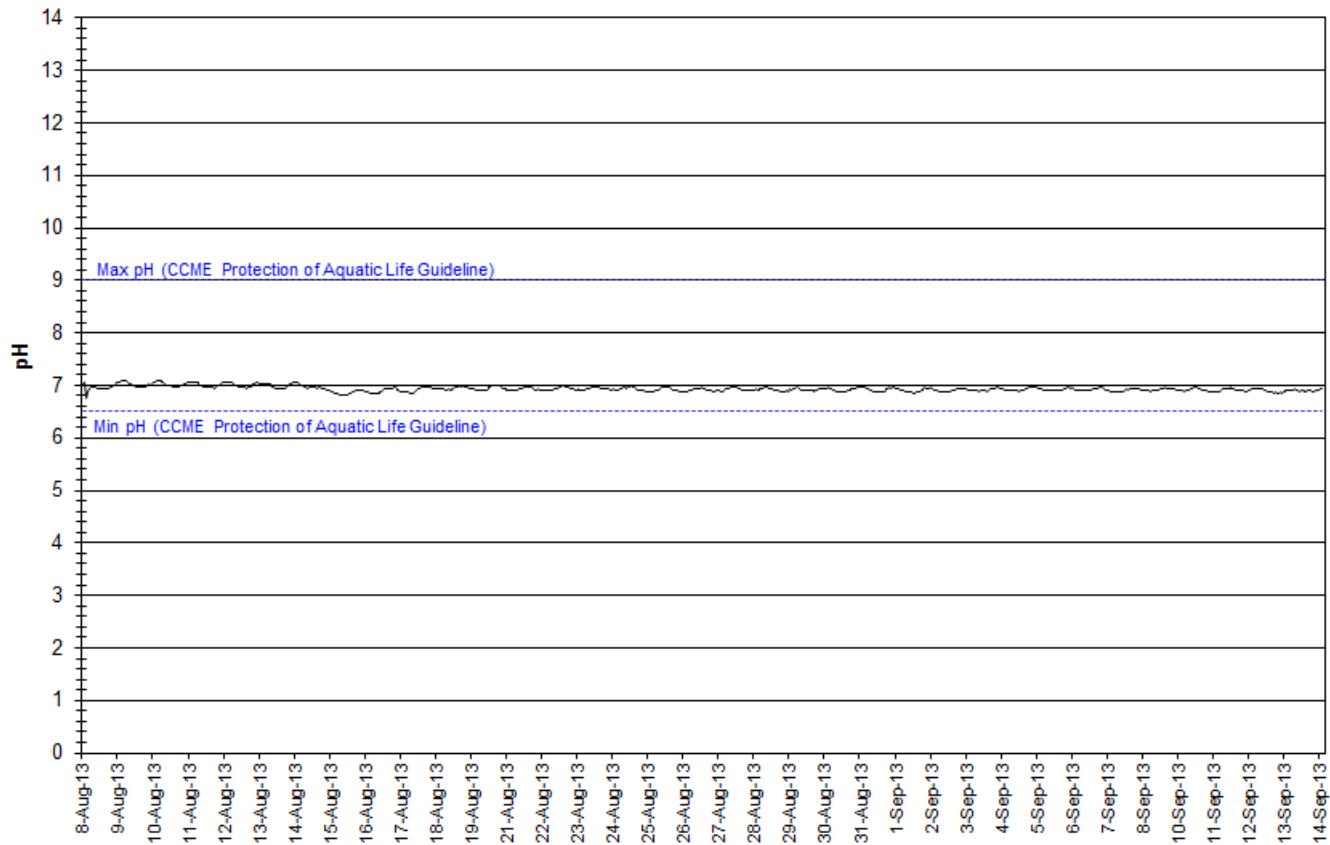


Figure 3: pH at Minipi River below Minipi Lake

Minipi River below Minipi Lake, Newfoundland and Labrador

- Specific conductivity ranges from 13.8 to 15.5 $\mu\text{S}/\text{cm}$.
- Specific conductivity decreased slightly during the later portion of the deployment period.

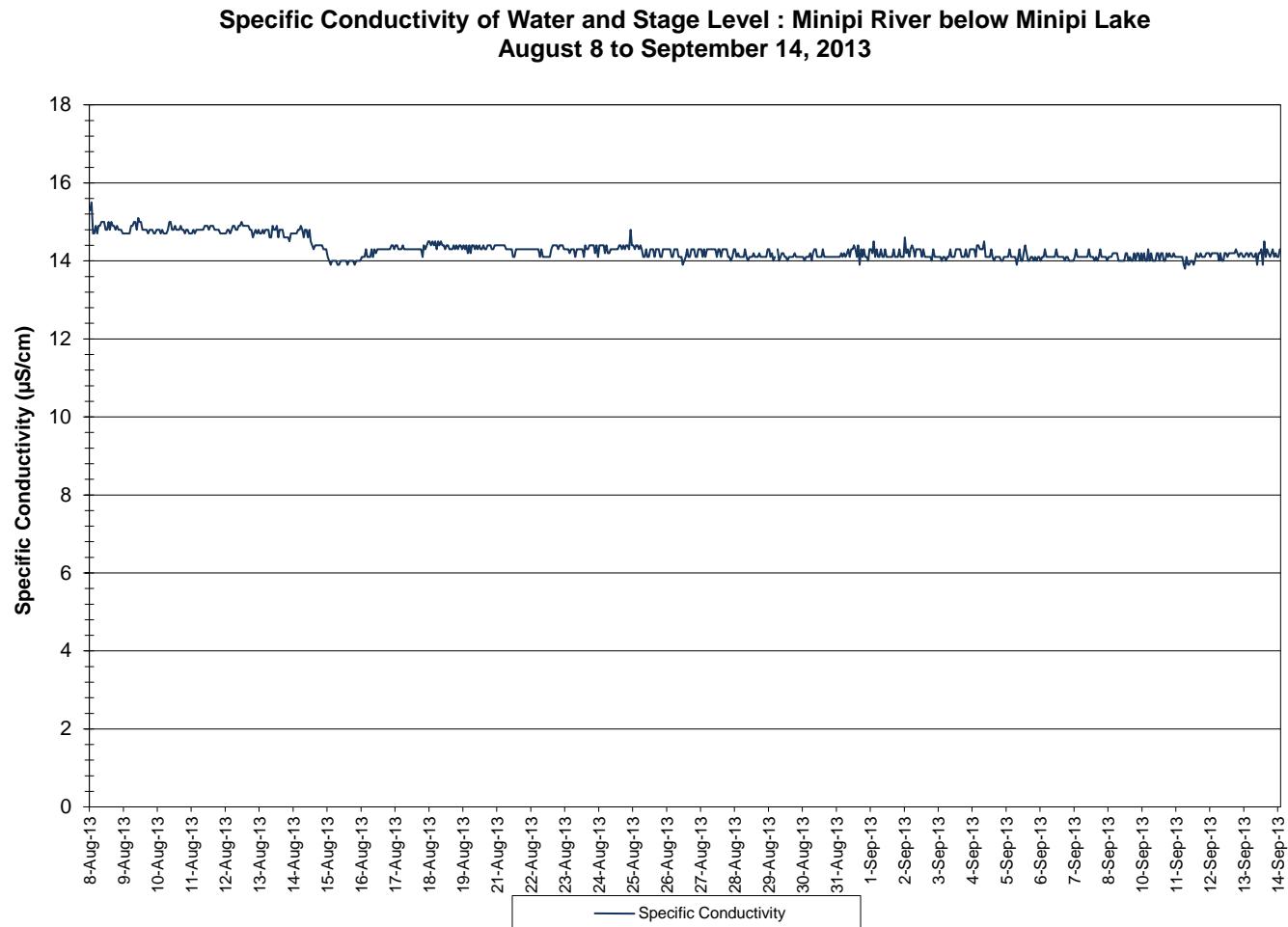


Figure 4: Specific conductivity at Minipi River below Minipi Lake

Minipi River below Minipi Lake, Newfoundland and Labrador

- The saturation of dissolved oxygen ranged from 92.4 to 99.5% and a range of 8.82 to 10.69 mg/l was found in the concentration of dissolved oxygen with a median value of 9.74 mg/l (Figure 5).
- All values were above the minimum CCME Guideline for the Protection of Other Life Stage Cold Water Biota of 6.5 mg/l. Most values were above the minimum CCME Guideline for the Protection of Early Life Stage Cold Water Biota value of 9.5 mg/l. The guidelines are indicated in blue on Figure 5.
- Dissolved Oxygen content is generally stable with a slight increase during the later portion of the deployment period; this is due to the decreasing water temperature. Dissolved oxygen content fluctuates diurnally, displaying the inverse relationship to water temperature.

Dissolved Oxygen Concentration and Saturation : Minipi River below Minipi Lake
August 8 to September 14, 2013

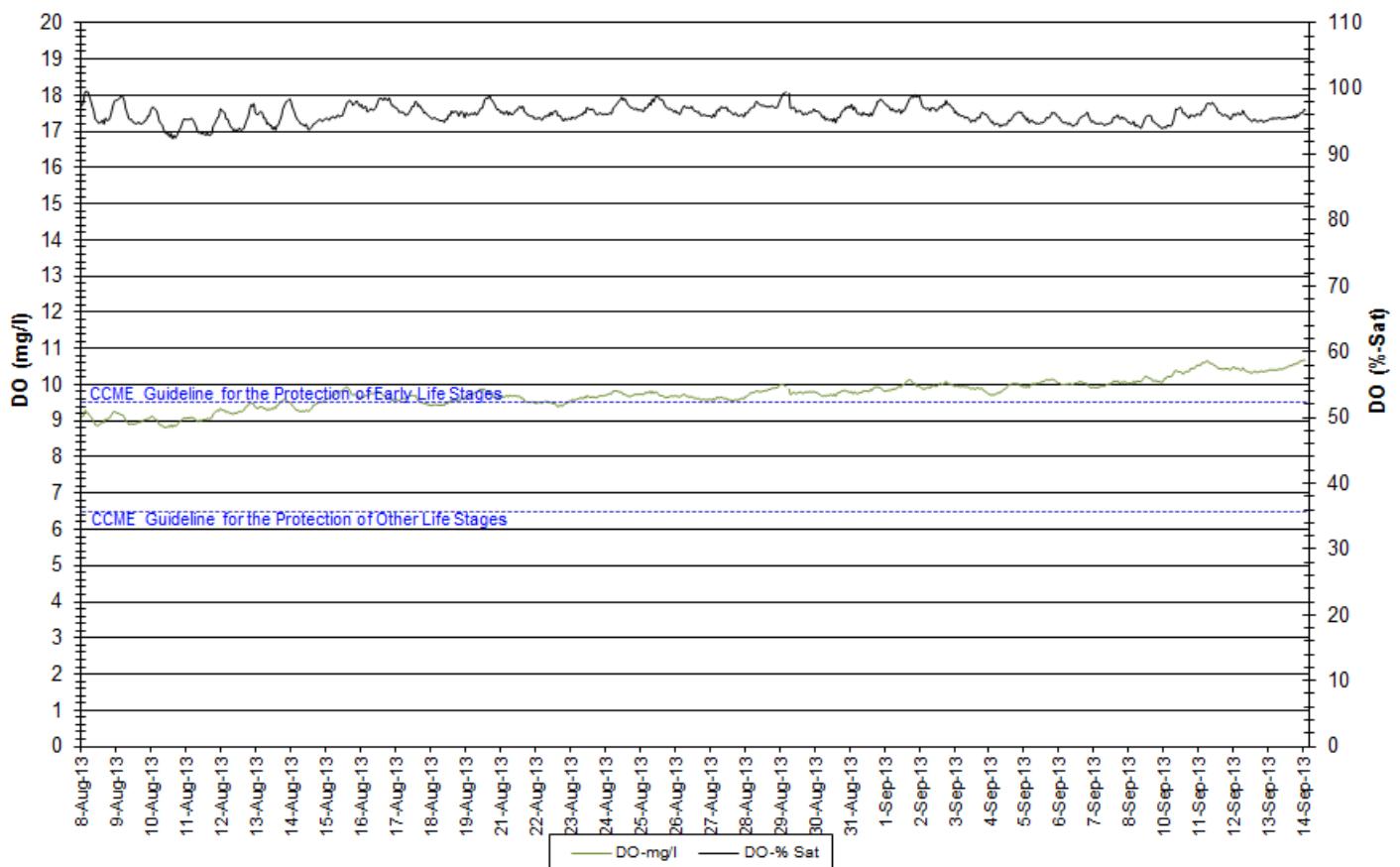


Figure 5: Dissolved oxygen and percent saturation at Minipi River below Minipi Lake

Minipi River below Minipi Lake, Newfoundland and Labrador

- Turbidity values typically remain at 0NTU for the majority of the deployment period (Figure 6).
- Turbidity readings >0NTU occur infrequently, at low magnitudes and for a maximum of 1 hour. This site is pristine with no background turbidity values.

Water Turbidity : Minipi River below Minipi Lake
August 8 to September 14, 2013

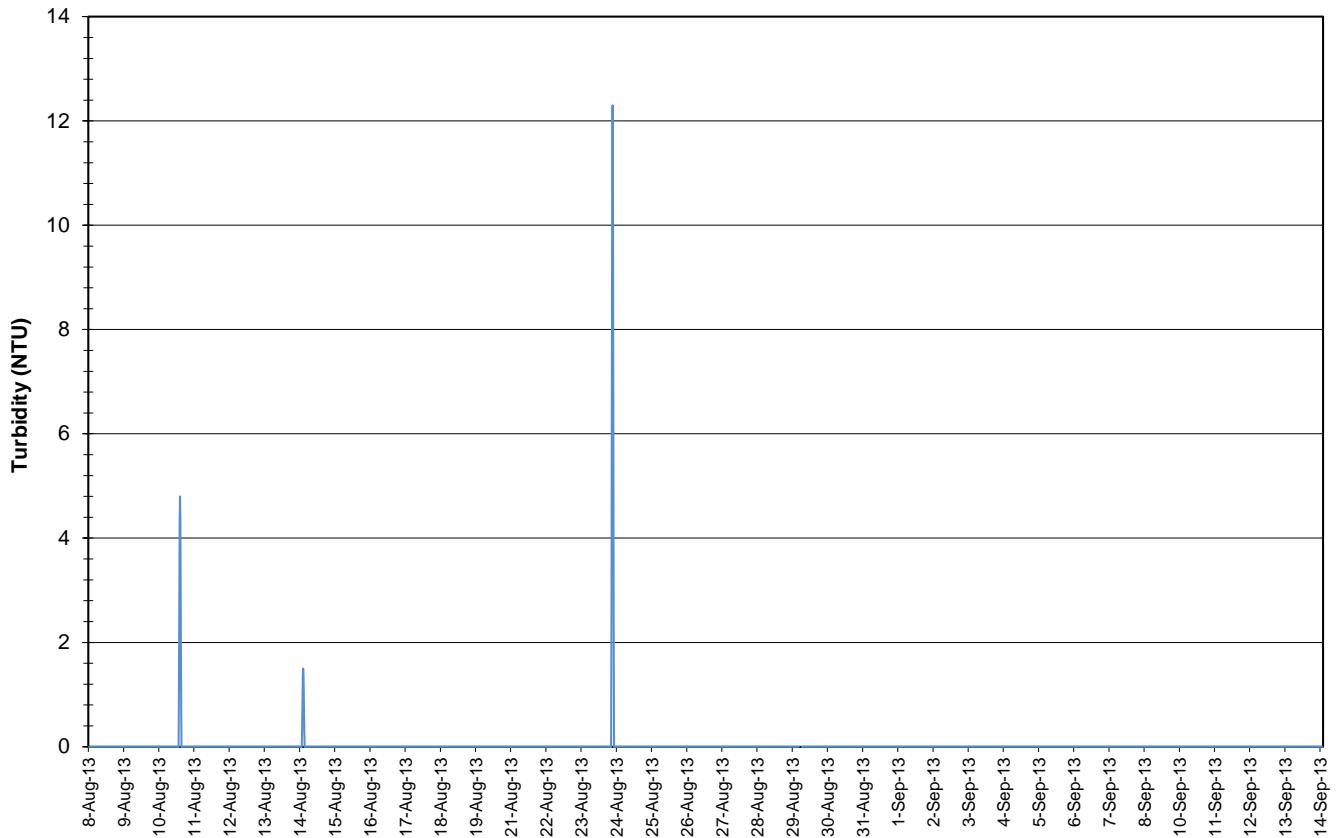


Figure 6: Turbidity at Minipi River below Minipi Lake

Minipi River below Minipi Lake, Newfoundland and Labrador

- Stage and precipitation are graphed below to show the relationship between rainfall and water level (Figure 7). Stage varies throughout the deployment period with varying precipitation records.
- It is important to note the distance between where the precipitation data was collected (~100km to Goose Bay) and the area that drains the Minipi River at this point (~2300km²). There is no significant correlation between precipitation and stage during this time at this station.
- Stage increased after a number of days with precipitation, before slowly decreasing towards the end of the deployment period.

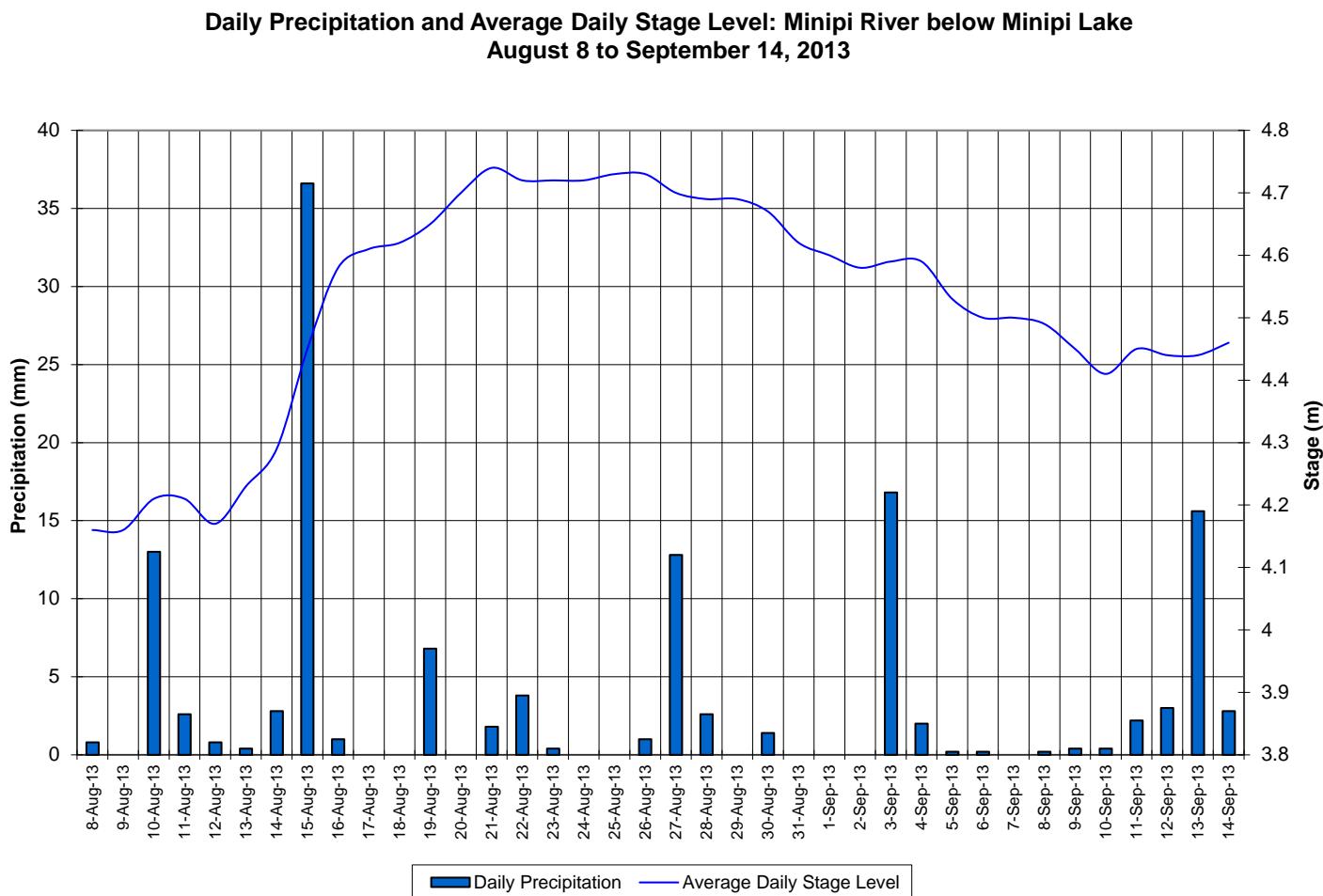


Figure 7: Stage and precipitation at Minipi River below Minipi Lake

Conclusions

- An instrument at the water quality monitoring station on the Minipi River below Minipi Lake was deployed on August 8 and removed on September 14.
- In most cases, weather related events or increase/decreases in water level could be used to explain the fluctuations. Most values recorded were within ranges as suggested by the CCME Guidelines for the Protection of Aquatic Life for pH and dissolved oxygen.
- Temperature decreased, while dissolved oxygen increased slightly. Specific conductivity remained relatively stable, and pH was stable. Turbidity remained typically at 0 NTU, however there were a few spikes at a low magnitude that occurred for a short period of time.

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Appendix 1

Average Daily Air Temperature and Precipitation: Happy Valley-Goose Bay August 8 to September 14, 2013

