

Real-Time Water Quality Deployment Report

Minipi River below Minipi Lake

June 26 to
August 8, 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 June 26, 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 42 days. The instrument was removed on August 8.

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

	Rank				
Parameter	Excellent	Good	Fair	Marginal	Poor
Temperature (°C)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	<+/-1
pH (unit)	<=+/-0.2	>+/-0.2 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Sp. Conductance (µS/cm)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Sp. Conductance > 35 µS/cm (%)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Dissolved Oxygen (mg/L) (% Sat)	<=+/-0.3	>+/-0.3 to 0.5	>+/-0.5 to 0.8	>+/-0.8 to 1	>+/-1
Turbidity <40 NTU (NTU)	<=+/-2	>+/-2 to 5	>+/-5 to 8	>+/-8 to 10	>+/-10
Turbidity > 40 NTU (%)	<=+/-5	>+/-5 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20

- It should be noted that the temperature sensor on any sonde is the most important. All other parameters can be broken down into three groups: temperature 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.

- Deployment and removal comparison rankings for the station on Minipi River deployed between June 26 and August 8, 2013 is summarized in Table 2.

Table 2: Comparison rankings for Minipi River station June 26 – August 8, 2013.

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Minipi River	June 26, 2013	Deployment	Excellent	Marginal	Excellent	Excellent	Excellent
	August 8, 2013	Removal	Excellent	Good	Excellent	Excellent	Excellent

- At the Minipi River station, all parameters ranked either ‘marginal’, ‘good’ or ‘excellent’ at deployment and removal.

Data Interpretation

- The following graphs and discussion illustrate water quality-related events from June 26 to August 8 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 12.45 to 20.91°C during this deployment period (Figure 1).
- Water temperature increased slightly throughout the deployment period. Air temperature fluctuated during this time. (Figure 2).

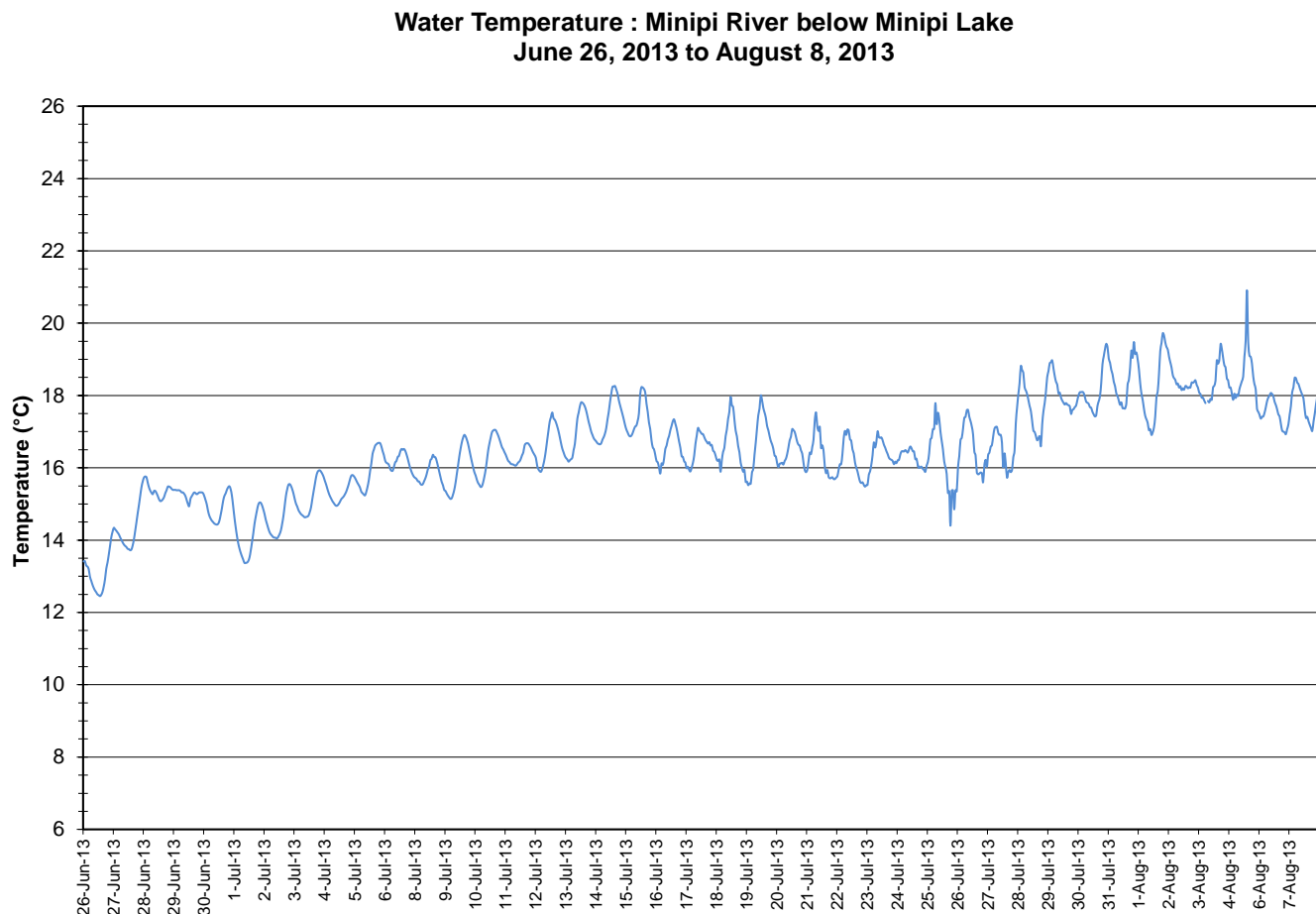
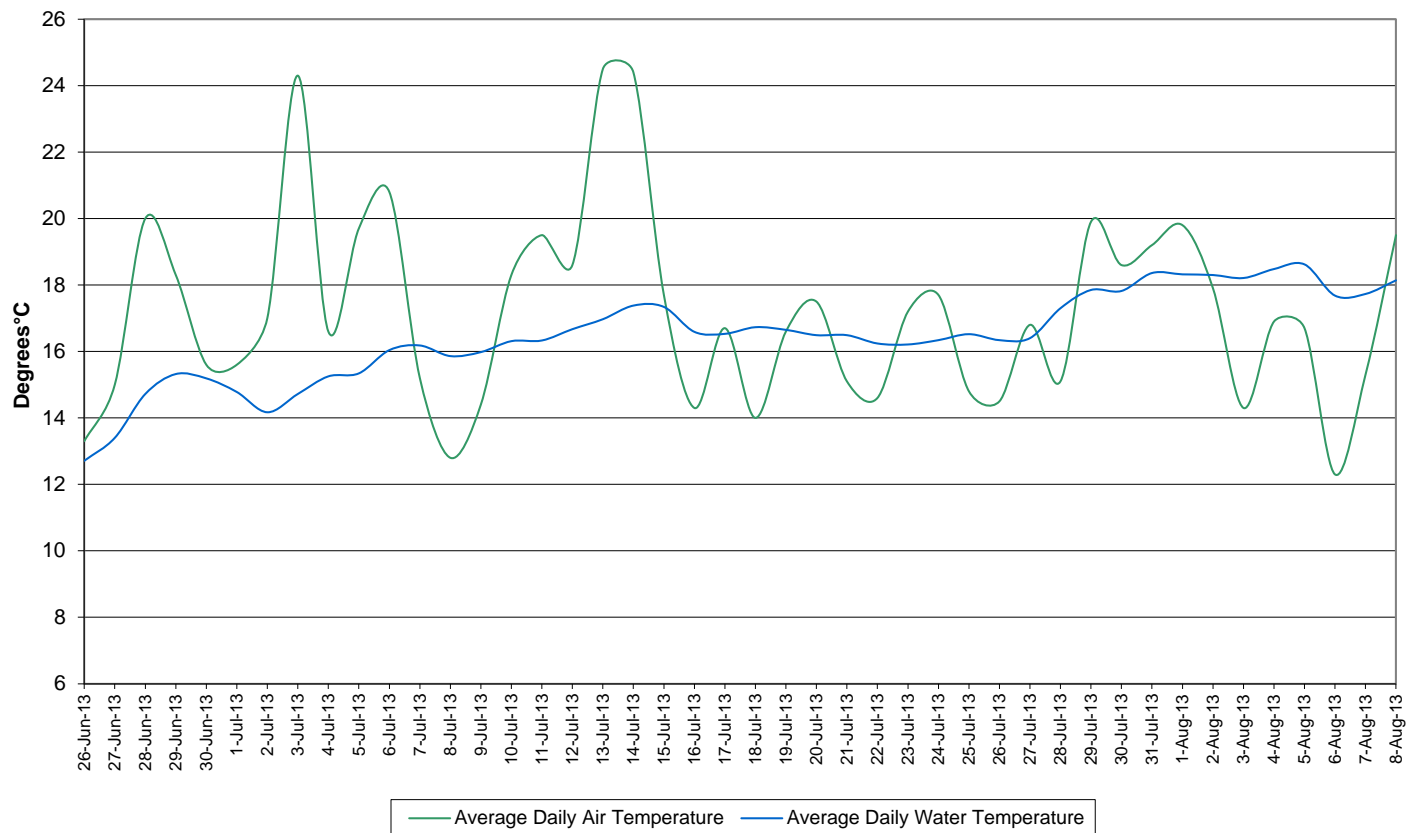


Figure 1: Water temperature at Minipi River below Minipi Lake

**Average Daily Air and Water Temperature: Minipi River below Minipi Lake
June 26 to August 8, 2013**



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

- pH ranges between 6.67 and 7.18 pH units throughout the deployment period (Figure 3). The average pH is 6.96 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.

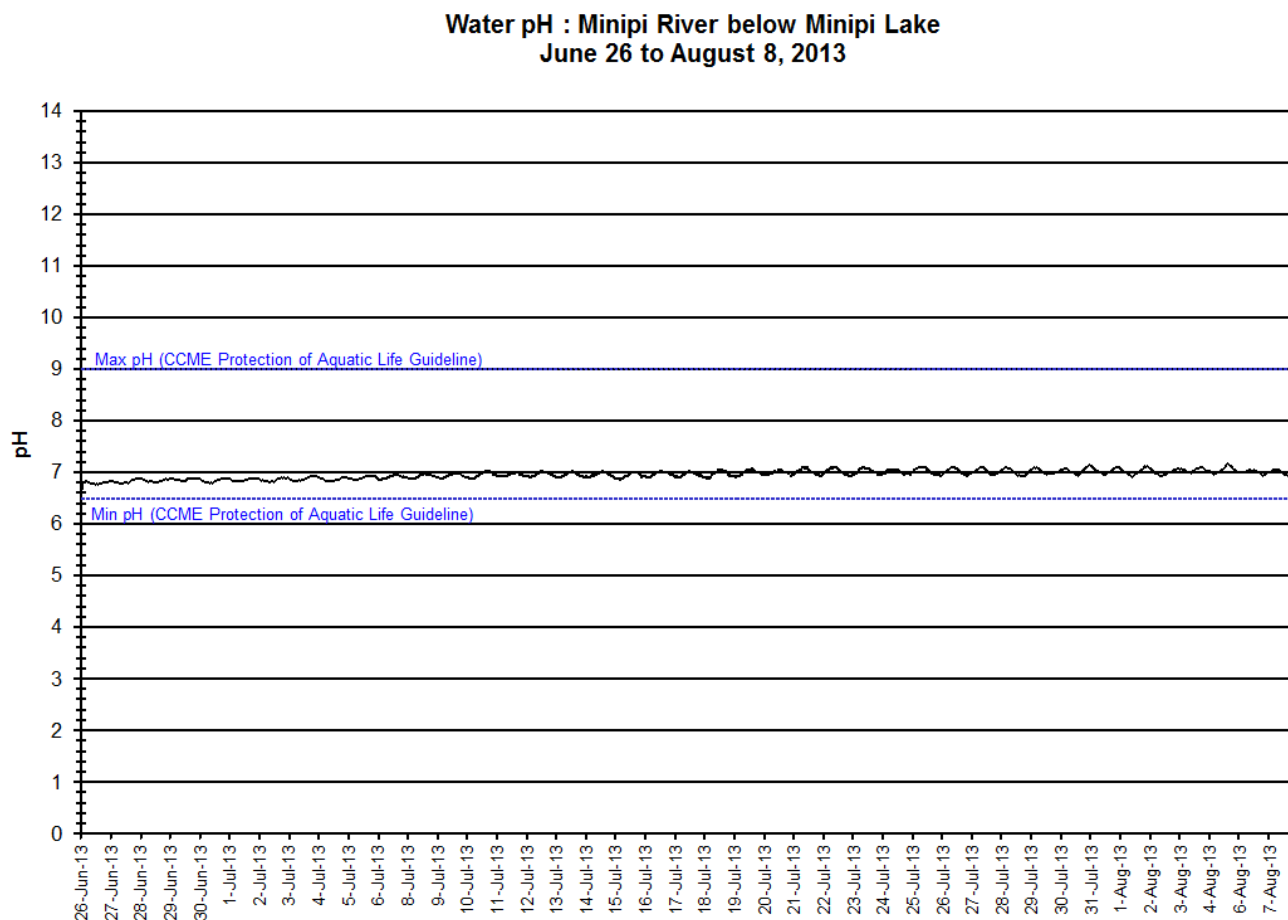


Figure 3: pH at Minipi River below Minipi Lake

- Specific conductivity ranges from 13.3 to 19.3 $\mu\text{S}/\text{cm}$.
- Specific conductivity increased slightly during the later portion of the deployment period, while stage decreased.

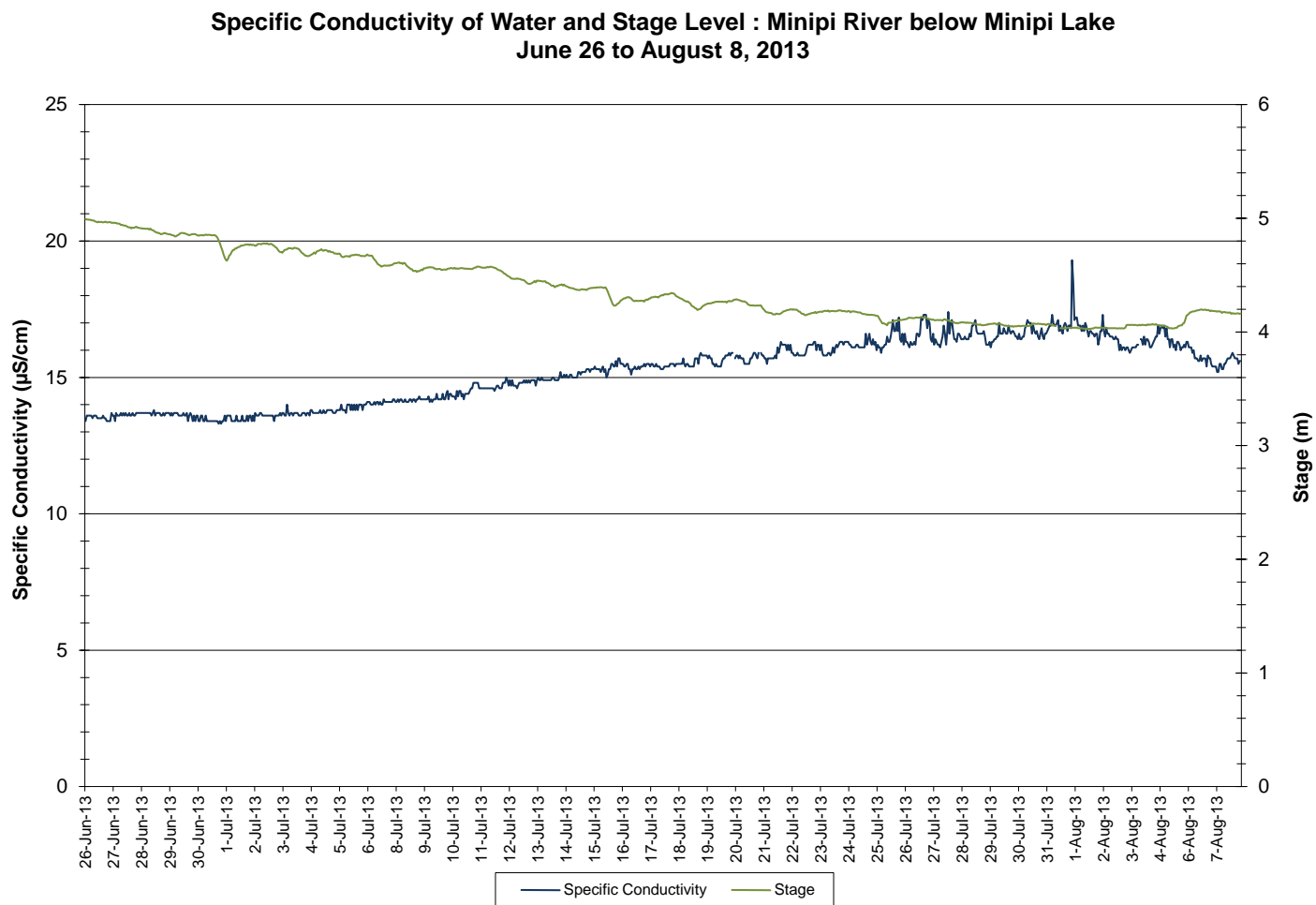


Figure 4: Specific conductivity and stage level at Minipi River below Minipi Lake

- The saturation of dissolved oxygen ranged from 89.5 to 101.2% and a range of 8.50 to 10.18 mg/l was found in the concentration of dissolved oxygen with a median value of 9.19 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 below 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 decrease during the later portion of the deployment period associated with the gradual increase in water temperature. Dissolved oxygen content fluctuates diurnally, displaying the inverse relationship to water temperature.

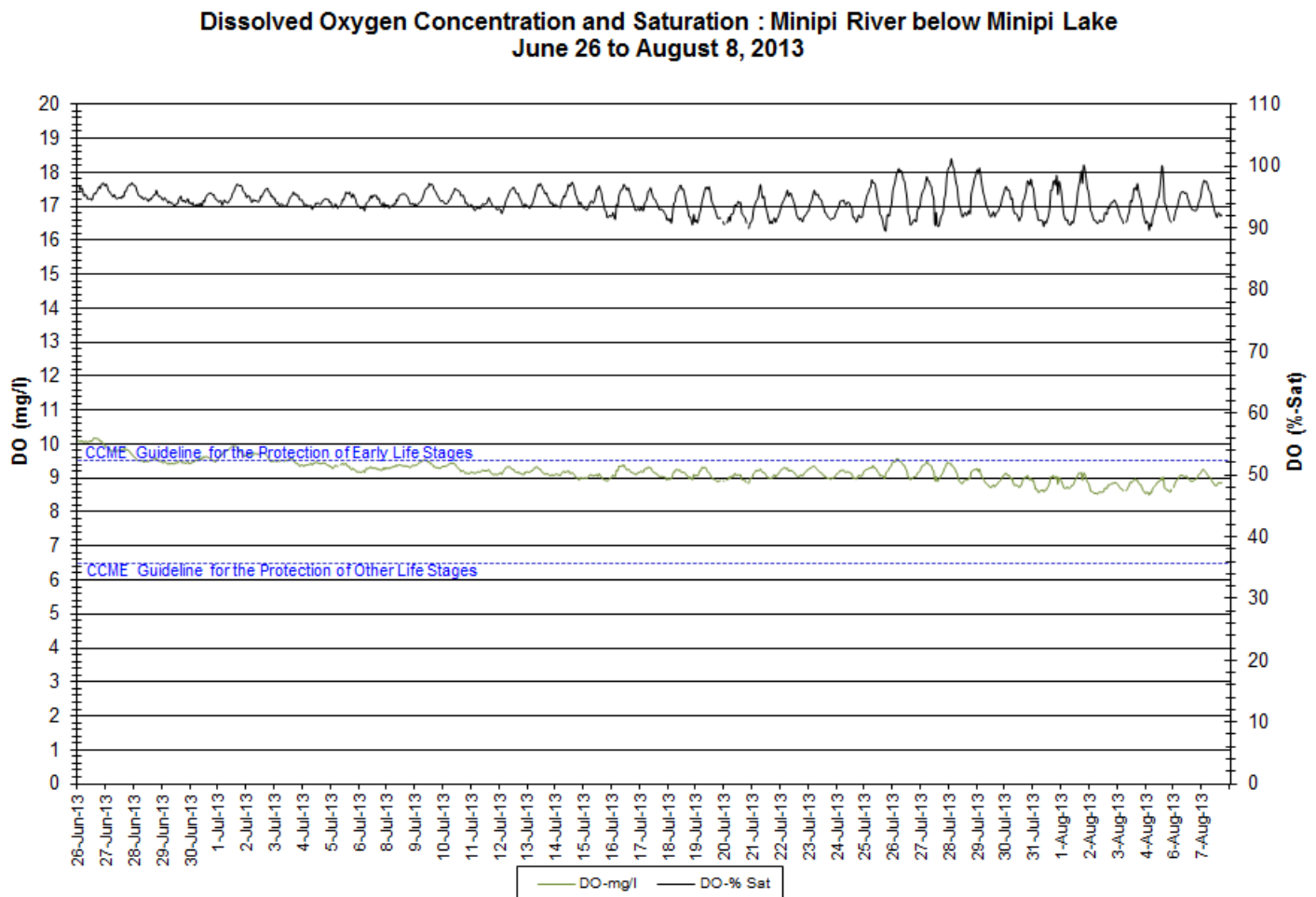


Figure 5: Dissolved oxygen and percent saturation at Minipi River below Minipi Lake

- Turbidity values typically remain at 0 NTU for the majority of the deployment period (Figure 6).
- Turbidity readings >0 NTU occur infrequently, at low magnitudes and for a maximum of 1 hour. This site is pristine with no background turbidity values.
- There was an unusual turbidity event that started on the 23rd of July and lasted over 24 hours before returning to 0 NTU. The cause of this turbidity spike is unknown.

**Water Turbidity : Minipi River below Minipi Lake
June 26 to August 8, 2013**

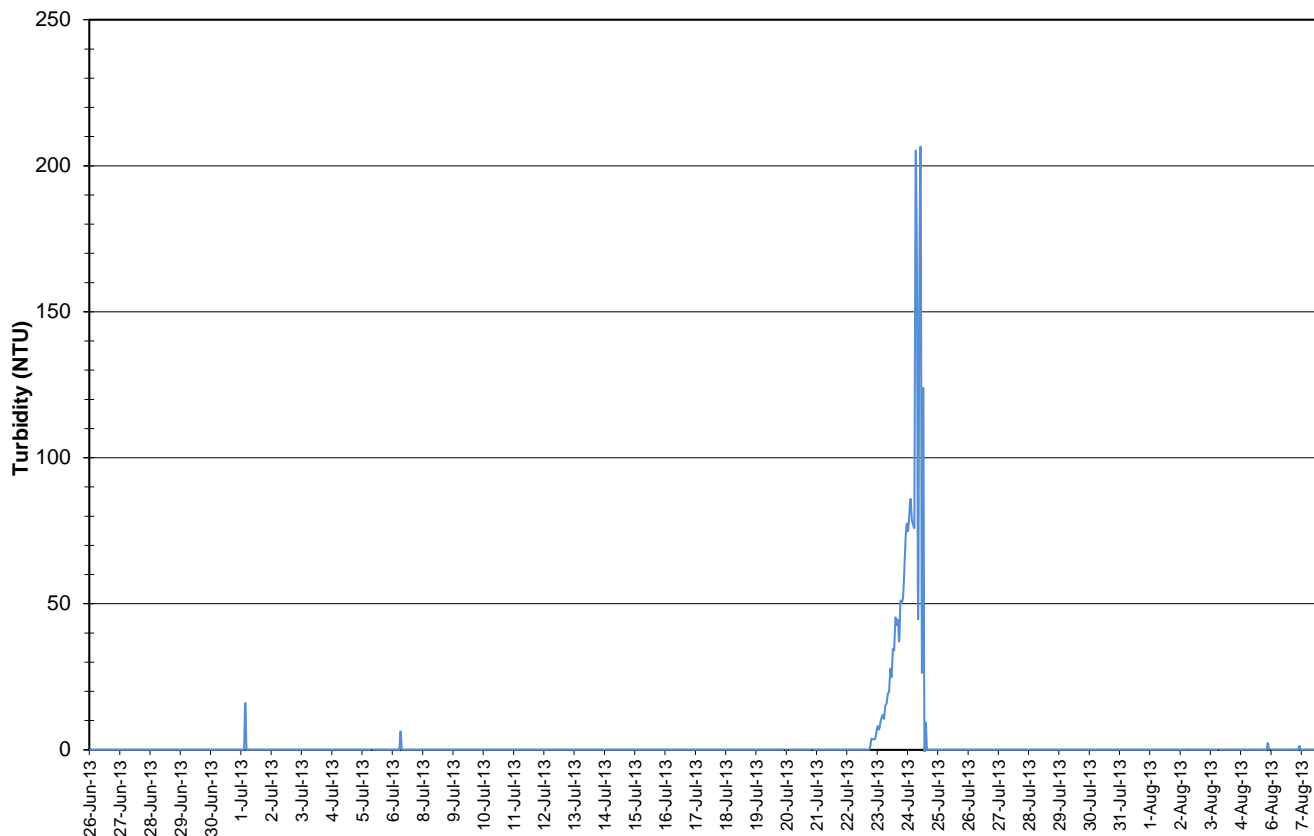


Figure 6: Turbidity and stage level at Minipi River below Minipi Lake

- 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.

**Daily Precipitation and Average Daily Stage Level: Minipi River below Minipi Lake
June 26 to August 8, 2013**

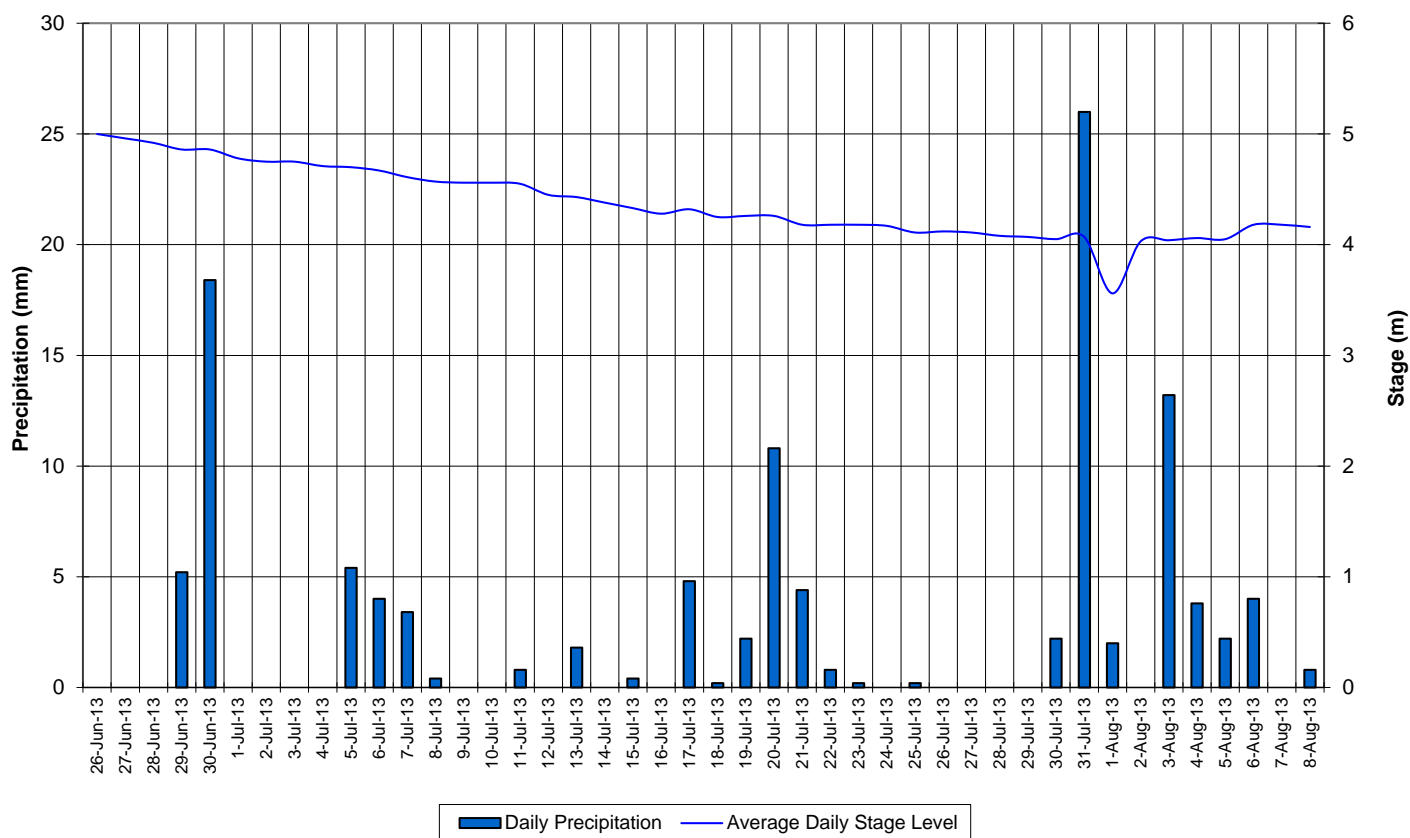


Figure 7: Stage and precipitation at Minipi River below Minipi Lake

Conclusions

- An instrument at the water quality monitoring station on the Minipi River below Minipi Lake was deployed on June 26 and removed on August 8.
- 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 increased, while dissolved oxygen decreased slightly. Specific conductivity increased, and pH was stable. There was a turbidity spike that lasted over 24 hours during the deployment period, readings reached up to and over 200 NTU. The cause of this turbidity spike is unknown.

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Appendix 1

**Average Daily Air Temperature and Precipitation: Happy Valley-Goose Bay
June 26 to August 8, 2013**

