



Real-Time Water Quality Deployment Report

Minipi River below Minipi Lake

October 10 to
November 6, 2013



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

Contents

General	4
Quality Assurance and Quality Control.....	4
Data Interpretation	6
Minipi River below Minipi Lake.....	6
Conclusions	13
Appendix 1	14

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 October 10, 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 27 days. The instrument was removed on November 6 for the winter 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. 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 October 10 and November 6, 2013 is summarized in Table 2.

Table 2: Comparison rankings for Minipi River station October 10 – November 6, 2013.

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Minipi River	Oct 10, 2013	Deployment	Excellent	N/A	Excellent	Excellent	Excellent
	Nov 6, 2013	Removal	Good	N/A	Excellent	N/A	N/A

- At the Minipi River station, temperature, conductivity and dissolved oxygen ranked excellent at deployment.
- Temperature and conductivity ranked good and excellent at removal
- pH and dissolved oxygen could not be ranked due to the failure of the sensors on the QA/QC sonde.
- Turbidity could not be ranked due to the failure of the turbidity sensor on the field sonde.

Data Interpretation

- The following graphs and discussion illustrate water quality-related events from September 14 to October 10 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 0.96 to 8.92°C during this deployment period (Figure 1).
- Water temperature decreased throughout the deployment period, this was expected due to the decreasing ambient air temperature of the season. (Figure 2).

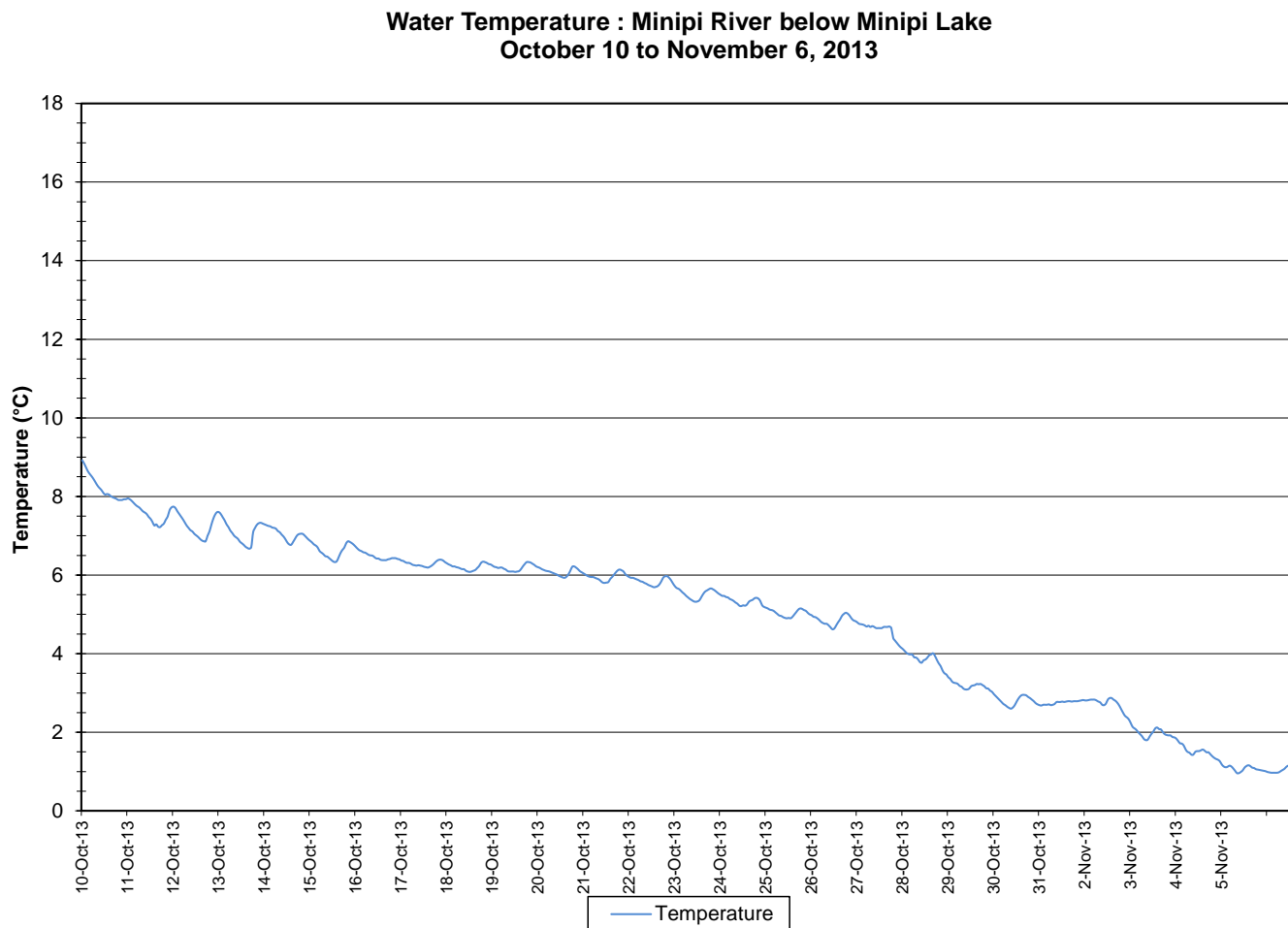
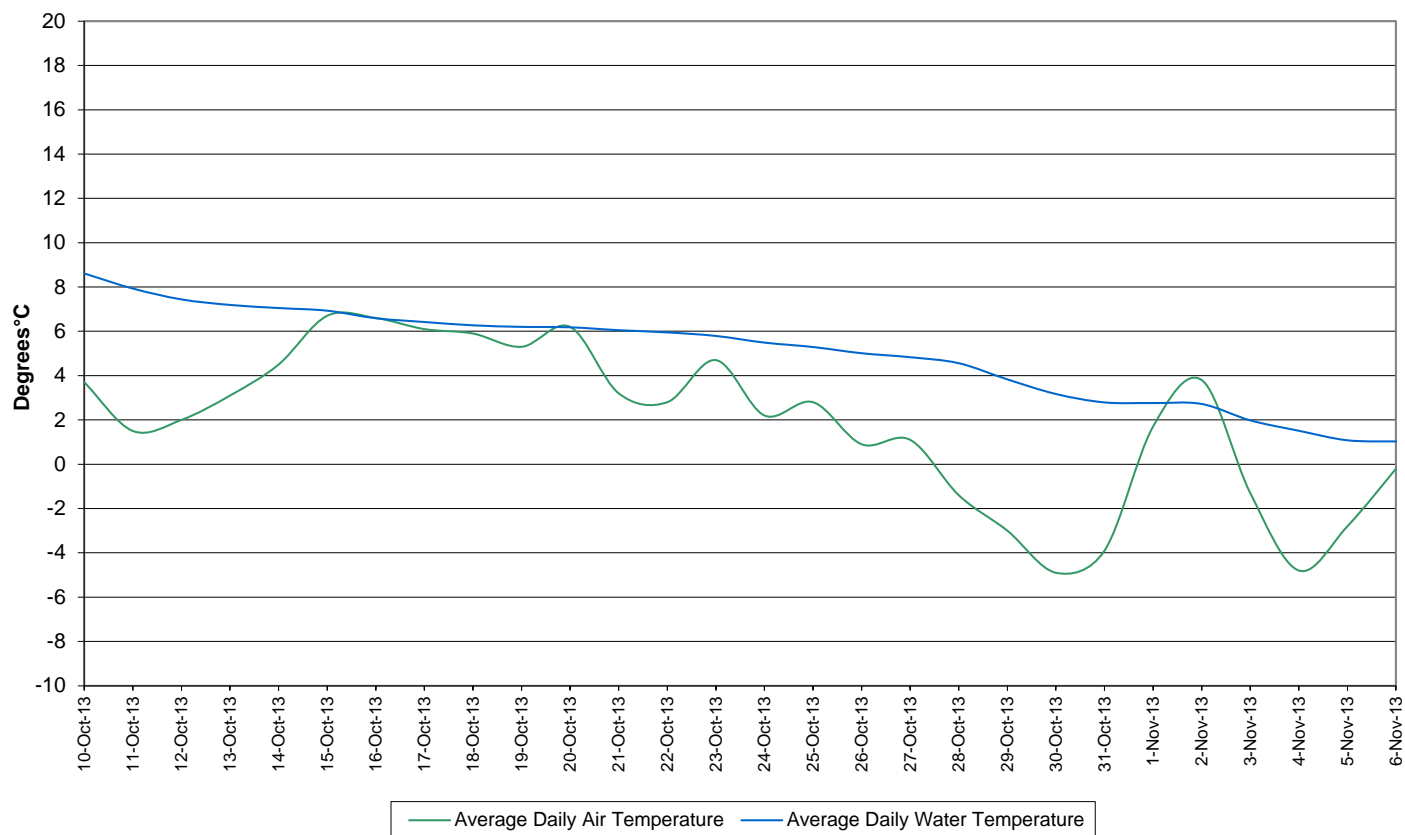


Figure 1: Water temperature at Minipi River below Minipi Lake

**Average Daily Air and Water Temperature: Minipi River below Minipi Lake
October 10 to November 6, 2013**



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

- pH ranges between 6.89 and 7.01 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.

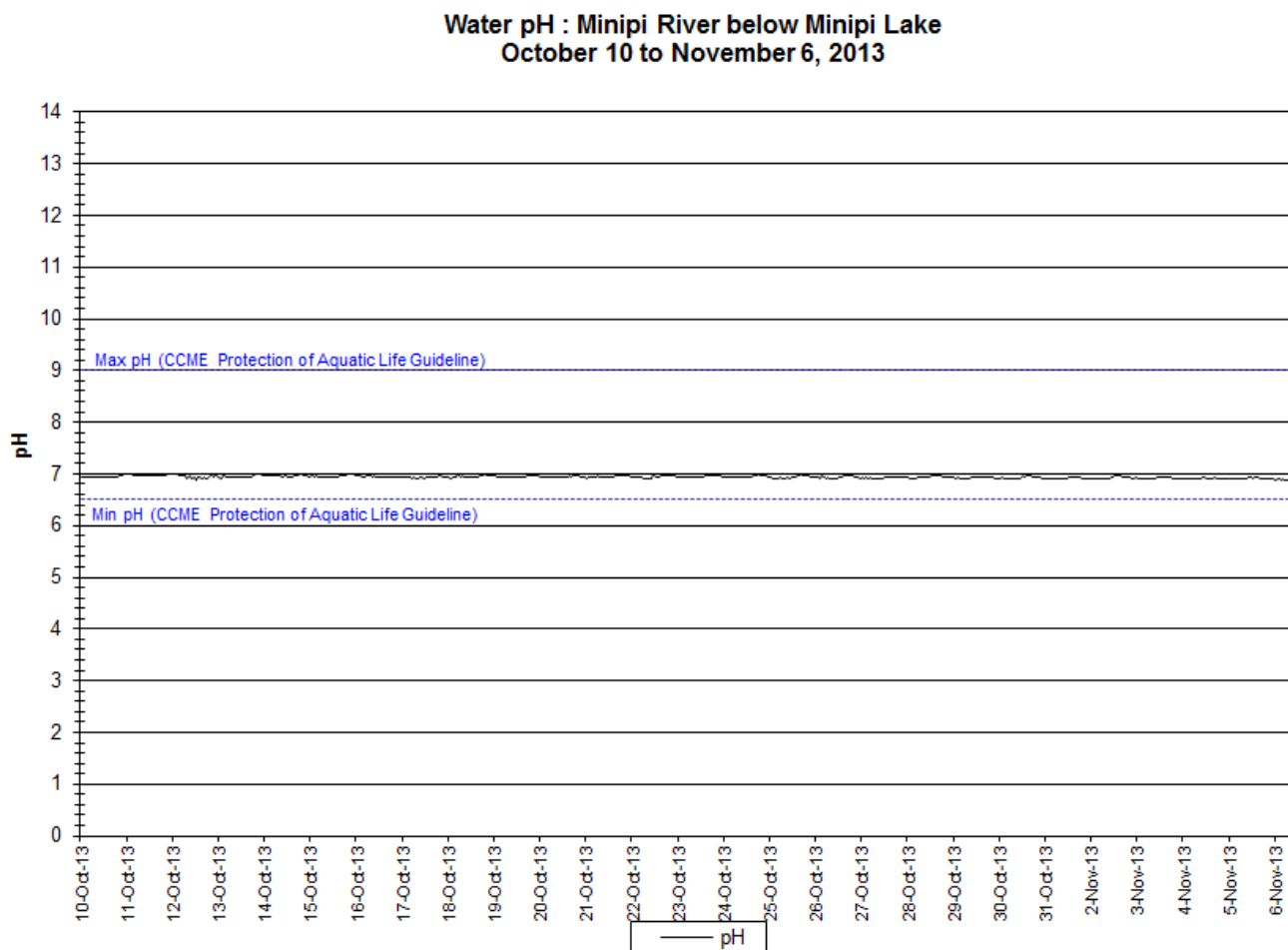


Figure 3: pH at Minipi River below Minipi Lake

- Specific conductivity ranges from 13.6 to 14.3 $\mu\text{S}/\text{cm}$.
- Specific conductivity is stable throughout the deployment period.

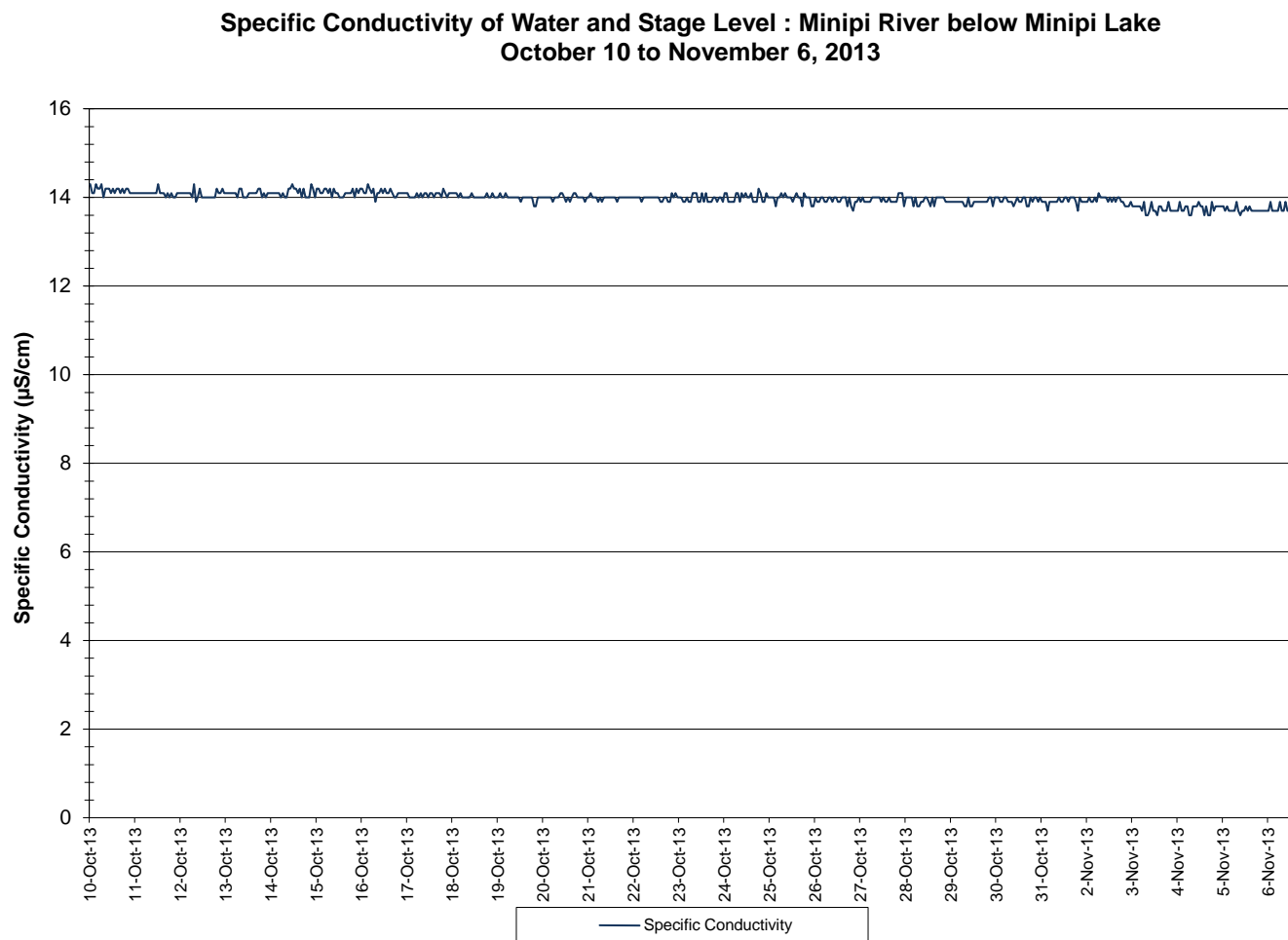


Figure 4: Specific conductivity at Minipi River below Minipi Lake

- The saturation of dissolved oxygen ranged from 91.8 to 98.2% and a range of 11.21 to 13.76 mg/l was found in the concentration of dissolved oxygen with a median value of 11.90 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 and 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 during the deployment period, with a slight increase towards the end of the period. Dissolved oxygen content fluctuates diurnally, displaying the inverse relationship to water temperature.

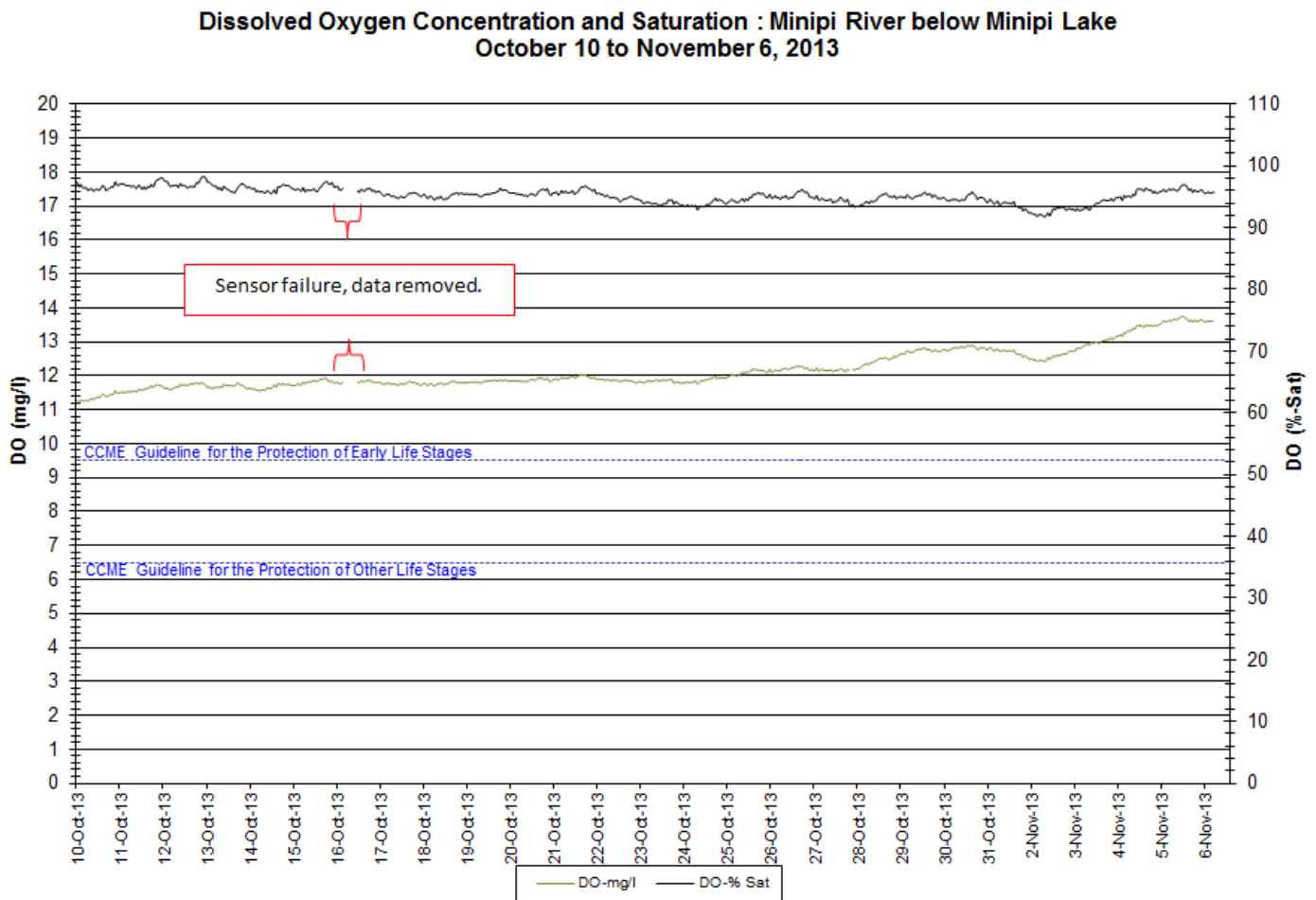


Figure 5: Dissolved oxygen and percent saturation at Minipi River below Minipi Lake

- 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.
- Starting on the 16th of October the turbidity sensor started reporting inaccurate values. This data was removed from the data set.

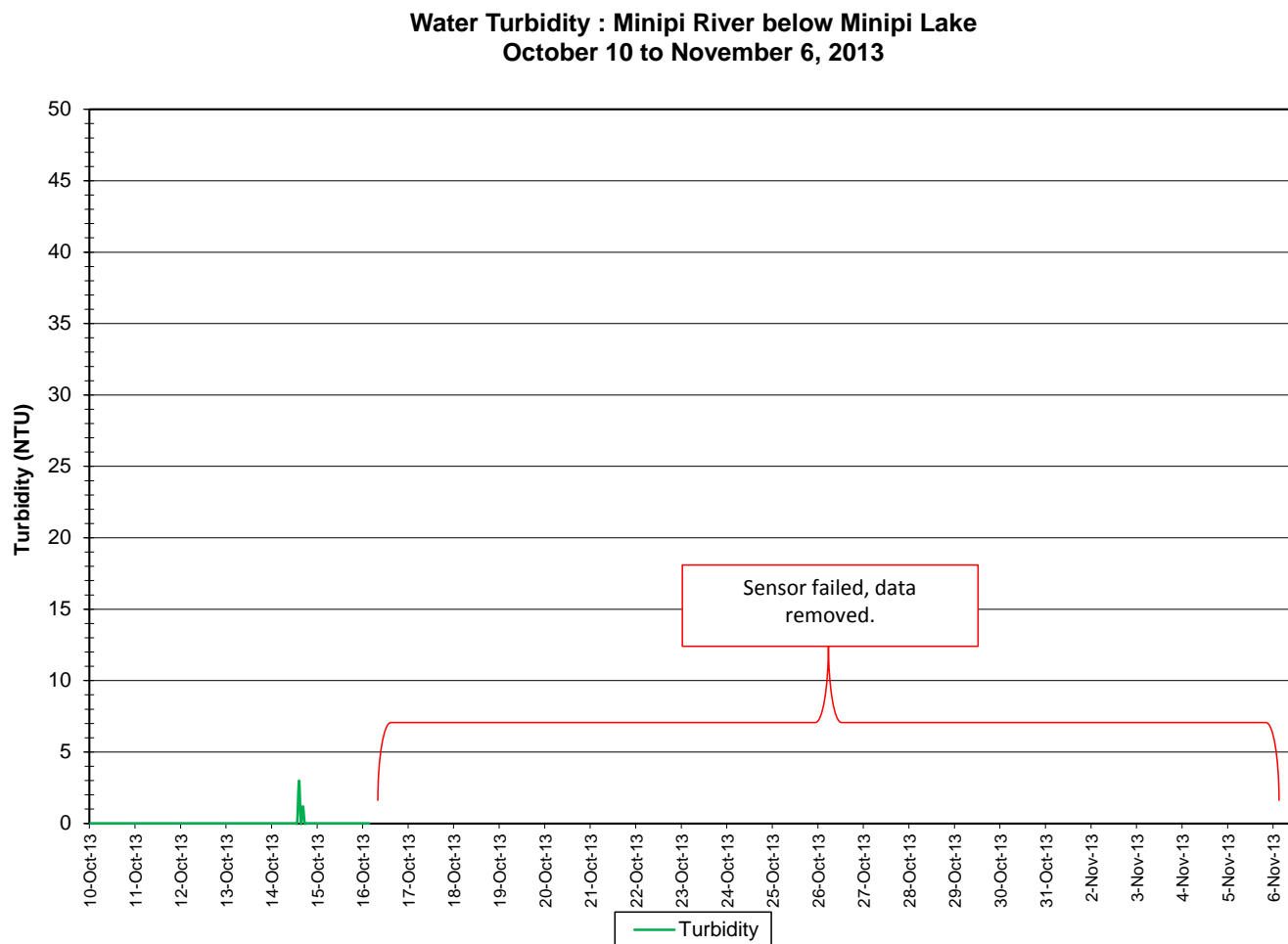


Figure 6: Turbidity at Minipi River below Minipi Lake

- Stage and precipitation are graphed below to show the relationship between rainfall and water level (Figure 7). Stage fluctuated with varying precipitation levels.
- 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
October 10 to November 6, 2013**

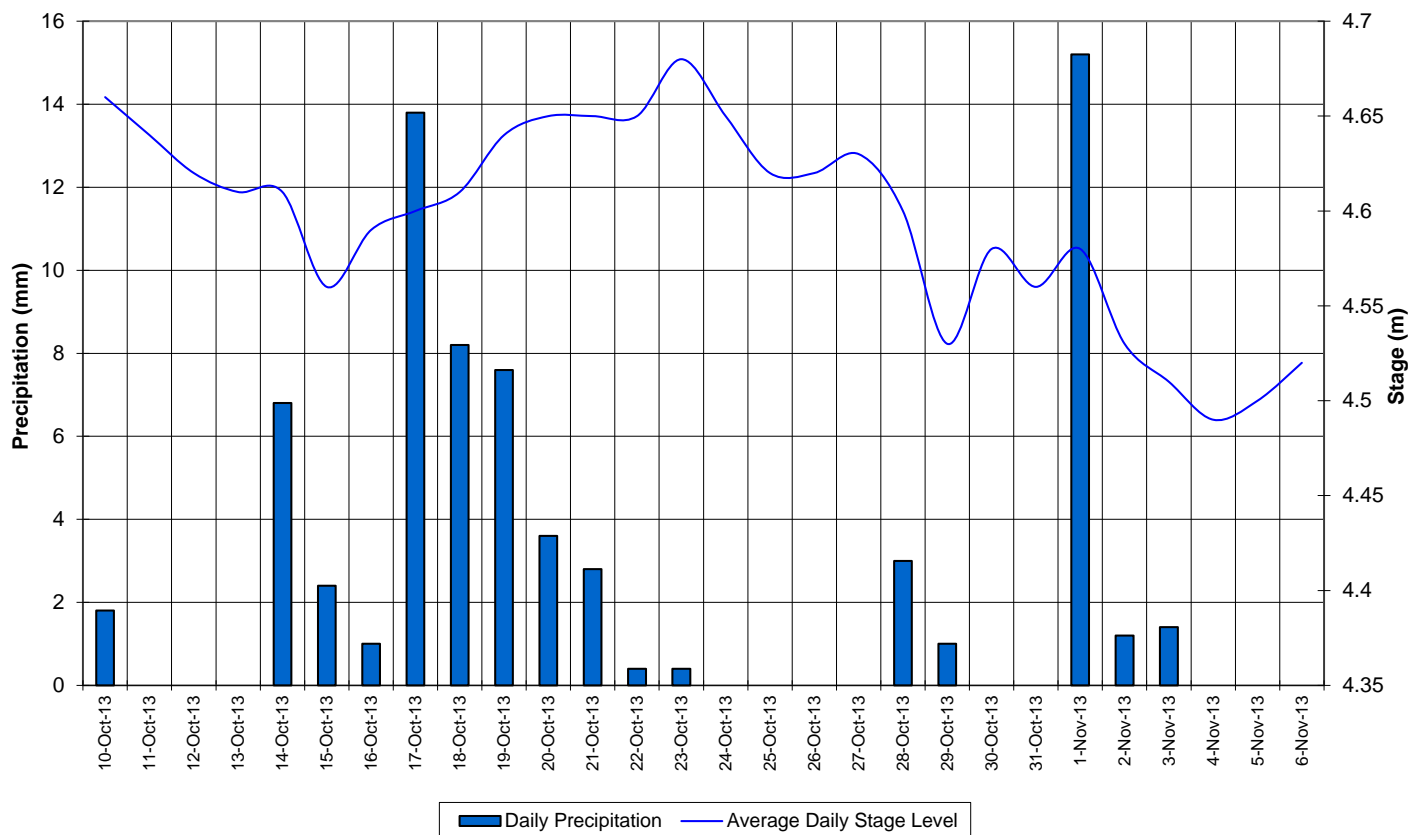


Figure 7: Stage and precipitation at Minipi River below Minipi Lake

Conclusions

- An instrument at the water quality monitoring station on the Minipi River below Minipi Lake was deployed on October 10 and removed on November 6, for the winter season.
- In most cases, weather related events or increase/decreases in water level could be used to explain the fluctuations. All 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 during the later portion of the period. Specific conductivity was stable as well as pH. Turbidity values were 0 NTU during the beginning of the deployment period, with few spikes. Turbidity data was removed for the remainder of the deployment period due to failure of the turbidity sensor.

Prepared by:
Maria Murphy
Department of Environment and Conservation
Water Resources Management Division
Phone: 709.896.7981
Fax: 709.896.9566

Appendix 1

**Average Daily Air Temperature and Precipitation: Happy Valley-Goose Bay
October 10 to November 6, 2013**

