

# Real-Time Water Quality Deployment Report

Minipi River below Minipi Lake

July 24 to  
August 21, 2012



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 July 24, 2012, 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 28 days. The instrument was removed on August 21.

## 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 July 24 and August 21, 2012 is summarized in Table 2.

**Table 2: Comparison rankings for Minipi River station July 24 – August 21, 2012.**

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Minipi River	July 24, 2012	Deployment	Excellent	Good	Excellent	Excellent	Excellent
	August 21, 2012	Removal	Good	Good	Excellent	Excellent	Excellent

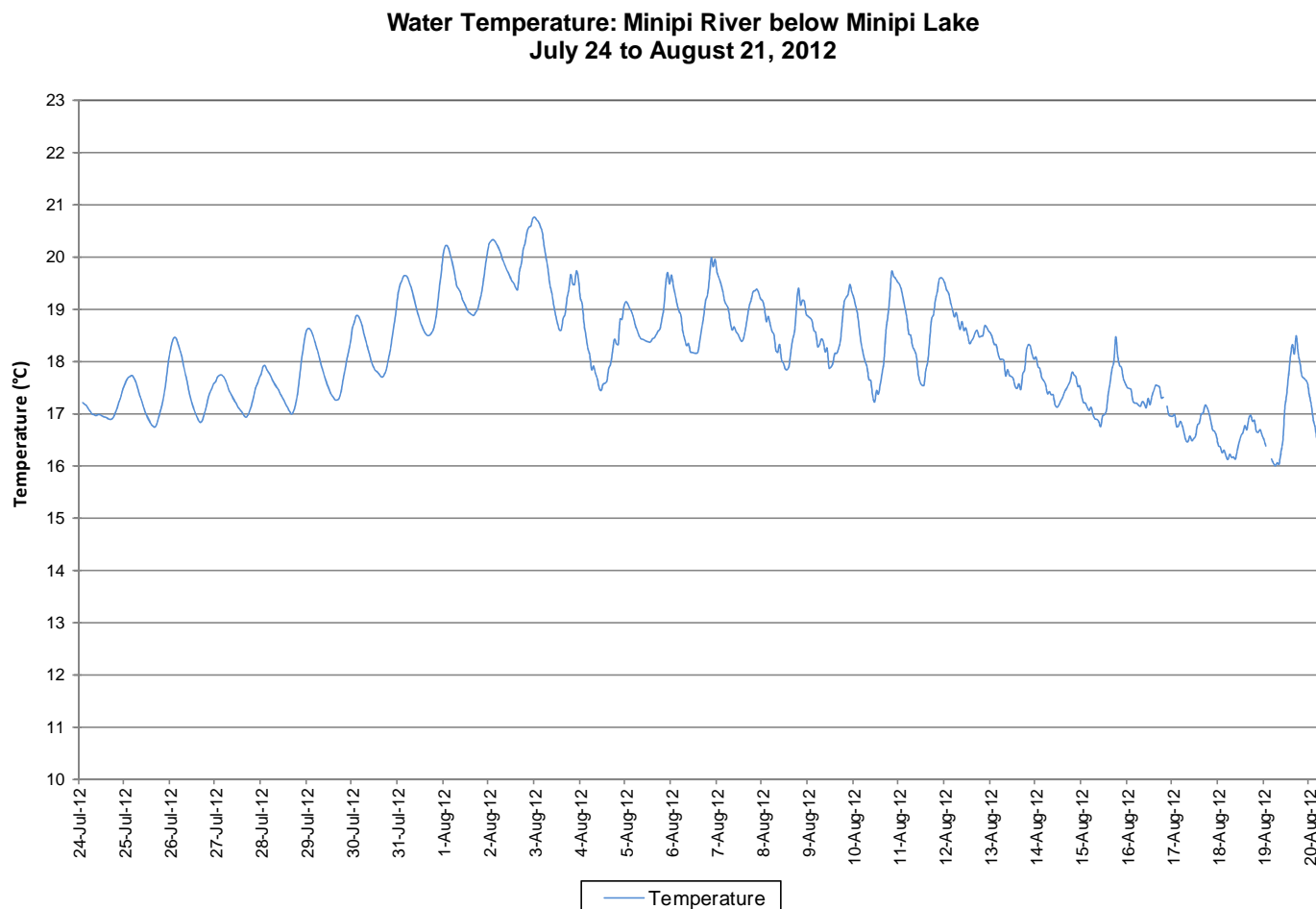
- At the Minipi River station, during both deployment and removal, all parameters ranked either 'excellent' or 'good'.

## Data Interpretation

- The following graphs and discussion illustrate water quality-related events from July 24 to August 21 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.

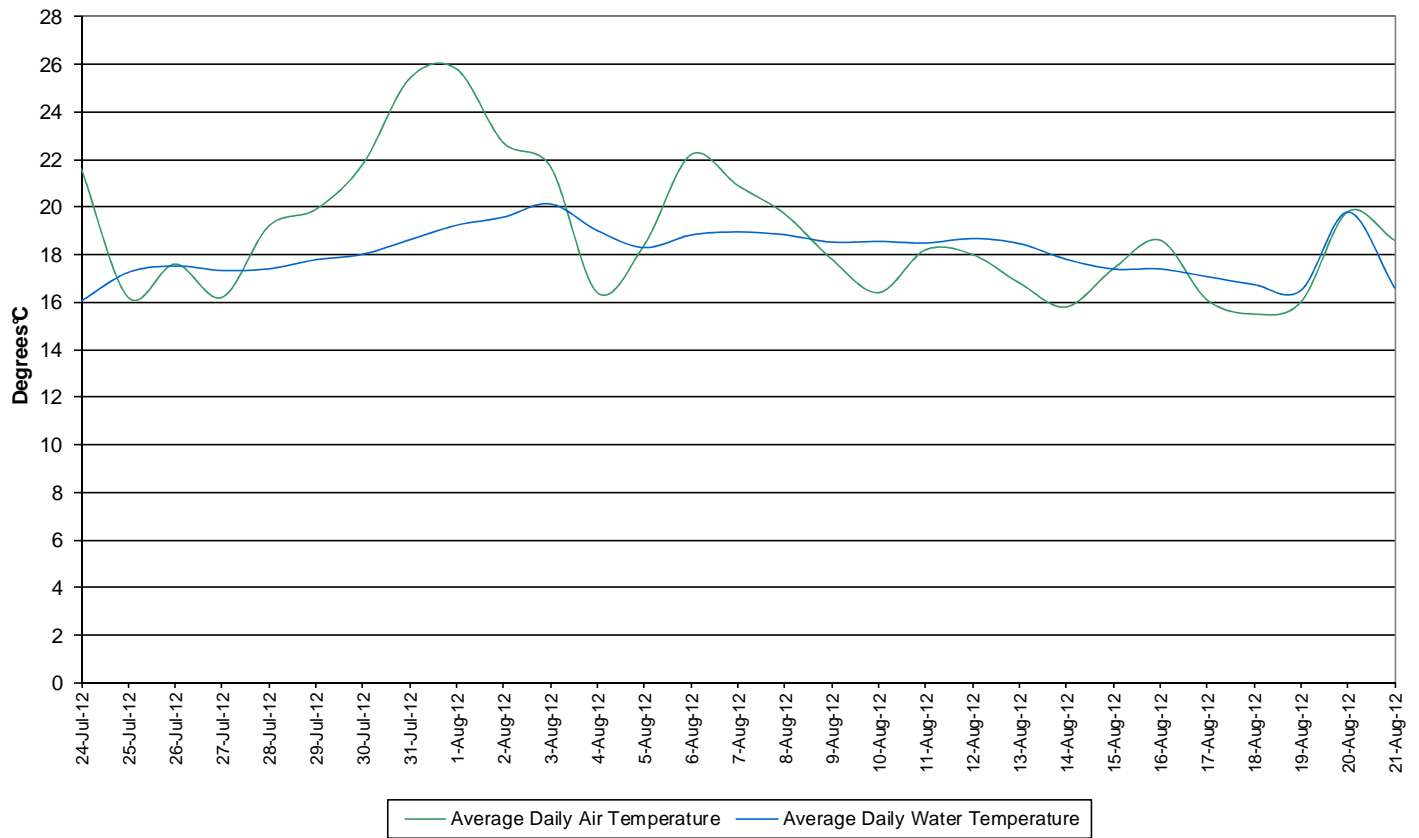
### Minipi River below Minipi Lake

- Water temperature ranged from 15.99 to 20.75°C during this deployment period (Figure 1).
- Water temperature fluctuates diurnally throughout the deployment period. As the ambient air temperature increases, the water temperature gradually increases as well (see Figure 2).



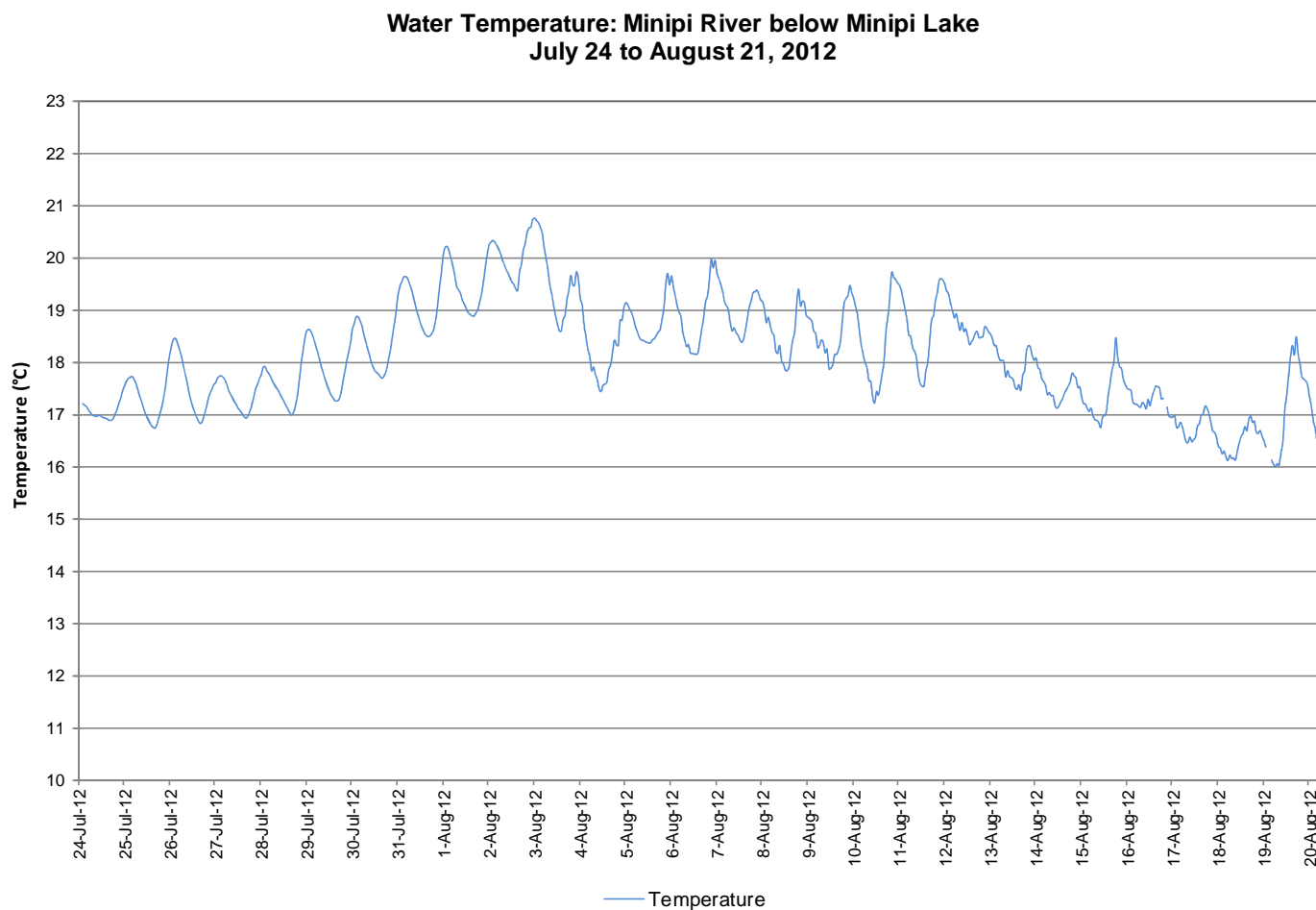
**Figure 1: Water temperature at Minipi River below Minipi Lake**

**Average Daily Air and Water Temperature: Minipi River below Minipi Lake  
July 24 to August 21, 2012**



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

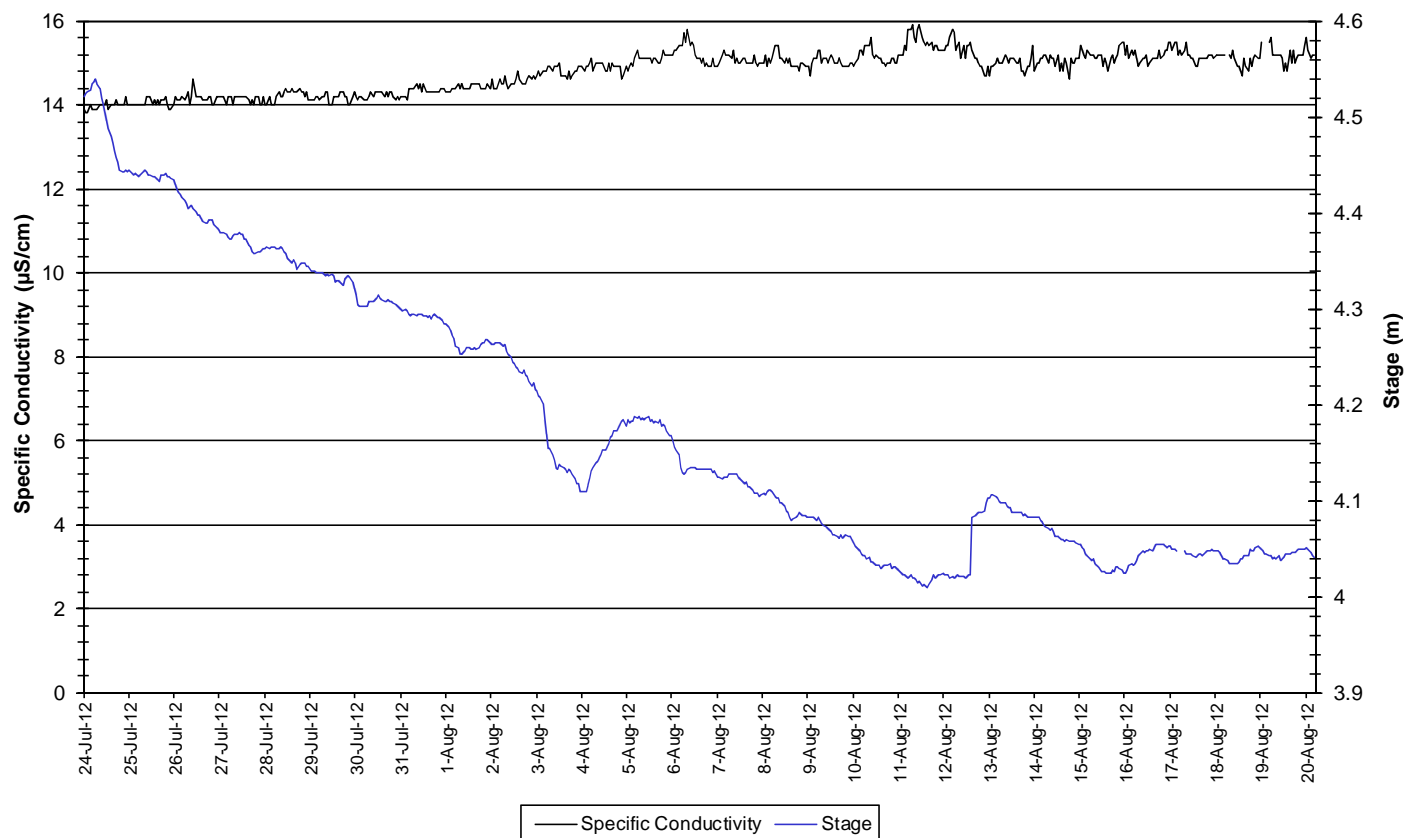
- pH ranges between 6.68 and 7.08 pH units throughout the deployment period (Figure 3). The average pH is 6.86 units.
- All values during the deployment are within the CCME Guidelines for the Protection of Aquatic Life (between 6.5 and 9 pH units). pH fluctuates slightly during the day and night.



**Figure 3: pH at Minipi River below Minipi Lake**

- Specific conductivity ranges from 13.8 to 15.9  $\mu\text{S}/\text{cm}$ .
- Specific conductivity is very stable at this station even during times when the stage is fluctuating.

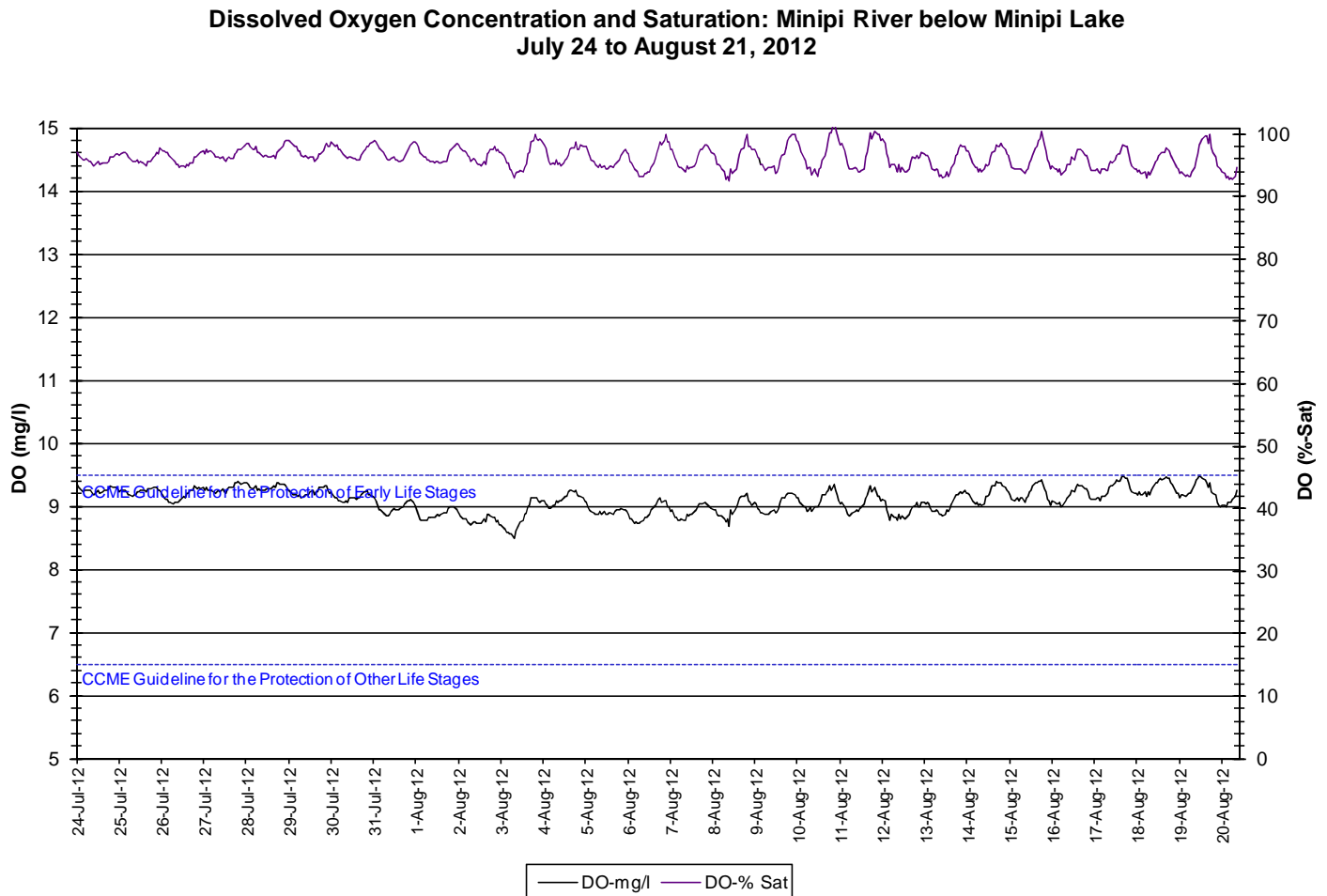
**Specific Conductivity of Water and Stage Level: Minipi River below Minipi Lake  
July 24 to August 21, 2012**



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



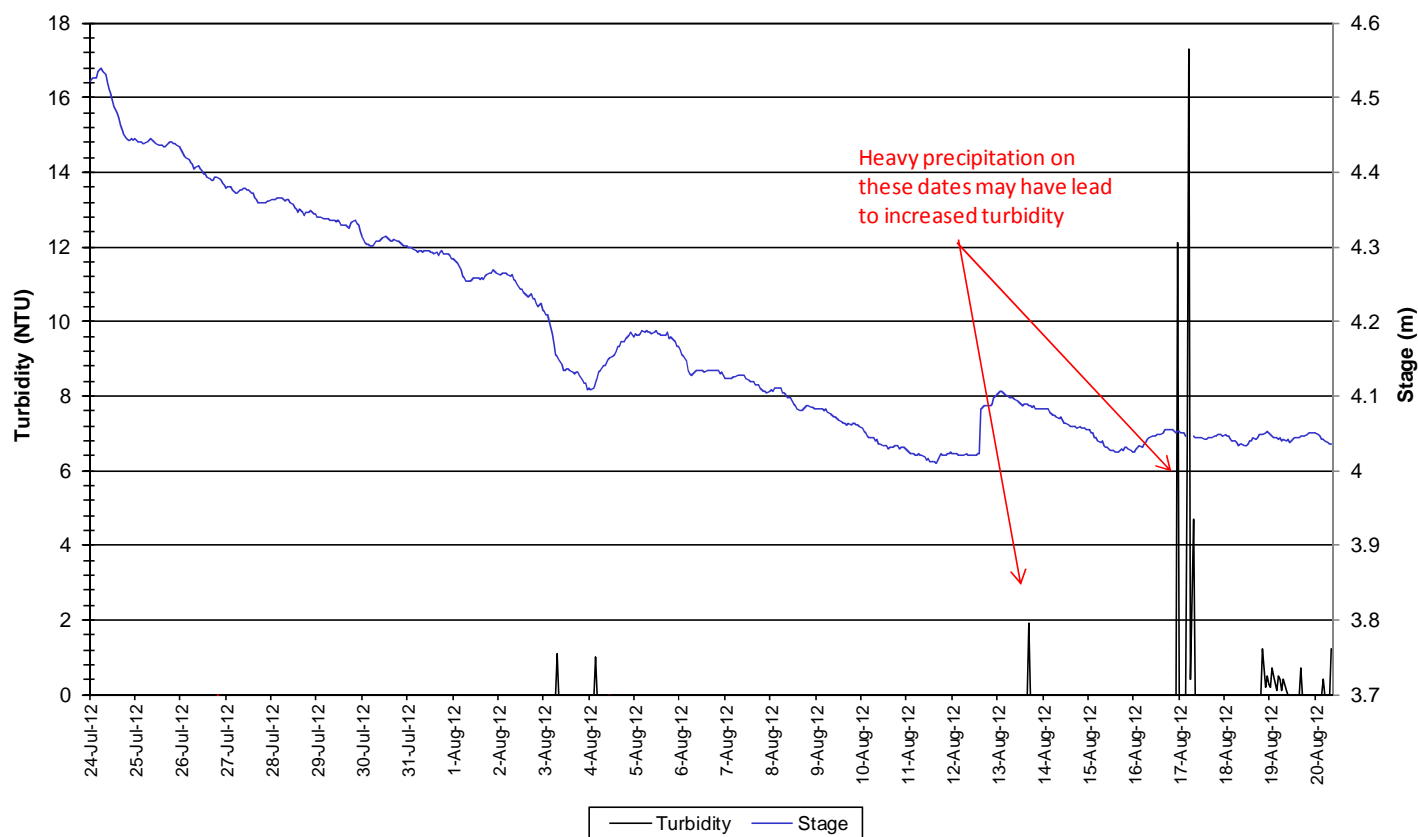
- The saturation of dissolved oxygen ranged from 92.4 to 102.1% and the concentration of dissolved oxygen ranged from 8.49 to 9.50mg/l with a median value of 9.11mg/l (Figure 5).
- All values were above the minimum CCME Guideline for the Protection of Other Life Stage Cold Water Biota of 6.5 mg/l. Not all 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. Dissolved oxygen content fluctuates diurnally, displaying an 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.

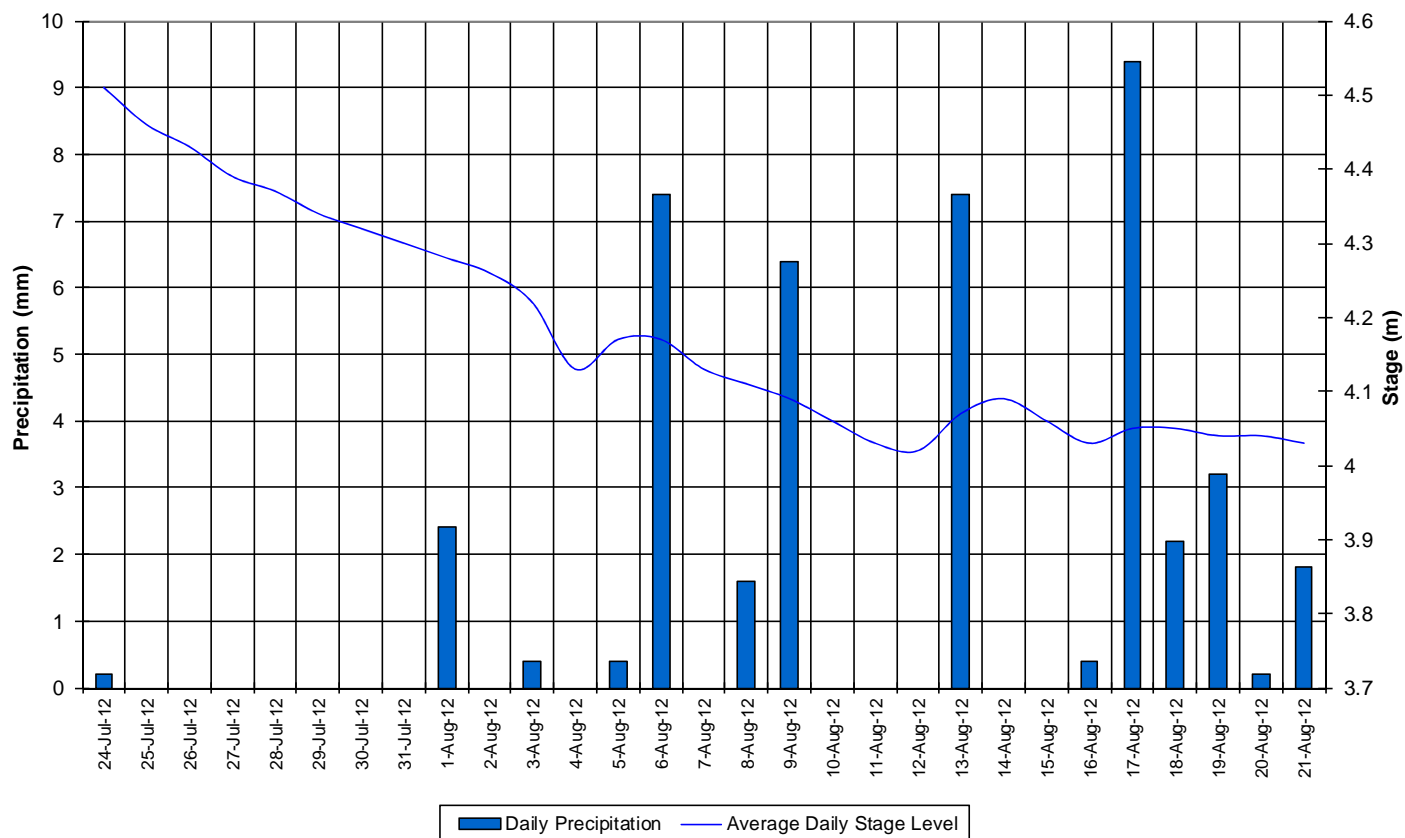
**Water Turbidity and Stage Level: Minipi River below Minipi Lake  
July 24 to August 21, 2012**



**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 decreases 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 (~2300km<sup>2</sup>). 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  
July 24 to August 21, 2012**



**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 July 24 and removed on August 21.
- In most cases, weather related events or increase/decreases in water level could be used to explain the fluctuations. The majority of values recorded were within ranges as suggested by the CCME Guidelines for the Protection of Aquatic Life for pH and dissolved oxygen.
- Temperature and dissolved oxygen were relatively stable throughout the deployment period. Specific conductivity remained stable while stage decreased. pH was very stable. There were few turbidity events during the deployment period, they were low and occurred for short periods of time generally in response to heavy rainfall.

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## Appendix 1

**Average Daily Air Temperature and Precipitation: Happy Valley-Goose Bay  
July 24 to August 21, 2012**

