Real-Time Water Quality Deployment Report

Minipi River below Minipi Lake

June 29 to
July 24, 2012

Newfoundland Labrador

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

Contents

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 29, 2012, a real-time water quality monitoring instrument was deployed at the station on the Minipi River below Minipi Lake. This was the initial deployment of the year, after the winter months. The instrument was deployed for a period of 25 days. The instrument was removed on July 24.

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.

Minipi River below Minipi Lake, Newfoundland and Labrador

- Deployment and removal comparison rankings for the station on Minipi River deployed between June 29 and July 24, 2012 is summarized in Table 2.

Table 2: Comparison rankings for Minipi River station June 29 – July 24, 2012

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Minipi River	June 29, 2012	Deployment	Excellent	Good	Excellent	Excellent	Excellent
	July 24, 2012	Removal	Excellent	Excellent	Excellent	Error	Excellent

- At the Minipi River station, temperature, conductivity, dissolved oxygen and turbidity ranked 'excellent' at deployment while pH ranked 'good'.

- At removal, temperature, pH, conductivity and turbidity ranked either 'excellent'. DO wasn't ranked due to sensor failure.

Data Interpretation

- The following graphs and discussion illustrate water quality-related events from June 29 to July 24 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 15.15 to 20.13°C during this deployment period (Figure 1).
- Water temperature fluctuates diurnally throughout the deployment period. It decreases slightly, halfway through the period. Water temperature is slightly higher than air temperature during the deployment period (Figure 2).

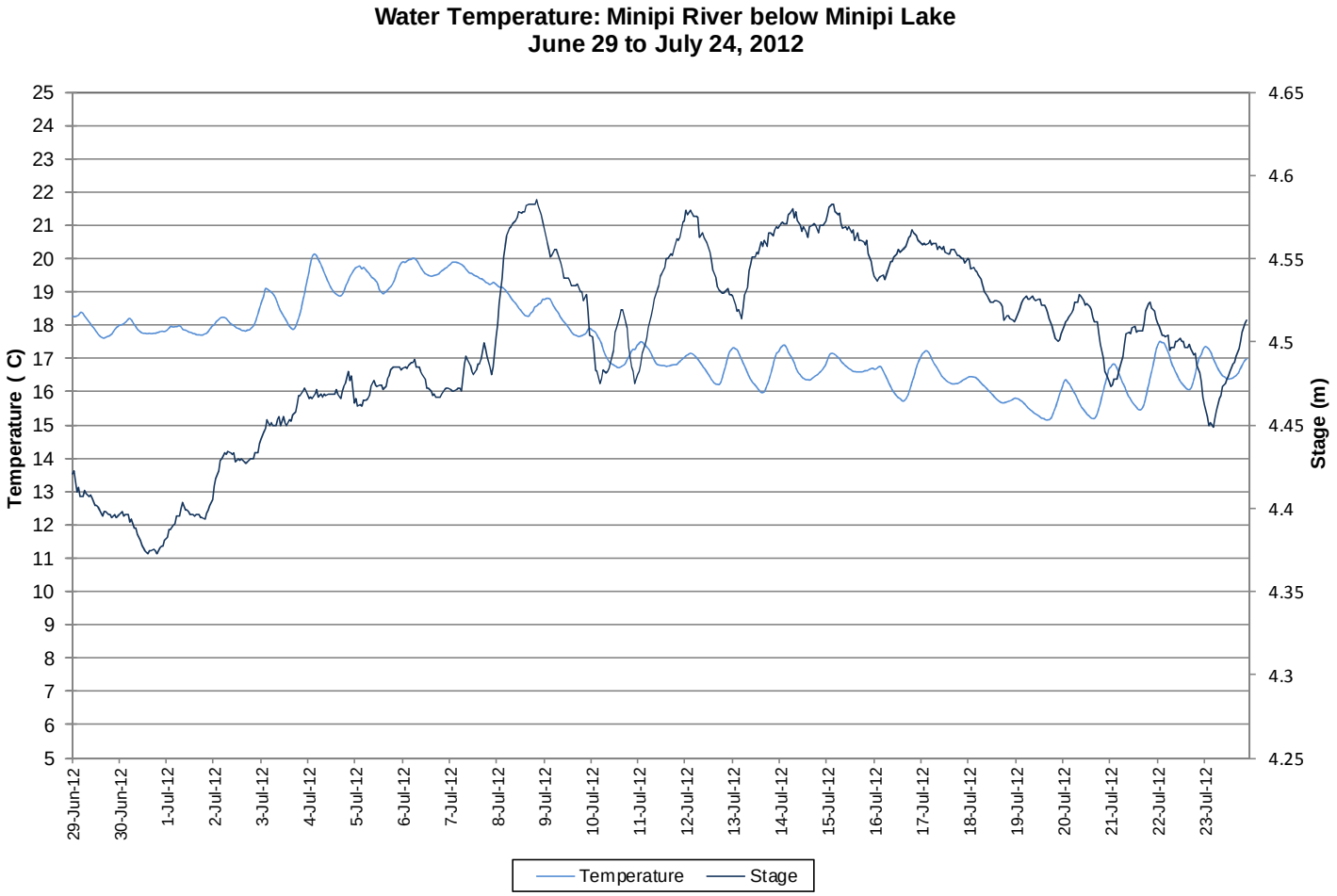


Figure 1: Water temperature and stage at Minipi River below Minipi Lake

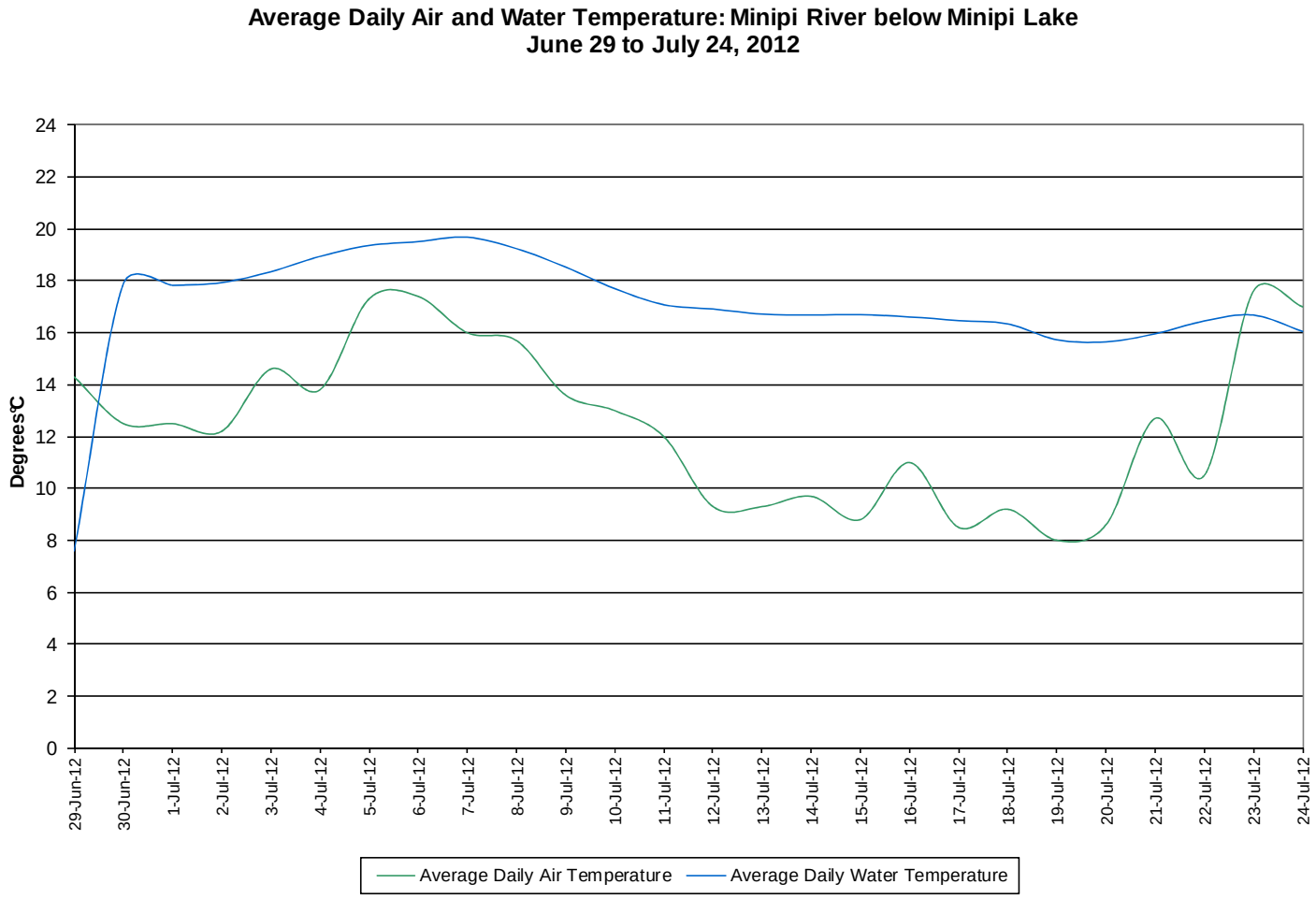


Figure 2: Average daily air and water temperatures at Minipi River below Minipi Lake (weather data collected at Goose Bay)

- pH ranges between 6.53 and 6.76 pH units throughout the deployment period (Figure 3). The average pH is 6.64 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.

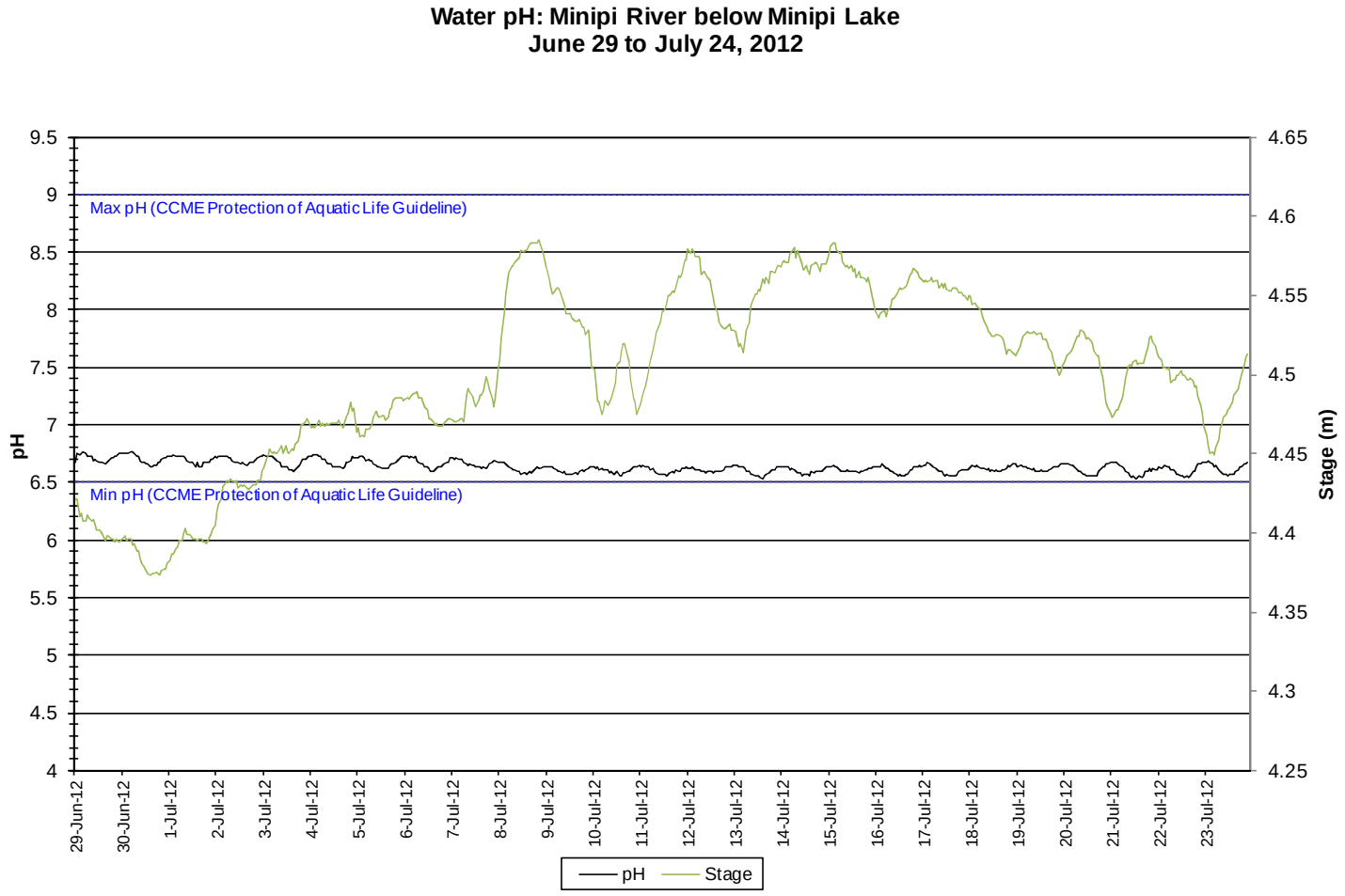


Figure 3: pH and stage at Minipi River below Minipi Lake

- Specific conductivity ranges from 13.6 to 14.6 µs/cm.
- Specific conductivity is very stable at this station even during times when the stage is fluctuating.

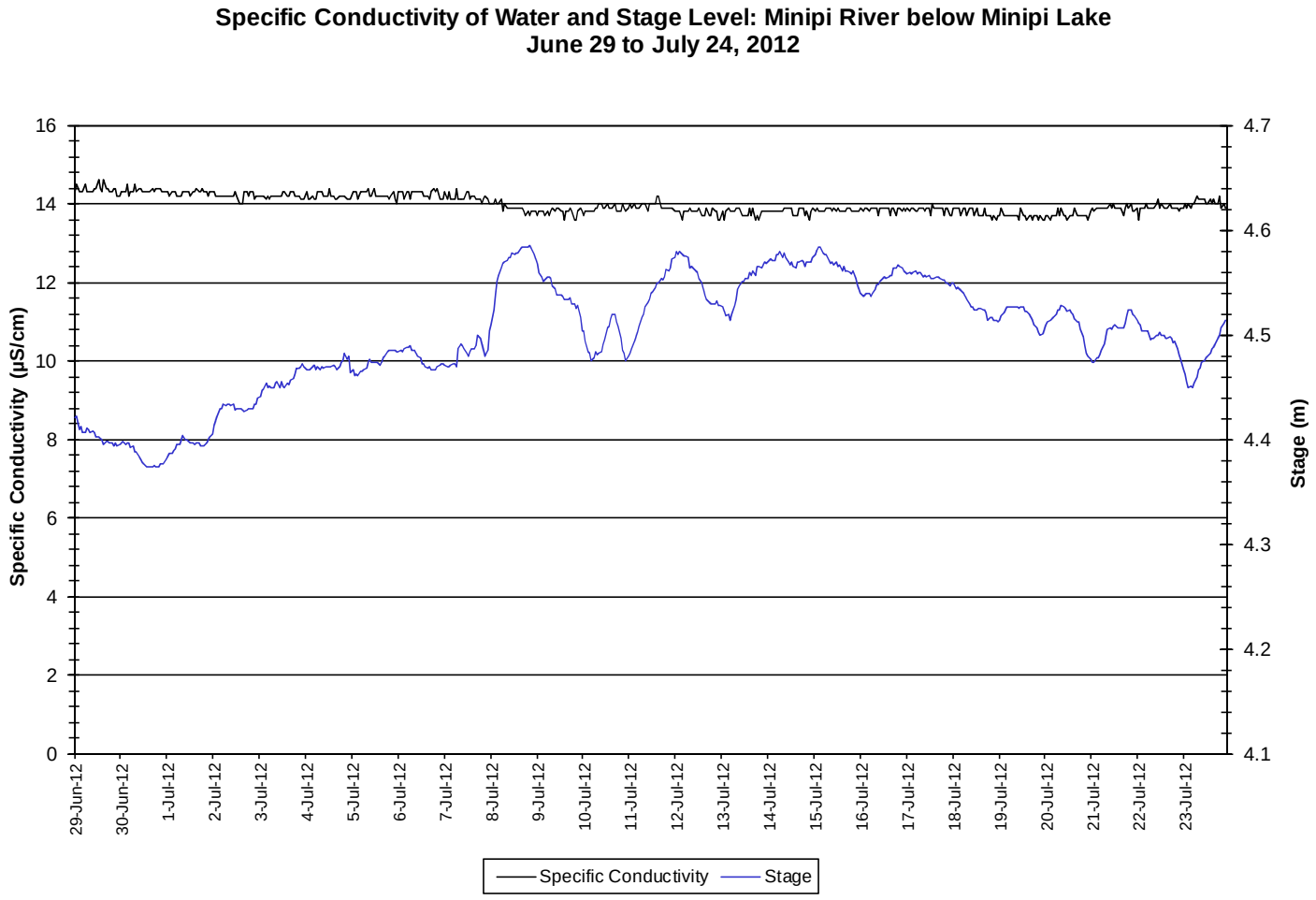


Figure 4: Specific conductivity and stage level at Minipi River below Minipi Lake

- The saturation of dissolved oxygen ranged from 93.4 to 98.6% and the concentration of dissolved oxygen ranged from 8.61 to 9.66mg/l with a median value of 9.10mg/l (Figure 5).
- The DO sensor failed near the end the deployment period, giving inaccurate readings of 0.00% and 0.00mg/l. This data was removed from the data set.
- All values were above the minimum CCME Guideline for the Protection of Other Life Stage Cold Water Biota of 6.5 mg/l. The majority of 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. Dissolved oxygen content fluctuates diurnally, displaying the inverse relationship to water temperature.

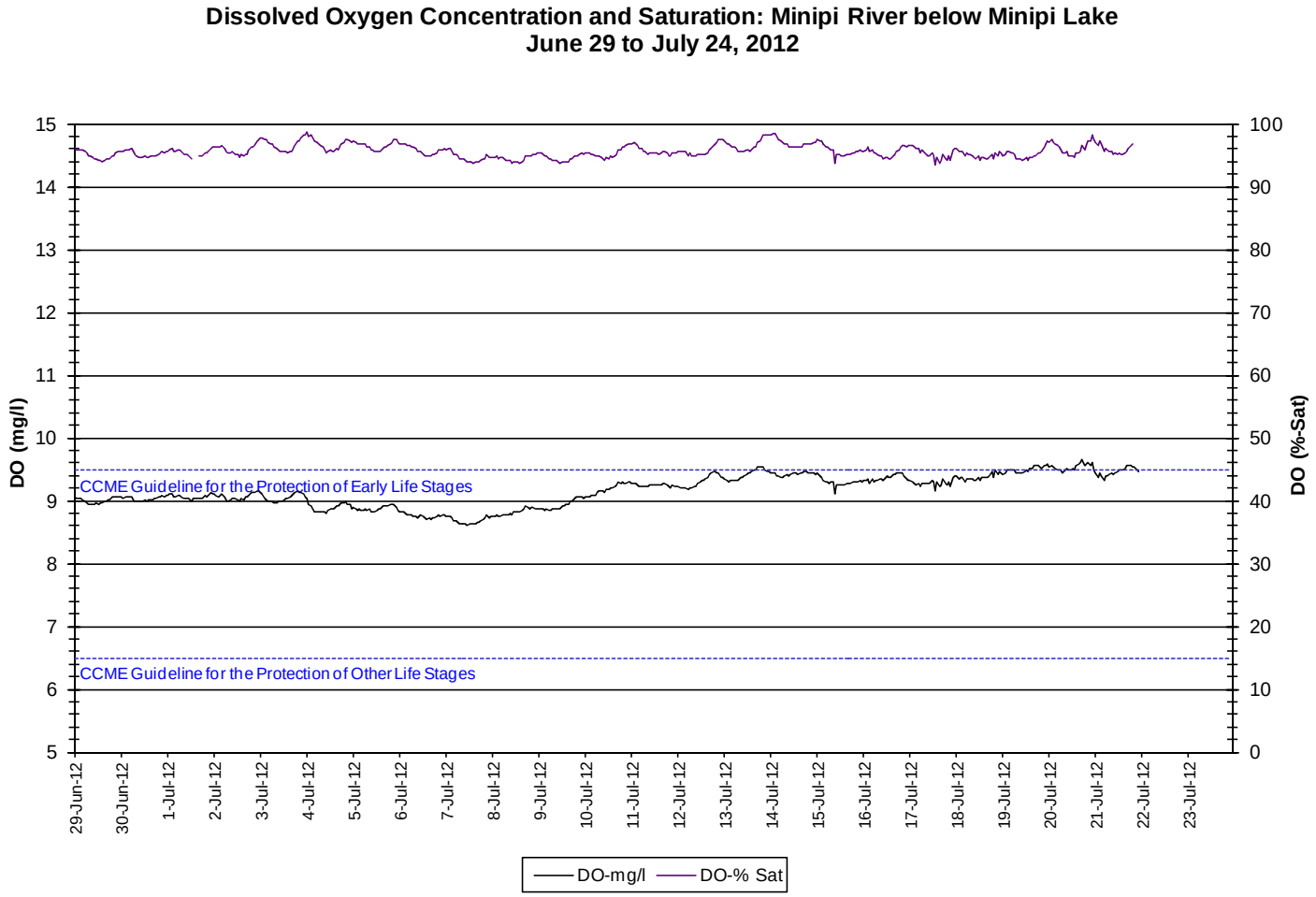


Figure 5: Dissolved oxygen and percent saturation at Minipi River below Minipi Lake

- Turbidity values remain at 0NTU for the entire deployment period (Figure 6).

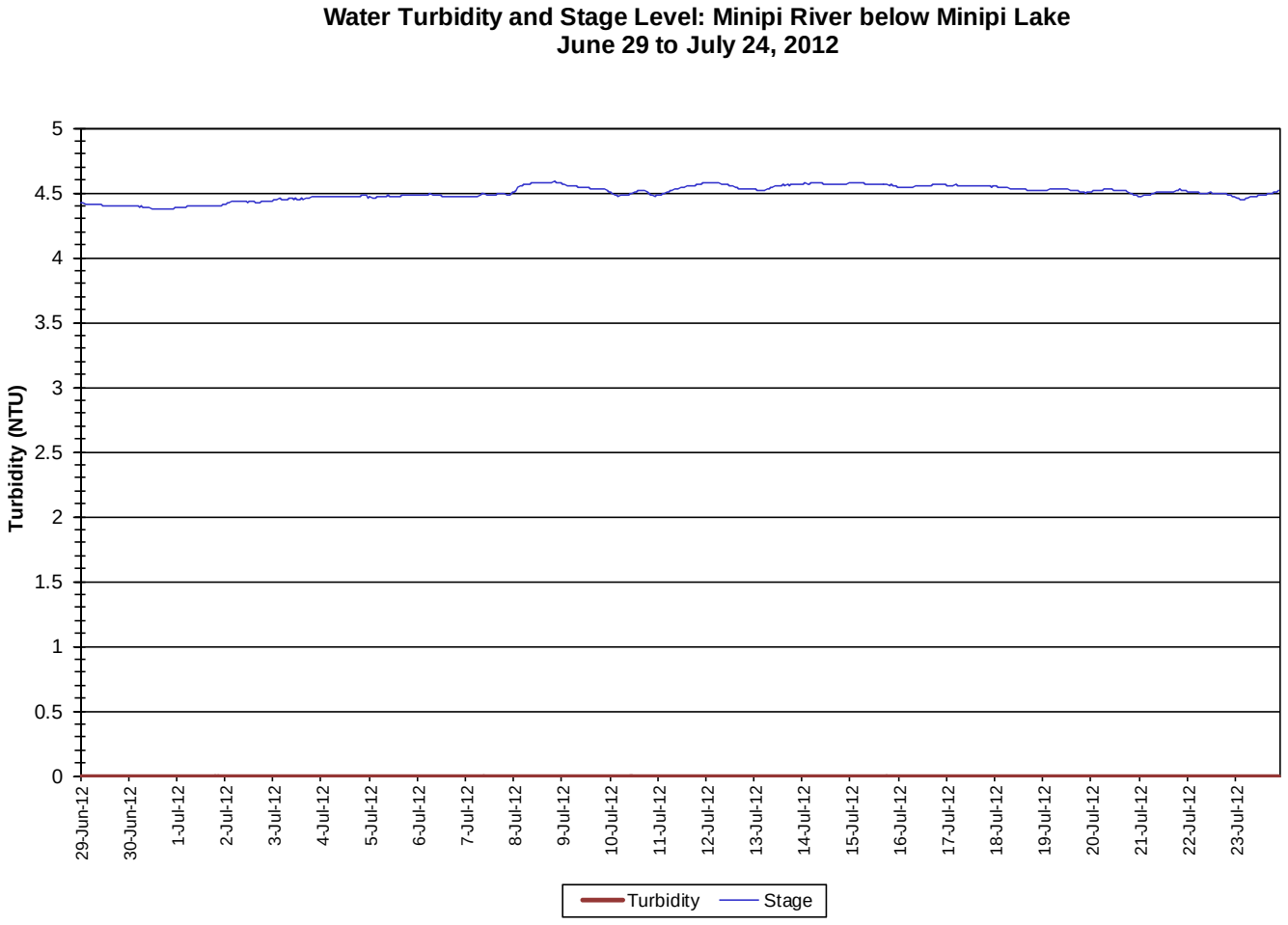


Figure 6: Turbidity and stage level at Minipi River below Minipi Lake

- 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 (~2300km^2). There is only slight correlation between precipitation and stage during this time at this station.

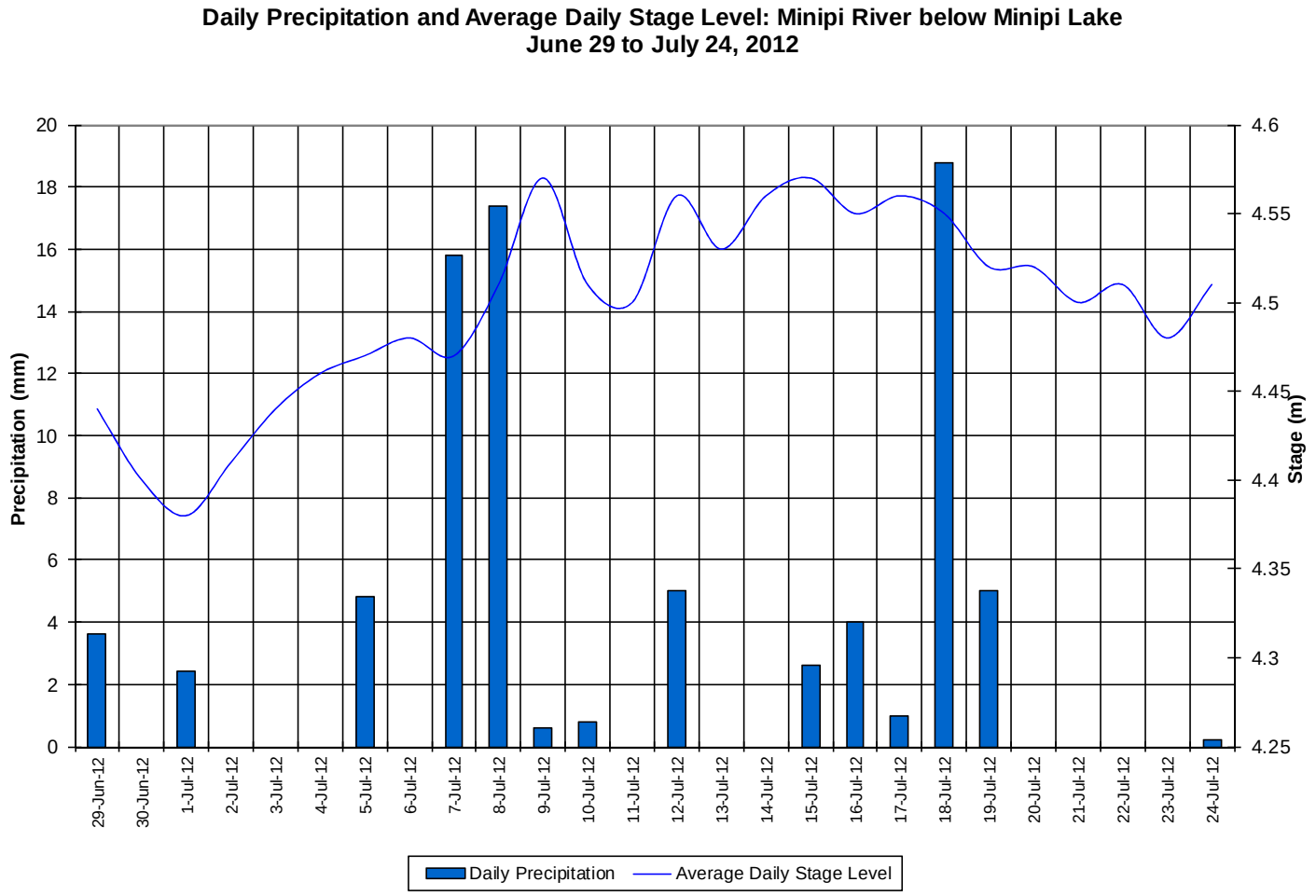


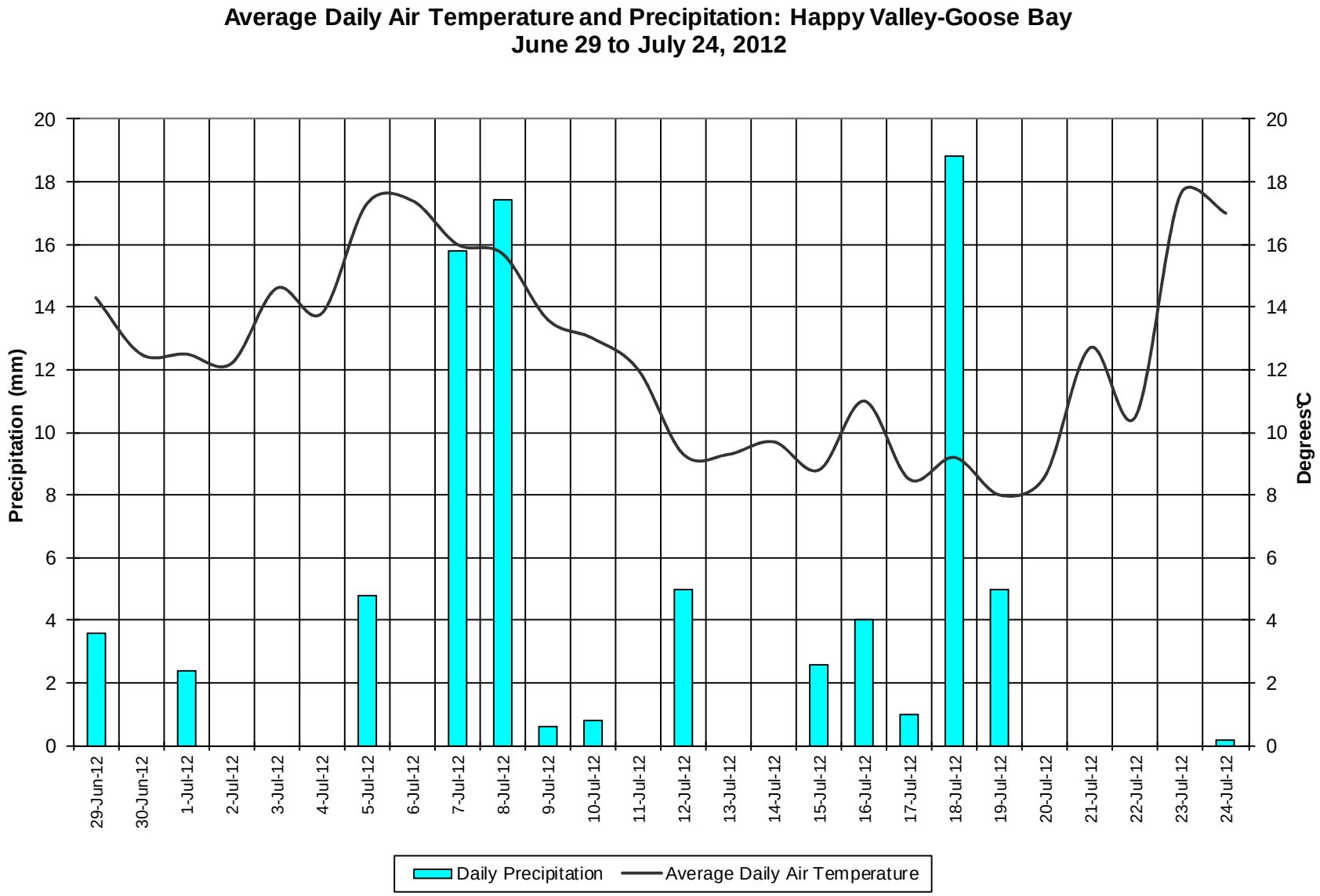
Figure 7: Stage and precipitation at Minipi River below Minipi Lake

Conclusions

- An instrument at the water quality monitoring station on the Minipi River below Minipi Lake was deployed on June 29 and removed on July 24. This was the initial deployment of the year, after the winter months.
- 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 decreased slightly during the middle of the deployment period, while dissolved oxygen increased during this time. Specific conductivity remained stable while stage fluctuated. pH was very stable. There were no turbidity events during the deployment period.

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
June 29 to July 24, 2012
Precipitation (mm)
Degrees℃
0
2
4
6
8
10
12
14
16
18
20
29-Jun-12
30-Jun-12
1-Jul-12
2-Jul-12
3-Jul-12
4-Jul-12
5-Jul-12
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21-Jul-12
22-Jul-12
23-Jul-12
24-Jul-12
Daily Precipitation
Average Daily Air Temperature