

Real Time Water Quality Report Southwest Brook below Southwest Pond

Deployment Period 2011-05-29 to 2011-07-24

2011-08-05



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

General

- This station is operated cooperatively with the Miawapukek First Nation (Conne River) as a Pilot Project for Drinking Water Source Monitoring. This is the only known application of Real Time Water Quality Monitoring for a drinking water source for any First Nations community in Canada.
- The Water Resources Management Division (WRMD) staff monitors the real-time web page on a daily basis. Any unusual observations are investigated, with site visits being carried out as warranted.
- Operators at Conne River are informed of any significant water quality events or instrumentation problems by WRMD.
- Site visits for QA/QC purposes are conducted by WRMD approximately four times per year.
- Monthly calibration and maintenance is undertaken by Cyrus Lambert at the Conne River Water Treatment Plant.

Maintenance and Calibration of Instrumentation

• After being cleaned and freshly calibrated the regular **DataSonde**[®] (s/n 44422) was installed on May 29, 2011, and remained deployed continuously until July 24, 2011, a 55 day period.

Quality Assurance / Quality Control (QA/QC) Measures

• As part of the QA/QC protocol, 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. See **Table 1**.

	Rank				
Parameter	Excellent	Good	Fair	Marginal	Poor
Temperature (oC)	<=+/-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 μ S/cm (%)	<=+/-3	>+/-3 to 10	>+/-10 to 15	>+/-15 to 20	>+/-20
Dissolved Oxygen (mg/L)	<=+/-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
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Table 1

- Upon deployment and removal, a QA/QC MiniSonde[®] is temporarily deployed along side the Field DataSonde[®]. Values for each recorded parameter are compared between the two instruments. Based on the difference between parameters recorded by the Field DataSonde[®], QAQC MiniSonde[®] a qualitative statement (Ranking) is usually made on the data.
- The ranking at the beginning and end of the deployment period are shown in **Table 2**.

• 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 Quality Assurance and Quality Control (QA/QC) protocol. Water Survey of Canada is responsible for QA/QC of water quantity data. Corrected data can be obtained upon request.

Southwest Brook below Southwest Pond (NF02ZE0033)				
Date (yyyy-mm-dd)	Parameter	Ranking		
2011-05-29 Deployment	Temp (°C)	Excellent		
	pH (units)	Good		
	Sp. Conductivity (uS/cm)	Excellent		
	Dissolved Oxygen (mg/L)	Excellent		
	Turbidity (NTU)	Excellent		
2011-07-24 Removal	Temp (°C)	Excellent		
	pH (units)	Good		
	Sp. Conductivity (uS/cm)	Excellent		
	Dissolved Oxygen (mg/L)	Good		
	Turbidity (NTU)	Excellent		
T-11-2				

Table 2

Data Interpretation

- The water temperature (**Figure 1**) ranged from a minimum of 9.67 °C to a maximum of 23.14 °C, with temperature generally increasing throughout the deployment period.
- While there appears to be little correlation with stage, there is far less diurnal variation during periods of increased stage, presumably due to precipitation, cloud cover and lower daytime ambient air temperatures.



Figure 1

- Throughout the deployment period pH values (Figure 2) ranged from a minimum of 4.72 to a maximum of 5.53 with all the values falling well below the recommended range (6.5 9.0) for the CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life.
- The background pH of this stream is normally lower than the lower limit of the recommended range.
- There appears to be in inverse correlation with stage.



Figure 2

- The specific conductivity (Figure 3) ranged from a minimum of 12.8 μS/cm to a maximum of 15.4 μS/cm over the deployment period.
- Specific conductivity remained very constant over the deployment period, with only subtle increases during periods of increased stage.



Figure 3

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 8.52 mg/L to a maximum of 10.88 mg/L over the deployment period. With the percent saturation ranging between 89.5 and 105.1.
- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature.
- For the entire deployment period dissolved oxygen values fell above the lower limit recommended by CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (cold water/other life stages above 6.5 mg/L; cold water/early life stages above 9.5 mg/L).
- Lower dissolved oxygen values (mg/L) are considered to be solely a function of the naturally warmer water temperatures.
- Based upon the fact that Dissolved Oxygen % Saturation had minimal change over the deployment period, we can be confident that the Dissolved Oxygen mg/L values are accurate.



Figure 4

- The turbidity values (Figure 5) ranged from a minimum of 0.0 NTU to a maximum of 18.2 NTU.
- During this deployment period, an effort was made to place the instrument away from the plunge pool and the influences of turbulent water.
- The individual spikes in turbidity are insignificant short term events when natural stream debris and/or air bubbles from turbulent flow passed near the sensor.



Figure 5

- The stage or water level ranged from a minimum of 0.92 m to a maximum of 1.43 m. The flow or discharge ranged from a minimum of 0.04 m³/s to a maximum of 3.96 m³/s (**Figure 6**).
- The increase in stage and flow is resultant from precipitation events.
- Stream flow is within normal range.





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