

Real Time Water Quality Report Southwest Brook below Southwest Pond

Deployment Period 2012-01-24 to 2012-03-14

2012-03-15



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

General

- This station is operated cooperatively with the Miawpukek 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 January 24, 2012, and remained deployed continuously until March 14, 2012, a 50 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**.

Parameter	Rank				
	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 µS/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

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**[®] and QA/QC **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**.
- The poor value for pH at the end of the deployment period is confirmation that the instrument was not recording this parameter correctly. Thus pH data have been discarded for the period 2012-03-07 to 2012-03-14.

- With the exception of water quantity data (Stage and Flow), 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.

Southwest Brook below Southwest Pond (NF02ZE0033)		
Date (yyyy-mm-dd)	Parameter	Ranking
2012-01-24 Deployment	Temp (°C)	Excellent
	pH (units)	Fair
	Sp. Conductivity (uS/cm)	Good
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent
2012-03-14 Removal	Temp (°C)	Good
	pH (units)	Poor
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent

Table 2

Data Interpretation

- The water temperature (**Figure 1**) ranged from a minimum of -0.17°C to a maximum of 2.58°C , with temperature remaining constant over the deployment period.
- There appears to be little correlation with stage, however, there is less diurnal variation with when stage is increased.

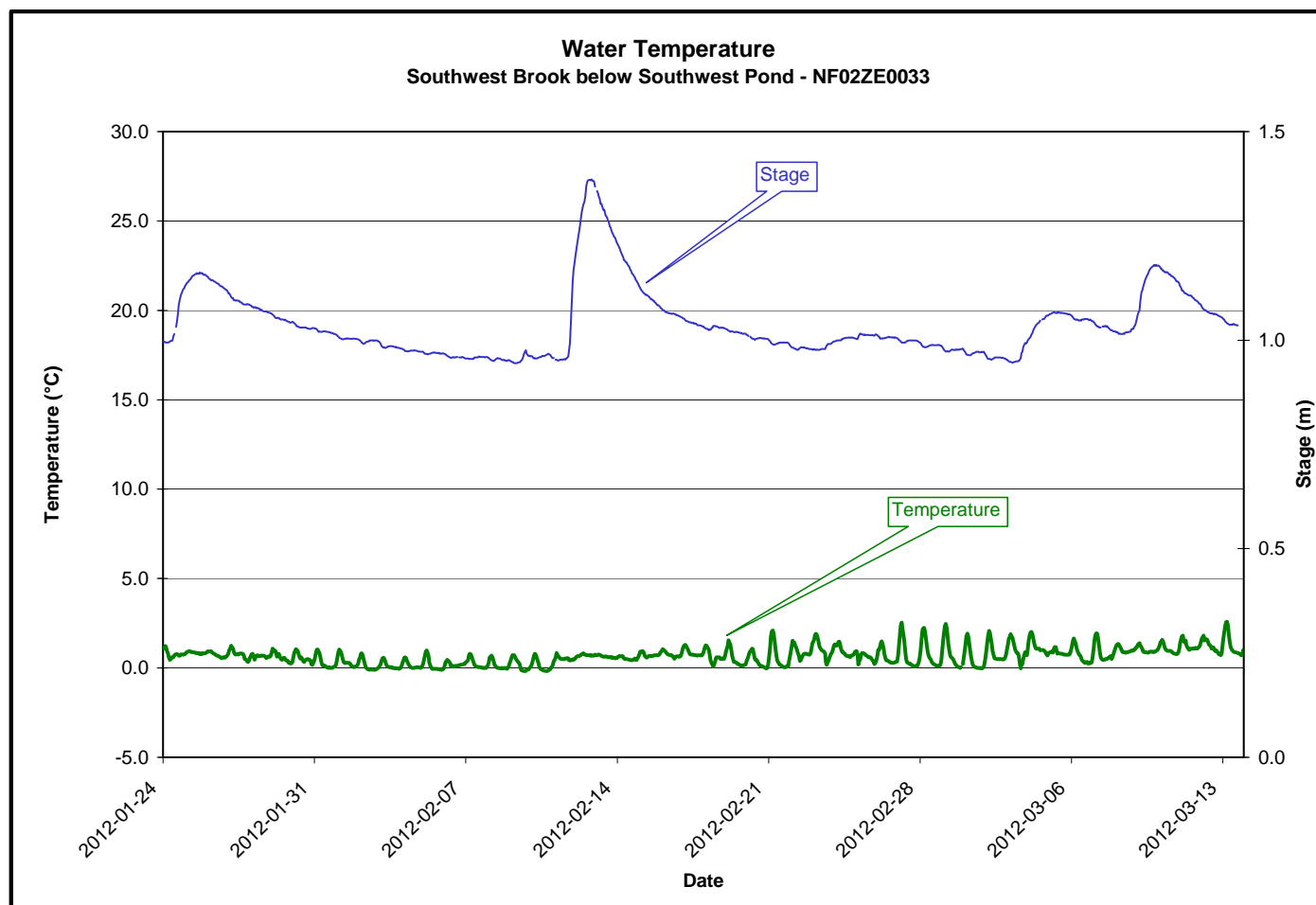
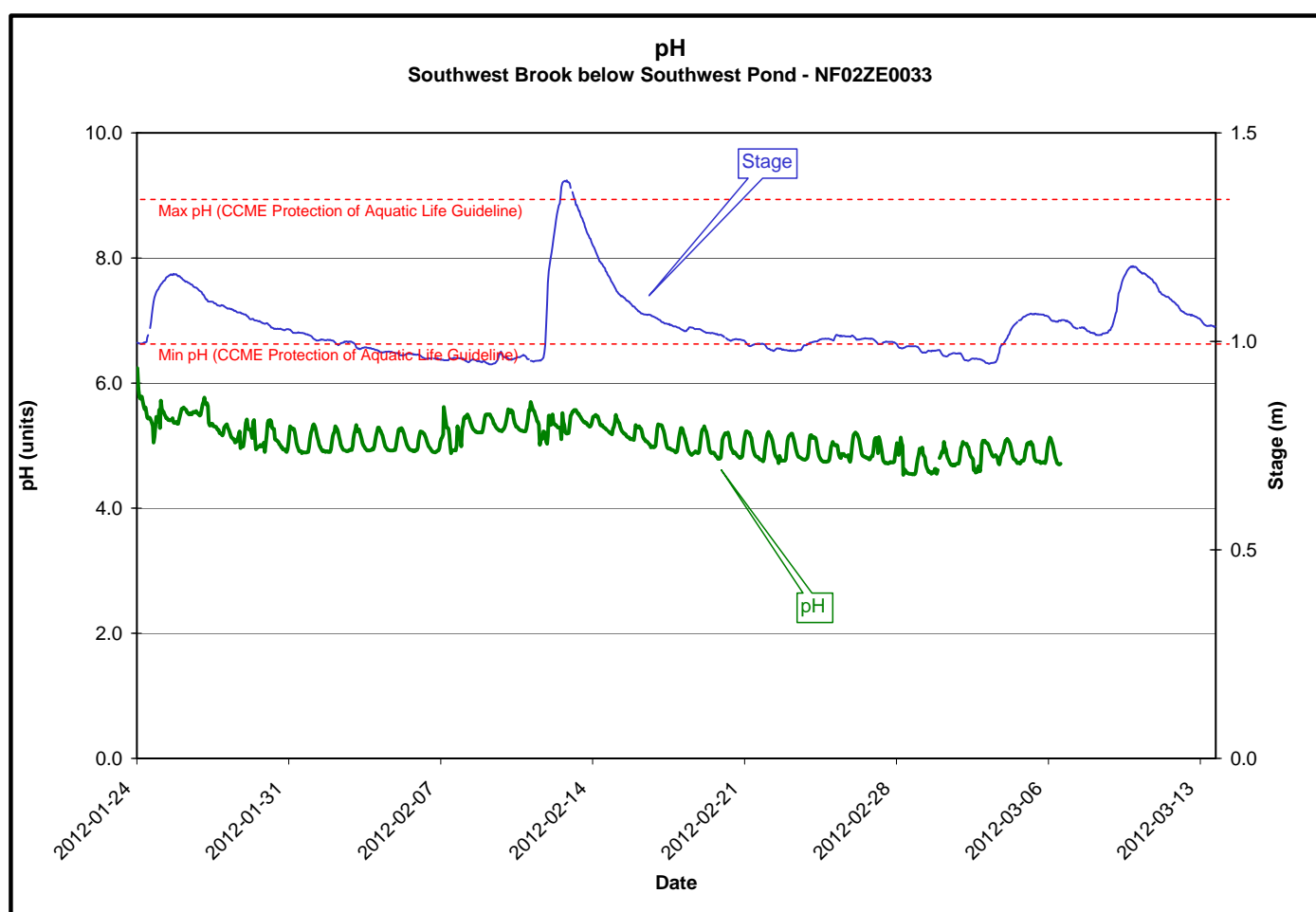


Figure 1

- Throughout the deployment period pH values (**Figure 2**) ranged from a minimum of 4.53 to a maximum of 6.24 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.
- During this deployment period, the inverse correlation with stage that is sometimes obvious is less evident, with little recorded change in pH.
- Due to a malfunctioning pH sensor, the pH data from period 2012-03-07 to 2012-03-14 have been discarded.

**Figure 2**

- The specific conductivity (**Figure 3**) ranged from a minimum of 19.7 $\mu\text{S}/\text{cm}$ to a maximum of 25.6 $\mu\text{S}/\text{cm}$ over the deployment period, with a slight decrease over the deployment period.
- Specific conductivity is affected by increases in stage, sometimes increasing markedly; sometimes decreasing markedly.
- In the graph below four distinct examples are evident where specific conductivity changes rapidly during the rising leg of the hydrograph.

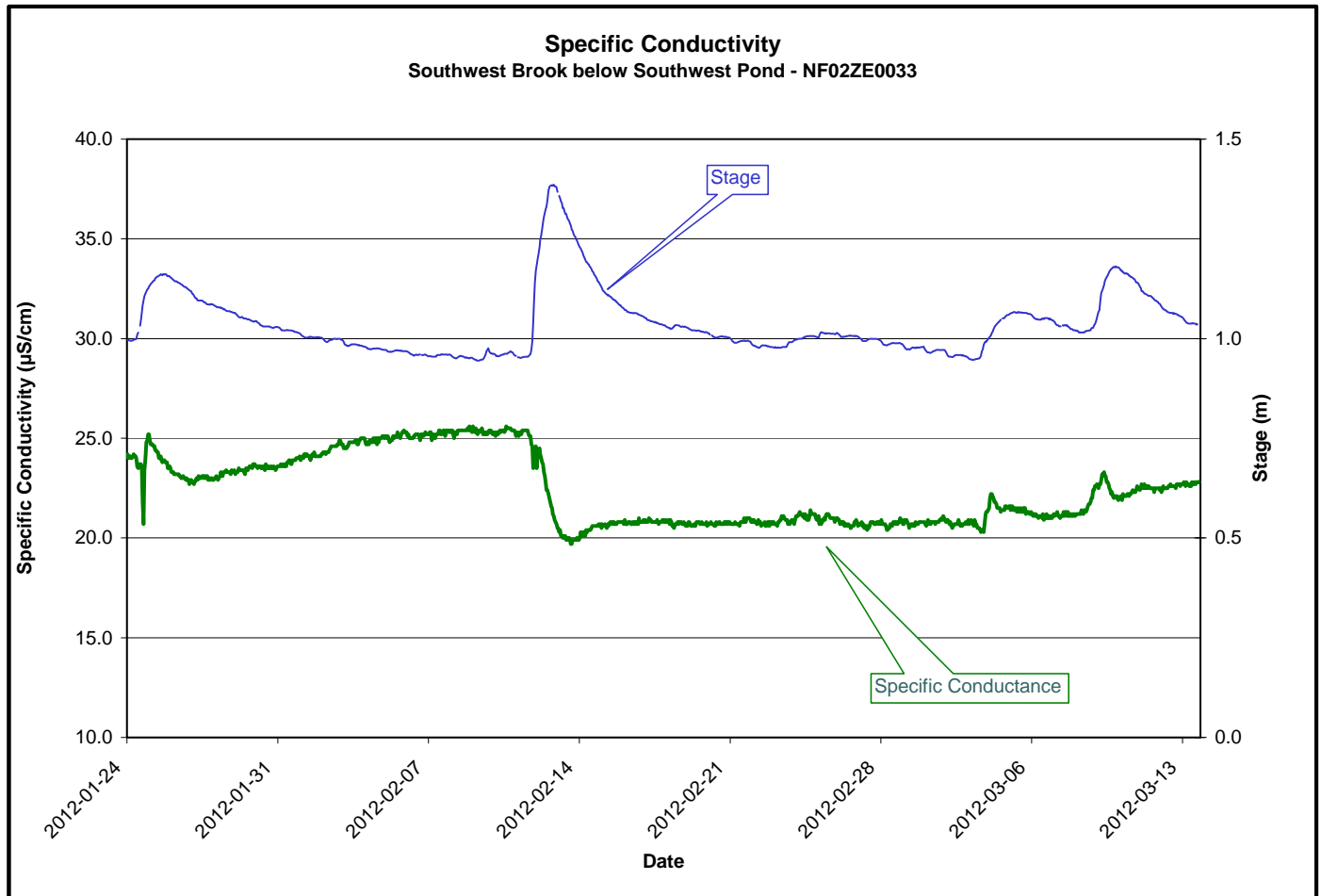
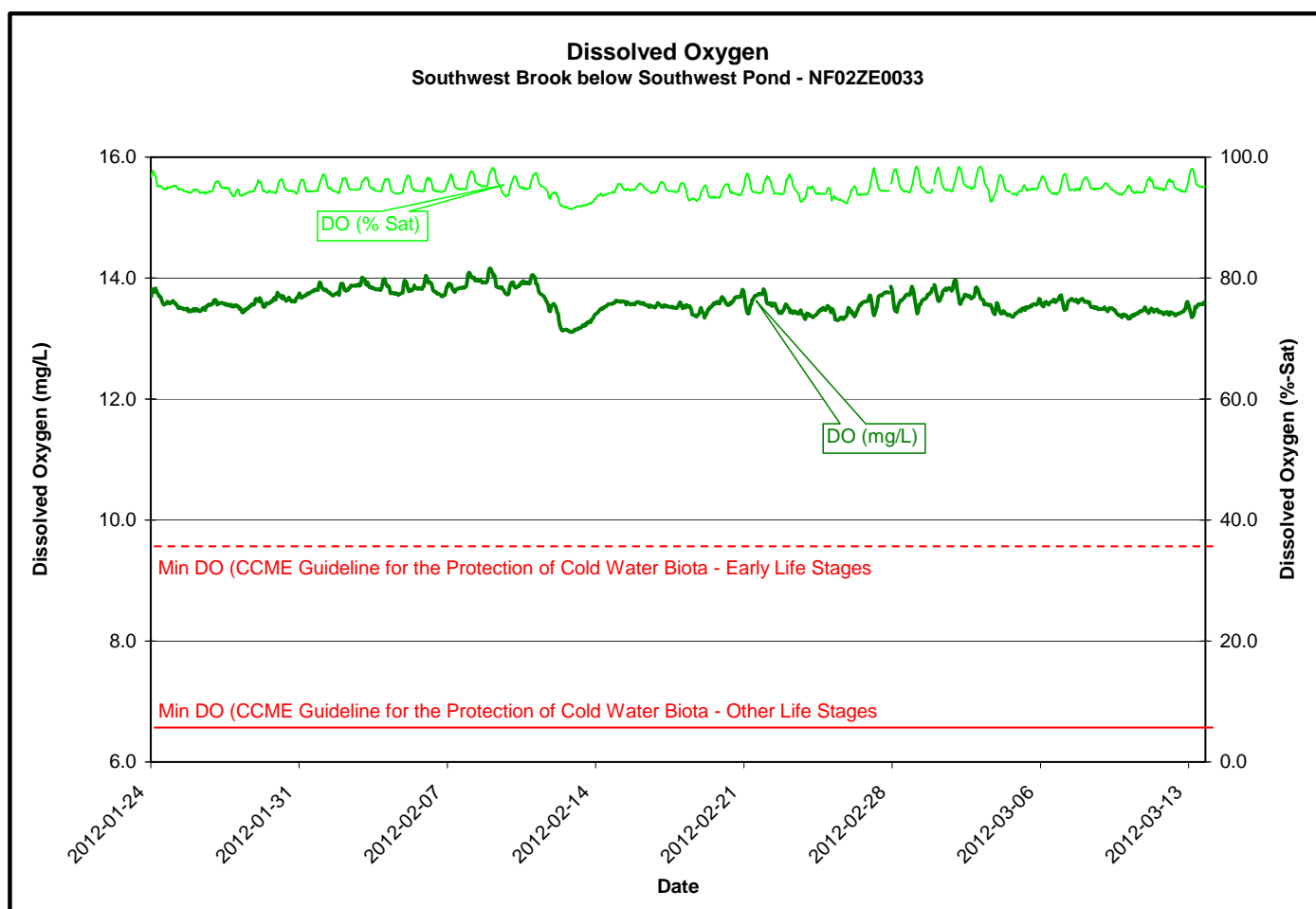
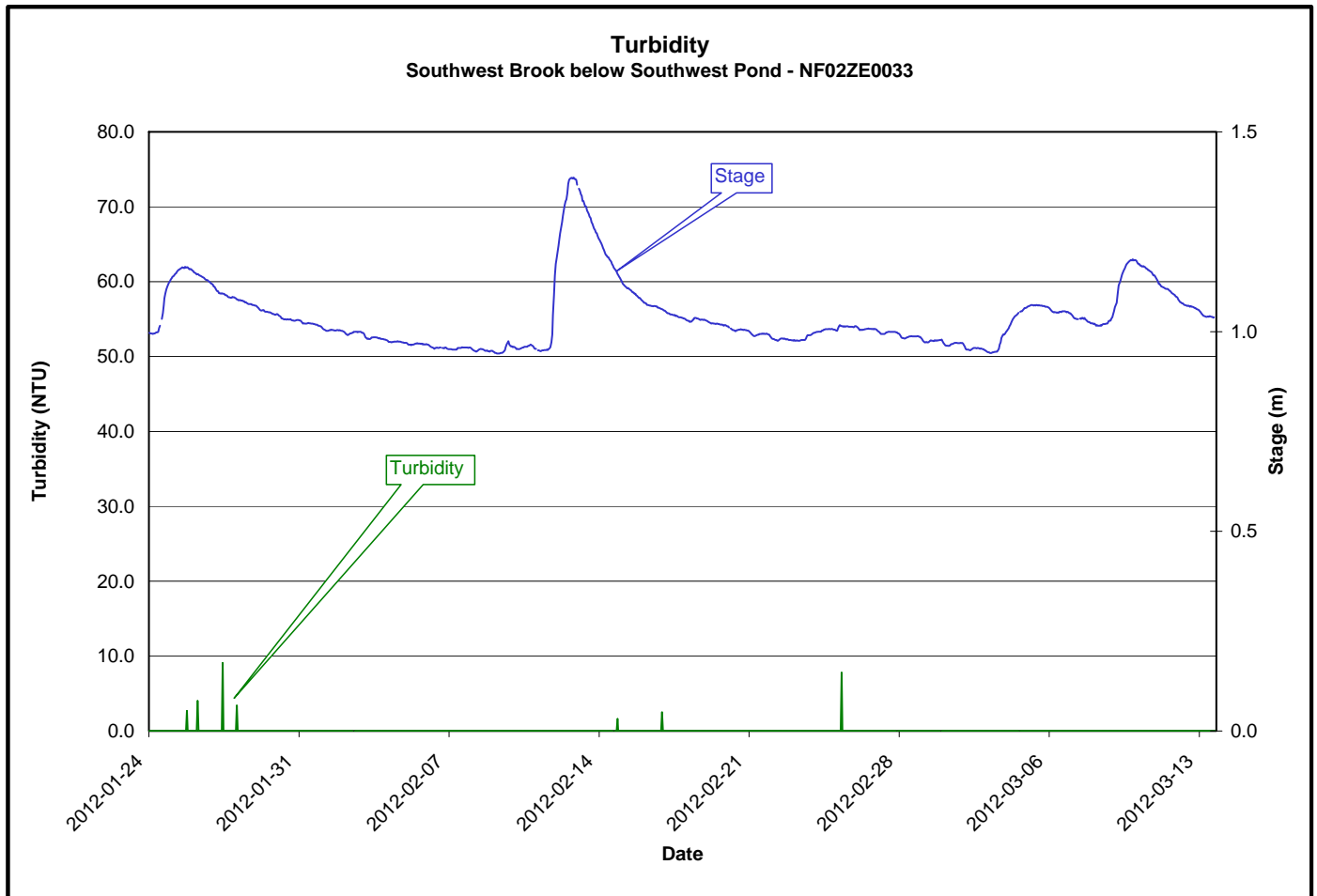


Figure 3

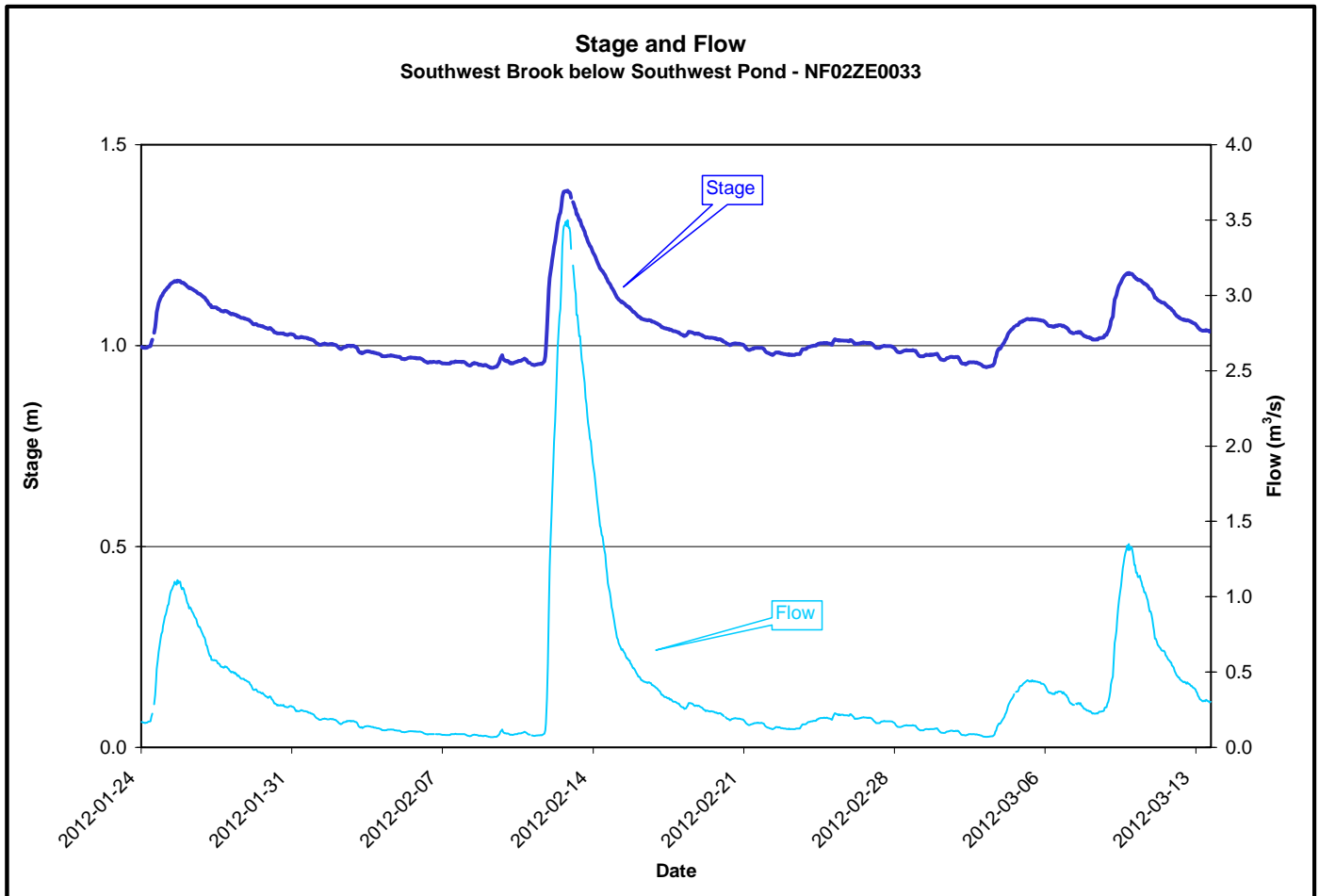
- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 13.11 mg/L to a maximum of 14.16 mg/L over the deployment period. With the percent saturation ranging between 91.4 and 98.5.
- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature.
- Throughout the deployment period dissolved oxygen values consistently fell above the upper 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).
- 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 9.1 NTU.
- During this deployment period, an effort was made to place the instrument away from the plunge pool and the influences of turbulent water.
- Turbidity was minimal during this deployment period, with only a few minor events recorded.

**Figure 5**

- The stage or water level ranged from a minimum of 0.95 m to a maximum of 1.39 m. The flow or discharge ranged from a minimum of 0.07 m³/s to a maximum of 3.50 m³/s (**Figure 6**).
- The increase in stage and flow is resultant from precipitation and snowmelt events.
- Stream flow and discharge are within normal range.

**Figure 6**

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