

Real Time Water Quality Report Southwest Brook below Southwest Pond

Deployment Period 2010-12-19 to 2011-02-13

2011-03-31



**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.
- The graphs below may sometimes show vertical lines from the data string to zero or the bottom of the graph. These lines should be ignored, as they are an artefact of individual missing data points. We are working to resolve this issue.

Maintenance and Calibration of Instrumentation

- After being cleaned and freshly calibrated the regular **DataSonde**® (s/n 44422) was installed on December 19, 2010, and remained deployed continuously until February 13, 2011, a 56 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)	$\leq \pm 0.2$	$> \pm 0.2$ to 0.5	$> \pm 0.5$ to 0.8	$> \pm 0.8$ to 1	$> \pm 1$
pH (unit)	$\leq \pm 0.2$	$> \pm 0.2$ to 0.5	$> \pm 0.5$ to 0.8	$> \pm 0.8$ to 1	$> \pm 1$
Sp. Conductance ($\mu\text{S}/\text{cm}$)	$\leq \pm 3$	$> \pm 3$ to 10	$> \pm 10$ to 15	$> \pm 15$ to 20	$> \pm 20$
Sp. Conductance $> 35 \mu\text{S}/\text{cm}$ (%)	$\leq \pm 3$	$> \pm 3$ to 10	$> \pm 10$ to 15	$> \pm 15$ to 20	$> \pm 20$
Dissolved Oxygen (mg/L)	$\leq \pm 0.3$	$> \pm 0.3$ to 0.5	$> \pm 0.5$ to 0.8	$> \pm 0.8$ to 1	$> \pm 1$
Turbidity < 40 NTU (NTU)	$\leq \pm 2$	$> \pm 2$ to 5	$> \pm 5$ to 8	$> \pm 8$ to 10	$> \pm 10$
Turbidity > 40 NTU (%)	$\leq \pm 5$	$> \pm 5$ to 10	$> \pm 10$ to 15	$> \pm 15$ to 20	$> \pm 20$

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**®, 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**.

- The 'Marginal' ranking for Dissolved Oxygen at beginning and end of the deployment period is unusual, and will be the subject of investigation should it be evident in subsequent deployment periods.
- 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. Where appropriate, corrected data for water quality parameters are indicated.

Southwest Brook below Southwest Pond (NF02ZE0033)		
Date (yyyy-mm-dd)	Parameter	Ranking
2010-12-19 Deployment	Temp (°C)	Excellent
	pH (units)	Fair
	Sp. Conductivity (uS/cm)	Good
	Dissolved Oxygen (mg/L)	Marginal
	Turbidity (NTU)	Excellent
2011-02-13 Removal	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Marginal
	Turbidity (NTU)	Excellent

Table 2

Data Interpretation

- The water temperature (**Figure 1**) ranged from a minimum of -0.19°C to a maximum of 4.42°C , with temperature generally decreasing 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.

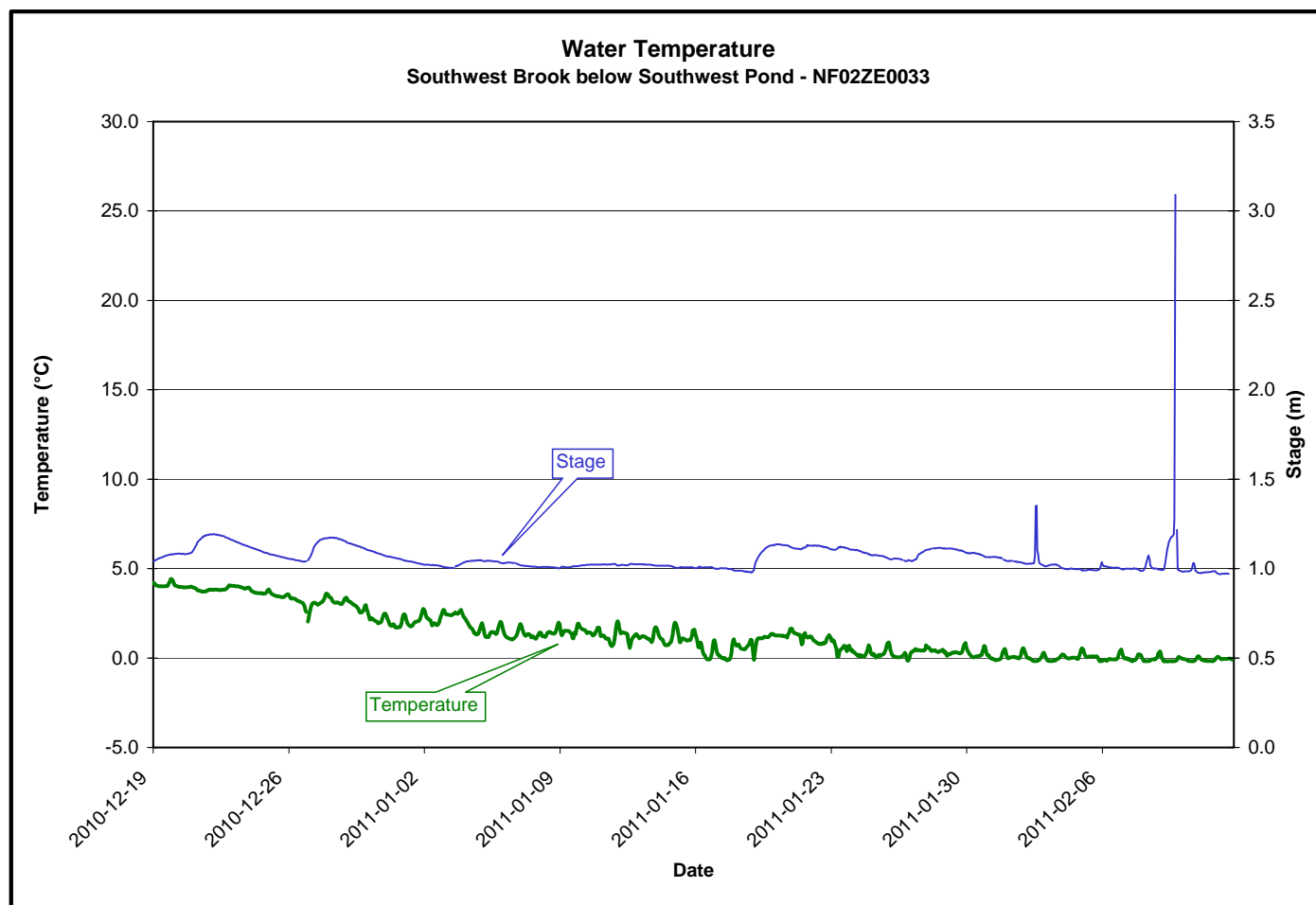
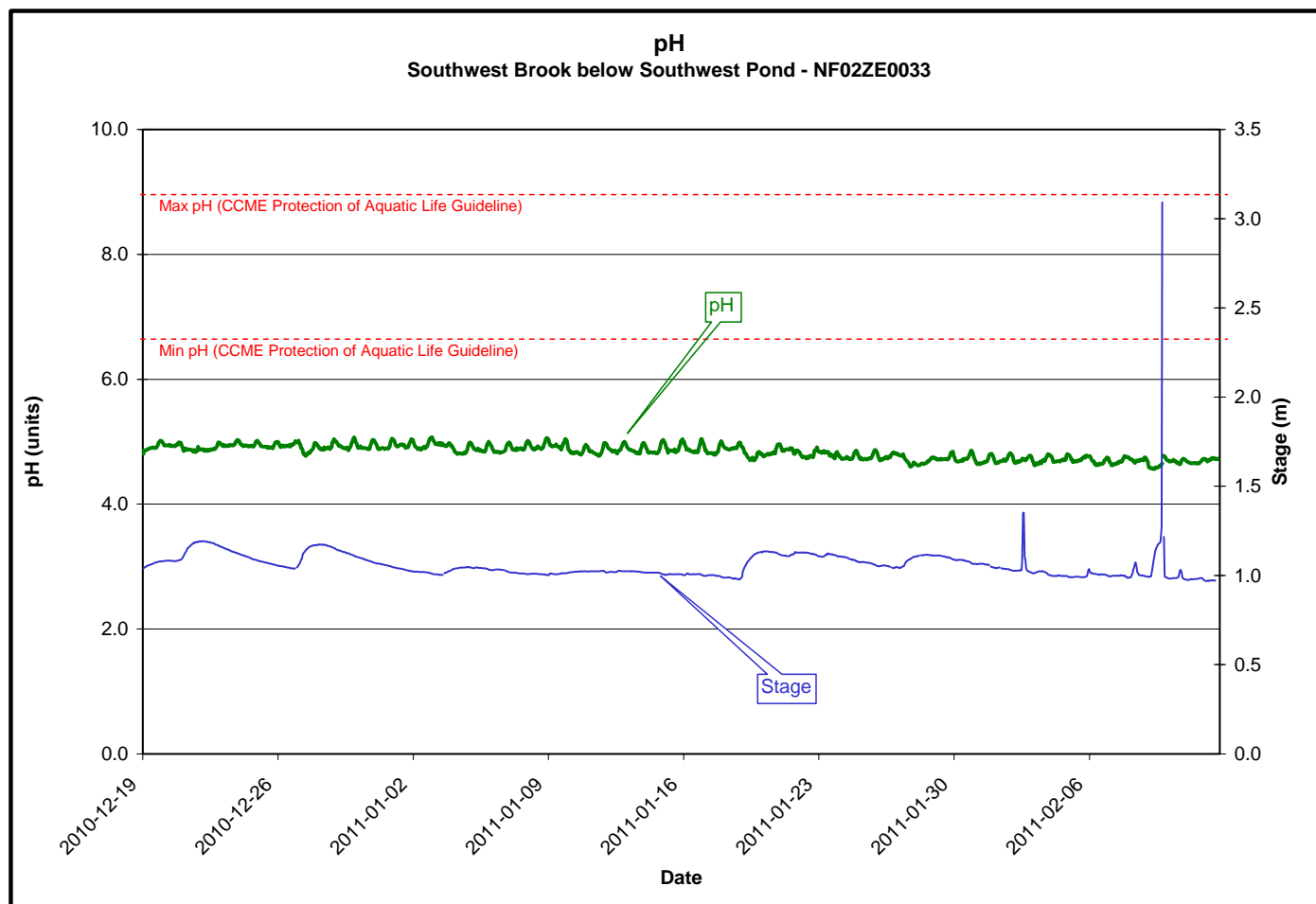
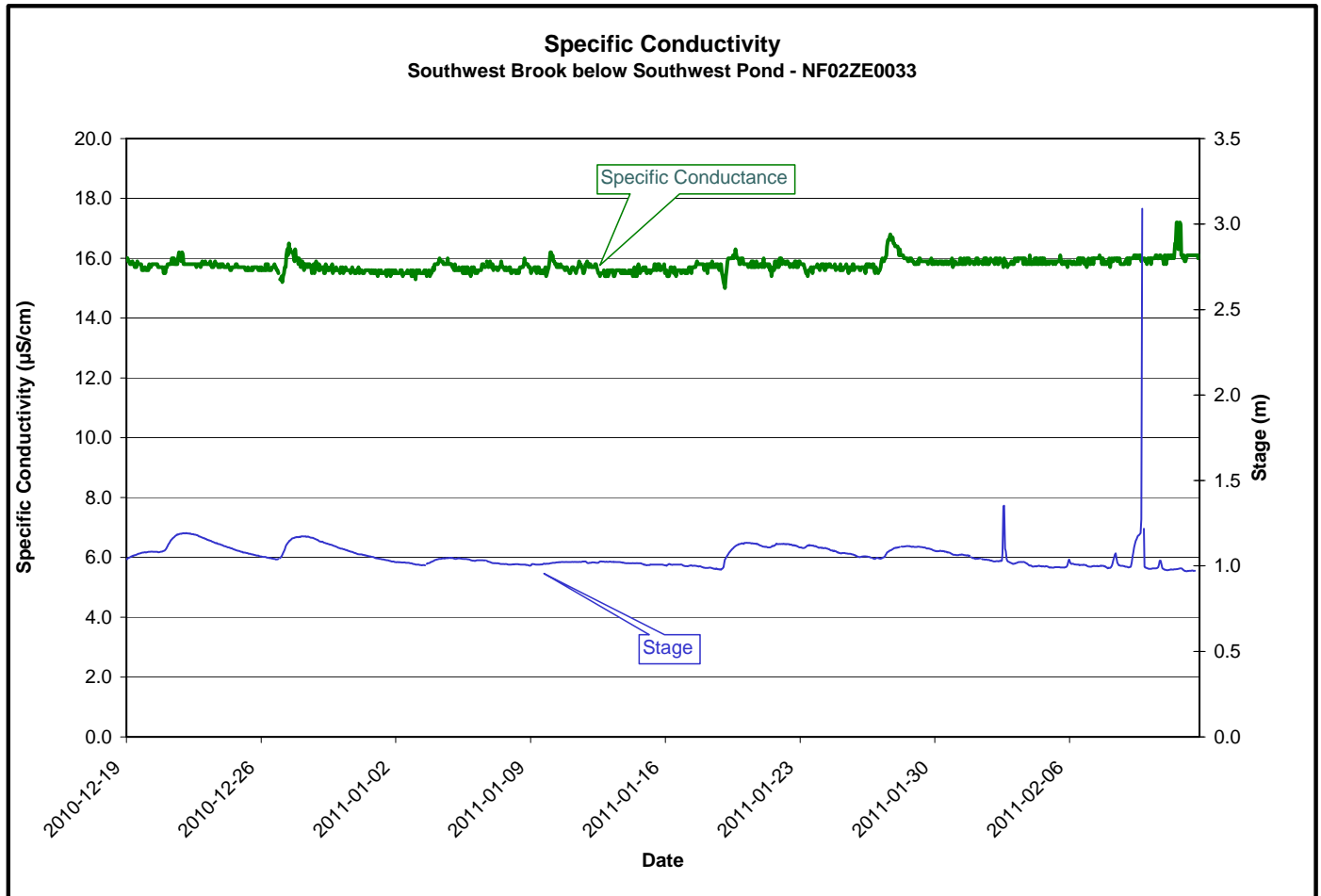


Figure 1

- Throughout the deployment period pH values (**Figure 2**) ranged from a minimum of 4.56 to a maximum of 5.07 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.

**Figure 2**

- The specific conductivity (**Figure 3**) ranged from a minimum of 15.0 $\mu\text{S}/\text{cm}$ to a maximum of 17.2 $\mu\text{S}/\text{cm}$ over the deployment period.
- There appears to be some correlation between specific conductivity and the beginning of the rising leg of each stage increase, suggesting that these changes were triggered by precipitation events and the onset of runoff.

**Figure 3**

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 12.72 mg/L to a maximum of 14.37 mg/L over the deployment period. With the percent saturation ranging between 93.9 and 101.5.
- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature.
- For the entire deployment period dissolved oxygen values 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).
- Lower dissolved oxygen values 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 reasonably accurate, despite a ‘marginal’ ranking when compared with a QA/QC instrument at the beginning and end of the deployment period.

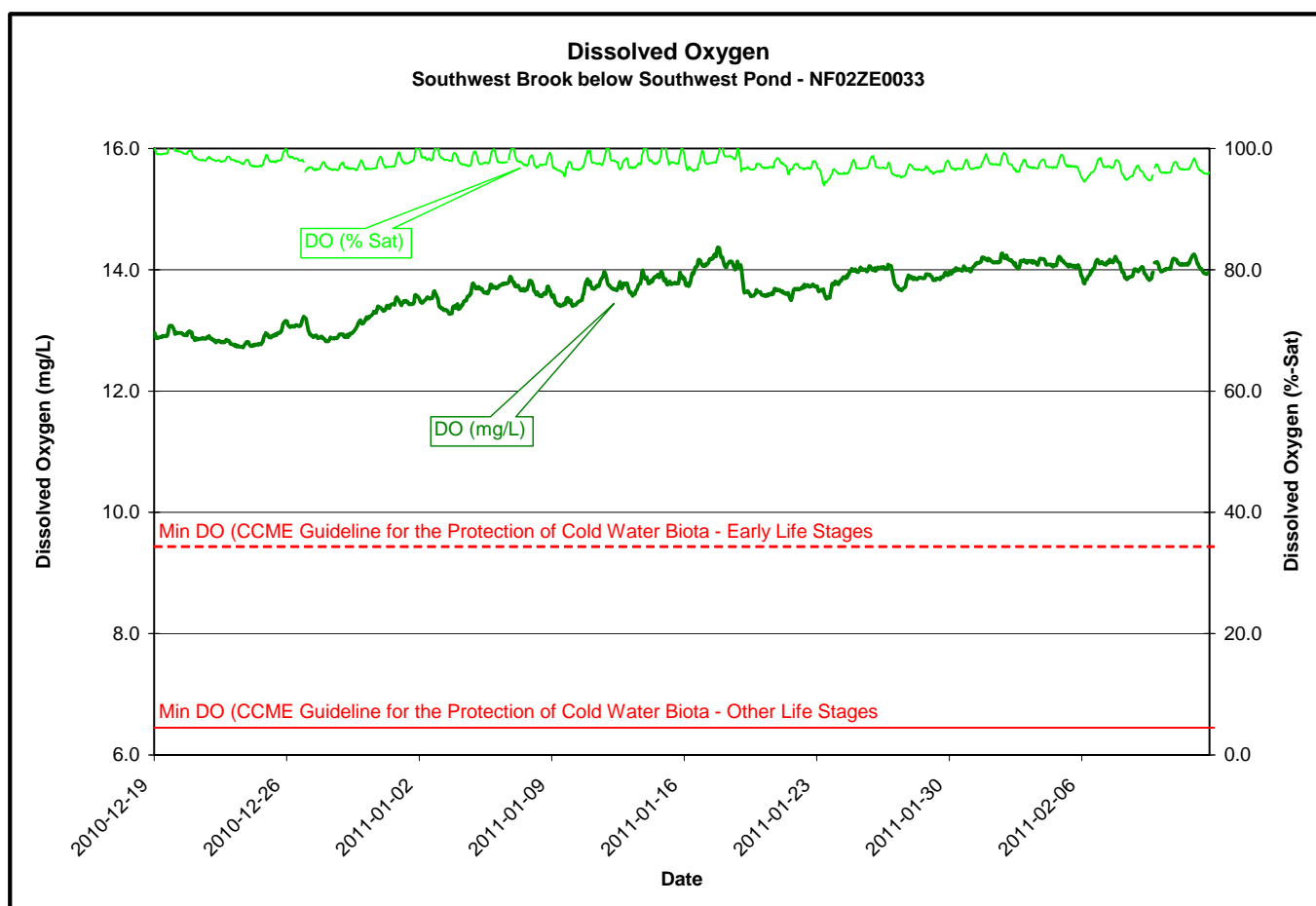
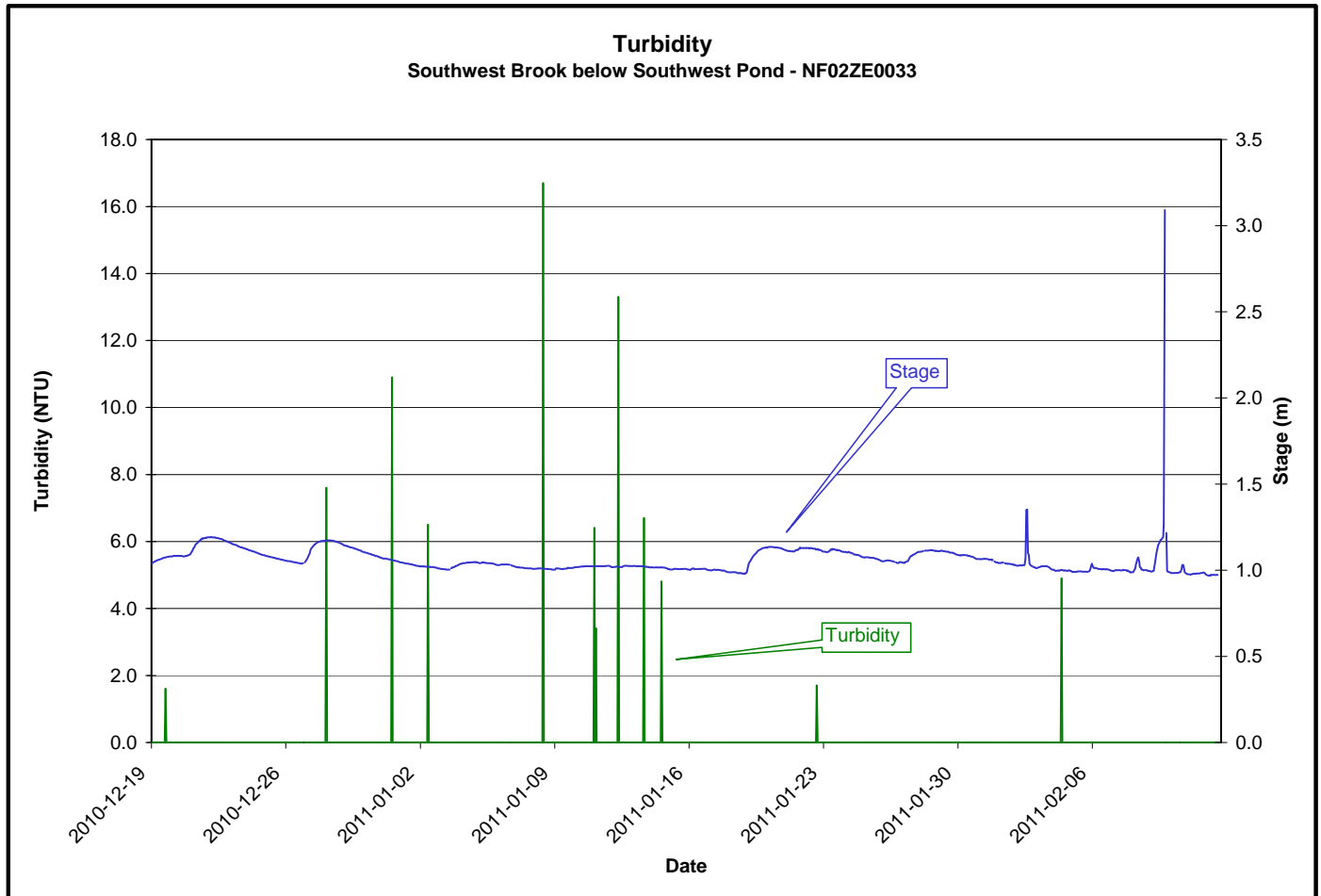


Figure 4

- The turbidity values (**Figure 5**) ranged from a minimum of 0.0 NTU to a maximum of 16.7 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. The events sometimes occur during the rising leg of the hydrograph, presumably resultant from precipitation events.

**Figure 5**

- The stage or water level ranged from a minimum of 0.97 m to a maximum of 3.09 m. The flow or discharge ranged from a minimum of 0.11 m³/s to a maximum of 3.14 m³/s (**Figure 6**).
- The two distinct peaks are likely the result of backwater caused by ice formation, as it is unlikely that water levels or flows would ever reach that high in this stream.
- The more subtle increase in stage and flow presumably result from precipitation events.
- Stream flow is within normal range.

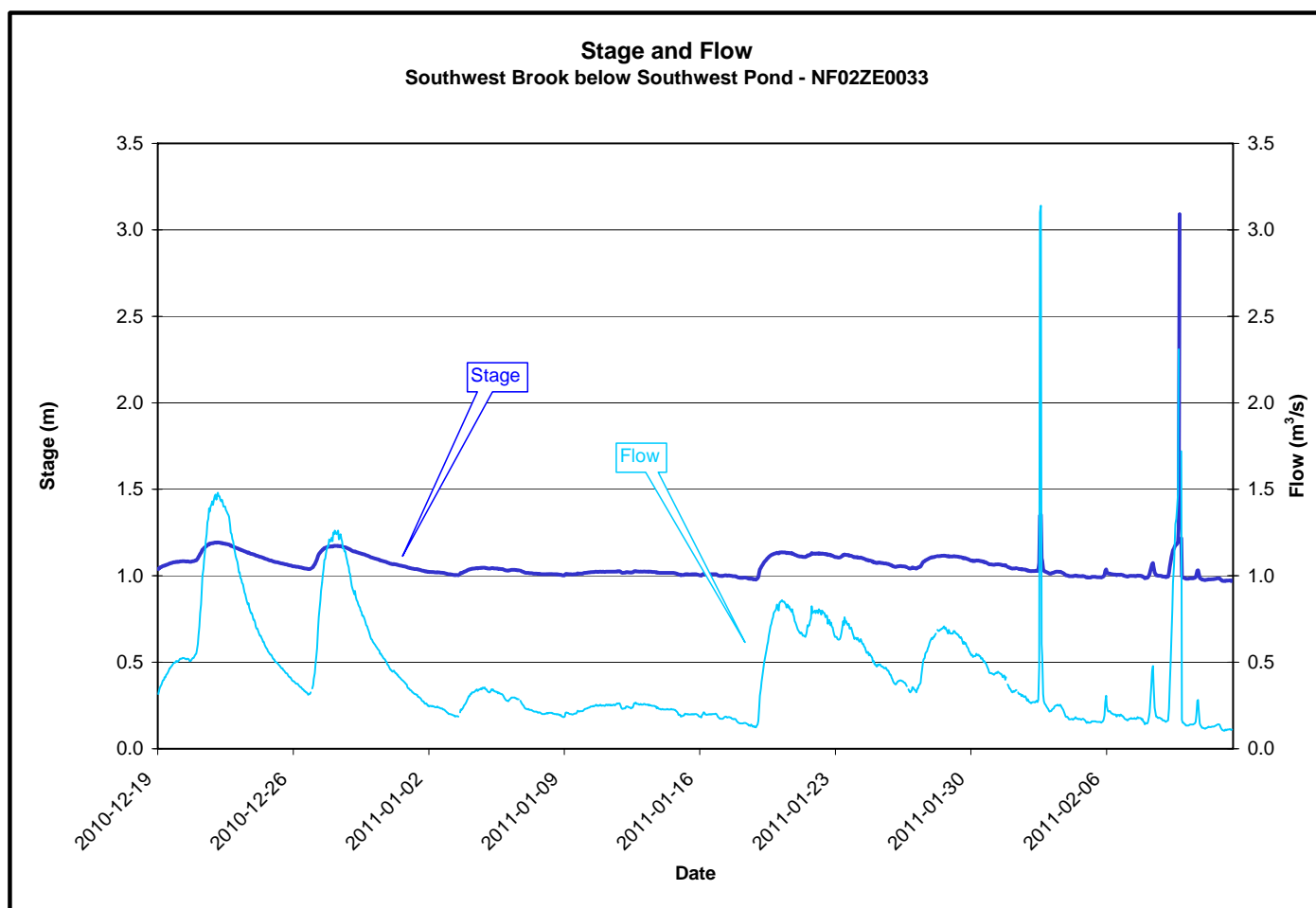


Figure 6

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