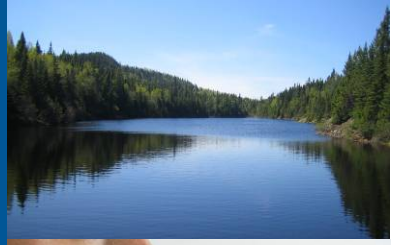
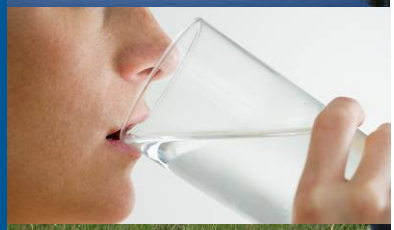



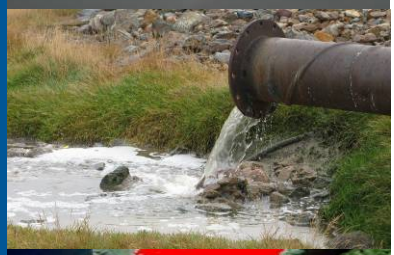


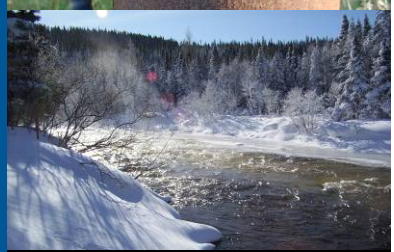

Real Time Water Quality Report Southwest Brook below Southwest Pond

Deployment Period 2010-03-03 to 2010-05-08

2010-05-25

Newfoundland Labrador

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 **DataSonde®** for Southwest brook below Southwest Pond was installed on March 3, 2010, and remained deployed continuously until May 8, 2010, a 66 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 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

Table 1

- Upon deployment, a QA/QC **MiniSonde®** is temporarily deployed along side the Field **DataSonde®**. Values for temperature and dissolved oxygen are compared between the two instruments. A grab sample is taken to compare with the Field **DataSonde®** for specific conductivity, pH and turbidity parameters. Based on the difference between parameters recorded by the Field **DataSonde®**, QAQC **MiniSonde®** and grab sample a qualitative statement is made on the data quality upon deployment.

- At the end of a deployment period, readings are taken in the water body from the Field **DataSonde®** before and after a thorough cleaning in order to assess the degree of biofouling. During calibration in the laboratory, an assessment of calibration drift is made and the two error values are combined to give Total Error (T_e). If T_e exceeds a predetermined data correction criterion, a correction based on T_e is applied to the dataset using linear interpolation. Based on the value for T_e, a qualitative statement is also made on the data quality upon removal.
- During the laboratory calibration process an instrument malfunction occurred with the **DataSonde®**, accordingly, the Total Error could only be calculated for pH. Analysis of the data from other parameters reveals minimal if any error due to biofouling, accordingly, no error calculations are performed for these parameters.
- 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. Where appropriate, corrected data for water quality parameters are indicated.

Southwest Brook below Southwest Pond (NF02ZE0033)		
Date (yyyy-mm-dd)	**Parameter**	**Ranking**
2010-03-03 Deployment	Temp (^oC)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Fair
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent
2010-05-08 Removal	Temp (^oC)	Excellent
	pH (units)	Fair
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (%)	Excellent
	Turbidity (NTU)	Excellent

Table 2

Data Interpretation

- The water temperature (**Figure 1**) ranged from a minimum of 0.07 ˚C to a maximum of 11.83 ˚C, with temperature increasing throughout the deployment period.
- There appears to be little correlation with stage.
- Fouling drift was negligible. Due to instrument malfunction it was impossible to determine if there was any instrument drift. Accordingly, no data corrections are made for temperature.

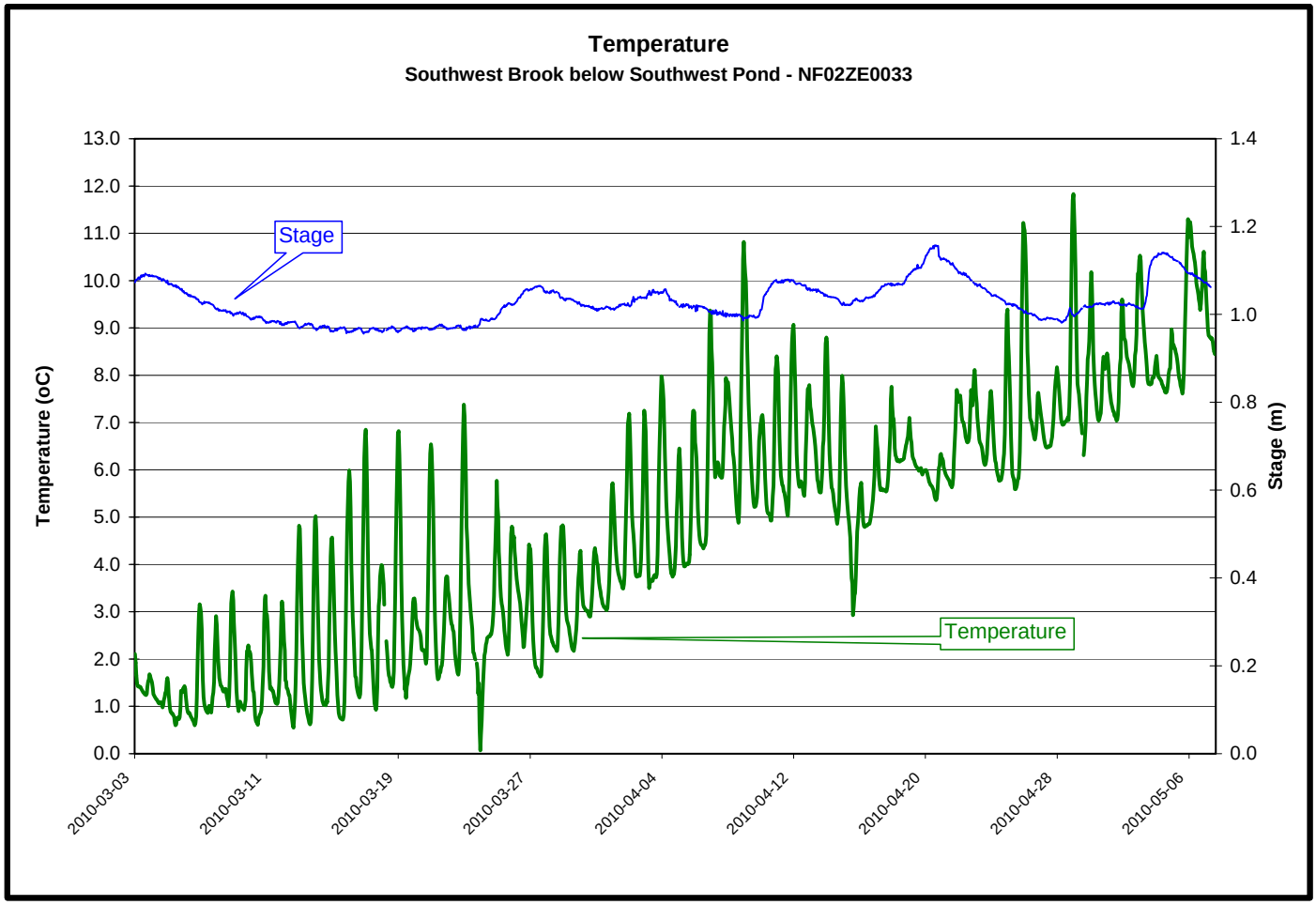

Figure 1

- Throughout the deployment period pH values (**Figure 2**) ranged from a minimum of 4.78 to a maximum of 5.85 with all the values falling 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 an inverse correlation with discharge.
- As there was some fouling and instrument drift, a data correction was required for pH.

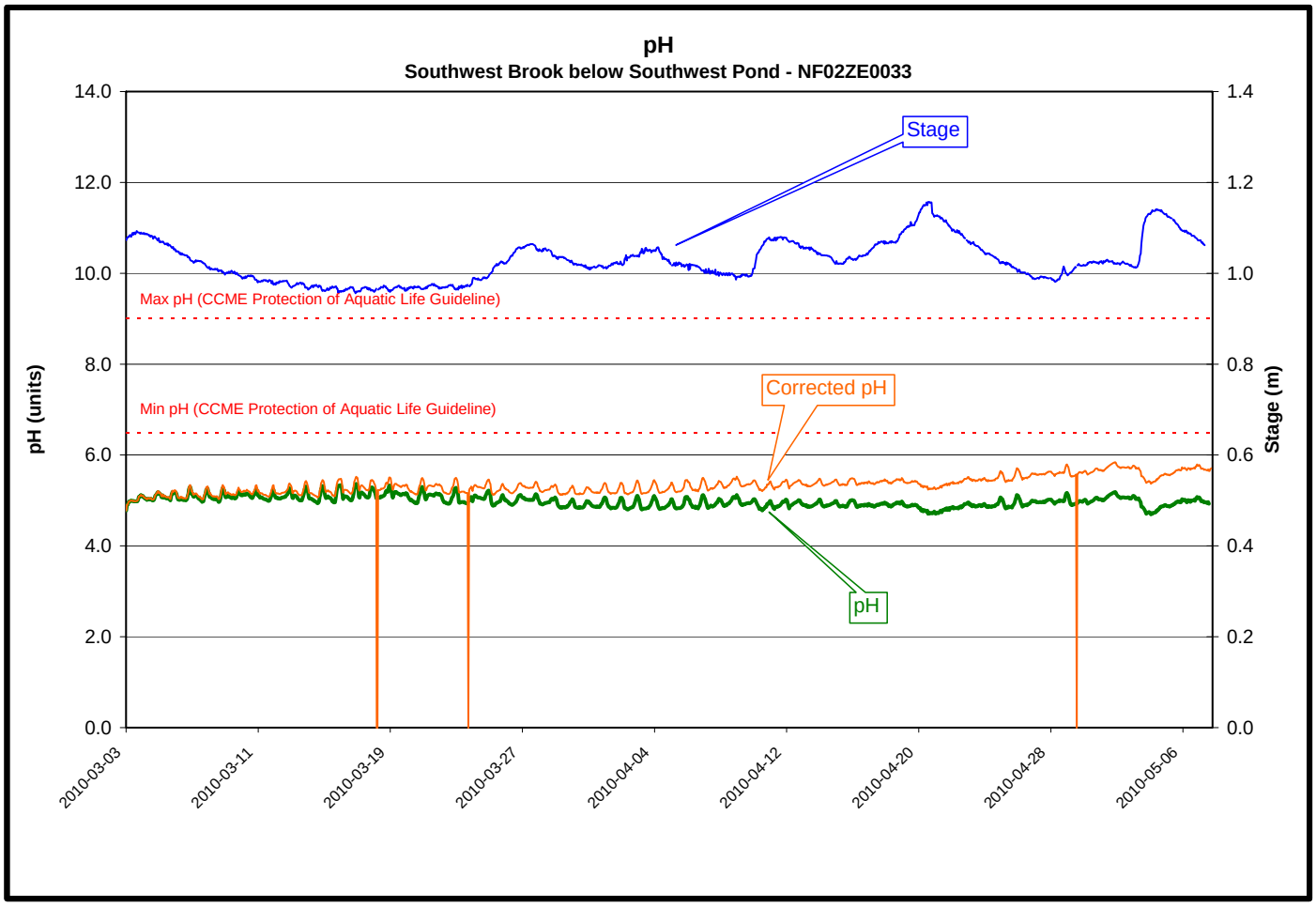

Figure 2

- The specific conductivity **(Figure 3)** ranged from a minimum of 4.5 µS/cm to a maximum of 11.8 µS/cm over the deployment period.
- Fouling drift was negligible. Due to instrument malfunction it was impossible to determine if there was any instrument drift. Accordingly, no data corrections are made for Specific Conductance.

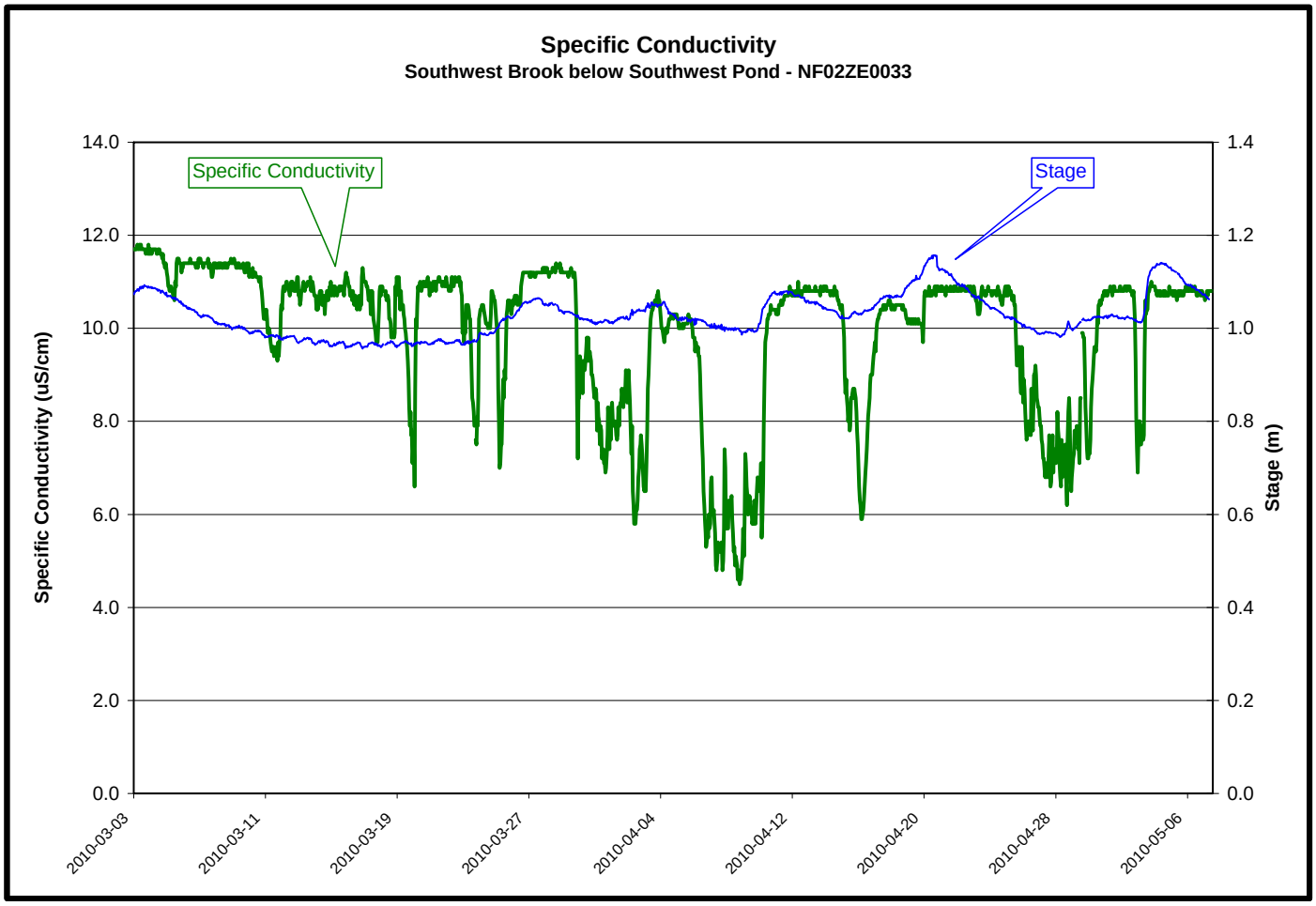

Figure 3

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 9.92 mg/L to a maximum of 12.91 mg/L over the deployment period. With the percent saturation ranging between 94.4 and 104.8.
- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature.
- Throughout the deployment period, all dissolved oxygen values fell above the limits 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).
- Fouling drift was negligible. Due to instrument malfunction it was impossible to determine if there was any instrument drift. Accordingly, no data corrections are made for dissolved oxygen.

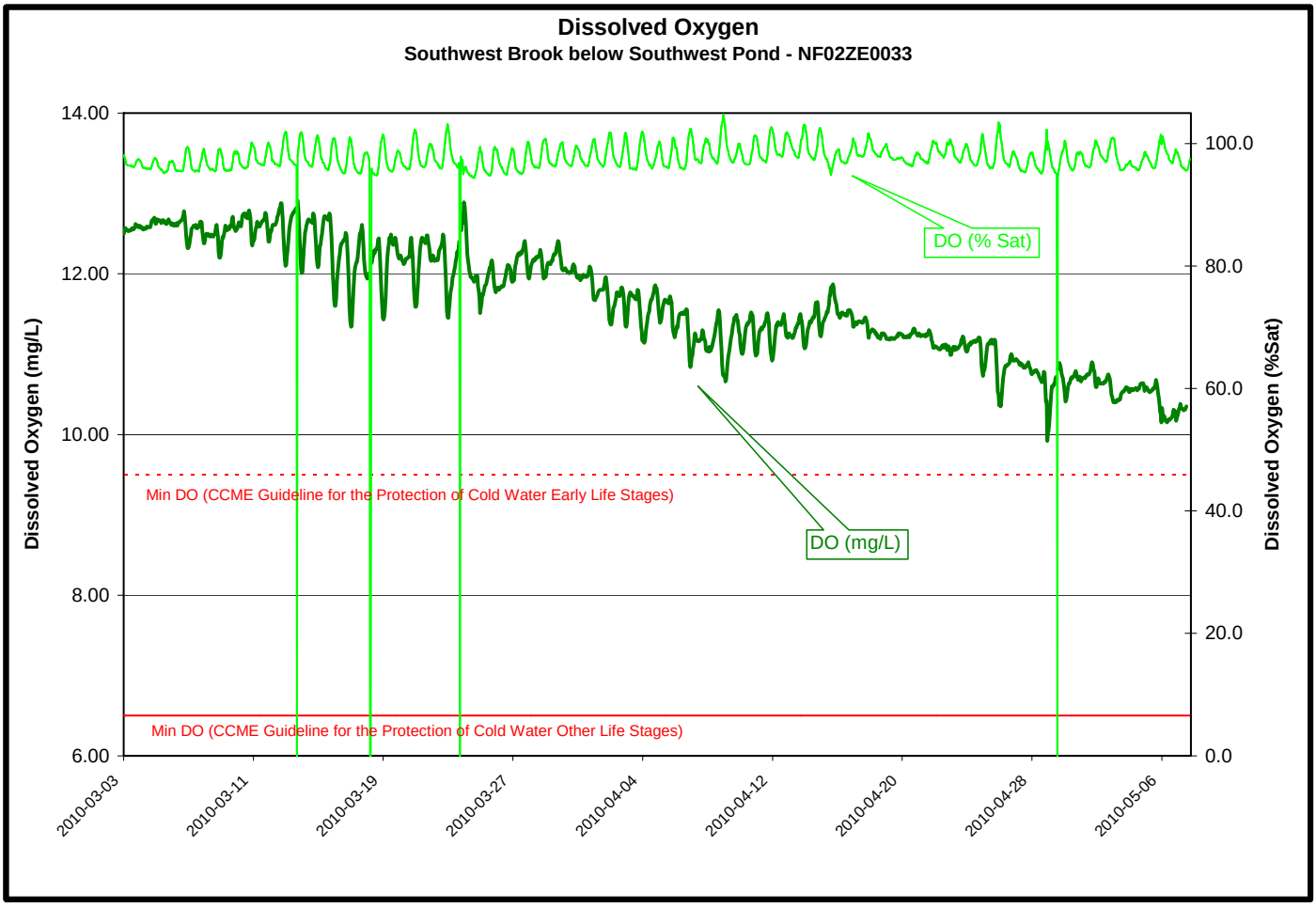

Figure 4

- The turbidity values **(Figure 5)** ranged from a minimum of 0.0 NTU to a maximum of 100.4 NTU.
- There does not appear to be any correlation between turbidity and high flow. If anything the opposite might be true.
- Fouling drift was negligible. Due to instrument malfunction it was impossible to determine if there was any instrument drift. Accordingly, no data corrections are made for turbidity.

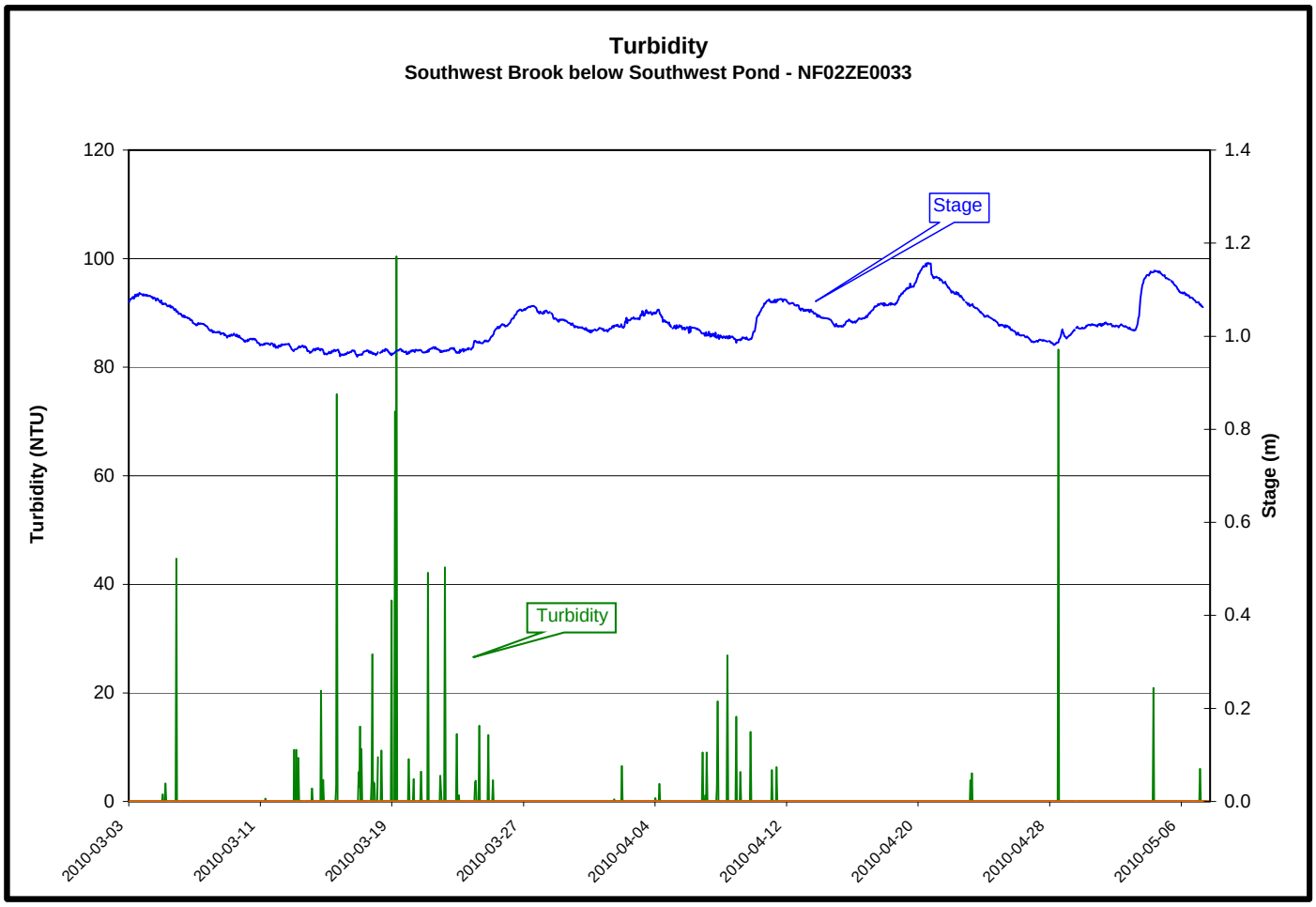

Figure 5

- The stage (**Figure 6)** or water level ranged from a minimum of 0.96 m to a maximum of 1.16 m with the highest peaks presumably resulting from precipitation events.

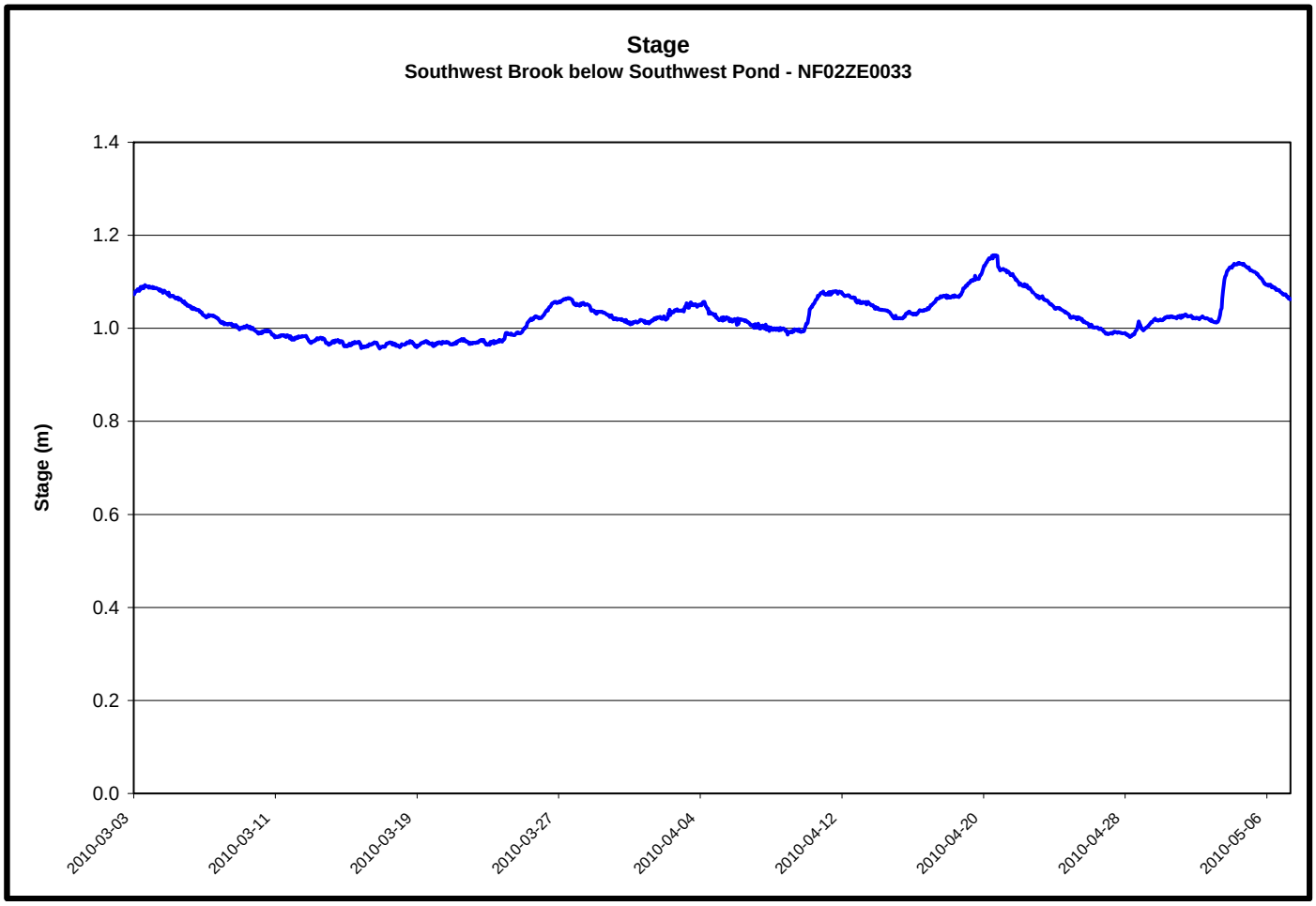

Figure 6

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