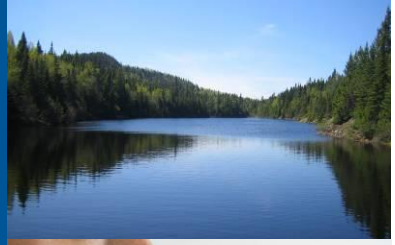




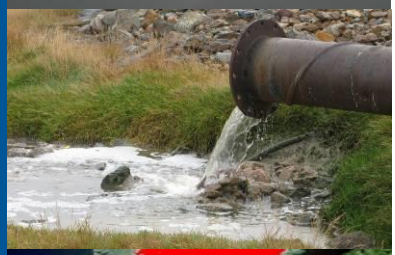


Real Time Water Quality Report Southwest Brook below Southwest Pond

Deployment Period 2013-04-16 to 2013-06-24

2013-06-25

Newfoundland Labrador

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

- The regular **DataSonde®** (s/n 44422) was exhibiting some unusual values during previous deployments, so it was decided to remove the instrument and along with the regular QA/QC **MiniSonde®** (s/n 44998) send them for Performance Testing and Evaluation (PTE).
- After being cleaned and freshly calibrated a replacement **DataSonde®** (s/n 60394) having the same technical specifications was installed on April 16, 2013 and remained deployed continuously until June 24, 2013, a 68 day period.
- The regular QA/QC **MiniSonde®** (s/n 44998) was cleaned and freshly calibrated and used during the deployment and removal for QA/QC measurements.

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)	<=+/-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**.
- 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**
2013-04-16 Deployment	Temp (^{o}C)	Excellent
	pH (units)	Excellent
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent
2013-06-24 Removal	Temp (^{o}C)	Excellent
	pH (units)	Good
	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 1.30 ˚C to a maximum of 20.98 ˚C.
- Water temperatures warmed significantly over the deployment period.
- There is no obvious relationship with stage.

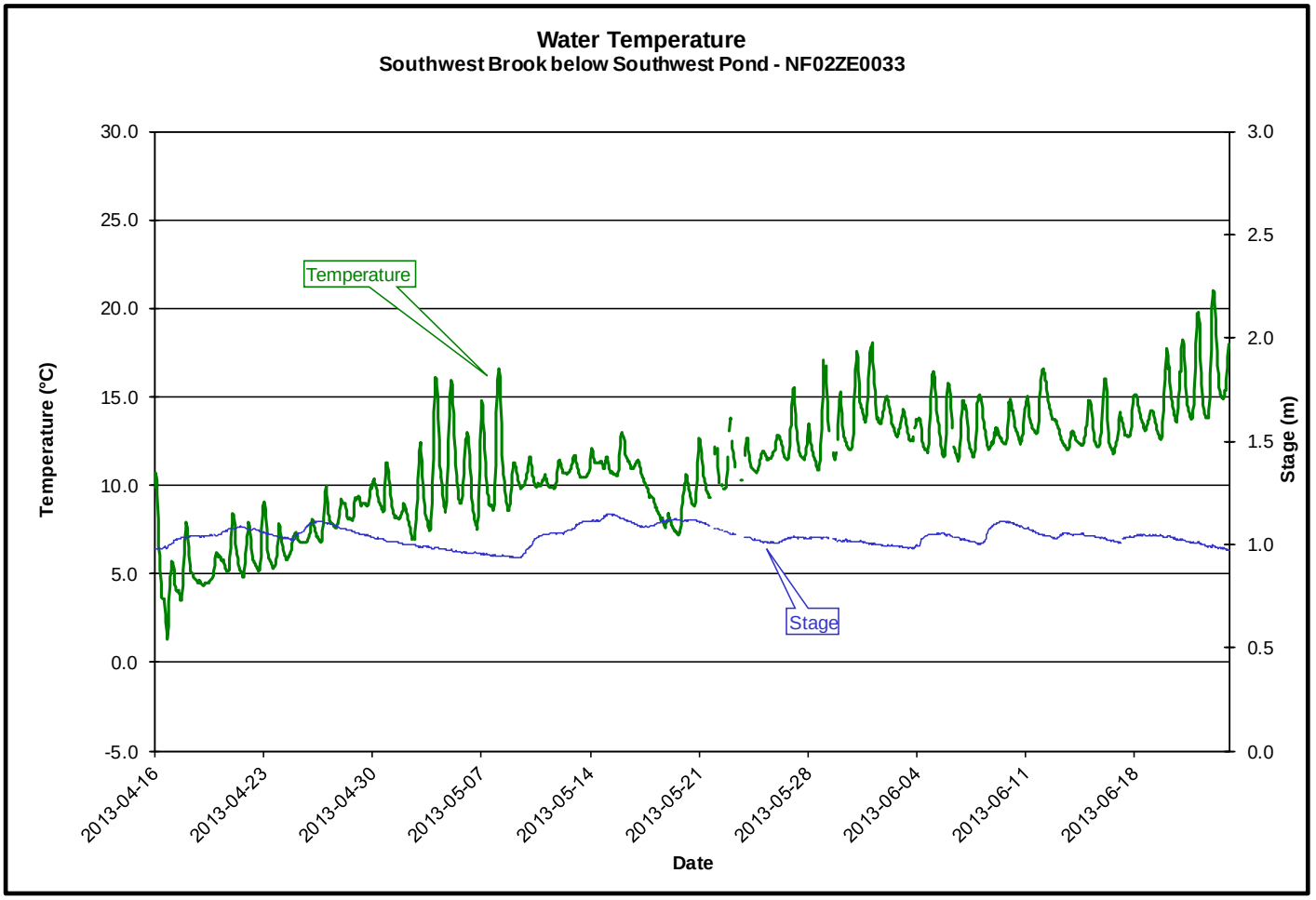

Figure 1

- Throughout the deployment period pH values (**Figure 2**) ranged from a minimum of 4.77 to a maximum of 5.52 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* for most of the deployment period.

- There was very little variation in pH over this deployment period.

- The background pH of this stream is normally lower than the lower limit of the recommended range.

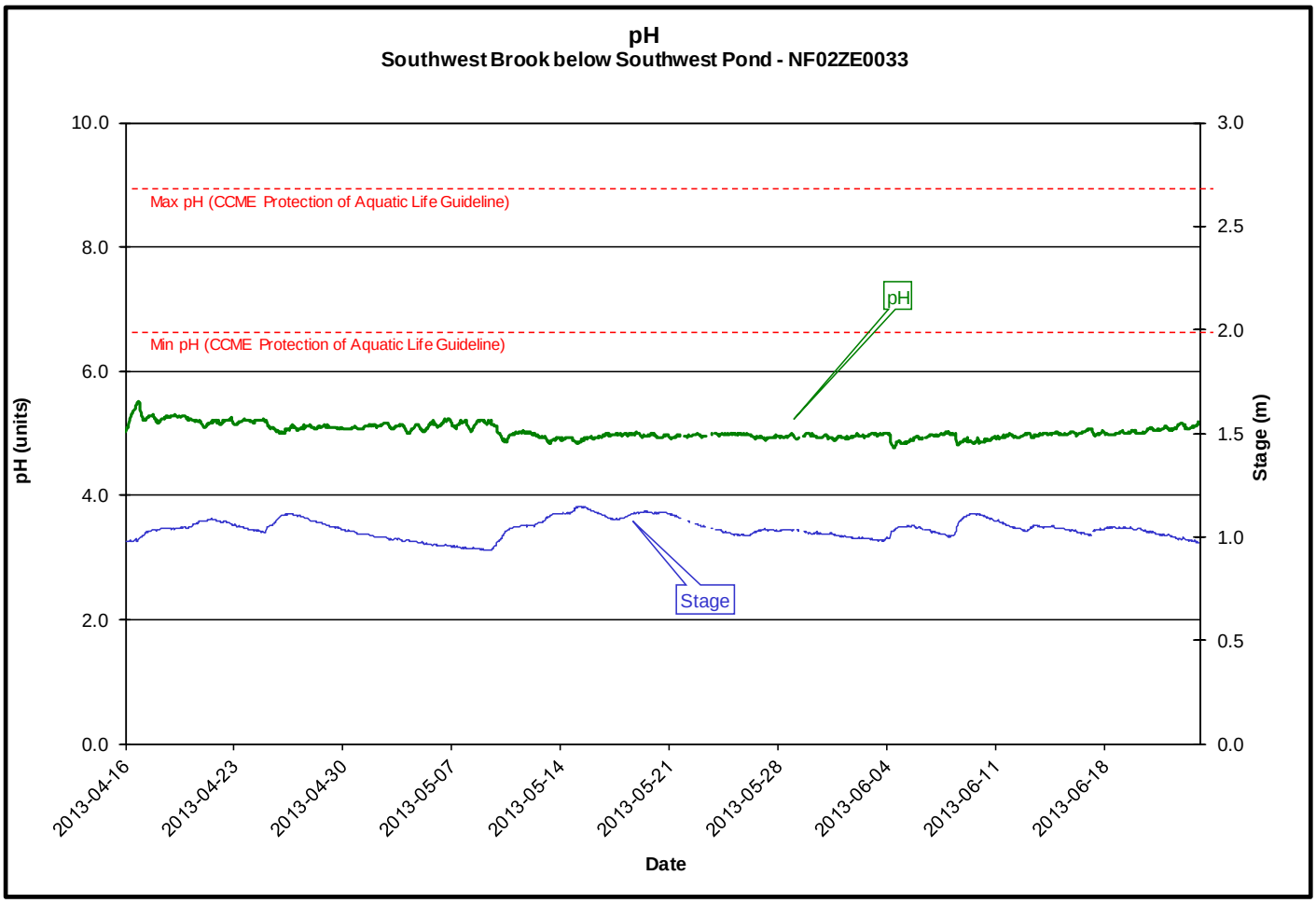

Figure 2

- The specific conductivity **(Figure 3)** ranged from a minimum of 21.1 µS/cm to a maximum of 26.6 µS/cm over the deployment period.

- There was little change over the deployment period.

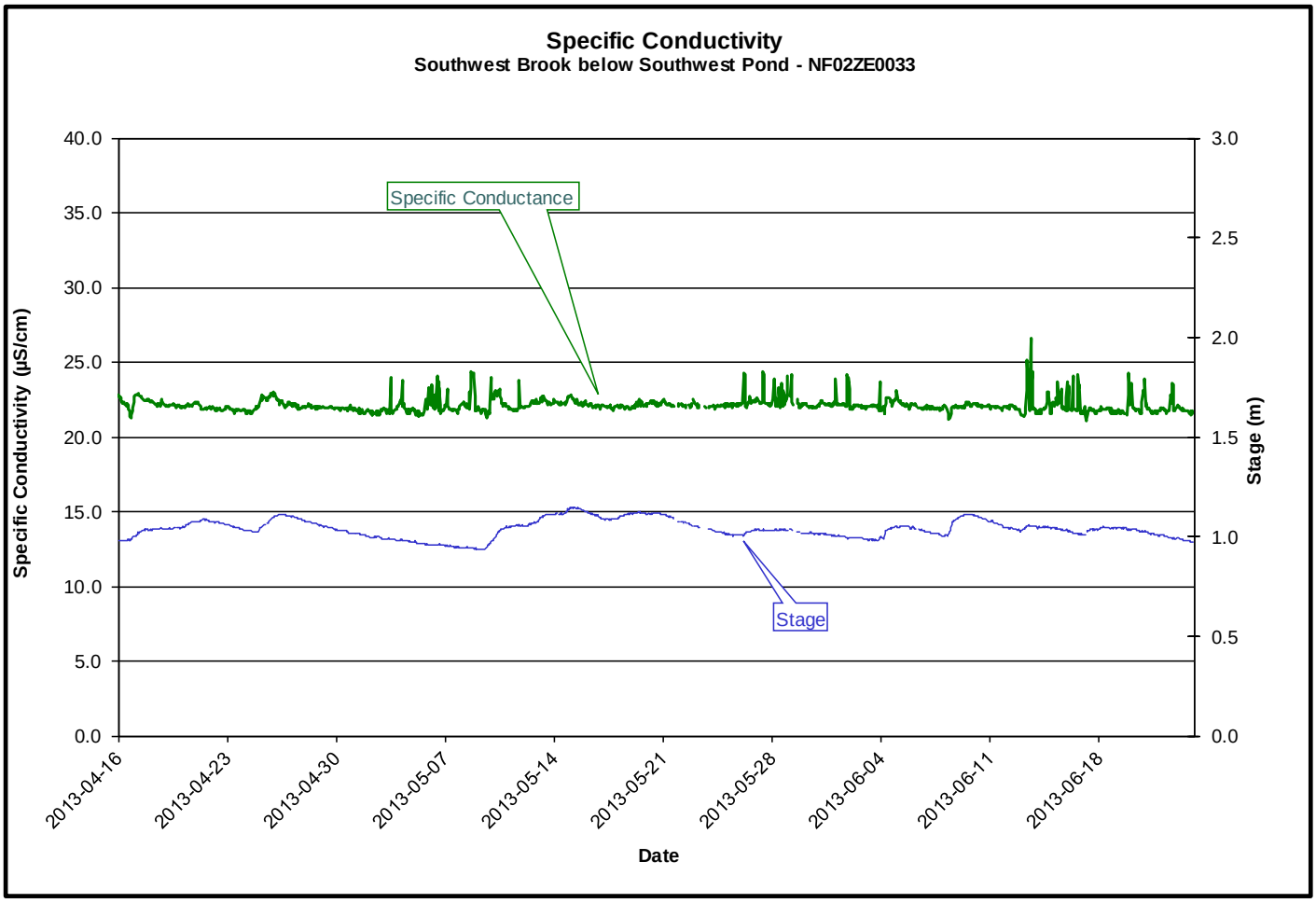

Figure 3

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 9.12 mg/L to a maximum of 13.38 mg/L over the deployment period; with the percent saturation ranging between 93.5 and 104.4.

- There was a general decrease in dissolved oxygen (mg/L) values over the deployment period, as one would expect, as dissolved oxygen (mg/L) is generally inversely proportional to water temperature.

- For most of the 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).

- Based on 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.

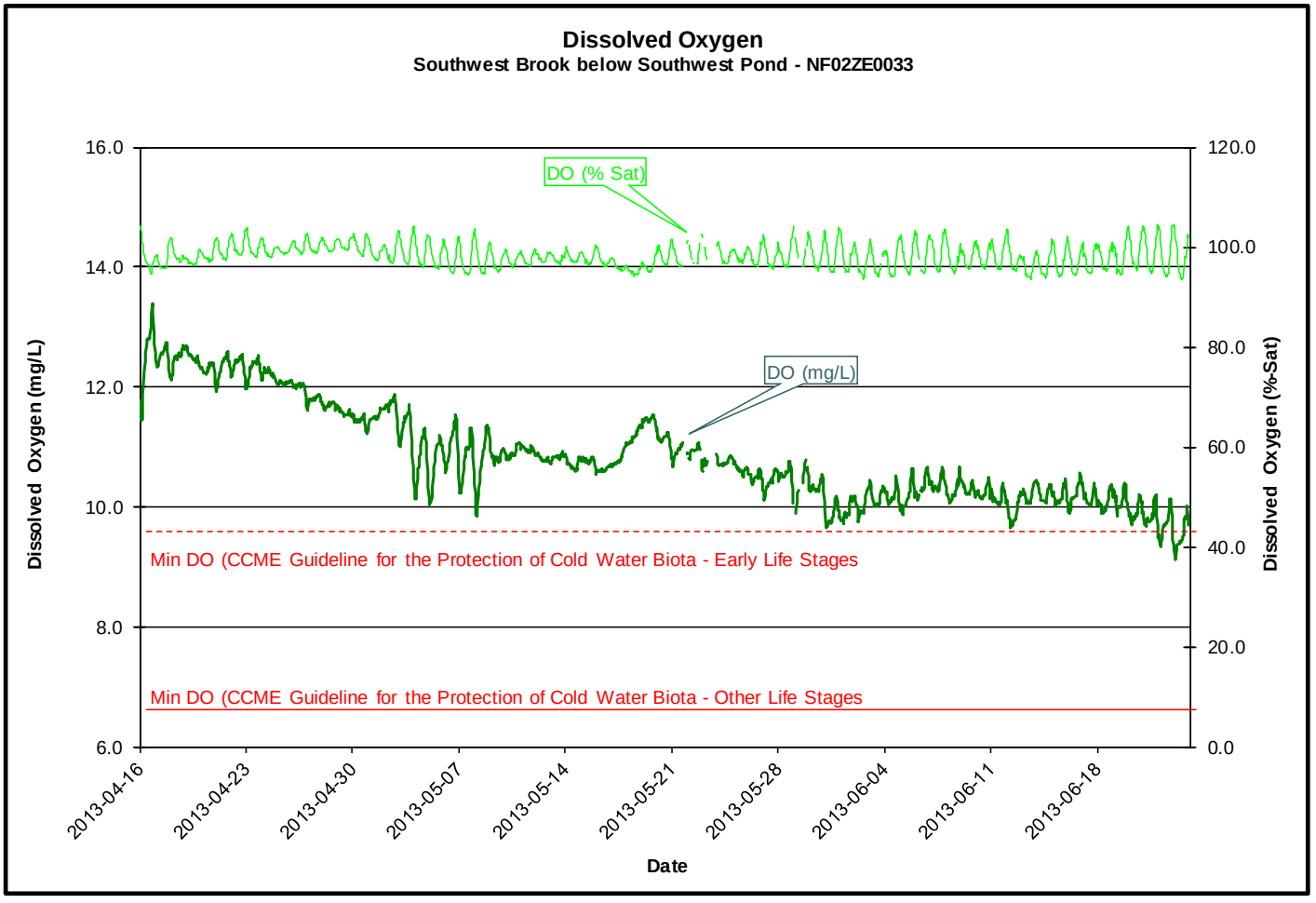

Figure 4

- The turbidity values **(Figure 5)** ranged from a minimum of 0.0 NTU to a maximum of 54.1 NTU.
- There were only three minor and short term spikes in turbidity recorded during the deployment period. These can be attributed to natural in-stream debris passing near the sensor.

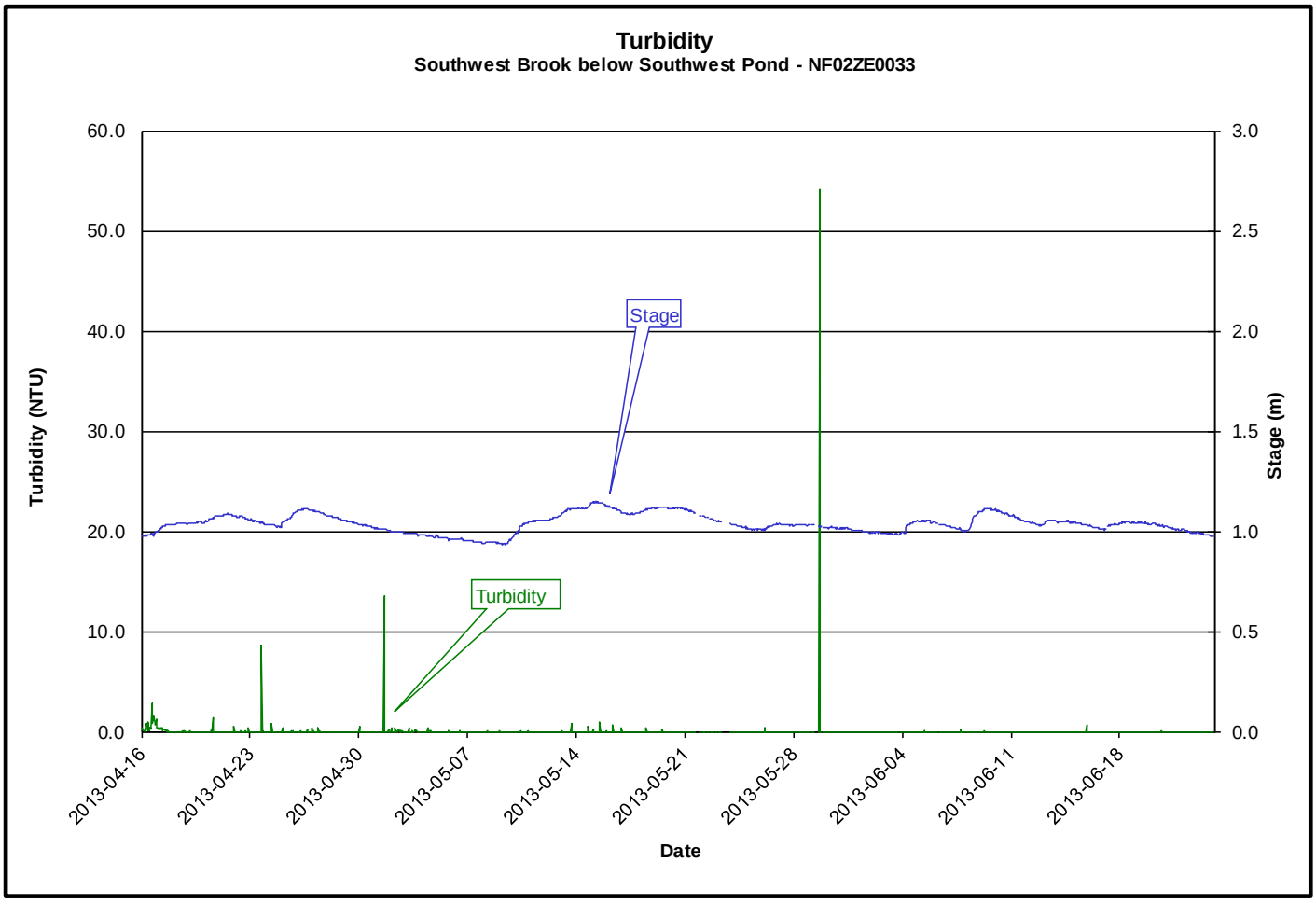

Figure 5

- The stage or water level ranged from a minimum of 0.93 m to a maximum of 1.15 m. The flow or discharge ranged from a minimum of 0.05 m^3/s to a maximum of 0.95 m^3/s (**Figure 6)**.

- The increases in stage and flow are resultant from precipitation/runoff events.

- Stream stage and flow are within normal ranges.

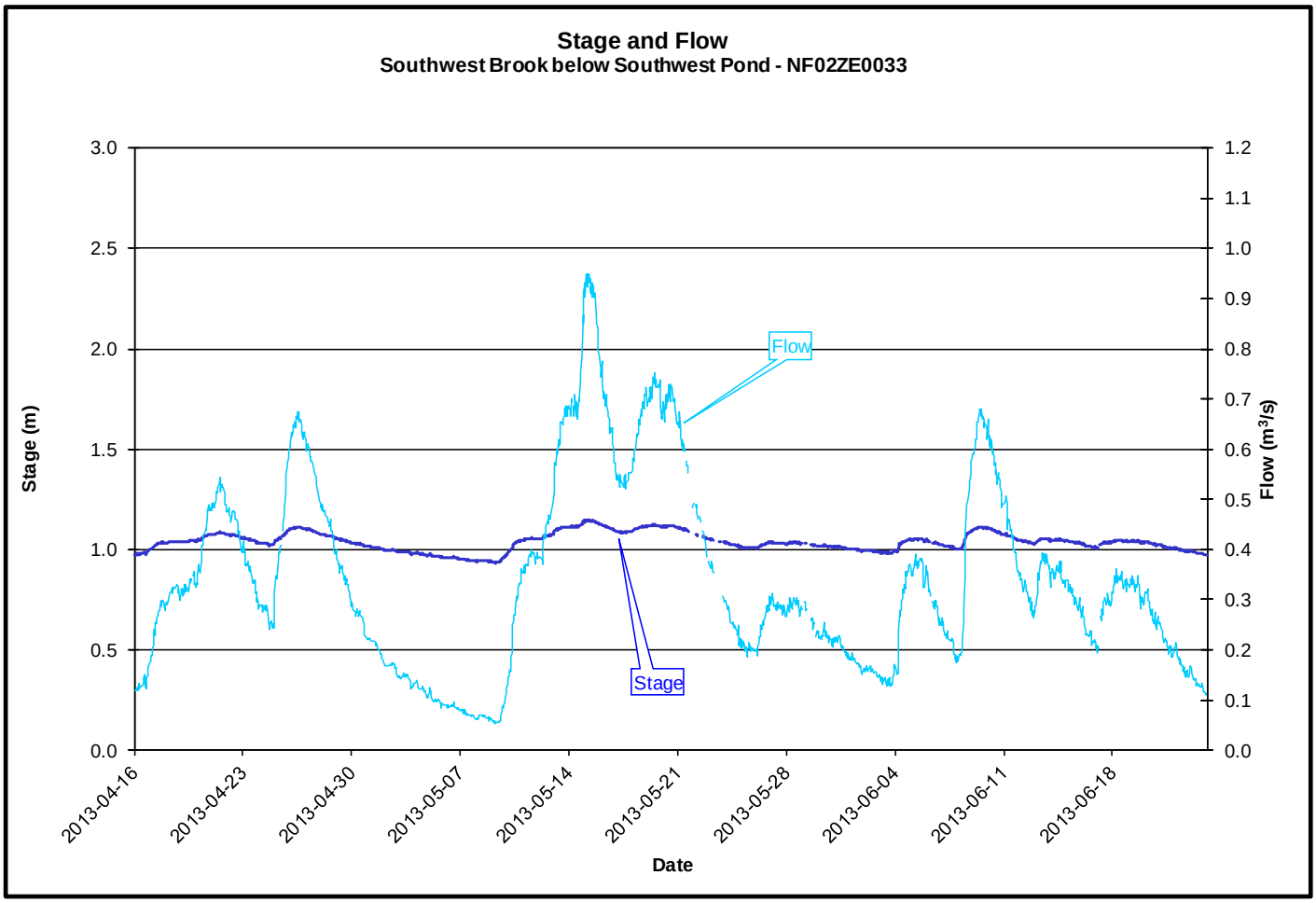

Figure 6

Prepared by:

Robert Wight
Environmental Scientist
Water Resources Management Division
Department of Environment and Conservation
Tel: 709-292-4280
Fax: 709-292-4365
e-mail: robertwight@gov.nl.ca