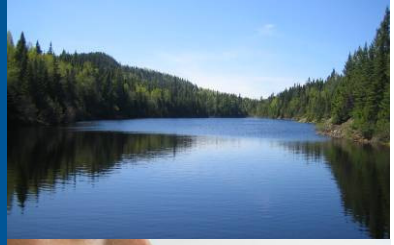
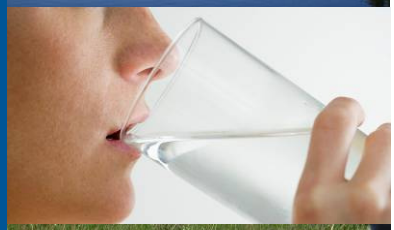






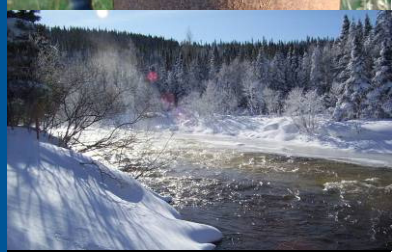

Real Time Water Quality Report
Humber River at Humber Village

Deployment Period 2010-12-16 to 2011-02-22

2011-03-03

Newfoundland Labrador

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

General

- This station is operated as part of the Provincial Real Time Water Quality (RTWQ) network.
- This station is operated year round.
- Staff of the Water Resources Management Division (WRMD) monitors the real-time web page on a daily basis. Any unusual observations are investigated.
- This site is easily accessed and the instrument is removed on a monthly to bi-monthly basis for maintenance and calibration and is reinstalled within one to two days.

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Maintenance and Calibration of Instrumentation

- After being freshly calibrated the **DataSonde®** for Humber River at Humber Village was installed on December 16, 2010, and remained deployed continuously until February 22, 2011. This deployment period was slightly longer than normal however with the exception of turbidity readings the instrument maintained good operation for the duration of the deployment 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 **DataSonde®** 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 **DataSonde®** 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®** and a freshly calibrated QA/QC **DataSonde®** and the two sets of values are compared to determine data quality at removal.
- 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.

Humber River at Humber Village (NF02Y10012)		
Date (yyyy-mm-dd)	**Parameter**	**Ranking**
2010-12-16 Deployment	Temp (°C)	Excellent
	pH (units)	Excellent
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Marginal
	Turbidity (NTU)	NA*
2011-02-22 Removal	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (%)	Fair
	Turbidity (NTU)	Poor

Table 2

* The QA/QC Instrument did not have a turbidity sensor and therefore no ranking could be made.

Data Interpretation

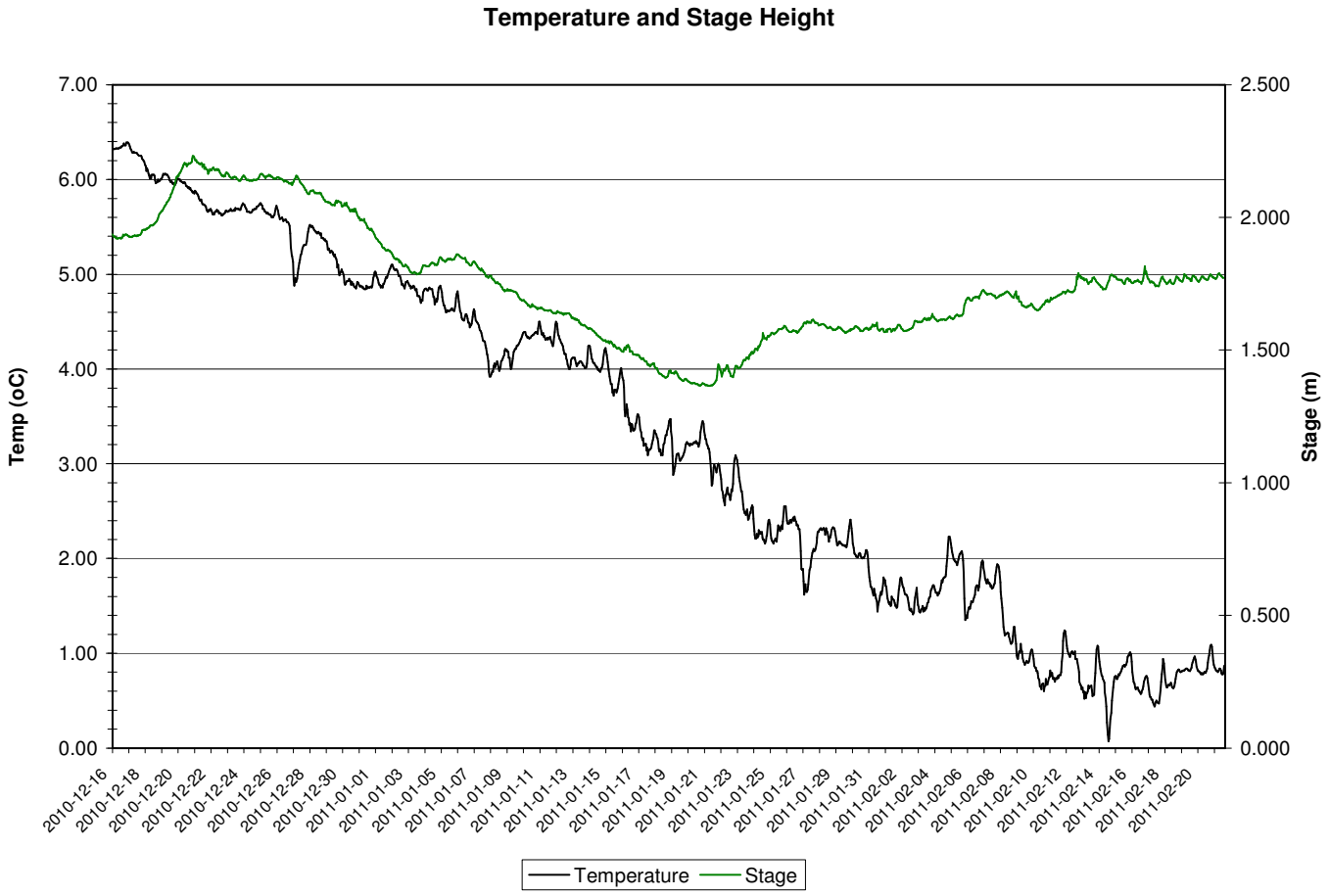

Figure 1

- The water temperature (**Figure 1**) ranged from a minimum of 0.07 ˚C to a maximum of 6.39 ˚C, with a general declining trend throughout the deployment period.

- There is a noticeable diurnal temperature trend with a gentle drop during cooling each night.

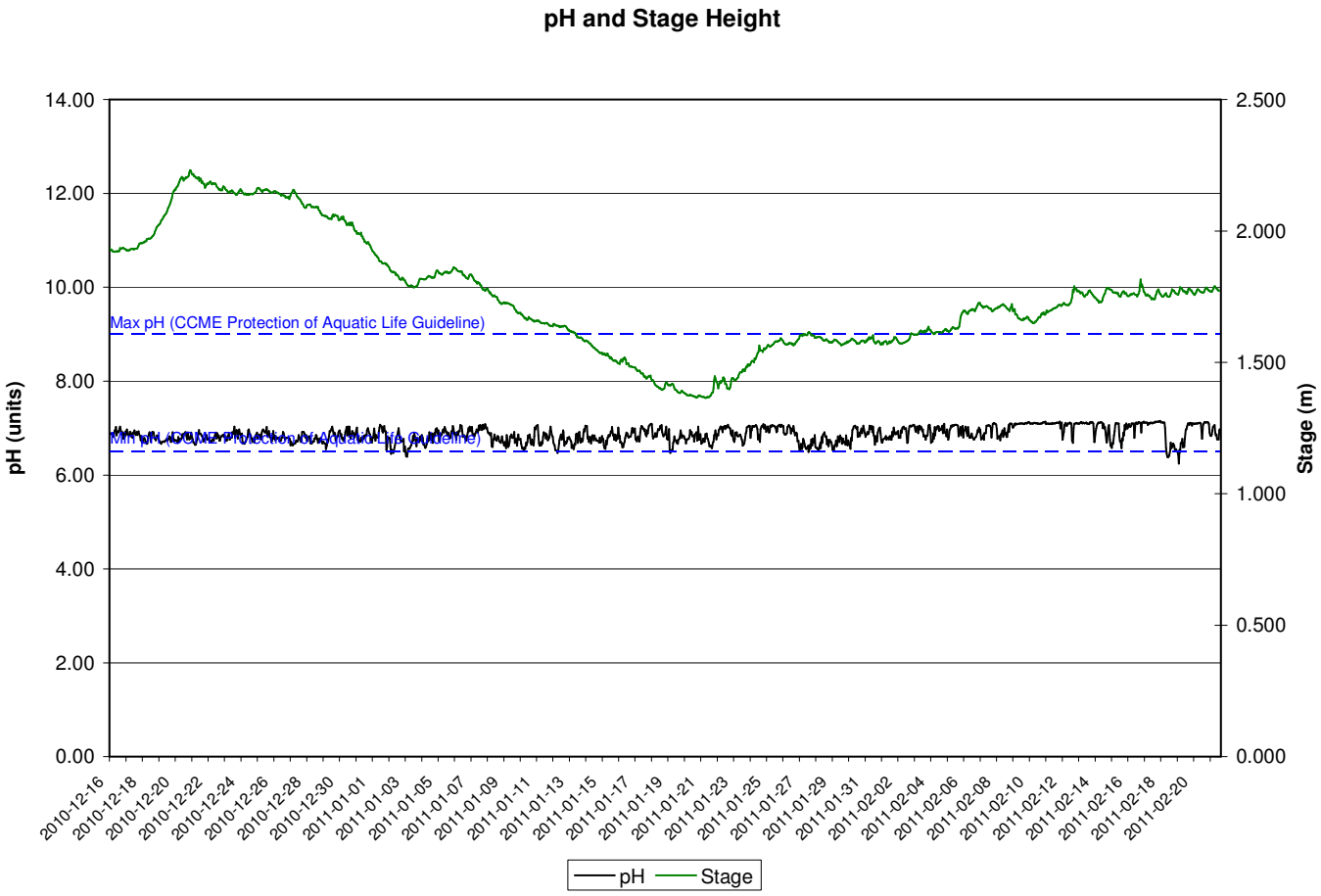

Figure 2

- The pH (**Figure 2**) ranged from a low of 6.24 to a high of 7.15 and remained quite stable throughout the deployment period.

- All but a few of the pH readings were within the range of 6.5 to 9.0 recommended by CCME for the protection of aquatic life.

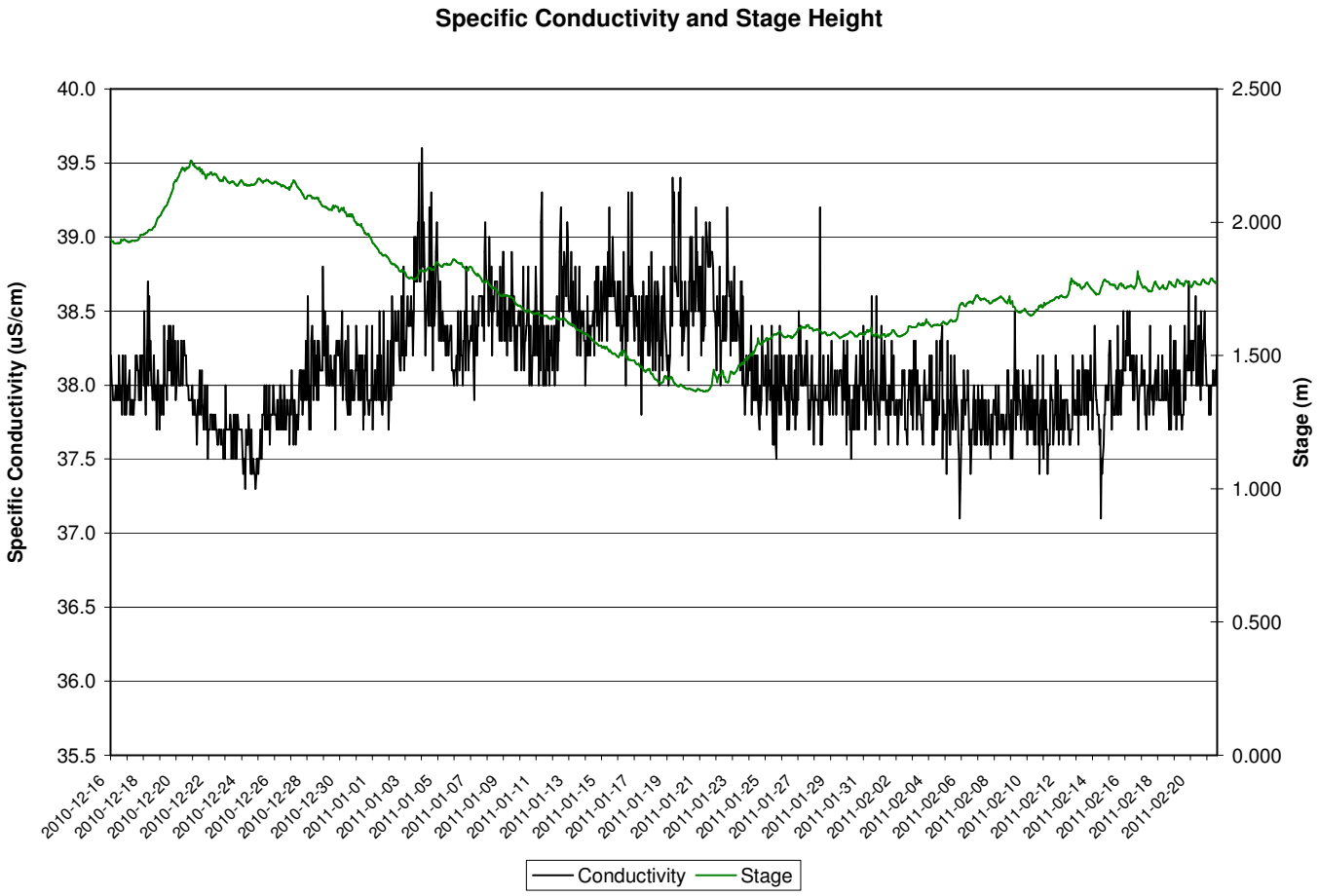

Figure 3

- The specific conductivity **(Figure 3)** ranged from a minimum of 37.1 µS/cm to a maximum of 39.6 µS/cm over the deployment period.

- Stage height and flow appear to have an inverse relationship with specific conductivity such that as stage increases conductivity decreases and vice versa.

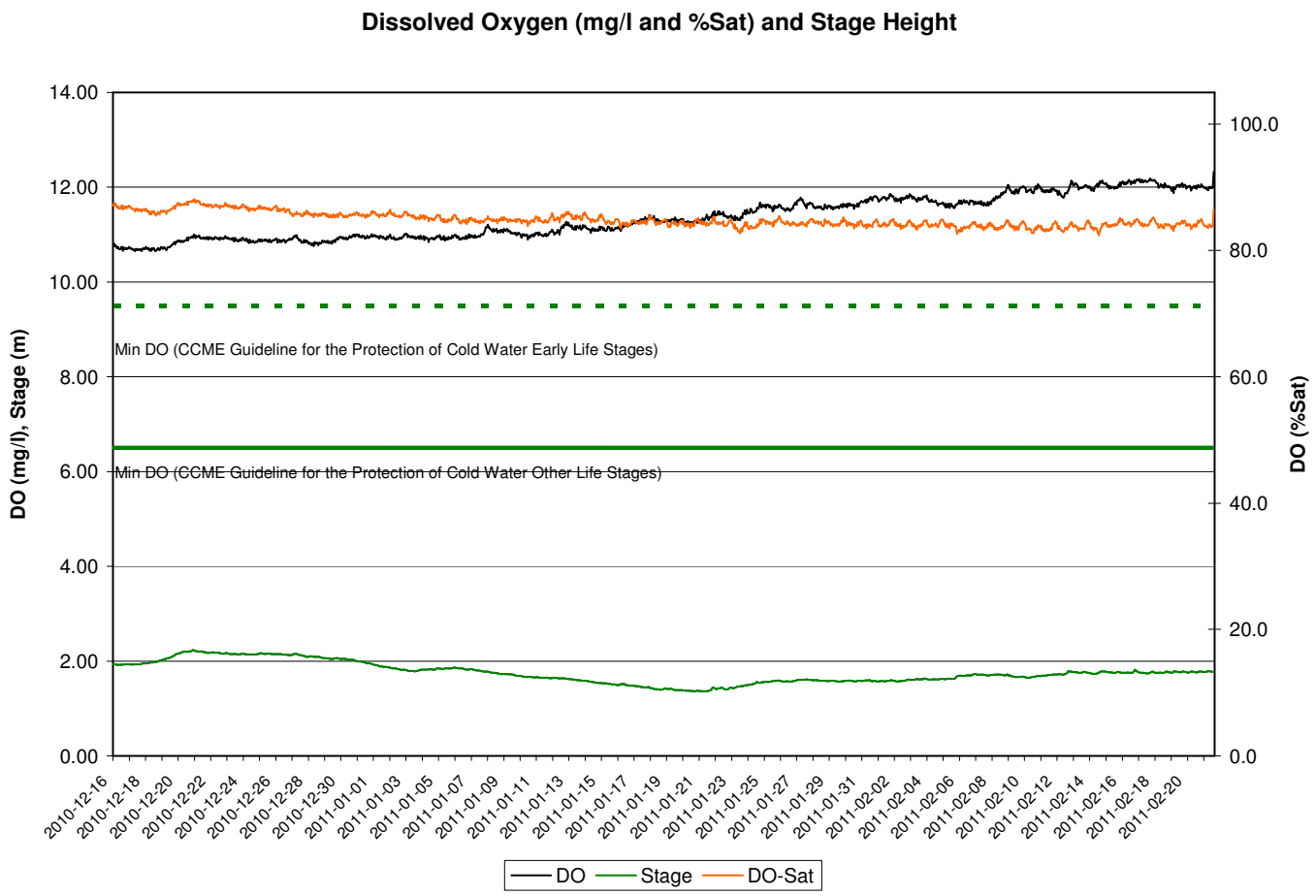

Figure 4

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 10.65 mg/L to a maximum of 12.33 mg/L over the deployment period. The percent saturation for dissolved oxygen ranged from a low of 82.4% to a high of 88.1%.

- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature and a gentle increasing trend over the deployment period can be attributed to the general cooling trend in water temperature. A regular diurnal fluctuation in DO can also be seen which is related to the normal diurnal fluctuation in 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* for both cold water/other life stages (above 6.5 mg/L) and cold water/early life stages (above 9.5 mg/L).

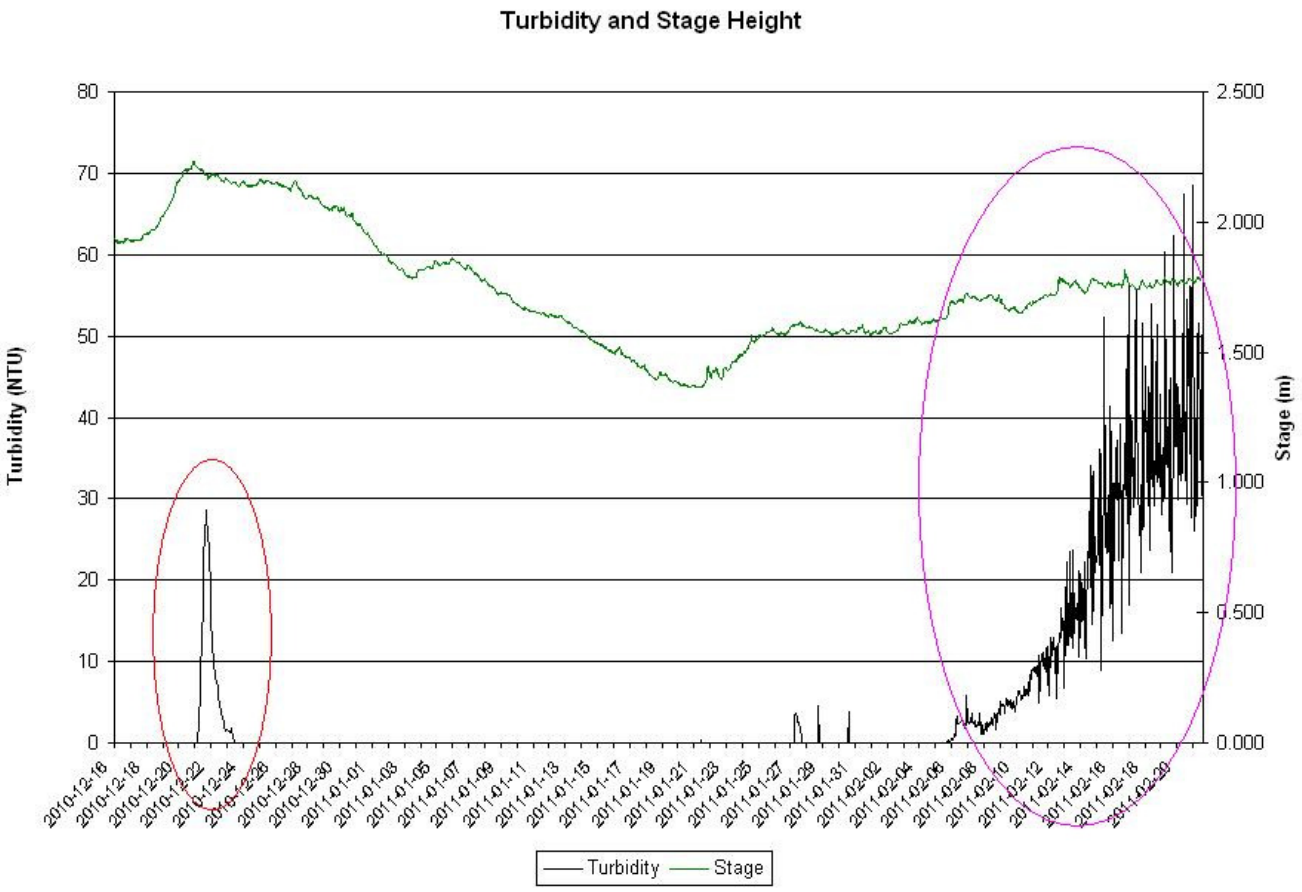

Figure 5

- With the exception of a significant spike around December 22nd (see red oval) and a few minor spikes from January 27th to 31st the turbidity values **(Figure 5)** were mostly at 0 NTU up until February 6th. At this point plant debris became stuck in the sonde began giving a continuous series of false readings (see inside the pink oval) up to the removal of the instrument for servicing and calibration.

- The spike in turbidity which started around December 22nd was caused by high winds which stirred up sediment in Deer Lake and along the Humber and its tributaries. It was several days before all sediment settled out and the water returned to its normal background turbidity levels of zero.

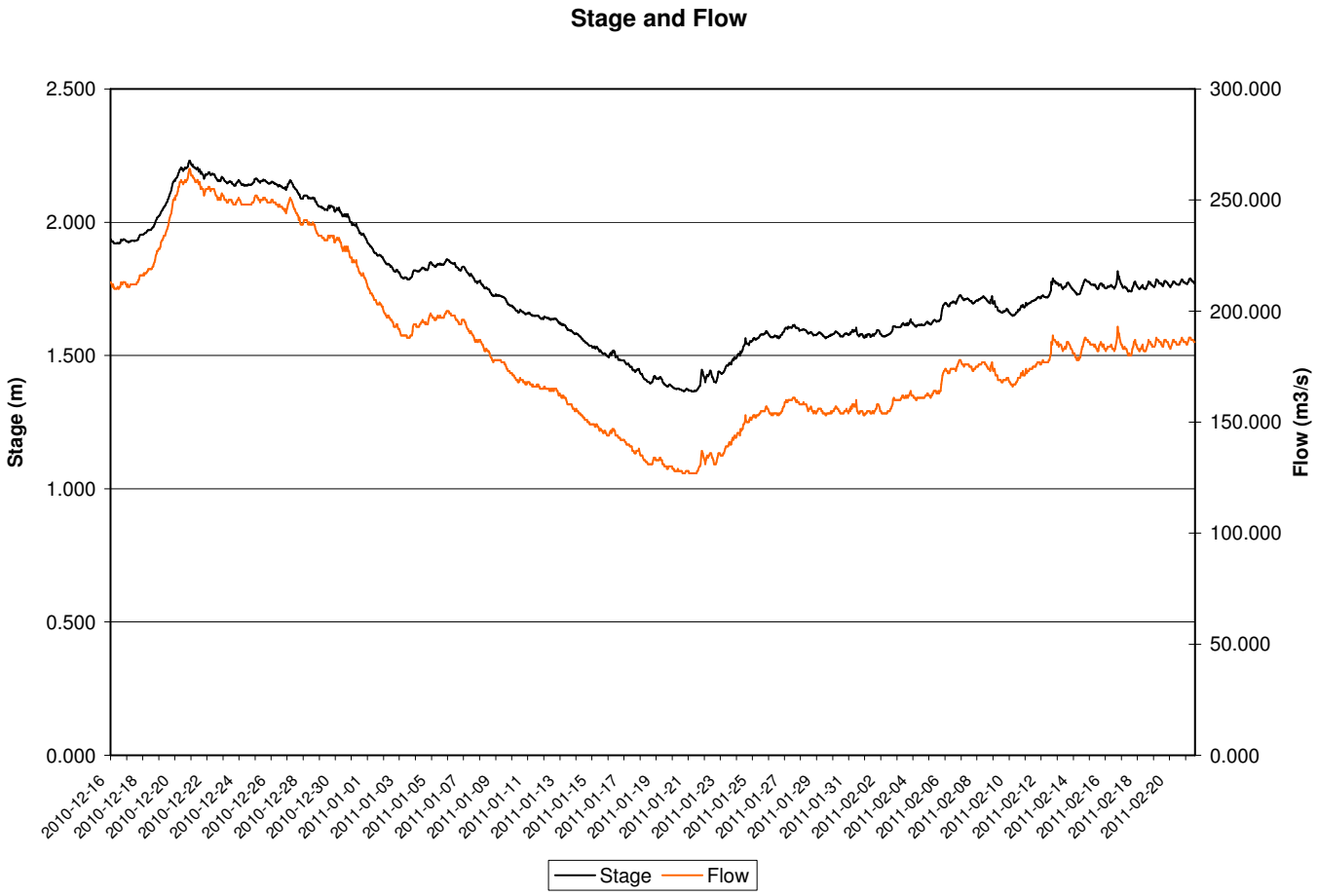

Figure 6

- The stage height (**Figure 6**) or water level ranged from a minimum of 1.365 m to a maximum of 2.231 m with the corresponding flow ranging from 127 m^3/s to 264 m^3/s.

Climate Data

- Climate data for the deployment period from the nearest station (Corner Brook) is included in Appendix A.

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Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
16†	10.0	5.5	7.8	10.2	0.0	1.4	0.0	1.4	0		
17†	5.5	3.0	4.3	13.7	0.0	0.8	0.6	1.4	0		
18†	3.0	0.5	1.8	16.2	0.0	5.6	12.0	17.6	0		
19†	5.0	0.5	2.8	15.2	0.0	11.0	0.0	11.0	4		
20†	5.5	2.5	4.0	14.0	0.0	1.2	0.0	1.2	0		
21†	4.0	3.0	3.5	14.5	0.0	3.7	0.0	3.7	0		
22†	3.5	2.0	2.8	15.2	0.0	0.5	0.0	0.5	0		
23†	5.0	2.5	3.8	14.2	0.0	0.4	0.0	0.4	0		
24†	4.0	2.5	3.3	14.7	0.0	3.2	0.0	3.2	0		
25†	2.5	0.5	1.5	16.5	0.0	0.0	0.0	0.0	0		
26†	3.5	0.5	2.0	16.0	0.0	0.0	1.0	1.0	0		
27†	4.5	-1.0	1.8	16.2	0.0	2.0	14.0	16.0	0		
28†	5.0	0.5	2.8	15.2	0.0	3.6	0.0	3.6	5		
29†	1.0	0.0	0.5	17.5	0.0	0.0	4.6	4.6	0		
30†	-1.5	-4.0	-2.8	20.8	0.0	0.0	2.6	2.6	2		
31†	2.0	-3.0	-0.5	18.5	0.0	0.0	1.2	1.2	3		
Sum				**465.3**	**0.0**	**50.6**	**40.4**	**91.0**			
Avg	**5.1**	**0.9**	**2.98**								
Xtrm	**12.0**	**-7.5**									

Daily Data Report for January 2011

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01†	2.0	-2.0	0.0	18.0	0.0	0.0	0.0	0.0	0		
02†	4.0	0.5	2.3	15.7	0.0	0.0	0.0	0.0	0		
03†	2.5	1.0	1.8	16.2	0.0	14.4	3.2	17.6	0		
04†	1.5	0.5	1.0	17.0	0.0	0.0	2.4	2.4	1		
05†	0.0	-1.5	-0.8	18.8	0.0	0.0	0.0	0.0	2		
06†	-0.5	-8.5	-4.5	22.5	0.0	0.0	0.4	0.4	2		
07†	0.5	-7.5	-3.5	21.5	0.0	0.0	0.0	0.0	2		
08†	0.5	-4.5	-2.0	20.0	0.0	1.0	0.8	1.8	1		
09†	4.0	-1.5	1.3	16.7	0.0	6.0	0.0	6.0	2		
10†	4.0	0.5	2.3	15.7	0.0	0.8	0.0	0.8	0		
11†	4.0	2.0	3.0	15.0	0.0	0.0	0.0	0.0	0		
12†	2.0	-1.5	0.3	17.7	0.0	0.6	1.0	1.6	0		
13†	2.0	0.0	1.0	17.0	0.0	0.0	1.0	1.0	0		
14†	2.5	-0.5	1.0	17.0	0.0	0.0	0.0	0.0	0		
15†	0.5	-5.5	-2.5	20.5	0.0	0.0	2.8	2.8	0		
16†	0.0	-4.0	-2.0	20.0	0.0	0.0	21.6	21.6	1		
17†	-1.5	-5.0	-3.3	21.3	0.0	0.0	0.0	0.0	21		
18†	1.0	-4.0	-1.5	19.5	0.0	0.0	0.8	0.8	19		
19†	3.0	-4.0	-0.5	18.5	0.0	2.0	5.6	7.6	18		
20†	-3.5	-5.5	-4.5	22.5	0.0	0.0	6.8	6.8	20		
21†	2.5	-5.0	-1.3	19.3	0.0	0.0	3.2	3.2	26		
22†	0.5	-4.0	-1.8	19.8	0.0	0.0	2.8	2.8	30		
23†	-3.5	-6.5	-5.0	23.0	0.0	0.0	18.0	18.0	29		
24†	-5.0	-7.5	-6.3	24.3	0.0	0.0	5.2	5.2	44		
25†	-5.5	-9.0	-7.3	25.3	0.0	0.0	0.0	0.0	46		
26†	-2.5	-9.5	-6.0	24.0	0.0	0.0	0.0	0.0	47		

27†	-1.5	-11.0	-6.3	24.3	0.0	0.0	17.0	17.0	47
28†	-3.0	-5.5	-4.3	22.3	0.0	0.0	2.2	2.2	60
29†	-2.5	-5.5	-4.0	22.0	0.0	0.0	5.2	5.2	61
30†	-3.5	-5.0	-4.3	22.3	0.0	0.0	4.0	4.0	64
31†	-5.0	-8.0	-6.5	24.5	0.0	0.0	6.0	6.0	65
Sum				**622.2**	**0.0**	**24.8**	**110.0**	**134.8**	
Avg	**0**	**-4.1**	**-2.06**						
Xtrm	**4.0**	**-11.0**							

Daily Data Report for February 2011

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01†	-7.0	-10.5	-8.8	26.8	0.0	0.0	6.4	6.4	68		
02†	-10.0	-11.0	-10.5	28.5	0.0	0.0	0.0	0.0	72		
03†	-6.5	-14.0	-10.3	28.3	0.0	0.0	0.4	0.4	70		
04†	-4.0	-12.5	-8.3	26.3	0.0	0.0	5.2	5.2	70		
05†	0.0	-6.0	-3.0	21.0	0.0	0.0	3.8	3.8	73		
06†	0.0	-5.0	-2.5	20.5	0.0	0.0	28.8	28.8	74		
07†	0.0	-6.0	-3.0	21.0	0.0	0.0	0.0	0.0	90		
08†	-3.0	-13.0	-8.0	26.0	0.0	0.0	1.0	1.0	88		
09†	-6.0	-8.0	-7.0	25.0	0.0	0.0	6.0	6.0	88		
10†	-8.5	-12.0	-10.3	28.3	0.0	0.0	17.0	17.0	88		
11†	-12.0	-14.5	-13.3	31.3	0.0	0.0	14.8	14.8	100		
12†	-7.5	-14.5	-11.0	29.0	0.0	0.0	4.8	4.8	102		
13†	-8.5	-10.0	-9.3	27.3	0.0	0.0	6.0	6.0	104		
14†	-3.0	-13.5	-8.3	26.3	0.0	0.0	10.4	10.4	107		
15†	0.5	-12.0	-5.8	23.8	0.0	0.0	1.0	1.0	110		
16†	0.5	-3.5	-1.5	19.5	0.0	0.0	0.0	0.0	100		
17†	-1.0	-5.0	-3.0	21.0	0.0	0.0	2.6	2.6	96		
18†	-1.5	-5.5	-3.5	21.5	0.0	0.0	0.0	0.0	90		
19†	-1.0	-6.5	-3.8	21.8	0.0	0.0	0.0	0.0	88		
20†	2.0	-2.5	-0.3	18.3	0.0	0.0	0.0	0.0	85		
21†	-1.0	-3.0	-2.0	20.0	0.0	0.0	0.0	0.0	82		
22†	-0.5	-3.5	-2.0	20.0	0.0	0.0	7.8	7.8	80		