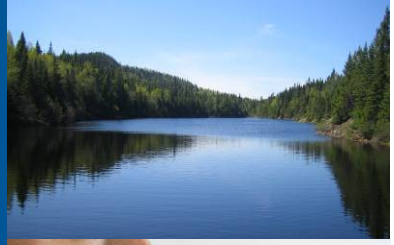
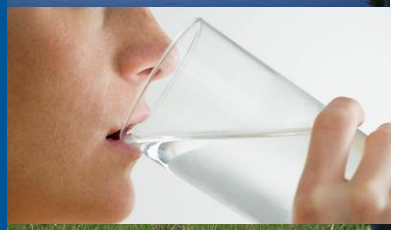






Real Time Water Quality Report
Humber River at Humber Village

Deployment Period 2011-11-25 to 2012-02-14

2012-04-05

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 normally 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 November 25, 2011, and remained deployed continuously until February 14, 2012. This deployment period was a total of 81 days and the instrument maintained good operation for the duration of the deployment, with the exception of an issue with the oxygen sensor in the first 10 days of deployment. This issue will be explained in the data interpretation section.

Quality Assurance / Quality Control (QA/QC) Measures

- As part of the Quality Assurance and Quality Control (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.

	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 *in situ,* adjacent to the Field **DataSonde®**. Depending on the degree of difference between each parameter from the Field and QA/QC sondes a qualitative rank is assigned (See Table 1). The possible ranks, from most to least desirable, are: Excellent, Good, Fair, Marginal and Poor. A grab sample is also taken for additional confirmation of conditions at deployment and to allow for future modelling studies.
- At the end of a deployment period, a freshly cleaned and calibrated QA/QC sonde is placed *in situ,* adjacent to the Field sonde. Values are compared between all parameters and differences are ranked for placement in Table 2.
- 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 and corrected data can be obtained upon request.

Humber River at Humber Village (NF02Y10012)		
Date (yyyy-mm-dd)	**Parameter**	**Ranking**
2011-11-25 Deployment	Temp (°C)	Good
	pH (units)	Excellent
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent
2012-02-14 Removal	Temp (°C)	Excellent
	pH (units)	Excellent
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (%)	Excellent
	Turbidity (NTU)	Excellent

Table 2

Data Interpretation

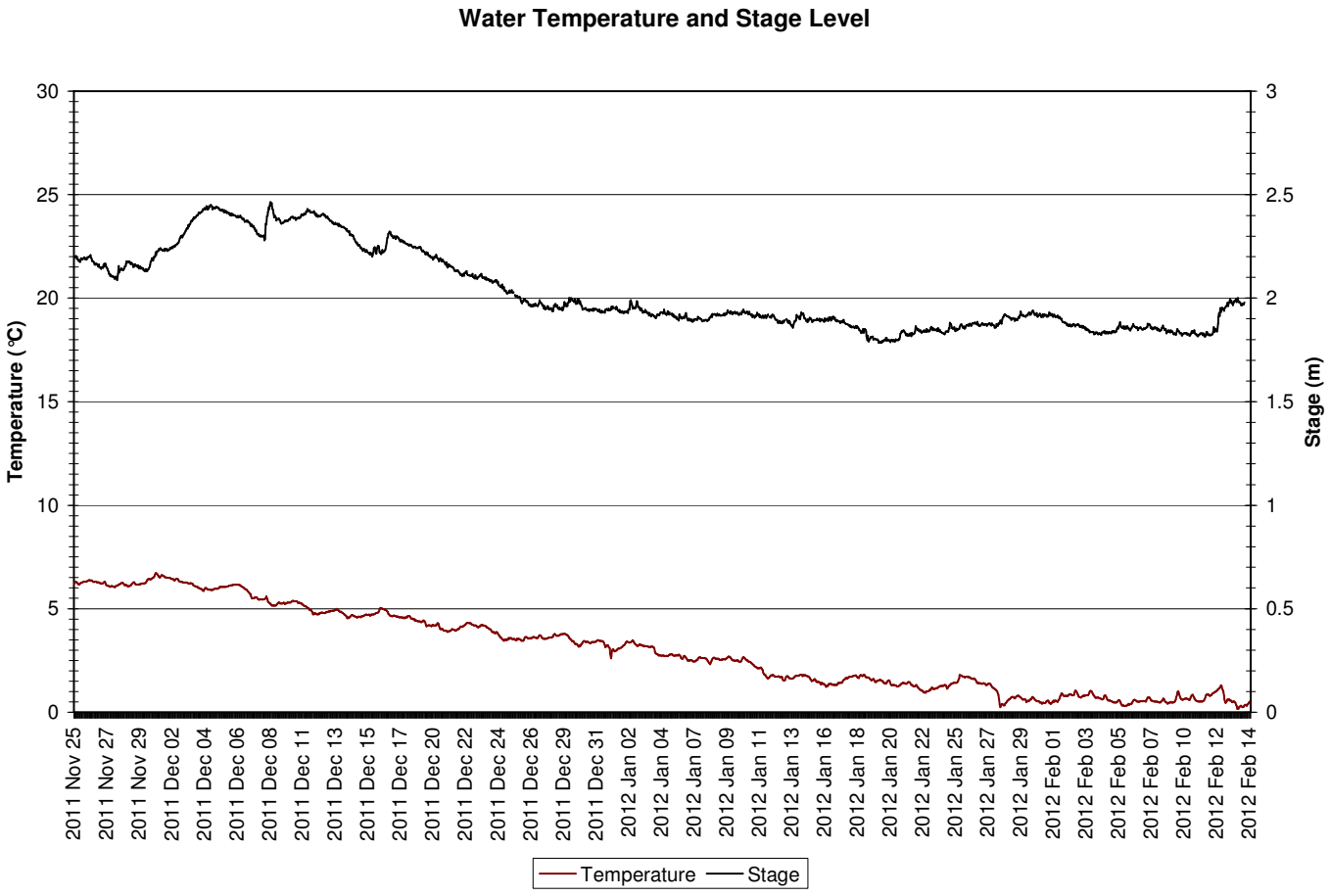

Figure 1

- The water temperature (**Figure 1**) ranged from a minimum of 0.16 ˚C to a maximum of 6.71 ˚C, with a general decreasing trend throughout the deployment period.

- For most of the deployment period there is a clear diurnal temperature cycling trend visible. This trend is caused by cooling each night and warming during the day.

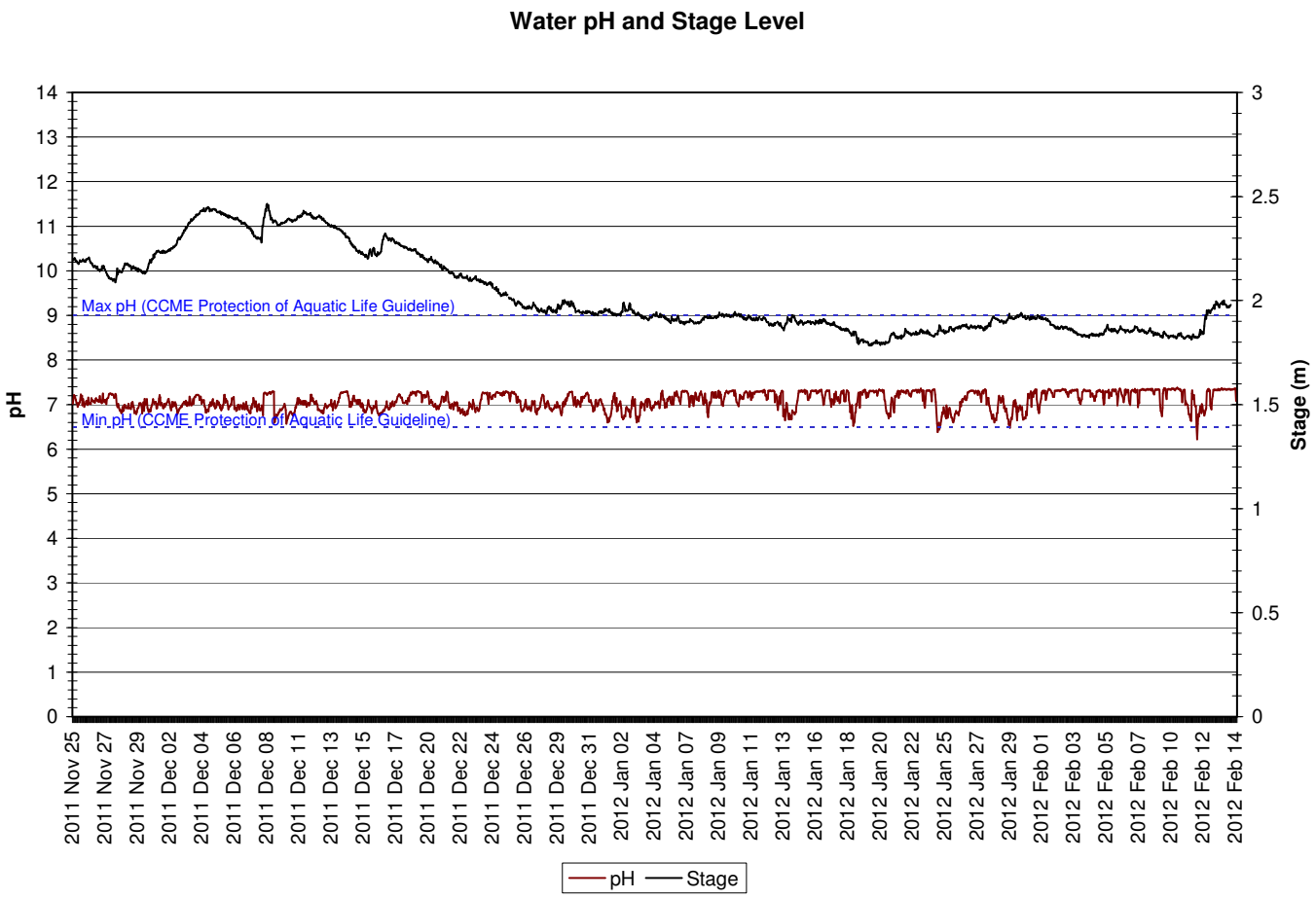

Figure 2

- The pH (**Figure 2**) ranged from a low of 6.22 to a high of 7.38 and remained relatively stable throughout the deployment period.

- Almost all of the pH readings were within the range of 6.5 to 9.0 as recommended by CCME for the Protection of Aquatic Life with only a small number of readings dropping below the recommended lower pH 6.5 guideline.

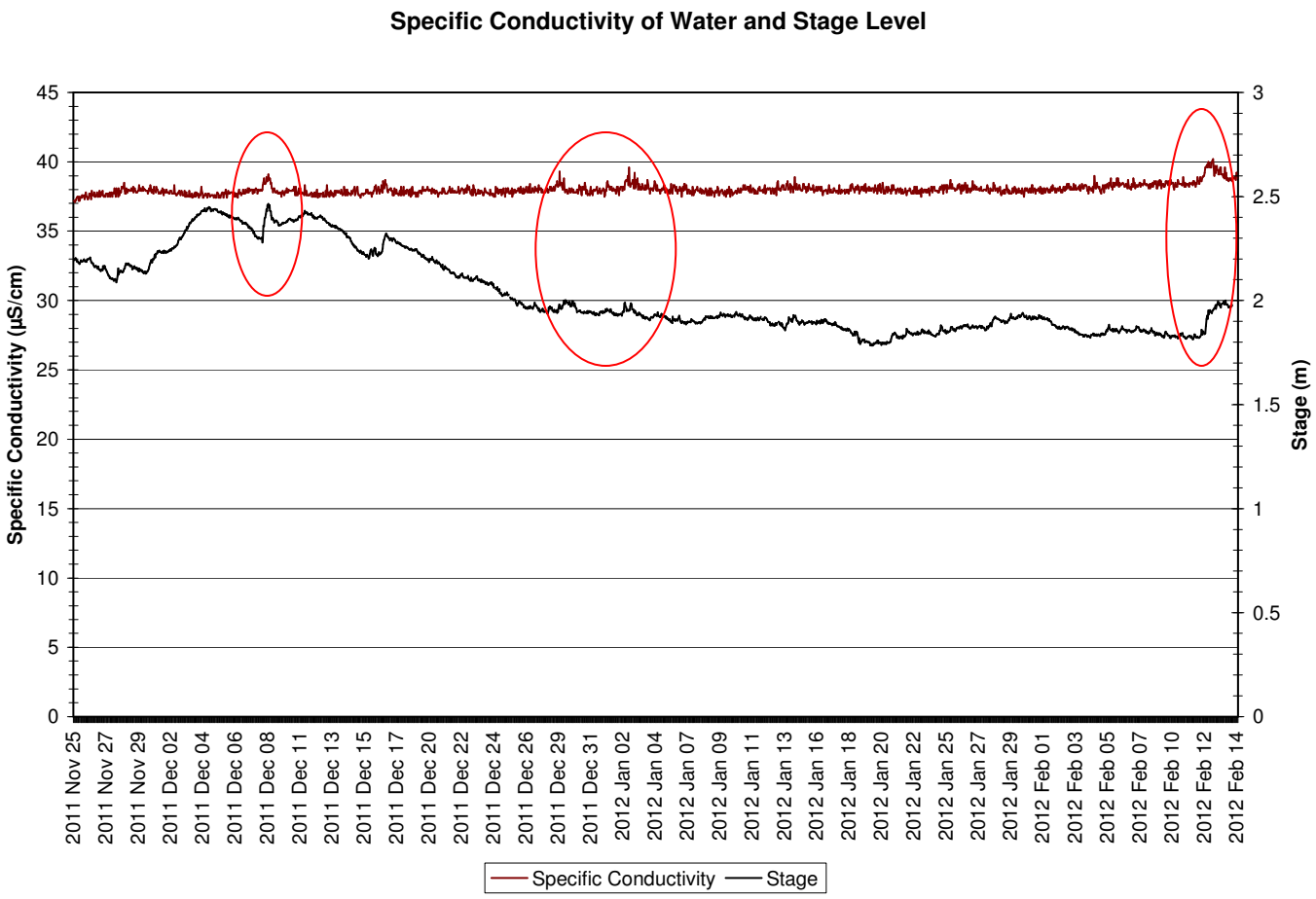

Figure 3

- The specific conductivity **(Figure 3)** ranged from a minimum of 37.1 µS/cm to a maximum of 40.2 µS/cm and remained relatively stable over the deployment period.

- There are several occasions (see inside red ovals) where a noticeable increase in specific conductance corresponds with an increase in flow. The increases in flow are related to rainfall events where additional dissolved material is washed into the river causing an increase in specific conductance.

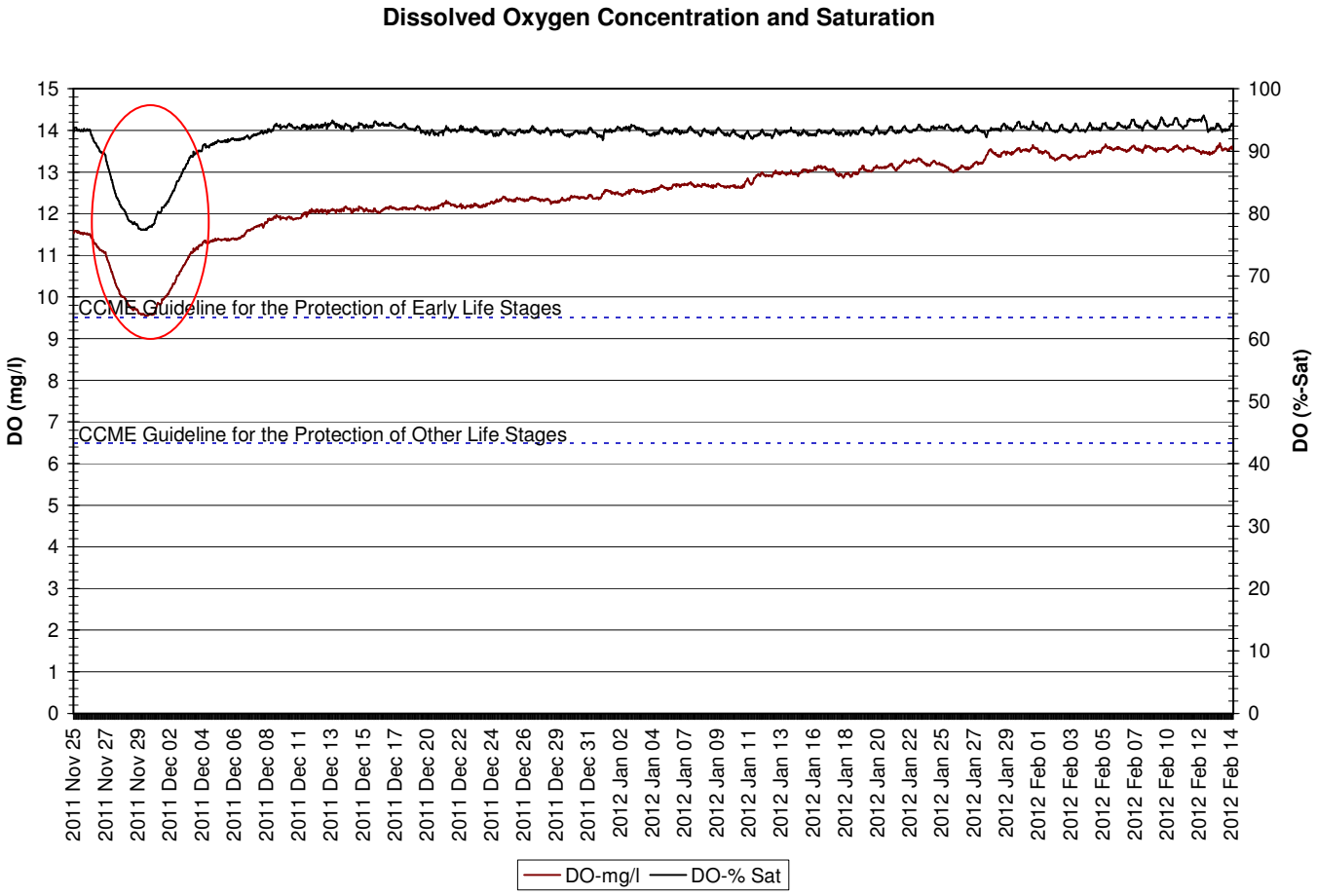

Figure 4

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 9.54 mg/L to a maximum of 13.69 mg/L over the deployment period. The percent saturation for dissolved oxygen ranged from a low of 77.4% to a high of 95.7%.

- During the initial phase of the deployment the dissolved oxygen readings took an unusual dip and recovery over a 8 to 10 day period. This dip does not appear to be correlated with flow or any of the other parameters and is most likely explained by a temporary issue with the sensor or possibly by a temporary blockage in the deployment tube which decreased flow significantly.

- 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 early life stages (above 9.5 mg/L).

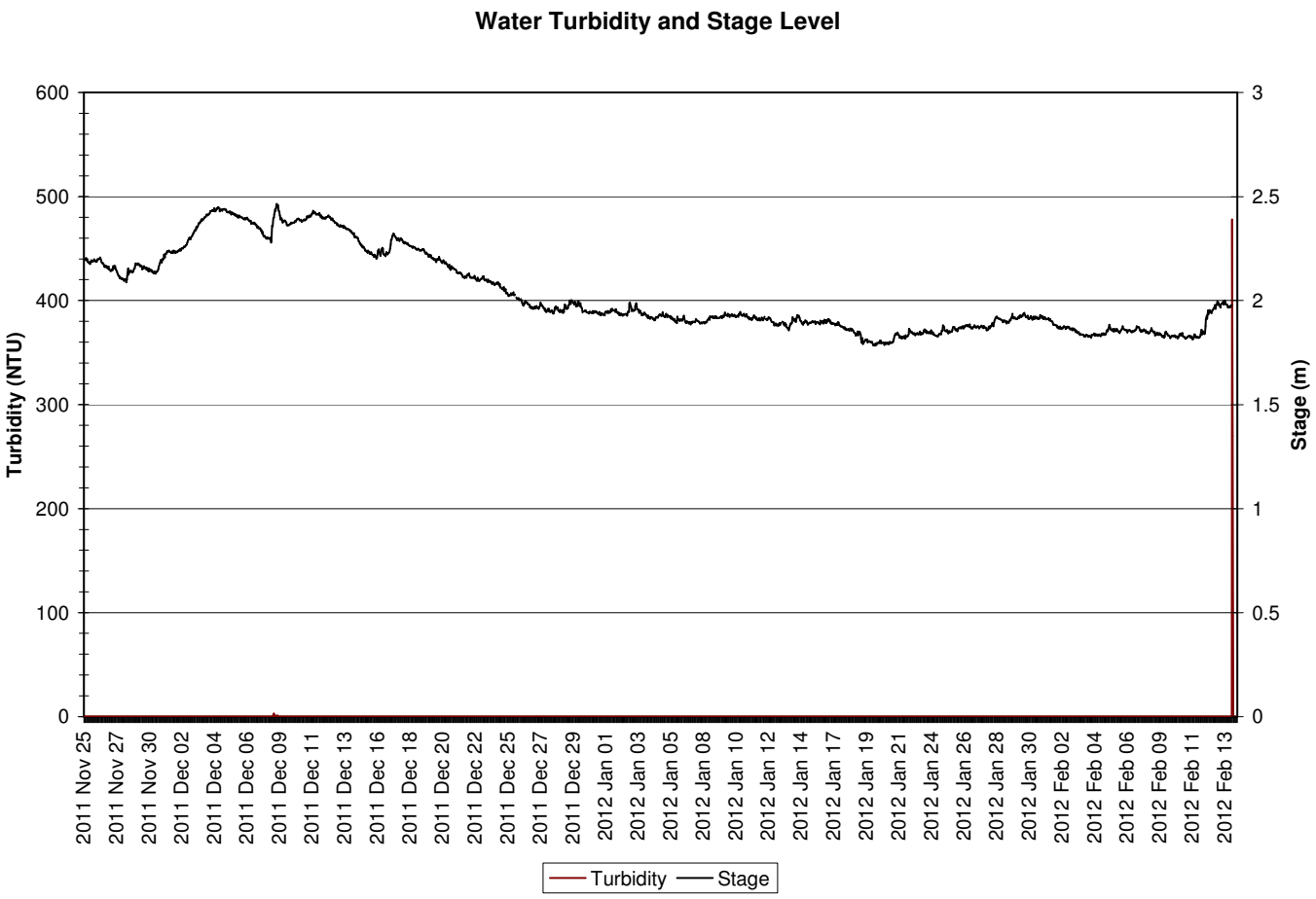

Figure 5

- Turbidity values ranged from 0.0 NTU to 478 NTU. The significant spike in turbidity near the end of the deployment can be attributed to interference from debris accumulation around the sensor. The turbidity at this site is usually close to zero but interference from biofouling or debris can occur causing false readings.

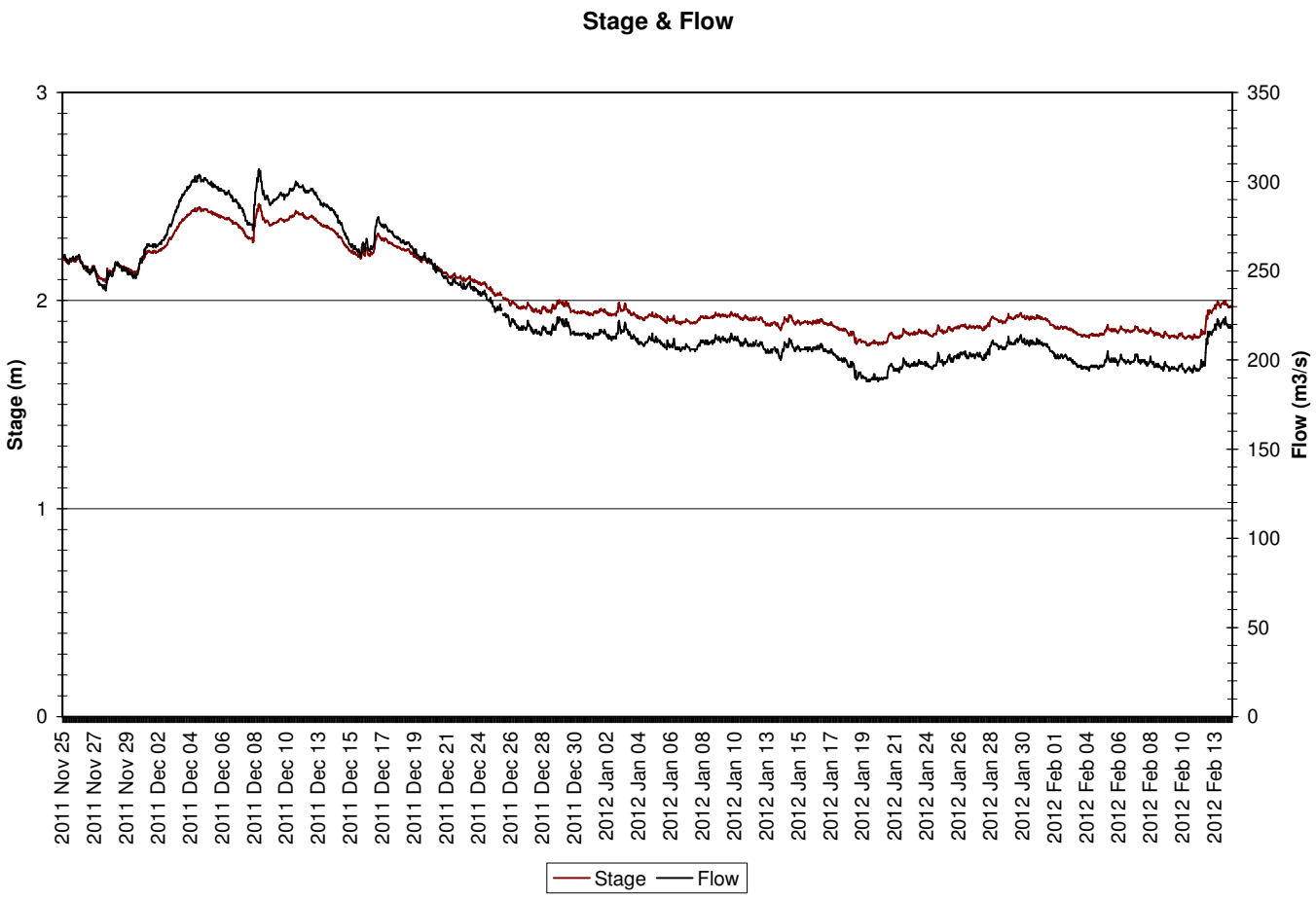

Figure 6

- The stage height (**Figure 6**) or water level ranged from a minimum of 1.78 m to a maximum of 2.46 m with the corresponding flow ranging from 188 m^3/s to 307 m^3/s.

- Peak flows starting around December 2nd and lasting for about two weeks corresponds with a period of significant precipitation.

Climate Data

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

Prepared by:

Ian Bell
Environmental Scientist
Water Resources Management Division
Department of Environment and Conservation
Tel: 709-637-2431
Fax: 709-637-2541
e-mail: ianbell@gov.nl.ca

Appendix A

Climate Data for November 2011

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	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
25†	4.0	-10.5	-3.3	21.3	0.0	3.6	0.6	4.2	0		
26†	5.0	1.0	3.0	15.0	0.0	0.0	0.0	0.0	0		
27†	1.0	-4.0	-1.5	19.5	0.0	0.0	0.6	0.6	0		
28†	9.5	-7.5	1.0	17.0	0.0	16.2	0.0	16.2	0		
29†	3.0	-1.5	0.8	17.2	0.0	0.4	0.0	0.4	0		
30†	16.5	-1.0	7.8	10.2	0.0	6.1	0.0	6.1	0		

Climate Data for December 2011

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	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†	11.0	7.5	9.3	8.7	0.0	0.6	0.0	0.6	0		
02†	2.5	0.5	1.5	16.5	0.0	0.0	0.0	0.0	0		
03†	1.0	-1.0	0.0	18.0	0.0	0.0	0.0	0.0	0		
04†	4.5	-6.0	-0.8	18.8	0.0	0.0	0.0	0.0	0		
05†	8.0	-0.5	3.8	14.2	0.0	0.4	0.0	0.4	0		
06†	7.0	1.5	4.3	13.7	0.0	3.4	0.0	3.4	0		
07†	2.0	-2.0	0.0	18.0	0.0	0.0	0.0	0.0	0		
08†	13.5	-2.0	5.8	12.2	0.0	13.0	0.6	13.6	0		
09†	2.0	-1.0	0.5	17.5	0.0	6.6	0.0	6.6	0		
10†	1.0	0.0	0.5	17.5	0.0	12.1	9.6	21.7	0		
11†	-4.5	-6.0	-5.3	23.3	0.0	0.0	5.2	5.2	9		
12†	1.0	-6.5	-2.8	20.8	0.0	0.0	5.0	3.4	11		
13†	-1.0	-6.0	-3.5	21.5	0.0	0.0	0.4	0.4	13		
14†	-3.5	-15.0	-9.3	27.3	0.0	0.0	0.0	0.0	10		
15†	3.0	-6.0	-1.5	19.5	0.0	0.0	4.0	4.0	10		
16†	6.5	-2.0	2.3	15.7	0.0	3.0	5.0	8.0	14		
17†	-5.5	-8.5	-7.0	25.0	0.0	0.0	3.0	3.0	14		
18†	-7.0	-8.5	-7.8	25.8	0.0	0.0	0.0	0.0	14		
19†	-5.5	-17.5	-11.5	29.5	0.0	0.0	2.0	2.0	13		
20†	-2.0	-14.5	-8.3	26.3	0.0	0.0	5.0	5.0	14		
21†	2.0	-7.0	-2.5	20.5	0.0	0.0	5.0	5.0	16		
22†	4.0	-3.0	0.5	17.5	0.0	0.0	0.0	0.0	17		
23†	-1.5	-4.5	-3.0	21.0	0.0	0.0	0.0	0.0	16		
24†	-11.0	-12.0	-11.5	29.5	0.0	0.0	0.0	0.0	14		
25†	-7.0	-13.0	-10.0	28.0	0.0	0.0	1.0	1.0	15		
26†	0.0	-10.0	-5.0	23.0	0.0	0.0	0.0	0.0	14		
27†	2.5	-1.5	0.5	17.5	0.0	0.0	0.0	0.0	12		
28†	6.0	-3.5	1.3	16.7	0.0	3.0	0.0	3.0	8		
29†	3.5	-5.0	-0.8	18.8	0.0	1.0	4.0	5.0	8		
30†	-1.5	-7.0	-4.3	22.3	0.0	0.0	2.4	2.4	12		
31†	-1.0	-7.0	-4.0	22.0	0.0	1.9	10.4	12.3	12		

Climate Data for January 2012

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	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†	0.0	-2.0	-1.0	19.0	0.0	0.0	2.0	2.0	14		
02†	9.0	-1.5	3.8	14.2	0.0	13.2	0.0	13.2	12		
03†	3.0	-0.5	1.3	16.7	0.0	0.0	0.0	0.0	4		
04†	1.5	-3.5	-1.0	19.0	0.0	0.0	38.6	38.6	2		
05†	1.5	-3.5	-1.0	19.0	0.0	0.0	5.6	5.6	36		
06†	-3.0	-4.5	-3.8	21.8	0.0	0.0	4.2	4.2	40		
07†	-4.0	-7.5	-5.8	23.8	0.0	0.0	16.0	16.0	41		
08†	-1.5	-5.5	-3.5	21.5	0.0	0.0	1.2	1.2	55		
09†	-3.0	-6.0	-4.5	22.5	0.0	0.0	0.8	0.8	56		
10†	-1.5	-11.5	-6.5	24.5	0.0	0.0	0.0	0.0	55		
11†	-0.5	-5.0	-2.8	20.8	0.0	0.0	5.0	5.0	55		
12†	-7.0	-13.0	-10.0	28.0	0.0	0.0	1.6	1.6	52		
13†	9.0	-14.0	-2.5	20.5	0.0	9.6	0.0	9.6	53		
14†	1.5	-2.5	-0.5	18.5	0.0	0.0	10.8	9.8	30		
15†	-8.0	-11.5	-9.8	27.8	0.0	0.0	0.0	0.0	40		
16†	-9.5	-13.5	-11.5	29.5	0.0	0.0	13.4	13.4	40		
17†	-2.0	-16.0	-9.0	27.0	0.0	0.0	7.2	7.2	50		
18†	6.0	-5.0	0.5	17.5	0.0	0.0	0.0	0.0	54		
19†	1.5	-6.0	-2.3	20.3	0.0	0.0	0.0	0.0	52		
20†	-6.0	-10.5	-8.3	26.3	0.0	0.0	2.6	2.6	51		
21†	0.5	-13.0	-6.3	24.3	0.0	0.0	9.6	9.6	53		
22†	-6.0	-9.0	-7.5	25.5	0.0	0.0	5.4	5.4	62		
23†	-2.5	-11.0	-6.8	24.8	0.0	0.0	1.8	1.8	64		
24†	4.0	-7.0	-1.5	19.5	0.0	2.6	0.0	2.6	62		
25†	5.5	0.0	2.8	15.2	0.0	0.0	0.8	0.8	45		
26†	-3.0	-7.5	-5.3	23.3	0.0	0.0	0.0	0.0	30		
27†	-6.0	-8.0	-7.0	25.0	0.0	0.0	31.6	31.6	30		
28†	-3.0	-10.5	-6.8	24.8	0.0	0.0	3.6	3.6	60		
29†	1.0	-5.5	-2.3	20.3	0.0	0.0	14.6	14.6	62		
30†	1.0	-3.5	-1.3	19.3	0.0	0.0	4.8	4.8	74		
31†	-5.0	-9.0	-7.0	25.0	0.0	0.0	1.0	1.0	70		

Climate Data for February 2012

y	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	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†	-7.5	-12.0	-9.8	27.8	0.0	0.0	0.0	0.0	69		
02†	-7.0	-14.0	-10.5	28.5	0.0	0.0	0.0	0.0	66		
03†	-5.0	-11.0	-8.0	26.0	0.0	0.0	0.0	0.0	65		
04†	-5.0	-12.5	-8.8	26.8	0.0	0.0	0.4	0.4	63		
05†	-3.5	-7.5	-5.5	23.5	0.0	0.0	2.4	2.4	62		
06†	-2.5	-8.5	-5.5	23.5	0.0	0.0	3.0	3.0	61		
07†	-2.0	-3.5	-2.8	20.8	0.0	0.0	3.0	3.0	63		
08†	-2.5	-7.5	-5.0	23.0	0.0	0.0	0.8	0.8	63		
09†	3.0	-11.0	-4.0	22.0	0.0	0.0	0.0	0.0	62		
10†	0.0	-7.5	-3.8	21.8	0.0	0.0	0.0	0.0	60		
11†	11.0	-10.5	0.3	17.7	0.0	12.2	0.0	12.2	58		

y	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	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
12†	11.0	0.0	5.5	12.5	0.0	0.0	14.6	14.6	25		
13†	-9.0	-10.0	-9.5	27.5	0.0	0.0	2.6	2.6	38		
14†	-2.5	-14.0	-8.3	26.3	0.0	0.0	0.8	0.8	40		