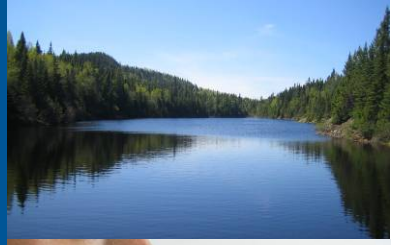
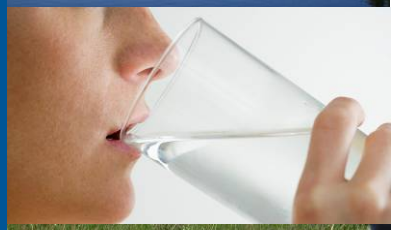



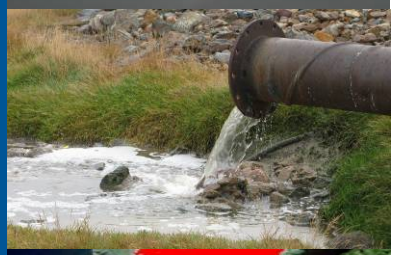


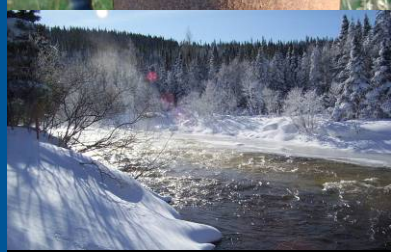

Real Time Water Quality Report
Humber River at Humber Village

Deployment Period 2012-10-09 to 2012-11-13

2012-11-27

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.

Maintenance and Calibration of Instrumentation

- After being freshly calibrated the **DataSonde®** for Humber River at Humber Village was installed on October 9, 2012, and remained deployed continuously until November 13, 2012. This deployment period was a total of 34 days and the instrument performed well. It should be noted that oxygen only ranked "Fair" at the time of deployment but was ranked "Good' at the time of removal

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**
2012-10-09 Deployment	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Fair
	Turbidity (NTU)	Excellent
2012-11-13 Removal	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Good
	Dissolved Oxygen (mg/L)	Good
	Turbidity (NTU)	Marginal

Table 2

Data Interpretation

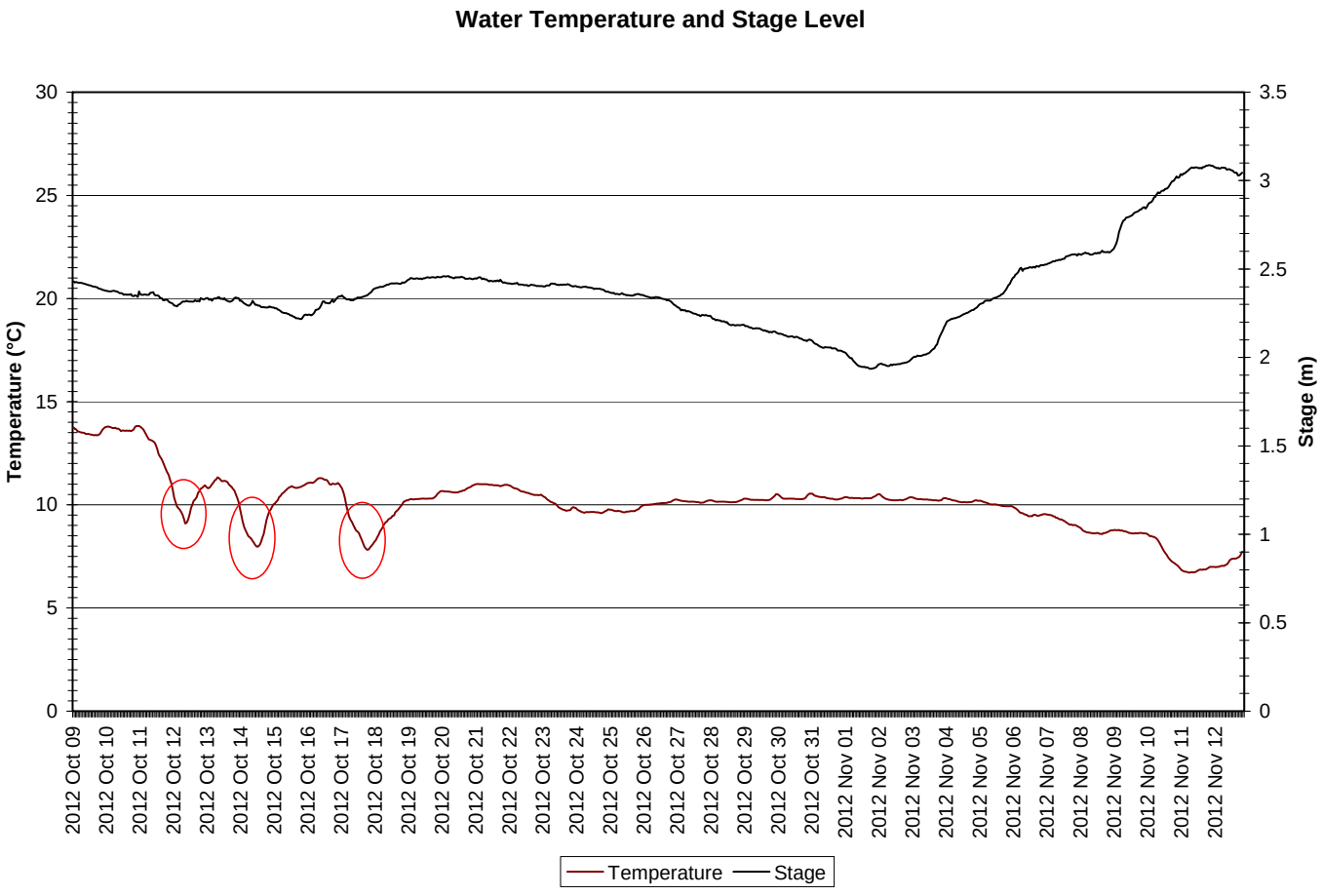

Figure 1

- Over the deployment period the water temperature (**Figure 1**) ranged from a minimum of 6.71 ˚C to a maximum of 13.82 ˚C, with an average temperature of 10.07˚C. There is a general cooling trend over the course of the deployment period.
- During the early phase of this deployment the water temperature took three distinct dips which each lasted approximately 24 to 48 hours (see inside red ovals). These dips in water temperature appear to be related to air temperature cooling trends.

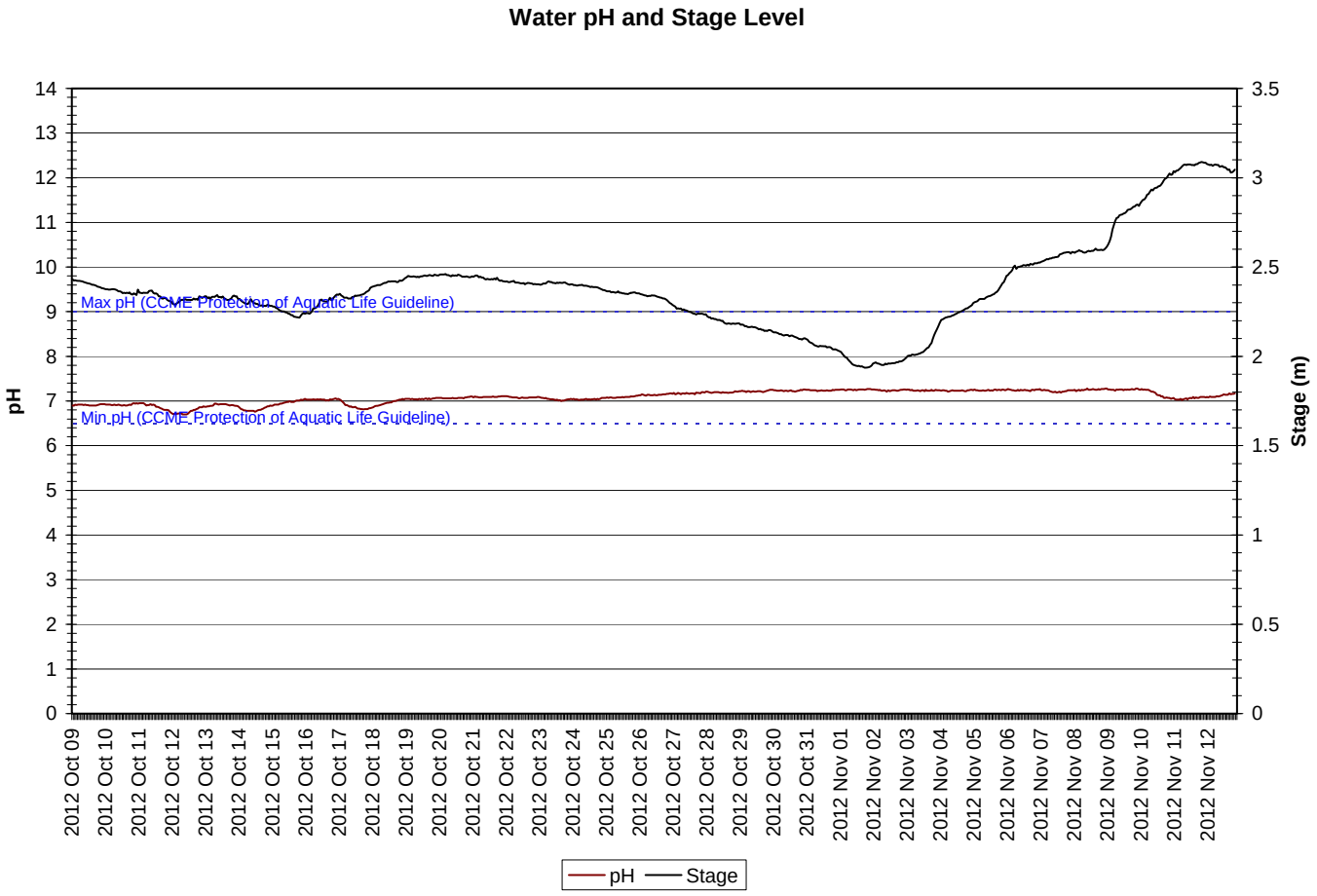

Figure 2

- The pH **(Figure2)** ranged from a minimum of 6.70 to a maximum of 7.28, with an average of 7.09.
- All pH readings for the deployment period are within the range recommended by CCME for the protection of aquatic life.

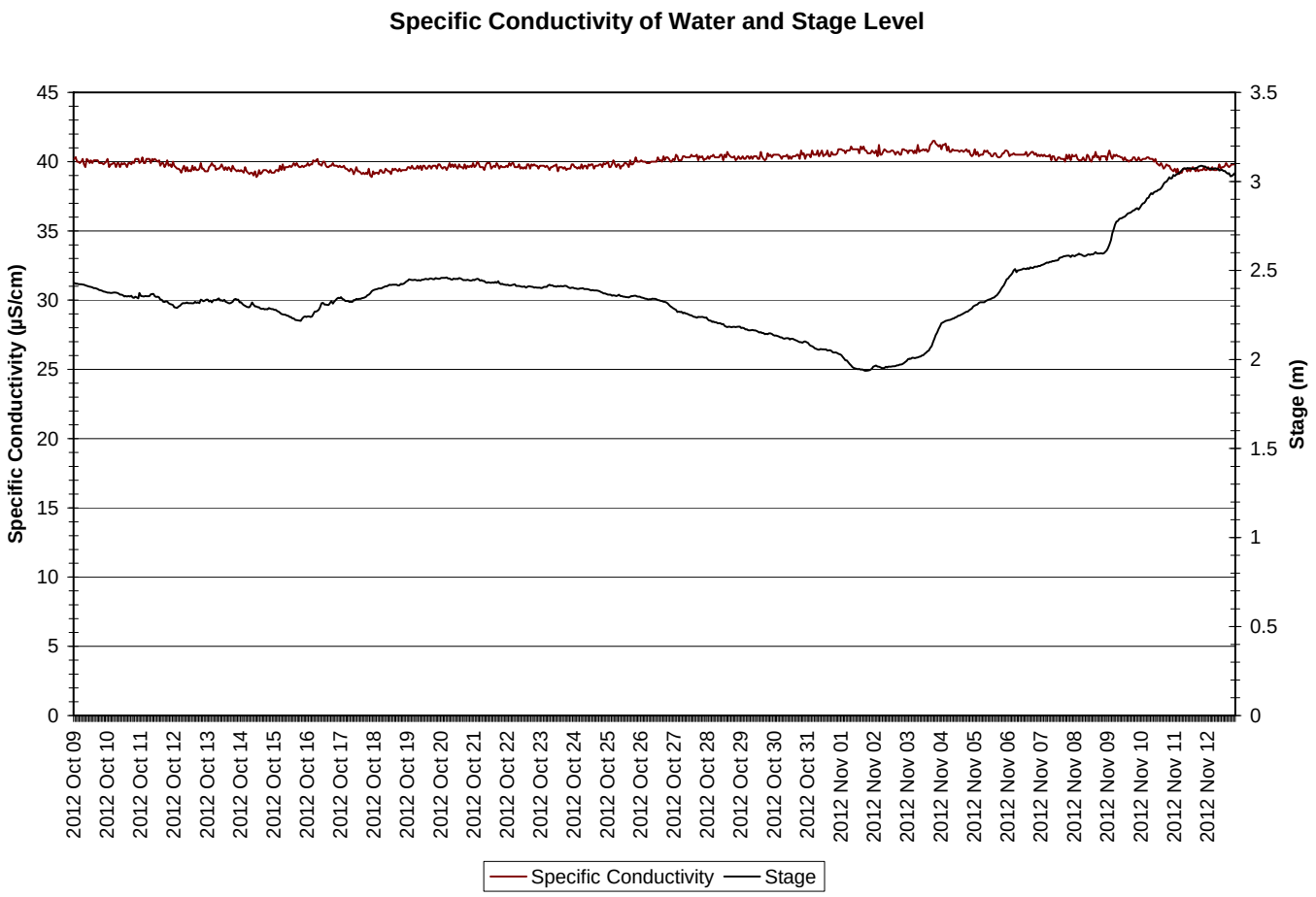

Figure 3

- The specific conductivity **(Figure 3)** ranged from a minimum of 38.9 S/cm to a maximum of 41.5 µS/cm and remained relatively stable over the deployment period. The average specific conductivity for the entire deployment period was 40.0 µS/cm.

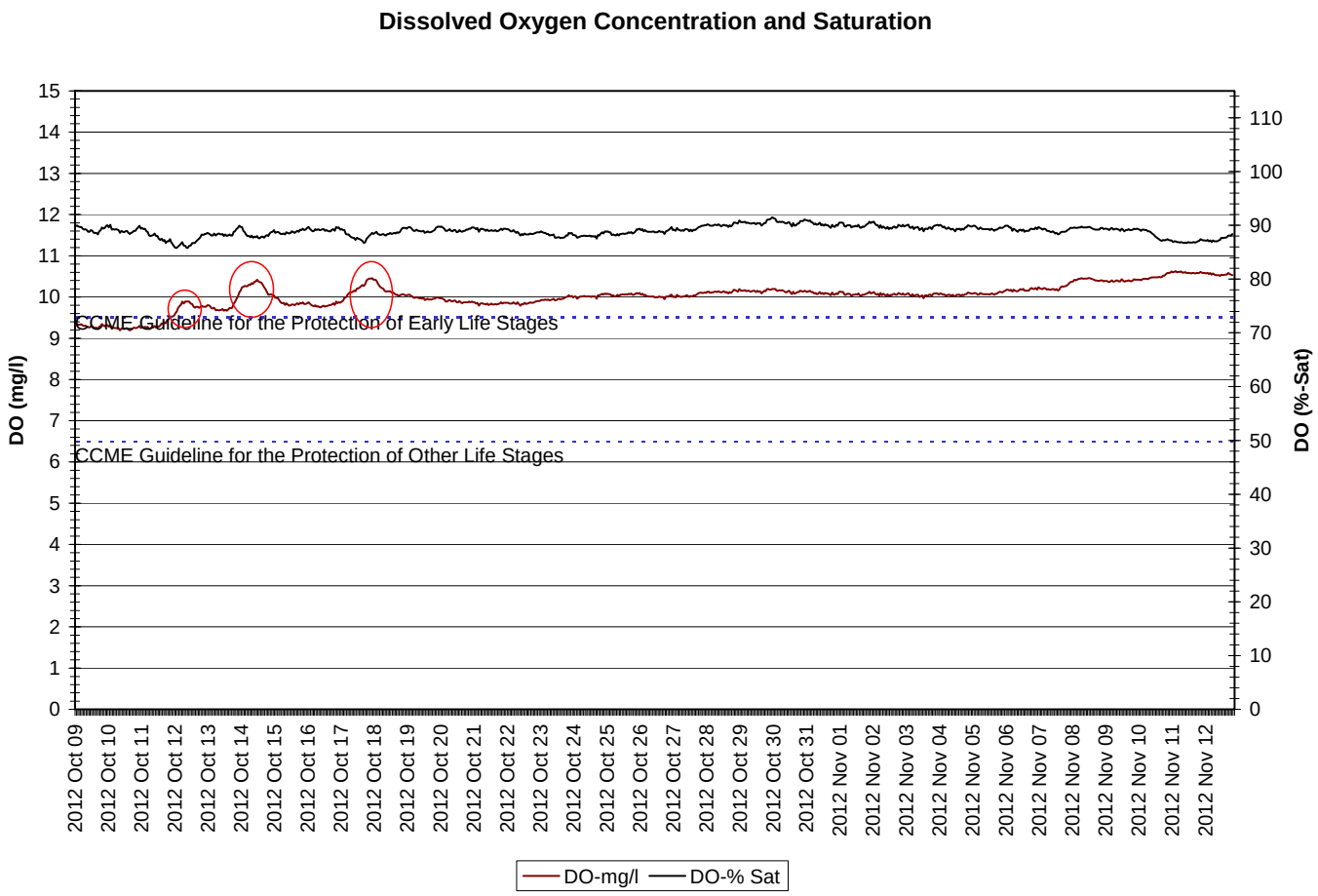

Figure 4

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 9.19 mg/L to a maximum of 10.63 mg/L over the deployment period with an average of 10.03 mg/L. The percent saturation for dissolved oxygen ranged from a low of 85.8% to a high of 91.5% with an average of 88.9%.

- Both the dissolved oxygen and percent saturation readings show a diurnal trend which is directly related to the diurnal temperature trend with cooling at night and warming during the day. This diurnal trend is most pronounced in the percent saturation data.

- The dissolved oxygen (mg/l) shows a gradual increasing trend over the deployment period. This gradual increasing trend is related to the gradual cooling trend for water temperature, as cooler water can hold more oxygen. In the early part of the deployment there are three noticeable spikes in the dissolved oxygen (mg/l) (see inside red ovals) which correspond to the three dips in temperature for the same time period.

- All oxygen readings for the deployment period are well above the CCME guideline for the protection of other life stages which is the relevant guideline for this time of the year.

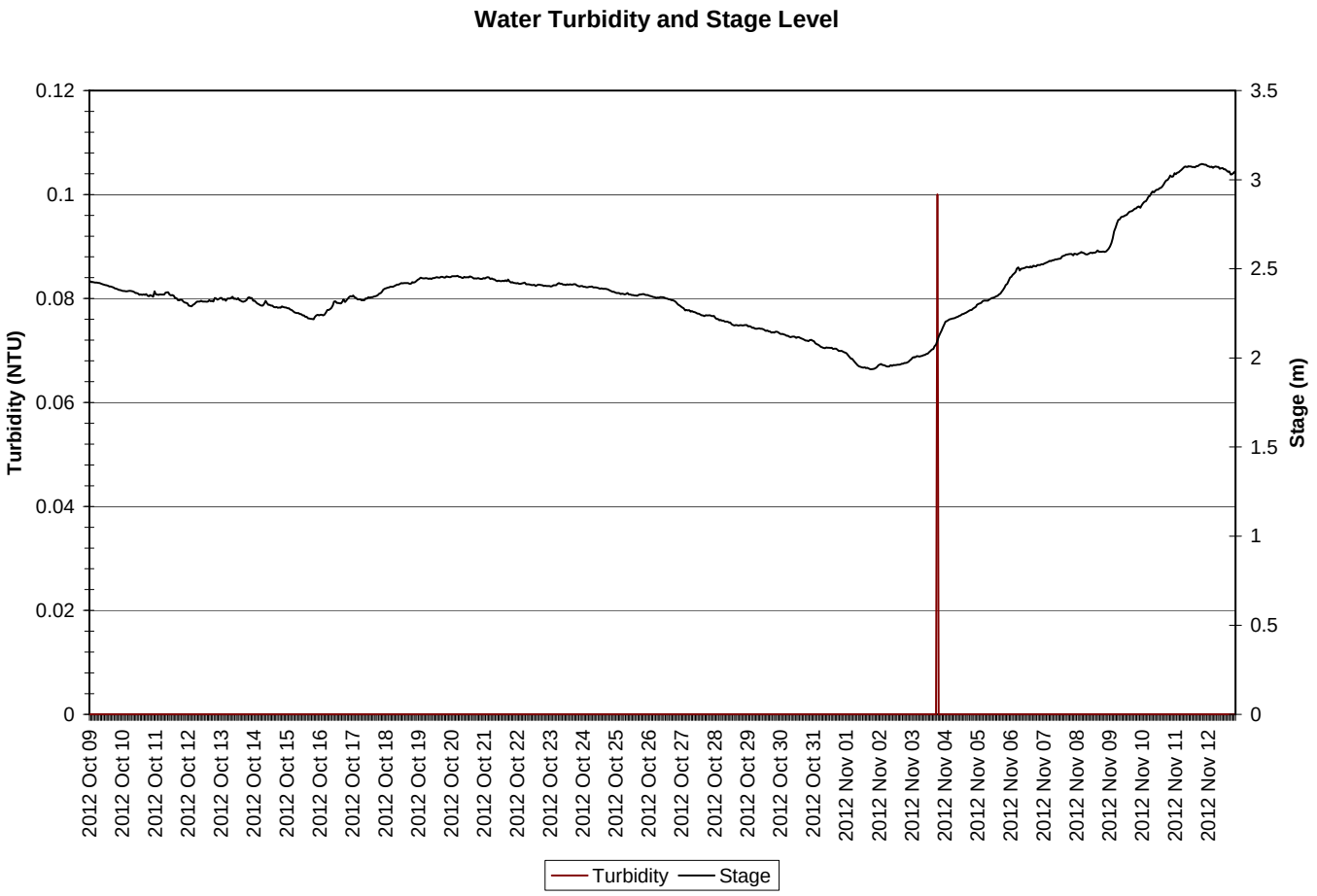

Figure 5

- Most of the turbidity values (**Figure 5**) were at 0.0 NTU during the deployment; however there was one reading of 0.1 NTU around November 4th.

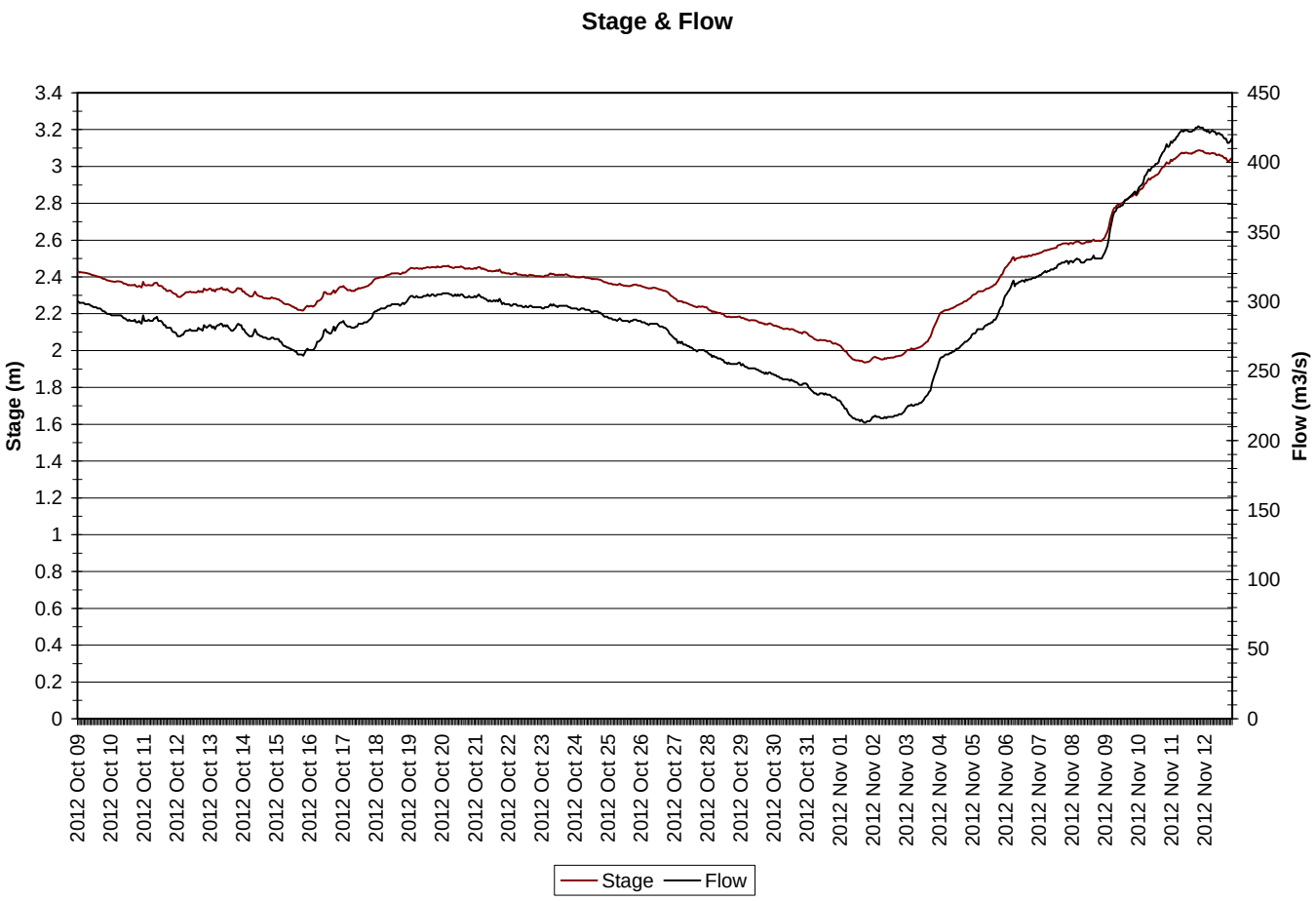

Figure 6

- The stage height (**Figure 6)** or water level ranged from a minimum of 1.94 m to a maximum of 3.09 m with an average of 2.38 m. The flow ranged from a low of 213.00 m^3/s to a high of 426.00 m^3/s with an average of 291.95 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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Appendix A

Daily Data Report for October 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 10s deg	Spd of Max Gust km/h
09†	11.0	6.5	8.8	9.2	0.0	0.0	0.0	0.0	0		
10†	13.0	-0.5	6.3	11.7	0.0	0.0	0.0	0.0	0		
11†	17.0	4.0	10.5	7.5	0.0	14.4	0.0	14.4	0		
12†	9.5	5.5	7.5	10.5	0.0	0.0	0.0	0.0	0		
13†	7.0	0.5	3.8	14.2	0.0	6.6	3.0	9.6	0		
14†	7.0	2.0	4.5	13.5	0.0	0.5	0.6	6.5	0		
15†	7.5	2.0	4.8	13.2	0.0	10.0	0.2	10.2	0		
16†	17.5	4.0	10.8	7.2	0.0	14.4	0.0	14.4	0		
17†	8.0	7.0	7.5	10.5	0.0	0.8	0.0	0.8	0		
18†	9.5	5.5	7.5	10.5	0.0	0.0	0.0	0.0	0		
19†	13.0	1.0	7.0	11.0	0.0	0.0	0.0	0.0	0		
20†	17.5	4.5	11.0	7.0	0.0	3.5	0.0	3.5	0		
21†	18.0	12.0	15.0	3.0	0.0	4.2	0.0	4.2	0		
22†	14.5	10.5	12.5	5.5	0.0	1.2	0.0	1.2	0		
23†	9.5	5.5	7.5	10.5	0.0	4.4	0.0	4.4	0		
24†	5.0	2.0	3.5	14.5	0.0	0.5	0.0	0.5	0		
25†	7.0	2.0	4.5	13.5	0.0	1.2	0.0	1.2	0		
26†	8.5	5.0	6.8	11.2	0.0	0.0	0.0	0.0	0		
27†	10.0	7.5	8.8	9.2	0.0	0.4	0.0	0.4	0		
28†	10.5	7.0	8.8	9.2	0.0	0.0	0.0	0.0	0		
29†	14.5	8.0	11.3	6.7	0.0	0.0	0.0	0.0	0		
30†	14.5	9.5	12.0	6.0	0.0	0.0	0.0	0.0	0		
31†	14.5	5.5	10.0	8.0	0.0	0.0	0.0	0.0	0		

Daily Data Report for November 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 10s deg	Spd of Max Gust km/h
01†	15.0	10.5	12.8	5.2	0.0	0.4	0.0	0.4	0		
02†	18.0	10.5	14.3	3.7	0.0	8.0	0.0	8.0	0		
03†	13.0	8.0	10.5	7.5	0.0	18.8	0.0	18.8	0		
04†	11.0	9.0	10.0	8.0	0.0	0.8	0.0	0.8	0		
05†	10.0	5.5	7.8	10.2	0.0	11.0	0.0	11.0	0		
06†	7.0	3.0	5.0	13.0	0.0	2.2	2.0	4.2	0		
07†	5.0	-0.5	2.3	15.7	0.0	0.8	0.0	0.8	2		
08†	6.5	-1.0	2.8	15.2	0.0	2.2	0.0	2.2	0		
09†	8.5	2.5	5.5	12.5	0.0	18.6	2.0	20.6	0		
10†	3.0	-0.5	1.3	16.7	0.0	0.0	1.4	1.4	0		
11†	1.5	-1.0	0.3	17.7	0.0	0.0	0.0	0.0	0		
12†	11.0	-2.5	4.3	13.7	0.0	0.0	0.0	0.0	0		
13†	19.0	3.5	11.3	6.7	0.0	2.4	0.0	2.4	0		