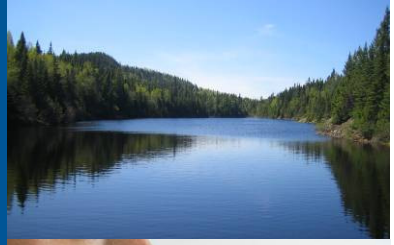
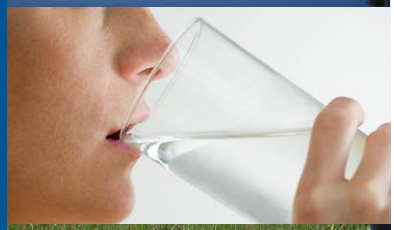






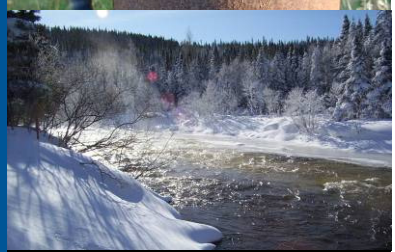

Real Time Water Quality Report
Humber River at Humber Village

Deployment Period 2011-02-24 to 2011-06-24

2011-07-25

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 February 24, 2011, and remained deployed continuously until June 24, 2011. This deployment period was longer than normal however the instrument maintained relatively 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**
2011-02-24 Deployment	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Good
	Dissolved Oxygen (mg/L)	Fair
	Turbidity (NTU)	Excellent
2011-06-24 Removal	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Fair
	Dissolved Oxygen (%)	Excellent
	Turbidity (NTU)	Excellent

Table 2

Data Interpretation

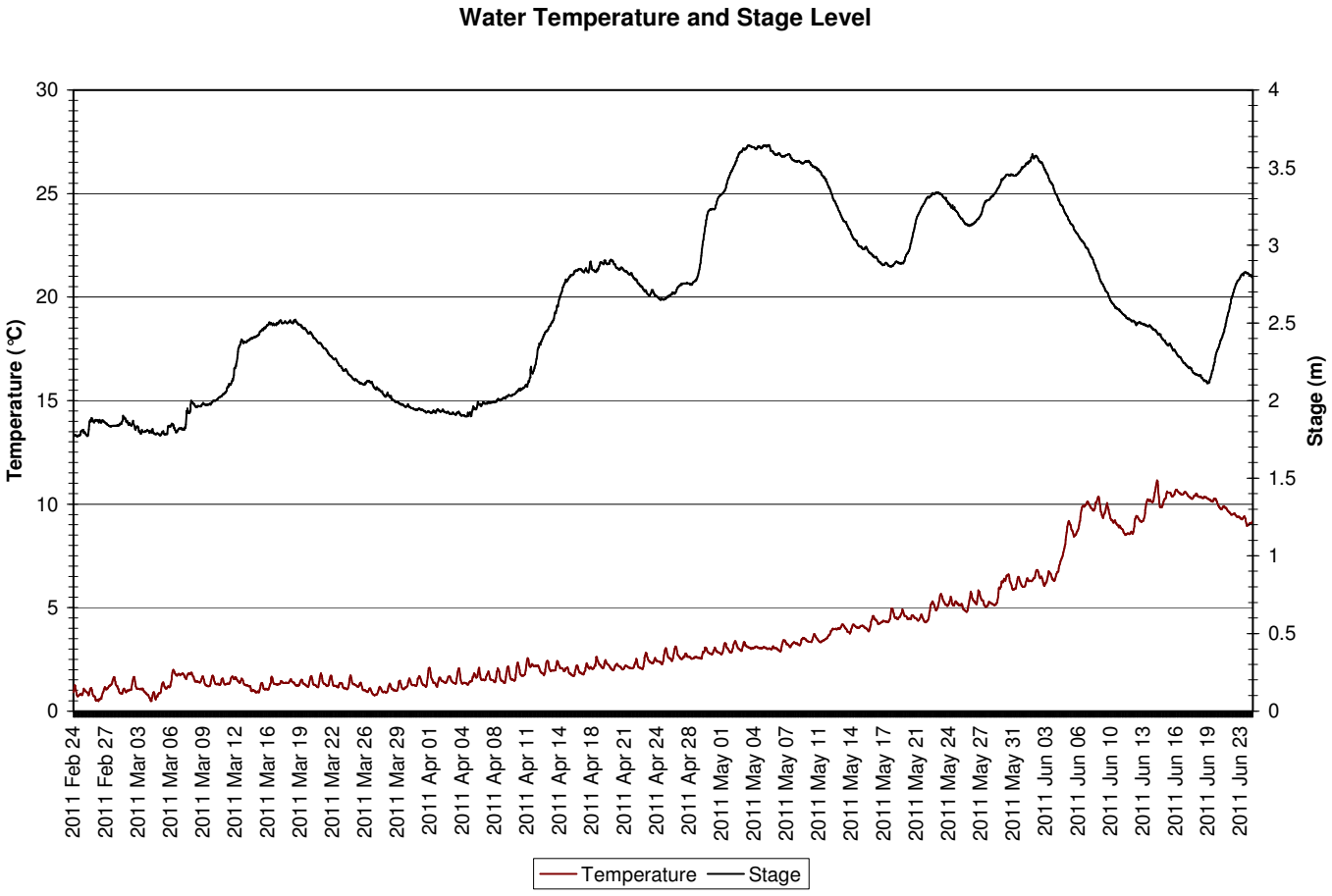

Figure 1

- The water temperature (**Figure 1**) ranged from a minimum of 0.48 ˚C to a maximum of 11.14 ˚C, with a general increasing trend throughout the deployment period.

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

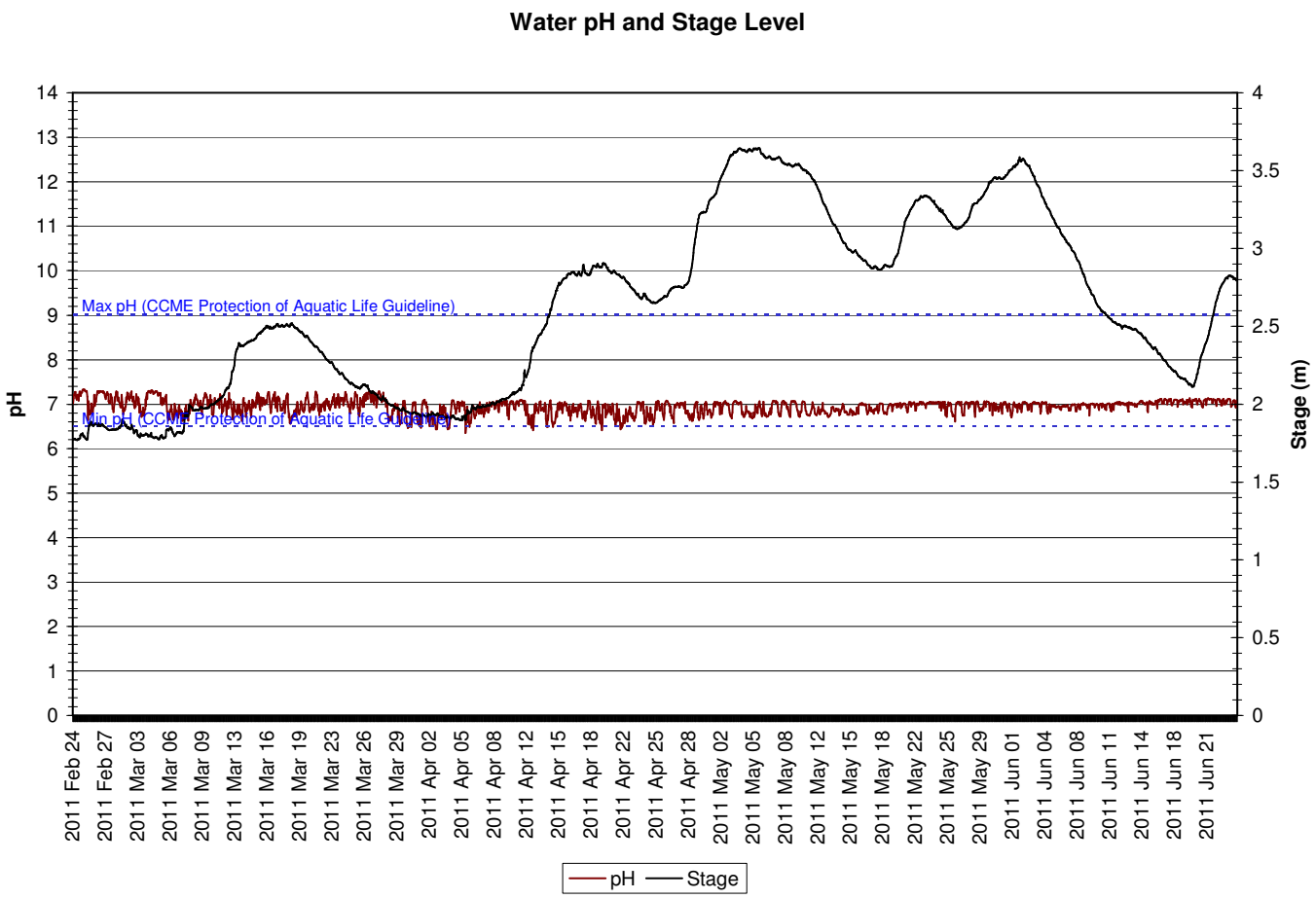

Figure 2

- The pH (**Figure 2**) ranged from a low of 6.35 to a high of 7.33 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.

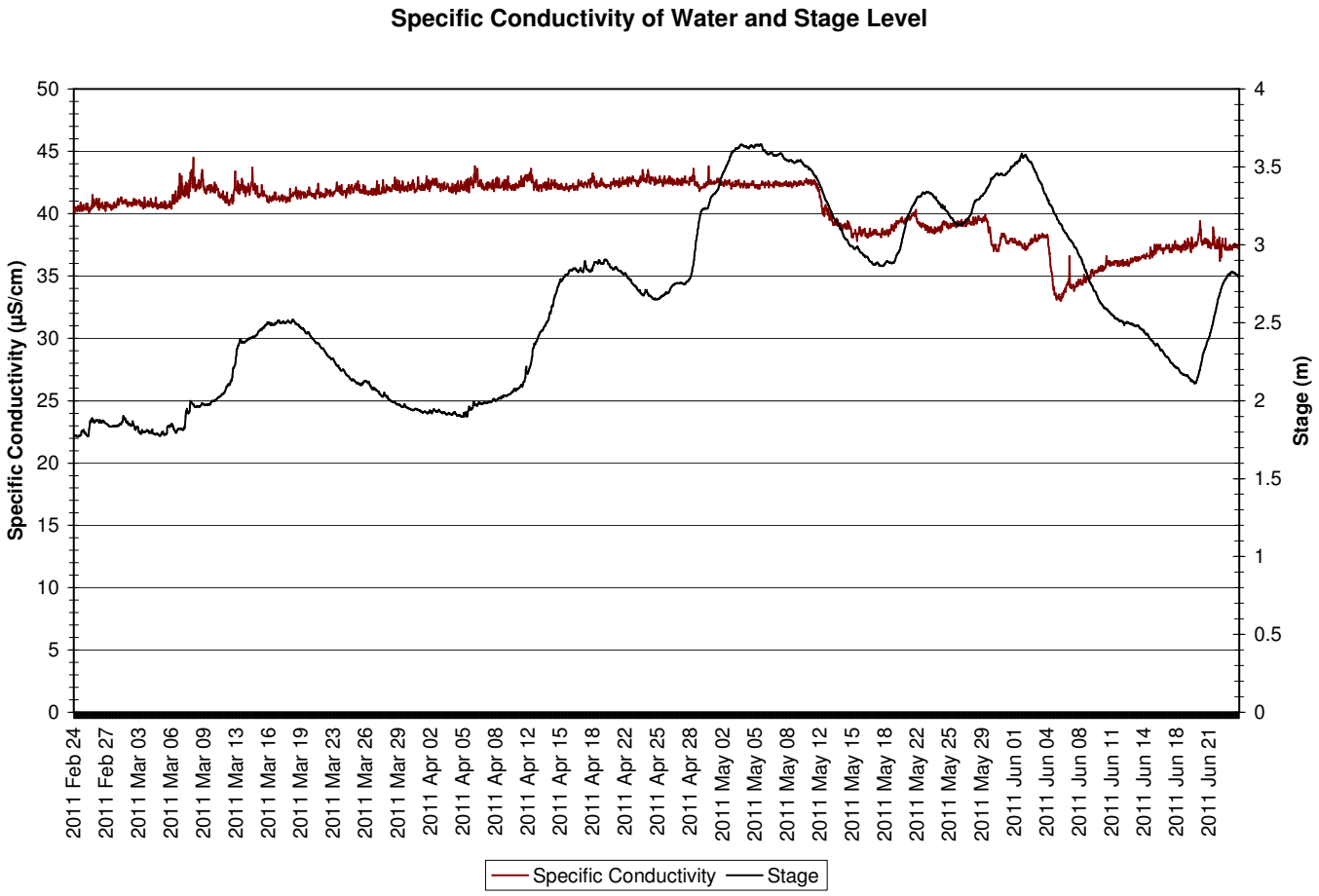

Figure 3

- The specific conductivity **(Figure 3)** ranged from a minimum of 33.0 µS/cm to a maximum of 44.5 µS/cm over the deployment period.

- During the last third of the deployment the conductivity sensor seems to have drifted out of calibration and to give readings more variable than normal. This trend becomes apparent after a significant drop in conductivity around May 12.

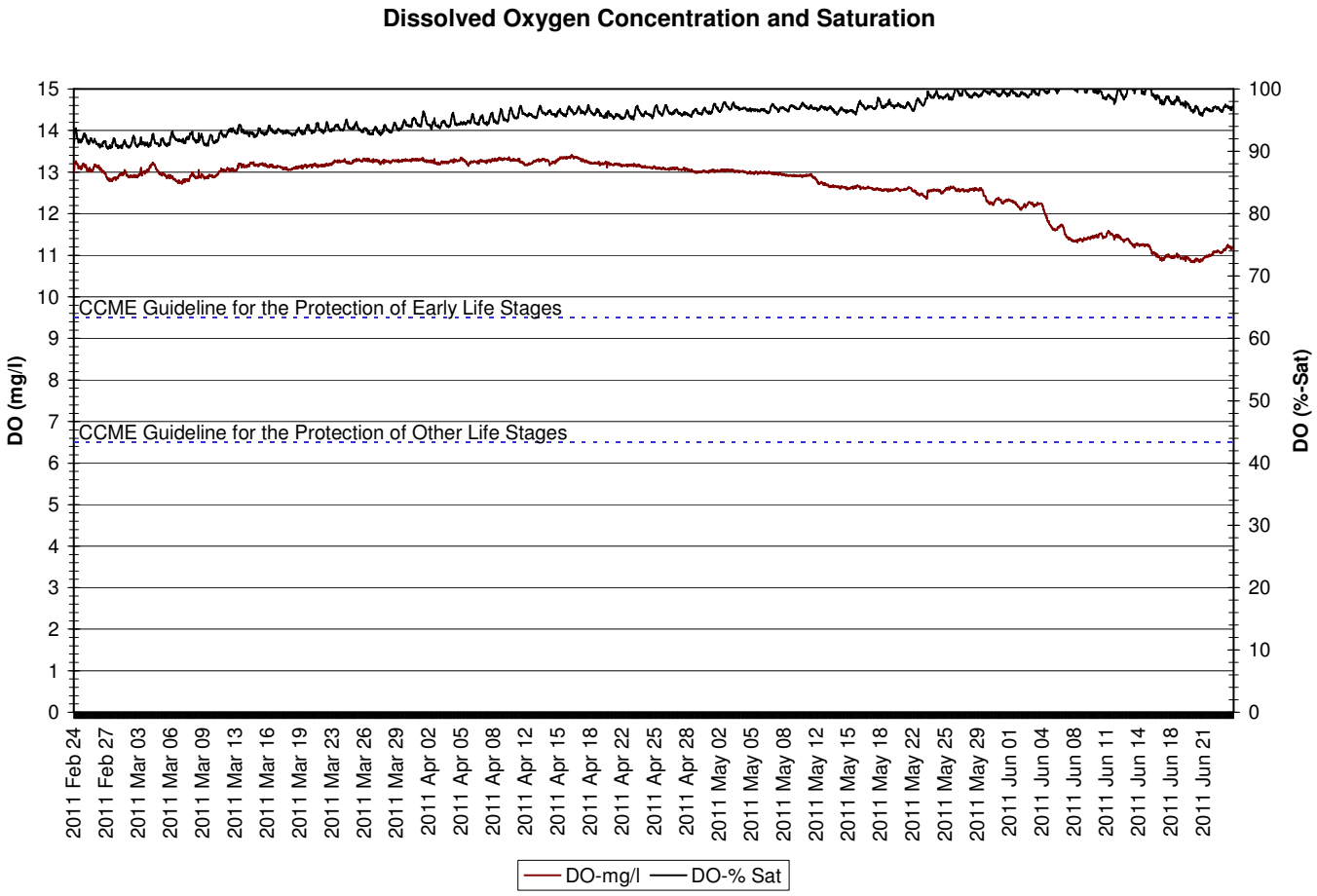

Figure 4

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 10.83 mg/L to a maximum of 13.41 mg/L over the deployment period. The percent saturation for dissolved oxygen ranged from a low of 90.4% to a high of 102.2%.

- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature and a gentle decreasing trend over the deployment period, most notable towards the end of the deployment period, can be attributed to the general increasing trend in water temperature. A regular diurnal fluctuation in DO can also be seen, most notably in the percent saturation data. This diurnal trend 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).

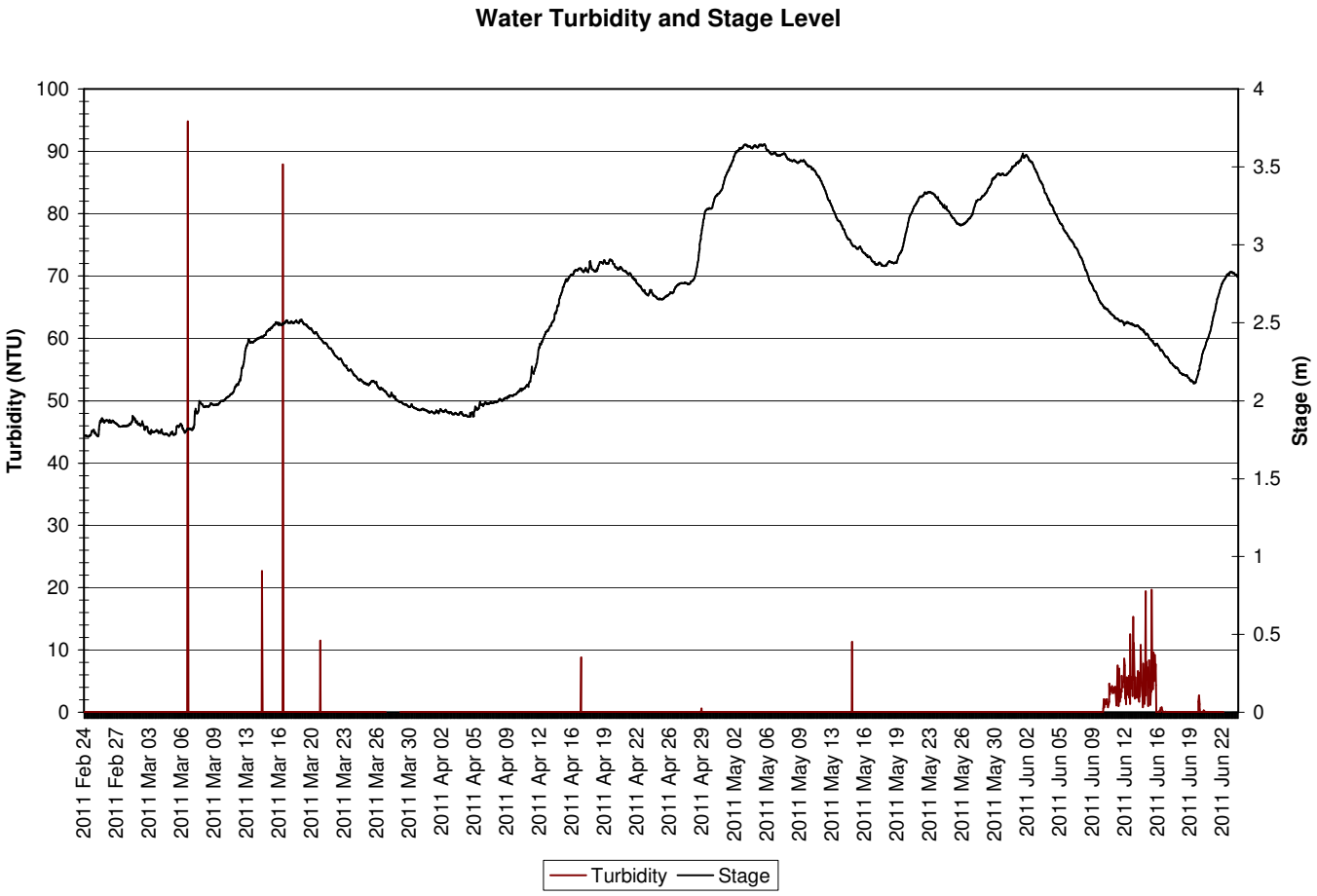

Figure 5

- Turbidity values ranged from 0.0 NTU to 94.8 NTU. Most of the turbidity readings, particularly the higher ones, can be attributed to debris accumulated around the sensor.

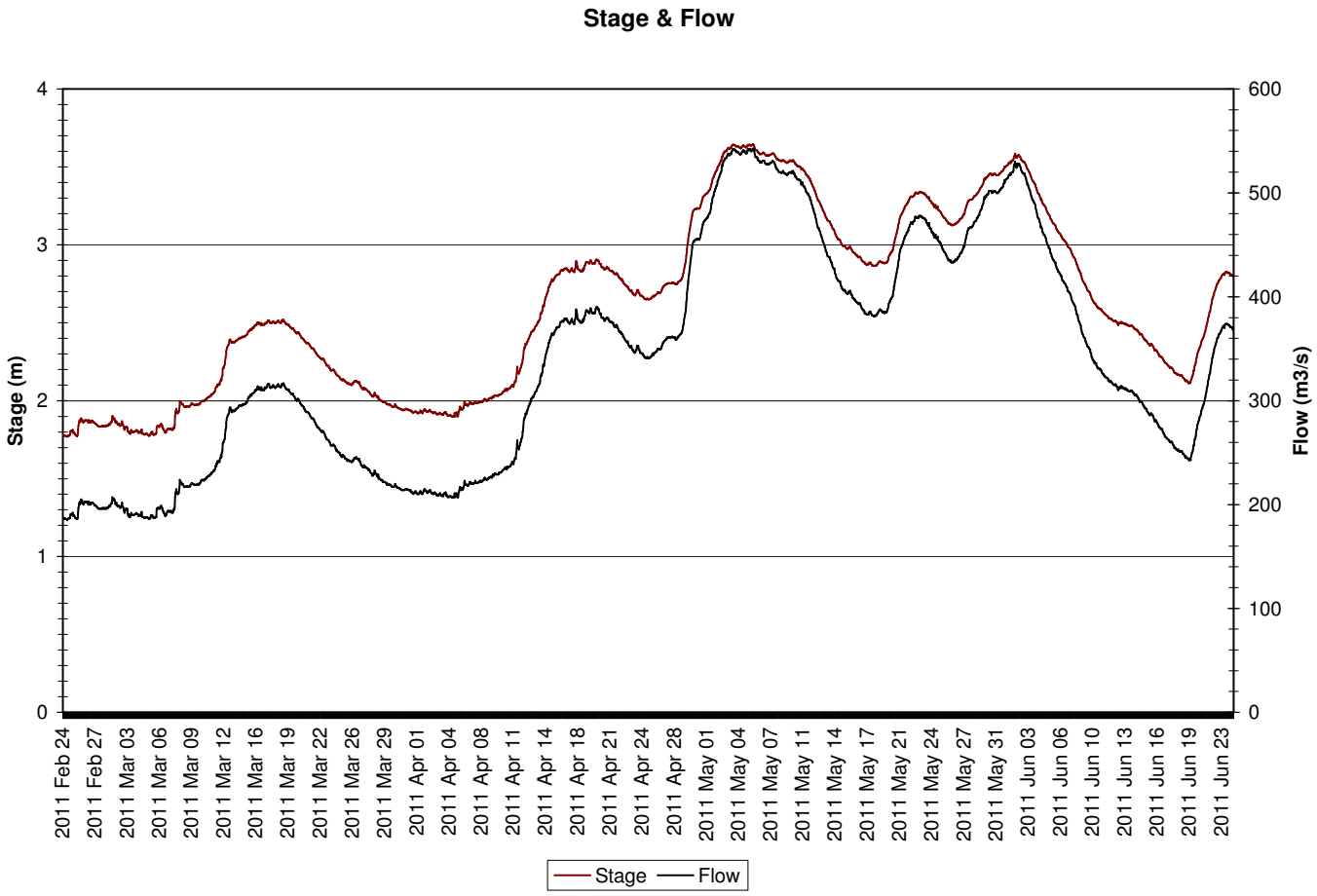

Figure 6

- The stage height (**Figure 6**) or water level ranged from a minimum of 1.77 m to a maximum of 3.65 m with the corresponding flow ranging from 185 m^3/s to 543 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

March Climate Data

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
Sum				606.2	0.0	34.5	43.2	77.7			
Avg	1.9	-5.0	-1.6								
Xtrm	12.5	-13.5									
01†	0.5	-9.5	-4.5	22.5	0.0	0.0	1.4	1.4	96		
02†	3.0	-6.5	-1.8	19.8	0.0	1.2	1.8	3.0	94		
03†	2.0	-3.5	-0.8	18.8	0.0	0.0	11.0	11.0	91		
04†	-7.5	-11.5	-9.5	27.5	0.0	0.0	0.0	0.0	100		
05†	-1.0	-9.5	-5.3	23.3	0.0	0.0	0.0	0.0	97		
06†	6.5	-5.5	0.5	17.5	0.0	9.0	0.0	9.0	95		
07†	9.5	1.5	5.5	12.5	0.0	3.6	0.0	3.6	85		
08†	6.0	0.5	3.3	14.7	0.0	0.0	1.0	1.0	70		
09†	1.5	-4.5	-1.5	19.5	0.0	0.0	0.0	0.0	68		
10†	0.0	-13.5	-6.8	24.8	0.0	0.0	0.0	0.0	65		
11†	5.0	-6.0	-0.5	18.5	0.0	0.0	0.0	0.0	64		
12†	12.5	-2.0	5.3	12.7	0.0	14.6	0.0	14.6	60		
13†	3.0	-2.0	0.5	17.5	0.0	0.0	0.0	0.0	50		
14†	-2.0	-3.0	-2.5	20.5	0.0	0.0	0.0	0.0	47		
15†	1.0	-7.0	-3.0	21.0	0.0	0.0	0.0	0.0	46		
16†	5.0	-5.0	0.0	18.0	0.0	1.0	1.0	2.0	44		
17†	4.0	-1.0	1.5	16.5	0.0	0.9	0.0	0.9	44		
18†	1.5	0.0	0.8	17.2	0.0	4.2	10.2	14.4	42		
19†	1.0	-2.5	-0.8	18.8	0.0	0.0	1.0	1.0	46		
20†	-3.0	-10.0	-6.5	24.5	0.0	0.0	0.0	0.0	46		
21†	1.0	-11.0	-5.0	23.0	0.0	0.0	0.0	0.0	42		
22†	2.0	-11.5	-4.8	22.8	0.0	0.0	0.0	0.0	41		
23†	1.0	-4.5	-1.8	19.8	0.0	0.0	0.0	0.0	38		
24†	1.0	-8.5	-3.8	21.8	0.0	0.0	0.0	0.0	38		
25†	-1.0	-3.5	-2.3	20.3	0.0	0.0	7.0	7.0	37		
26†	-1.5	-3.0	-2.3	20.3	0.0	0.0	7.4	7.4	41		
27†	1.5	-4.0	-1.3	19.3	0.0	0.0	1.4	1.4	47		
28†	3.0	-2.0	0.5	17.5	0.0	0.0	0.0	0.0	44		
29†	0.5	-2.5	-1.0	19.0	0.0	0.0	0.0	0.0	44		
30†	0.0	-2.5	-1.3	19.3	0.0	0.0	0.0	0.0	40		
31†	4.0	-2.0	1.0	17.0	0.0	0.0	0.0	0.0	40		

April Climate Data

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
Sum				443.1	0.0	53.9	24.8	78.7			
Avg	7.5	-1.1	3.2								
Xtrm	15.5	-8.0									
01†	5.5	-2.0	1.8	16.2	0.0	0.0	7.8	7.8	38		
02†	2.0	-1.5	0.3	17.7	0.0	0.6	0.6	1.2	45		
03†	1.0	-2.5	-0.8	18.8	0.0	0.0	0.0	0.0	43		
04†	-0.5	-3.0	-1.8	19.8	0.0	0.0	0.0	0.0	41		
05†	12.0	-8.0	2.0	16.0	0.0	4.4	0.0	4.4	35		
06†	7.0	2.0	4.5	13.5	0.0	0.0	0.0	0.0	15		
07†	3.5	-2.0	0.8	17.2	0.0	0.0	0.0	0.0	12		
08†	1.5	-3.5	-1.0	19.0	0.0	0.0	0.0	0.0	11		
09†	1.0	-3.0	-1.0	19.0	0.0	0.0	0.0	0.0	10		
10†	7.5	-5.0	1.3	16.7	0.0	0.0	0.0	0.0	6		
11†	15.5	-2.5	6.5	11.5	0.0	11.4	0.0	11.4	0		
12†	10.5	3.5	7.0	11.0	0.0	1.0	1.4	2.4	0		
13†	5.5	-1.5	2.0	16.0	0.0	1.4	0.0	1.4	0		
14†	12.5	-1.0	5.8	12.2	0.0	0.0	8.4	8.4	0		
15†	1.0	-7.0	-3.0	21.0	0.0	0.0	0.0	0.0	8		
16†	0.5	-8.0	-3.8	21.8	0.0	0.0	0.0	0.0	2		
17†	9.0	-4.0	2.5	15.5	0.0	2.3	0.0	2.3	0		
18†	14.0	5.0	9.5	8.5	0.0	3.0	0.0	3.0	0		
19†	8.5	1.5	5.0	13.0	0.0	3.4	0.0	3.4	0		
20†	4.0	-0.5	1.8	16.2	0.0	0.0	2.6	2.6	0		
21†	5.0	0.5	2.8	15.2	0.0	3.2	4.0	7.2	0		
22†	3.0	-0.5	1.3	16.7	0.0	0.0	0.0	0.0	0		
23†	13.0	-1.5	5.8	12.2	0.0	10.2	0.0	10.2	0		
24†	8.5	1.5	5.0	13.0	0.0	1.4	0.0	1.4	0		
25†	11.5	0.5	6.0	12.0	0.0	0.0	0.0	0.0	0		
26†	15.5	0.5	8.0	10.0	0.0	0.0	0.0	0.0	0		
27†	5.0	-1.0	2.0	16.0	0.0	0.0	0.0	0.0	0		
28†	12.5	2.0	7.3	10.7	0.0	11.2	0.0	11.2	0		
29†	15.0	4.0	9.5	8.5	0.0	0.4	0.0	0.4	0		
30†	15.0	4.5	9.8	8.2	0.0	0.0	0.0	0.0	0		

May Climate Data

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
Sum				296.3	1.0	43.1	1.2	44.3			
Avg	12.9	4.0	8.5								
Xtrm	25.5	-1.0									
01†	12.0	2.5	7.3	10.7	0.0	0.0	0.0	0.0	0		
02†	13.0	2.0	7.5	10.5	0.0	0.0	0.0	0.0	0		
03†	18.0	-0.5	8.8	9.2	0.0	2.5	0.0	2.5	0		
04†	13.5	5.5	9.5	8.5	0.0	0.2	0.0	0.2	0		
05†	13.0	6.0	9.5	8.5	0.0	1.1	0.0	1.1	0		
06†	9.0	4.5	6.8	11.2	0.0	0.6	0.0	0.6	0		
07†	18.0	1.5	9.8	8.2	0.0	0.0	0.0	0.0	0		
08†	15.0	5.5	10.3	7.7	0.0	0.0	0.0	0.0	0		
09†	9.5	5.5	7.5	10.5	0.0	0.0	0.0	0.0	0		
10†	9.5	3.5	6.5	11.5	0.0	0.0	0.0	0.0	0		
11†	6.0	1.5	3.8	14.2	0.0	0.0	0.0	0.0	0		
12†	11.0	3.0	7.0	11.0	0.0	3.1	0.0	3.1	0		
13†	7.0	5.0	6.0	12.0	0.0	5.4	1.2	6.6	0		
14†	7.0	1.0	4.0	14.0	0.0	1.2	0.0	1.2	0		
15†	9.5	2.5	6.0	12.0	0.0	0.0	0.0	0.0	0		
16†	9.0	0.0	4.5	13.5	0.0	0.0	0.0	0.0	0		
17†	11.5	4.0	7.8	10.2	0.0	1.9	0.0	1.9	0		
18†	11.5	6.0	8.8	9.2	0.0	0.0	0.0	0.0	0		
19†	16.0	5.5	10.8	7.2	0.0	9.3	0.0	9.3	0		
20†	9.0	3.5	6.3	11.7	0.0	0.9	0.0	0.9	0		
21†	7.0	3.5	5.3	12.7	0.0	0.0	0.0	0.0	0		
22†	11.5	-0.5	5.5	12.5	0.0	0.0	0.0	0.0	0		
23†	16.0	-1.0	7.5	10.5	0.0	0.0	0.0	0.0	0		
24†	16.0	6.0	11.0	7.0	0.0	5.5	0.0	5.5	0		
25†	16.0	11.0	13.5	4.5	0.0	0.4	0.0	0.4	0		
26†	21.0	1.5	11.3	6.7	0.0	0.0	0.0	0.0	0		
27†	25.5	12.5	19.0	0.0	1.0	0.0	0.0	0.0	0		
28†	10.0	3.5	6.8	11.2	0.0	0.0	0.0	0.0	0		
29†	22.0	7.0	14.5	3.5	0.0	9.1	0.0	9.1	0		
30†	17.0	6.5	11.8	6.2	0.0	1.9	0.0	1.9	0		
31†	10.0	6.0	8.0	10.0	0.0	0.0	0.0	0.0	0		

June Climate Data

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
Sum				167.6	0.8	62.3	0.0	62.3			
Avg	16.6	8.2	12.4								
Xtrm	25.0	2.5									
01†	10.0	2.5	6.3	11.7	0.0	4.9	0.0	4.9	0		
02†	14.5	2.5	8.5	9.5	0.0	0.0	0.0	0.0	0		
03†	20.0	10.5	15.3	2.7	0.0	0.0	0.0	0.0	0		
04†	19.5	9.5	14.5	3.5	0.0	0.2	0.0	0.2	0		
05†	23.0	12.5	17.8	0.2	0.0	0.2	0.0	0.2	0		
06†	21.5	14.0	17.8	0.2	0.0	0.0	0.0	0.0	0		
07†	15.0	11.5	13.3	4.7	0.0	1.2	0.0	1.2	0		
08†	20.5	10.5	15.5	2.5	0.0	0.0	0.0	0.0	0		
09†	25.0	12.5	18.8	0.0	0.8	5.2	0.0	5.2	0		
10†	15.0	11.5	13.3	4.7	0.0	6.8	0.0	6.8	0		
11†	15.0	3.5	9.3	8.7	0.0	2.0	0.0	2.0	0		
12†	15.0	3.5	9.3	8.7	0.0	0.0	0.0	0.0	0		
13†	18.0	4.5	11.3	6.7	0.0	0.0	0.0	0.0	0		
14†	18.5	6.5	12.5	5.5	0.0	0.0	0.0	0.0	0		
15†	19.0	7.5	13.3	4.7	0.0	1.2	0.0	1.2	0		
16†	11.0	9.0	10.0	8.0	0.0	1.0	0.0	1.0	0		
17†	11.5	7.0	9.3	8.7	0.0	0.0	0.0	0.0	0		
18†	16.0	7.0	11.5	6.5	0.0	0.7	0.0	0.7	0		
19†	15.0	10.5	12.8	5.2	0.0	25.2	0.0	25.2	0		
20†	13.0	11.0	12.0	6.0	0.0	5.1	0.0	5.1	0		
21†	13.5	8.0	10.8	7.2	0.0	0.2	0.0	0.2	0		
22†	11.0	6.0	8.5	9.5	0.0	2.1	0.0	2.1	0		
23†	9.5	6.0	7.8	10.2	0.0	0.0	0.0	0.0	0		
24†	15.0	6.5	10.8	7.2	0.0	0.0	0.0	0.0	0		
25†	17.5	4.5	11.0	7.0	0.0	0.0	0.0	0.0	0		
26†	17.5	4.5	11.0	7.0	0.0	3.5	0.0	3.5	0		
27†	16.0	12.5	14.3	3.7	0.0	0.9	0.0	0.9	0		
28†	17.0	9.5	13.3	4.7	0.0	0.0	0.0	0.0	0		
29†	21.0	10.0	15.5	2.5	0.0	0.0	0.0	0.0	0		
30†	24.0	11.5	17.8	0.2	0.0	1.9	0.0	1.9	0		