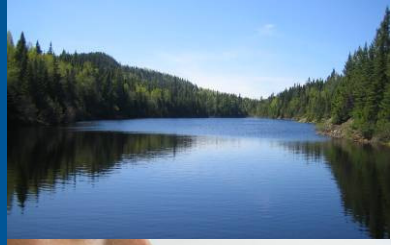
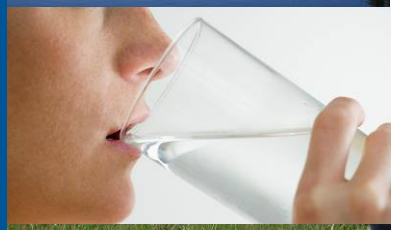





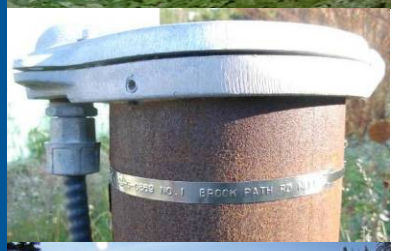


Real Time Water Quality Report
Humber River at Humber Village

Deployment Period 2012-06-08 to 2012-07-10

2012-08-15

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 June 8, 2012, and remained deployed continuously until July 10, 2012. This deployment period was a total of 32 days and the instrument maintained good operation for the duration of the deployment.

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**
2012-06-08 Deployment	Temp (°C)	Excellent
	pH (units)	Excellent
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent
2012-07-10 Removal	Temp (°C)	Good
	pH (units)	Fair
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Poor*
	Turbidity (NTU)	Excellent

Table 2

***note:** Dissolved Oxygen compared very well between the QA/QC and field instruments at the time of deployment but compared poorly at the time of removal. This is most likely due to the field instrument drifting off calibration significantly over the duration of the deployment due to biofouling and/or a maintenance issue with the oxygen sensor.*

Data Interpretation

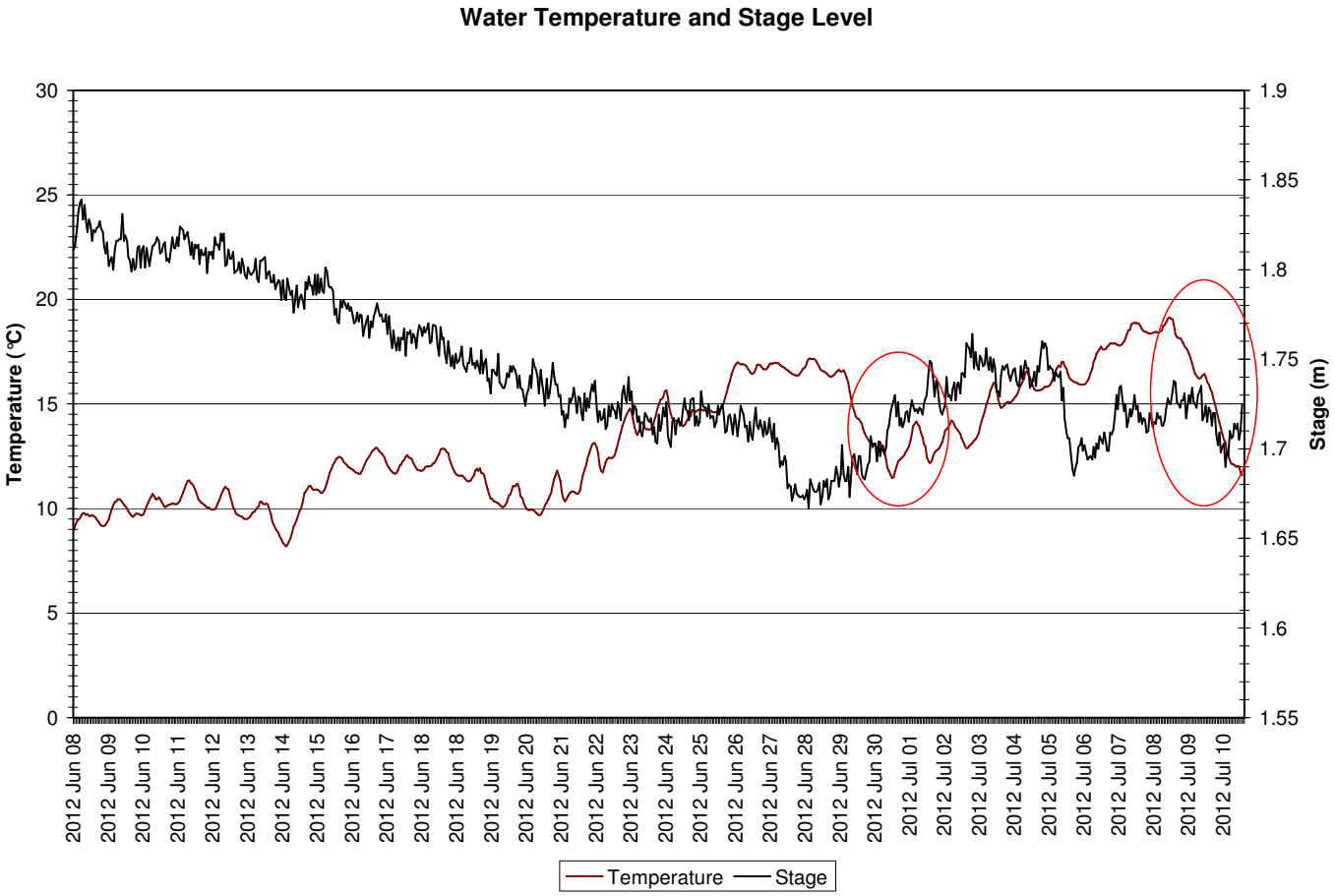

Figure 1

- Over the deployment period the water temperature (**Figure 1**) ranged from a minimum of 8.19 ˚C to a maximum of 19.14 ˚C, with an average temperature of 13.32˚C.

- 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.

- For most of the deployment period temperature shows a general increasing trend, however there are two periods when the water temperature takes a significant dip (see inside red ovals). The first dip in temperature starts on June 29, when over about a 36 hour period the temperature drops about 5^0c. A review of the climate date (Appendix A) shows that this period corresponds with both a significant rainfall event and a dip in air temperature. The second dip in temperature is more pronounced than the first, starting on July 8 and lasting about 48 hours, with a drop of about 7.5^0c. This second dip appears to be related to a significant drop in air temperature for the corresponding time period.

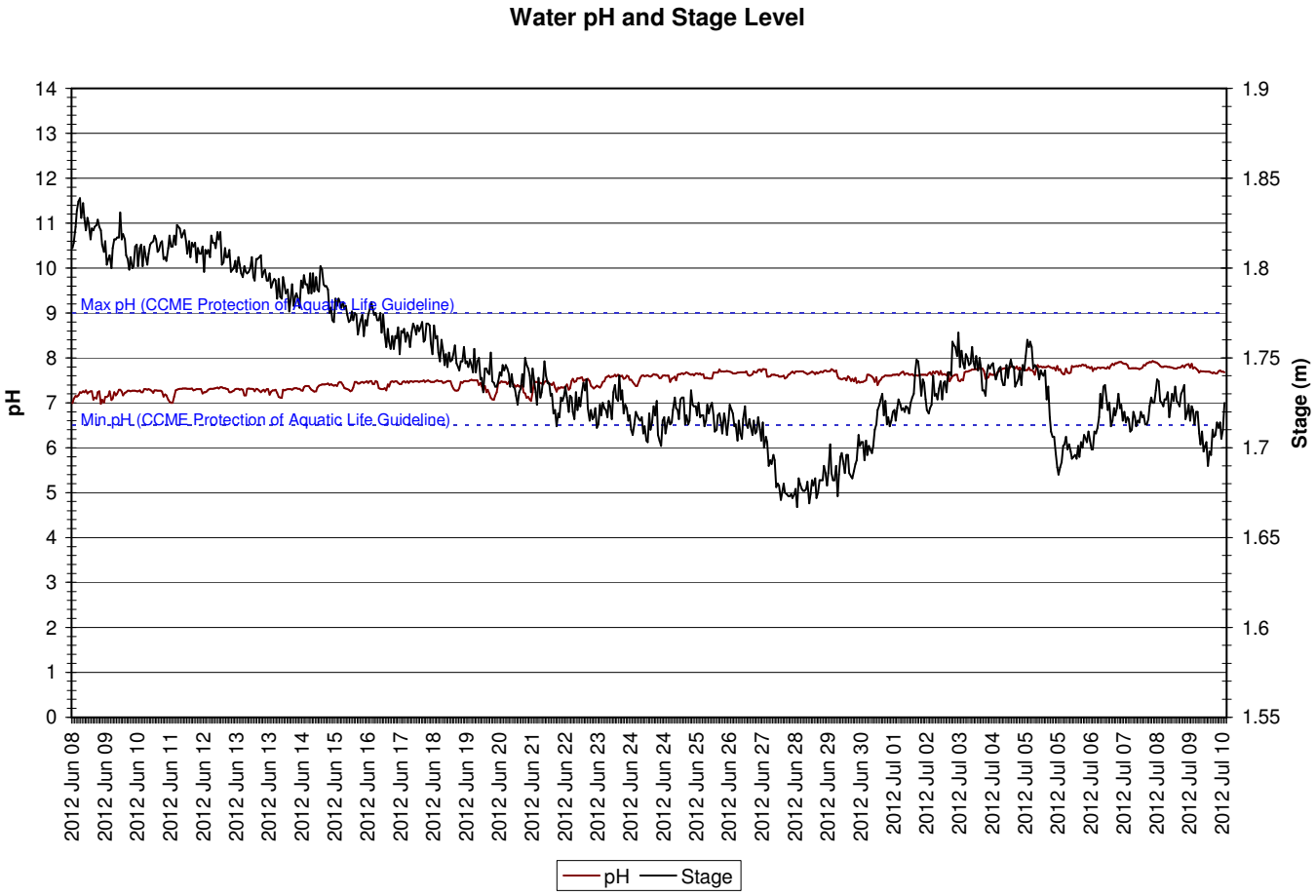

Figure 2

- The pH (**Figure 2**) ranged from a low of 6.98 to a high of 7.93 with a mean of 7.52 and remained relatively stable throughout the deployment period.

- All pH readings were within the range of 6.5 to 9.0 recommended by CCME for the Protection of Aquatic Life.

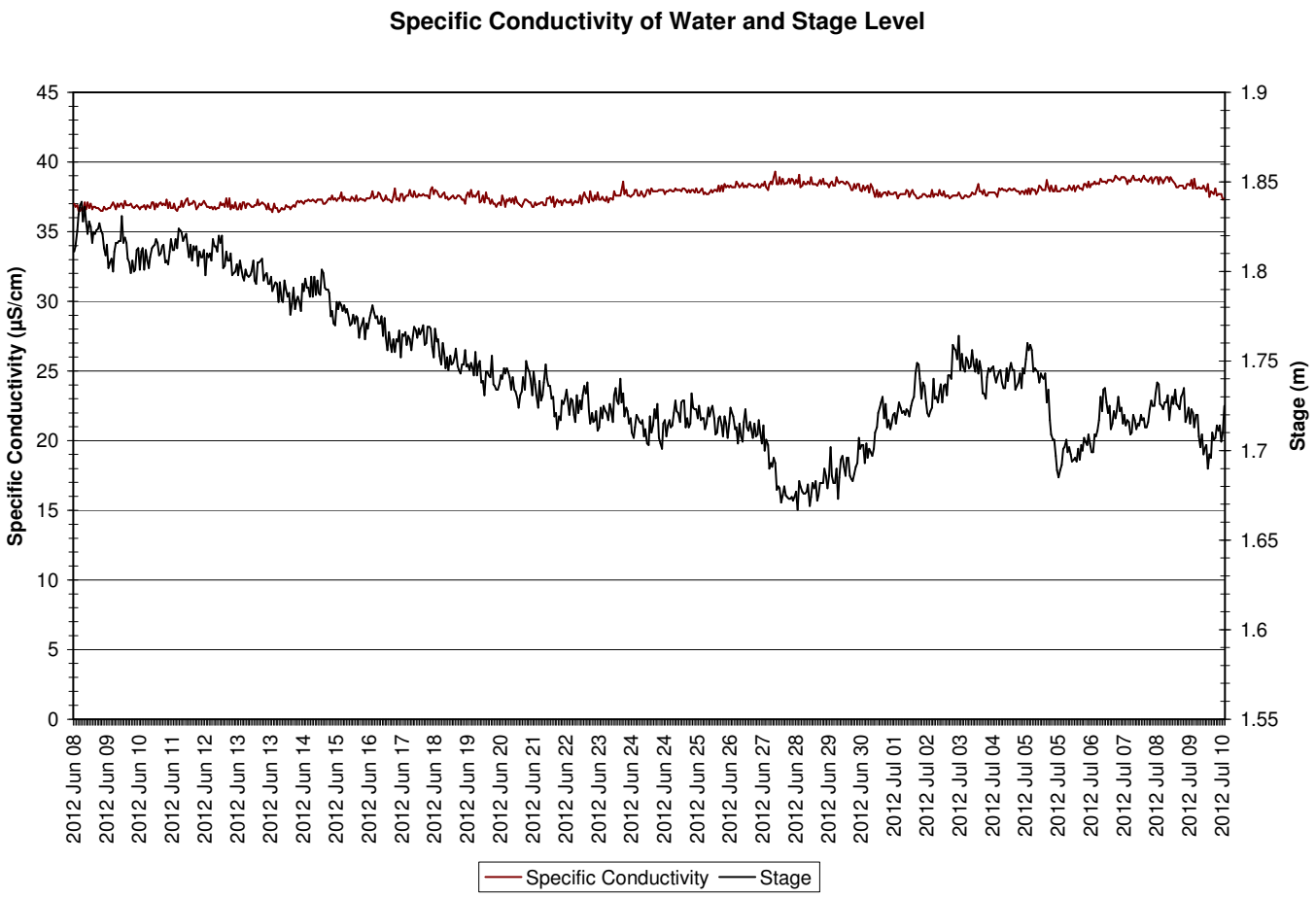

Figure 3

- The specific conductivity **(Figure 3)** ranged from a minimum of 36.4 µS/cm to a maximum of 39.3 µS/cm and showed a gentle increasing trend over the deployment period. The average specific conductivity for the entire deployment period was 37.7 µS/cm.

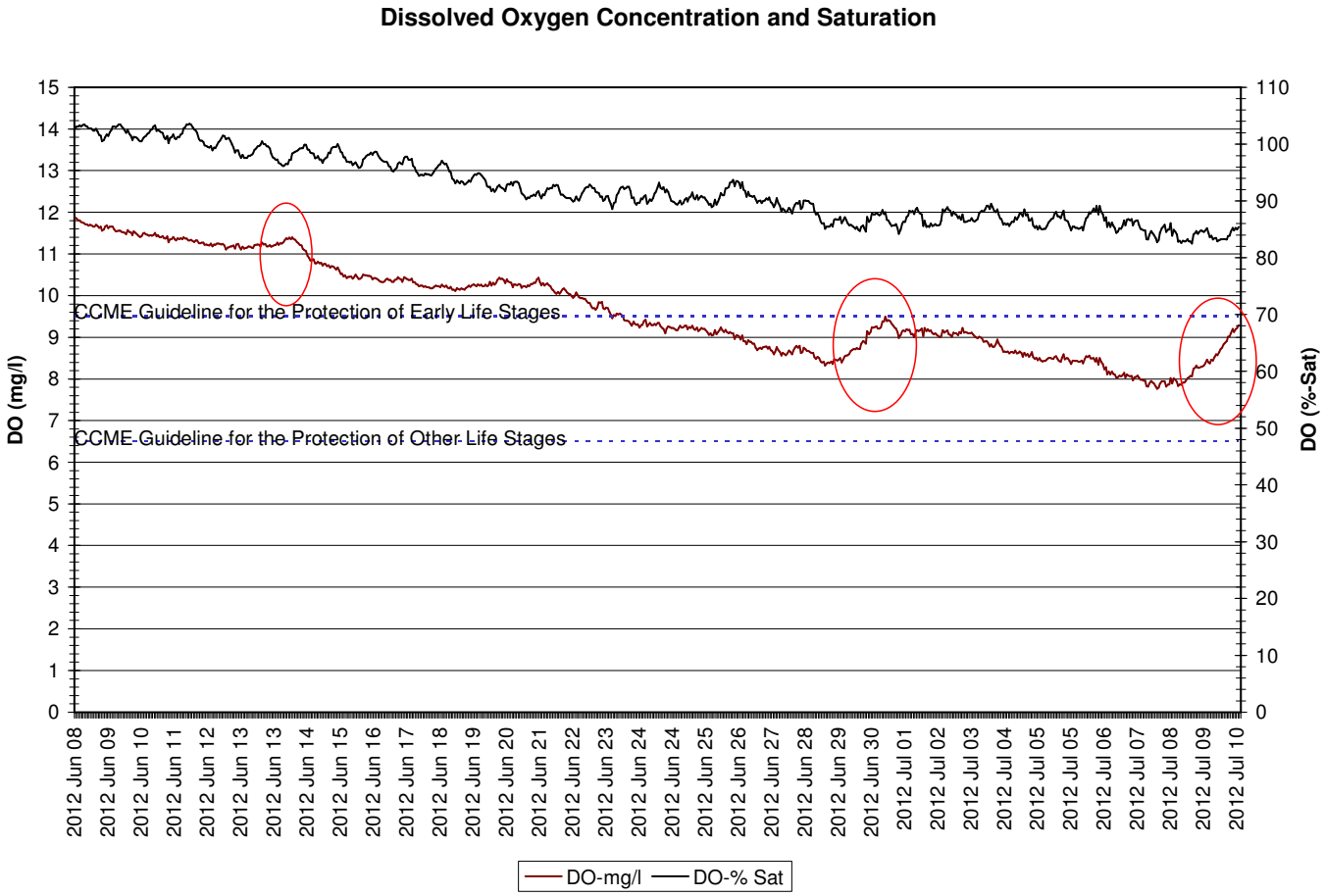

Figure 4

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 7.76 mg/L to a maximum of 11.88 mg/L over the deployment period with an average of 9.68 mg/L. The percent saturation for dissolved oxygen ranged from a low of 82.5% to a high of 103.6% with an average of 91.9%.

- During the deployment period the dissolved oxygen readings show a gentle declining trend which is related to the increasing temperature trend. There is also a distinct diurnal trend which is most notable with the percent saturation readings and is related to the diurnal temperature trend.

- During the deployment period there are a number of occasions where dissolved oxygen shows a noticeable increase (see inside red ovals). These periods of increased dissolved oxygen are directly related to water temperature when cooler temperatures allow the water to carry more dissolved oxygen.

- Throughout the deployment period, all dissolved oxygen values were above the limits recommended by CCME *Canadian Water Quality Guidelines for the Protection of Aquatic Life* for other life stages (above 6.5 mg/L), however some values did drop below the guideline for early life stages (above 9.5 mg/L).

- It should be noted that dissolved oxygen compared very well between the QA/QC and field instruments at the time of deployment but compared poorly at the time of removal. This is most likely due to the field instrument drifting off calibration significantly over the duration of the deployment due to biofouling and/or a maintenance issue with the oxygen sensor. This issue will be fully investigated before the instrument is redeployed.

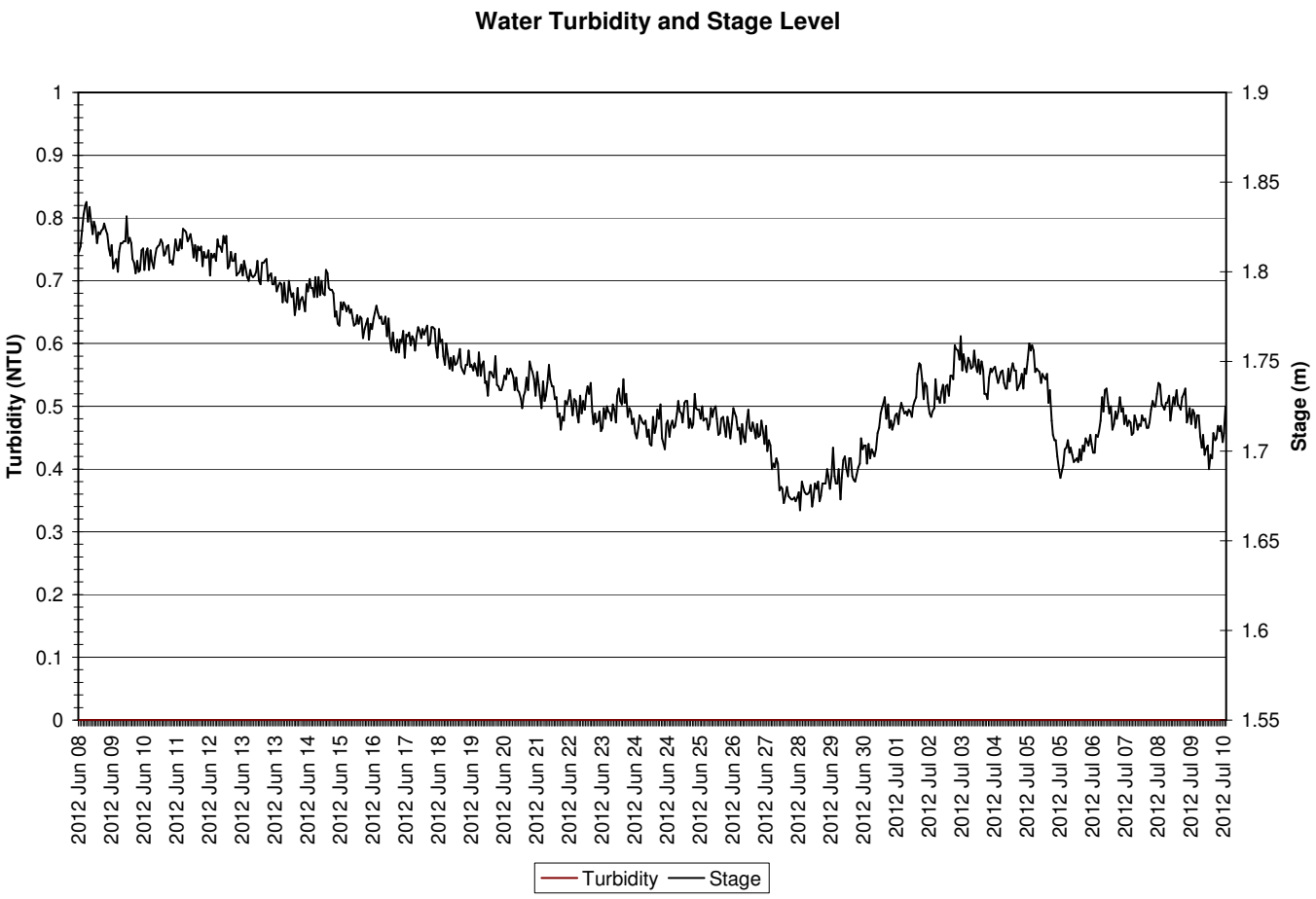

Figure 5

- All turbidity values were at 0.0 NTU for the duration of the deployment.

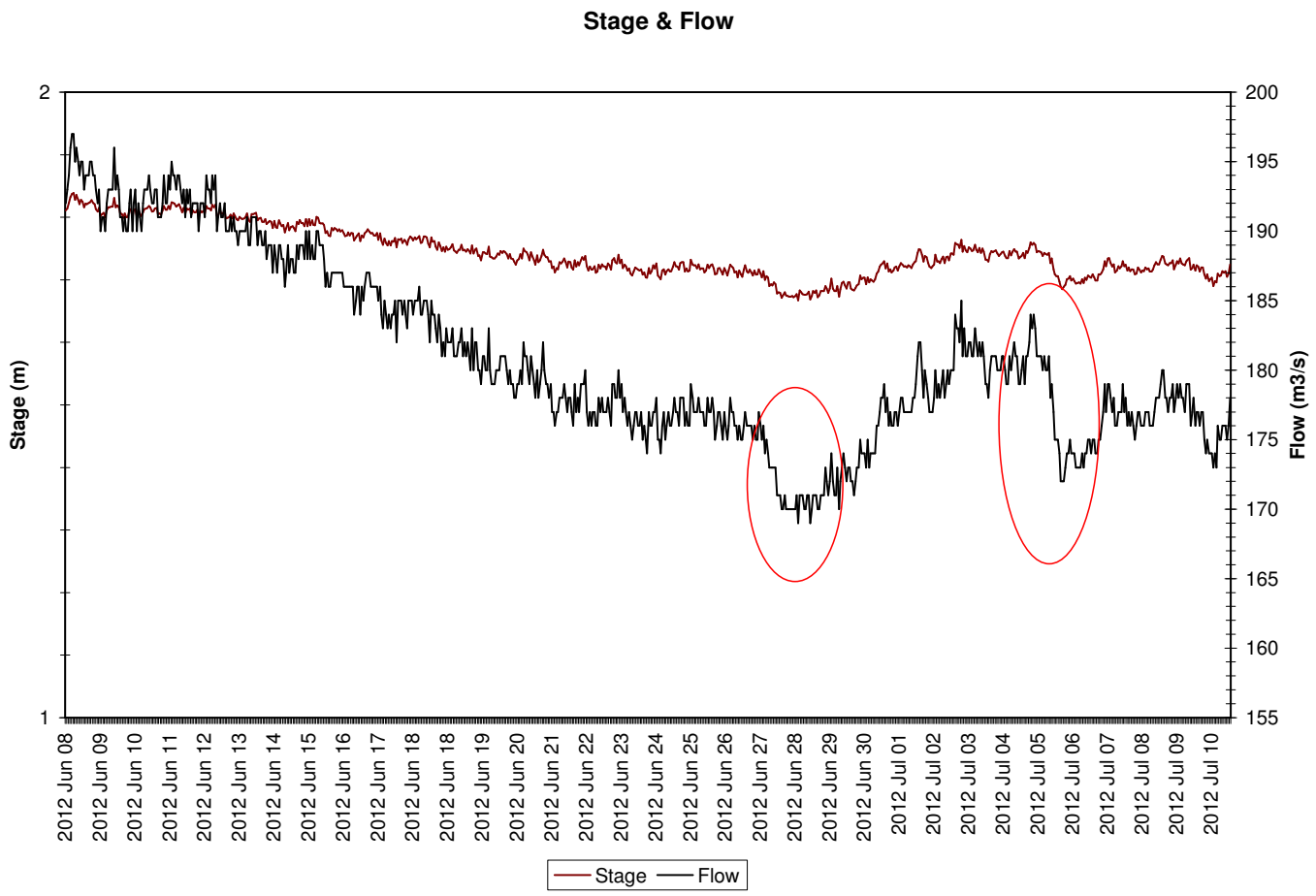

Figure 6

- The stage height (**Figure 6**) or water level ranged from a minimum of 1.67 m to a maximum of 1.84 m with the corresponding flow ranging from 169 m^3/s to 197 m^3/s.

- It should be noted that the flow level for the deployment period was significantly lower than a typical year due to the fact that precipitation for the same period was significantly lower and than most years. While the average discharge for the deployment period was only181 m^3, a more typical or average flow for this period would be approximately 275 m^3.

- During the deployment period there are two periods where the flow takes a significant quick drop over a short period (see inside red ovals). The most likely explanation for these sudden drops is a significant drop in flow through the Humber Canal which is regulated for power production by Deer Lake Power.

Climate Data

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

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Appendix A

Daily Data Report for June 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
08†	13.5	5.5	9.5	8.5	0.0	0.7	0.0	0.7	0		
09†	20.0	3.0	11.5	6.5	0.0	0.0	0.0	0.0	0		
10†	22.0	8.5	15.3	2.7	0.0	0.0	0.0	0.0	0		
11†	20.5	7.0	13.8	4.2	0.0	0.0	0.0	0.0	0		
12†	25.0	8.5	16.8	1.2	0.0	0.0	0.0	0.0	0		
13†	21.0	15.5	18.3	0.0	0.3	0.0	0.0	0.0	0		
14†	24.0	9.5	16.8	1.2	0.0	0.0	0.0	0.0	0		
15†	20.0	10.5	15.3	2.7	0.0	0.0	0.0	0.0	0		
16†	18.0	6.5	12.3	5.7	0.0	0.0	0.0	0.0	0		
17†	19.0	6.0	12.5	5.5	0.0	0.0	0.0	0.0	0		
18†	20.0	8.0	14.0	4.0	0.0	0.0	0.0	0.0	0		
19†	20.0	9.0	14.5	3.5	0.0	0.0	0.0	0.0	0		
20†	24.0	8.5	16.3	1.7	0.0	0.0	0.0	0.0	0		
21†	21.0	11.5	16.3	1.7	0.0	0.0	0.0	0.0	0		
22†	23.5	10.5	17.0	1.0	0.0	0.0	0.0	0.0	0		
23†	24.5	9.0	16.8	1.2	0.0	0.0	0.0	0.0	0		
24†	30.0	10.0	20.0	0.0	2.0	3.4	0.0	3.4	0		
25†	20.0	12.5	16.3	1.7	0.0	0.0	0.0	0.0	0		
26†	25.5	13.5	19.5	0.0	1.5	2.2	0.0	2.2	0		
27†	22.0	15.5	18.8	0.0	0.8	15.0	0.0	15.0	0		
28†	24.5	15.0	19.8	0.0	1.8	4.4	0.0	4.4	0		
29†	19.0	16.0	17.5	0.5	0.0	1.0	0.0	1.0	0		
30†	25.5	14.5	20.0	0.0	2.0	0.7	0.0	0.7			

Daily Data Report for July 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†	26.5	17.0	21.8	0.0	3.8	0.0	0.0	0.0	0		
02†	27.0	15.5	21.3	0.0	3.3	0.0	0.0	0.0	0		
03†	25.0	14.5	19.8	0.0	1.8	0.0	0.0	0.0	0		
04†	25.0	13.5	19.3	0.0	1.3	0.0	0.0	0.0	0		
05†	26.0	15.0	20.5	0.0	2.5	0.0	0.0	0.0	0		
06†	28.5	16.5	22.5	0.0	4.5	8.5	0.0	8.5	0		
07†	24.0	17.5	20.8	0.0	2.8	0.4	0.0	0.4	0		
08†	23.5	16.0	19.8	0.0	1.8	0.2	0.0	0.2	0		
09†	17.5	13.5	15.5	2.5	0.0	0.0	0.0	0.0	0		
10†	22.0	14.0	18.0	0.0	0.0	0.0	0.0	0.0	0		