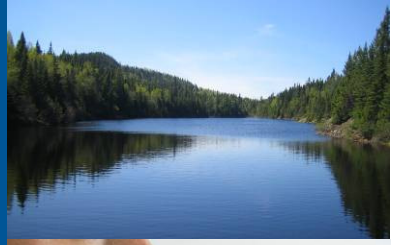
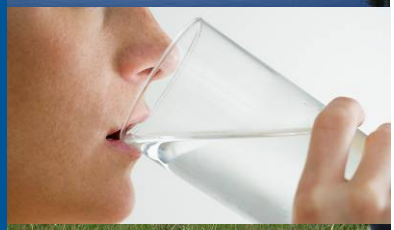






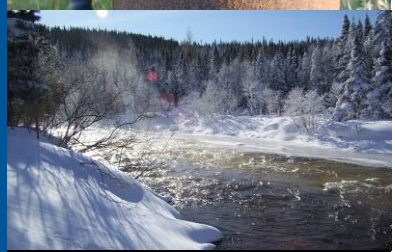

Real Time Water Quality Report
Humber River at Humber Village

Deployment Period 2011-06-30 to 2011-08-11

2011-09-30

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 30, 2011, and remained deployed continuously until August 11, 2011. This deployment period was a total of 42 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**
2011-06-30 Deployment	Temp (°C)	Good
	pH (units)	Excellent
	Sp. Conductivity (uS/cm)	Fair
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent
2011-08-11 Removal	Temp (°C)	Excellent
	pH (units)	Excellent
	Sp. Conductivity (uS/cm)	Fair
	Dissolved Oxygen (%)	Excellent
	Turbidity (NTU)	Good

Table 2

Data Interpretation

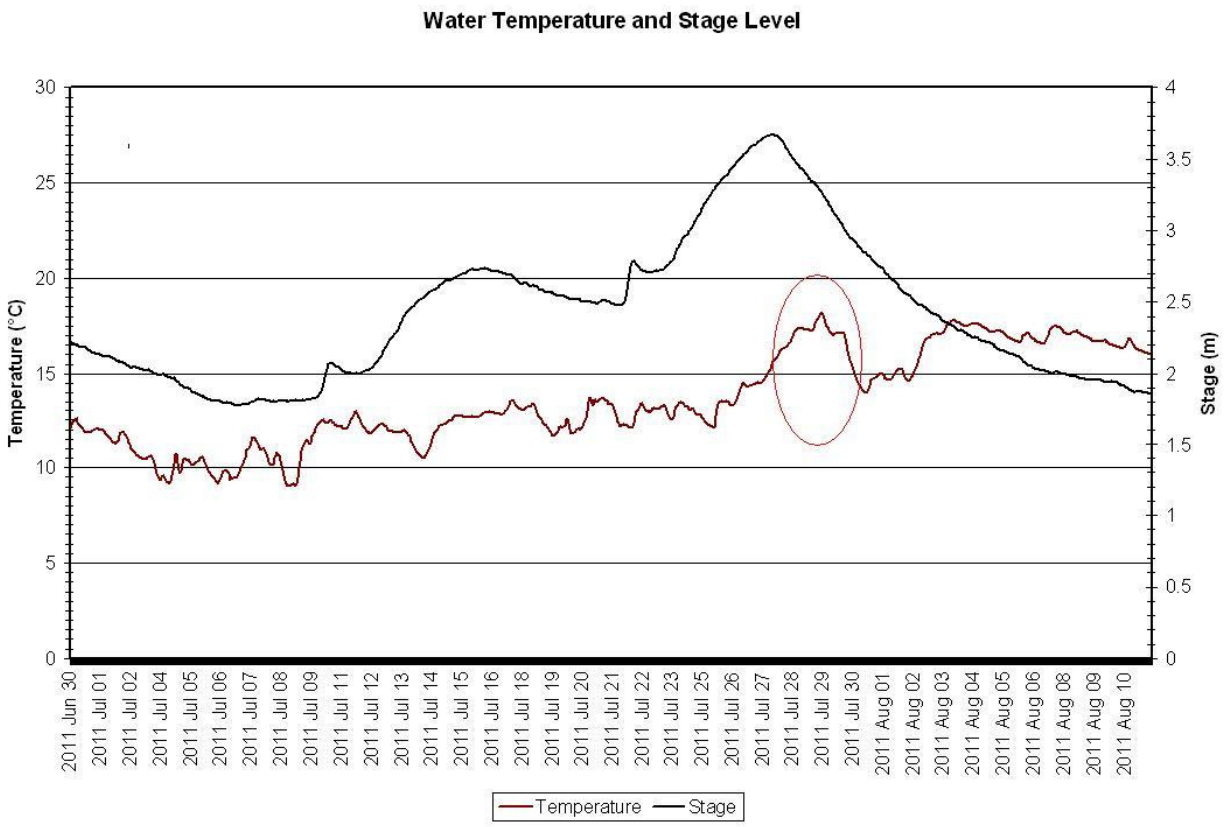

Figure 1

- The water temperature (**Figure 1**) ranged from a minimum of 9.01 ˚C to a maximum of 18.21 ˚C, with a general increasing trend throughout the deployment period.

- While diurnal temperature cycling caused by cooling each night and warming during the day is noticeable, it is not very pronounced and is partially hidden by other trends over the 2 to 4 day time frame, i.e. some times the diurnal trends are much easier to see than they are during this particular deployment.

- A significant increase in temperature around July 28th to 30th (see inside red oval) can be partially attributed to a period with increased air temperatures, and partly to a significant increase in flow caused by Deer Lake Power spilling a large volume of water from the Grand Lake Reservoir. During the middle of summer water in a lake or reservoir is generally warmer than moving river water and the thermal impact from a significant spill through Junction Brook is clear in the temperature trend.

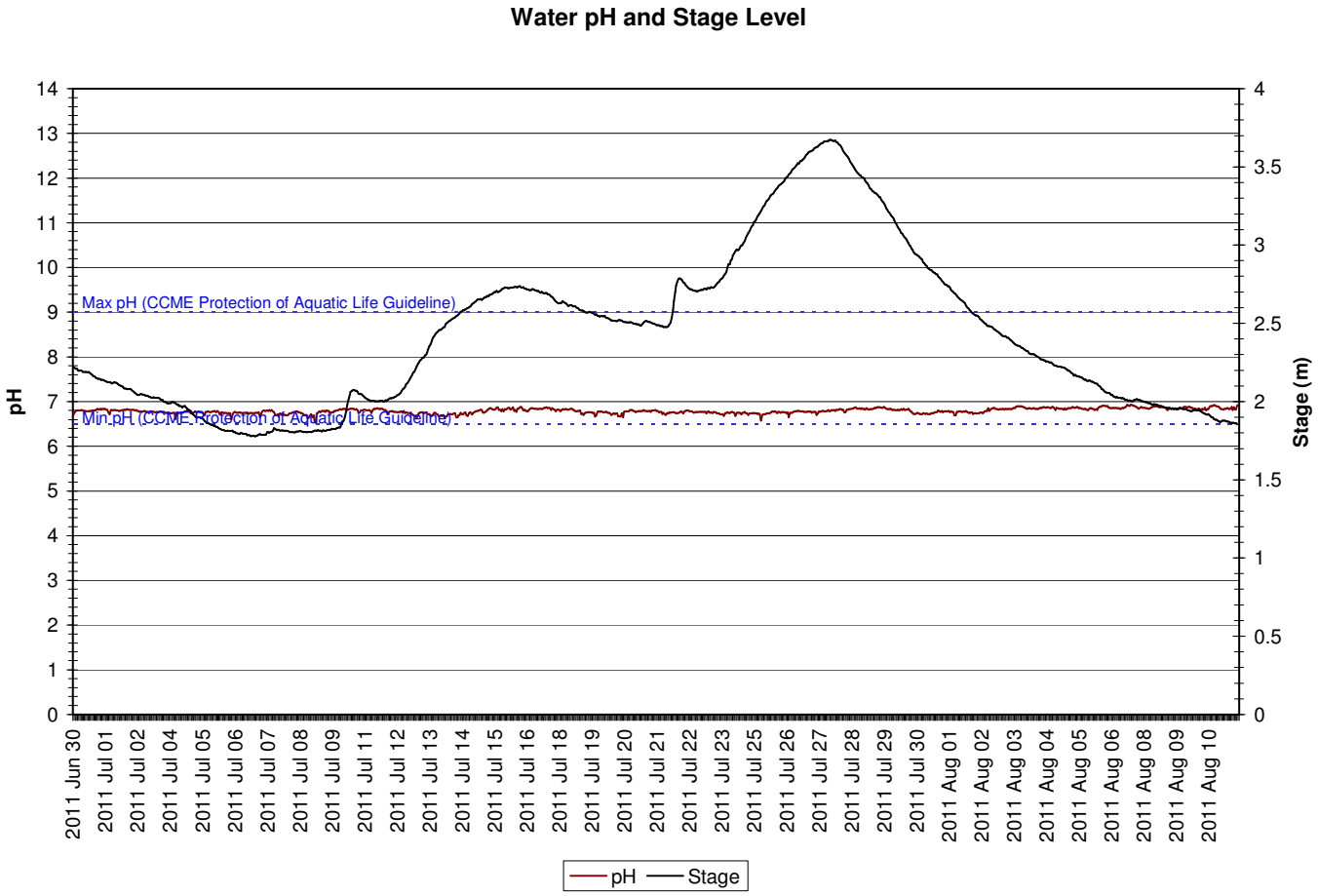

Figure 2

- The pH (**Figure 2**) ranged from a low of 6.53 to a high of 6.93 and remained very stable throughout the deployment period.

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

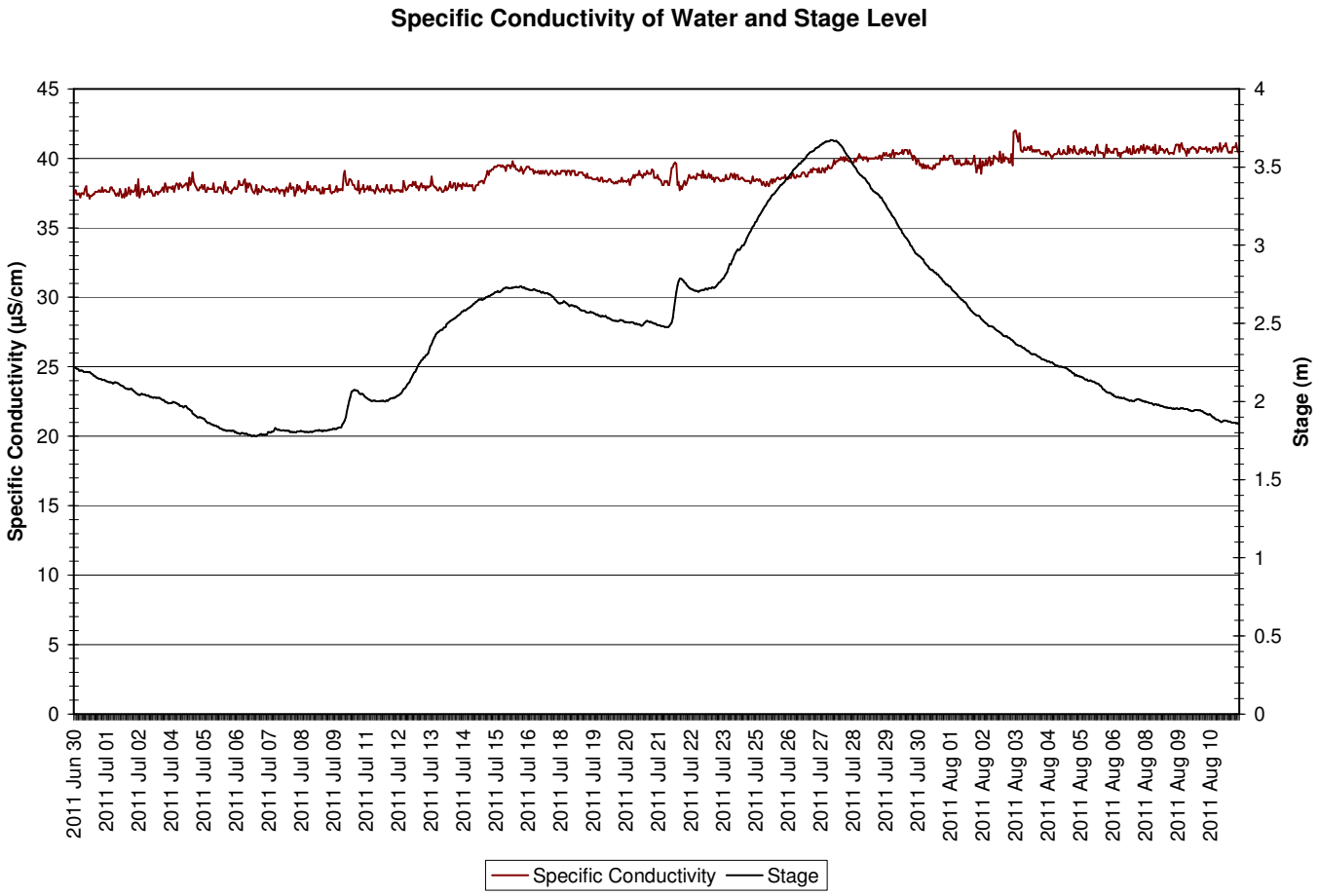

Figure 3

- The specific conductivity **(Figure 3)** ranged from a minimum of 37.1 µS/cm to a maximum of 42.0 µS/cm over the deployment period.

- There is a gentle rising trend in specific conductivity over the deployment period which is related to the rise in temperature over the deployment period.

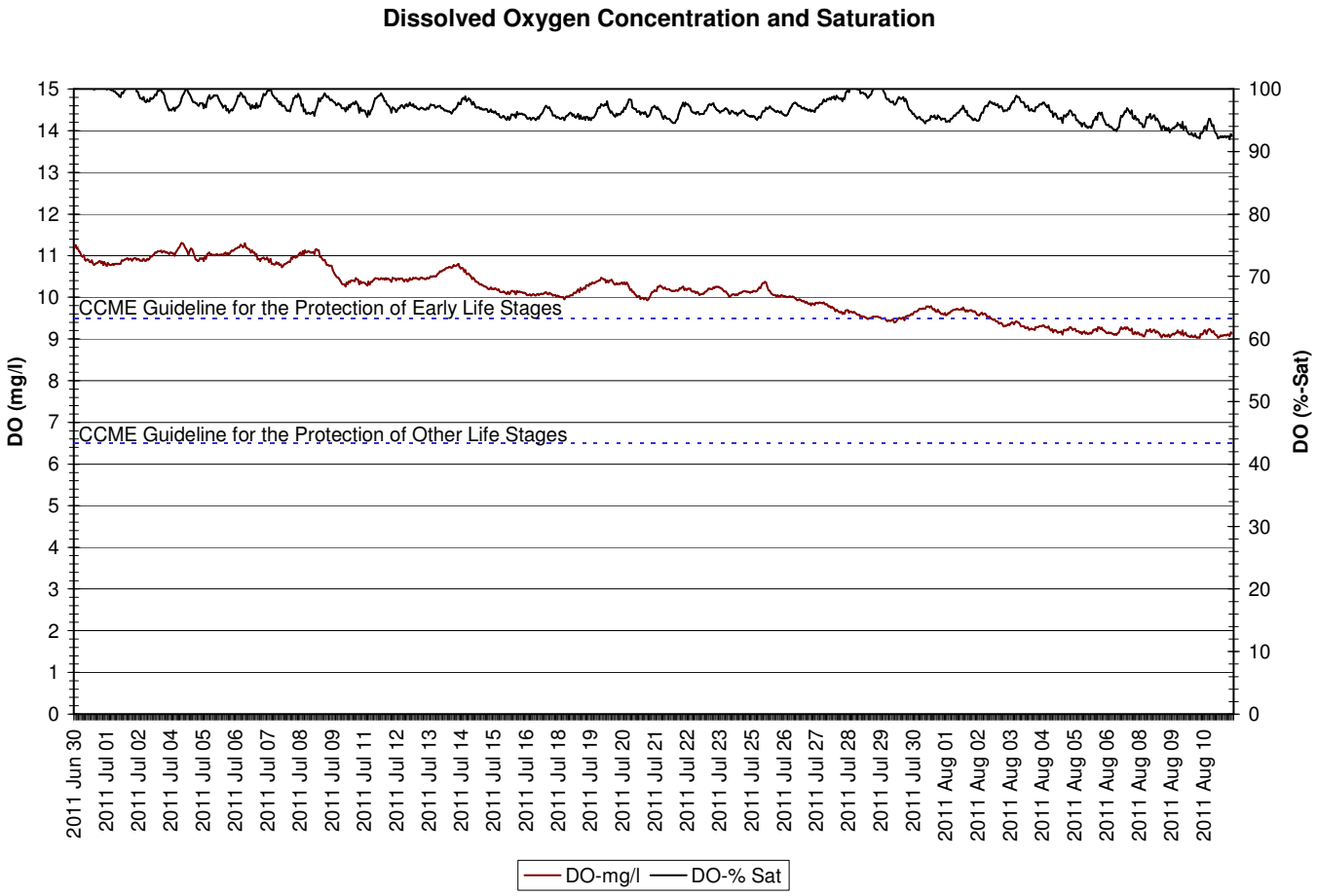

Figure 4

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 9.03 mg/L to a maximum of 11.31 mg/L over the deployment period. The percent saturation for dissolved oxygen ranged from a low of 92.0% to a high of 105.1%.

- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature and a gentle decreasing trend over the deployment period is related to an increasing temperature trend.

- 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* both cold water/other life stages (above 6.5 mg/L) and the majority of the values were above the cold water/early life stages (above 9.5 mg/L). Those values below the cold water/early life stages limit were after the end of July and outside the critical period for early life stages.

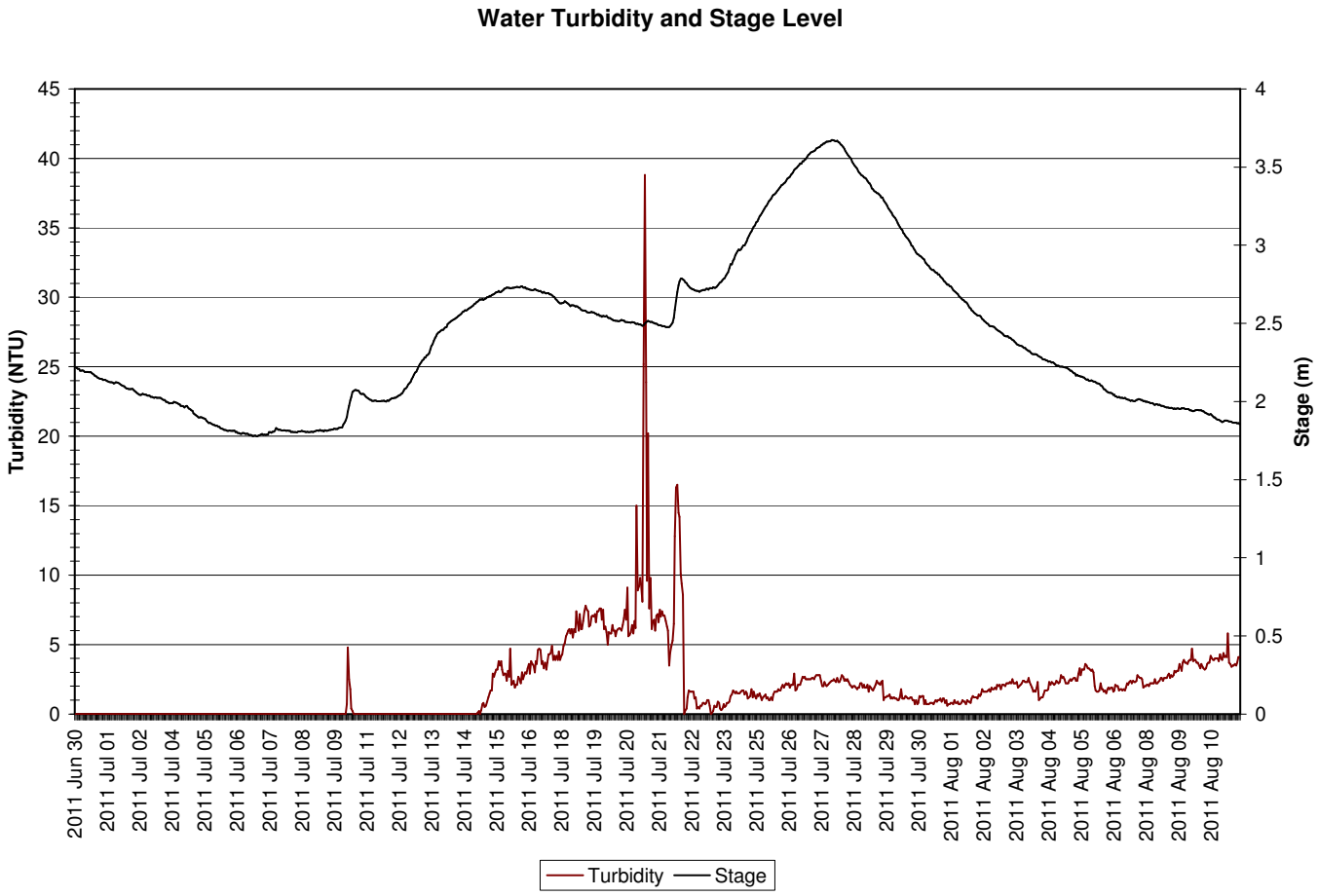

Figure 5

- Turbidity values ranged from 0.0 NTU to 38.8 NTU. Most of the higher turbidity readings can be attributed to a combination of biofouling * and/or debris accumulation** around the sensor after the initial reading on July 10. The turbidity at this site is usually close to zero but during the summer months biofouling can occur. Any fluctuations in turbidity related to other factors, such as siltation related to flood events or an upstream disturbance, can often be masked by interference from biofouling and debris accumulation.

* Biofouling is the growth of a thin film of algae, mould and/or other aquatic life forms and can even include interference from benthic macroinvertebrates. Biofouling interferes with the normal operation of a number of water quality sensors on the **DataSonde®** used at this site, including turbidity.
** Typical debris at this site includes small bits of plant matter such as grass or leaves which get trapped near the head of the turbidity sensor and interfere with normal readings.

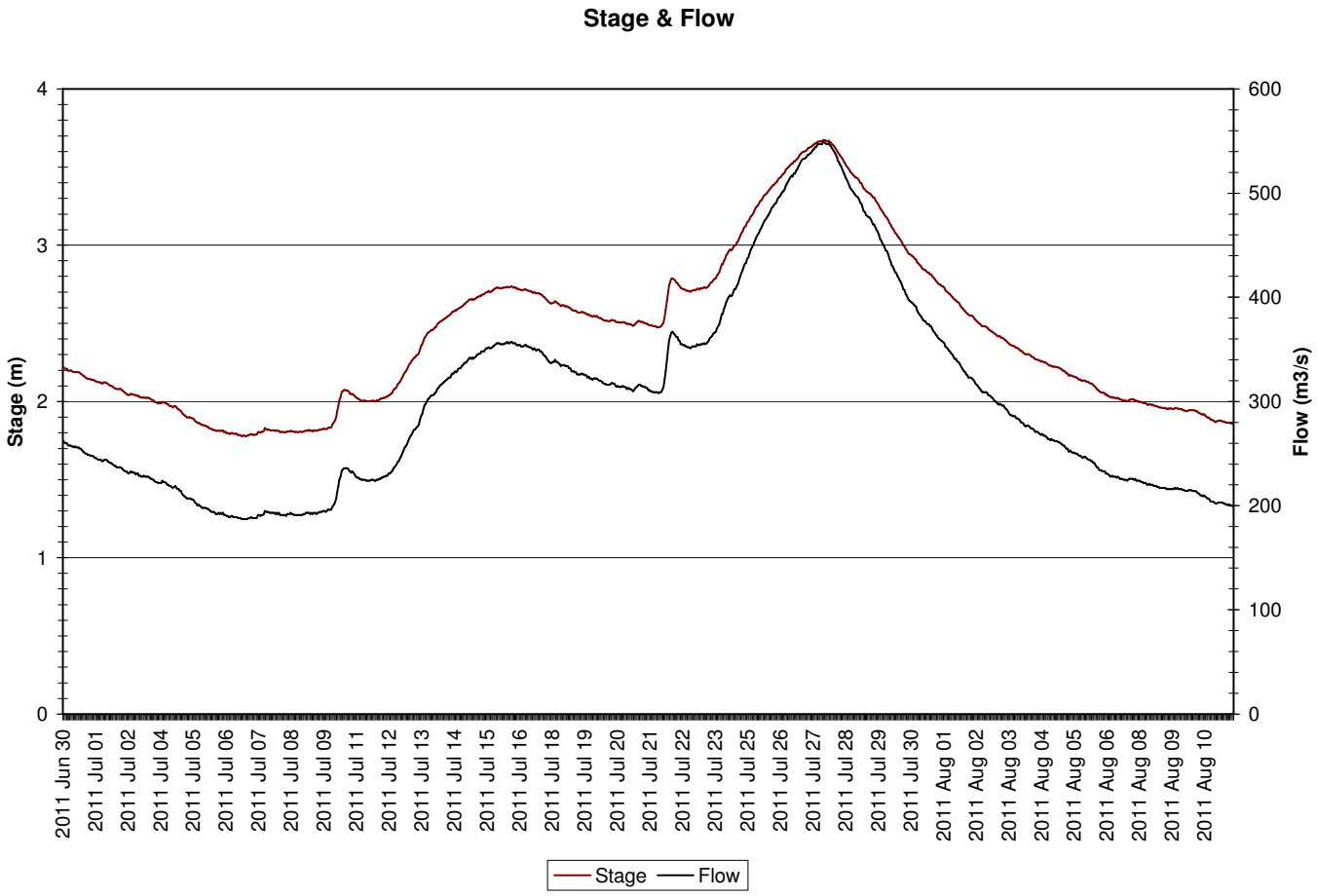

Figure 6

- The stage height (**Figure 6**) or water level ranged from a minimum of 1.78 m to a maximum of 3.67 m with the corresponding flow ranging from 187 m^3/s to 549 m^3/s.

- The peak flow from July 21 to July 28 can be largely attributed to the spilling of excess water from the Grand Lake Reservoir through the Junction Brook outlet.

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

Climate Data for July 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†	16.5	9.5	13.0	5.0	0.0	0.0	0.0	0.0	0		
02†	20.5	10.0	15.3	2.7	0.0	0.0	0.0	0.0	0		
03†	26.5	11.0	18.8	0.0	0.8	0.0	0.0	0.0	0		
04†	26.5	12.0	19.3	0.0	1.3	0.0	0.0	0.0	0		
05†	25.0	16.5	20.8	0.0	2.8	0.9	0.0	0.9	0		
06†	27.5	13.0	20.3	0.0	2.3	0.0	0.0	0.0	0		
07†	24.0	17.5	20.8	0.0	2.8	0.0	0.0	0.0	0		
08†	20.0	12.0	16.0	2.0	0.0	0.0	0.0	0.0	0		
09†	24.5	9.5	17.0	1.0	0.0	19.4	0.0	19.4	0		
10†	14.5	11.5	13.0	5.0	0.0	5.6	0.0	5.6	0		
11†	27.0	12.0	19.5	0.0	1.5	10.1	0.0	10.1	0		
12†	21.0	16.0	18.5	0.0	0.5	27.0	0.0	27.0	0		
13†	17.0	14.0	15.5	2.5	0.0	0.9	0.0	0.9	0		
14†	17.0	11.0	14.0	4.0	0.0	0.9	0.0	0.9	0		
15†	11.5	10.0	10.8	7.2	0.0	9.3	0.0	9.3	0		
16†	13.0	8.5	10.8	7.2	0.0	0.0	0.0	0.0	0		
17†	22.5	9.5	16.0	2.0	0.0	4.1	0.0	4.1	0		
18†	20.5	17.0	18.8	0.0	0.8	0.9	0.0	0.9	0		
19†	19.0	14.0	16.5	1.5	0.0	0.0	0.0	0.0	0		
20†	21.5	9.5	15.5	2.5	0.0	8.7	0.0	8.7	0		
21†	19.5	14.5	17.0	1.0	0.0	41.6	0.0	41.6	0		
22†	20.0	12.5	16.3	1.7	0.0	0.0	0.0	0.0	0		
23†	22.0	11.0	16.5	1.5	0.0	16.4	0.0	16.4	0		
24†	15.0	11.0	13.0	5.0	0.0	0.9	0.0	0.9	0		
25†	21.0	9.0	15.0	3.0	0.0	0.0	0.0	0.0	0		
26†	26.0	10.5	18.3	0.0	0.3	0.0	0.0	0.0	0		
27†	23.5	13.5	18.5	0.0	0.5	0.0	0.0	0.0	0		
28†	24.0	13.5	18.8	0.0	0.8	0.0	0.0	0.0	0		
29†	25.0	10.5	17.8	0.2	0.0	0.0	0.0	0.0	0		
30†	22.0	13.5	17.8	0.2	0.0	4.4	0.0	4.4	0		
31†	17.5	15.0	16.3	1.7	0.0	4.9	0.0	4.9	0		

Climate Data for August 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†	20.5	15.0	17.8	0.2	0.0	0.0	0.0	0.0	0		
02†	22.0	13.5	17.8	0.2	0.0	0.0	0.0	0.0	0		
03†	22.5	13.5	18.0	0.0	0.0	0.0	0.0	0.0	0		
04†	18.5	13.5	16.0	2.0	0.0	0.0	0.0	0.0	0		
05†	17.5	13.0	15.3	2.7	0.0	0.0	0.0	0.0	0		
06†	18.0	12.0	15.0	3.0	0.0	0.0	0.0	0.0	0		
07†	22.0	11.0	16.5	1.5	0.0	0.0	0.0	0.0	0		
08†	16.0	10.5	13.3	4.7	0.0	9.5	0.0	9.5	0		
09†	15.5	11.0	13.3	4.7	0.0	2.0	0.0	2.0	0		
10†	15.0	11.5	13.3	4.7	0.0	0.9	0.0	0.9	0		
11†	14.0	11.5	12.8	5.2	0.0	1.9	0.0	1.9	0		