

Real Time Water Quality Report Humber River at Humber Village

Deployment Period 2012-09-07 to 2012-10-09

2012-10-18



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 September 7, 2012, and remained deployed continuously until October 9, 2012. This deployment period was a total of 32 days and the instrument performed well. It should be noted that oxygen drifted off calibration slightly during the deployment and was only ranked “Fair” 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.

Parameter	Rank				
	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

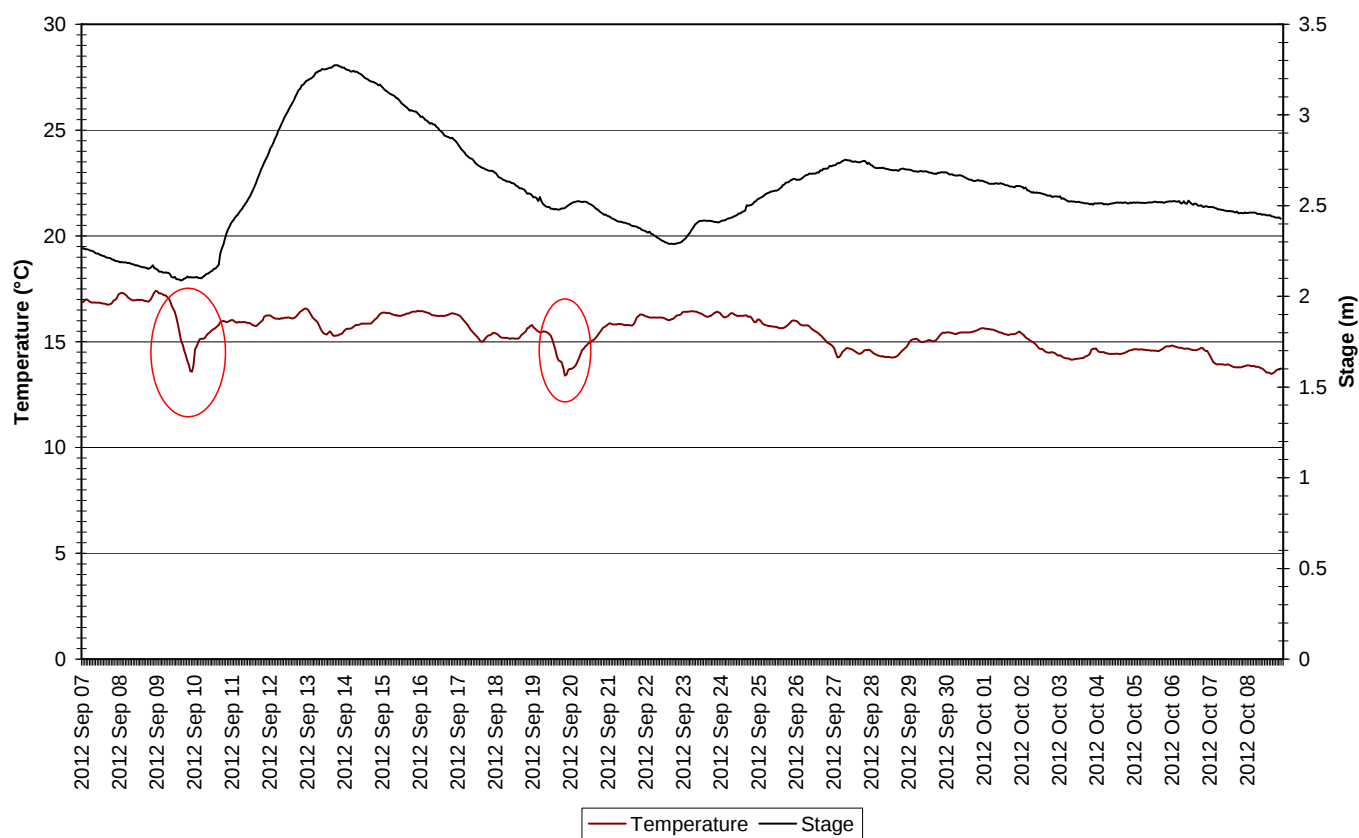
- Upon deployment, a QA/QC **DataSonde®** is temporarily deployed *in situ*, adjacent to the Field **DataSonde®**. Depending on the degree of difference between each parameter from the Field and QA/QC sondes a qualitative rank is assigned (See Table 1). The possible ranks, from most to least desirable, 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
2012-09-07 Deployment	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Excellent
	Turbidity (NTU)	Excellent
2012-10-09 Removal	Temp (°C)	Excellent
	pH (units)	Good
	Sp. Conductivity (uS/cm)	Excellent
	Dissolved Oxygen (mg/L)	Fair
	Turbidity (NTU)	Excellent

Table 2

Data Interpretation

Water Temperature and Stage Level

**Figure 1**

- Over the deployment period the water temperature (**Figure 1**) ranged from a minimum of 13.40 °C to a maximum of 17.41 °C, with an average temperature of 15.42°C. There is a general cooling trend over the course of the deployment period.

- While it is possible to see some evidence of diurnal temperature cycling, with warming during the day and cooling at night, these short term trends are masked by a number of significant changes in temperature over a two to three day time frame. Most notable are two significant dips in temperature around September 10th and September 20th (See inside red ovals). The dip around September 10th appears to be related to heavy rainfall on September 9th and 10th, while the dip around September 20th appears to be related to a significant drop in air temperature combined with significant rainfall.

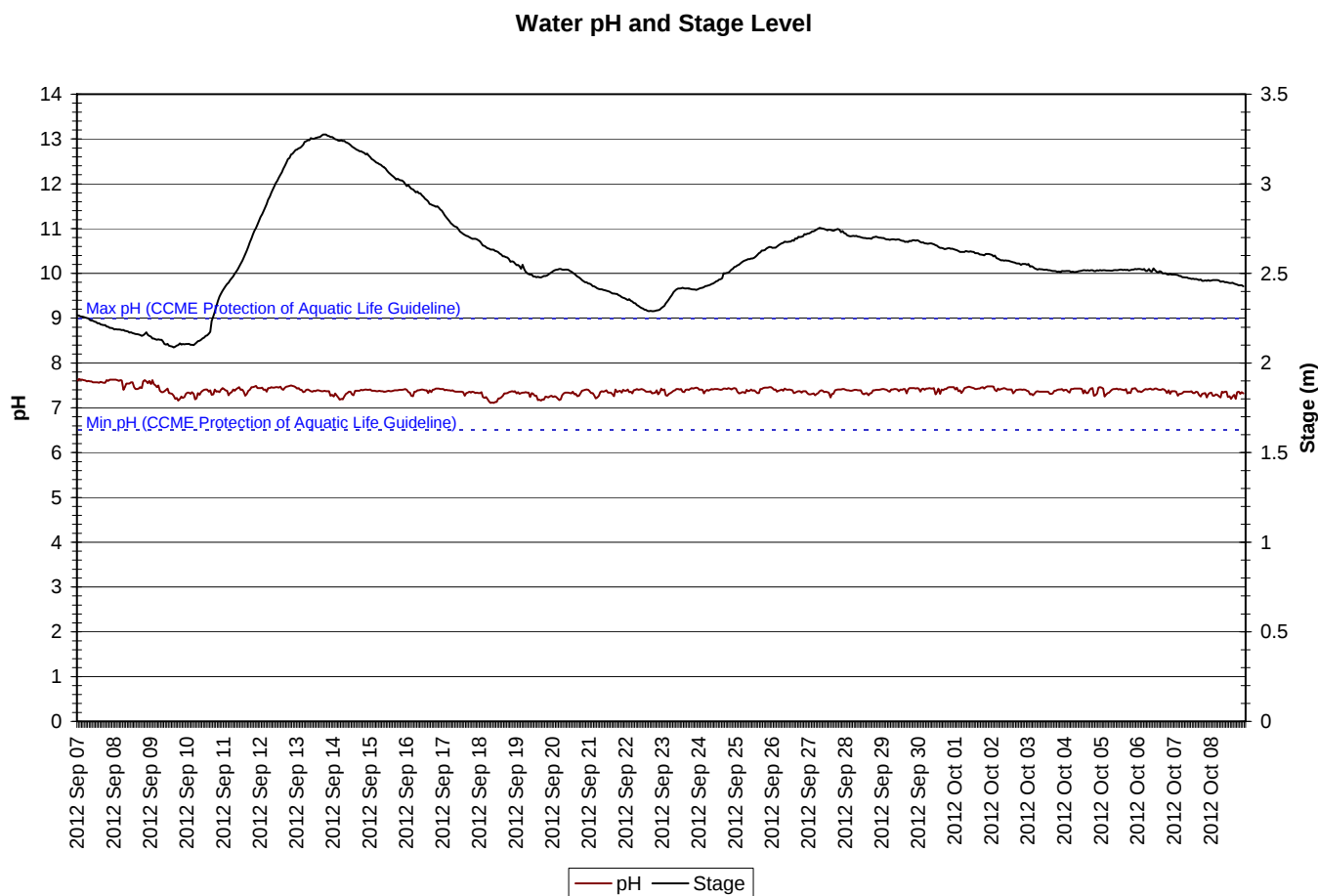
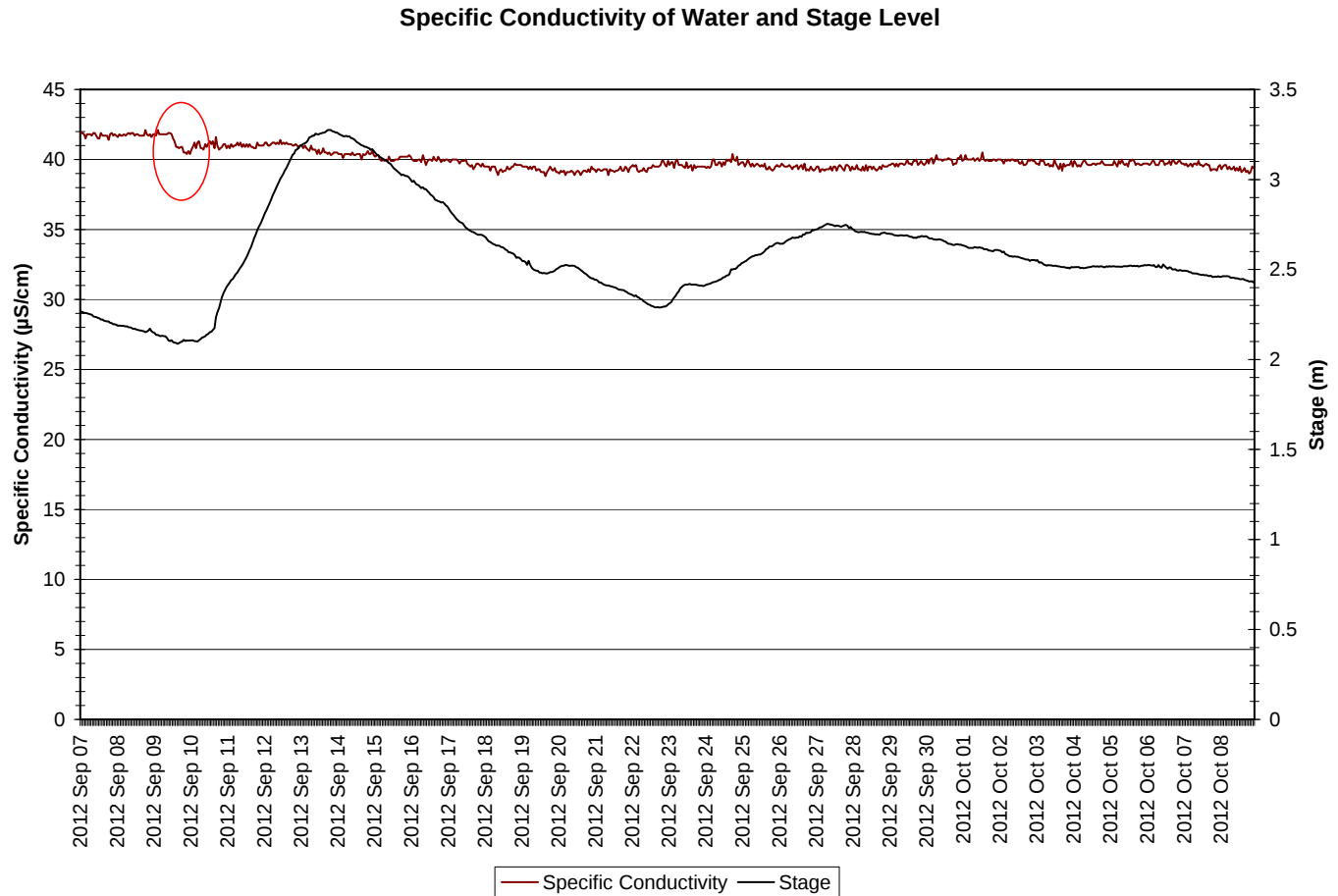


Figure 2

- The pH (**Figure2**) ranged from a minimum of 7.11 to a maximum of 7.64, with an average of 7.38.
- 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 38.8 $\mu\text{S}/\text{cm}$ to a maximum of 42.1 $\mu\text{S}/\text{cm}$ and showed a gentle decreasing trend over the deployment period. The average specific conductivity for the entire deployment period was 40.0 $\mu\text{S}/\text{cm}$.
- There is a noticeable dip in conductivity between September 9th and 10th (See inside red oval) which is related to heavy rainfall and a significant dip in water temperature for the corresponding period. Heavy rain dilutes the river water and decreases specific conductivity and the specific conductivity of water decreases with decreasing temperature.

Dissolved Oxygen Concentration and Saturation

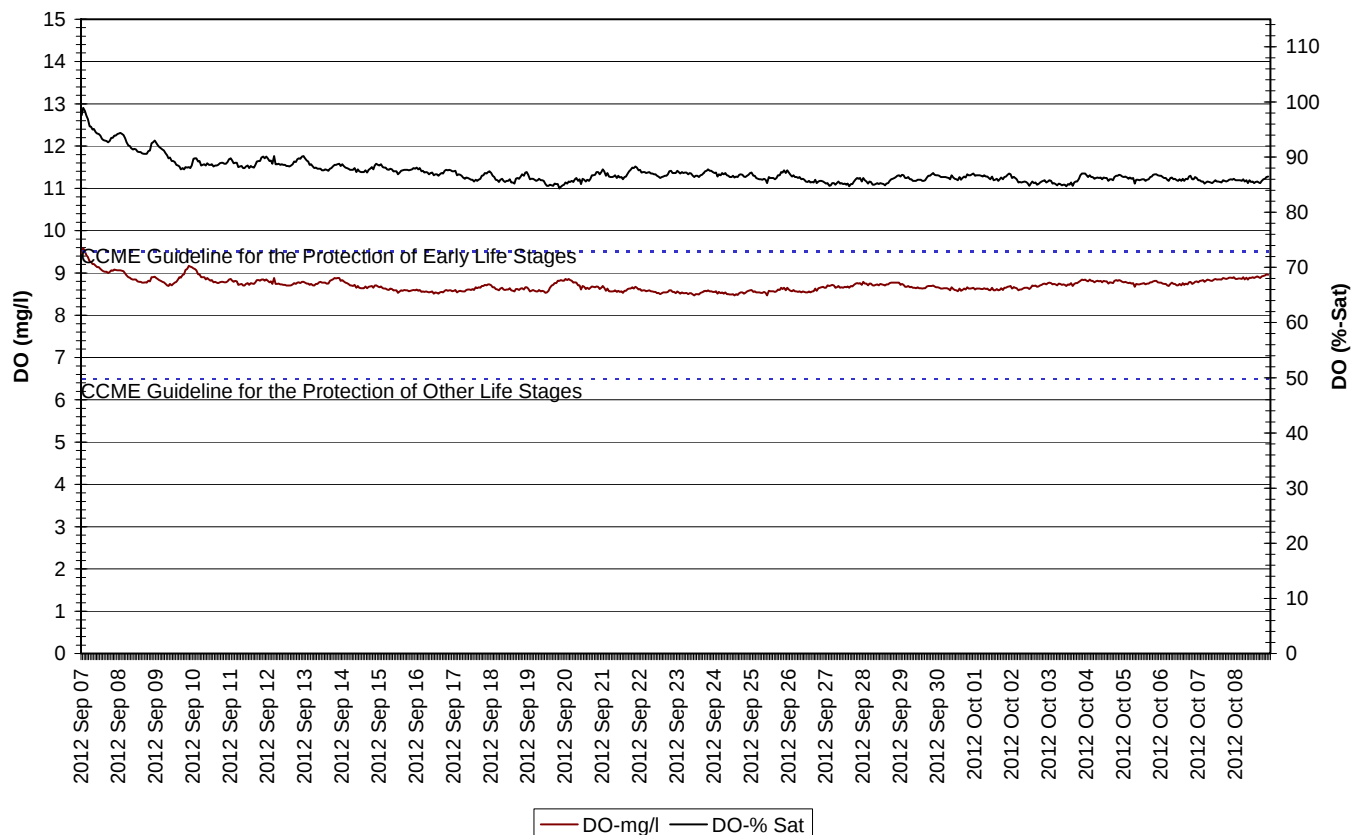
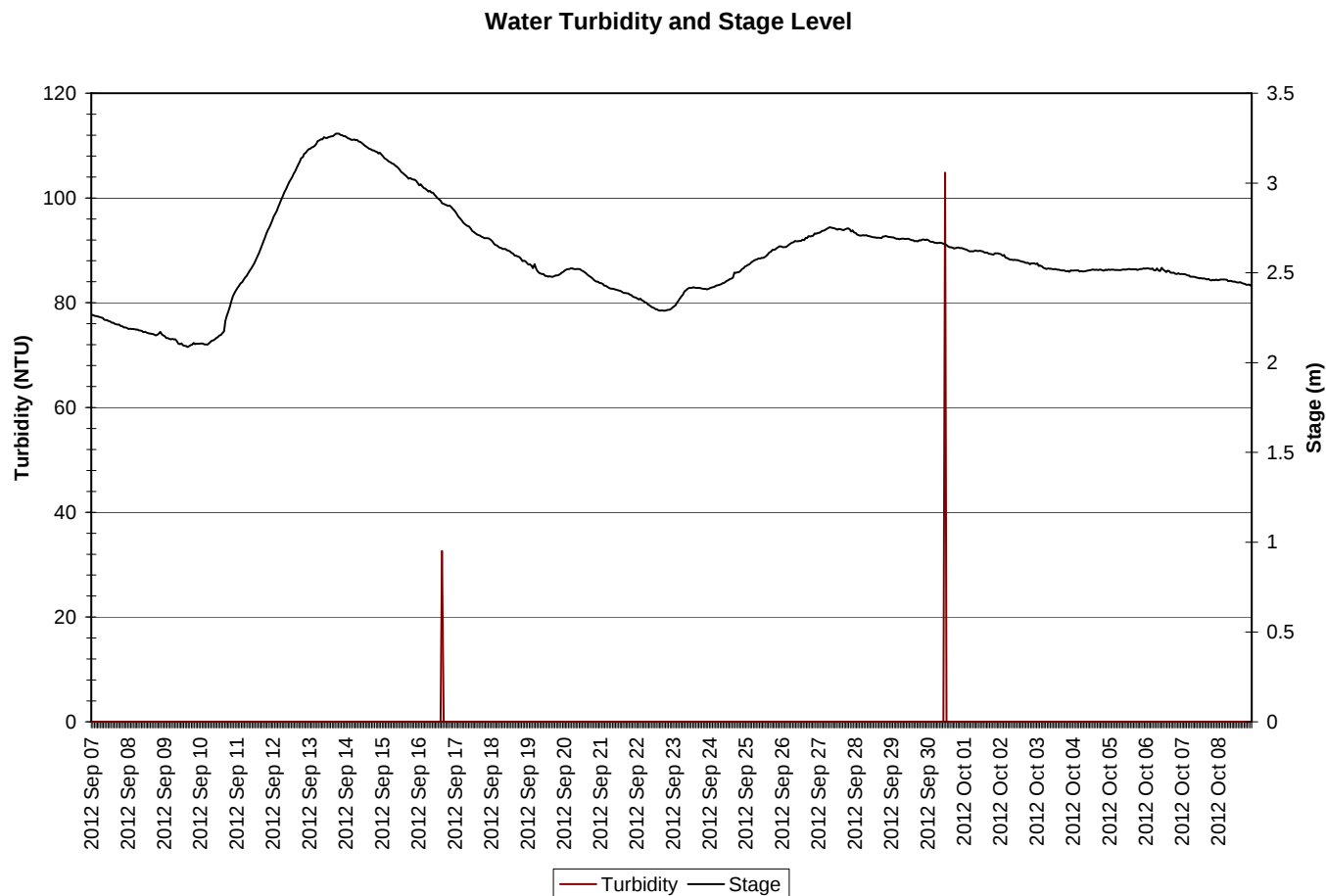
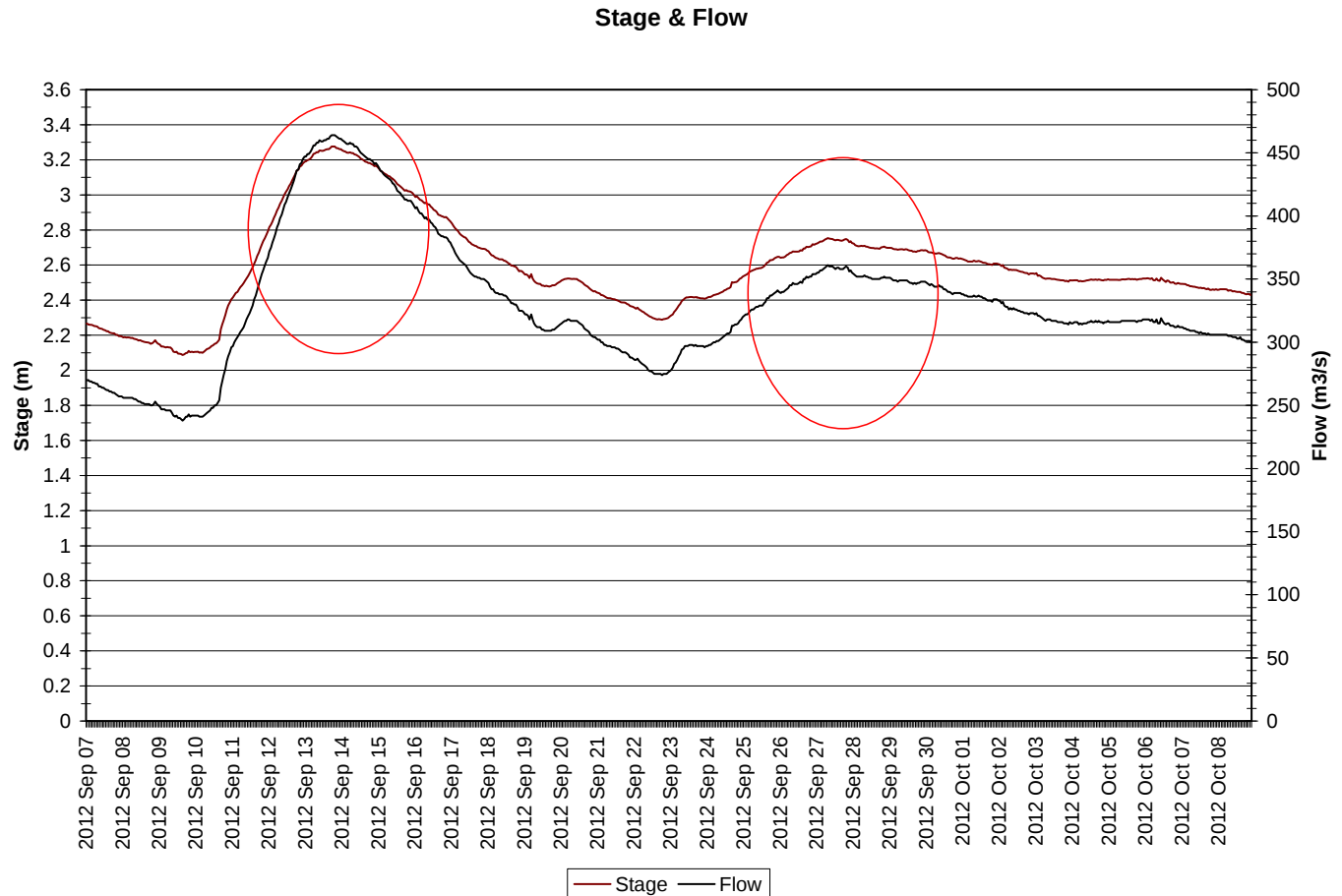


Figure 4

- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 8.47 mg/L to a maximum of 9.58 mg/L over the deployment period with an average of 8.71 mg/L. The percent saturation for dissolved oxygen ranged from a low of 84.3% to a high of 98.9% with an average of 87.2%.
- 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.
- 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 are two spikes in turbidity on September 17th and October 1st. Both of these spikes are very short term and reach significant levels which are a clear indication that they are false readings caused by some type of organic debris temporarily blocking the sensor, rather than an actual change in the waters turbidity level.

**Figure 6**

- The stage height (**Figure 6**) or water level ranged from a minimum of 2.09 m to a maximum of 3.28 m with an average of 2.59 m. The flow ranged from a low of 238.00 m³/s to a high of 464.00 m³/s with an average of 330.98 m³/s.
- This deployment period is dominated by two periods with marked increases in stage height and flow (see inside red ovals). Both these periods are related to significant rainfall in the watershed area. The first and most significant peak, centered around September 13th and 14th, is related to heavy rains of 70 to 80 millimetres which took place on September 9th and 10th. The second peak is centered around September 27th and 28th and is related to sustained rainfall for the preceding week.

Climate Data

- Climate data for most of 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

Daily Data Report for September 2012

<u>D</u> <u>a</u> <u>y</u>	<u>Max</u> <u>Temp</u> °C	<u>Min</u> <u>Temp</u> °C	<u>Mean</u> <u>Temp</u> °C	<u>Heat</u> <u>Deg</u> <u>Days</u>	<u>Cool</u> <u>Deg</u> <u>Days</u>	<u>Total</u> <u>Rain</u> mm	<u>Total</u> <u>Snow</u> cm	<u>Total</u> <u>Precip</u> mm	<u>Snow on</u> <u>Grnd</u> cm	<u>Dir of</u> <u>Max</u> <u>Gust</u> 10s deg	<u>Spd of</u> <u>Max Gust</u> km / h
<u>07</u> † 18.5	12.5	15.5	2.5	0.0	0.0	0.0	0.0	0.0	0		
<u>08</u> † 21.5	12.5	17.0	1.0	0.0	0.0	0.0	0.0	0.0	0		
<u>09</u> † 25.0	13.5	19.3	0.0	1.3	19.4	0.0	19.4	0			
<u>10</u> † 22.0	17.0	19.5	0.0	1.5	54.7	0.0	54.7	0			
<u>11</u> † 16.5	15.0	15.8	2.2	0.0	1.7	0.0	1.7	0			
<u>12</u> † 21.5	9.5	15.5	2.5	0.0	0.0	0.0	0.0	0.0	0		
<u>13</u> † 25.0	9.5	17.3	0.7	0.0	0.0	0.0	0.0	0.0	0		
<u>14</u> † 26.5	19.0	22.8	0.0	4.8	0.0	0.0	0.0	0.0	0		
<u>15</u> † 23.0	16.0	19.5	0.0	1.5	0.0	0.0	0.0	0.0	0		
<u>16</u> † 20.0	14.5	17.3	0.7	0.0	4.4	0.0	4.4	0			
<u>17</u> † 20.0	11.0	15.5	2.5	0.0	0.2	0.0	0.2	0			
<u>18</u> † 20.5	11.0	15.8	2.2	0.0	0.0	0.0	0.0	0.0	0		
<u>19</u> † 22.0	4.0	13.0	5.0	0.0	6.0	0.0	6.0	0			
<u>20</u> † 14.0	10.0	12.0	6.0	0.0	23.0	0.0	23.0	0			
<u>21</u> † 22.5	11.0	16.8	1.2	0.0	0.0	0.0	0.0	0.0	0		
<u>22</u> † 24.5	14.0	19.3	0.0	1.3	12.1	0.0	12.1	0			
<u>23</u> † 22.5	18.5	20.5	0.0	2.5	16.6	0.0	16.6	0			
<u>24</u> † 19.0	16.5	17.8	0.2	0.0	9.6	0.0	9.6	0			
<u>25</u> † 15.5	12.0	13.8	4.2	0.0	1.2	0.0	1.2	0			
<u>26</u> † 19.5	9.5	14.5	3.5	0.0	8.0	0.0	8.0	0			
<u>27</u> † 17.0	12.5	14.8	3.2	0.0	6.1	0.0	6.1	0			
<u>28</u> † 13.0	9.0	11.0	7.0	0.0	0.0	0.0	0.0	0			
<u>29</u> † 16.5	4.5	10.5	7.5	0.0	0.4	0.0	0.4	0			
<u>30</u> † 20.0	9.0	14.5	3.5	0.0	0.0	0.0					

Daily Data Report for October 2012

<u>D</u> <u>a</u> <u>y</u>	<u>Max</u> <u>Temp</u> °C	<u>Min</u> <u>Temp</u> °C	<u>Mean</u> <u>Temp</u> °C	<u>Heat</u> <u>Deg</u> <u>Days</u>	<u>Cool</u> <u>Deg</u> <u>Days</u>	<u>Total</u> <u>Rain</u> mm	<u>Total</u> <u>Snow</u> cm	<u>Total</u> <u>Precip</u> mm	<u>Snow on</u> <u>Grnd</u> cm	<u>Dir of</u> <u>Max</u> <u>Gust</u> 10s deg	<u>Spd of</u> <u>Max Gust</u> km / h
<u>01</u> † 21.0	12.0	16.5	1.5	0.0	8.1	0.0	8.1	0			
<u>02</u> † 17.0	12.5	14.8	3.2	0.0	0.4	0.0	0.4	0			
<u>03</u> † 15.0	12.5	13.8	4.2	0.0	0.0	0.0	0.0	0			
<u>04</u> † 14.5	11.0	12.8	5.2	0.0	0.0	0.0	0.0	0			
<u>05</u> † 10.5	8.0	9.3	8.7	0.0	0.0	0.0	0.0	0			
<u>06</u> † 16.5	8.0	12.3	5.7	0.0	0.0	0.0	0.0	0			
<u>07</u> † 17.5	14.0	15.8	2.2	0.0	7.6	0.0	7.6	0			
<u>08</u> † 12.5	9.5	11.0	7.0	0.0	7.4	0.0	7.4	0			