

Real Time Water Quality Report Humber River at Humber Village

Deployment Period 2010-09-27 to 2010-12-15

2011-01-11



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 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 27, 2010, and remained deployed continuously until December 15, 2010. This deployment period was slightly longer than normal however the instrument maintained good operation for the duration of it.

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 μ S/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[®] before and after a thorough cleaning in order to assess the degree of biofouling. During calibration in the laboratory, an assessment of calibration drift is made and the two error values are combined to give Total Error (T_e). If T_e exceeds a predetermined data correction criterion, a correction based on T_e is applied to the dataset using linear interpolation. Based on the value for T_e, a qualitative statement is also made on the data quality upon 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					
2010-09-27 Deployment	Temp (°C)	Good					
	pH (units)	Good					
	Sp. Conductivity (uS/cm)	Excellent					
	Dissolved Oxygen (mg/L)	Excellent					
	Turbidity (NTU)	Excellent					
	Temp (°C)	Excellent					
2010 12 15	pH (units)	Excellent					
2010-12-13 Romoval	Sp. Conductivity (uS/cm)	Excellent					
Kennoval	Dissolved Oxygen (%)	Excellent					
	Turbidity (NTU)	Excellent					

Table 2

Data Interpretation



Temperature and Stage Height

• The water temperature (**Figure 1**) ranged from a minimum of 5.98 °C to a maximum of 13.52 °C, with a general declining trend throughout the deployment period.

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



pH and Stage Height

- The pH (**Figure 2**) ranged from a low of 6.63 to a high of 7.17 and remained quite 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.



Specific Conductivity and Stage Height

- The specific conductivity (Figure 3) ranged from a minimum of 35.7 μS/cm to a maximum of 39.5 μS/cm over the deployment period.
- Stage height and flow were relatively stable throughout the deployment period and did not seem to have a significant impact on conductivity.

Dissolved Oxygen (mg/l and %Sat)



- The dissolved oxygen (**Figure 4**) values ranged from a minimum of 9.56 mg/L to a maximum of 11.26 mg/L over the deployment period. The corrected percent saturation for dissolved oxygen ranged from a low of 88.1% to a high of 94.1%.
- By comparing the corrected and uncorrected percent saturation data it can be seen that the instrument slowly drifted off calibration over the deployment period.
- Dissolved oxygen (mg/L) is generally inversely proportional to water temperature and an increasing trend over the deployment period can be attributed to the general cooling trend in water temperature. A regular diurnal fluctuation in DO can also be seen which 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).



Turbidity and Stage Height

• With the exception of several significant spikes around November 14th and 15th the turbidity values (**Figure 5**) were consistently at 0 NTU for the entirety of the deployment period. As no plausible cause can be determined for these spikes it is assumed that they were caused by organic debris temporarily trapped around the turbidity sensor.



The stage height (Figure 6) or water level ranged from a minimum of 1.892 m to a maximum of 3.086 m with the corresponding flow ranging from 206 m³/s to 425 m³/s.

Climate Data

• Climate data for the full deployment period from the nearest station (Corner Brook) is included in Appendix A.

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Appendix A

Daily Data Report for September 2010

D a y	<u>Max</u> <u>Temp</u> ℃ ₩	<u>Min</u> <u>Temp</u> ℃ ₩	<u>Mean</u> <u>Temp</u> °C ₩	<u>Heat</u> Deg Days °C ₩	<u>Cool</u> Deg Days °C ₩	<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 ₩	Dir of Max Gust 10's Deg	<u>Spd of</u> <u>Max Gust</u> km/h
27†	14.0	0.0	7.0	11.0	0.0	0.0	0.0	0.0	0		
28†	19.5	8.0	13.8	4.2	0.0	33.8	0.0	33.8	0		
29†	21.0	15.5	18.3	0.0	0.3	15.8	0.0	15.8	0		
30†	21.5	12.5	17.0	1.0	0.0	0.4	0.0	0.4	0		
Sum				133.8	14.2	124.9	0.0	124.9			
Avg	17.1	10.9	13.99								
Xtrm	28.0	0.0									

Daily Data Report for October 2010

D	<u>Max</u> Temp	<u>Min</u> Temp	<u>Mean</u> Temp	<u>Heat</u> Deg Days	<u>Cool</u> Deg Davs	<u>Total</u> <u>Rain</u>	<u>Total</u> <u>Snow</u>	<u>Total</u> Precip	<u>Snow on</u> <u>Grnd</u>	<u>Dir of</u> <u>Max</u> Gust	<u>Spd of</u> Max Gust
y	°C M	°C M	°C M	°C	°Č M	mm M	cm M	mm M	cm M	10's Deg	km/h
01†	27.0	18.0	22.5	0.0	4.5	0.0	0.0	0.0	0		
02†	26.0	18.5	22.3	0.0	4.3	9.6	0.0	9.6	0		
03†	12.0	10.0	11.0	7.0	0.0	0.0	0.0	0.0	0		
04†	14.0	5.0	9.5	8.5	0.0	0.0	0.0	0.0	0		
05†	14.0	6.0	10.0	8.0	0.0	0.0	0.0	0.0	0		
06†	9.5	6.0	7.8	10.2	0.0	3.0	0.0	3.0	0		
07†	15.0	1.5	8.3	9.7	0.0	14.9	0.0	14.9	0		
08†	12.5	9.5	11.0	7.0	0.0	6.6	0.0	6.6	0		
09†	9.5	5.5	7.5	10.5	0.0	10.0	0.0	10.0	0		
10†	8.0	5.0	6.5	11.5	0.0	16.4	0.0	16.4	0		
11†	8.5	4.0	6.3	11.7	0.0	2.6	0.0	2.6	0		
12†	12.5	4.5	8.5	9.5	0.0	6.6	0.0	6.6	0		
13†	10.5	6.0	8.3	9.7	0.0	5.2	0.0	5.2	0		
14†	9.5	5.5	7.5	10.5	0.0	0.2	0.0	0.2	0		
15†	15.0	0.5	7.8	10.2	0.0	17.7	0.0	17.7	0		
16†	12.5	5.5	9.0	9.0	0.0	0.0	0.0	0.0	0		
17†	18.0	11.0	14.5	3.5	0.0	16.7	0.0	16.7	0		
18†	12.0	8.0	10.0	8.0	0.0	13.3	0.0	13.3	0		
19†	8.0	4.0	6.0	12.0	0.0	1.6	0.0	1.6	0		
20†	12.0	4.0	8.0	10.0	0.0	0.0	0.0	0.0	0		
21†	12.5	2.5	7.5	10.5	0.0	10.3	0.0	10.3	0		
22†	10.0	4.5	7.3	10.7	0.0	12.6	0.0	12.6	0		
23†	9.0	5.0	7.0	11.0	0.0	1.7	0.0	1.7	0		
24†	8.0	5.0	6.5	11.5	0.0	0.7	0.0	0.7	0		
25†	7.5	4.0	5.8	12.2	0.0	0.0	0.0	0.0	0		
26†	7.5	1.0	4.3	13.7	0.0	0.0	0.0	0.0	0		
27†	14.0	-2.5	5.8	12.2	0.0	8.0	0.0	8.0	0		
28†	16.0	5.5	10.8	7.2	0.0	0.6	0.0	0.6	0		
29†	13.5	5.0	9.3	8.7	0.0	13.7	0.0	13.7	0		
30†	8.0	5.5	6.8	11.2	0.0	15.0	0.0	15.0	0		
31†	6.0	4.0	5.0	13.0	0.0	6.4	0.0	6.4	0		
Sum				288.4	8.8	193.4	0.0	193.4			
Avg	12.2	5.7	8.96								
Xtrm	27.0	-2.5									

Daily Data Report for November 2010

D a y	<u>Max</u> <u>Temp</u> °C ₩	<u>Min</u> <u>Temp</u> °C ₩	<u>Mean</u> <u>Temp</u> °C ₩	<u>Heat</u> Deg Days °C ₩	<u>Cool</u> Deg Days °C ₩	<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 ₩	Dir of Max Gust 10's Deg	<u>Spd of</u> <u>Max Gust</u> km/h
01†	3.5	0.5	2.0	16.0	0.0	0.0	0.0	0.0	0		
02†	4.0	-0.5	1.8	16.2	0.0	0.4	0.4	0.8	0		
03†	4.5	0.0	2.3	15.7	0.0	0.4	0.0	0.4	0		
04†	6.0	1.5	3.8	14.2	0.0	0.4	0.0	0.4	0		
05†	18.0	0.5	9.3	8.7	0.0	5.4	0.0	5.4	0		
06†	17.5	15.0	16.3	1.7	0.0	12.0	0.0	12.0	0		
07†	19.5	11.0	15.3	2.7	0.0	0.0	0.0	0.0	0		
08†	11.5	5.5	8.5	9.5	0.0	6.4	0.0	6.4	0		
09†	10.0	6.0	8.0	10.0	0.0	0.3	0.0	0.3	0		
10†	4.5	0.5	2.5	15.5	0.0	0.0	0.0	0.0	0		
11†	4.0	-2.0	1.0	17.0	0.0	0.0	0.0	0.0	0		
12†	4.0	-2.0	1.0	17.0	0.0	0.0	0.0	0.0	0		
13†	15.0	0.5	7.8	10.2	0.0	0.0	0.0	0.0	0		
14†	5.0	2.5	3.8	14.2	0.0	0.0	0.0	0.0	0		
15†	6.0	-5.0	0.5	17.5	0.0	0.0	0.0	0.0	0		
16†	9.0	0.0	4.5	13.5	0.0	0.4	0.0	0.4	0		
17†	11.5	5.0	8.3	9.7	0.0	4.4	0.0	4.4	0		
18†	13.0	7.0	10.0	8.0	0.0	9.9	0.0	9.9	0		
19†	4.0	0.0	2.0	16.0	0.0	0.0	0.0	0.0	0		
20†	0.0	-2.5	-1.3	19.3	0.0	0.0	1.2	1.2	0		
21†	-3.0	-4.5	-3.8	21.8	0.0	0.0	1.6	1.6	0		
22†	-1.0	-3.5	-2.3	20.3	0.0	0.0	0.4	0.4	1		
23†	2.0	-3.0	-0.5	18.5	0.0	0.0	0.0	0.0	1		
24†	4.0	0.5	2.3	15.7	0.0	0.0	0.0	0.0	0		
25†	5.5	1.0	3.3	14.7	0.0	0.0	0.0	0.0	0		
26†	4.0	1.0	2.5	15.5	0.0	4.8	0.0	4.8	0		
27†	4.5	1.0	2.8	15.2	0.0	0.6	0.8	1.4	0		
28†	3.5	0.5	2.0	16.0	0.0	0.0	2.4	2.4	0		
29†	3.5	0.5	2.0	16.0	0.0	0.4	0.0	0.4	0		
30†	4.5	0.5	2.5	15.5	0.0	0.0	0.0	0.0	0		
Sum				421.8	0.0	45.8	6.8	52.6			
Avg Xtrm	6.6 19.5	1.3 -5.0	3.93								

Daily Data Report for December 2010

D a y	<u>Max</u> <u>Temp</u> °C ₩	<u>Min</u> <u>Temp</u> °C ₩	<u>Mean</u> <u>Temp</u> °C ₩	<u>Heat</u> Deg Days °C ਔ	<u>Cool</u> Deq Days °C ⊮	<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> 10's Deg	<u>Spd of</u> <u>Max Gust</u> km/h
01†	4.5	-2.5	1.0	17.0	0.0	0.0	0.0	0.0	0		
02†	8.0	0.5	4.3	13.7	0.0	0.0	0.0	0.0	0		
03†	9.0	3.5	6.3	11.7	0.0	1.6	0.0	1.6	0		
04†	10.5	5.5	8.0	10.0	0.0	0.2	0.0	0.2	0		
05†	10.0	6.0	8.0	10.0	0.0	1.4	0.0	1.4	0		
06†	12.0	7.0	9.5	8.5	0.0	4.2	0.0	4.2	0		
07†	9.0	2.5	5.8	12.2	0.0	1.4	0.0	1.4	0		
08†	5.0	2.0	3.5	14.5	0.0	3.6	2.0	5.6	0		
09†	1.0	-1.5	-0.3	18.3	0.0	0.0	1.8	1.8	1		
10†	-2.5	-4.0	-3.3	21.3	0.0	0.0	0.0	0.0	3		
11†	1.0	-7.0	-3.0	21.0	0.0	0.0	0.6	0.6	2		

12† 1.0	-3.0	-1.0	19.0	0.0	0.0	0.0	0.0	2
13† 7.5	-7.5	0.0	18.0	0.0	4.4	0.0	4.4	2
14† 11.0	5.0	8.0	10.0	0.0	0.0	0.0	0.0	0
15† 8.5	4.5	6.5	11.5	0.0	0.4	0.0	0.4	0