

# Real Time Water Quality Report Humber River at Humber Village

Deployment Period 2012-07-10 to 2012-08-03

2012-08-20



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**<sup>®</sup> for Humber River at Humber Village was installed on July 10, 2012, and remained deployed continuously until August 3, 2012. This deployment period was a total of only 23 days as the deployment was ended early due to poor operation of both the pH and oxygen sensors.

# 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 $\mu$ 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			



- Upon deployment, a QA/QC DataSonde<sup>®</sup> is temporarily deployed *in situ*, adjacent to the Field DataSonde<sup>®</sup>. 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					
	Temp (°C)	Fair					
2012-07-10	pH (units)	Poor					
Deployment	Sp. Conductivity (uS/cm)	Excellent					
Deployment	Dissolved Oxygen (mg/L)	Fair					
	Turbidity (NTU)	Excellent					
	Temp (°C)	Excellent					
2012 08 03	pH (units)	Fair					
2012-08-05 Perroval	Sp. Conductivity (uS/cm)	Excellent					
Keniovai	Dissolved Oxygen (mg/L)	Good					
	Turbidity (NTU)	Excellent					
	Table 2						

#### **Data Interpretation**

During this deployment period both the pH and the oxygen (dissolved and percent saturation) sensors were not reading accurately and therefore the data recorded for these parameters for this deployment period is not reliable and must be discarded. Information of the remaining parameters is outlined below.



#### Water Temperature and Stage Level

Figure 1

- Over the deployment period the water temperature (**Figure 1**) ranged from a minimum of 8.93 °C to a maximum of 20.05 °C, with an average temperature of 15.57 °C.
- For most of the deployment period there is a diurnal temperature cycling trend visible. This trend is caused by cooling each night and warming during the day.
- Water temperature is closely related to air temperature and seasonal weather trends. For this deployment period there is a general warming trend, however there is significant variability on a day to day basis. For example, around July 12<sup>th</sup> there is a noticeable peak in water temperature (see inside red oval) which is due to the fact that this was a very warm day when the air temperature reached 29.5<sup>o</sup>c. Likewise between July 19<sup>th</sup> and 20<sup>th</sup> there is a noticeable dip in water temperature (see inside red oval) related to a period when air temperatures were cooler than the preceding and following days.



#### Specific Conductivity of Water and Stage Level

- The specific conductivity (Figure 2) ranged from a minimum of 37.8 μS/cm to a maximum of 40.8 μS/cm and showed a gentle increasing trend over the deployment period. The average specific conductivity for the entire deployment period was 39.1 μS/cm.
- Between July 16<sup>th</sup> and 17<sup>th</sup> there is a small spike in specific conductivity (see inside red oval) which appears to be related to a significant rainfall event which caused a noticeable increase in flow. A significant rainfall event would increase the inputs of suspended and dissolved material into the river causing a rise in specific conductivity for a short time period.



Water Turbidity and Stage Level

• All turbidity values (**Figure 3**) were at 0.0 NTU for the duration of the deployment.

Stage & Flow



- The stage height (Figure 4) or water level ranged from a minimum of 1.63 m to a maximum of 1.79 m with the corresponding flow ranging from 164 m<sup>3</sup>/s to 188 m<sup>3</sup>/s.
- Stage height and stream flow show constant variation on a day-to-day basis however there are two noticeable peaks (see inside red ovals) which stand out during the deployment period. The first is on July 17<sup>th</sup>, is relatively short lived, and appears to be related to a heavy rainfall on July 16<sup>th</sup>. The second is more sustained than the first and lasts from July 26<sup>th</sup> to July 29<sup>th</sup>. It appears to be related to rainfall on the 25<sup>th</sup> and 26<sup>th</sup> however it is difficult to interpret flow data for this station based solely on precipitation data, as flow through Humber Canal is regulated by Deer Lake Power and varies with the amount of power being produced.

## **Climate Data**

 Climate data for most of the deployment period from the nearest station (Corner Brook) is included in Appendix A. Data for the end of the deployment period was not available for this report.

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# Appendix A

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D	Max Tama	<u>Min</u> Tomm	<u>Mean</u>	Heat	<u>Cool</u>	Total Daim	<u>Total</u>	<u>Total</u>	Snow on	Dir of	Spd of
а	°C	°C	°C	Deg	Deg	<u>Rain</u>	Snow	Precip	Grna	Guet	Max Gust
У										10s dea	
10+	22.0	14 0	18.0	0.0	0.0	0.0	0.0	0.0	0	105 409	<b>**</b>
11+	26.0	12 5	19.3	0.0	13	0.0	0.0	0.0	0		
12+	20.0	16.0	19.5 22.8	0.0	1.J 1 Q	0.0	0.0	0.0	0		
12+	10 5	16.0	17.8	0.0	4.0 0.0	55	0.0	55	0		
<u>1</u> ]	19.5	10.0	155	0.2	0.0	5.5	0.0	0.0	0		
<u>14</u> 1	22.0	9.0	12.5	2.5	0.0	0.0	0.0	0.0	0		
101	25.0	9.5 1 F F	10.0	0.7	0.0	0.0	0.0	0.0	0		
101	22.0	15.5	18.8	0.0	0.8	32.1	0.0	32.1	0		
<u>1/</u> T	20.5	15.5	18.0	0.0	0.0	0.7	0.0	0.7	0		
<u>18</u> T	21.0	17.0	19.0	0.0	1.0	2.2	0.0	2.2	0		
<u>19</u> †	24.0	16.0	20.0	0.0	2.0	7.2	0.0	7.2	0		
<u>20</u> +	17.5	13.0	15.3	2.7	0.0	0.0	0.0	0.0	0		
<u>21</u> †	25.5	13.0	19.3	0.0	1.3	0.0	0.0	0.0	0		
<u>22</u> †	27.0	14.5	20.8	0.0	2.8	0.0	0.0	0.0	0		
<u>23</u> †	28.0	14.0	21.0	0.0	3.0	0.0	0.0	0.0	0		
<u>24</u> †	28.5	18.5	23.5	0.0	5.5	0.0	0.0	0.0	0		
<u>25</u> †	26.5	20.0	23.3	0.0	5.3	16.1	0.0	16.1	0		
<u>26</u> †	18.0	16.0	17.0	1.0	0.0	6.6	0.0	6.6	0		
<u>27</u> †	26.0	13.5	19.8	0.0	1.8	0.0	0.0	0.0	0		
<u>28</u> †	24.5	13.5	19.0	0.0	1.0	0.0	0.0	0.0	0		
<u>29</u> †	27.5	12.5	20.0	0.0	2.0	0.0	0.0	0.0	0		
<u>30</u> +	22.0	13.0	17.5	0.5	0.0	0.0	0.0	0.0	0		
<u>31</u> †	24.5	13.5	19.0	0.0	1.0	0.0	0.0	0.0	0		

#### Daily Data Report for July 2012

# Daily Data Report for August 2012

D a y	Max Temp °C	<u>Min</u> Temp °C ₩	<u>Mean</u> <u>Temp</u> ℃	<u>Heat</u> Deg Days	Cool Deg Days	<u>Total</u> <u>Rain</u> mm ₩	<u>Total</u> <u>Snow</u> cm ₩	<u>Total</u> <u>Precip</u> mm ₩	Snow on Grnd cm	Dir of Max Gust 10s deg	Spd of Max Gust km/h
<u>01</u> +	31.0	16.5	23.8	0.0	5.8	1.2	0.0	1.2	0	-	_
<u>02</u> †	24.0	16.5	20.3	0.0	2.3	0.7	0.0	0.7	0		
<u>03</u> †	28.0	18.0	23.0	0.0	5.0	0.0	0.0	0.0	0		