

## Waterford River @ Kilbride

# NF02ZM0009

December 2010-January 2011



Government of Newfoundland & Labrador Department of Environment and Conservation Water Resources Management Division St. John's, NL, A1B 4J6 Canada

### Real Time Water Quality Monthly Report Waterford River - St. John's NL December 2010 – January 2011

### General

• Data from the Waterford River monitoring station is monitored by the Water Resources Management Division staff.

## Maintenance and Calibration of Instrumentation

- The following table displays the dates when the Waterford River water quality probe was installed and removed during this deployment period for routine cleaning, maintenance and calibration.
- The instrument at Waterford River does not include a turbidity sensor, thus turbidity will not be recorded at this station until further notice.

**Table 1**: Table of Water Quality Probe Installation and Removal

Date Installed	Date Removed					
December 14, 2010	January 26, 2011					

• Water quality readings were taken with a second water quality instrument at the time of installation and removal for QAQC comparison. The QAQC instrument was calibrated prior to each use.

## **Data Interpretation**

• Water temperatures were fairly constant during this deployment, ranging between -0.11 and 6.49°C, which is within the expected temperature range for this time of year. There was no ice cover on Waterford River during this deployment period, though water temperatures frequently hovered near the freezing point. Water temperature data is shown in **Figure 1** below.



#### Figure 1: Water Temperature

Dissolved oxygen (DO) levels displayed a decreasing trend from December 14 to January 6 before bottoming out at 4.27mg/L on January 7. The Canadian Water Quality Guidelines for the Protection of Aquatic Life recommend a minimum dissolved oxygen level of 6.5 mg/L. Hourly recorded dissolved oxygen values fell below this minimum guideline from 6:05PM on January 7 to 12:05PM on January 8, 2011 representing a period of 19 hours. Water temperatures were near 2°C during this period, so freezing doesn't appear to have been a contributing factor, and pH and specific conductivity values were in the expected range during this time. Water levels and flows were at their lowest point in the deployment period during the 19 hours that dissolved oxygen values rebounded to 9.18mg/L at 1:05 PM on January 8and remained within the expected dissolved oxygen value for this deployment period was 10.82 mg/L. Dissolved oxygen is shown in blue and water temperature is shown in green in Figure 2, below.

#### Figure 2: Dissolved Oxygen and Water Temperature



• **pH** levels were fairly constant and within the expected range for this station throughout the deployment, ranging from 7.25 to 8.6 pH units, as seen in **Figure 3** below. All pH values were within the range recommended by the Canadian Water Quality Guidelines for the Protection of Aquatic Life of 6.5 to 9.0 pH units.



Specific conductivity levels typically share an inverse relationship with water flow, showing decreasing levels as flow increases due to precipitation. However, when air temperatures are below 0°C and road salting is employed as a safety measure, precipitation and resulting land run-off cause an increase in specific conductivity in receiving waters. This phenomenon can be observed in Figure 4 below, which shows specific conductivity levels in green and water flow in blue. Specific conductivity levels typically increased in response to increases in flow during this deployment. Specific conductivity values ranged between 37.4-382µS/cm. Canadian Climate Data for December 2010 and January 2011, found in Appendix 1 at the end of this report, indicates that spikes in conductivity and flow correspond with significant precipitation events.



#### Figure 4: Specific Conductance and Flow

**APPENDIX 1**: Weather information for St. John's, NL provided by Environment Canada 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 ₩	Cool Deg Days °C W	<u>Total</u> <u>Rain</u> mm ₩	<u>Total</u> <u>Snow</u> cm ₩	<u>Total</u> Precip mm ₩	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
<u>01</u>	6.8	3.7	5.3	12.7	0.0	Т	0.0	Т	Т	7E	59E
<u>02</u>	6.2	4.4	5.3	12.7	0.0	Т	0.0	Т	0	7E	48E
<u>03</u>	5.8	4.4	5.1	12.9	0.0	18.6	0.0	18.6	0	9E	41E
<u>04</u>	5.8	3.2	4.5	13.5	0.0	Т	0.0	Т	0	12E	41E
<u>05</u>	5.9	3.0	4.5	13.5	0.0	3.4	0.0	3.4	0	13	46
<u>06</u>	7.7	5.0	6.4	11.6	0.0	35.0	0.0	35.0	0	16E	69E
<u>07</u>	11.4	6.2	8.8	9.2	0.0	0.8	0.0	0.8	0	16E	32E
<u>80</u>	9.5	4.2	6.9	11.1	0.0	1.2	0.0	1.2	0	23E	37E
<u>09</u>	7.1	0.2	3.7	14.3	0.0	10.2	2.0	12.2	0	23E	37E
<u>10</u>	1.0	-5.1	-2.1	20.1	0.0	0.0	4.0	4.0	2	31E	35E
<u>11</u>	-4.2	-7.0	-5.6	23.6	0.0	0.0	0.2	Т	1		<31
<u>12</u>	1.3	-5.4	-2.1	20.1	0.0	0.0	0.0	0.0	1		<31
<u>13</u>	2.5	-6.7	-2.1	20.1	0.0	0.0	0.0	0.0	1		<31
<u>14</u>	4.2	-1.0	1.6	16.4	0.0	0.4	0.0	0.4	Т	13E	39E
<u>15</u>	5.7	2.3	4.0	14.0	0.0	14.0	0.0	14.0	0	14E	46E
<u>16</u>	7.5	5.6	6.6	11.4	0.0	53.6	0.0	53.6	0	12E	48E
<u>17</u>	8.4	4.7	6.6	11.4	0.0	15.0	0.0	15.0	0		<31
<u>18</u>	6.2	4.1	5.2	12.8	0.0	11.6	0.0	11.6	0		<31
<u>19</u>	4.6	3.6	4.1	13.9	0.0	7.4	0.0	7.4	0	7E	50E
<u>20</u>	5.4	3.7	4.6	13.4	0.0	0.4	0.0	0.4	0	9E	54E
<u>21</u>	4.7	3.8	4.3	13.7	0.0	34.8	0.0	34.8	0	Μ	М
<u>22</u>	4.9	4.0	4.5	13.5	0.0	25.7	0.0	25.7	0	8E	91E
<u>23</u>	5.0	3.7	4.4	13.6	0.0	4.6	0.0	4.6	0	3E	72E
<u>24</u>	5.1	3.2	4.2	13.8	0.0	19.6	0.0	19.6	0	36E	69E
<u>25</u>	4.4	2.4	3.4	14.6	0.0	10.4	0.0	10.4	0	34E	70E
<u>26</u>	3.3	0.8	2.1	15.9	0.0	1.6	0.0	1.6	0	Μ	Μ
<u>27</u>	7.6	0.7	4.2	13.8	0.0	44.4	0.0	44.4	0	15E	80E
<u>28</u>	9.0	3.1	6.1	11.9	0.0	3.2	0.0	3.2	0	18E	56E
<u>29</u>	4.2	-0.3	2.0	16.0	0.0	2.2	0.0	2.2	0		<31
<u>30</u>	1.7	-2.1	-0.2	18.2	0.0	0.4	2.6	2.8	1	28E	54E
<u>31</u>	-0.4	-1.9	-1.2	19.2	0.0	0.0	Т	Т	1	29E	48E
Sum				452.9	0.0	318.5	8.8	326.9			
Avg	5.1	1.6	3.4								
Xtrm	11.4	-7.0								8*	91

**APPENDIX 1**: Weather information for St. John's, NL provided by Environment Canada for January 2011:

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 ₩	Snow on Grnd cm ₩	Dir of Max Gust 10's Deg	Spd of Max Gust km/h ₩
<u>01</u> †	2.2	-2.0	0.1	17.9	0.0	2.0	3.4	5.4	1	29	52
<u>02</u> †	2.6	-0.5	1.1	16.9	0.0	1.5	0.5	2.0	1	12	37
<u>03</u> †	4.4	1.1	2.8	15.2	0.0	4.0	0.0	4.0	Т		<31

<u>04</u> †	4.2	-1.0	1.6	16.4	0.0	10.1	0.5	10.6	Т	28E	59E
<u>05</u> †	0.0	-5.0	-2.5	20.5	0.0	0.0	Т	Т	Т	27	54
<u>06</u> †	0.4	-5.2	-2.4	20.4	0.0	0.0	Т	Т	Т	32	32
<u>07</u> †	-0.1	-6.9	-3.5	21.5	0.0	0.0	Т	Т	Т	9	44
<u>08</u> †	1.6	-0.7	0.5	17.5	0.0	11.0	11.8	22.8	Т	8	54
<u>09</u> †	3.7	0.2	2.0	16.0	0.0	10.6	0.0	10.6	2		<31
<u>10</u> †	4.5	0.4	2.5	15.5	0.0	1.8	Т	1.8		34	41
<u>11</u> †	2.0	0.0	1.0	17.0	0.0	0.4	Т	0.4		1	67
<u>12</u> †	3.2	-1.0	1.1	16.9	0.0	0.0	Т	Т	Т	31	48
<u>13</u> †	0.6	-1.0	-0.2	18.2	0.0	0.0	37.8	29.2	8	3	54
<u>14</u> †	1.5	-3.2	-0.9	18.9	0.0	0.0	1.8	1.8	38	36	67
<u>15</u> †	0.9	-3.3	-1.2	19.2	0.0	0.0	Т	Т	38		<31
<u>16</u> †	2.5	-2.5	0.0	18.0	0.0	0.8	2.0	2.8	38	27	63
<u>17</u> †	-1.1	-6.5	-3.8	21.8	0.0	0.0	0.2	Т	37	28	70
<u>18</u> †	-2.8	-8.0	-5.4	23.4	0.0	0.0	0.0	0.0	37	30	65
<u>19</u> †	5.3	-3.9	0.7	17.3	0.0	14.3	4.7	19.0	36	16	76
<u>20</u> †	5.3	-0.5	2.4	15.6	0.0	0.2	0.8	1.0	15	34	41
<u>21</u> †	0.5	-3.7	-1.6	19.6	0.0	0.0	0.0	0.0	15	16	57
<u>22</u> †	4.9	-2.1	1.4	16.6	0.0	8.8	1.6	10.4	11	16	72
<u>23</u> †	6.8	-3.9	1.5	16.5	0.0	39.4	6.6	48.4	10	17	78
<u>24</u> †	6.8	-9.4	-1.3	19.3	0.0	2.4	2.2	3.8	13	26	93
<u>25</u> †	-2.8	-9.9	-6.4	24.4	0.0	0.0	0.6	0.2	15	25	46
<u>26</u> †	-4.7	-9.9	-7.3	25.3	0.0	0.0	0.2	Т	15		<31
<u>27</u> †	5.9	-7.5	-0.8	18.8	0.0	10.4	5.5	15.9	15	19	63
<u>28</u> †	4.9	-1.5	1.7	16.3	0.0	0.2	Т	0.2	6	25	83
<u>29</u> †	0.6	-1.7	-0.6	18.6	0.0	1.0	7.3	7.3	6	12	54
<u>30</u> †	-0.9	-4.3	-2.6	20.6	0.0	0.0	0.2	Т	9		<31
<u>31</u> †	-1.8	-11.2	-6.5	24.5	0.0	0.0	10.4	5.2	9	30	56
Sum				584.6	0.0	118.9	98.1	202.8			
Avg	2	-3.7	-0.86								
Xtrm	6.8	-11.2								26	93

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