

## Real Time Water Quality Monthly Report Leary's Brook- St. John's NL December 2008 to March 2009

### General

- Data from Leary's Brook monitoring station is monitored by the Water Resources Management Division staff.

### Maintenance and Calibration of Instrumentation

- The following table displays the dates when the water quality probe was installed and later removed at the end of the deployment period for routine cleaning, maintenance and calibration:

**Table 1:** Table of probe installation and removal dates

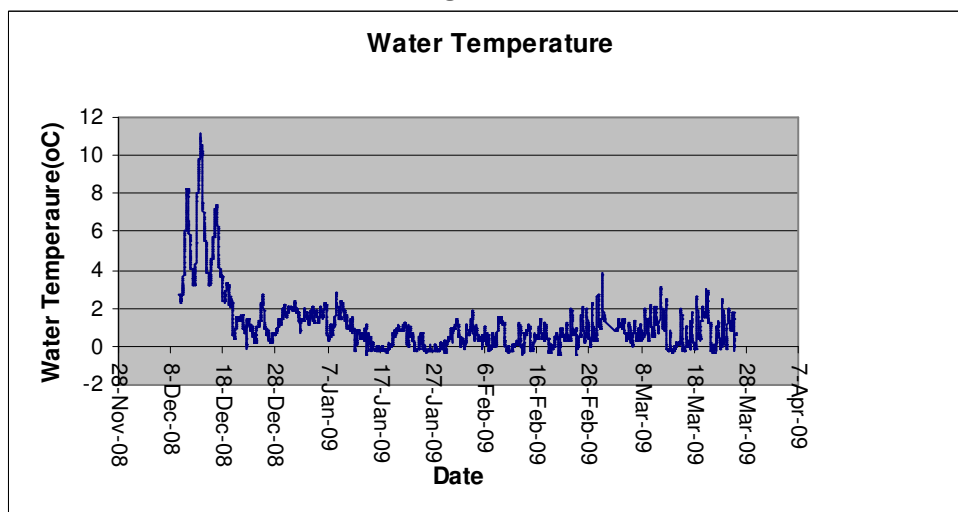
Date Installed	Date Removed
December 9, 2008	March 25, 2009

- Water quality readings were taken with a second, freshly calibrated water quality probe at the time of installation and removal for QAQC comparison.

### Data Interpretation

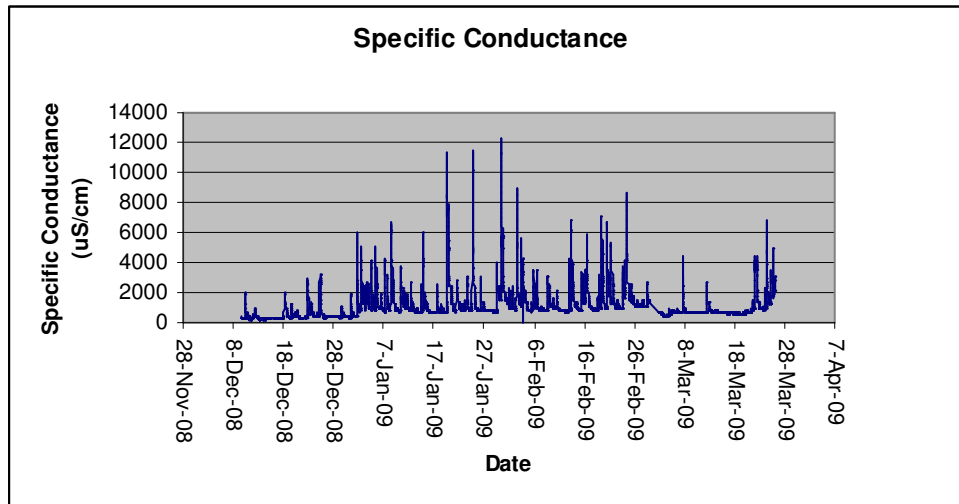
- Water quality parameter levels fluctuated within expected ranges during the deployment period with diurnal and seasonal variations.
- There is data gap from December 3-9, 2008. The probe that was installed during that period had problems with the turbidity sensor. The probe was removed December 9 and replaced with another probe in which all sensors were operational.
- Water temperatures** ranged between -0.43 and 11.2 °C, as seen in **Figure 1**, in response to seasonal and daily maximum and minimum air temperatures. Daily climate information is presented in graphs recorded by Environment Canada, found in **Appendix 1** at the end of this report.

Figure 1



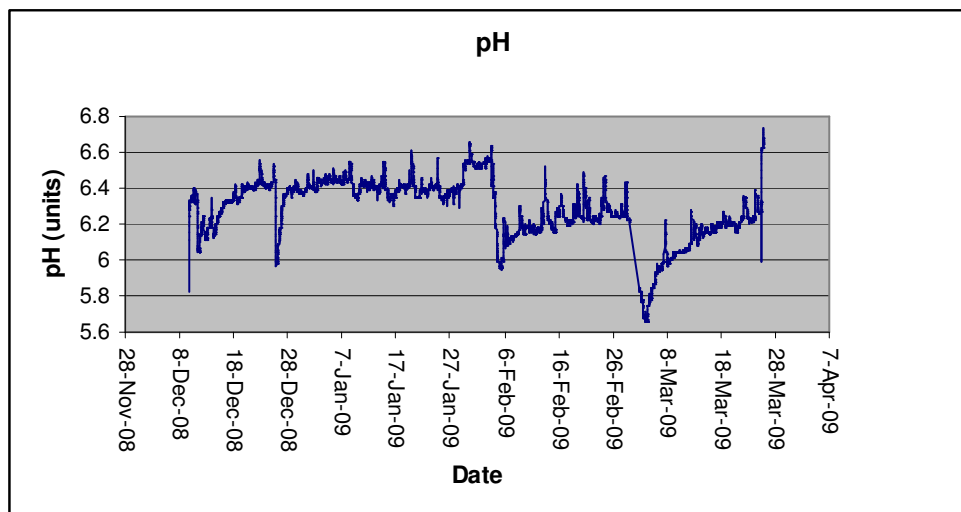
- Specific conductance** levels fluctuated during the deployment period as observed in **Figure 2**, ranging from 14.1 to 12,218 $\mu$ S/cm. Specific conductance levels tend to spike during the winter months, when road salting operations are in effect.

Figure 2



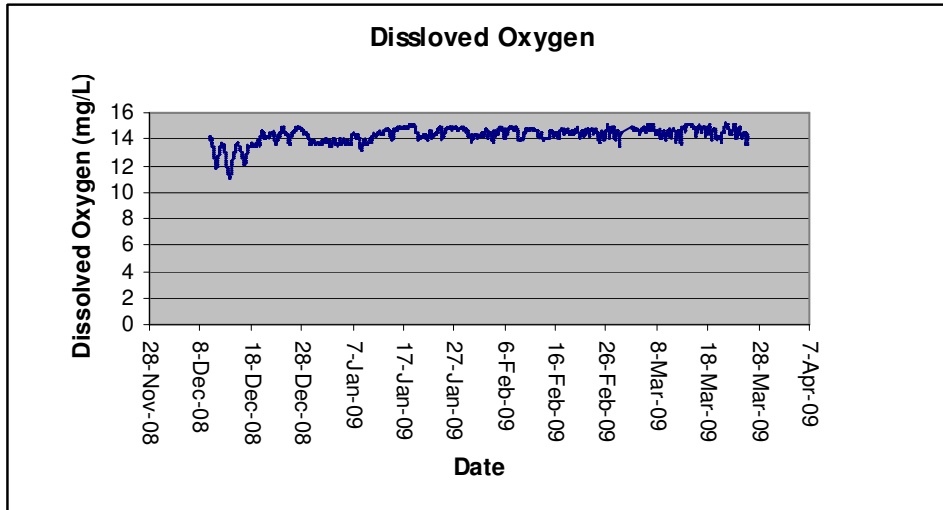
- pH** values ranged from 5.66 to 6.73 pH units during the deployment period, as shown in **Figure 3** below. Most values fell below the range recommended by the Canadian Water Quality Guidelines for the Protection of Aquatic Life of 6.5 to 9 pH units. It is typical for surface water in NL to have pH levels below the recommended guideline, due to the acidic nature of the terrain. Sharp declines in pH levels can be seen on December 25<sup>th</sup>, February 5<sup>th</sup> and March 3<sup>rd</sup>. On December 25<sup>th</sup> Environment Canada (see **Appendix 1**) recorded a sudden increase in air temperature along with 26mm of rainfall, resulting in significant surface run-off which lowered pH values in Learys Brook. Increased air temperatures and 25mm of rainfall from February 3<sup>rd</sup> -5<sup>th</sup> also resulted in significant surface run-off entering the brook and lowering pH levels. Similarly, high air temperatures and rainfall from March 1<sup>st</sup> to 4<sup>th</sup> caused a peak spring run-off period as shown in **Figure 3**, which impacted pH levels.

Figure 3



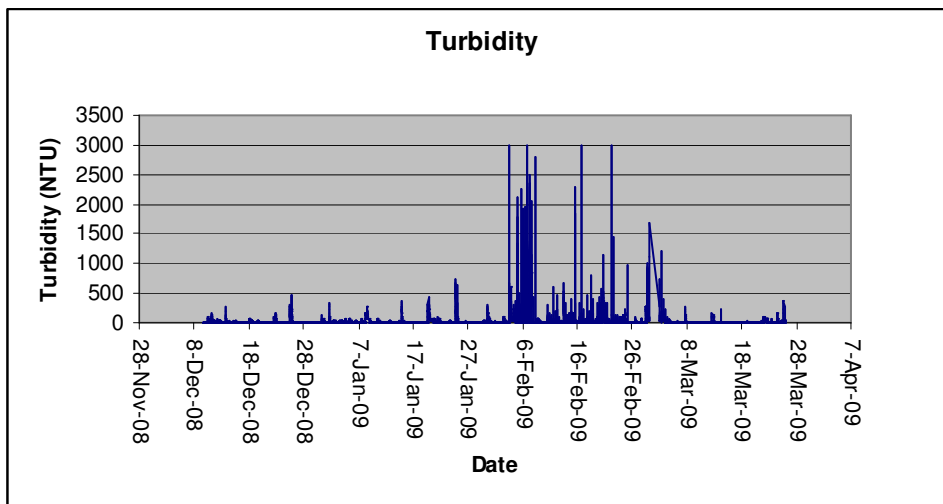
- Dissolved oxygen (DO)** levels ranged from 10.99 to 15.17 mg/L during this deployment period, as seen in **Figure 4** below. DO levels above 10mg/L reflect the low water temperatures, which were less than 2°C for most of this deployment, and high flows which maximized air entrainment.

Figure 4



- Turbidity** values hovered close to 0 NTU for most of this deployment period, highlighting an improving trend in turbidity levels in Learys Brook in recent months (see **Figure 5**). This is partly due to a decrease in land development and construction upstream from the sampling station. Sudden sharp spikes that increase and rapidly return to near background levels in February and March may be attributed to snow and ice passing immediately in front of the sensor while it was collecting a data reading.

Figure 5



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

Daily Data Report for December 2008

D	<u>Max</u>	<u>Min</u>	<u>Mean</u>	<u>Heat</u>	<u>Cool</u>	<u>Total</u>	<u>Total</u>	<u>Total</u>	<u>Snow</u>	<u>Dir of</u>	<u>Spd of</u>
a	<u>Temp</u>	<u>Temp</u>	<u>Temp</u>	<u>Deg</u>	<u>Deg</u>	<u>Rain</u>	<u>Snow</u>	<u>Precip</u>	<u>on</u>	<u>Max</u>	<u>Max</u>
y	°C	°C	°C	Days	Days	mm	cm	mm	Grnd	Gust	Gust

				°C 	°C 				cm 	10's Deg	km/h 
<a href="#">01</a>	14.2	1.3	7.8	10.2	0.0	4.8	0.0	4.8	0	18E	76E
<a href="#">02</a>	16.7	5.5	11.1	6.9	0.0	8.6	0.0	8.6	0	M	M
<a href="#">03</a>	6.6	0.2	3.4	14.6	0.0	14.0	11.0	25.0	0		<31
<a href="#">04</a>	5.2	0.0	2.6	15.4	0.0	0.0	T	T	2	24E	63E
<a href="#">05</a>	9.0	2.6	5.8	12.2	0.0	1.6	0.0	1.6	0	25E	54E
<a href="#">06</a>	2.6	-4.3	-0.9	18.9	0.0	0.0	0.0	0.0	0		<31
<a href="#">07</a>	12.2	-3.1	4.6	13.4	0.0	31.0	9.0	40.0	T	18E	80E
<a href="#">08</a>	12.8	-1.6	5.6	12.4	0.0	29.4	0.6	30.0	0	20E	69E
<a href="#">09</a>	-0.2	-4.7	-2.5	20.5	0.0	0.0	2.4	2.2	2	30E	67E
<a href="#">10</a>	12.7	-0.7	6.0	12.0	0.0	11.6	T	11.6	2	24E	104E
<a href="#">11</a>	11.8	-1.0	5.4	12.6	0.0	28.2	5.6	38.0	0	26E	67E
<a href="#">12</a>	16.8	-0.6	8.1	9.9	0.0	7.0	0.4	9.0	4	23E	89E
<a href="#">13</a>	17.3	1.0	9.2	8.8	0.0	18.6	0.0	18.6	0	21E	91E
<a href="#">14</a>	1.1	-6.2	-2.6	20.6	0.0	1.8	0.2	1.8	T	13E	37E
<a href="#">15</a>	9.3	-5.3	2.0	16.0	0.0	T	0.0	T	0	23E	63E
<a href="#">16</a>	11.4	-1.2	5.1	12.9	0.0	1.0	0.0	1.0	0	23E	89E
<a href="#">17</a>	0.1	-3.2	-1.6	19.6	0.0	T	9.4	9.4	0	29E	41E
<a href="#">18</a>	0.9	-7.0	-3.1	21.1	0.0	7.0	T	7.0	5	36E	50E
<a href="#">19</a>	-2.5	-13.1	-7.8	25.8	0.0	0.0	6.8	5.4	5	29E	69E
<a href="#">20</a>	-5.1	-11.3	-8.2	26.2	0.0	0.0	T	T	10	29E	56E
<a href="#">21</a>	-6.1	-13.3	-9.7	27.7	0.0	0.0	T	T	9	33E	39E
<a href="#">22</a>	3.2	-11.6	-4.2	22.2	0.0	4.0	16.2	18.0	12	13E	89E
<a href="#">23</a>	-1.7	-8.5	-5.1	23.1	0.0	0.0	2.0	1.2	16	29E	78E
<a href="#">24</a>	-0.3	-10.4	-5.4	23.4	0.0	0.0	T	T	16	29E	44E
<a href="#">25</a>	9.1	-1.8	3.7	14.3	0.0	26.4	T	26.4	14	20E	80E
<a href="#">26</a>	-1.8	-13.3	-7.6	25.6	0.0	0.0	0.0	0.0	5	30E	67E
<a href="#">27</a>	-10.5	-13.5	-12.0	30.0	0.0	0.0	T	T	5	30E	44E
<a href="#">28</a>	-2.8	-10.5	-6.7	24.7	0.0	0.0	0.2	T	5	16E	33E
<a href="#">29</a>	4.4	-2.9	0.8	17.2	0.0	0.8	T	0.8	5	16E	63E
<a href="#">30</a>	-0.1	-1.9	-1.0	19.0	0.0	0.0	T	T	5		<31
<a href="#">31</a>	-0.3	-2.8	-1.6	19.6	0.0	0.0	2.2	2.0	3		<31
Sum				556.8	0.0	195.8	66.0	262.4			
Avg	4.7	-4.6	0.0								
Xtrm	17.3	-13.5								24*	104*

Daily Data Report for January 2009

D a y	Max Temp	Min Temp	Mean Temp	Heat Deg Days	Cool Deg Days	Total Rain	Total Snow	Total Precip	Snow on Grnd	Dir of Max Gust	Spd of Max Gust
	°C 	°C 	°C 	°C 	°C 	mm 	cm 	mm 	cm 	10's Deg	km/h 
<a href="#">01</a>	2.0	-3.6	-0.8	18.8	0.0	7.0	0.6	7.6	5	12E	46E
<a href="#">02</a>	1.2	-1.7	-0.3	18.3	0.0	0.0	2.4	2.4	4	25E	67E
<a href="#">03</a>	0.6	-3.2	-1.3	19.3	0.0	T	4.4	4.4	4	25E	61E
<a href="#">04</a>	-0.3	-4.6	-2.5	20.5	0.0	0.0	6.2	3.2	9	24E	39E
<a href="#">05</a>	1.4	-3.5	-1.1	19.1	0.0	0.0	2.4	1.6	11	26E	78E
<a href="#">06</a>	2.4	-6.0	-1.8	19.8	0.0	0.4	6.4	4.4	9	27E	65E

<a href="#">07</a>	-2.1	-5.7	-3.9	21.9	0.0	0.0	T	T	15	26E	74E
<a href="#">08</a>	8.5	-2.7	2.9	15.1	0.0	1.6	1.8	3.0	11	24E	85E
<a href="#">09</a>	3.5	-1.0	1.3	16.7	0.0	0.0	T	T	5	25E	74E
<a href="#">10</a>	-1.0	-4.0	-2.5	20.5	0.0	0.0	6.2	3.0	6	32E	37E
<a href="#">11</a>	-2.2	-8.1	-5.2	23.2	0.0	0.0	10.0	7.2	10	9E	46E
<a href="#">12</a>	-2.0	-7.3	-4.7	22.7	0.0	0.0	3.8	2.8	19	4E	57E
<a href="#">13</a>	-3.9	-9.7	-6.8	24.8	0.0	0.0	T	T	19	28E	48E
<a href="#">14</a>	7.1	-4.1	1.5	16.5	0.0	2.0	12.2	12.2	19	26E	95E
<a href="#">15</a>	-2.8	-12.1	-7.5	25.5	0.0	0.0	0.2	T	24	27E	89E
<a href="#">16</a>	-11.6	-13.9	-12.8	30.8	0.0	0.0	0.0	0.0	24	28E	65E
<a href="#">17</a>	-10.3	-14.0	-12.2	30.2	0.0	0.0	2.0	1.4	24	29E	78E
<a href="#">18</a>	-8.5	-13.6	-11.1	29.1	0.0	0.0	T	T	25	29E	65E
<a href="#">19</a>	7.2	-12.8	-2.8	20.8	0.0	2.8	T	2.8	25	18E	78E
<a href="#">20</a>	6.2	-2.8	1.7	16.3	0.0	T	0.2	T	19	25E	39E
<a href="#">21</a>	-2.8	-8.8	-5.8	23.8	0.0	T	4.8	4.4	19		<31
<a href="#">22</a>	-2.8	-10.2	-6.5	24.5	0.0	0.0	0.2	T	23	24E	50E
<a href="#">23</a>	-3.7	-11.3	-7.5	25.5	0.0	0.0	1.0	1.0	22	27E	85E
<a href="#">24</a>	6.7	-11.4	-2.4	20.4	0.0	6.8	1.4	8.2	20	18E	67E
<a href="#">25</a>	-3.2	-13.1	-8.2	26.2	0.0	0.0	T	T	16	27E	78E
<a href="#">26</a>	-11.1	-13.9	-12.5	30.5	0.0	0.0	0.0	T	16	29E	69E
<a href="#">27</a>	-10.3	-13.6	-12.0	30.0	0.0	0.0	0.0	0.0	16	27E	65E
<a href="#">28</a>	-4.3	-12.0	-8.2	26.2	0.0	0.0	0.0	0.0	16	28E	67E
<a href="#">29</a>	2.2	-6.9	-2.4	20.4	0.0	T	8.8	8.8	16	15E	78E
<a href="#">30</a>	0.0	-2.5	-1.3	19.3	0.0	T	2.0	1.8	20	29E	76E
<a href="#">31</a>	-1.6	-3.3	-2.5	20.5	0.0	0.0	7.2	4.2	20	6E	32E
Sum				<b>697.2</b>	<b>0.0</b>	<b>20.6</b>	<b>84.2</b>	<b>84.4</b>			
Avg	<b>-1.1</b>	<b>-7.8</b>	<b>-4.5</b>								
Xtrm	<b>8.5</b>	<b>-14.0</b>								<b>26E</b>	<b>95E</b>

Daily Data Report for February 2009

Day	<u>Max Temp</u>	<u>Min Temp</u>	<u>Mean Temp</u>	<u>Heat Deg Days</u>	<u>Cool Deg Days</u>	<u>Total Rain</u>	<u>Total Snow</u>	<u>Total Precip</u>	<u>Snow on Grnd</u>	<u>Dir of Max Gust</u>	<u>Spd of Max Gust</u>
	°C	°C	°C	°C	°C	mm	cm	mm	cm	10's Deg	km/h
<a href="#">01</a>	-1.6	-6.8	-4.2	22.2	0.0	0.0	21.2	17.0	29	33E	74E
<a href="#">02</a>	-0.9	-7.0	-4.0	22.0	0.0	0.0	0.0	0.0	32	28E	63E
<a href="#">03</a>	6.0	-1.7	2.2	15.8	0.0	7.8	T	7.8	27	19E	48E
<a href="#">04</a>	9.7	-2.3	3.7	14.3	0.0	7.2	T	7.2	20	18E	69E
<a href="#">05</a>	5.5	-5.6	-0.1	18.1	0.0	7.4	3.0	10.4	12	29E	56E
<a href="#">06</a>	-4.4	-8.8	-6.6	24.6	0.0	0.0	0.4	0.2	14	29E	72E
<a href="#">07</a>	-3.3	-7.7	-5.5	23.5	0.0	0.0	0.4	0.2	12	27	52
<a href="#">08</a>	4.8	-5.8	-0.5	18.5	0.0	0.8	T	0.8	12	26E	61E
<a href="#">09</a>	1.1	-12.0	-5.5	23.5	0.0	0.6	6.0	4.2	10	26E	65E
<a href="#">10</a>	-9.8	-12.5	-11.2	29.2	0.0	0.0	T	T	11	29E	63E
<a href="#">11</a>	-4.0	-11.1	-7.6	25.6	0.0	0.0	0.0	0.0	11	28E	59E
<a href="#">12</a>	-0.3	-7.9	-4.1	22.1	0.0	T	7.0	7.0	11	10E	56E
<a href="#">13</a>	2.0	-0.5	0.8	17.2	0.0	7.0	2.4	11.0	16	9E	57E
<a href="#">14</a>	0.2	-7.2	-3.5	21.5	0.0	0.0	T	T	11	26E	74E
<a href="#">15</a>	-1.1	-9.1	-5.1	23.1	0.0	T	7.4	4.4	11	36E	52E

<a href="#">16</a>	-2.0	-6.7	-4.4	22.4	0.0	0.0	3.2	1.8	17	35E	54E
<a href="#">17</a>	-3.3	-8.1	-5.7	23.7	0.0	T	T	T	17	7E	39E
<a href="#">18</a>	-0.1	-3.4	-1.8	19.8	0.0	1.6	21.8	17.4	27	3E	80E
<a href="#">19</a>	-1.0	-4.1	-2.6	20.6	0.0	T	0.8	0.8	39	33E	67E
<a href="#">20</a>	5.9	-3.0	1.5	16.5	0.0	5.3	10.1	13.2	45	13E	57E
<a href="#">21</a>	1.2	-3.1	-1.0	19.0	0.0	0.0	3.2	1.2	34	25E	50E
<a href="#">22</a>	0.5	-3.6	-1.6	19.6	0.0	0.0	T	T	34	25E	50E
<a href="#">23</a>	1.4	-4.2	-1.4	19.4	0.0	8.4	6.6	18.6	34	12E	63E
<a href="#">24</a>	2.0	-3.7	-0.9	18.9	0.0	0.0	T	T	35	23E	59E
<a href="#">25</a>	0.8	-5.0	-2.1	20.1	0.0	0.0	0.2	T	35	28E	61E
<a href="#">26</a>	0.5	-5.8	-2.7	20.7	0.0	0.0	0.0	0.0	35	29E	41E
<a href="#">27</a>	2.1	-6.1	-2.0	20.0	0.0	0.0	0.0	0.0	32	26E	39E
<a href="#">28</a>	9.0	1.1	5.1	12.9	0.0	0.8	0.0	0.8	28	21E	67E
Sum				<b>574.8</b>	<b>0.0</b>	<b>46.9</b>	<b>93.7</b>	<b>124.0</b>			
Avg	<b>0.7</b>	<b>-5.8</b>	<b>-2.5</b>								
Xtrm	<b>9.7</b>	<b>-12.5</b>								<b>3E</b>	<b>80E</b>

Daily Data Report for March 2009

<u>Day</u>	<u>Max Temp</u> °C	<u>Min Temp</u> °C	<u>Mean Temp</u> °C	<u>Heat Deg Days</u> °C	<u>Cool Deg Days</u> °C	<u>Total Rain</u> mm	<u>Total Snow</u> cm	<u>Total Precip</u> mm	<u>Snow on Grnd</u> cm	<u>Dir of Max Gust</u> 10's Deg	<u>Spd of Max Gust</u> km/h
<a href="#">01</a>	8.3	-4.8	1.8	16.2	0.0	18.0	T	18.0	10	25E	48E
<a href="#">02</a>	11.8	-2.1	4.9	13.1	0.0	17.2	0.0	17.2	6	M	M
<a href="#">03</a>	13.5	8.8	11.2	6.8	0.0	3.6	0.0	3.6	6	21E	76E
<a href="#">04</a>	9.6	-4.8	2.4	15.6	0.0	10.6	1.0	11.4	2	26E	48E
<a href="#">05</a>	-4.6	-10.1	-7.4	25.4	0.0	0.0	3.8	2.6	3	27E	61E
<a href="#">06</a>	-1.9	-13.7	-7.8	25.8	0.0	0.0	T	T	5	29E	52E
<a href="#">07</a>	3.8	-7.2	-1.7	19.7	0.0	2.8	4.2	7.0	5	18E	70E
<a href="#">08</a>	1.3	-3.4	-1.1	19.1	0.0	0.0	0.0	0.0	6	28E	74E
<a href="#">09</a>	-0.2	-6.3	-3.3	21.3	0.0	0.0	1.0	0.6	6	33E	61E
<a href="#">10</a>	-0.3	-3.6	-2.0	20.0	0.0	0.0	0.0	0.0	6	33E	46E
<a href="#">11</a>	2.9	-5.1	-1.1	19.1	0.0	0.0	0.0	0.0	6		<31
<a href="#">12</a>	4.8	-9.8	-2.5	20.5	0.0	2.2	T	2.2	2	27E	82E
<a href="#">13</a>	-6.5	-11.6	-9.1	27.1	0.0	0.0	T	T	1	28E	72E
<a href="#">14</a>	-2.8	-11.1	-7.0	25.0	0.0	0.0	T	T	1	29E	63E
<a href="#">15</a>	3.7	-9.6	-3.0	21.0	0.0	0.0	T	T	1	27E	63E
<a href="#">16</a>	-5.9	-10.7	-8.3	26.3	0.0	0.0	T	T	1	29E	39E
<a href="#">17</a>	-2.8	-9.8	-6.3	24.3	0.0	0.0	2.0	2.0	3	32E	37E
<a href="#">18</a>	-0.3	-10.7	-5.5	23.5	0.0	0.0	T	T	2		<31
<a href="#">19</a>	4.0	-3.9	0.1	17.9	0.0	0.2	0.0	0.2	T	24E	54E
<a href="#">20</a>	3.9	-2.8	0.6	17.4	0.0	0.6	T	0.6	T		<31
<a href="#">21</a>	-0.1	-5.5	-2.8	20.8	0.0	9.2	27.8	36.4	7	5E	52E
<a href="#">22</a>	-0.1	-6.7	-3.4	21.4	0.0	3.8	T	3.8	24	M	M
<a href="#">23</a>	-1.6	-7.4	-4.5	22.5	0.0	0.0	8.0	6.4	24	M	M
<a href="#">24</a>	-0.1	-1.7	-0.9	18.9	0.0	T	3.2	2.4	32	2E	76E
<a href="#">25</a>	-0.1	-1.6	-0.9	18.9	0.0	8.0	12.2	20.0	30	4E	54E
<a href="#">26</a>	1.1	-1.3	-0.1	18.1	0.0	11.6	0.0	11.6	31	M	M
<a href="#">27</a>	5.3	0.0	2.7	15.3	0.0	0.6	0.0	0.6	20	M	M

<a href="#">28</a>	7.2	0.9	4.1	13.9	0.0	T	0.0	T	15	33E	33E
<a href="#">29</a>	7.1	-1.2	3.0	15.0	0.0	0.0	T	T	12	32E	50E
<a href="#">30</a>	2.1	-1.7	0.2	17.8	0.0	0.0	T	T	12	35E	50E
<a href="#">31</a>	0.9	-1.9	-0.5	18.5	0.0	0.0	0.0	0.0	8	2E	54E
Sum				<b>606.2</b>	<b>0.0</b>	<b>88.4</b>	<b>63.2</b>	<b>146.6</b>			
Avg	<b>2.1</b>	<b>-5.2</b>	<b>-1.6</b>								
Xtrm	<b>13.5</b>	<b>-13.7</b>								<b>27*</b>	<b>82*</b>

**Report prepared by:**

Joanne Sweeney  
Environmental Scientist  
Water Resources Management Division  
Department of Environment and Conservation  
Confederation Building West Block 4<sup>th</sup> Floor  
PO Box 8700  
St. John's NL A1B 4J6  
Ph. (709) 729-0351  
Fax (709) 729-0320