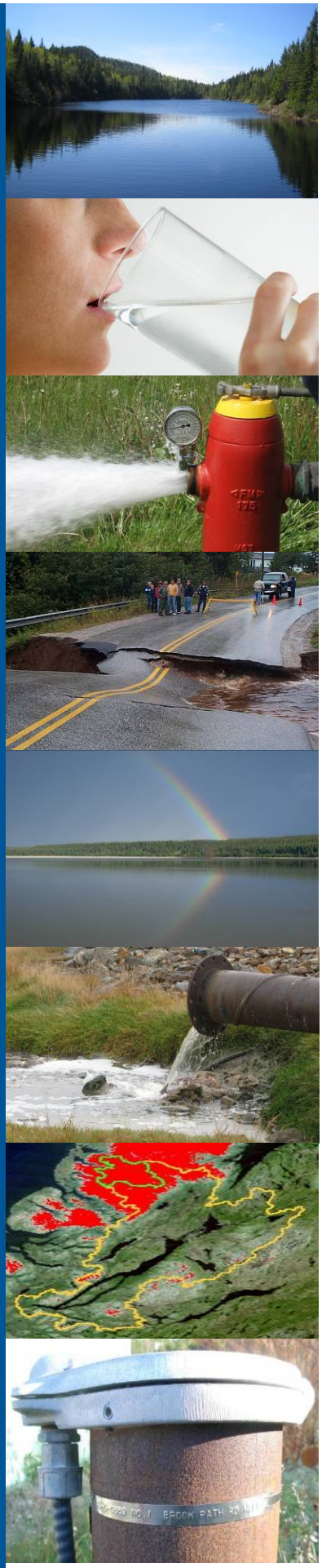


Waterford River @ Kilbride

NF02ZM0009

March 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
March 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

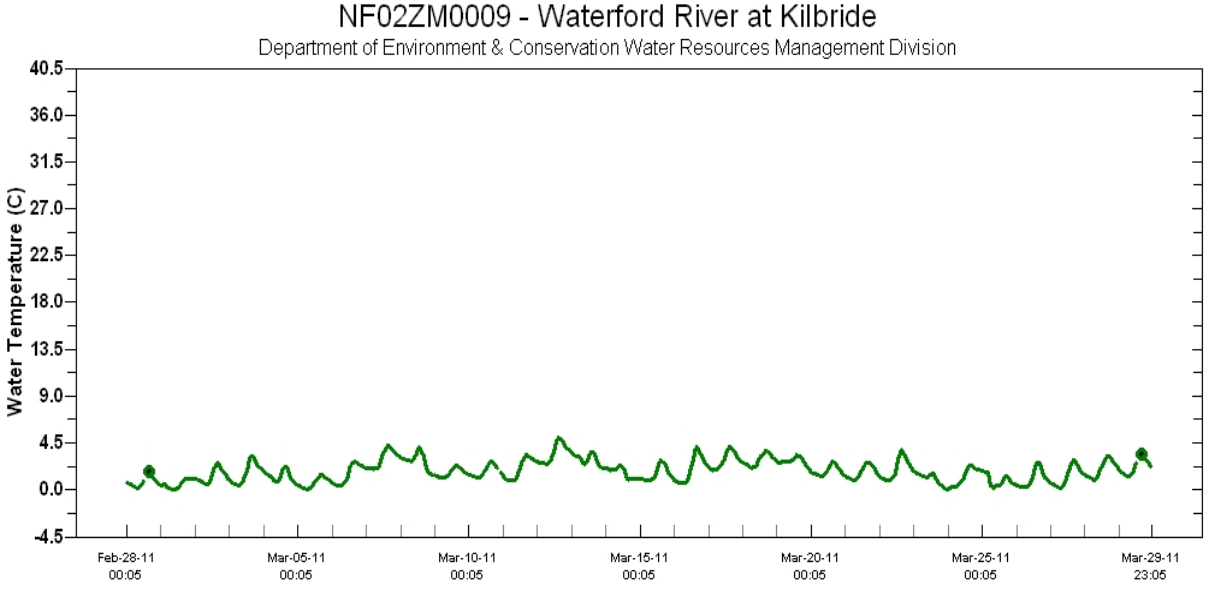
Date Installed	Date Removed
February 28, 2011	March 29, 2011

- 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

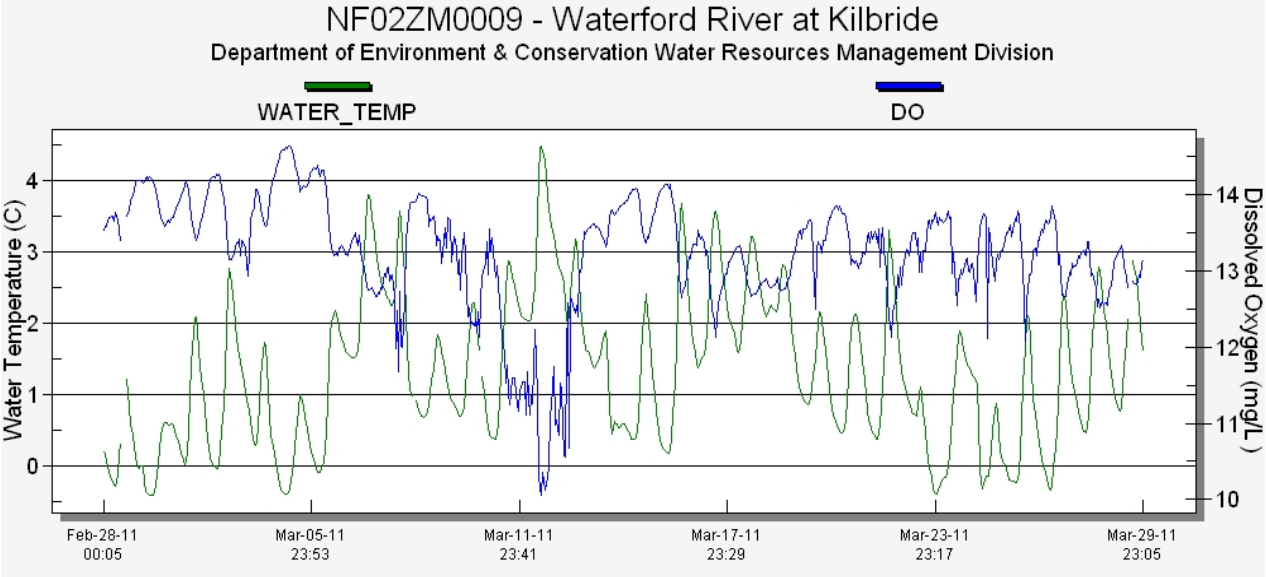
- **Water temperatures** were fairly constant during this deployment, ranging between -0.41 and 4.48^{o}C, which is within the expected temperature range for this time of year. There was no ice cover on Waterford River at the time of instrument deployment and removal, though water temperatures frequently hovered near the freezing point. Water temperature data is shown in **Figure 1** below.

Figure 1: Water Temperature



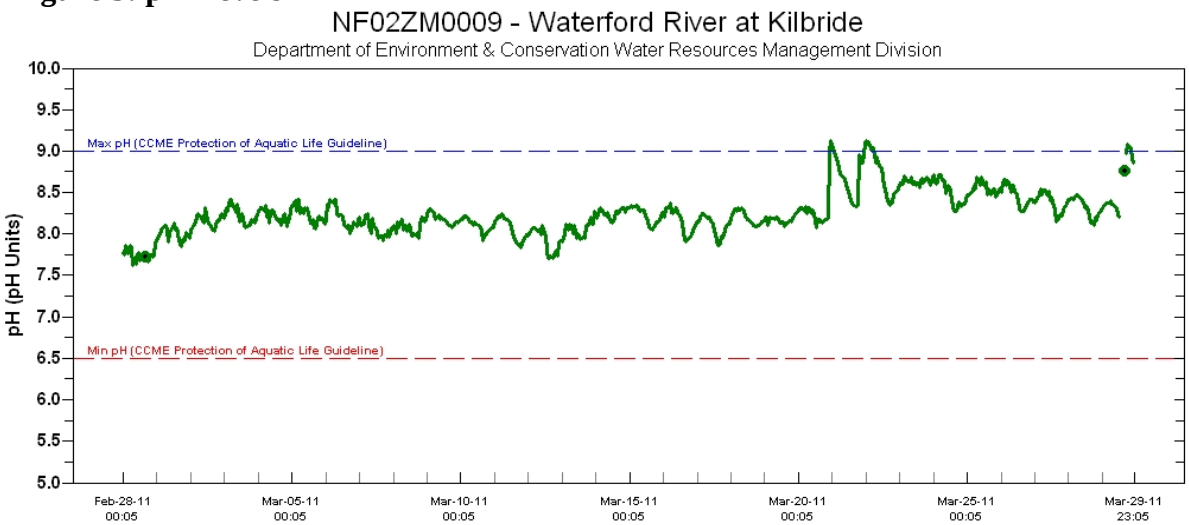
- **Dissolved oxygen (DO)** has an inverse relationship with water temperature whereby DO levels increase as water temperature decreases, and DO decreases as water temperature increases. Dissolved oxygen is shown in blue and water temperature is shown in green in **Figure 2**, below. The graph indicates that dissolved oxygen levels peaked at 14.63 mg/L on March 5, the same day that water temperature reached its lowest level of -0.4°C. DO plummeted to its lowest level of 10.06 mg/L on March 12, corresponding to the day the highest water temperatures during the deployment period were reached.

Figure 2: Dissolved Oxygen and Water Temperature



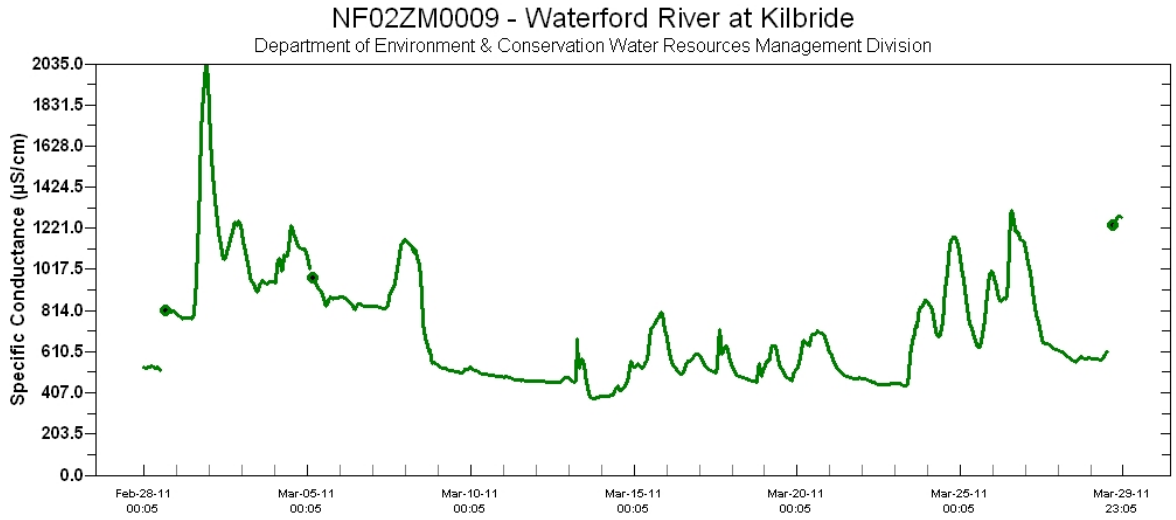
- **pH** levels were fairly constant and within the expected range for this station, with the exception of two sudden surges that occurred on March 20 and 21, as seen in **Figure 3** below. Environment Canada climate data, shown in **Appendix 1** at the end of this report, indicates that 24 cm of snow fell on March 14, followed by 4 consecutive days, March 16-19, when maximum daily air temperatures were above 0°C. The resulting spring run-off is a major contributing factor to the pH spikes on March 20 and 21.

Figure 3: pH Levels



- **Specific conductivity** levels peaked fairly high, but within the expected range for Waterford River during this deployment. Specific conductivity levels ranged between 377-2035µS/cm and showed sudden increases, generally in response to spring run-off conditions that occurred whenever daily maximum air temperatures rose above 0^{o}C. Specific conductivity data is shown in **Figure 4** below. The Environment Canada Daily Climate Data for March, for the St. John's region, shown below in **Appendix 1**, indicates that maximum daily air temperatures were frequently above 0^{o}C during the month of March, resulting in increased run-off containing significant amounts of road salt entering the river.

Figure 4: Specific Conductance and Flow



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

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01†	5.2	-6.8	-0.8	18.8	0.0	2.2	10.6	8.9	57	18	91
02†	-0.4	-6.3	-3.4	21.4	0.0	0.0	0.0	0.0	52	31	44
03†	0.1	-6.1	-3.0	21.0	0.0	0.0	1.0	0.8	51	18	57
04†	-2.8	-10.7	-6.8	24.8	0.0	0.0	T	T	51	29	63
05†	-2.5	-11.7	-7.1	25.1	0.0	0.0	0.0	0.0	51		<31
06†	3.1	-5.6	-1.3	19.3	0.0	0.0	0.0	0.0	51	24	48
07†	8.2	2.6	5.4	12.6	0.0	0.0	0.0	0.0	44	22	56
08†	9.5	-4.1	2.7	15.3	0.0	T	0.0	T	36	21	72
09†	-1.7	-4.5	-3.1	21.1	0.0	0.0	0.4	0.4	32	3	33
10†	-2.8	-8.5	-5.7	23.7	0.0	0.0	T	T	32		<31
11†	0.7	-7.9	-3.6	21.6	0.0	0.0	T	T	32	22	32
12†	4.8	0.2	2.5	15.5	0.0	T	0.0	T	28	20	65
13†	6.7	-1.1	2.8	15.2	0.0	3.4	0.0	3.4	18	19	59
14†	1.6	-4.3	-1.4	19.4	0.0	0.2	24.0	23.8	16	1E	72E
15†	-4.2	-7.8	-6.0	24.0	0.0	0.0	0.6	T	27	36	50
16†	2.5	-6.1	-1.8	19.8	0.0	0.0	0.0	0.0	27	26	54
17†	6.1	-1.0	2.6	15.4	0.0	1.5	T	1.5	22	22	67
18†	4.3	-0.7	1.8	16.2	0.0	1.2	2.0	3.2	10	18	46

19†	3.4	-2.0	0.7	17.3	0.0	0.0	3.8	3.8	7	36	57
20†	-1.7	-6.2	-4.0	22.0	0.0	0.0	T	T	11	1	52
21†	-2.8	-6.2	-4.5	22.5	0.0	0.0	T	T	11	4	33
22†	-1.6	-4.9	-3.3	21.3	0.0	0.0	T	T	11	36	57
23†	-1.3	-3.7	-2.5	20.5	0.0	0.0	15.7	14.8	11	34	74
24†	0.7	-3.6	-1.5	19.5	0.0	0.0	0.4	0.4	20	31	54
25†	0.2	-3.5	-1.7	19.7	0.0	0.8	21.2	22.0	24	4	70
26†	-1.4	-5.2	-3.3	21.3	0.0	0.0	2.2	2.2	37	26	76
27†	-0.7	-5.8	-3.3	21.3	0.0	0.0	T	T	36	23	41
28†	-0.5	-4.7	-2.6	20.6	0.0	0.0	1.0	1.0	36	26	35
29†	3.0	-3.2	-0.1	18.1	0.0	0.0	2.4	1.2	36	24	37
30†	2.8	-2.3	0.3	17.7	0.0	0.0	2.2	1.6	34	30	46
31†	1.8	-1.9	-0.1	18.1	0.0	0.0	0.6	0.4	34	1	35
Sum				**610.1**	**0.0**	**9.3**	**88.1**	**89.4**			
Avg	**1.3**	**-4.6**	**-1.67**								
Xtrm	**9.5**	**-11.7**								**18**	**91**

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