Government of Newfoundland and Labrador
Department of Environment and Conservation
Water Resources Management Division

Real Time Water Quality Monthly Report
Waterford River - St. John's NL
December 2008 to January 2009

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.

Table 1: Table of Water Quality Probe installation and removal:

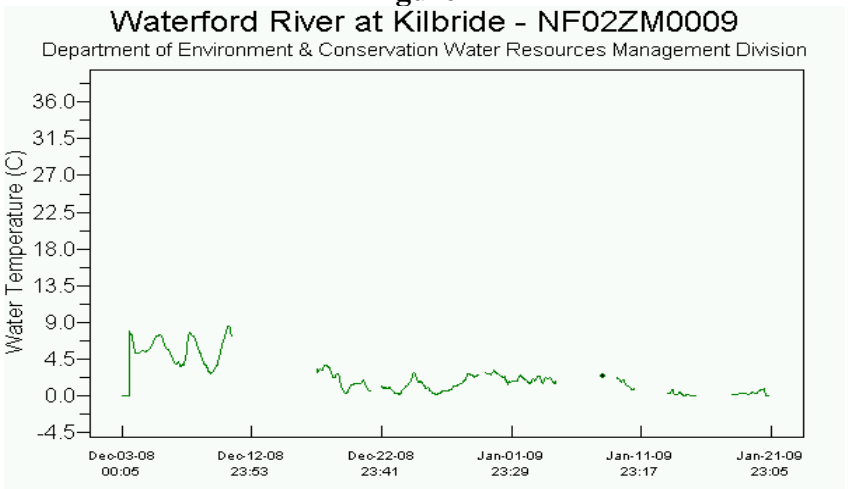
Date Installed	Date Removed
December 3, 2008	January 21, 2009

- 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

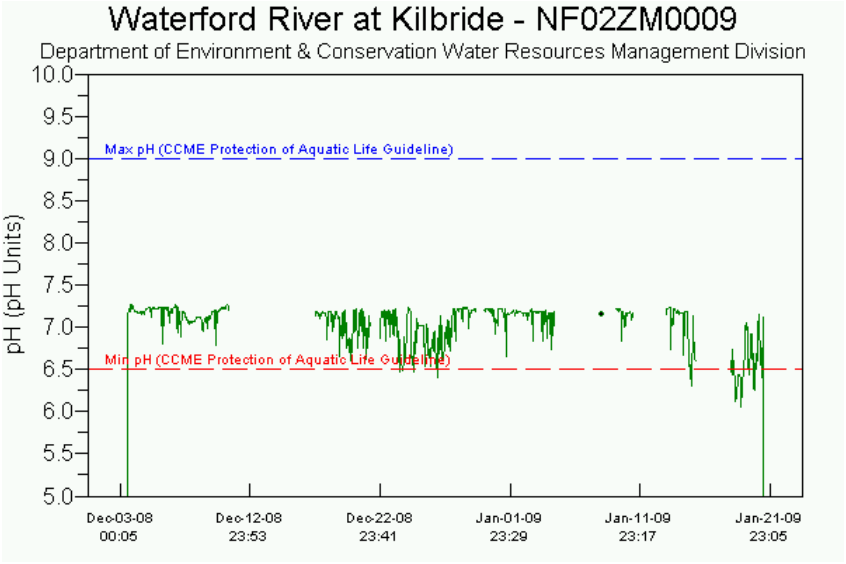
- Technical transmission difficulties were experienced resulting in several data gaps during this deployment period.
- In general, water quality parameters were stable during the deployment period with expected diurnal and seasonal variations occurring.
- **Water temperatures** fluctuated in response to daily maximum and minimum air temperatures. This is demonstrated by comparing the graph in **Figure 1** below, to the air temperature data in **Appendix 1,** found at the end of this report. Water temperatures ranged from 0.05 to 8.52 ^{o}C and displayed an overall decreasing trend in response to seasonally decreasing temperatures.

Figure 1



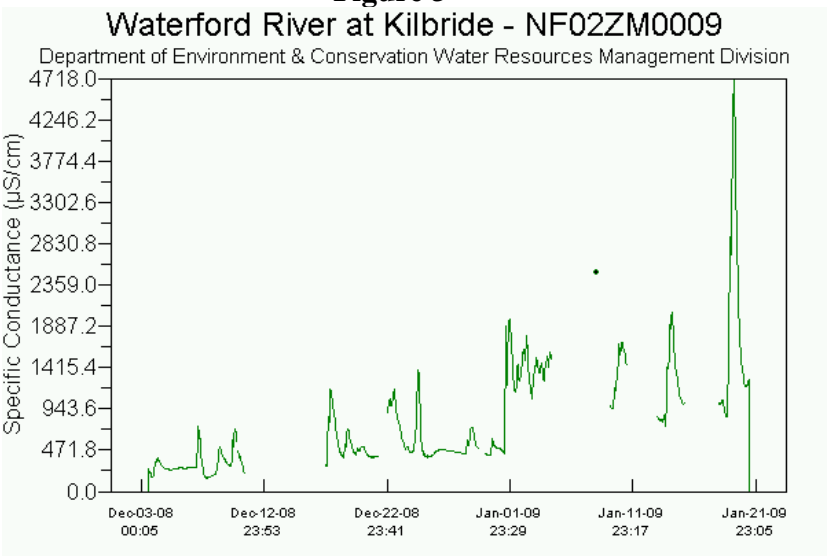
- **pH** ranged from 6.06 to 7.27 pH units, as seen in **Figure 2**. Some pH measurements were below the range recommended by the Canadian Water Quality Guidelines for the Protection of Aquatic Life of 6.5 to 9 **(Figure 2).** It is typical for surface water in NL to have pH levels below the recommended guideline, due to the acidic nature of the terrain.

Figure 2



- **Specific conductivity** levels ranged from 149 to 4718µS/cm, as seen in **Figure 3,** and displayed an overall increasing trend. Sharp spikes in conductivity levels can be attributed to significant rainfall that occurred on coinciding dates (see **Appendix 1**). Rainfall during the spring, summer and fall months often has a dilution affect on conductivity, causing levels to decrease. When road salt is used on public streets for ice control during the winter months, rainfall and surface run-off often cause conductivity levels to spike.

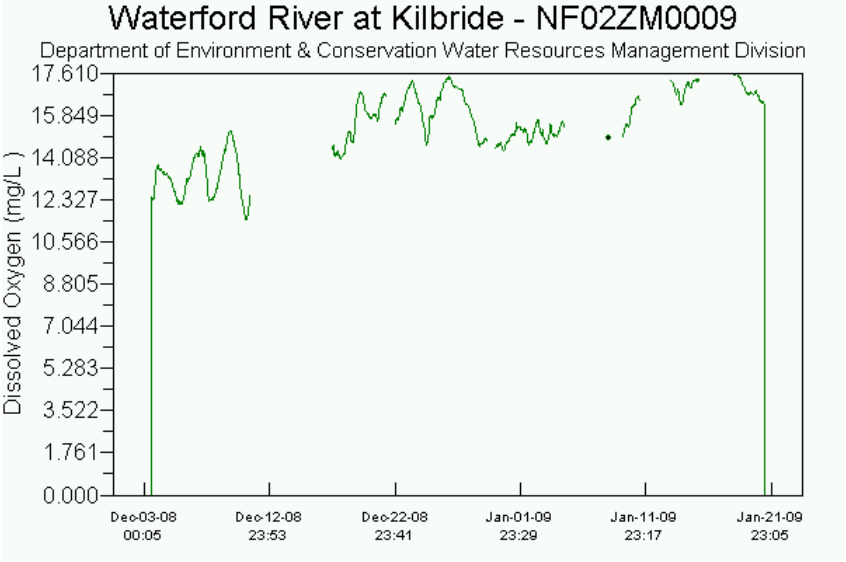
Figure 3



- **Dissolved oxygen (DO)** levels displayed diurnal fluctuations (**see Figure 4**) in response to changes in water temperatures from daytime highs to night time lows (**see Figure 1**).

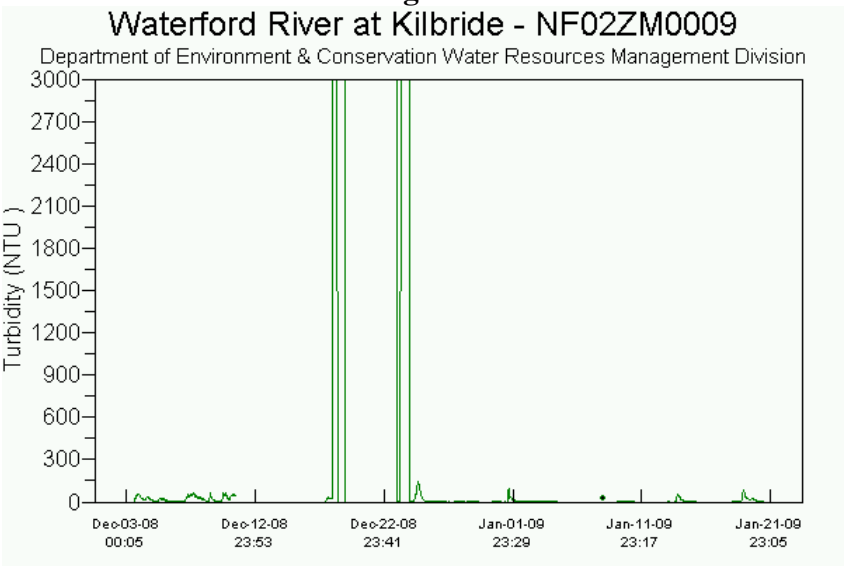
DO illustrated an overall increasing trend during the deployment. Colder water typically holds more dissolved oxygen than warmer water, so as water temperatures decrease, dissolved oxygen levels tend to increase.

Figure 4



- **Turbidity** data was consistent for most of the deployment with spikes occurring near December 19 -20 and December 23-35, as seen in **Figure 5**. Snowfall that occurred near these dates (see **Appendix 1)** combined with freezing temperatures may have caused a build up of slush around the end of the protective pipe that houses the water quality probe, resulting in increased turbidity values until the slush moved downstream.

Figure 5



APPENDIX 1: Weather information for St. John's, NL provided by Environment Canada for December 2008:

Daily Data Report for December 2008

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	14.2	1.3	7.8	10.2	0.0	4.8	0.0	4.8	0	18E	76E
02	16.7	5.5	11.1	6.9	0.0	8.6	0.0	8.6	0	M	M
03	6.6	0.2	3.4	14.6	0.0	14.0	11.0	**25.0**	0		<31
04	5.2	0.0	2.6	15.4	0.0	0.0	T	T	2	24E	63E
05	9.0	2.6	5.8	12.2	0.0	1.6	0.0	1.6	0	25E	54E
06	2.6	-4.3	-0.9	18.9	0.0	0.0	0.0	0.0	0		<31
07	12.2	-3.1	4.6	13.4	0.0	31.0	9.0	**40.0**	T	18E	80E
08	12.8	-1.6	5.6	12.4	0.0	29.4	0.6	**30.0**	0	20E	69E
09	-0.2	-4.7	-2.5	20.5	0.0	0.0	2.4	2.2	2	30E	67E
10	12.7	-0.7	6.0	12.0	0.0	11.6	T	**11.6**	2	24E	104E
11	11.8	-1.0	5.4	12.6	0.0	28.2	5.6	**38.0**	0	26E	67E
12	16.8	-0.6	8.1	9.9	0.0	7.0	0.4	9.0	4	23E	89E
13	17.3	1.0	9.2	8.8	0.0	18.6	0.0	**18.6**	0	21E	91E
14	1.1	-6.2	-2.6	20.6	0.0	1.8	0.2	1.8	T	13E	37E
15	9.3	-5.3	2.0	16.0	0.0	T	0.0	T	0	23E	63E
16	11.4	-1.2	5.1	12.9	0.0	1.0	0.0	1.0	0	23E	89E
17	0.1	-3.2	-1.6	19.6	0.0	T	9.4	9.4	0	29E	41E
18	0.9	-7.0	-3.1	21.1	0.0	7.0	T	7.0	5	36E	50E
19	-2.5	-13.1	-7.8	25.8	0.0	0.0	6.8	5.4	5	29E	69E
20	-5.1	-11.3	-8.2	26.2	0.0	0.0	T	T	10	29E	56E
21	-6.1	-13.3	-9.7	27.7	0.0	0.0	T	T	9	33E	39E
22	3.2	-11.6	-4.2	22.2	0.0	4.0	16.2	**18.0**	12	13E	89E
23	-1.7	-8.5	-5.1	23.1	0.0	0.0	2.0	1.2	16	29E	78E
24	-0.3	-10.4	-5.4	23.4	0.0	0.0	T	T	16	29E	44E
25	9.1	-1.8	3.7	14.3	0.0	26.4	T	**26.4**	14	20E	80E
26	-1.8	-13.3	-7.6	25.6	0.0	0.0	0.0	0.0	5	30E	67E
27	-10.5	-13.5	-12.0	30.0	0.0	0.0	T	T	5	30E	44E
28	-2.8	-10.5	-6.7	24.7	0.0	0.0	0.2	T	5	16E	33E
29	4.4	-2.9	0.8	17.2	0.0	0.8	T	0.8	5	16E	63E
30	-0.1	-1.9	-1.0	19.0	0.0	0.0	T	T	5		<31
31	-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**

Weather information for St. John's, NL provided by Environment Canada for January 2009:

Daily Data Report for January 2009

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	2.0	-3.6	-0.8	18.8	0.0	7.0	0.6	7.6	5	12E	46E
02	1.2	-1.7	-0.3	18.3	0.0	0.0	2.4	2.4	4	25E	67E

03	0.6	-3.2	-1.3	19.3	0.0	T	4.4	4.4	4	25E	61E
04	-0.3	-4.6	-2.5	20.5	0.0	0.0	6.2	3.2	9	24E	39E
05	1.4	-3.5	-1.1	19.1	0.0	0.0	2.4	1.6	11	26E	78E
06	2.4	-6.0	-1.8	19.8	0.0	0.4	6.4	4.4	9	27E	65E
07	-2.1	-5.7	-3.9	21.9	0.0	0.0	T	T	15	26E	74E
08	8.5	-2.7	2.9	15.1	0.0	1.6	1.8	3.0	11	24E	85E
09	3.5	-1.0	1.3	16.7	0.0	0.0	T	T	5	25E	74E
10	-1.0	-4.0	-2.5	20.5	0.0	0.0	6.2	3.0	6	32E	37E
11	-2.2	-8.1	-5.2	23.2	0.0	0.0	10.0	7.2	10	9E	46E
12	-2.0	-7.3	-4.7	22.7	0.0	0.0	3.8	2.8	19	4E	57E
13	-3.9	-9.7	-6.8	24.8	0.0	0.0	T	T	19	28E	48E
14	7.1	-4.1	1.5	16.5	0.0	2.0	12.2	**12.2**	19	26E	95E
15	-2.8	-12.1	-7.5	25.5	0.0	0.0	0.2	T	24	27E	89E
16	**-11.6**	-13.9	-12.8	30.8	0.0	0.0	0.0	0.0	24	28E	65E
17	**-10.3**	-14.0	-12.2	30.2	0.0	0.0	2.0	1.4	24	29E	78E
18	-8.5	-13.6	-11.1	29.1	0.0	0.0	T	T	25	29E	65E
19	7.2	-12.8	-2.8	20.8	0.0	2.8	T	2.8	25	18E	78E
20	6.2	-2.8	1.7	16.3	0.0	T	0.2	T	19	25E	39E
21	-2.8	-8.8	-5.8	23.8	0.0	T	4.8	4.4	19		<31
22	-2.8	-10.2	-6.5	24.5	0.0	0.0	0.2	T	23	24E	50E
23	-3.7	-11.3	-7.5	25.5	0.0	0.0	1.0	1.0	22	27E	85E
24	6.7	-11.4	-2.4	20.4	0.0	6.8	1.4	8.2	20	18E	67E
25	-3.2	-13.1	-8.2	26.2	0.0	0.0	T	T	16	27E	78E
26	**-11.1**	-13.9	-12.5	30.5	0.0	0.0	0.0	T	16	29E	69E
27	**-10.3**	-13.6	-12.0	30.0	0.0	0.0	0.0	0.0	16	27E	65E
28	-4.3	-12.0	-8.2	26.2	0.0	0.0	0.0	0.0	16	28E	67E
29	2.2	-6.9	-2.4	20.4	0.0	T	8.8	8.8	16	15E	78E
30	0.0	-2.5	-1.3	19.3	0.0	T	2.0	1.8	20	29E	76E
31	-1.6	-3.3	-2.5	20.5	0.0	0.0	7.2	4.2	20	6E	32E
Sum				**697.2**	**0.0**	**20.6**	**84.2**	**84.4**			
Avg	**-1.1**	**-7.8**	**-4.5**								
Xtrm	**8.5**	**-14.0**								**26E**	**95E**

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