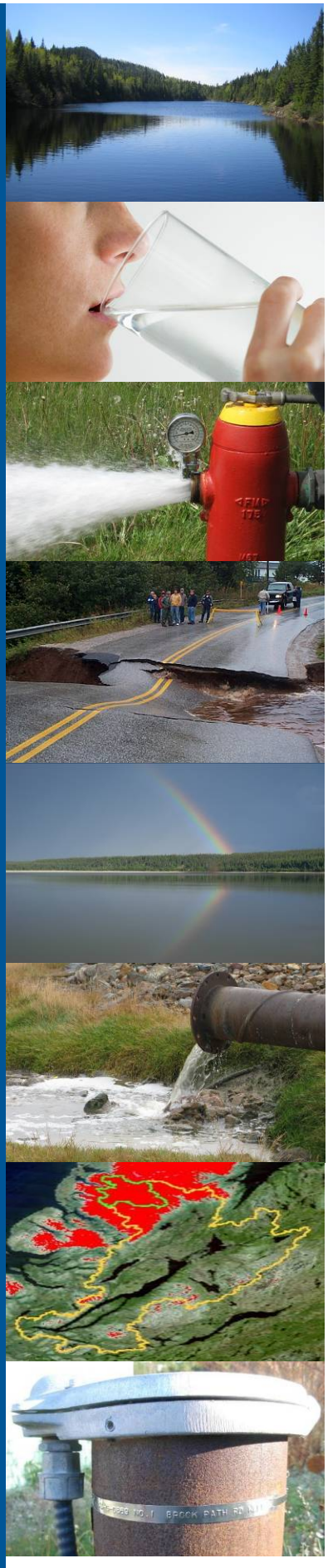


Waterford River @ Kilbride

NF02ZM0009

September 2010

Newfoundland Labrador

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
September 2010

General

- Data from the Waterford River monitoring station is monitored by the Water Resources Management Division staff.
- Despite the approximately 112mm of rainfall that reportedly fell in the St. John's area during Hurricane Igor on September 20th-21st, the Waterford River water quality monitoring instrument remained in tact and recorded water quality data throughout the event.

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 hydrolab at Waterford River has been replaced with a sonde that has a luminescent dissolved oxygen sensor, which should be fully functional and provide reliable dissolved oxygen data for a 30-day deployment period. The recording of dissolved oxygen data will resume at this station. The replacement sonde does not include a turbidity sensor, thus turbidity will no longer be recorded at this station.

Table 1: Table of Water Quality Probe Installation and Removal

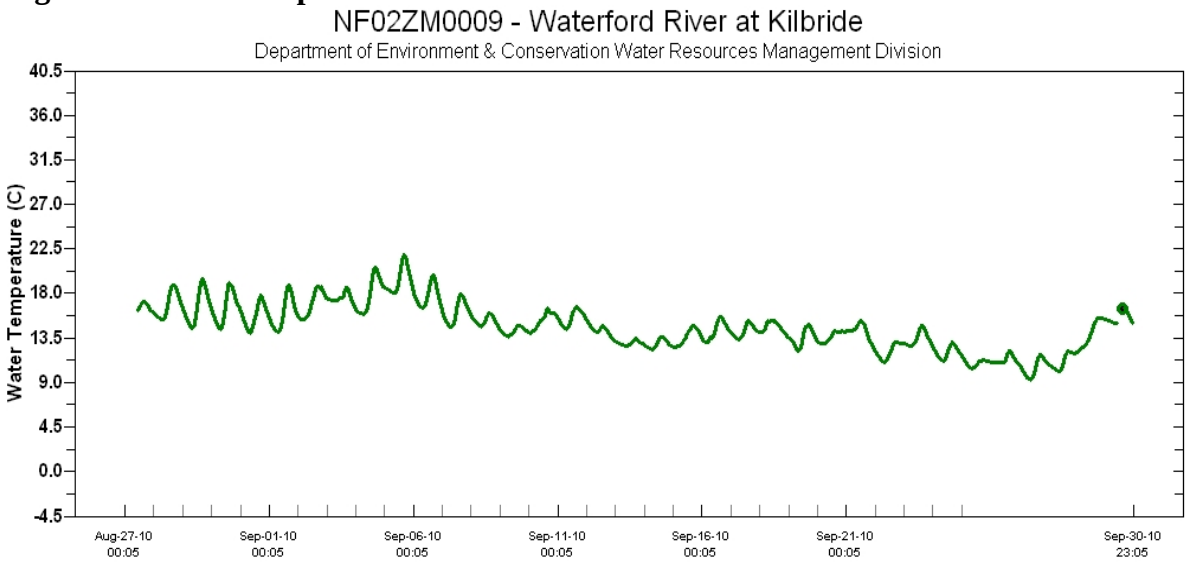
Date Installed	**Date Removed**
August 27, 2010	September 30, 2010

- 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

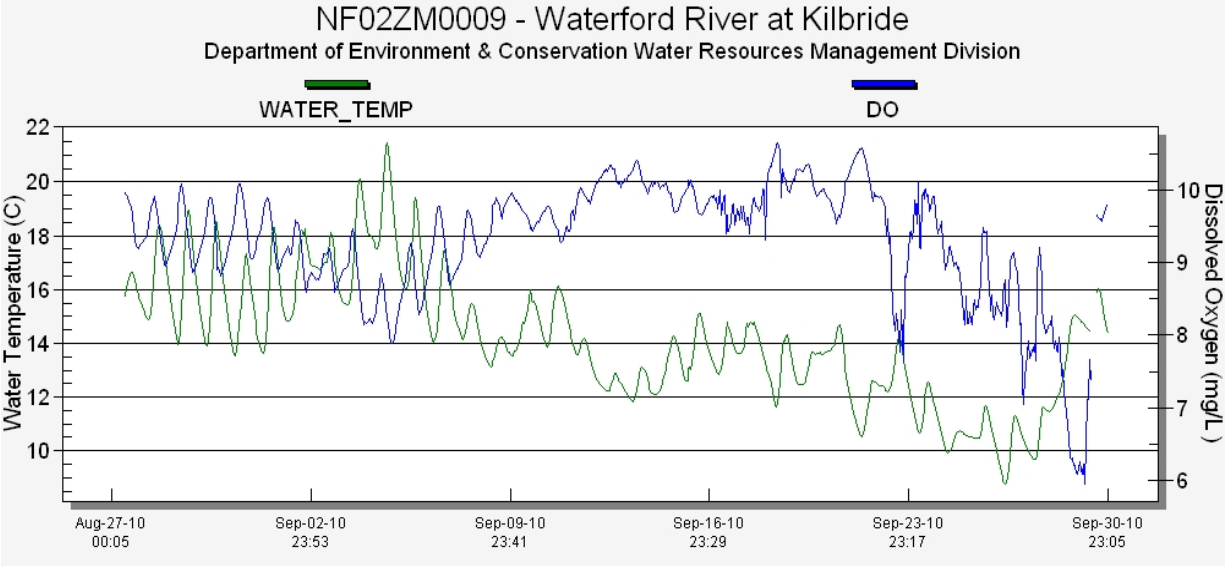
- **Water temperatures** were fairly constant during this deployment, ranging between 8.77 and 21.45°C, which is within the expected temperature range for this time of year. Water temperature data is shown in **Figure 1** below.

Figure 1: Water Temperature



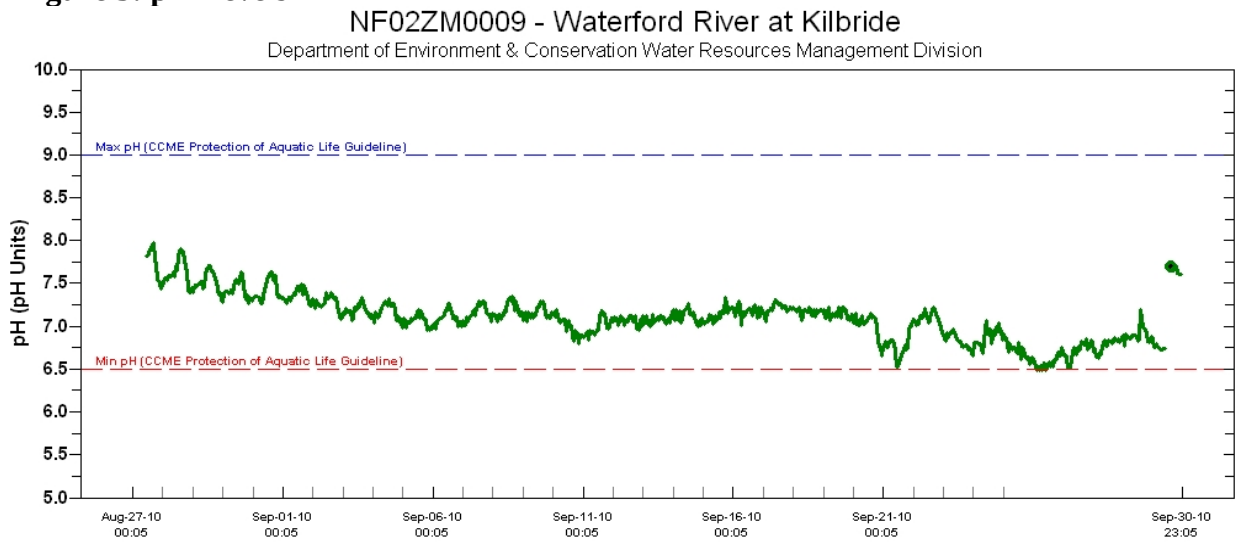
- **Dissolved oxygen (DO)** levels displayed diurnal fluctuations in response to changes in water temperatures from daytime highs to night time lows. Colder water typically holds more dissolved oxygen than warmer water, so as water temperatures decrease, dissolved oxygen levels typically increase. Conversely, as water temperatures increase, dissolved oxygen levels decrease. Dissolved oxygen levels ranged between 5.95 and 10.65mg/L during this deployment, dipping below the CCME dissolved oxygen minimum guideline for the Protection of Aquatic Life of 6.5mg/L. The lowest dissolved oxygen values occurred toward the end of the deployment period, when the DO sensor had become partially encased in mud deposited after extremely heavy rainfall on September 21, 2010. Dissolved oxygen is shown in blue and water temperature is shown in green in **Figure 2**, below.

Figure 2: Dissolved Oxygen and Water Temperature



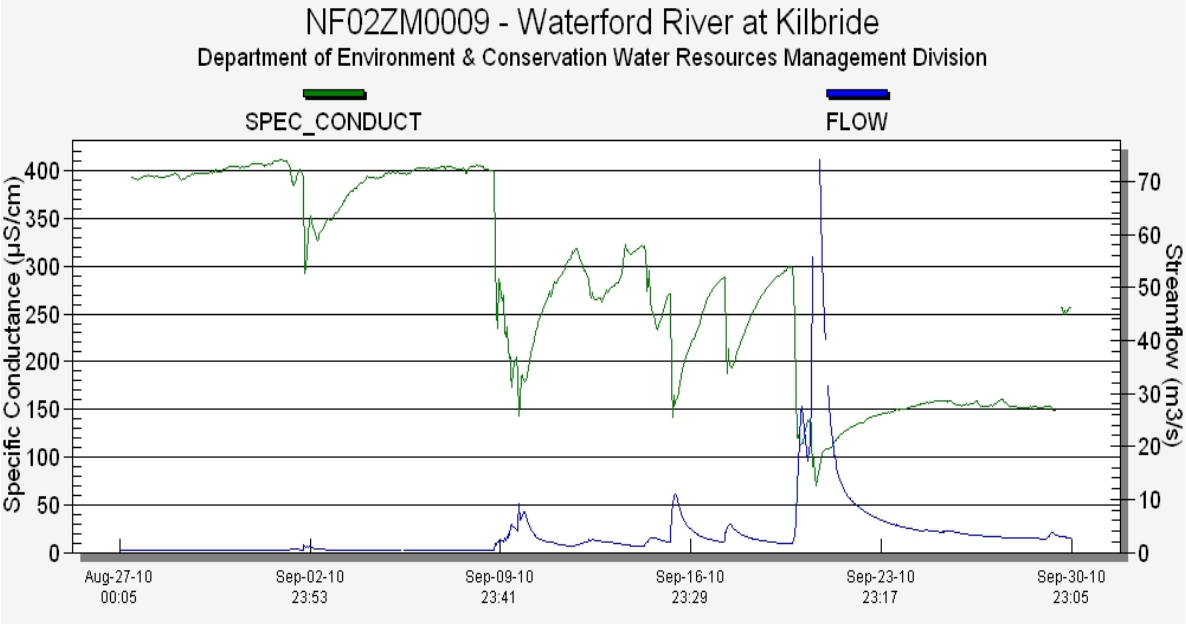
- **pH** levels were fairly constant and within the expected range for this station throughout the deployment, ranging from 6.49 to 7.97 units, as seen in **Figure 3** below. Almost all pH values were within the range recommended by the Canadian Water Quality Guidelines for the Protection of Aquatic Life of 6.5 to 9.0 pH units.

Figure 3: pH Levels



- **Specific conductivity** levels typically share an inverse relationship with water flow, showing decreasing levels as flow increases due to precipitation. This is caused by the dilution effect precipitation has on conductivity, which is most noticeable during the warmer months when road salting operations are not in effect. Conversely, specific conductivity levels typically increase as flow decreases. Specific conductivity ranged between 69-412µS/cm during this deployment. Significantly heavy rainfall that occurred on September 9th-10th, 15th-16th, and particularly on the 20th-21st resulted in substantial decreases in conductivity and increases in flow on these dates, as shown in **Figure 4** below. Canadian Climate Data shows daily rainfall amounts for September 2010, and is found in Appendix 1 at the end of this report.

Figure 4: Specific Conductance and Flow



APPENDIX 1: Weather information for St. John's, NL provided by Environment Canada for September 2010:

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	19.6	12.6	16.1	1.9	0.0	0.4	0.0	0.4	0	31E	37E
02	20.9	16.2	18.6	0.0	0.6	5.6	0.0	5.6	0		<31
03	19.5	13.4	16.5	1.5	0.0	T	0.0	T	0	34E	33E
04	24.8	15.9	20.4	0.0	2.4	T	0.0	T	0	23E	59E
05	25.5	16.3	20.9	0.0	2.9	0.0	0.0	0.0	0	24E	67E
06	22.2	12.9	17.6	0.4	0.0	0.0	0.0	0.0	0	26E	50E
07	20.7	12.8	16.8	1.2	0.0	0.6	0.0	0.6	0	25E	39E
08	14.2	10.6	12.4	5.6	0.0	1.0	0.0	1.0	0	31E	35E
09	14.4	10.6	12.5	5.5	0.0	26.2	0.0	26.2	0	14E	54E
10	19.1	14.2	16.7	1.3	0.0	27.2	0.0	27.2	0	15E	59E
11	20.4	10.8	15.6	2.4	0.0	1.8	0.0	1.8	0	35E	32E
12	11.1	9.4	10.3	7.7	0.0	6.4	0.0	6.4	0	3E	52E
13	11.4	9.7	10.6	7.4	0.0	8.4	0.0	8.4	0	4E	46E
14	12.0	8.5	10.3	7.7	0.0	0.0	0.0	0.0	0		<31
15	18.1	9.6	13.9	4.1	0.0	16.8	0.0	16.8	0	15E	35E
16	21.1	9.6	15.4	2.6	0.0	19.8	0.0	19.8	0	25E	44E
17	18.1	12.0	15.1	2.9	0.0	0.2	0.0	0.2	0	27E	50E
18	18.0	8.6	13.3	4.7	0.0	12.8	0.0	12.8	0	23E	61E
19	18.4	6.6	12.5	5.5	0.0	0.0	0.0	0.0	0		<31
20	15.7	10.9	13.3	4.7	0.0	47.2	0.0	47.2	0	18E	65E
21	15.8	7.9	11.9	6.1	0.0	73.0	0.0	73.0	0	M	M
22	15.0	8.5	11.8	6.2	0.0	T	0.0	T	0	28E	78E
23	17.7	7.2	12.5	5.5	0.0	0.0	0.0	0.0	0	28E	59E
24	13.5	4.8	9.2	8.8	0.0	T	0.0	T	0	28E	56E
25	9.2	4.3	6.8	11.2	0.0	1.6	0.0	1.6	0		<31
26	11.0	2.3	6.7	11.3	0.0	2.6	0.0	2.6	0		<31
27	14.7	2.4	8.6	9.4	0.0	0.0	0.0	0.0	0	27E	59E
28	16.0	7.6	11.8	6.2	0.0	T	0.0	T	0	26E	61E
29	20.6	15.4	18.0	0.0	0.0	1.4	0.0	1.4	0	25E	65E
30	18.8	9.9	14.4	3.6	0.0	T	0.0	T	0	26E	41E
Sum				**135.4**	**5.9**	**253.0**	**0.0**	**253.0**			
Avg	**17.3**	**10.1**	**13.7**								
Xtrm	**25.5**	**2.3**								**28***	**78***

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