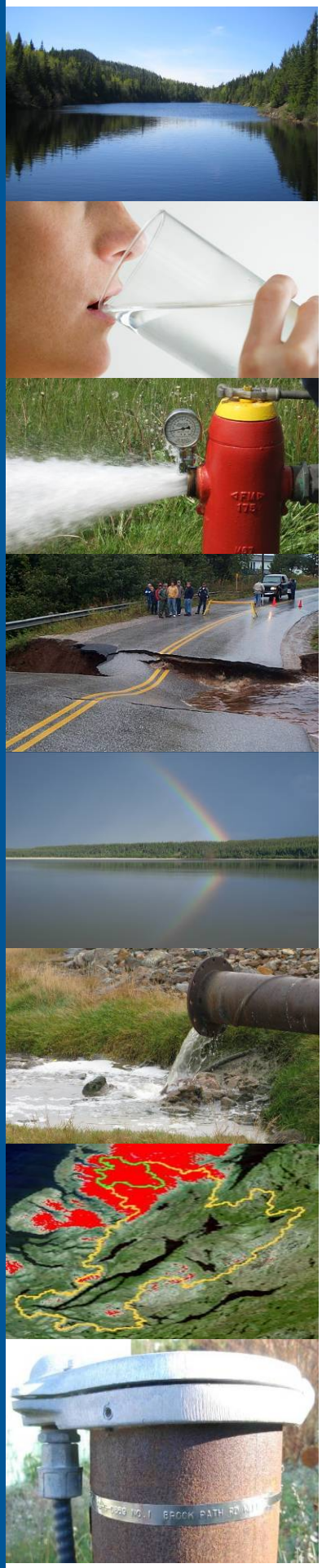


Waterford River @ Kilbride

NF02ZM0009

November 2007

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
November 2007

General

- Data from the Waterford River real-time station is monitored by the Water Resources Management Division staff regularly.

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**
October 31st, 2007	November 20th, 2007

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

Quality Assurance and Quality Control

- Deployment and removal comparison rankings for the Waterford River deployment from October 31st to November 20th, 2007 are summarized in **Table 2.**
- The absence of turbidity ranking can be attributed to the QA/QC probe lacking a turbidity sensor.

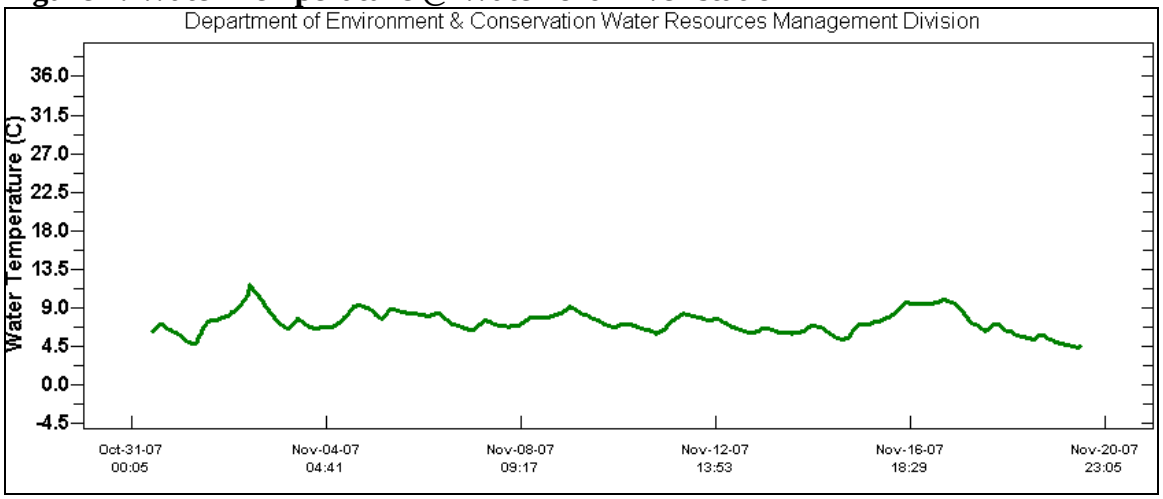
Table 2: Comparison rankings for Waterford @ Kilbride station, October 31st – November 20th, 2007

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Waterford @ Kilbride	October 31st, 2007	Deployment	Good	Excellent	Excellent	Poor	N/A
	November 20th, 2007	Removal	Marginal	Good	Fair	Poor	N/A

Data Interpretation

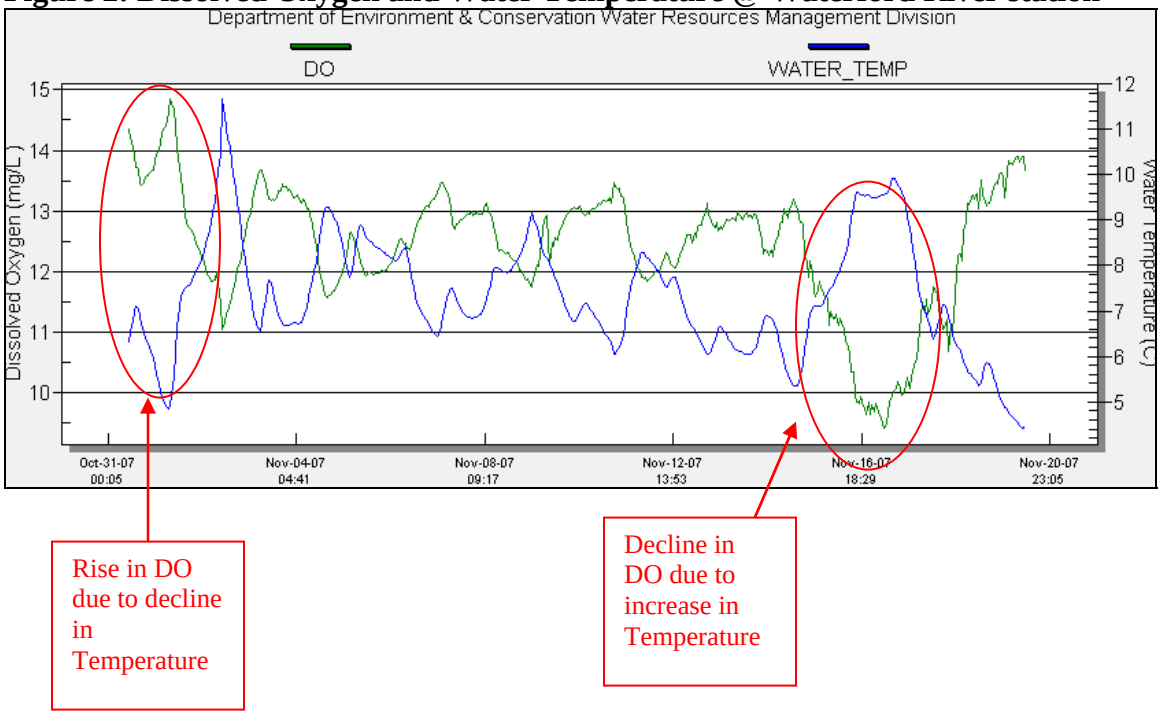
- **Water temperatures** were fairly constant during this deployment, ranging between 4.43 and 11.66°C, which is within the expected temperature range for this time of year. Water temperature data is shown in **Figure 1** below.

Figure 1: Water Temperature @ Waterford River station



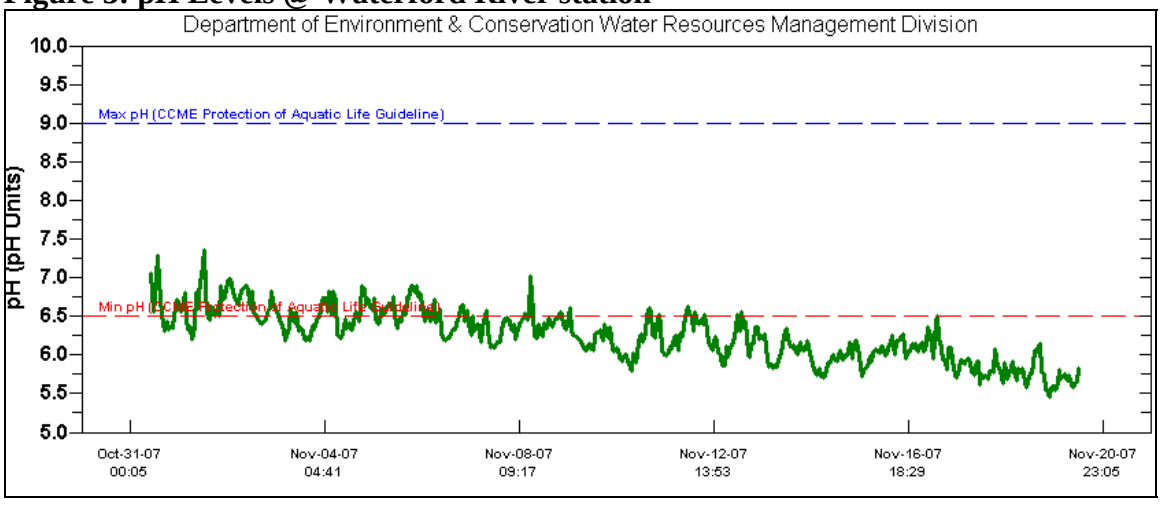
- **Dissolved oxygen (DO)** has an inverse relationship with water temperature whereby DO levels decrease as water temperature increases. Dissolved oxygen is shown in green and water temperature is shown in blue in **Figure 2**, below. The graph indicates that dissolved oxygen levels peaked at 14.84 mg/L on November 1st, the same day the water temperature reached one of its lowest values, at 4.90 °C. DO plummeted to its lowest level of 9.43 mg/L on November 17th, corresponding to the day one of the highest water temperatures during the deployment period were reached at roughly 9.57 °C.

Figure 2: Dissolved Oxygen and Water Temperature @ Waterford River station



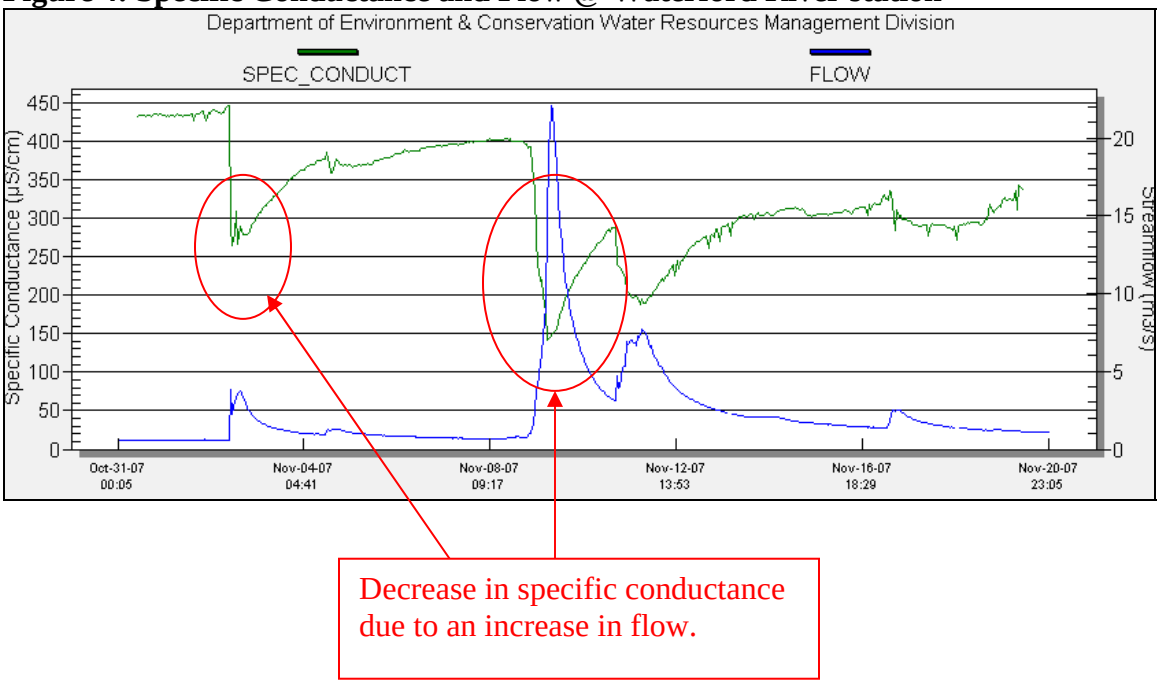
- **pH** levels were fairly constant and were within the expected range for this station, with pH values ranging from of 5.46 – 7.36. It should be noted pH followed a decreasing trend during this deployment, falling below the CCME minimum guideline of 6.5 pH units. This may be the direct result of shorter daylight hours, and therefore less photosynthetic activity, causing a lower pH.

Figure 3: pH Levels @ Waterford River station



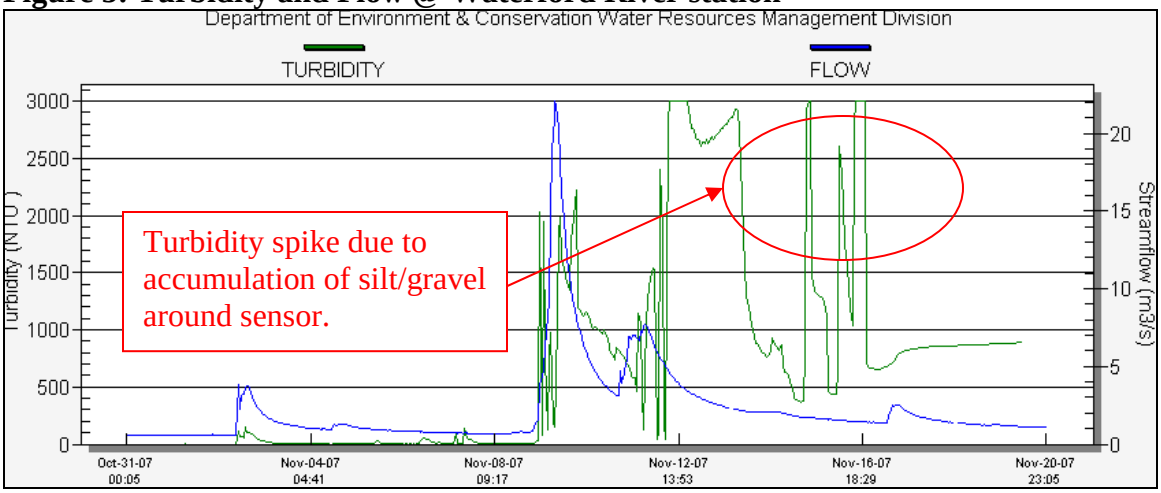
- **Specific conductivity** levels were within the expected range for Waterford River during this deployment. Specific conductivity levels ranged between 141.0 - 446.0 µS/cm and showed sudden increases, generally in response to the aftermath of significant precipitation events. The specific conductivity data for this deployment period is shown in **Figure 4** below. The Environment Canada Daily Climate Data for November, for the St. John's region, shown below in **Appendix 2,** indicates that there was significant precipitation events during the month of November, more specifically on November 9th, which resulted in rainfall in excess of 45mm. This resulted in an increase of runoff, which in turn caused the specific conductivity to plummet, producing values low in magnitude.

Figure 4: Specific Conductance and Flow @ Waterford River station



- **Turbidity** levels shown in green in **Figure 5**, were within the expected range for Waterford River during this deployment, up until November 9th when 66mm of rain between November 9th – 11th, as seen in **Appendix 2**. Waterford River is a catchment for many small tributaries and this heavy rainfall affected turbidity and flow until November 15th. Flow levels returned to background levels after the 15th, but turbidity remained higher than background levels, probably due to an accumulation of silt and gravel in the sensor housing unit.

Figure 5: Turbidity and Flow @ Waterford River station



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APPENDIX 1: Weather information for St. John's, NL provided by Environment Canada for October 2007:

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
Sum				81.0	5.6	150.2	0.0	150.2			
Avg	20.0	11.1	15.6								
Xtrm	25.1	6.3								24	93
01†	18.4	7.6	13.0	5.0	0.0	0.6	0.0	0.6		13	32
02†	21.1	10.6	15.9	2.1	0.0	T	0.0	T		27	44
03†	21.9	11.6	16.8	1.2	0.0	0.0	0.0	0.0		29	48
04†	23.8	12.9	18.4	0.0	0.4	0.0	0.0	0.0			<31
05†	22.2	15.3	18.8	0.0	0.8	7.2	0.0	7.2		27	37
06†	25.1	13.9	19.5	0.0	1.5	0.0	0.0	0.0		27	41
07†	25.0	12.9	19.0	0.0	1.0	T	0.0	T		26	48
08†	22.8	10.6	16.7	1.3	0.0	0.0	0.0	0.0		27	48
09†	20.4	9.8	15.1	2.9	0.0	15.8	0.0	15.8		20	50
10†	17.8	10.4	14.1	3.9	0.0	2.4	0.0	2.4		24	93
11†	23.1	10.6	16.9	1.1	0.0	0.0	0.0	0.0		26	50

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
12†	22.3	15.0	18.7	0.0	0.7	T	0.0	T		24	52
13†	18.4	6.8	12.6	5.4	0.0	5.6	0.0	5.6		24	50
14†	8.0	6.3	7.2	10.8	0.0	31.4	0.0	31.4		7	37
15†	20.2	7.1	13.7	4.3	0.0	23.0	0.0	23.0		19	70
16†	23.8	13.8	18.8	0.0	0.8	12.4	0.0	12.4		19	46
17†	18.8	11.4	15.1	2.9	0.0	0.6	0.0	0.6		26	52
18†	23.0	11.4	17.2	0.8	0.0	6.6	0.0	6.6		25	57
19†	20.2	13.6	16.9	1.1	0.0	6.6	0.0	6.6		19	44
20†	21.5	15.2	18.4	0.0	0.4	0.2	0.0	0.2		23	35
21†	19.3	14.2	16.8	1.2	0.0	0.2	0.0	0.2		26	48
22†	20.0	12.7	16.4	1.6	0.0	7.2	0.0	7.2		25	63
23†	19.0	9.0	14.0	4.0	0.0	0.8	0.0	0.8			<31
24†	20.5	9.1	14.8	3.2	0.0	5.4	0.0	5.4		26	59
25†	23.1	9.8	16.5	1.5	0.0	0.0	0.0	0.0		27	32
26†	23.6	12.1	17.9	0.1	0.0	T	0.0	T		20	35
27†	13.4	9.6	11.5	6.5	0.0	2.4	0.0	2.4		8	37
28†	12.1	9.2	10.7	7.3	0.0	9.8	0.0	9.8			<31
29†	15.4	9.3	12.4	5.6	0.0	6.6	0.0	6.6			<31
30†	18.2	10.8	14.5	3.5	0.0	T	0.0	T			<31
31†	17.5	11.0	14.3	3.7	0.0	5.4	0.0	5.4		26	35

APPENDIX 2: Weather information for St. John's, NL provided by Environment Canada for November 2007:

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
Sum				411.1	0.0	232.1	4.2	236.3			
Avg	8.1	0.5	4.3								
Xtrm											
01	12.9	-2.1	5.4	12.6	0.0	0.0	0.0	0.0	0	23E	57E
02	16.3	1.7	9.0	9.0	0.0	20.0	0.0	20.0	0	M	M
03	6.6	-0.5	3.1	14.9	0.0	0.0	0.0	0.0	0	15E	56E
04	13.3	4.8	9.1	8.9	0.0	3.9	0.0	3.9	0	18E	80E
05	10.1	3.0	6.6	11.4	0.0	0.2	0.0	0.2	0		<31
06	5.7	2.2	4.0	14.0	0.0	0.4	0.0	0.4	0	35E	37E
07	4.1	1.3	2.7	15.3	0.0	T	0.0	T	0		<31
08	9.6	3.2	6.4	11.6	0.0	1.6	0.0	1.6	0	17E	63E
09	10.6	2.1	6.4	11.6	0.0	45.4	0.0	45.4	0	33E	59E
10	3.0	0.7	1.9	16.1	0.0	T	T	T	0	31E	41E
11	11.3	1.3	6.3	11.7	0.0	21.2	T	21.2	0	11E	57E
12	7.0	1.1	4.1	13.9	0.0	0.4	0.0	0.4	0	20E	57E
13	4.9	0.3	2.6	15.4	0.0	T	0.4	0.4	0	29E	44E
14	4.4	-0.8	1.8	16.2	0.0	3.4	0.2	3.6	0		<31
15	9.0	0.7	4.9	13.1	0.0	T	0.0	T	0	20E	48E
16	14.6	8.7	11.7	6.3	0.0	T	0.0	T	0	18E	67E

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
17	11.3	1.8	6.6	11.4	0.0	5.6	0.0	5.6	0	18E	82E
18	7.1	0.1	3.6	14.4	0.0	0.0	0.0	0.0	0		<31
19	1.5	-1.5	0.0	18.0	0.0	0.0	2.2	2.2	T	1E	39E
20	3.2	-1.5	0.9	17.1	0.0	1.2	T	1.2	T	3E	33E
21	10.0	1.1	5.6	12.4	0.0	63.4	0.0	63.4	0	10E	50E
22	2.6	0.4	1.5	16.5	0.0	0.2	0.0	0.2	0		<31
23	10.6	1.1	5.9	12.1	0.0	T	0.0	T	0	21E	33E
24	10.6	-2.5	4.1	13.9	0.0	8.6	T	8.6	0	29E	61E
25	0.0	-3.9	-2.0	20.0	0.0	0.0	T	T	0	29E	50E
26	4.8	-2.2	1.3	16.7	0.0	0.0	1.2	1.2	1	24E	35E
27	14.5	3.3	8.9	9.1	0.0	50.8	0.0	50.8	0	24E	78E
28	12.1	-2.5	4.8	13.2	0.0	0.6	0.0	0.6	0	27E	82E
29	1.6	-5.4	-1.9	19.9	0.0	0.0	0.0	0.0	0	31E	57E
30	8.7	-1.6	3.6	14.4	0.0	5.2	0.2	5.4	0	18E	63E