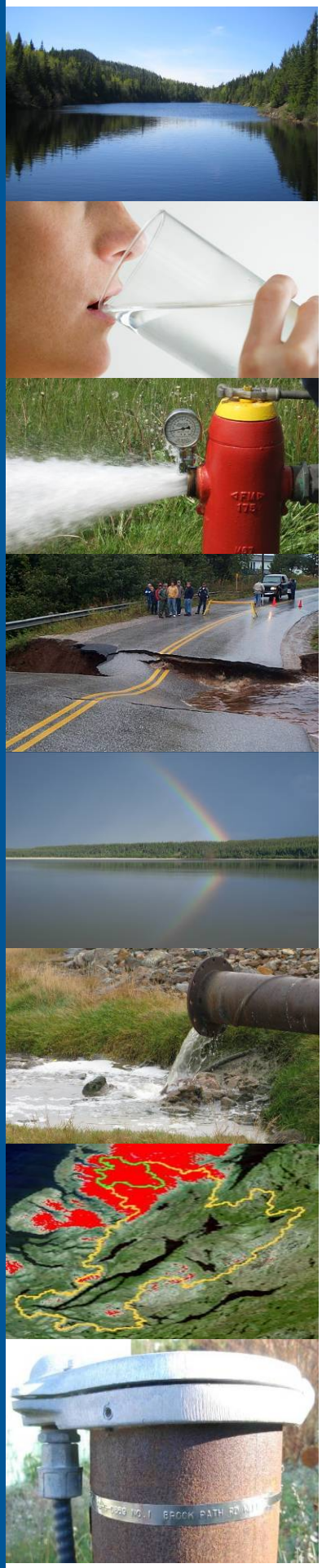


Waterford River @ Kilbride

NF02ZM0009

September 2007

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 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**
August 30th, 2007	September 24th, 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 August 30th to September 24th, 2007 are summarized in **Table 2.**
- The absence of turbidity ranking can be attributed to the QA/QC probe lacking a turbidity sensor.

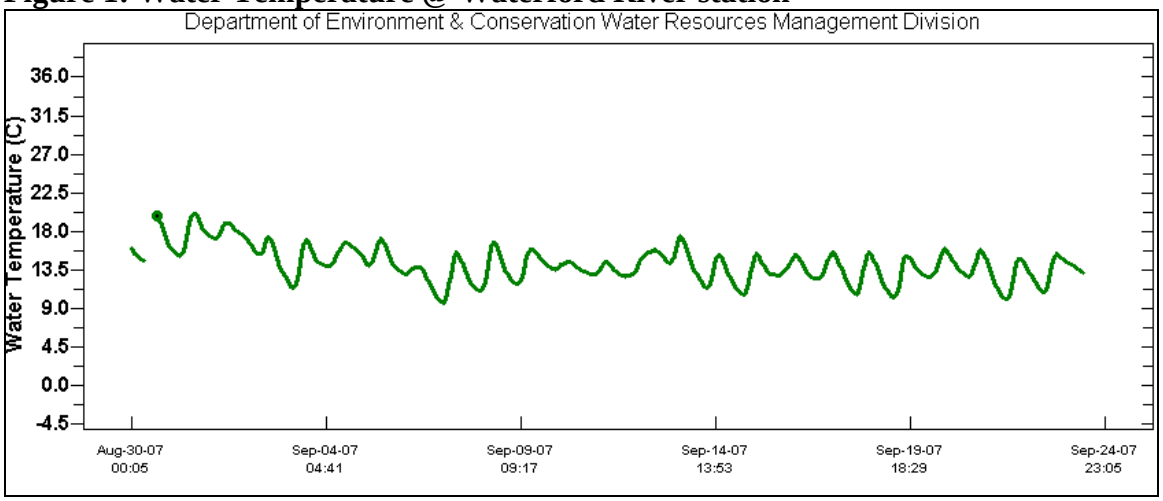
Table 2: Comparison rankings for Waterford @ Kilbride station, August 30th – September 24th, 2007

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Waterford @ Kilbride	August 30th, 2007	Deployment	Excellent	Fair	Excellent	Poor	N/A
	September 24th, 2007	Removal	Poor	Poor	Excellent	Poor	N/A

Data Interpretation

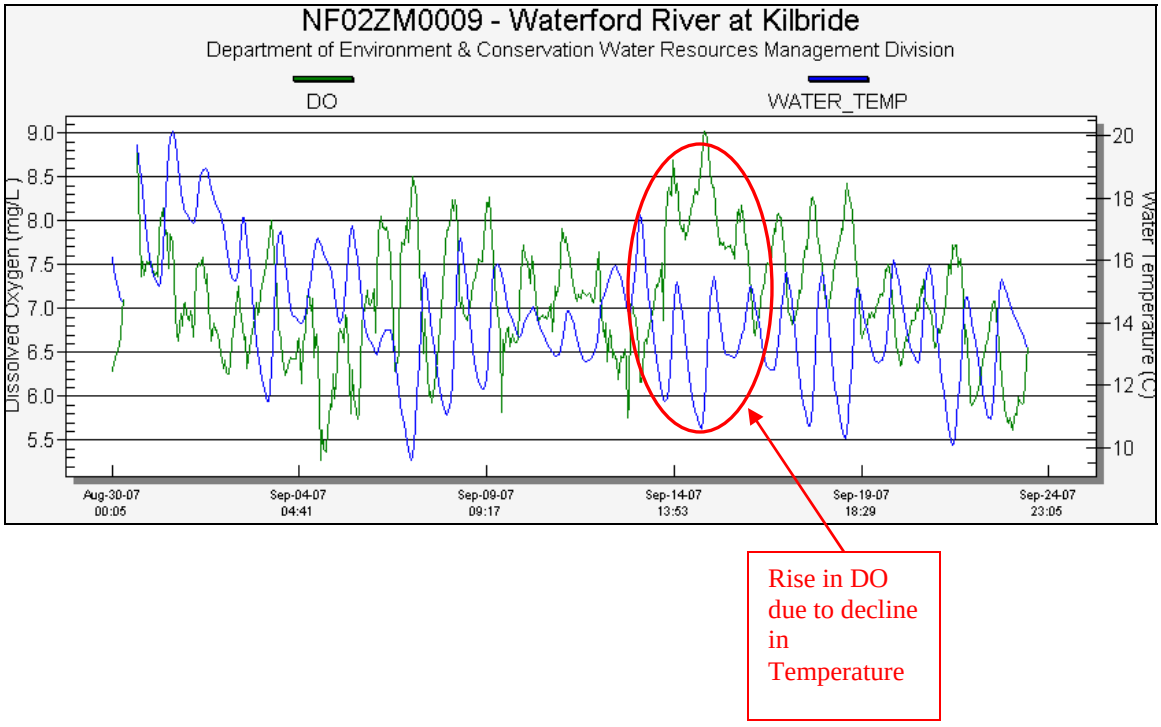
- **Water temperatures** were fairly constant during this deployment, ranging between 9.62 and 20.13°C, which is within the expected temperature range for this time of year. Water temperature data is shown in **Figure 1** below.

Figure 1: Water Temperature @ Waterford River station



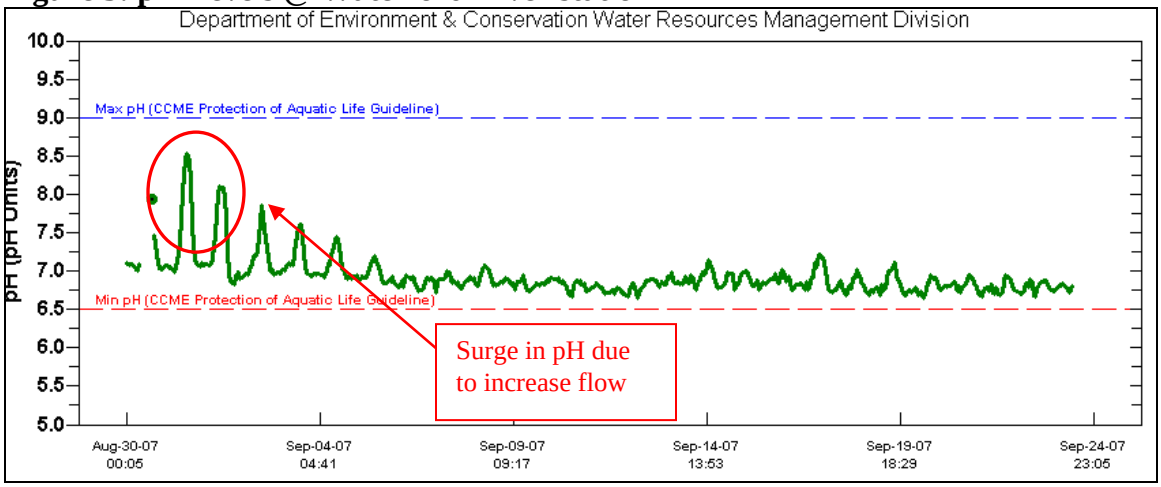
- **Dissolved oxygen (DO)** has an inverse relationship with water temperature whereby DO levels decrease as water temperature increases. Dissolved oxygen is shown in green and water temperature is shown in blue in **Figure 2**, below. The graph indicates that dissolved oxygen levels peaked at 9.01 mg/L on September 15th, the same day that water temperature reached one of its lowest levels of 11.40 ^{o}C. DO plummeted to its lowest level of 5.28 mg/L on September 4th, corresponding to the day one of the highest water temperatures during the deployment period was reached at 16.54 ^{o}C.

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



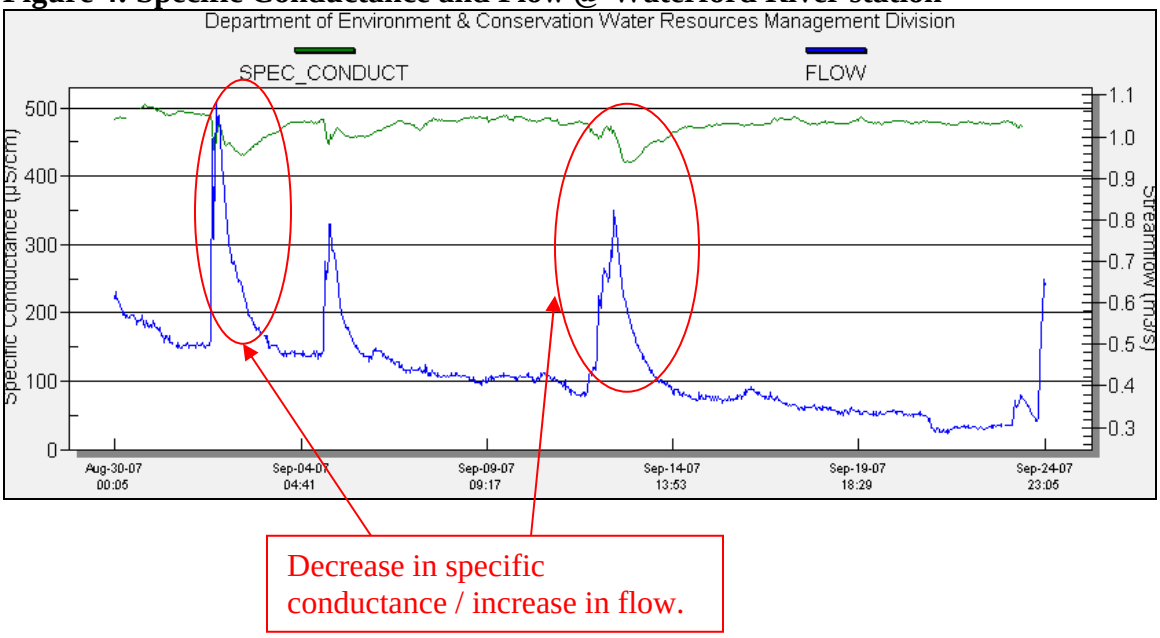
- **pH** levels were fairly constant and were within the expected range for this station, with pH values ranging from 6.65 – 8.53. There was a sudden surge in pH at the beginning of September that can be attributed to a significant precipitation event on August 31, that saw rainfall amounts in excess of 77 mm. This caused a dramatic rise in pH that soon tapered off to normal background pH levels.

Figure 3: pH Levels @ Waterford River station



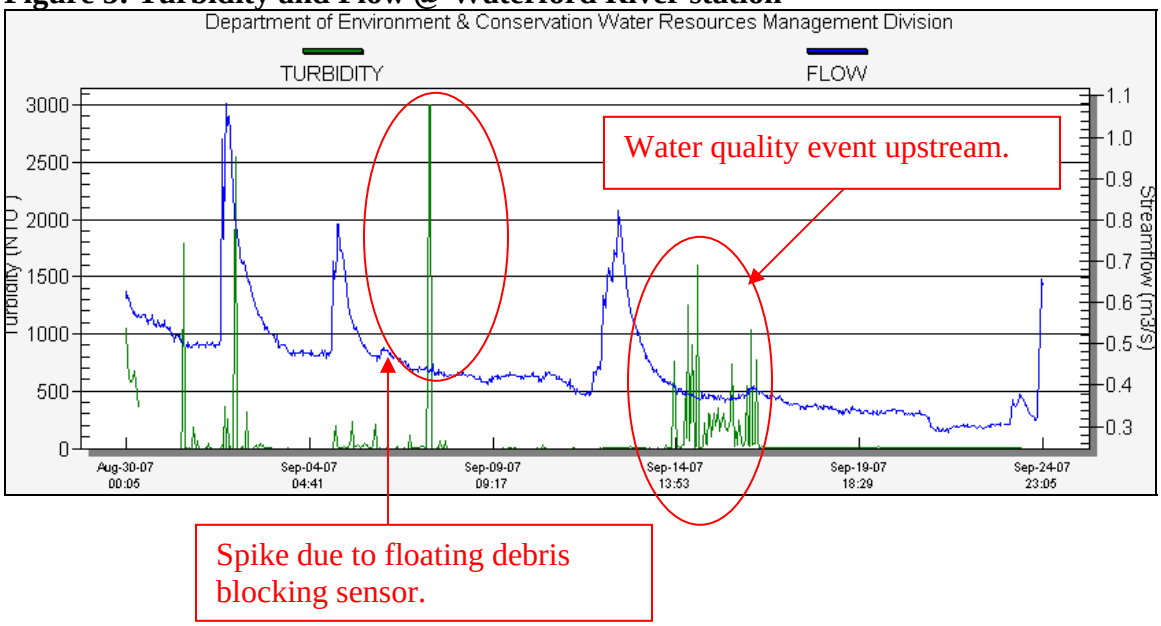
- **Specific conductivity** levels were within the expected range for Waterford River during this deployment. Specific conductivity levels ranged between 420.0 -505.0 µS/cm and showed sudden decreases, generally in response to the aftermath of significant precipitation events. The specific conductivity data for this deployment period is shown in **Figure 4** below. The Environment Canada Daily Climate Data for August, for the St. John's region, shown below in **Appendix 1,** indicates that there were significant precipitation events on August 31st, and during the month of September. This resulted in an increase of runoff, which in turn caused the specific conductivity to decrease.

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, with the exception of September 2nd, 7th, 8th. Most likely these spikes were caused by floating debris passing in front of the turbidity sensor when the readings were being taken. The sudden return to background levels is indicative of this. The spike seen on September 14th and 15th can be attributed to an unknown water quality event upstream.

Figure 5: Turbidity and Flow @ Waterford River station



Report prepared by: Michael Clarke
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St. John's NL A1B 4J6
Ph. (709) 729-2316

APPENDIX 1: Weather information for St. John's, NL provided by Environment Canada for August 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				60.1	13.7	152.3	0.0	152.3			
Avg	20.8	12.2	16.5								
Xtrm	26.3	8.1								25*	70*
01	19.7	11.5	15.6	2.4	0.0	77.8	0.0	77.8	0	30E	44E
02	15.2	10.2	12.7	5.3	0.0	T	0.0	T	0		<31
03	14.8	10.0	12.4	5.6	0.0	0.0	0.0	0.0	0		<31
04	19.9	11.4	15.7	2.3	0.0	0.0	0.0	0.0	0		<31
05	22.3	11.7	17.0	1.0	0.0	2.6	0.0	2.6	0	15E	32E
06	24.0	14.0	19.0	0.0	1.0	0.0	0.0	0.0	0	27E	41E
07	25.0	12.9	19.0	0.0	1.0	1.4	0.0	1.4	0	25E	32E
08	24.0	16.9	20.5	0.0	2.5	27.5	0.0	27.5	0	18E	33E

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
09	20.1	12.0	16.1	1.9	0.0	12.4	0.0	12.4	0	19	65
10	19.2	10.9	15.1	2.9	0.0	2.0	0.0	2.0	0	29E	52E
11	23.5	14.0	18.8	0.0	0.8	0.0	0.0	0.0	0	25E	41E
12	21.3	11.0	16.2	1.8	0.0	2.6	0.0	2.6	0	26E	32E
13	22.9	10.6	16.8	1.2	0.0	0.0	0.0	0.0	0		<31
14	20.0	11.8	15.9	2.1	0.0	0.0	0.0	0.0	0	19E	39E
15	21.5	13.5	17.5	0.5	0.0	0.8	0.0	0.8	0		<31
16	22.8	15.4	19.1	0.0	1.1	T	0.0	T	0	24E	46E
17	24.7	15.4	20.1	0.0	2.1	5.8	0.0	5.8	0	23E	63E
18	20.4	17.6	19.0	0.0	1.0	13.6	0.0	13.6	0	21E	52E
19	19.5	13.1	16.3	1.7	0.0	0.4	0.0	0.4	0	25E	70E
20	19.0	11.9	15.5	2.5	0.0	T	0.0	T	0	28E	44E
21	16.3	11.6	14.0	4.0	0.0	0.4	0.0	0.4	0		<31
22	15.7	8.9	12.3	5.7	0.0	5.0	0.0	5.0	0		<31
23	17.0	9.0	13.0	5.0	0.0	T	0.0	T	0		<31
24	20.3	9.1	14.7	3.3	0.0	0.0	0.0	0.0	0		<31
25	18.6	8.1	13.4	4.6	0.0	0.0	0.0	0.0	0		<31
26	17.8	9.3	13.6	4.4	0.0	0.0	0.0	0.0	0		<31
27	23.3	12.4	17.9	0.1	0.0	T	0.0	T	0		<31
28	21.1	11.3	16.2	1.8	0.0	T	0.0	T	0		<31
29	23.8	13.3	18.6	0.0	0.6	0.0	0.0	0.0	0		<31
30	24.7	13.0	18.9	0.0	0.9	0.0	0.0	0.0	0	M	M
31	26.3	15.0	20.7	0.0	2.7	T	0.0	T	0		<31

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06	24.0	14.0	19.0	0.0	1.0	0.0	0.0	0.0	0	27E	41E
07	25.0	12.9	19.0	0.0	1.0	1.4	0.0	1.4	0	25E	32E
08	24.0	16.9	20.5	0.0	2.5	27.5	0.0	27.5	0	18E	33E
09	20.1	12.0	16.1	1.9	0.0	12.4	0.0	12.4	0	19	65
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14	20.0	11.8	15.9	2.1	0.0	0.0	0.0	0.0	0	19E	39E
15	21.5	13.5	17.5	0.5	0.0	0.8	0.0	0.8	0		<31
16	22.8	15.4	19.1	0.0	1.1	T	0.0	T	0	24E	46E
17	24.7	15.4	20.1	0.0	2.1	5.8	0.0	5.8	0	23E	63E
18	20.4	17.6	19.0	0.0	1.0	13.6	0.0	13.6	0	21E	52E
19	19.5	13.1	16.3	1.7	0.0	0.4	0.0	0.4	0	25E	70E
20	19.0	11.9	15.5	2.5	0.0	T	0.0	T	0	28E	44E
21	16.3	11.6	14.0	4.0	0.0	0.4	0.0	0.4	0		<31
22	15.7	8.9	12.3	5.7	0.0	5.0	0.0	5.0	0		<31
23	17.0	9.0	13.0	5.0	0.0	T	0.0	T	0		<31
24	20.3	9.1	14.7	3.3	0.0	0.0	0.0	0.0	0		<31
25	18.6	8.1	13.4	4.6	0.0	0.0	0.0	0.0	0		<31
26	17.8	9.3	13.6	4.4	0.0	0.0	0.0	0.0	0		<31
27	23.3	12.4	17.9	0.1	0.0	T	0.0	T	0		<31
28	21.1	11.3	16.2	1.8	0.0	T	0.0	T	0		<31
29	23.8	13.3	18.6	0.0	0.6	0.0	0.0	0.0	0		<31
30	24.7	13.0	18.9	0.0	0.9	0.0	0.0	0.0	0	M	M
31	26.3	15.0	20.7	0.0	2.7	T	0.0	T	0		<31