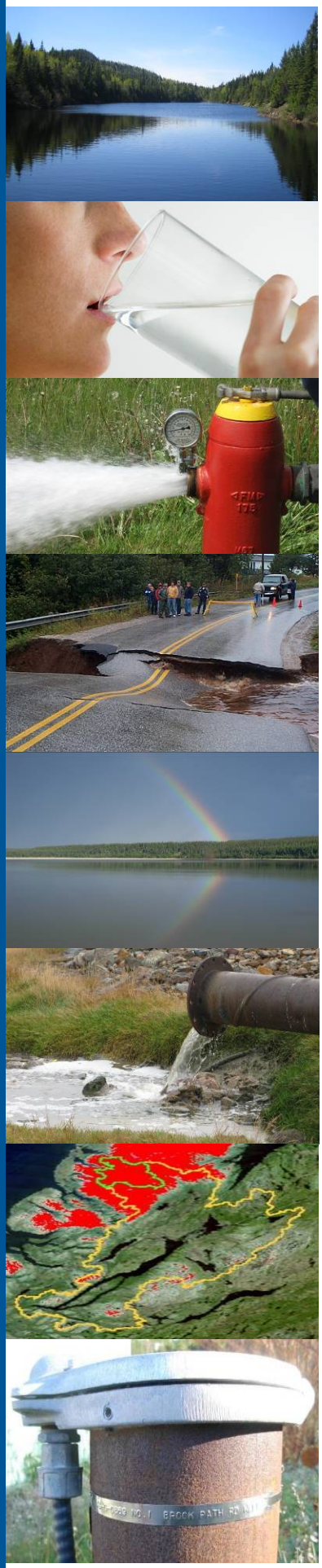


Waterford River @ Kilbride

NF02ZM0009

September to October 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 to October 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**
September 26th, 2007	October 19th, 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 September 26th to October 19th, 2007 are summarized in **Table 2.**
- The absence of turbidity ranking can be attributed to the QA/QC probe lacking a turbidity sensor.

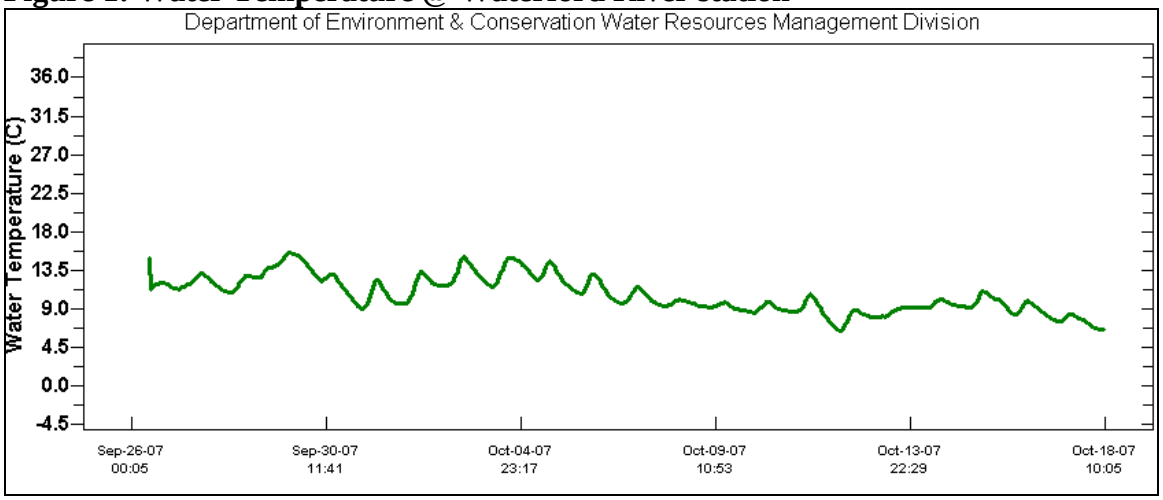
Table 2: Comparison rankings for Waterford @ Kilbride station, September 26th – October 19th, 2007

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Waterford @ Kilbride	September 26th, 2007	Deployment	Good	Good	Good	Fair	N/A
	October 19th, 2007	Removal	Good	Good	Poor	Poor	N/A

Data Interpretation

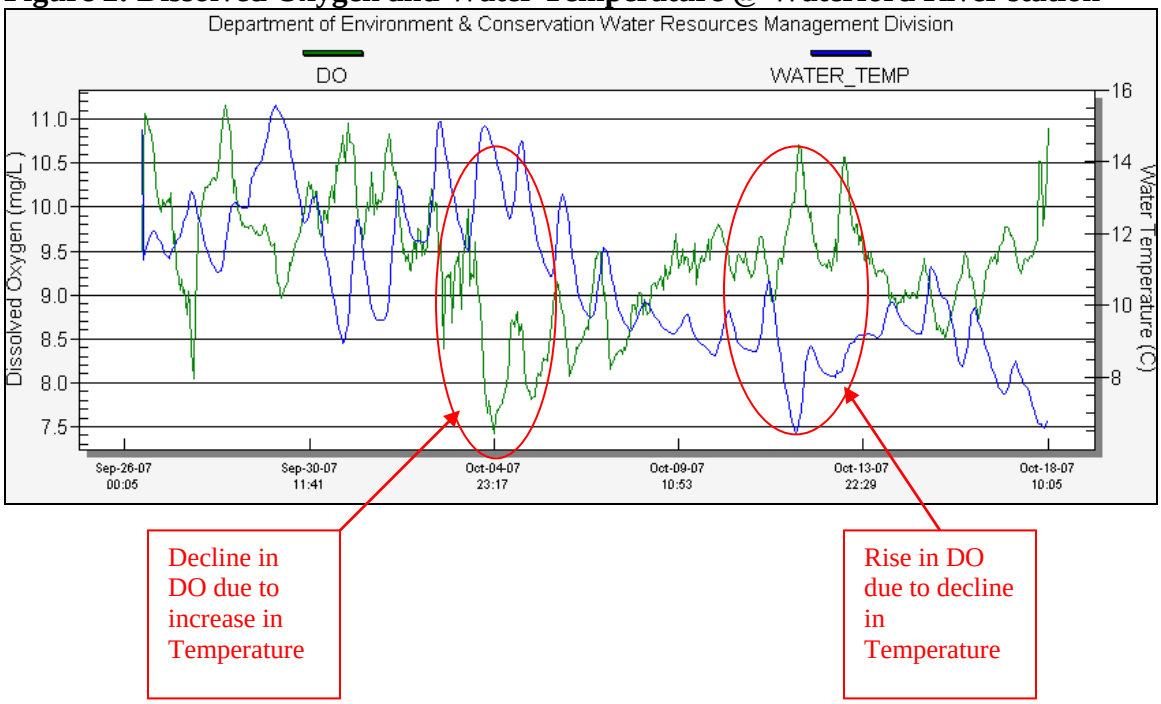
- **Water temperatures** were fairly constant during this deployment, ranging between 6.46 and 15.54°C, which is within the expected temperature range for this time of year. Water temperature data is shown in **Figure 1** below.

Figure 1: Water Temperature @ Waterford River station



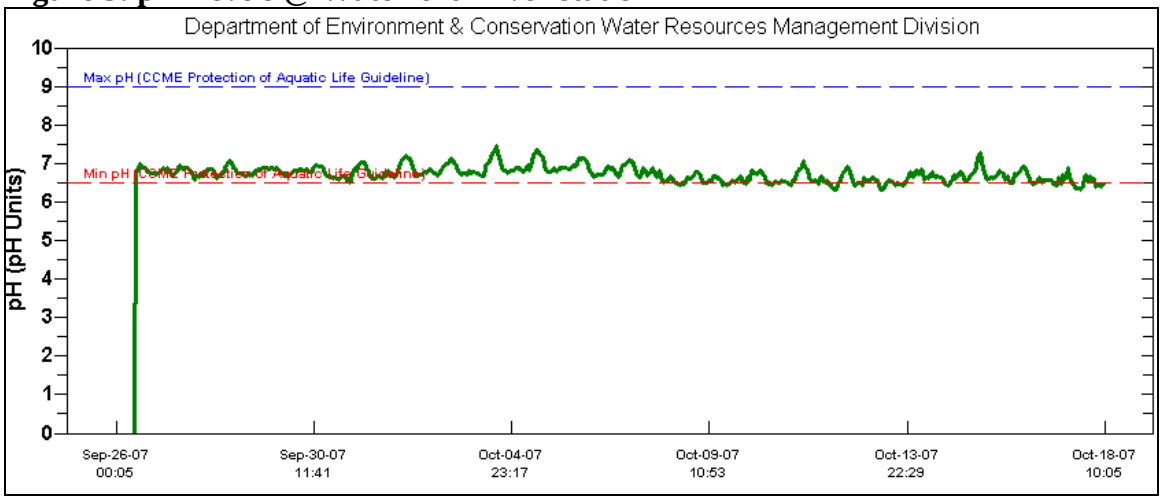
- **Dissolved oxygen (DO)** has an inverse relationship with water temperature whereby DO levels decrease as water temperature increases. Dissolved oxygen is shown in green and water temperature is shown in blue in **Figure 2**, below. The graph indicates that dissolved oxygen levels peaked at 11.15 mg/L on September 28. DO plummeted to its lowest level of 7.43 mg/L on October 4, corresponding to the day, one of the highest water temperatures during the deployment period were reached at roughly 14.38 ^{o}C.

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



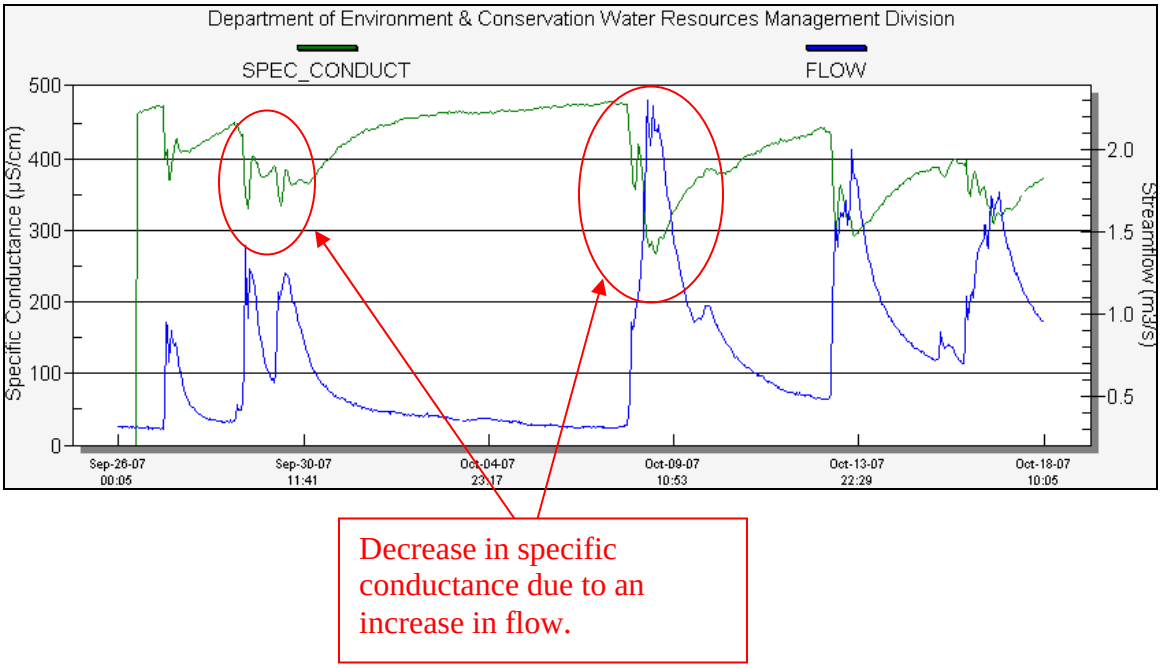
- **pH** levels were fairly constant and were within the expected range for this station, with pH values ranging from of 6.30 – 7.45. It should be noted that throughout this deployment period, the pH was above the CCME Protection of Aquatic Life Guidelines recommended level of 6.5 pH units.

Figure 3: pH Levels @ Waterford River station



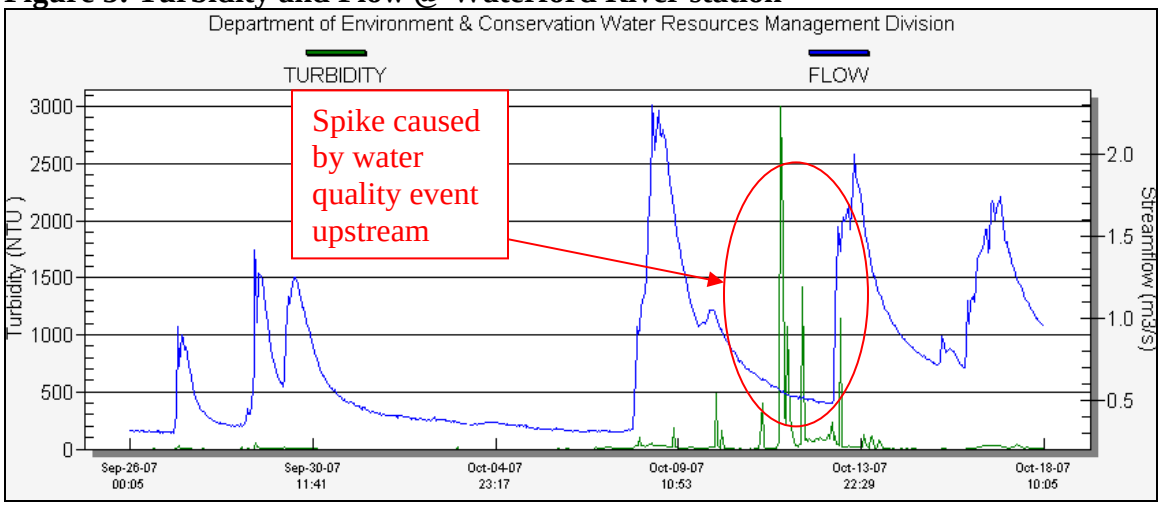
- **Specific conductivity** levels were within the expected range for Waterford River during this deployment. Specific conductivity levels ranged between 268.0 - 480.0 µS/cm and showed sudden increases, generally in response to the aftermath of significant precipitation events. The specific conductivity data for this deployment period is shown in **Figure 4** below. The Environment Canada Daily Climate Data for September and October, for the St. John's region, shown below in **Appendix 1** and **Appendix 2,** indicates that there was significant precipitation events during the month of October, more specifically on October 9, which 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 October 11th – 13$^{th.}$ During this time there were numerous turbidity spikes. These turbidity spikes can be attributed to a water quality event upstream. As can be seen in **Appendix 2**, there was no significant precipitation events to account for these spikes. It is determined not to be a sensor malfunction, as turbidity returned to background levels without intervention soon after the spikes. Since these spikes occurred over a few days, it can be concluded that these spikes were caused by a water quality event upstream.

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 September 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

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
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
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

APPENDIX 2: 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

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
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
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