# Waterford River
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# NF02ZM0009

**October 2010**

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**
**October 2010**

## 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.
- The instrument at Waterford River does not include a turbidity sensor, thus turbidity will not be recorded at this station until further notice.

**Table 1**: Table of Water Quality Probe Installation and Removal

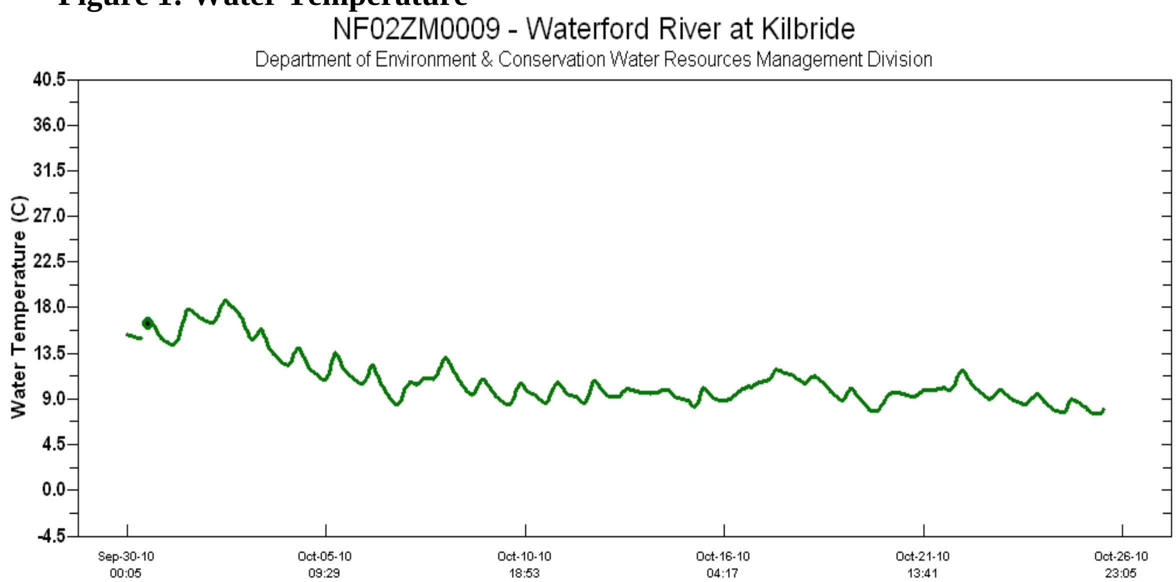
| Date Installed | Date Removed |
|---|---|
| September 30, 2010 | October 26, 2010 |

- 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

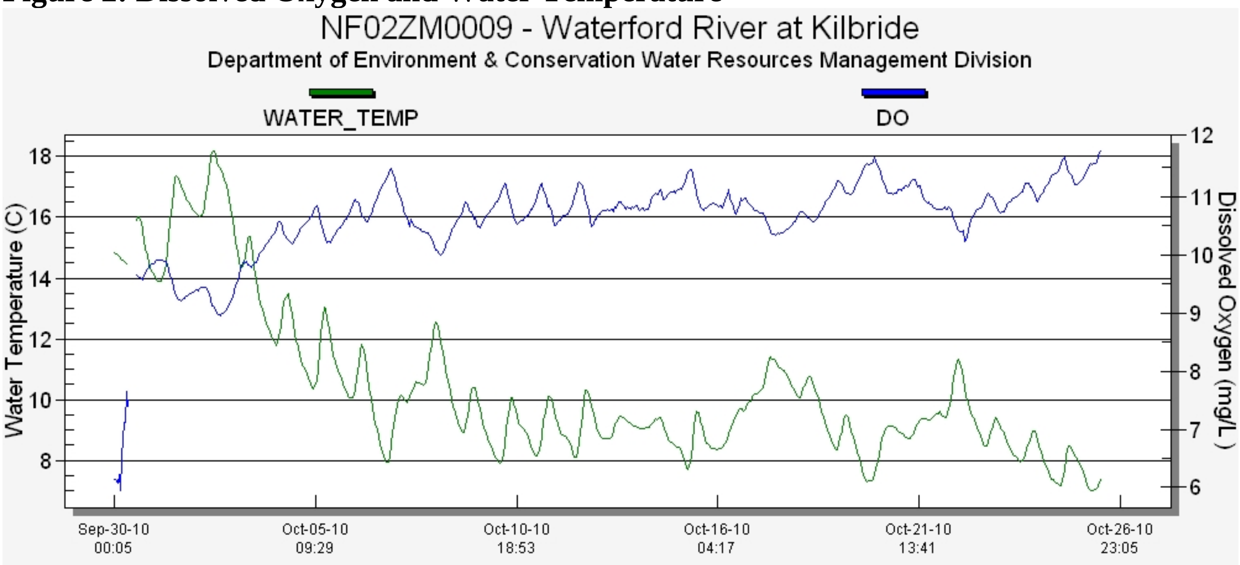
- **Water temperatures** were fairly constant during this deployment, ranging between 7.02 and 18.17$^{o}$C, which is within the expected temperature range for this time of year. Water temperatures are beginning to show a decreasing trend, in response to seasonally decreasing air temperatures. Water temperature data is shown in **Figure 1** below.

- **Figure 1: Water Temperature**



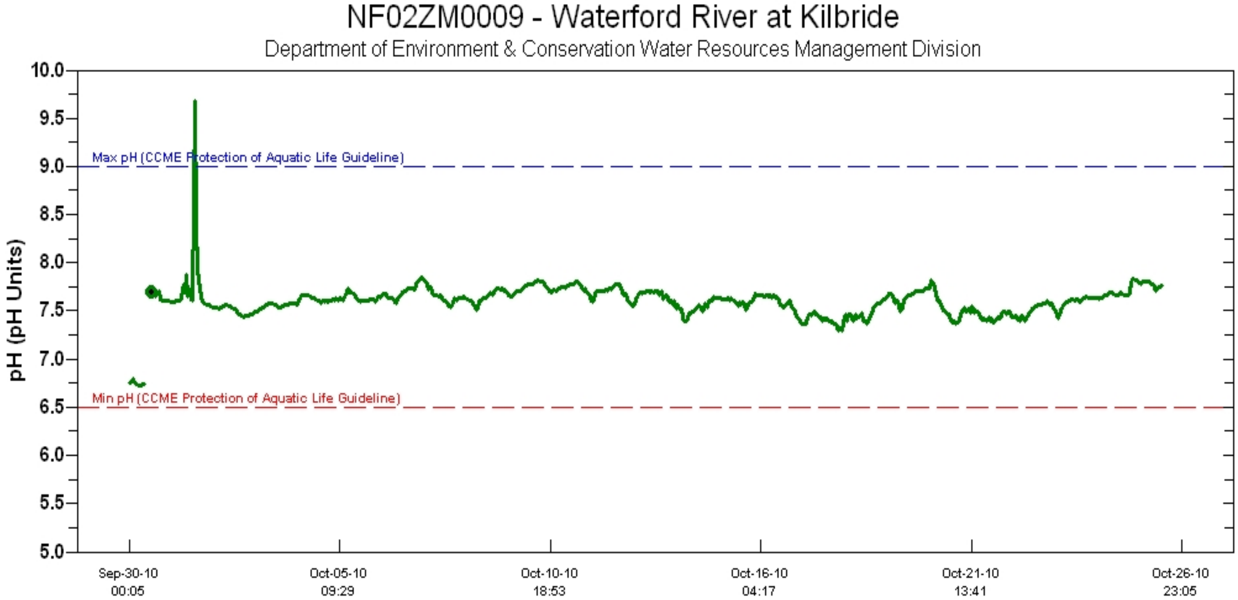
- **Dissolved oxygen (DO)** levels displayed diurnal fluctuations in response to changes in water temperatures from daytime highs to night time lows. Colder water typically holds more dissolved oxygen than warmer water, so as water temperatures decrease, dissolved oxygen levels typically increase. Conversely, as water temperatures increase, dissolved oxygen levels decrease. Dissolved oxygen levels ranged between 8.95 and 11.78 mg/L during this deployment. Dissolved oxygen levels showed an overall increasing trend during this deployment, in response to seasonally decreasing water temperatures. Dissolved oxygen is shown in blue and water temperature is shown in green in **Figure 2**, below.

**Figure 2: Dissolved Oxygen and Water Temperature**



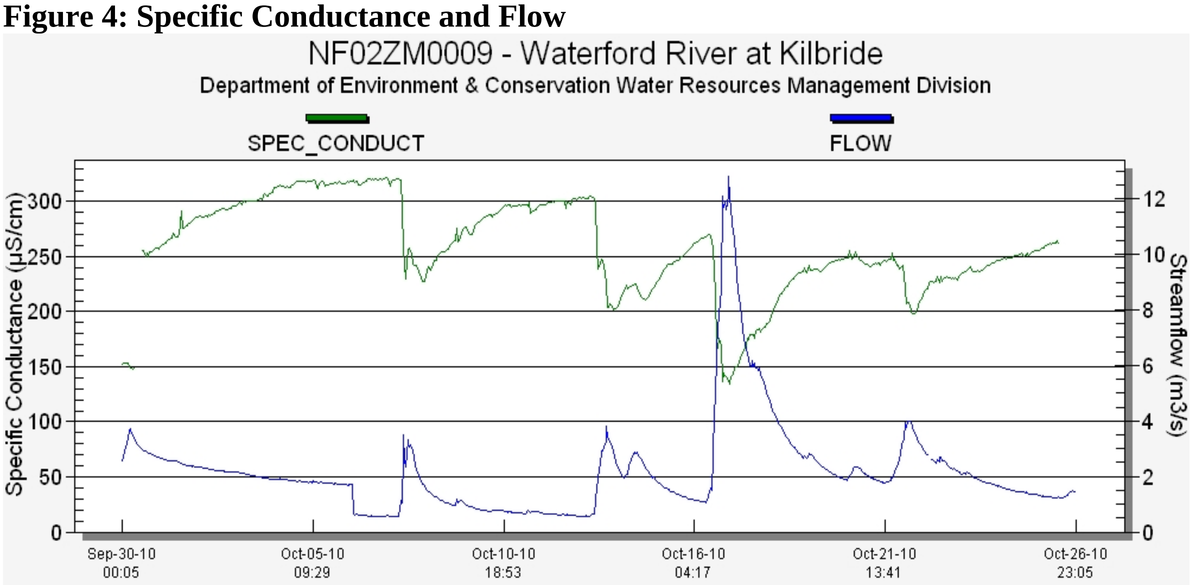

- With the exception of one spike on October 1, 2010, **pH** levels were fairly constant and within the expected range for this station throughout the deployment, ranging from 7.29 to 9.68 units, as seen in **Figure 3** below. Almost all pH values were within the range recommended by the Canadian Water Quality Guidelines for the Protection of Aquatic Life of 6.5 to 9.0 pH units, except for 1 pH reading of 9.68 pH units recorded at 4:05PM on October 1. The pH reading 1 hour prior to this spike was within the normal range at 7.6 pH units, and the 2 consecutive hourly readings after the spike, at 5:05 and 6:05PM were 8.4 and 7.94 pH units respectively. This may be an indication that a water quality event occurred upstream from this station that affected pH levels in Waterford River for a short duration of 2-3 hours. Environment Canada Climate Data, shown below in **Appendix 1**, indicates that there was no significant precipitation on October 1st that could otherwise have affected water quality. (According to EC data there was no precipitation recorded on September 30).

**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 134-322 µS/cm during this deployment. **Figure 4** below indicates that specific conductivity (green) decreased in response to increases in flow (blue) during this deployment period. This is particularly noticeable on and immediately after October 16$^{th}$, when 35 mm of rain fell. Canadian Climate Data for October 2010is 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 October 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 | 23.1 | 14.2 | 18.7 | 0.0 | 0.7 | T | 0.0 | T | 0 | 26E | 72E |
| 02 | 22.2 | 14.3 | 18.3 | 0.0 | 0.3 | T | 0.0 | T | 0 | 22E | 72E |
| 03 | 15.7 | 7.4 | 11.6 | 6.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 29E | 56E |
| 04 | 12.5 | 6.7 | 9.6 | 8.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 26E | 32E |
| 05 | 14.2 | 7.1 | 10.7 | 7.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 27E | 44E |
| 06 | 10.4 | 2.9 | 6.7 | 11.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 31E | 37E |
| 07 | 12.6 | 2.3 | 7.5 | 10.5 | 0.0 | 12.2 | 0.0 | 12.2 | 0 | 16E | 70E |
| 08 | 16.8 | 5.8 | 11.3 | 6.7 | 0.0 | 0.6 | 0.0 | 0.6 | 0 | 26E | 54E |
| 09 | 10.7 | 5.0 | 7.9 | 10.1 | 0.0 | 0.2 | 0.0 | 0.2 | 0 | 25E | 44E |
| 10 | 10.2 | 5.1 | 7.7 | 10.3 | 0.0 | 2.6 | 0.0 | 2.6 | 0 | 24E | 50E |
| 11 | 11.3 | 5.1 | 8.2 | 9.8 | 0.0 | 1.8 | 0.0 | 1.8 | 0 | 24E | 48E |
| 12 | 11.5 | 5.7 | 8.6 | 9.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 26E | 39E |
| 13 | 8.4 | 6.5 | 7.5 | 10.5 | 0.0 | 19.8 | 0.0 | 19.8 | 0 | 16E | 32E |
| 14 | 7.2 | 5.1 | 6.2 | 11.8 | 0.0 | 3.4 | 0.0 | 3.4 | 0 | 34E | 39E |
| 15 | 9.9 | 1.4 | 5.7 | 12.3 | 0.0 | T | 0.0 | T | 0 | M | M |
| 16 | 11.4 | 7.1 | 9.3 | 8.7 | 0.0 | 35.2 | 0.0 | 35.2 | 0 | 14E | 65E |
| 17 | 13.9 | 9.1 | 11.5 | 6.5 | 0.0 | 7.8 | 0.0 | 7.8 | 0 | 22E | 41E |
| 18 | 11.9 | 5.1 | 8.5 | 9.5 | 0.0 | 0.2 | 0.0 | 0.2 | 0 | 23E | 56E |
| 19 | 9.7 | 2.6 | 6.2 | 11.8 | 0.0 | 3.1 | 0.3 | 3.4 | 0 | 25E | 63E |
| 20 | 8.6 | 2.5 | 5.6 | 12.4 | 0.0 | 4.6 | 0.0 | 4.6 | 0 | | <31 |
| 21 | 10.5 | 5.7 | 8.1 | 9.9 | 0.0 | 11.8 | 0.0 | 11.8 | 0 | | <31 |
| 22 | 16.1 | 6.9 | 11.5 | 6.5 | 0.0 | 0.6 | 0.0 | 0.6 | 0 | 23E | 61E |
| 23 | 10.0 | 4.4 | 7.2 | 10.8 | 0.0 | 0.8 | 0.0 | 0.8 | 0 | 23E | 46E |
| 24 | 8.4 | 3.4 | 5.9 | 12.1 | 0.0 | T | 0.0 | T | 0 | 31E | 37E |
| 25 | 8.5 | 2.5 | 5.5 | 12.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 29E | 37E |
| 26 | 5.5 | 2.7 | 4.1 | 13.9 | 0.0 | 3.8 | 0.0 | 3.8 | 0 | | <31 |
| 27 | 6.4 | 2.4 | 4.4 | 13.6 | 0.0 | 1.6 | 0.0 | 1.6 | 0 | 18E | 44E |
| 28 | 16.7 | 5.8 | 11.3 | 6.7 | 0.0 | 21.8 | 0.0 | 21.8 | 0 | 25E | 65E |
| 29 | 13.2 | 10.2 | 11.7 | 6.3 | 0.0 | 0.2 | 0.0 | 0.2 | 0 | 26E | 35E |
| 30 | 15.7 | 4.1 | 9.9 | 8.1 | 0.0 | 10.4 | 0.0 | 10.4 | 0 | 25E | 78E |
| 31 | 7.4 | 1.6 | 4.5 | 13.5 | 0.0 | T | 0.0 | T | 0 | 25E | 74E |
| Sum | | | | **287.6** | **1.0** | **142.5** | **0.3** | **142.8** | | | |
| Avg | **12.0** | **5.5** | **8.8** | | | | | | | | |
| Xtrm | **23.1** | **1.4** | | | | | | | | **25*** | **78*** |

Report prepared by: Joanne Sweeney
Environmental Scientist
Water Resources Management Division
Department of Environment and Conservation
Confederation Building West Block 4th Floor
St. John's NL A1B 4J6
Ph. (709) 729-0351