

Waterford River @ Kilbride

NF02ZM0009

May to June 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
May - June 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 |
|-----------------------------|-----------------------------|
| May 10 th , 2007 | June 4 th , 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 May 10th to June 4th, 2007 are summarized in **Table 2**.
- The absence of turbidity ranking can be attributed to the QA/QC probe lacking a turbidity sensor.

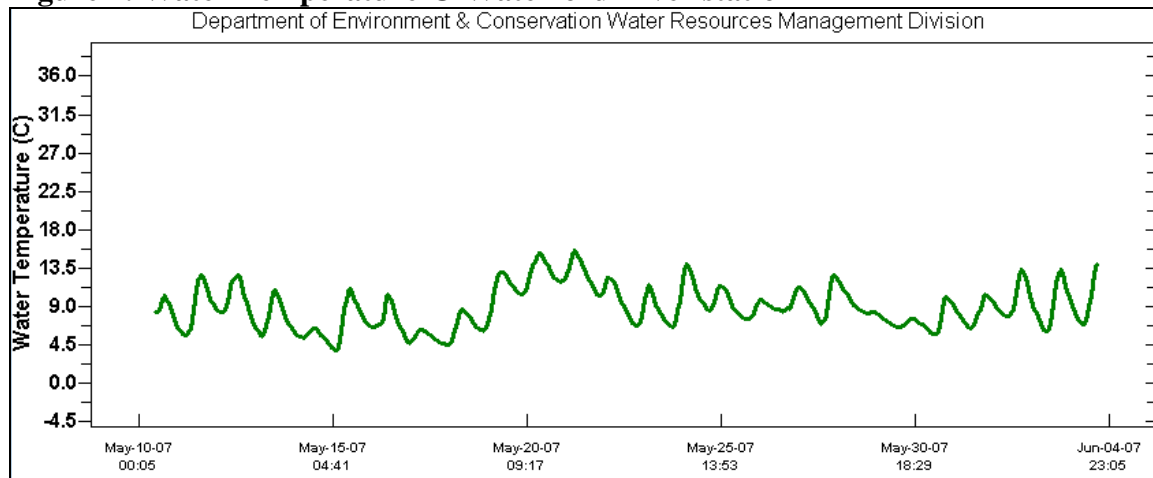
Table 2: Comparison rankings for Waterford @ Kilbride station, May 10th – June 4th, 2007

| Station | Date | Action | Comparison Ranking | | | | |
|----------------------|-----------------------------|------------|--------------------|------|--------------|------------------|-----------|
| | | | Temperature | pH | Conductivity | Dissolved Oxygen | Turbidity |
| Waterford @ Kilbride | May 10 th , 2007 | Deployment | Good | Good | Poor | Poor | N/A |
| | June 4 th , 2007 | Removal | Excellent | Good | Poor | Poor | N/A |

Data Interpretation

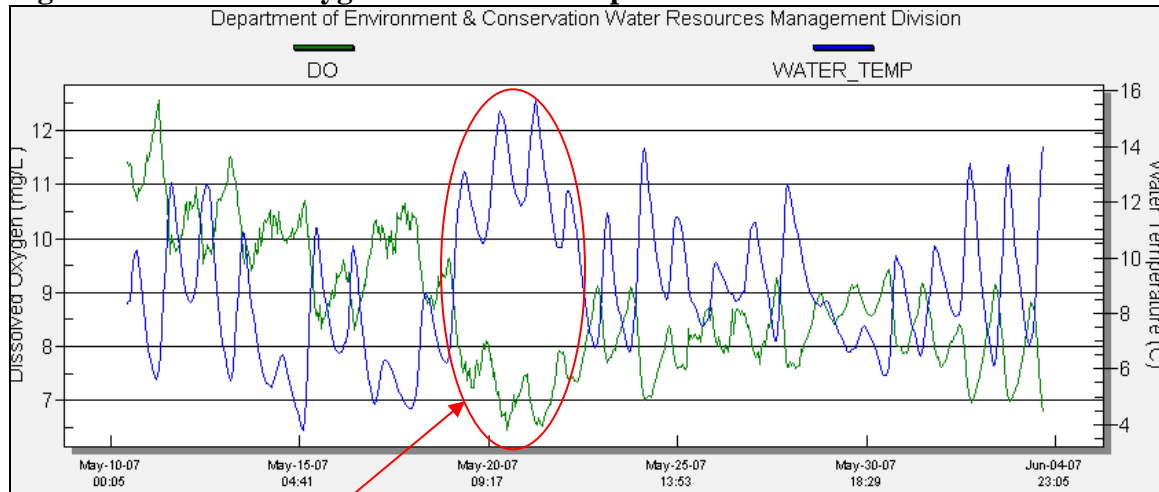
- **Water temperatures** were fairly constant during this deployment, ranging between 3.81 and 15.65°C, which is within the expected temperature range for this time of year. Water temperature data is shown in **Figure 1** below.

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 10.69 mg/L on May 15th, the same day that water temperature reached its lowest level of 3.81 °C. DO plummeted to its lowest level of 6.46 mg/L on May 20th, corresponding to the day one of the highest water temperatures during the deployment period were reached at roughly 14.35.0 °C.

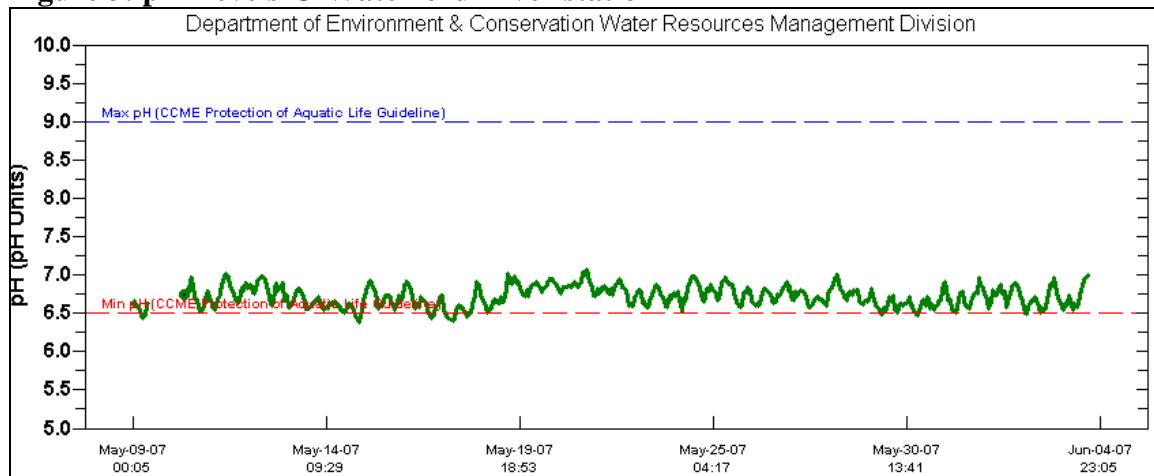
Figure 2: Dissolved Oxygen and Water Temperature @ Waterford River station



Decrease in DO / Increase
in Temperature

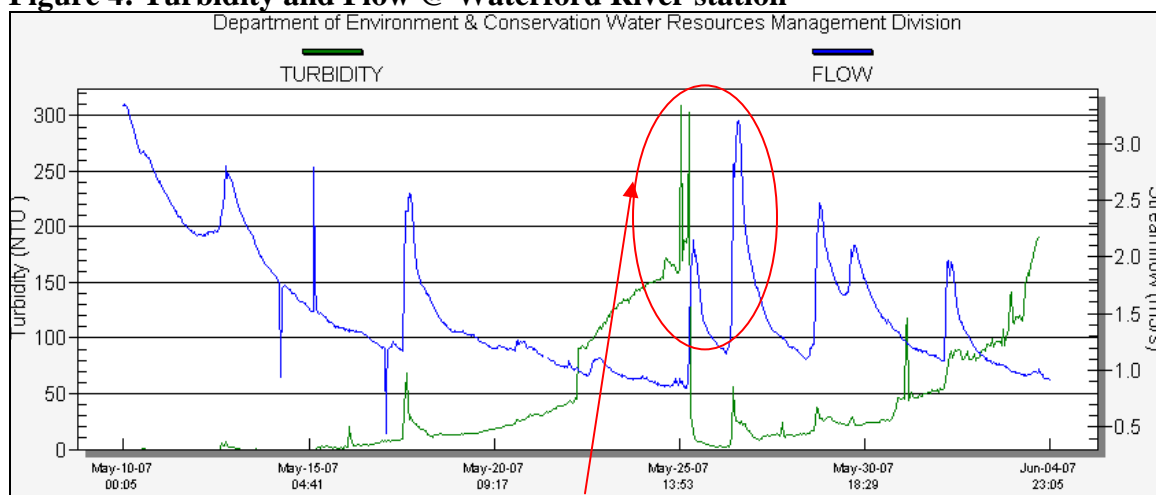
- **pH** levels were fairly constant and were within the expected range for this station, with pH values ranging from of 6.38 – 7.08. There were no sudden drops or surges in pH during the specified time frame, but it should be noted that the pH for this deployment period, occasionally fell below the minimum CCME protection of Aquatic Life Guideline, of 6.5 pH units.

Figure 3: pH Levels @ Waterford River station



- **Turbidity** levels shown in green in **Figure 4** were fairly constant with exception of the presence of one notable turbidity spike (May 26th). This turbidity spike is the direct consequence of increased flow rates brought upon by precipitation events. In **Appendix 1**, it can be seen that 20 mm of rain fell on May 25th to 26th, which increased run-off and flow rates and caused the turbidity to spike.











Figure 4: Turbidity and Flow @ Waterford River station













Spike in turbidity attributed to run-off from precipitation event.

- **Specific conductivity** levels were within the expected range for Waterford River during this deployment. Specific conductivity levels ranged between 314.0-501.0 $\mu\text{S}/\text{cm}$ and showed sudden increases, generally in response to the aftermath of significant precipitation events. The specific conductivity data for this deployment period highlighted in green is shown in **Figure 5** below. The Environment Canada Daily Climate Data for May, for the St. John's region, shown below in **Appendix 1**, indicates that there were significant precipitation events during the month of May, which resulted in an increase of runoff. This increase in run-off caused the specific conductivity to decrease.

[illegible]

| <u>D</u> <u>a</u> <u>y</u> | <u>Max</u> <u>Temp</u> °C  | <u>Min</u> <u>Temp</u> °C  | <u>Mean</u> <u>Temp</u> °C  | <u>Heat</u> <u>Deg</u> <u>Days</u> °C  | <u>Cool</u> <u>Deg</u> <u>Days</u> °C  | <u>Total</u> <u>Rain</u> mm  | <u>Total</u> <u>Snow</u> cm  | <u>Total</u> <u>Precip</u> mm  | <u>Snow</u> <u>on</u> <u>Grnd</u> cm  | <u>Dir of</u> <u>Max</u> <u>Gust</u> 10's deg | <u>Spd of</u> <u>Max</u> <u>Gust</u> km/h  |
|----------------------------------|--|--|---|---|---|--|--|---|--|---|---|
| 01 | 6.1 | 0.3 | 3.2 | 14.8 | 0.0 | 9.0 | 0.0 | 9.0 | T | | <31 |
| 02 | 8.2 | 0.5 | 4.4 | 13.6 | 0.0 | 2.8 | 0.0 | 2.8 | T | M | M |
| 03 | 8.2 | 1.3 | 4.8 | 13.2 | 0.0 | 1.0 | 0.0 | 1.0 | T | 25E | 56E |
| 04 | 7.0 | 1.1 | 4.1 | 13.9 | 0.0 | 0.6 | 0.0 | 0.6 | T | 26E | 56E |
| 05 | 5.5 | -0.1 | 2.7 | 15.3 | 0.0 | 0.2 | 0.0 | 0.2 | 0 | | <31 |
| 06 | 4.4 | -0.2 | 2.1 | 15.9 | 0.0 | T | T | T | 0 | 32E | 37E |
| 07 | 11.5 | -2.2 | 4.7 | 13.3 | 0.0 | T | T | T | 0 | 26E | 48E |
| 08 | 9.1 | -2.3 | 3.4 | 14.6 | 0.0 | 2.2 | 0.0 | 2.2 | 0 | | <31 |
| 09 | 19.4 | 5.5 | 12.5 | 5.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 27E | 56E |
| 10 | 13.4 | -1.2 | 6.1 | 11.9 | 0.0 | 2.2 | 0.0 | 2.2 | 0 | 25E | 37E |
| 11 | 16.5 | -0.1 | 8.2 | 9.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 22E | 43E |
| 12 | 19.5 | -0.8 | 9.4 | 8.6 | 0.0 | 3.8 | 0.0 | 3.8 | 0 | 24E | 63E |
| 13 | 3.0 | -1.6 | 0.7 | 17.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 3 | 33 |
| 14 | 1.9 | -2.5 | -0.3 | 18.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | <31 |
| 15 | 10.3 | -2.2 | 4.1 | 13.9 | 0.0 | T | 0.0 | T | 0 | 23E | 41E |
| 16 | 11.8 | -3.1 | 4.4 | 13.6 | 0.0 | 0.2 | 0.0 | 0.2 | 0 | 29E | 48E |
| 17 | 6.5 | -2.8 | 1.9 | 16.1 | 0.0 | 11.2 | 0.0 | 11.2 | 0 | 14E | 41E |
| 18 | 4.4 | 0.1 | 2.3 | 15.7 | 0.0 | 0.4 | 0.0 | 0.4 | 0 | | <31 |
| 19 | 19.9 | 3.1 | 11.5 | 6.5 | 0.0 | T | 0.0 | T | 0 | 25E | 33E |
| 20 | 21.7 | 11.2 | 16.5 | 1.5 | 0.0 | 1.2 | 0.0 | 1.2 | 0 | 18E | 69E |
| 21 | 19.9 | 6.3 | 13.1 | 4.9 | 0.0 | 0.2 | 0.0 | 0.2 | 0 | 24E | 44E |
| 22 | 10.1 | 0.2 | 5.2 | 12.8 | 0.0 | 1.4 | 0.0 | 1.4 | 0 | 2E | 41E |
| 23 | 4.4 | -0.1 | 2.2 | 15.8 | 0.0 | 0.4 | T | 0.4 | 0 | 3E | 37E |
| 24 | 8.6 | -0.2 | 4.2 | 13.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | <31 |
| 25 | 12.0 | 2.4 | 7.2 | 10.8 | 0.0 | 11.4 | 0.0 | 11.4 | 0 | | <31 |
| 26 | 9.2 | 2.4 | 5.8 | 12.2 | 0.0 | 8.0 | 0.0 | 8.0 | 0 | 15E | 37E |
| 27 | 9.0 | 0.5 | 4.8 | 13.2 | 0.0 | T | 0.0 | T | 0 | 27E | 41E |
| 28 | 13.3 | -0.4 | 6.5 | 11.5 | 0.0 | T | 0.0 | T | 0 | | <31 |
| 29 | 5.1 | 2.3 | 3.7 | 14.3 | 0.0 | 8.4 | 0.0 | 8.4 | 0 | 15E | 37E |
| 30 | 3.5 | 0.9 | 2.2 | 15.8 | 0.0 | 1.8 | 0.0 | 1.8 | 0 | 5E | 56E |
| 31 | 5.5 | -0.2 | 2.7 | 15.3 | 0.0 | T | T | T | 0 | 33E | 43E |

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

| <u>D</u> <u>a</u> <u>y</u> | <u>Max</u> <u>Temp</u> °C  | <u>Min</u> <u>Temp</u> °C  | <u>Mean</u> <u>Temp</u> °C  | <u>Heat</u> <u>Deg</u> <u>Days</u> °C  | <u>Cool</u> <u>Deg</u> <u>Days</u> °C  | <u>Total</u> <u>Rain</u> mm  | <u>Total</u> <u>Snow</u> cm  | <u>Total</u> <u>Precip</u> mm  | <u>Snow</u> <u>on</u> <u>Grnd</u> cm  | <u>Dir of</u> <u>Max</u> <u>Gust</u> 10's deg | <u>Spd of</u> <u>Max</u> <u>Gust</u> km/h  |
|----------------------------------|--|--|---|---|---|--|--|---|--|---|---|
| Sum | | | | 189.8 | 4.0 | 61.4 | 0.0 | 61.4 | | | |

| <u>D</u> <u>a</u> <u>y</u> | <u>Max</u> <u>Temp</u> °C | <u>Min</u> <u>Temp</u> °C | <u>Mean</u> <u>Temp</u> °C | <u>Heat</u> <u>Deg</u> <u>Days</u> °C | <u>Cool</u> <u>Deg</u> <u>Days</u> °C | <u>Total</u> <u>Rain</u> mm | <u>Total</u> <u>Snow</u> cm | <u>Total</u> <u>Precip</u> mm | <u>Snow</u> <u>on</u> <u>Grnd</u> cm | <u>Dir of</u> <u>Max</u> <u>Gust</u> 10's deg | <u>Spd of</u> <u>Max</u> <u>Gust</u> km/h |
|----------------------------------|---------------------------------|---------------------------------|----------------------------------|--|--|-----------------------------------|-----------------------------------|-------------------------------------|---|---|--|
| | | | | | | | | | | | |
| Avg | 16.8 | 6.8 | 11.8 | | | | | | | | |
| Xtrm | 25.9 | -0.7 | | | | | | | | 31 | 74 |
| 01 | 11.7 | 0.5 | 6.1 | 11.9 | 0.0 | 9.2 | 0.0 | 9.2 | 0 | 22E | 59E |
| 02 | 9.9 | 0.0 | 5.0 | 13.0 | 0.0 | 0.6 | 0.0 | 0.6 | 0 | 31E | 74E |
| 03 | 9.6 | -0.7 | 4.5 | 13.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | <31 |
| 04 | 14.9 | 0.1 | 7.5 | 10.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | <31 |
| 05 | 11.9 | 3.0 | 7.5 | 10.5 | 0.0 | 2.0 | 0.0 | 2.0 | 0 | 18E | 46E |
| 06 | 25.2 | 11.9 | 18.6 | 0.0 | 0.6 | 1.2 | 0.0 | 1.2 | 0 | 26E | 35E |
| 07 | 25.9 | 11.3 | 18.6 | 0.0 | 0.6 | T | 0.0 | T | 0 | 18E | 46E |
| 08 | 24.3 | 9.5 | 16.9 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 18E | 48E |
| 09 | 24.9 | 9.0 | 17.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 20E | 33E |
| 10 | 25.2 | 14.1 | 19.7 | 0.0 | 1.7 | T | 0.0 | T | 0 | 28E | 37E |
| 11 | 15.7 | 5.0 | 10.4 | 7.6 | 0.0 | 0.4 | 0.0 | 0.4 | 0 | | <31 |
| 12 | 7.2 | 4.8 | 6.0 | 12.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0 | 4E | 37E |
| 13 | 6.5 | 3.7 | 5.1 | 12.9 | 0.0 | 1.0 | 0.0 | 1.0 | 0 | | <31 |
| 14 | 11.4 | 3.3 | 7.4 | 10.6 | 0.0 | T | 0.0 | T | 0 | 26E | 39E |
| 15 | 22.8 | 5.7 | 14.3 | 3.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 26E | 57E |
| 16 | 25.7 | 6.9 | 16.3 | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 27E | 44E |
| 17 | 25.1 | 13.0 | 19.1 | 0.0 | 1.1 | T | 0.0 | T | 0 | 27E | 43E |
| 18 | 19.3 | 7.6 | 13.5 | 4.5 | 0.0 | 6.4 | 0.0 | 6.4 | 0 | 6E | 37E |
| 19 | 9.5 | 5.4 | 7.5 | 10.5 | 0.0 | 13.6 | 0.0 | 13.6 | 0 | 6E | 44E |
| 20 | 8.6 | 5.4 | 7.0 | 11.0 | 0.0 | 7.2 | 0.0 | 7.2 | 0 | 2E | 33E |
| 21 | 13.1 | 6.7 | 9.9 | 8.1 | 0.0 | 1.0 | 0.0 | 1.0 | 0 | | <31 |
| 22 | 16.7 | 8.9 | 12.8 | 5.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | | <31 |
| 23 | 15.4 | 8.8 | 12.1 | 5.9 | 0.0 | 12.2 | 0.0 | 12.2 | 0 | 15E | 41E |
| 24 | 19.2 | 8.5 | 13.9 | 4.1 | 0.0 | 0.6 | 0.0 | 0.6 | 0 | 23E | 46E |
| 25 | 21.7 | 9.7 | 15.7 | 2.3 | 0.0 | T | 0.0 | T | 0 | 21E | 46E |
| 26 | 23.1 | 9.9 | 16.5 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 26E | 46E |
| 27 | 17.3 | 9.9 | 13.6 | 4.4 | 0.0 | 0.2 | 0.0 | 0.2 | 0 | 26E | 56E |
| 28 | 12.5 | 7.3 | 9.9 | 8.1 | 0.0 | 1.8 | 0.0 | 1.8 | 0 | 33E | 35E |
| 29 | 8.8 | 6.6 | 7.7 | 10.3 | 0.0 | 3.0 | 0.0 | 3.0 | 0 | | <31 |
| 30 | 19.5 | 8.6 | 14.1 | 3.9 | 0.0 | T | 0.0 | T | 0 | 26E | 37E |