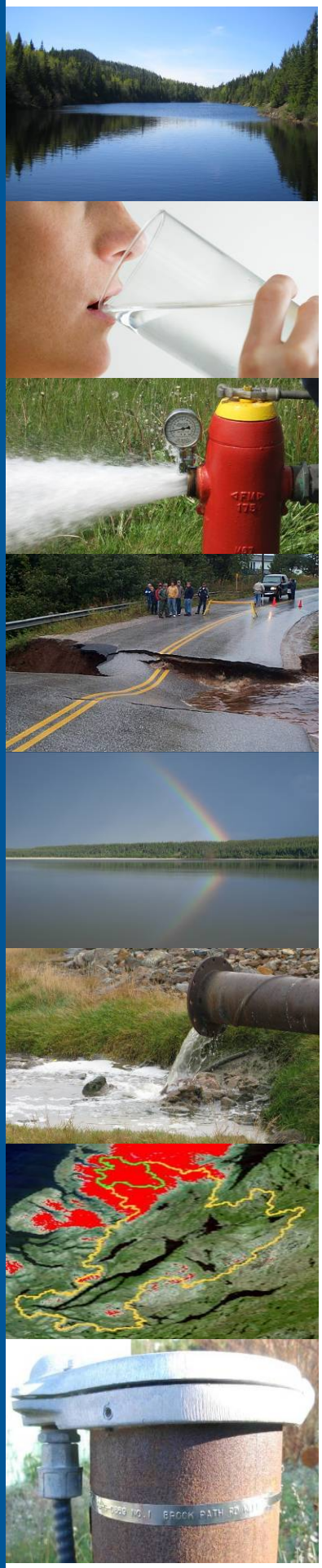


# Waterford River @ Kilbride

# NF02ZM0009

**April to May 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**
**April to May 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 |
|---|---|
| April 3rd, 2007 | May 9th, 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 April 3rd to May 9th are summarized in **Table 2**.
- The absence of turbidity ranking can be attributed to the QA/QC probe lacking a turbidity sensor.

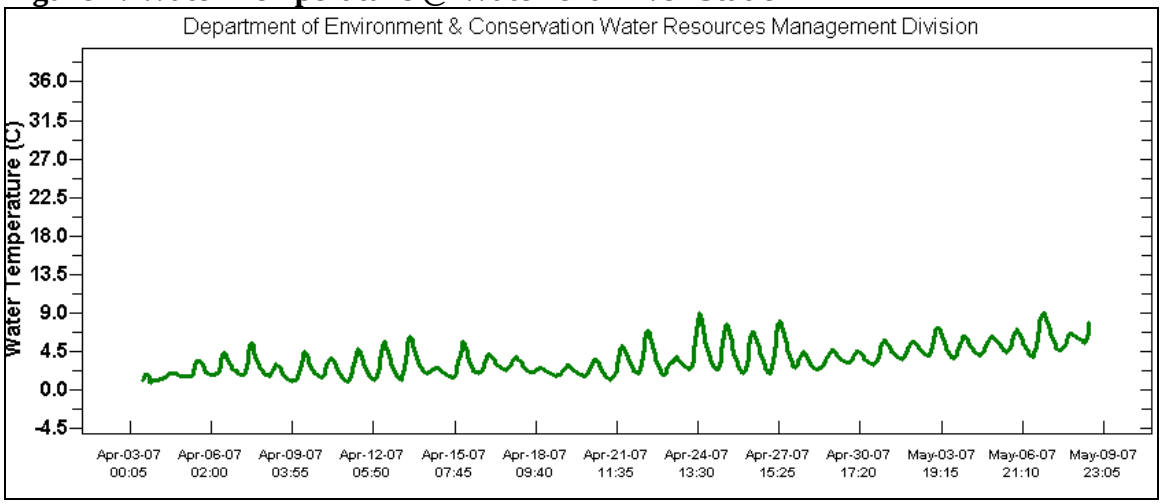
**Table 2: Comparison rankings for Waterford @ Kilbride station, April 3rd – May 9th, 2007**

| Station | Date | Action | Comparison Ranking | | | | |
|---|---|---|---|---|---|---|---|
| | | | Temperature | pH | Conductivity | Dissolved Oxygen | Turbidity |
| Waterford @ Kilbride | April 3rd, 2007 | Deployment | Good | Marginal | Excellent | Poor | N/A |
| | May 9th, 2007 | Removal | Good | Excellent | Excellent | Good | N/A |

## Data Interpretation

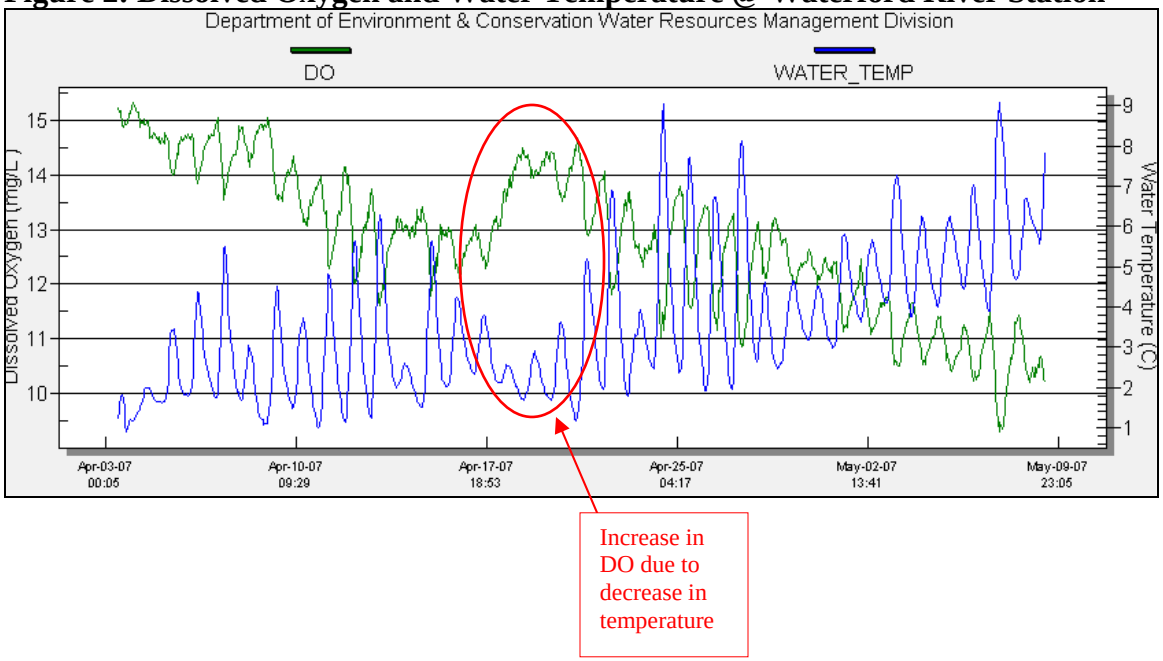
- **Water temperatures** were fairly constant and increasing during this deployment, ranging between 0.92 and 9.06°C, which is within the expected temperature range for this time of year. Water temperature data is shown in **Figure 1** below.

**Figure 1: Water Temperature @ Waterford River Station**



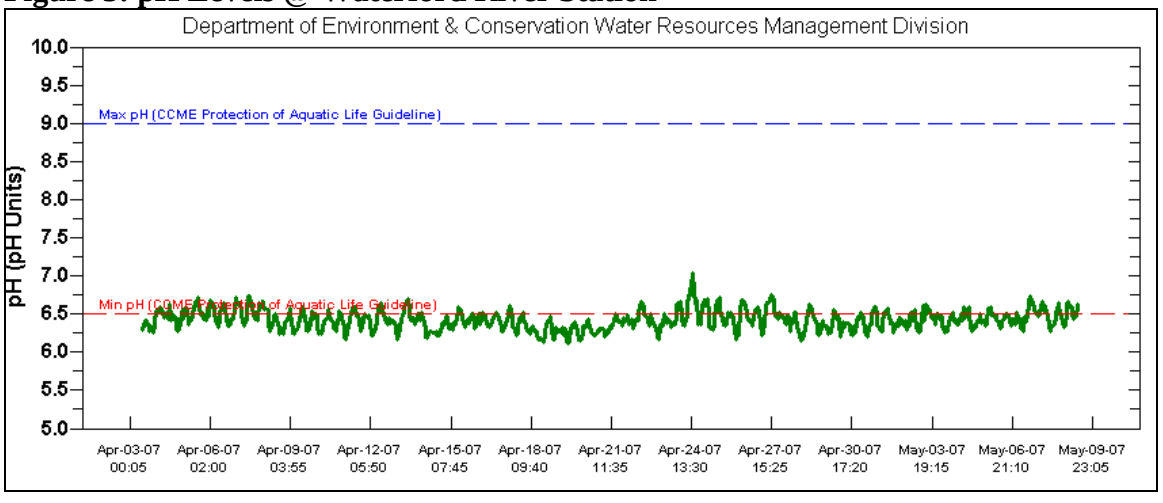
- **Dissolved oxygen (DO)** has an inverse relationship with water temperature whereby DO levels decrease as water temperature increases. Dissolved oxygen is shown in green and water temperature is shown in blue in **Figure 2**, below. The graph indicates that dissolved oxygen levels peaked at 15.31 mg/L on April 4th, the same day that water temperature reached its lowest level of 9.07°C. It should be noted that this high DO value can be attributed to the sensors taking time to stabilize. DO plummeted to its lowest level of 9.31 mg/L on May 7th, corresponding to the day the highest water temperatures during the deployment period were reached at 9.06 °C.

**Figure 2: Dissolved Oxygen and Water Temperature @ Waterford River Station**



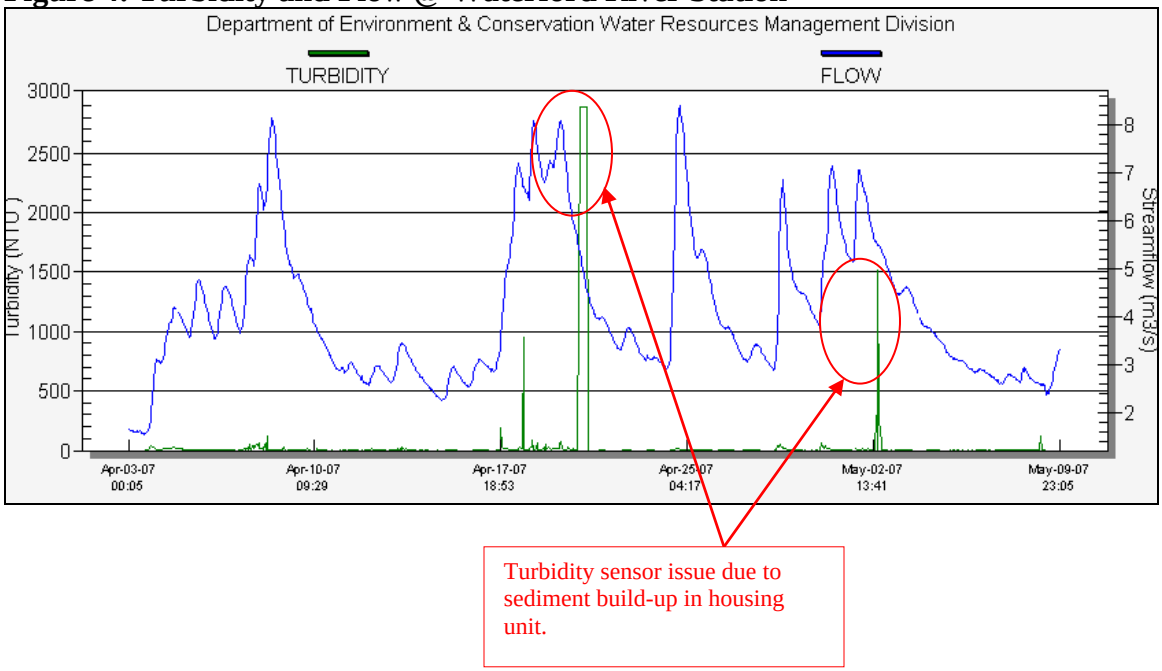

- **pH** levels were fairly constant and were within the expected range for this station, with pH values ranging from of 6.12 – 7.03. There was no sudden surge or drop in pH during the specified time frame, but it should be noted that the pH for this time frame repeatedly fell below the range of the minimum CCME protection of Aquatic Life Guideline, of 6.5 pH units, which is typical of surface water in this province.

**Figure 3: pH Levels @ Waterford River Station**



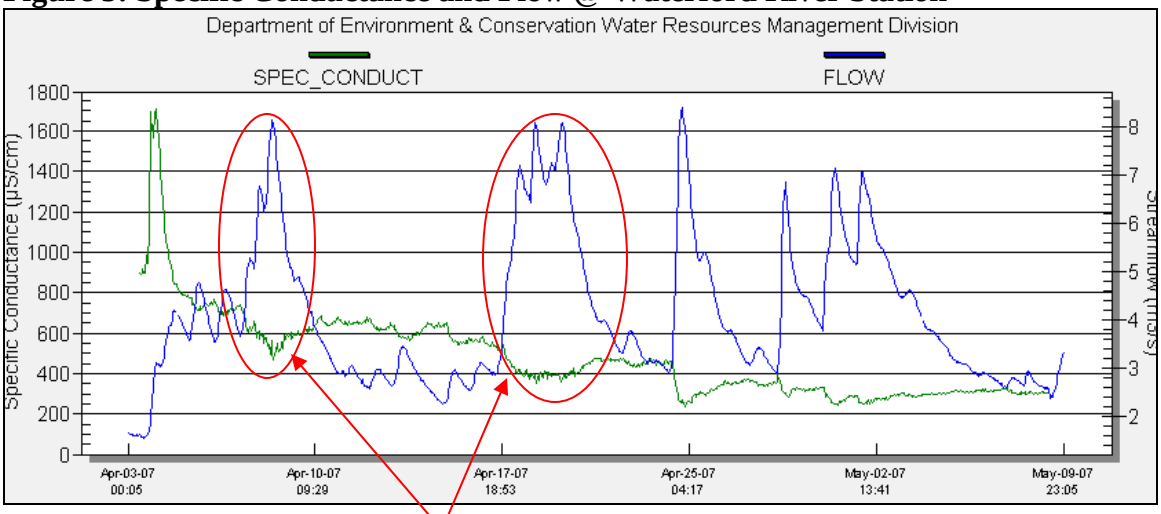
- **Turbidity** levels shown in green were fairly constant with exception of the presence of two notable turbidity spikes (April 20th and May 2nd). These turbidity spikes can be seen in green in **Figure 4** below and are the direct consequence of a significant malfunction of the turbidity sensor. It was deduced upon further investigation that these sensor malfunctions and corresponding turbidity spikes are the consequence of massive accumulations of muddy water/sediment inside the protective housing unit. Since these fluctuations are suddenly up and return to background levels immediately, it is more likely that passing debris (leaves, sticks, etc.) got trapped around the sensor before finally floating on. Sediment build up shows a more gradual increase and would not likely resolve itself.

**Figure 4: Turbidity and Flow @ Waterford River Station**




- **Specific conductivity** levels were within the expected range for Waterford River during this deployment. Specific conductivity levels ranged between 236.0-1708.0 µS/cm and showed sudden increases, generally in response to the aftermath of significant precipitation events. The specific conductivity data, for this deployment period highlighted in green, is shown in **Figure 5** below. The Environment Canada Daily Climate Data for April, for the St. John's region, shown below in **Appendix 1,** indicates that there were numerous precipitation events during the first few days of the month of April. This caused a significant increase in flow, which in turn caused a rapid decline in specific conductance. The Environment Canada Daily Climate Data for May, for the St. John's region, shown below in **Appendix 2,** indicates that there was significant precipitation events during the latter end of the month of May, which resulted in an increased runoff, which in turn caused the specific conductivity to decrease. This large range of values is higher than background levels, due to residual salt entering the watershed during run-off, from road salting operations in the winter.

**Figure 5: Specific Conductance and Flow @ Waterford River Station**




Decrease in specific conductance/ increase in flow.

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**APPENDIX 1**: Weather information for St. John's, NL provided by Environment Canada for April 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 | | | | 527.1 | 0.0 | 51.8 | 7.5 | 59.3 | | | |
| Avg | 3.5 | -2.7 | 0.4 | | | | | | | | |
| Xtrm | 15.0 | -6.9 | | | | | | | | 24* | 80* |
| 01 | 1.4 | -6.9 | -2.8 | 20.8 | 0.0 | 0.0 | T | T | 15 | 34E | 56E |
| 02 | -1.4 | -5.8 | -3.6 | 21.6 | 0.0 | 0.0 | T | T | 15 | 31E | 46E |
| 03 | 0.3 | -5.9 | -2.8 | 20.8 | 0.0 | 3.2 | 2.4 | 5.6 | 15 | 1E | 54E |
| 04 | 1.4 | 0.1 | 0.8 | 17.2 | 0.0 | 4.6 | 0.0 | 4.6 | 14 | 2E | 33E |
| 05 | -0.2 | -1.3 | -0.8 | 18.8 | 0.0 | 0.4 | 0.0 | 0.4 | 10 | 2E | 44E |
| 06 | 5.5 | -1.1 | 2.2 | 15.8 | 0.0 | 2.0 | 0.0 | 2.0 | 9 | | <31 |
| 07 | 7.6 | -1.1 | 3.3 | 14.7 | 0.0 | 5.2 | T | 5.2 | 5 | 13E | 39E |
| 08 | 6.8 | -0.6 | 3.1 | 14.9 | 0.0 | 6.2 | 0.0 | 6.2 | 3 | 32E | 74E |
| 09 | 4.0 | -1.6 | 1.2 | 16.8 | 0.0 | 0.0 | 0.4 | 0.4 | 3 | 22E | 67E |
| 10 | 1.8 | -3.5 | -0.9 | 18.9 | 0.0 | 0.0 | 0.5 | 0.5 | 3 | 26E | 63E |
| 11 | 3.4 | -4.8 | -0.7 | 18.7 | 0.0 | 0.0 | 0.0 | 0.0 | 3 | | <31 |
| 12 | 4.0 | -6.1 | -1.1 | 19.1 | 0.0 | 0.0 | 0.0 | 0.0 | 2 | | <31 |
| 13 | 2.2 | -5.0 | -1.4 | 19.4 | 0.0 | 0.0 | 0.0 | 0.0 | 2 | | <31 |
| 14 | -0.8 | -2.5 | -1.7 | 19.7 | 0.0 | 0.0 | T | T | 1 | 2E | 48E |
| 15 | 3.1 | -1.8 | 0.7 | 17.3 | 0.0 | 0.0 | 0.0 | 0.0 | T | 1E | 63E |
| 16 | 1.7 | -0.4 | 0.7 | 17.3 | 0.0 | 3.2 | 0.0 | 3.2 | T | 2E | 61E |
| 17 | 1.7 | -0.4 | 0.7 | 17.3 | 0.0 | 2.4 | 0.0 | 2.4 | T | 3E | 44E |
| 18 | 1.1 | -0.3 | 0.4 | 17.6 | 0.0 | 8.2 | 0.0 | 8.2 | T | M | M |
| 19 | 1.0 | -0.4 | 0.3 | 17.7 | 0.0 | 5.4 | 0.0 | 5.4 | T | M | M |
| 20 | 0.2 | -3.9 | -1.9 | 19.9 | 0.0 | T | 0.0 | T | T | M | M |
| 21 | 0.9 | -4.7 | -1.9 | 19.9 | 0.0 | 0.0 | T | T | T | M | M |
| 22 | 4.5 | -3.6 | 0.5 | 17.5 | 0.0 | 0.0 | 0.0 | 0.0 | T | M | M |
| 23 | 3.6 | -3.5 | 0.1 | 17.9 | 0.0 | 0.4 | 0.8 | 1.2 | T | 25E | 67E |
| 24 | 15.0 | 0.8 | 7.9 | 10.1 | 0.0 | 0.0 | 0.0 | 0.0 | T | 24E | 80E |
| 25 | 7.7 | -3.9 | 1.9 | 16.1 | 0.0 | 0.0 | 0.0 | 0.0 | T | 27E | 48E |
| 26 | 8.1 | -3.6 | 2.3 | 15.7 | 0.0 | 0.0 | T | T | T | 27E | 56E |
| 27 | 9.1 | -4.2 | 2.5 | 15.5 | 0.0 | 0.0 | 0.0 | 0.0 | T | 27E | 48E |
| 28 | 6.9 | -3.5 | 1.7 | 16.3 | 0.0 | 4.4 | 3.4 | 7.8 | T | 14E | 43E |
| 29 | 1.8 | -0.3 | 0.8 | 17.2 | 0.0 | 0.4 | 0.0 | 0.4 | T | M | M |
| 30 | 2.7 | 0.0 | 1.4 | 16.6 | 0.0 | 5.8 | 0.0 | 5.8 | T | 10E | 44E |

**APPENDIX 2**: Weather information for St. John's, NL provided by Environment Canada for May 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 | | | | 393.7 | 0.0 | 66.4 | T | 66.4 | | | |
| Avg | 10.0 | 0.6 | 5.3 | | | | | | | | |
| Xtrm | 21.7 | -3.1 | | | | | | | | 18* | 69* |
| 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 |