Name:_____ Date:_____ Section:_____

Lab Group/Partners: _____

Understanding Temperature Patterns in Our Watersheds

Overview

In this lab we will use data from Mayfly Data Logger Board™ Sensor Stations installed in rivers and streams to learn more about the patterns of temperature in nature. These Sensor Stations measure and transmit important data to the Monitor My Watershed® web portal that can be accessed by scientists, educators, students, and various organizations interested in understanding and monitoring watersheds in our area. Throughout these activities, you will learn how to use the portal to view and interpret data collected at the sensor stations, investigate significant events, analyze the information, and create new understandings about the dynamics and interactions of variables in your local waterways. As you go through the activities, be sure to record the data and your analyses on your lab sheet.

Learning Objective:

By the end of this lab you will explain temperature patterns in watersheds and develop analytical and reasoning skills by accessing and interpreting real world data.

Introduction

What do you think of when you hear the word "temperature?" Write your definition for temperature below.

_____

_____

Prediction #1: Which is warmer, air temperature or water temperature? (Circle one below)

Air Temperature **Water Temperature**

Explain your prediction: _____

_____

_____

Prediction #2: Which changes faster, air temperature or water temperature? (Circle one below)

Air Temperature **Water Temperature**

Explain your prediction: _____

_____

_____

Note: For the duration of this lab we will be comparing the temperature in the stream (water) to the temperature of the Mayfly Data Logger Board™ in the station box (equipment). The actual air temperature has not been measured at the sensor station, although the air temperature would follow a similar pattern.

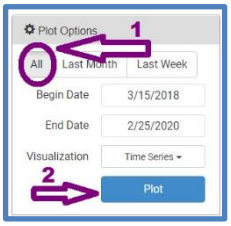
Explore the Sensor Station Data

1. On a computer load the website: https://www.monitormywatershed.org
2. Click on ***Browse Sites*** in the top banner
3. In the "Search sites" box (top center of the map) type in "BCMC4." As you type the map will zoom in and center over a sensor station site balloon.
4. **Left click** on the site balloon logo, and then **right click** on "View data for this site" and select "Open link in new tab."
5. When the new window loads, fill in the following information:

Site Name: _____

Site code: _____ *(in parentheses after the site name)* Site Type: _____

6. Scroll down and click on the "Time Series Analyst" box above the variable graphs. A new tab will open displaying all of the variables measured at this site over the last month.
7. In the "Plot" column on the left, click the two boxes for "Temperature" (Decagon_CTD-10_Temp and EnviroDIY_Mayfly_Temp) and then click on the "Visualization" tab (top left above the list of variables).
8. When the new graph loads, change the date range to "All" in the "Plot Options" box and then click the "Plot" button.



When the new graph loads take a moment to make some general observations about the data displayed. Uncheck and re-check each variable to view them one at a time and together. Record your initial observations below.

_____

_____

_____

_____

_____

_____

Observing the Data

Follow the directions below to collect and record important observations and data on daily stream and equipment temperature changes at this sensor station during a summer and winter date range.

NOTE: All data points displayed on the Monitor My Watershed graphs are in UTC (Universal Time Coordinated). To convert readings during Eastern Standard Time subtract 5 hours (winter) and during Daylight Savings Time subtract 4 hours (spring to fall).

Summer

9. In the plot options box, change the "Begin Date" to **7/7/2018** and the "End Date" to **7/11/2018** and then click on "Plot."
10. Move your cursor through the data graph to explore the behavior differences between stream temperature (CTD-10) and equipment temperature (Mayfly). (*EST = UTC – 4 hours*)

Record your observations below.

Circle the answers for each of the following:

Which temperature increases fastest during the day?	Stream (CTD_10)	Equipment (Mayfly)
Which temperature cools the fastest at night?	Stream (CTD_10)	Equipment (Mayfly)
Which temperature changes the most in the summer?	Stream (CTD_10)	Equipment (Mayfly)

Winter

11. In the plot options box, change the "Begin Date" to **1/9/2019** and the "End Date" to **1/13/2019** and then click on "Plot."
12. Move your cursor through the data graph to explore the behavior differences between stream temperature (CTD-10) and equipment temperature (Mayfly). (*EST = UTC – 5 hours*)

Record your observations below.

Circle the answers for each of the following:

Which temperature increases fastest during the day?	Stream (CTD_10)	Equipment (Mayfly)
Which temperature cools the fastest at night?	Stream (CTD_10)	Equipment (Mayfly)
Which temperature changes the most in the winter?	Stream (CTD_10)	Equipment (Mayfly)

Analyze the Data

What were the biggest differences that you observed between the summer and the winter data graphs?

Conclusion

What do you know that would explain the differences in temperature changes observed between the equipment (Mayfly) and stream (CTD-10) sensors? Support your claim with evidence and reasoning.

Brainstorm Questions for Further Studies

Based on what you explored and learned in this lab activity, what questions do you have about how temperature variables interact in our waters? Can you think of relationships or comparisons that you would like to investigate further?