Student Guide Activity 3 Cascade Brook Water Temperature

Like all bodies of water, Cascade Brook is important to supporting life. You'll start your investigation of the Brook's water quality by examining water temperature during one year (2009). The data was collected hourly by sensors at the Brook and then transmitted to a computer where it is stored. Later in the year you'll visit the Forest to make field observations of the area's physical and biological characteristics.

How do you think Cascade Brook water temperature will change during one year? In your Journal**,** sketch the way you think the graph will look. Use months as the labels on the x-axis and degrees on the y-axis (either Celsius or Fahrenheit are fine right now).

Compare your graph with graphs made by other students. Talk about how they're similar and how they're different from each other. What factors might be affecting temperature during the year? Describe those factors in the Journal.

A. Use the Graphing Tool to construct the water temperature graph based on real data

You'll use the period 1/2/2009 to 12/31/2009 (for some reason there's no data for January 1). Follow the steps below to set up your graph:

1. In the title section, type "Cascade Brook Water Temp".
2. Click on the "Time Series" button.
3. From the list of data sets, click on "Cascade Brook Temp" to highlight it.
4. Click in the box under "Start" to select a starting date. A calendar pops up.
5. Navigate to January 2009 and click on "2"
6. Click in the box under "End" to select an ending date.
7. Navigate to December and click on "31".
8. Click on the green "Create Graph" button.

The graph takes several seconds to appear at the bottom of the screen. Look at the overall shape of the graph and compare it to the graph you sketched earlier. Record your comparison in the Journal**.**

B. Getting detailed information from the graph

The x-axis is labeled by months. The y-axis has numbers representing temperatures from 0 to 25 degrees Celsius. Practice moving the cursor along the graph and notice that you can get detailed information as you do so. Use this feature to find the extremes of temperature (maximum and minimum) during 2009 and when they occurred. Record those in your Journal.

C. Download the graph into your Journal

Find the icon In the upper right hand portion of the graphing area that shows a downward-pointing arrow over a horizontal bar. Click on this icon and notice the choices of format you might use. Because of differences in computers and word processing software, your teacher will advise you on the best format to use. Insert the graph into your Journal in the space provided.

D. Which organisms can live in Cascade Brook? (Class discussion)

Examine the Water Temperature graph you made and the Temperature Range Chart below**.** Would your organism be healthy, stressed or unable to survive in Cascade Brook, just on the basis of temperature? [There may be other factors that might still make life impossible for your animal but we'll consider those at a later time.] If your organism has different temperature needs at different stages of its life, be sure to mention them.

As a group, compile a list of the organisms that **could** survive in Cascade Brook and enter the list in your Journal.

Aquatic Organisms	Temperature Range
VERTEBRATES	
Brook Trout	5 to 20°C
Black Nose Dace	12 to 24°C
Creek Chub	12 to 24°C
Northern Two-lined Salamander	5 to 20°C
MACROINVERTEBRATES	
Stonefly larva	10 to 25°C
Mayfly larva	10 to 25°C
Caddisfly larva	10 to 25°C
Hellgrammite	10 to 25°C
Dragonfly larva	10 to 25°C
Scud (amphipod)	10 to 25°C
Whirligig beetle	10 to 25°C
Water boatman	10 to 26°C
Mosquito larva	10 to 26°C
Leech	10 to 30°C
Aquatic Worm	10 to 30°C

E. Air temperature graph

It's interesting to think about how the temperature of the air might affect water temperature in Cascade Brook. How do you think a graph of air temperature for 2009 would look? Sketch your ideas in your Journal.

Air temperature was not actually measured at Cascade Brook but we do have data collected at the Open Lowland Station nearby. Follow the instructions above for using the Graphing Tool but select BRF Lowlands Temp as the parameter and Air Temp as the title. Keep the dates the same. In your Journal, compare the actual graph with your predicted graph.

F. Compare air temperature and water temperature graphs

Download the air temperature graph to your Journal. If possible, place it directly below the Water Temperature graph so that the vertical axes line up directly above each other. Compare the two graphs by answering the questions in the Journal.