Lesson 4.3 (Understanding climate change)
Stream Temperature Data Exercise

Date (2024/25)	Temp (degrees C)
February 1	6.3
February 15	7.4
March 1	7.7
March 15	12.5
April 1	13.6
April 15	13.3
May 1	16.8
May 15	15.6
June 1	17.8
June 15	24.8
July 1	26.6
July 15	26.1
August 1	22.8
August 15	22.6
September 1	23.1

1. Open a spreadsheet program (Google Sheets or Microsoft Excel). Make a table with two vertical columns titled "Date (years)" and "Temp (℃)". See example to right.
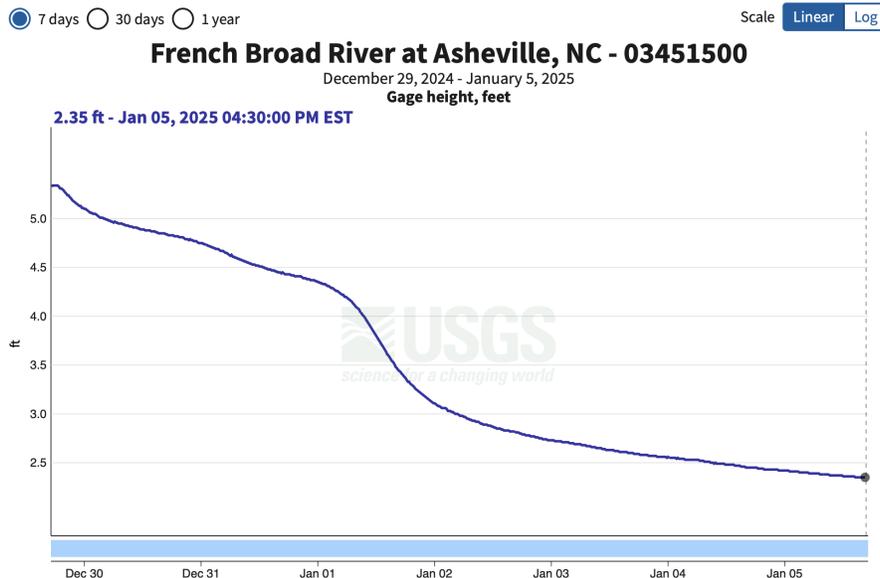
2. Using the United States Geological Survey (USGS) Water Quality Watch webpage linked to temperature (link: https://waterwatch.usgs.gov/wqwatch/), find a flow gauge station on a river in your state.

   a. First click on your state on the United States map

   b. Then click on one of the colored dots representing an individual flow monitoring station.

   c. Then click on one the blue 8 to 10-digit numbers on the popup window which will open a page with the graph of today's flow. The top of the page might look something like the screenshot below.

French Broad River at Asheville, NC - 03451500
December 29, 2024 - January 5, 2025
Gage height, feet

   d. Scroll down and choose the "Temperature, water, degrees Celsius" button.

e. Expand the range of data displayed by selecting the "1 year" button on the top left.

3. By moving your cursor carefully along the graph, find the highest temperature of the past year and record it below.

    High temperature: _____   Time and date: _____

4. By moving your cursor carefully along the graph, find the lowest temperature of the past year and record it below.

    Low temperature: _____   Time and date: _____

5. By moving your cursor carefully along the graph, find the temperature (in degrees Celsius) as close to noon as possible on the 1st and 15th day of each month of the past 12 months. The time and value is displayed on the upper left top of the graph.

6. Record the date in the first column (for example in the format of "03/01/2024" – make sure the year is correct). Record the streamflow discharge value on your spreadsheet in the second vertical column for the corresponding date.

7. Once you have completed your table, make a chart of your data. Choose the "Line chart" option for chart types and make sure your axes and chart are labeled (by including the column titles in your data selection).

Temp (degrees C) vs. Date (2024/25)
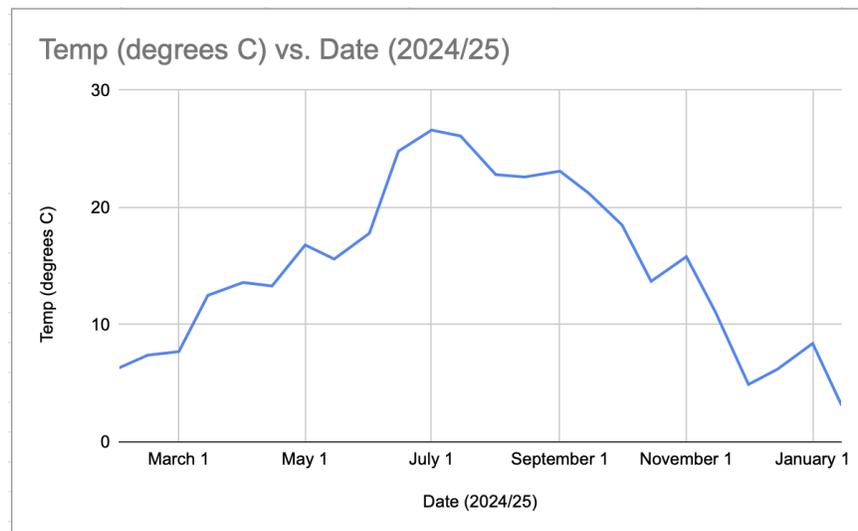
8. Insert a screenshot of your first table and chart below.

9. As global air temperatures rise with human-induced climate change, water temperatures in streams and rivers will rise as well. Make a second table with 2°C added to each temperature data from your first table. Make a second chart with the data presented in the same way.

10. Insert a screenshot of your second table and chart below.

Analysis questions

1. Calculate the average stream temperature for your river in the:

    a. winter months (January through March)

    b. spring months (April through June)

    c. summer months (July through September)

    d. autumn months (October through December)

2. According to your first set of data:

    a. which dates have water temperatures that are too high for brown trout (potential lethal temperature for brown trout is 24℃)?

    b. which dates have water temperatures that are too high for brook trout (potential lethal temperature for brown trout is 22℃)?

3. According to your second set of data (with 2℃ of climate change added):

    a. which dates have water temperatures that are too high for brown trout (potential lethal temperature for brown trout is 24℃)?

    b. which dates have water temperatures that are too high for brook trout (potential lethal temperature for brown trout is 22℃)?

4. Did your data table and graph include the highest and lowest temperature of the year for your river?

5. If it did not, why not?

6. What are two actions that can be done to rivers to make trout more resilient to climate change?

    a. Action 1:

    b. Action 2: