FutureWater Exercise Option 1:
Climate Change and Seasonal Changes in Rainfall and Streamflow

Student Worksheet

This lesson is designed to give you a tangible insight into seasonal changes in precipitation and streamflow due to climate change. Discuss the following questions:

1. What is precipitation? What sorts of things count?

2. What is streamflow? How is it measured?

Next we'll look at precipitation and streamflow data from your local area.

Head over to futurewater.indiana.edu. Futurewater hosts a model which simulates how water patterns will change over your lifetime. You are going to find the watershed with your stream and look at a few important numbers around precipitation and streamflow.

1. Go to https://futurewater.indiana.edu
2. Click 'explore modeling forecasts'
3. Choose your watershed at the HUC-12 scale (the pre-selected **Subwatershed Size**)
4. Locate your watershed by typing the zip code in the box "Zip Code" at the upper right corner on your screen. For example, you type 47401, the watershed containing downtown Bloomington and the southeast of Monroe County will be zoomed in on the map at left. Note the faint label "Bloomington" in the background.
5. Select "Precipitation" as the **Variable** and **Summary Period** as "Annual".
6. Go to the **Emissions Scenario** drop-down and select "High (RCP 8.5)"

Let's make some guesses. What do you think will happen to precipitation in the next 80 years? What about streamflow? Why?

Now we'll go through and gather some data about annual precipitation values and annual streamflow values.

To the right of the map, you will see a chart similar to the one below. Take a look at the axes. The Y-axis represents percent change in the displayed variable from the average value taken from the years 1971-2000. The X-axis shows the different decade–emission scenario combinations. The data points for the selected decade–emission scenario combination are shown in bold colors. The black box represents the Ensemble Mean (or average) of the 10 climate models represented by the different colored dots.
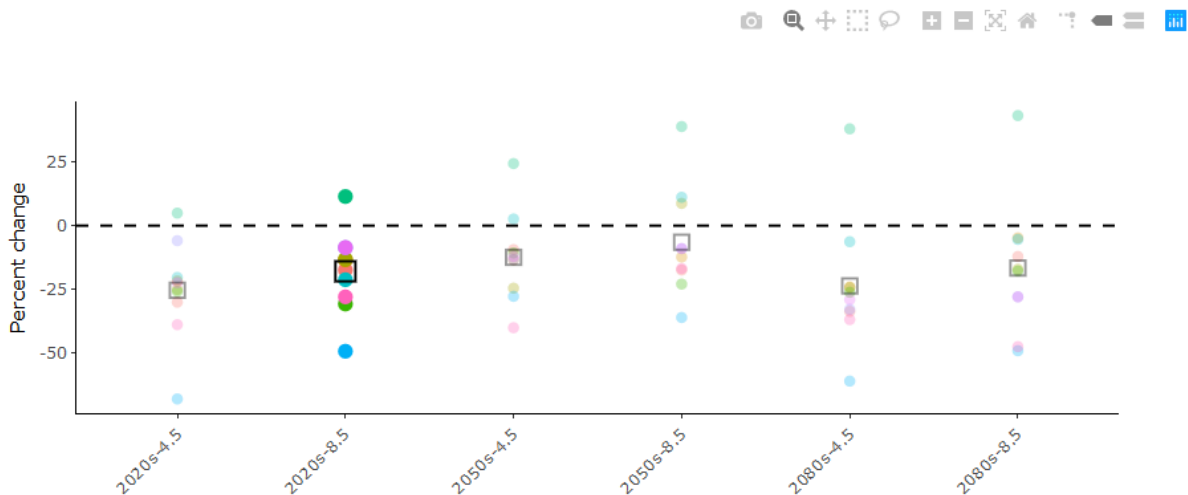
Fill out the following charts using the average value. Hint: you can view the value by hovering over the black boxes on the chart.

Annual Precipitation under RCP 8.5

	2020s	2050s	2080s
Change in precip (%)			

Now change your variable to 'streamflow'.

Annual Streamflow under RCP 8.5

	2020s	2050s	2080s
Change in streamflow (%)			

What patterns do you see for the 2020s - 2080s in streamflow and in precipitation?

Next let's look at some seasonal data and see how they compare to the annual averages.

How do you think precipitation will increase or decrease in March and September compared to the historical mean? Why? How about streamflow?

Now, adjust the Summary Period and fill out the following charts for March and September as you did above for the annual projections.

Percent Change in Seasonal Precipitation

	2020s	2050s	2080s
March			
September			

Percent Change in Seasonal Streamflow

	2020s	2050s	2080s
March			
September			

Look at the September data, are the changes in precipitation and streamflow at the same scale?

Does an increase of precipitation always result in an increase of streamflow? Why?

How do these seasonal changes compare to the annual summary?

What does seasonal variation in water imply about how we should be managing water over the year?

What impact does the increase in precipitation have on crop planting?

How might streamflow variation impact animal habitat? Do you think annual or seasonal variation would be more important?