Name: Date:

Weather to Climate Investigation: Snow

Guiding Questions:

• What are the historical and current weather patterns or events for a location in the United States?

• What are the long-term weather (i.e. climate) patterns for this location?

Definitions:

• ***Weather*** *is the mix of events (precipitation, humidity, temperature, etc.) that happen over a short period of time (minutes to months) in a specific location.*

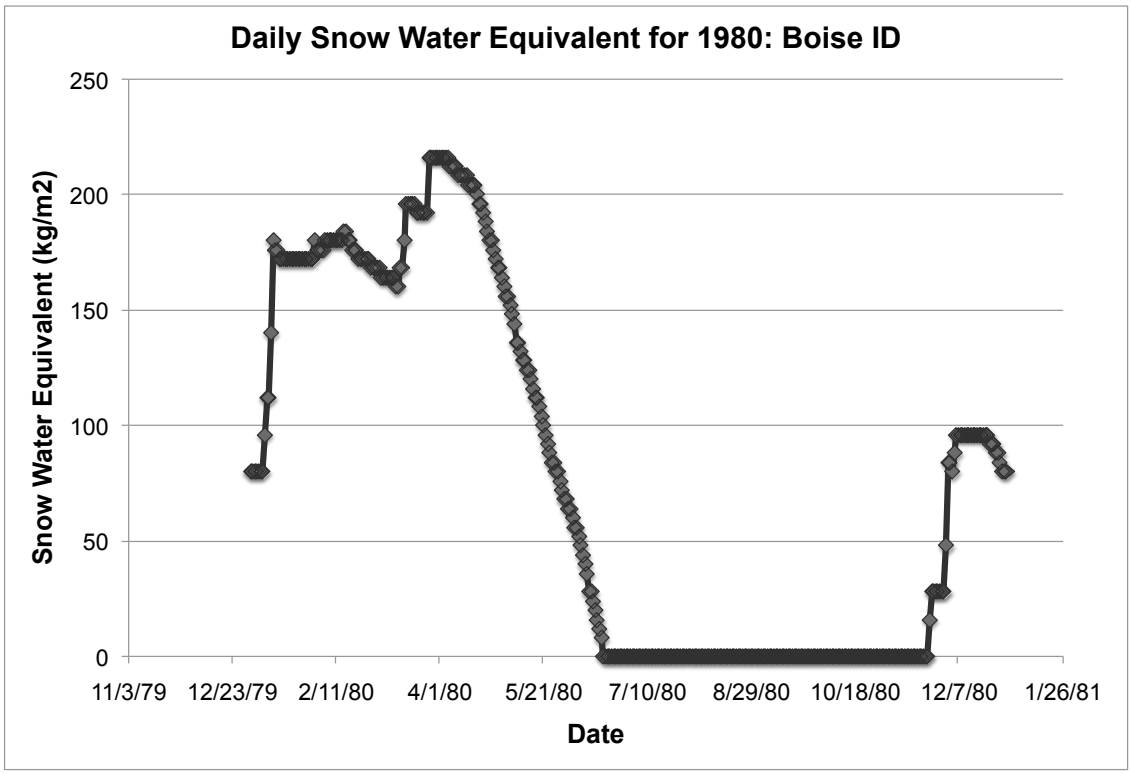
• ***Climate*** *is the long-term pattern of weather in a particular area. This is often measured as the average weather over a period of time.*

• ***Snow Water Equivalent*** *is the amount of water in the snowpack. Essentially, the volume of water that would result if you melted the entire snowpack instantaneously.*

Conduct the Investigation:

Location	Latitude	Longitude
Boise, ID	*44.14*	*-115.63*

1) The graph below shows daily snow water equivalent data for the year 1980. You will use the graph to analyze and interpret data and to prepare you for a climate investigation.



2) In Boise, in 1980, which month had the maximum daily snow water equivalent? Make an estimate of the highest snow water equivalent in 1980.

The maximum snow water equivalent was at the end of March. I would estimate the value was 225 kg/m2.

3) When was the final spring snowmelt? Make an estimate of which the month has the last snow of 1980.

The final spring snowmelt didn't occur until June! I can tell because this is when the snow water equivalent drops to zero for the summer.

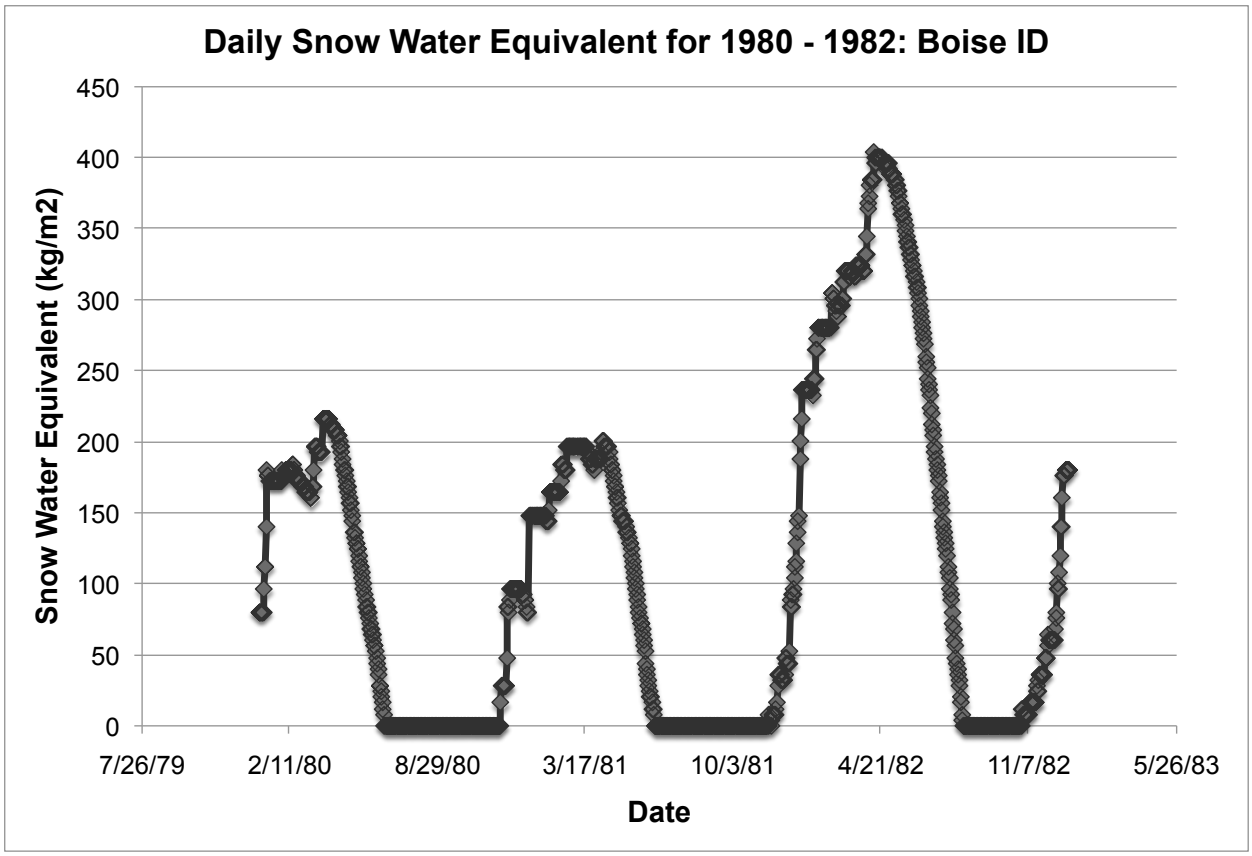
4) How would you describe the overall snow water equivalent pattern for 1980?

The overall pattern has two peaks: one from January to June, then it falls to zero until the second peak in December.

5) Make a prediction: do you think the overall snow water equivalent pattern is similar or different from year to year? (i.e. will the snow in 1981 look the same as the snow in 1980?).

I think that each year, the snow will follow the same pattern, but the values for the highest point and when the snow melts in the spring might be different.

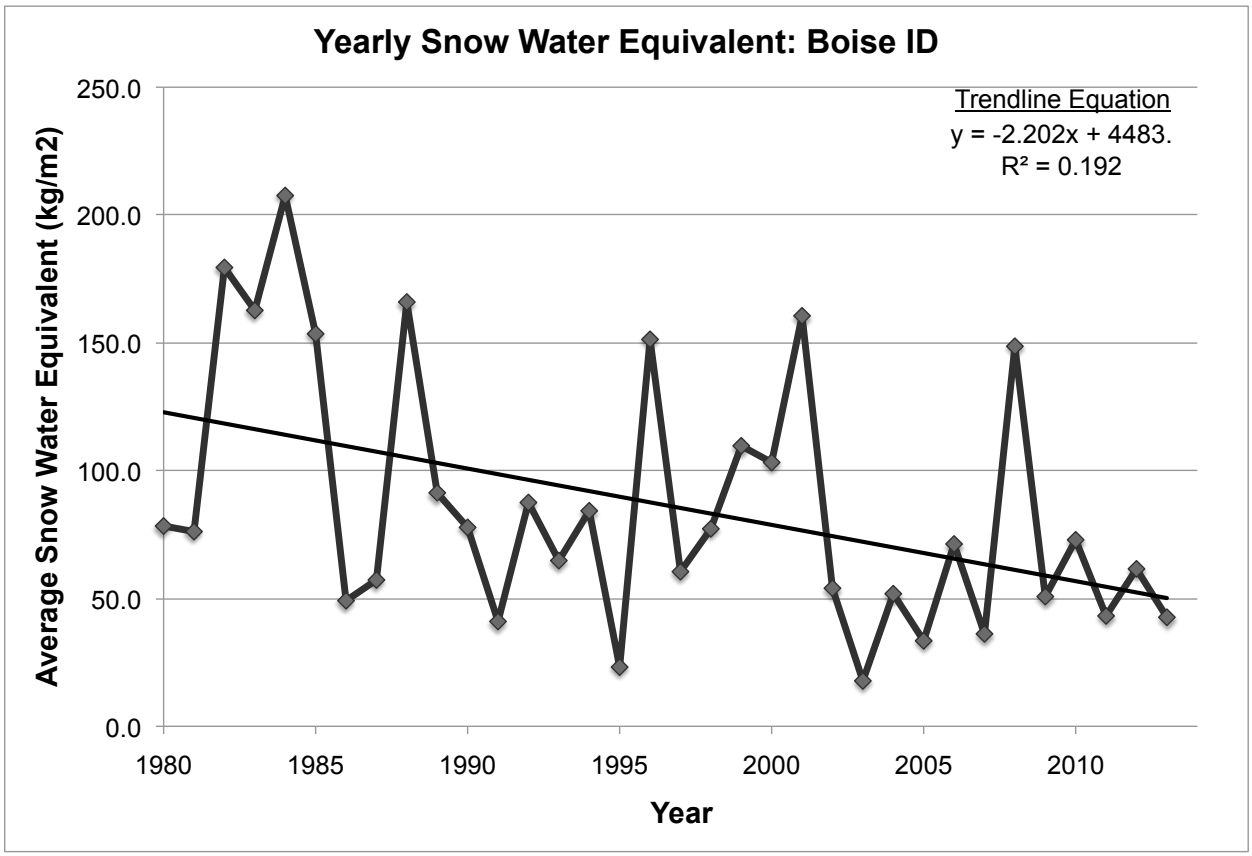
6) Now look at a graph of 3 years of snow water equivalent data.



7) Do the data support your prediction? Explain using data from the graph.

The data did support my prediction. Each year had a peak at the beginning and end. However, the highs and lows each year are very different. For example, the highest snow water equivalent is in 1982, at 400 kg/m2, much higher than the 200 kg/m2 in 1982.

8) Will these weather patterns remain the same over time? One way to find out is to display the yearly averages (the daily weather data averaged over each year), which illustrates how the climate in an area may be changing over time. By averaging the daily weather data, an entire year's worth of daily weather data is summarized with a single number. On the next page is a graph of the yearly average temperature from 1980 to 2013.



9) What is the range of yearly average snow depth from 1980 to 2013?

The average snow depth ranges from about 2 km/m2 to 210 km/m2.

10) Using the trendline to help you, do you observe a trend in snow depth over time? Is the snow increasing, decreasing or remaining the same? Support your response with specific evidence displayed in the graph. (*A **trendline** is the line showing the general direction of the data, its equation is displayed on the graph*).

The snow water equivalent is decreasing over time. I can tell because the slope of the line is negative, with a value of -2.202 (R^2 = 0.192).

11) Make a prediction: Do you expect this trend to continue over time? How might the climate change in this area in 100 years? Provide some evidence that supports your prediction.

I think that the trend will continue over time. I expect that by the end of the century, the snow water equivalent will have decreased significantly because of increasing greenhouse gas levels in the atmosphere. In 100 years, the average yearly snow depth might still change year to year, but it might be mostly below 100 km/m2.

12) Ask a question: What questions do you have about weather and/or climate following an initial exploration of one site?

Will the average snow depth continue to decrease over time with climate change?