



## Flooded: Using Data to Understand a Changing Lake Superior

### Overview:

Did you wake up in July of 2016 during a thunderstorm and the next morning see images of flooded Wisconsin rivers in the news? Floods like these could have a big impact on the Lake Superior of the future. Take a look at play-by-play data from the National Oceanic and Atmospheric Administration, National Park Service and US Geological Survey to help you and your students make sense of big picture impacts to our watershed and our communities.

Students will use different weather related data sets from the South Shore region in order to answer questions about the relationship between Lake Superior and the land and people surrounding it.

This data was shared by Dr. Brenda LaFrancois, an aquatic ecologist with the National Parks Service in Ashland WI. Dr. LaFrancois is studying the impact of sediment plumes from the St. Louis River in Duluth/Superior and Whittlesey Creek and Bad River near Ashland WI on the Apostle Islands. She hypothesizes that areas of high nutrients and low dissolved oxygen sometimes found in the Apostle Islands National Lake Shore could worsen if severe storms increase in frequency. This differs from the popular perception of Lake Superior as “clean, clear and cold.” What does the data show you?

### Subject Areas:

Science, Math, Social Science

### Grade Levels:

6-8, 9-12

### Topics:

Earth Science/Geology, Water, Weather, Climate

## Great Lakes Literacy Principles:

2. Natural forces formed the Great Lakes; the lakes continue to shape the features of their watershed.
3. The Great Lakes influence local and regional weather and climate.
6. The Great Lakes and humans in their watersheds are inextricably interconnected.

## Materials:

3 Weather related data sets from the South Shore region

- Streamflow (US Geological Survey Stream Gauges)
- General Weather (National Weather Service)
- Satellite Imagery (National Park Service/NOAA)

## Procedure:

1. This is a jigsaw activity. Begin by dividing your class into three groups (or make two copies of each data set for 6 groups). Each group will analyze and discuss a different data set.
2. Pass out the data sets to their respective groups. Provide multiple copies so that they do not have to crowd around one copy of the data.
3. With their data sets in hand, provide them with some questions to consider while they look at the data sets. Give the students 20 minutes to discuss the data and these questions before calling the class back together. You may use the following example questions to spur discussion or the worksheets below.

*Some example questions are:*

- a. What patterns do you observe?
  - b. Are those patterns related in some way?
  - c. What do the changes in the graph mean for the area surrounding the data collection points?
  - d. What influence might those changes have on Lake Superior?
  - e. Are these changes related in any way to climate change?
  - f. What effect has climate change had that may have influenced this weather event?
  - g. What effect might climate change have in the future on weather events of this kind?
  - h. What influence might a weather event like this have on the people in the region?
  - i. What influence might a weather event like this have on local businesses?
4. After the 20 minutes is complete, call the class back together and assign one or two students from each group to “jigsaw” and form a new group. The new groups should share their data with one guiding question: How are these data sets related? Give them 20 minutes to discuss their data.

5. After 20 minutes bring the group back together as a whole and ask them to explain what they found out.
6. Share “Table 1. Scientific confidence that climate change has already impacted common Minnesota weather/climate hazards” and “Table 2. Scientific confidence that climate change will impact common Minnesota weather/climate hazards beyond 2025”. Ask them to specifically notice rainfall patterns on each table.
7. Then direct the discussion using the following two questions:
  - a. What is the influence of the land (and human uses of it) on Lake Superior?
  - b. As climate changes, how might these influences changes?
  - c. What influence will this have on local farm land?
  - d. What influence will this have on local infrastructure and local tax spending?
8. The above questions do not have clear answers but are merely discussion prompts to get your students thinking about what is happening around them.
9. This lesson is science and data based, but is adaptable to a variety of subject matter. This is achieved by altering the questions you ask the students.

**Additional Materials:** As an introduction, you may share one or both of these videos about the 2016 floods:

Newscast about the flooding: <https://youtu.be/XRfvws1LuMI>

Flooding on the Bad River Reservation: <https://youtu.be/hgVLENz97zw>

This is a story about flooding along Denomie Creek on the Bad River Reservation on July 11-12, 2016 shot by teenage participants of Tribal Youth Media. The video was shot by 16-year-old Zach Oja and reported by 14-year-old Donovan O'Claire.