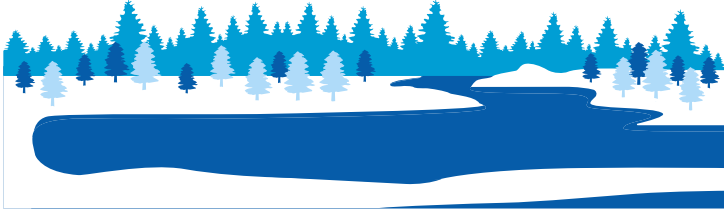


ACTIVITY 4: INVESTIGATING LAKE SUPERIOR ALGAL BLOOMS



The purpose of this activity is for students to understand the conditions that lead to harmful algal blooms and their impacts on aquatic ecosystems and human health.

Materials:

- Clear plastic bottles
- Water
- Fertilizer (such as plant food or liquid fertilizer)
- Algae samples (available from an aquarium store)
- Light source (e.g., desk lamps or sunlight)
- Measuring spoons or syringes (for precise fertilizer amounts)
- Labels and markers (for identifying bottles)

First, inform students that they will be investigating how algal blooms form in an aquatic ecosystem and have been newly observed as of late in Lake Superior where they were never before seen. If students are unfamiliar with the concept of eutrophication or how algal blooms happen in a lake, review the concept, especially as it relates to the warming water temperatures in Lake Superior, or check out [Lesson 1028](#) which focuses on it.

Next, have them partner up with someone for the lab, and begin setup by doing the following:

- Label each clear plastic bottle with a unique identifier (e.g., Bottle 1, Bottle 2, etc.)
- Fill each bottle with an equal amount of water, leaving some space at the top.
- Add different amounts of fertilizer to each bottle. For example:
 - Bottle 1: No fertilizer (control)
 - Bottle 2: 1 teaspoon of fertilizer
 - Bottle 3: 2 teaspoons of fertilizer
 - Bottle 4: 3 teaspoons of fertilizer
- Add a small amount of algae sample to each bottle. If using green food coloring, add the same amount to each bottle.

- Place all bottles under a consistent light source. Ensure they receive equal light exposure by arranging them uniformly.
- Over the course of a week, observe the bottles daily. Record any changes in water color, clarity, and the presence of algae growth.
- Take notes and photos daily to document differences and changes between bottles.
- Summarize findings at the end of one week using charts, tables, or graphs.
- As an extension you can have one set of trials for this experiment where you heat the water each day and see how it compares with the trials that only use room temperature water.

Then, have students discuss with one another, based on their data, what happened in the different bottles with the algae and different amounts of fertilizer. If you did a trial with heating the water each day, introduce that data some time after the discussion has already started about the regular trials, and have students discuss how that affects the mental model they were developing based on the data.

Last, discuss with students specific examples of algal blooms (like Lake Erie) that happen often and contrast that with those now starting to be observed in Lake Superior. Ensure that they understand that one contributing factor is warmer temperatures—both in the lake water and the atmosphere—because warmer weather means more rain/storms. More precipitation contributes to more runoff, which can fuel the algal blooms like adding the fertilizer to the bottles in the experiment. Additionally, warmer waters mean better conditions for algal growth.

Extend the discussion by having students create a process diagram or flow chart that explains how the algal blooms come about in a lake and how the warmer temperatures can contribute to them happening in Lake Superior.

****Teaching Tip: Set this up and test this experiment out ahead of time, possibly even recording a video of your set up steps to use if you teach more than one class in a day.***