



## Swamp Lake

# Influence of Environment and Genetics on Algal Blooms

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<b>Grade Level</b>	6th – 8th Grade	<b>Time Frame</b>	3-4 class period(s)
<b>Subject</b>	Science	<b>Duration</b>	130 minutes

## Essential Question

What are the environmental and genetic factors that influence the growth of algae?

## Summary

Students will develop a greater understanding of local environmental conditions that affects bodies of water. Students will recognize the various breeds and sizes of algae noticing their unique characteristics.

## Snapshot

### Engage:

Students will make observations and ask questions about, and relate to past experiences to images of various algae in multiple environments.

### Explore:

Students will collect relevant information addressing the identification of algae and the cause and effect of algal blooms.

### Explain:

Working in pairs, students will examine a false statement, then using evidence from research and prior knowledge rewrite it as a true statement.

### Extend:

Students will extend their knowledge of how environmental and genetic factors influence the growth of algae and self-assess their learning so far.

### Evaluate:

Students will actively participate in the Socratic seminar discussing the identification of algal bloom, environmental factors and genetic factors that influence the growth of algae.

## Standards

*Next Generation Science Standards (Grades 6, 7, 8)*

**MS-LS1-5:** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

*Oklahoma Academic Standards (8th Grade)*

**8.LS1.5 :** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

**8.LS1.5.1:** Genetic factors, as well as local conditions, affect the growth of the adult plant.

## Materials

- device with internet access

10 minutes

## Engage

Assign students to small groups of 2-4 and provide one of the images found on **slides 4-12** to each group. Students with access to a device can view the image directly from the slide and complete the activity with group members using a shared doc. Alternatively, set up the images around the room (on devices or as physical copies) and have students explore them in a [Gallery Walk](#).

Instruct students that they will have 5 minutes to complete an "I Notice, I Wonder, It Reminds Me Of..." for their image.

### **I Notice, I Wonder, It Reminds Me Of**

This strategy is an extension of "[I Notice, I Wonder](#)," in which students make observations, ask questions, and make a personal connection to the topic, image, etc. being observed. The strategy supports students to develop a mindset of curiosity while directly engaging with the phenomenon and provides an opportunity for formative assessment. For more instructional detail, use slides 2-4.

Review the images as a class, allowing students to discuss their answers. Avoid giving feedback or correcting any possible misconceptions at this time.

30 minutes

## Explore

As a class, watch and discuss the video [Harmful Algal Blooms Pollute US Lakes](#). Go to slide 15. Students will revisit I notice, I wonder, It reminds me of strategy using a picture of Lake Erie. Consider using a digital tool like Padlet to collect student ideas. Instruct students they will have 5 minutes to visit the Padlet message board to complete this activity. For more support, go to slide 16 for an example for an I notice, I wonder, It reminds me of example using picture lake Erie.

Give students the **Explore Research Handout**. Allow students 15 minutes to research and instruct them to cite their sources for each piece of information collected during their research. During their exploration, students will be answering the following questions:

1. What environmental and genetic factors cause algae to grow?
2. What is algal bloom?
3. What are the local effects of algal bloom?

Have students generate a list of examples of environmental and genetic factors that could potentially cause algal bloom.

### Teacher's Note: Formative Assessment

Answers to the research questions represent an opportunity to formatively assess students' understanding of the phenomenon. Encourage students to discuss their answers with the table partner. Listen and provide feedback when necessary. Student answers should include, but not limited to the following:

- Algal blooms are dense layers of tiny green plants that occur on the surface of lakes and other bodies of water.
- Environmental factors influencing growth include agriculture runoff in freshwater, phytoplankton population, available nutrients, temperature, sunlight, and ecosystem disturbance influence growth of algae.
- Genetic factors influencing growth include the specific species identity and typical sizes of algae.
- Local effects of algal bloom can reduce populations of a variety of aquatic life and become toxic to wildlife and humans.

20 minutes

## Explain

Go to slide 20. Read the statement. Ask students if they believe it is a true or false statement. Once students have identified the statement as false, tell them our job is to make it right. As a class, discuss why students think the statement is false. Ask a volunteer to rewrite the true statement on the board.

Slide 20 statement is false. Algal bloom occurs when phytoplankton grows quickly in large quantities.

Go to slide 21. Read the information about how phytoplankton and algal bloom relate as a whole class discussion. Allow students to further discuss how genetic and environmental factors produce algal bloom. During the discussion, pass out a make it right statement to each pair of students prompting them to begin the next assignment.

To prepare for the activity, the teacher should print and cut Make It Right Statements for students working in pairs.

Instruct students to read the false statement with a partner. Using prior knowledge and research, determine why the statement is false. Rewrite it as a true statement and respond to the listed prompt below.

## Extend

Split the pairs. Reassign groups of four so each student has their own individual statement. Instruct students to discuss their statements with the group. Go to slide 23. Working in groups of four, students will use the prompts to categorize each statement into identification (what is algal bloom), genetic factors, environmental factors, or local effects of algal bloom. When students finish the group work, instruct each student to further research additional factors and effects of algal bloom on their own.

This step is designed to help students prepare for the socratic seminar. Students should have at least 2 constructed responses for each question listed on slide 23.

Go to slide 24. Students will now self-assess their ability to construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of algae.

Student's self-assessment represents an opportunity to formatively assess their understanding of the phenomenon. Ask students to grade themselves based on the learning goal. Listen and provide feedback when necessary.

40 minutes

## Evaluate

### Socratic Seminar

The purpose of this activity is for students to work together to deepen their understanding of the phenomenon by addressing the essential question, "What are the environmental and genetic factors that influence the growth of algae?" While facilitating, the teacher should evaluate students' understanding. See [this link](#) and the **Socratic Seminar Facilitation Guide** handout for additional information.

### Preparation

Before beginning the Socratic seminar consider and plan for classroom environment, establish expectations and roles with students. For more detail, use this link.

During the Socratic seminar, you may need to support students by encouraging some to contribute. Once students have practiced this enough, students should take on the leader role. Provide students with sentence starters during the Socratic seminar.

Provide students with a score card to keep track of when, what, and how they contributed to the discussion. Have students sit in a circle or any other arrangement that allows them all to face one another. Each student should have a note sheet to record speaking notes, questions, and answers. Allow students the space and opportunity to contribute a number of times during the discussion.

For the teacher evaluation, consider recording the Socratic seminars. By doing this you will be able to contribute in the conversation rather than assessing students during the conversation. Consider two stars and a wish for student feedback

### Evaluate

This material is based on work supported by the National Science Foundation under Grant No. 1634630. Any opinions, findings, and conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

## Resources

- Wright, W. E. (2010). Foundations for Teaching English Language Learners: Research, Theory, Policy, and Practice. Caslon Inc. Pages 158-159
- Harmful algal blooms pollute US Lakes <https://www.youtube.com/watch?v=LqXKWT9cyOk>