

Overview:

In this lesson, students investigate the effects of saltwater on plants that grow in a freshwater habitat, then apply this to the presence of ghost forests.

Targeted Alaska Grade Level Expectations:

Science

- [3] SA1.2 The student demonstrates an understanding of the processes of science by observing and describing the student's own world to answer simple questions.
- [4] SA1.2 The student demonstrates an understanding of the processes of science by observing, measuring, and collecting data from explorations and using this information to classify, predict, and communicate.
- [4] SA2.1 The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by supporting the student's own ideas with observations and peer review.
- [3] SA3.1 The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by observing local conditions that determine which plants and/or animals survive.
- [4] SA3.1 The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by identifying the local limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive.
- [4] SC2.2 The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by describing the basic characteristics and requirements of living things.
- [4] SC3.1 The student demonstrates an understanding that all organisms are linked to each other and their physical environments through the transfer and transformation of matter and energy by identifying examples of living and non-living things and the relationship between them (e.g., living things need water, herbivores need plants).

Writing

- [K] 1.2.1 The student writes for a variety of purposes and audiences by writing to express ideas for self and others (e.g., using drawings, symbols, letters, words, sentences)
- [1] 1.2.1 The student writes for a variety of purposes and audiences by writing thought or ideas to communicate with specific audiences (e.g., cards, letters, notes, lists)
- [2] 1.2.1 The student writes for a variety of purposes and audiences by producing a variety of written forms for specific audiences (e.g., stories, reports, letters, journal entries)
- [3] 1.2.1 The student writes for a variety of purposes and audiences by choosing the appropriate organizational structure to match a purpose and audience (e.g., letters and notes, recounts, stories, and poems) (L)
- [4] 2.2.2 The student writes for a variety of purposes and audiences by writing in a variety of nonfiction forms using appropriate information and structure (i.e., personal letters, recounts, descriptions or observations)

Objectives:

The student will:

- identify areas of freshwater and saltwater habitats;
- predict and observe the effects of saltwater on freshwater plants; and
- make an inference about how ghost forests form.

Materials:

- Clear plastic cups
- Radish or grass seed
- Paper towels or soil
- Water
- ½ cup salt
- Two spray bottles
- Colored Pencils or Markers
- STUDENT WORKSHEET: “Ghost Forest”
- STUDENT WORKSHEET: “Plant Journal”

Whole Picture:

Ghost forests are signs that the land has dropped, or subsided, in an area. When earthquakes cause the land to subside along a coastal area, the saltwater of the tides comes into contact with trees, consequently killing them. Because soils contain salt, soils saturated with seawater will contain more salt than regular soil. Once green and lush forests turn into stands of dead trees.

Activity Preparation:

1. Distribute two paper cups to each student. Label cups with students’ names. Fill with soil or white paper towels. Add seeds. Care for plants until they are grown.
2. Prepare a spray bottle of salt water (1/2 cup salt + 2 cups water) and a spray bottle of fresh water.

Activity Procedure:

1. Distribute the STUDENT WORKSHEET: “Ghost Forest.” As a pre-assessment, write the words “Ghost Forest” on the board and ask students to draw and/or write what they think a ghost forest is. Ask volunteers to share their drawings with the class.
2. Explain ghost forests are related to water. For grades 3-4, discuss the locations of freshwater sources and saltwater sources (oceans). Use a world map to point out bodies of water.

Critical Thinking: Think-Pair-Share. Pose a question: What do plants and trees need to grow? Ask students to think of an answer, then share their ideas with a partner. Call on some students to share their group’s ideas. Students may respond that plants need water, sunlight, and food. Repeat the process with another question: How do plants get the water they need? (Plants get water through their roots.)

3. Point to areas on a map and ask students to consider what kind of habitat a plant lives in (fresh or saltwater), i.e., if pointing to land areas and inland water ways, students should show understanding that plants live in fresh water habitat. If pointing to ocean environments, students should show understanding that plants live in saltwater habitats.
4. Display the two spray bottles, salt water and fresh water. Explain that students will do a scientific investigation like scientists do. They will study what saltwater will do to plants that are normally in freshwater habitats.
6. Distribute two plant cups, a marker, and the STUDENT WORKSHEET: “Plant Journal” to each student. Guide students through the worksheet and explain the meaning of the vocabulary words (prediction, procedure, observation, conclusion). Demonstrate that students should saturate each cup whenever they water. For younger students, drawings will be more appropriate for the prediction and

observations. For older students, insist on including writing with any sketches. Continue the process over several days. Discuss student results.

7. Display the VISUAL AID: "Ghost Forest." Ask students what they think happened to the trees.
8. Explain the trees normally live in a freshwater habitat. In some areas, when there is an earthquake, the land level drops. So, ocean water can cover areas that were freshwater habitats. The saltwater kills the trees. These are called ghost forests. Over a long period of time the land under these forests starts coming up again.
9. Return to the STUDENT WORKSHEET: "Ghost Forest." Ask students to complete the worksheet. Insist that older students, grades 3-4, show understanding of how ghost forests form.

Extension Idea:

- If a ghost forest is nearby, go on a fieldtrip to see it.
- At the time of planting, use tools like magnifying glasses to examine the parts of the plant as they grow to address Alaska science GLE [4] SC 2.1 and [3] SC2.2. The following children's books apply:
Jordan, H. J., & Krupinski, L. (1992). *How a seed grows*. Let's-read-and-find-out science book. New York: HarperCollins.
Cole, H. (1997). *Jack's garden*. New York: Mulberry Books.

Answers:

STUDENT WORKSHEET: "Ghost Forest"

1. Answers will vary.
2. Student depictions should more accurately depict ghost forests with stands of dead trees. For grades 3-4, students should show understanding of how ghost forests form.

STUDENT WORKSHEET: "Plant Journal"

Prediction: Answers will vary.

Observations: Drawings/writing should show that the plant with saltwater wilted or died and the plant with the freshwater lived.

Conclusion:

1. Answers will vary.
2. Answer should reflect that the plant's health was poor or it died as a result of the saltwater.

Name: _____

Ghost Forest

Student Worksheet



At first, I think a ghost forest is...

Now I know that a ghost forest is....

Name: _____

Plant Journal

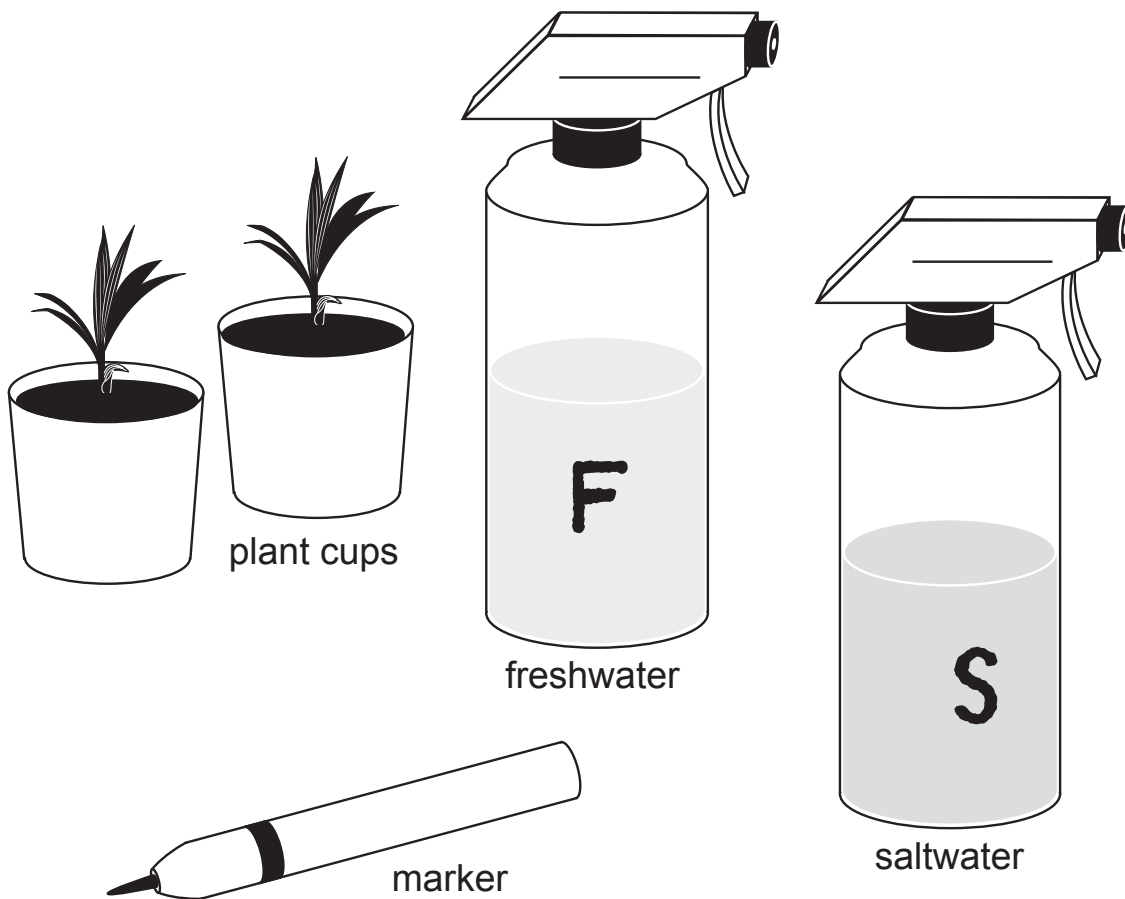
Student Worksheet (1 of 4)



Prediction:

If I add saltwater to my plant, this will happen:

You will need:



Name: _____

Plant Journal

Student Worksheet (2 of 4)





Procedure:

1. Write "F" on one cup.
2. Write "S" on one cup.
3. Water the cup with the "F" with freshwater each day.
4. Water the cup with the "S" with saltwater each day.
5. Write and draw your observations in the boxes below the next day.

Observations:

Date: _____

Name: _____



Plant Journal

Student Worksheet (3 of 4)





Observations:

Date: _____

Observations:

Date: _____

Name: _____

Plant Journal

Student Worksheet (4 of 4)

Conclusion:

1. Did your observations match your prediction? _____

2. If a freshwater plant gets salt water, then _____

_____.