

## 1.5.2 Primary Producers and the Food Chain

### Overview

Although often microscopic, algae are organisms that can capture the sun's energy and use this light energy to produce organic compounds through the process of photosynthesis. This transformation forms the basis of any food web because these primary producers create carbohydrates using sunlight, carbon dioxide and water. The proteins, lipids, and starches that the primary producers build and store in their cells provide food for consumers. Consumers in different parts of the food web rely on these tiny primary producers for survival.

### Learning Objectives

- Primary producers use the process of photosynthesis to create organic compounds that they use or store.
- Primary producers like algae form the basis of any food chain.
- Consumers rely on primary producers like algae for survival because they cannot produce their own food.

### Student Activity: Primary Producers and the Food Chain

#### Materials

Access to the Internet

3 x 5 notecards

String

Tape

#### Advance Preparation

Read Section 1.5: Life in the Ocean: Plants and Algae.

Divide into teams of roughly equal numbers of students.

Prepare seven notecards, each with the name of one of the following organisms: algae, birds, fish, blue whale, seal, killer whale, and krill.

#### Process and Procedures

1. Gather in your teams and have each team select at random one of the seven prepared cards. This is the organism on which your team will become an expert.
2. Use the Internet (valid and credible sites) and/or your school library to learn about the ecology of your organism. Be sure that each student in your team is ready to discuss the following with other teams:
  - Where does your organism live? What is the general range and habitat of your organism?
  - What does your organism eat?

- What eats your organism?
3. Print or draw a picture of your organism to share with the class. Have one member of the team be responsible for retaining the picture until needed.
  4. Gather together as a class and rearrange into new teams so that each team has at least one member that is an expert on each of the organisms. This cooperative learning strategy is called a jigsaw. Each expert in the new jigsaw team is essential to the completion of the next task.
  5. Share your expertise with your new jigsaw team. Answer the following questions:
    - Where might all of the organisms live together in one location?
    - How are the organisms related? Predator/prey? Symbiotic? Competitive?
  6. Once the teams have had time to share information about the organisms and make connections, gather again as a whole class. Share some of each jigsaw team's thoughts.
  7. As a class, answer the following questions: What would a food chain look like among these seven organisms? Would a food web be a better representation? Why or why not?
  8. Using the pictures of organisms retained by select students, the string, and the tape, make a classroom-sized food chain/web that illustrates the feeding levels of all the organisms. Spread yourselves among all of the organism points in your chain/web so you can see the whole thing.
  9. Take a look at the food chain/web you created. What would happen if changes occurred in the population of any of the organisms? What connections would suffer? Do changes in the population of apex predators cause as much disruption as those in the population of primary producers? Discuss the following scenarios to help you answer these questions:
    - Killer whales are hunted to extinction.
    - An oil spill grounds seabirds that cannot fly because of oil on their feathers.
    - Volcanic ash from an eruption slows down the growth of algae to one-quarter of its usual growth.

### Assessment

Describe the importance of primary producers to the entire food web of the ocean. Use specific examples from your class activity and information you gained in your jigsaw teams.

## Expected Outcomes

### **What's the take-away?**

Primary producers create organic compounds that they use or store, which puts them at the base of any food chain. Consumers (such as birds, fish, blue whale, seal, killer whale, krill) rely on producers (such as algae) for survival because they cannot make their own food. Organisms are connected; they rely on each other for survival.

### **What does the student work product look like?**

#### Work product #1: Group Research

Student groups should collect and organize data about their assigned organism. Students should take sufficient notes that will allow them to make an informative presentation to their peers. Students will include a drawing or an image in their presentations.

During conversations, students should share information about their organisms and make connections between them.

#### Work product #2: Whole Group Foodweb

Holding the picture of their organisms, representatives from each of the seven groups will stand and physically arrange themselves into a food web, using the string to represent the connections.

Students should discuss the role each organism plays in the chain and how the organisms depend on each other for survival. Student conversations should specifically include the significance of the algae as the only producer in the chain.

#### Assessment

Each student should create a written response that supports their assertions with evidence. Look for student responses to use information learned during the activity as their evidence.