

# Marine Food Web Simulation

*A simulation of the dynamics of food webs and predator/prey relationships in the marine environment*

by John Ogletree

**Grade levels:** 4-6

**Subject areas:** art, science

**Key concepts:** primary producers, predators, prey, food chain, marine food web

**Skills:** listening, observing, cooperating as a group

**Location:** indoors or outdoors

**Time:** 5-8 minutes per round

**Materials:** flipchart paper, index cards, drawings or photographs of marine organisms, glue, 2 metal cans, 2 small stones, 2 wooden sticks, stopwatch or watch with a second hand



Plants, with their ability to transform the sun's energy into food through photosynthesis, are called the primary producers of our global ecosystems; and microscopic plants called phytoplankton

that drift near the surface of the oceans account for more productivity than all the plants on land. The transfer of food energy from a plant source through a succession of animals eating and being eaten is called a food chain. Food chains are in turn linked together in a complex interlocking pattern called a food web.

In this activity, students play the roles of marine organisms in a food web, and must find food while avoiding being eaten by their predators. For the purposes of the game, the web example is greatly simplified, with no reference to decomposers, zooplankton, or many other groups of marine organisms. As the students learn more about the marine environment they may wish to play the game using different species.

## Outcomes:

It is expected that students will:

- ⓐ recognize the importance of marine food producers
- ⓑ recognize seven to eight individual marine organisms
- ⓒ identify three or four food chains in the marine food web

## Preparation:

1. Prepare a set of food web I.D. cards according to the numbers of organisms shown on the "Food Web Organisms" chart (see next page). The organisms listed correspond to those in the food web example given, and the numbers are for a group of 22 students. Add organisms (and cards) as needed to ensure that each student will have one card. In addition, make extra phytoplankton cards for use as described in Step 6 below.

To make the cards, glue photos or drawings of the organisms on card stock. (Wall calendars having a marine theme are an excellent source of photos.) Alternatively, have students research the marine organisms and make drawings of them on cards as a means of learning the characteristics of these organisms. If possible, laminate the cards.

2. On a large sheet of paper or chalkboard, draw the food web (see "Marine Food Web," next page).

3. On a large sheet of paper or chalkboard, list the organisms and their identifying sounds, as shown on the "Food Web Organisms" chart.

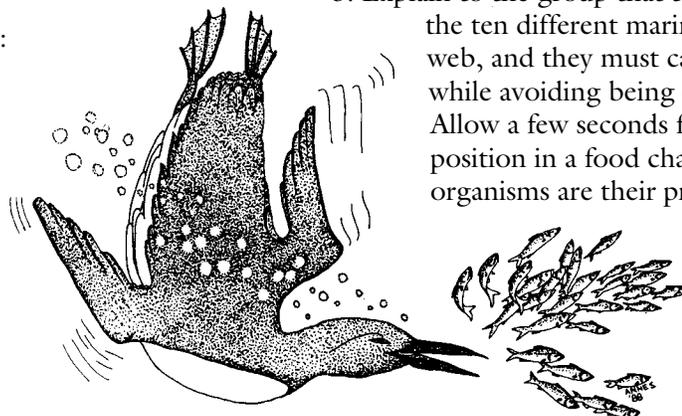
## Procedure:

1. Introduce the "Marine Food Web" chart and discuss the concepts of food chains and food webs. Ask students to identify the various food chains in the web (e.g., algae → periwinkle → dogwinkle → crab → human). As each food chain is discussed, show the cards depicting those organisms so that students become familiar with all of the members of the web.

2. Outline an area with boundaries to represent an area of the ocean. Assign a marine organism to each student by handing out the food web cards.

3. Explain to the group that together they represent the ten different marine organisms in the food web, and they must catch food for themselves while avoiding being eaten by a predator. Allow a few seconds for students to find their position in a food chain and review which organisms are their prey and predators.

4. To begin the game, ask students to move slowly around the "ocean," holding their cards in front of them



so that they are visible. Explain that, to catch their prey, predators must touch the card of the prey organism. If a prey organism is caught, it has been eaten and must leave the game (go outside the boundary). Begin timing the round.

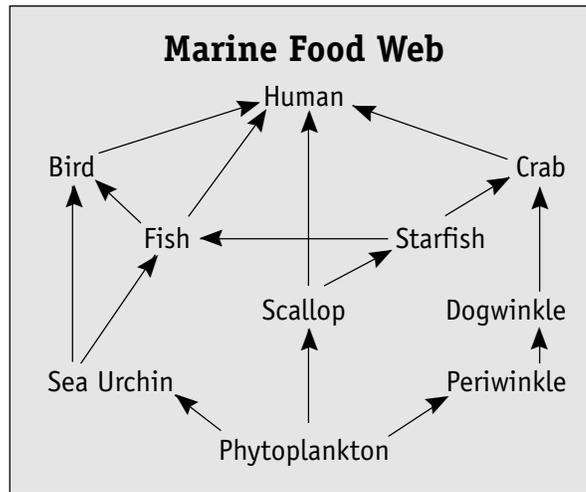
5. Continue the round until all of the prey have been consumed. Record the time.

6. Discuss the round and how quickly prey organisms were eaten. Ask students how the simulation might be changed so that more prey are available and the food web can be sustained for a longer period of time. Then incorporate some of their ideas in ensuing rounds of the game. Variations might include the following:

- ⊗ Simulate reproduction and/or the migration of animals into that area of the ocean by allowing some of the captured prey organisms to return to the game following a “death interval.”
- ⊗ Change the composition of the food web so that as many as four-fifths of the prey organisms return as phytoplankton (additional phytoplankton cards are needed for this variation).

Collect and redistribute the cards between each round so that students have the opportunity to play the roles of different organisms. Continue timing the rounds.

7. After several rounds, introduce a twist: explain that the object of the game will remain the same, but the only way the players will be able to identify their predators and/or prey is by the unique sounds they make. Introduce the “Food Web Organisms” chart and, as a group, practice making the sounds described. Alternatively, invite students to suggest sounds for each organism, and record these on a chart. The important thing is that each organism has a unique sound and that the group agrees on how these sounds are produced so that everyone will be able to recognize them.



*Note:* In lower grades, the simulation is easier to run using only visual identification of animals. For older students, the sound identification is a good representation of the importance, for some marine animals, of having a highly developed sense of hearing.

8. After handing out the food web cards, give students a few seconds to review which organisms are their prey and predators and the sounds

these organisms make. Then ask them to keep their cards out of view as they move slowly around the ocean, making their identifying sounds and listening for the sounds of the organisms they feed on. To catch their prey, predators must touch the prey organism and show their own card as “predator I.D.”

9. Graph the times of all of the rounds and conclude by discussing the factors that helped to sustain the food web the longest (e.g., migration, reproduction, increasing the number of primary producers or of other organisms at the lower ends of food chains).

**Extensions:**

- ⊗ Discuss how an oil spill, toxic chemical, or other human interference might affect the food web.
- ⊗ Adapt the activity to another ecosystem under investigation. ✳

*This activity was designed by Cheryl Rowatt and modified by John Ogletree, professor of Education at the University of Western Ontario in London, Ontario.*

Food Web Organisms		
Organism	Number	Identifying sound
Phytoplankton	4	Say “photosynthesis” or “making food”
Periwinkle	3	Say “graze, graze”
Sea urchin	3	Say “spiny-spiny”
Scallop	3	Say “squirt, squirt”
Dogwinkle	2	Rotate stones in can (drilling sound)
Starfish	2	Say “yum-yum”
Fish	2	Hum
Bird	1	Whistle
Crab	1	Snap fingers (claws) or strike sticks
Human	1	Remain quiet