



FOOD CHAINS AND FOOD WEBS

Food Chains

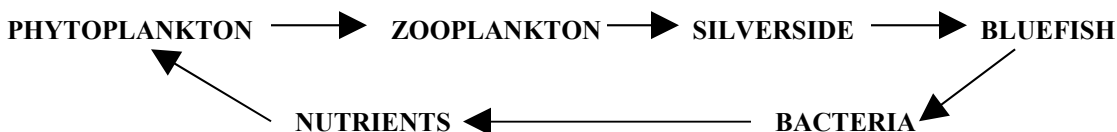
All living organisms (plants and animals) must eat some type of food for survival. Plants make their own food through a process called **photosynthesis**. Using the energy from the sun, water and carbon dioxide from the atmosphere and nutrients, they chemically make their own food. Since they make or produce their own food they are called **producers**.

Organisms which do not create their own food must eat either plants or animals. They are called **consumers**. Some animals get their energy from eating plants while other animals get energy indirectly from plants by eating other animals that already ate the plants.

Animals that eat only plants are called **herbivores**. Animals that eat both plants and other animals are called **omnivores**. Animals that eat only other animals are called **carnivores**. Some animals eat only dead or decaying materials and are called **decomposers**.

In the marine food web, special producers are found. They are tiny microscopic plants called **phytoplankton**. Since the water is the home for these special tiny plants; it is also the home for tiny microscopic animals called **zooplankton**. And of course, zooplankton eat phytoplankton. Sometimes zooplankton and phytoplankton are collectively referred to as plankton.

Food chains show the relationships between producers, consumers, and decomposers, showing who eats whom with arrows. The arrows show the movement of energy through the food chain. For example, in the food chain shown below, the small fish (silverside) gets its energy by eating the plankton and the large fish (bluefish) gets its energy by eating the small fish. Finally, the bacteria eats the fish after it dies, getting its energy from the large fish. The bacteria also returns nutrients back to the environment for use by the phytoplankton.



Thus the food chain becomes a complete circle. Animals may eat more than one type of food. They may eat many different types of plants or many different animals. This makes everything more complicated and the food chain becomes a food web.

Food Webs

A **food web** is made up of interconnected food chains. Most communities include various populations of producer organisms which are eaten by any number of consumer populations. The green crab, for example, is a consumer as well as a decomposer. The



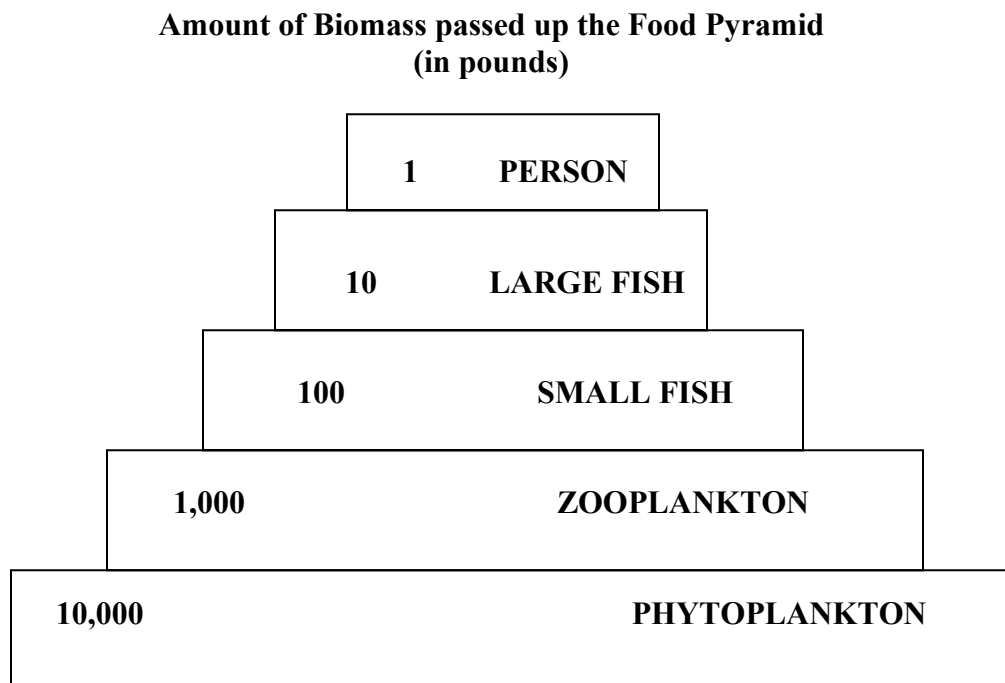
crab will eat dead things or living things if it can catch them. A secondary consumer may also eat any number of primary consumers or producers. This non-linear set of interactions which shows the complex flow of energy in nature is more easily visualized in the following diagram.

In a food web nutrients are recycled in the end by decomposers. Animals like shrimp and crabs can break the materials down to detritus. Then bacteria reduce the detritus to nutrients. Decomposers work at every level, setting free nutrients that form an essential part of the total food web.

ENERGY LOSS IN THE FOOD CHAIN AND FOOD WEB

In a food chain, energy is lost in each step of the chain in two forms: first by the organism producing heat and doing work, and second, by the food that is not completely digested or absorbed. Therefore, the food web depends on a constant supply of energy from producers and nutrients that are recycled by the decomposition of organisms.

As food is passed along the food chain, only about 10% of the energy is transferred to the next level. For example, 10% of the energy phytoplankton received from the sun can be used by zooplankton at the next level. From one level to the next about 90% of the energy used by the previous level is lost. This means that there has to be a lot more organisms at the lower levels than at the upper levels. The number of organisms at each level makes a pyramid shape and is called a food pyramid. To better understand this energy loss, it is helpful to look at a food pyramid.





Organisms at the broader base of the pyramid are greater in number than those at the top. There is, for example, a greater number of phytoplankton than zooplankton and more zooplankton than small fish, etc.



PRODUCERS, CONSUMERS AND DECOMPOSERS

OBJECTIVES:

1. Students will learn the concepts of producers, consumers, decomposers and food web.
2. Students will show that they understand the concepts by completing the following worksheet.

MATERIALS:

1. Producers, Consumers and Decomposers student worksheet
2. Diagram of marine food web
3. Producers, Consumers and Decomposers teacher answer sheet
4. Pencils

PROCEDURE:

1. Introduce or review the concepts and vocabulary for food chains and food webs.
2. Pass out the sheets for students to complete.
3. Discuss the answers.

Connections to the Massachusetts Curriculum Frameworks in Science and Technology/Engineering (May 2001)

Grades 3 - 5

Strand	Learning Standard
Life Science	11. Describe how energy derived from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers to decomposers.
Physical Science	Give examples of how energy can be transferred from one form to another.



PRODUCERS, CONSUMERS AND DECOMPOSERS

Name: _____

Date: _____

1. In each of the following lists, one organism does not belong because it eats different types of food than the other organisms in the list. Cross off the organisms that does not belong and then label the list as producers, herbivores, carnivores, omnivores, or decomposers.

List A: **Carnivore**

Green crab
Minnow
Sea bass
Algae
Herring gull

List B: **Producer**

phytoplankton
seaweed
marsh grass
ribbed mussel
eel grass

List C: **Herbivore**

Zooplankton
Canada goose
Periwinkle
Grass shrimp
Phytoplankton

List D: **Decomposer**

beach fleas
phytoplankton
bacteria

2. A producer is

3. A consumer

4. A decomposer is.



5. Using some of the organisms from questions 1, create a food web on the back of this paper.



PRODUCERS, CONSUMERS AND DECOMPOSERS

Teacher Answer Sheet

1. In each of the following lists, one organism does not belong because it eats different types of food than the other organisms in the list. Cross off the organisms that does not belong and then label the list as producers, herbivores, carnivores, omnivores, or decomposers.

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List C: **Herbivore**

Zooplankton
Canada goose
Periwinkle
Grass shrimp
~~Phytoplankton~~

List D: **Decomposer**

beach fleas
~~phytoplankton~~
bacteria

2. A producer is an organism which produces its own food through photosynthesis.
3. A consumer is an organism which does not make its own food but must get its energy from eating a plant or animal.
4. A decomposer is an organism which digests or breaks down dead plants and animals.
5. Using some of the organisms from questions 1, create a food web on the back of this paper.