

OWL HAVE TO THINK ABOUT THIS!



BENCHMARKS AND TASKS

SC.B.1.2.1 The student knows how to trace the flow of energy in a system (e.g., as in an ecosystem).

SC.B.2.2.1 The student knows that some source of energy is needed for organisms to stay alive and grow.

SC.F.1.2.2 The student knows how all animals depend on plants.

SC.G.1.2.1 The student knows ways that plants, animals, and protists interact.

SC.G.1.2.4 The student knows that some organisms decompose dead plants and animals into simple minerals and nutrients for use by living things and thereby recycle matter.

SC.G.1.2.5 The student knows that animals eat plants or other animals to acquire the energy they need for survival.

SC.G.1.2.6 The student knows that organisms are growing, dying, and decaying and that new organisms are being produced from the materials of dead organisms.

- The student describes an ecosystem as a community of living and nonliving organisms and their immediate surroundings (e.g., air, rocks, soil) driven by the sun's energy.
- The student recognizes that some source of energy is needed for all organisms to stay alive and grow.
- The student identifies the major source of energy of ecosystems as sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.
- The student categorizes populations of organisms by the function they serve in an ecosystem: plants and some microorganisms as *producers* that make their own food; animals, including humans, as *consumers*, which obtain food by eating other organisms; and *decomposers*, primarily bacteria and fungi, recyclers that break down dead plant and animal materials into elements that return to the soil, water, and air for use again.
- The student examines patterns of interdependency in ecological systems by analyzing relationships in food webs among producers, consumers, and decomposers and discovers that no matter how distant the relationship may seem, all things are connected.

KEY QUESTION

What is an owl's role in a food web?

BACKGROUND INFORMATION

Owls are birds of **prey** – raptors, or birds that kill and eat other animals. In the food web, the owl is a secondary **consumer**. The animals that owls prey upon vary with the owl's size and species, but owls eat mostly small mammals, including rabbits, squirrels, mice, rats, shrews, and voles. Owls usually swallow their prey whole. If the prey is too large, the owl can tear it into smaller pieces with its sharp, curved beak. The owl's digestive juices cannot break down the fur, feathers, teeth, or

bones that it swallows, so those indigestible materials are clumped together in the owl's stomach, compressed into pellets, and then regurgitated through the mouth 18-20 hours after feeding. A bird often produces two pellets a day.

Owl pellets usually contain all the bones of one or more prey animals the owl has eaten, making it possible to identify the prey animal and reconstruct its entire skeleton. Owl pellets can also be useful in determining the distribution of rodents in a specific area. Each pellet contains an average of 3.3 animals.

One barn owl in a single year may eat about 1500 mice. Each mouse, in turn, may eat more than 10 kg of green plants, which would amount to about 15,000 kg of plants for all the mice. The number of living things in each link of a **food chain** can be shown as an **energy pyramid** - a pyramid of numbers. The green plants form the base. This means that all animals in the links above the base depend on green plants. There are usually fewer living things in the link next to green plants than there are green plants. With each higher link in the pyramid, the number of living things tends to get smaller and the amount of available **energy** decreases. When the animal at the top dies (e.g., owl), it may become food for small scavengers, such as insects or it may become food for **protists**. Protists, such as fungi, slime molds, and bacteria, are decomposers, organisms that feed on the remains or wastes of other organisms and return the remains to the soil.

Pellets are also made by other raptors, but those made by owls tend to be the most complete. Nearly all of the pellets typically dissected in classrooms are produced by barn owls. This is because barn owls are concentrated in areas more convenient to humans. Barn owl pellets are egg-shaped masses averaging 47 mm in length by 33 mm in width.

Owl pellets themselves are **ecosystems**, providing food and shelter for **communities**, which may include clothes moths, carpet beetles, and fungi. Moth larvae are frequently abundant in pellets, feeding on fur and feathers. The black spheres about the size of periods that are found in the pellets are the droppings of the caterpillars. The larvae metamorphose near the surface of a pellet in cocoons made of the fur.

MATERIALS

Per group

1 owl pellet
toothpicks
gloves (optional)
1 sheet of white paper
1 measuring tape
1 balance and mass set

Per student

1 hand lens
Making Sense of Mystery Pellets observation sheet
1 pair of tweezers

TEACHING TIP

Although owl pellets can often be found on the ground under trees where owls roost, it is preferable to order them from a scientific company because they have been fumigated to eliminate the presence of any insects and individually wrapped for preservation. Students can safely handle these pellets.

ENGAGE

Show students an owl pellet and ask, *What do you think this is?* Record their responses but do not identify the object as an owl pellet.

Tell students they will be dissecting the objects in order to learn more about them.

EXPLORE

1. Instruct students to place the pellet down on the piece of white paper and use the hand lenses to examine it.
2. Have students find the length, width, and mass of the pellet and record this information on the observation sheet, along with coloration, and other observations.
3. Again, ask students to infer about what the mystery pellets may be. Explain that the mystery objects are owl pellets. (See Background information.)
4. Students should then use the tweezers and toothpicks to slowly pry the pellet apart, being careful to save each piece.
5. Group members should each take a piece of the pellet once it has been pried apart and separate and clean all bones, even the tiniest ones, by removing as much of the attached matter as possible. Students should clean the skulls as thoroughly as possible since these are the best bones for identifying the prey.
6. Have students group similar bones together – skulls, femurs, vertebrae, etc. Students should add this information to the observation sheet.

EXPLAIN

What are owl pellets? (Owl pellets are the undigested remains of prey ingested by an owl that are regurgitated through the mouth.)

What did you discover inside when you dissected the pellet? (fur, feathers, bones, teeth)

How many skulls or pairs of jawbones did you discover? How many prey do you think the owl had eaten?

What was the total number of pellets dissected?

What was the size and mass of the pellet you dissected?

What was the average size and mass of the pellets dissected by the whole class?

What was the total number of prey animals found in the pellets?

What was the average number of prey animals per pellet?

What kind of prey seems to be most abundant? Least abundant?

What is the role of an owl in a food web? (The owl is a raptor – a secondary consumer that eats other animals.)

What is the main source of energy in every food chain or web? (sun)

What happens when the owl at the top of the food web or energy pyramid dies? (It may become food for small scavengers, such as insects or it may become food for protists. Protists, such as fungi, slime molds, and bacteria, are decomposers, organisms that feed on the remains or wastes of other organisms and return the remains to the soil.)

Do only owls produce pellets? (Pellets are also made by other raptors.)

What important information can be obtained from owl pellets? (See Background Information)

EXTEND/APPLY

1. Discuss: *How can an owl pellet be considered an ecosystem?* (See Background Information)

2. *Encourage students to find out what animals eat owls, their eggs, and owlets.* (Students will discover that owls have few natural enemies; that is why owls are most often the last consumers in food chains. Animals that prey on owls include eagles and hawks. Snakes and weasels can climb trees and prey on owl eggs and owlets.)
3. If a barn owl produces one pellet each day, estimate how much food the owl would eat in a year.

EXTENSION

Students can place the bones of one type of prey, such as a vole, on a piece of cardstock or cardboard and try to recreate a whole skeleton. The bones should be glued in place once the skeleton is as complete as possible.

ASSESSMENT

Ask students to create a food web using some of the following components: owl, weasel, mole, shrew, rat, songbird, salamander, slug, mouse, caterpillar, centipede, snail, vole, earthworm, green plants, and sun.

MAKING SENSE OF MYSTERY PELLETS



Trace around the pellet and color it.

	YOUR PELLETT	CLASS AVERAGE
MASS		
LENGTH		
WIDTH		
OTHER OBSERVATIONS		

	YOUR PELLETT TOTAL	CLASS TOTAL	CLASS AVERAGE
NUMBER OF SKULLS FOUND			
NUMBER OF PAIRS OF JAWBONES FOUND			