

6th Grade Owl Pellet Dissection

Objective:

Students will learn the flow of energy through an ecosystem by observing the prey of an owl.

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.] Source: *Next Gen Science*

Docent Lab Guidelines:

1. Schedule a date and time with your teacher to have the students come into the lab. Allow at least 1 hour of class time. Ideally it would be better if you can get 1hr. 15 min. or 1-1/2 hrs.
 2. Input the day and time into the Science Lab Master Schedule. Please make sure you add set up and clean up time to the class time.
 3. Allow 30 minutes to set up and 30 minutes of clean up time. Allow additional time to return and display dried presentations of dissections on student work board.
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General Docent Information about the Subject Matter – For Reference

Unlike other birds, owls have no crop (a loose sac in the throat) that serve as storage for food for later consumption. Since the owl lacks this, food is passed directly into their digestive system.

The bird's stomach has two parts:

The first part is the glandular stomach or proventriculus, which produces enzymes, acids and mucus that begin the process of digestion.

The second part is the muscular stomach, or gizzard. There are no digestive glands in the gizzard, and in birds of prey, it serves as a filter, holding back insoluble items such as bones, fur, teeth, and feathers.

The soluble, or soft parts of the food are ground by muscular contractions, and allowed to pass through to the rest of the digestive system, which includes the small and large intestine. The liver and pancreas secrete digestive enzymes into the small intestine where the food is absorbed in the body. At the end of the digestive tract (after the large intestine) is the cloaca, a holding area for wastes and products from the digestive urinary systems. The cloaca opens to the outside by means of a vent. It is interesting to note that birds (apart from the ostrich) do not

have a bladder. The excretion from the vent is largely made up of an acid which is the white part of a heathy dropping.

Several hours after eating, the indigestible parts (fur, bones, teeth and feathers are still in the gizzard) are compressed into a pellet the same shape as the gizzard. This pellet travels up from the gizzard back to the proventriculus. It will remain there for up to 10 hours before being regurgitated. Because the stored pellet partially blocks the owls' digestive system, new prey cannot be swallowed until the pellet is ejected. Regurgitation often signifies that an owl is ready to eat again. When the owl eats more than one prey item within several hours, the various remains are consolidated into one pellet.

In ornithology, the pellet is the mass of undigested parts of a bird's food. The contents of a bird's pellet depend on its diet, but can include the exoskeletons of insects, indigestible plant matter, bones, fur, feathers, bills, claws and teeth. In falconry, the pellet is called a casting.

While our pellets are not identified as to owl species, the barn owl is one of the most wide-spread of all land birds. They are found on all continents (except Antarctica) and large islands and occur over the whole of Australia, including Tasmania.

The barn owl is found in virtually all habitats but much more abundantly in open woodlands, heaths, and moors than forested country. They usually roost by day in tree hollows (they are nocturnal) but have also been found in caves, wells, outbuildings and thick foliage.

Barn owls feed on voles, frogs and insects, but are economically valuable birds as they also prey on animal pests like rats, shrews, moles and mice. Not having teeth, they swallow their prey whole.

Barn owls were numerous until the late 1980's, however in recent years the population of the barn owl has diminished. This decline is attributed to a number of factors: old barns being torn down, grasslands, reverting to woods or farmland being gobbled up by urban sprawl.

Next Generation Science Standards for this unit

Students who demonstrate understanding can:

- MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]
- MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.**[Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.]

MS-LS2-3.	<p>Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.]</p>	
MS-LS2-4.	<p>Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]</p>	
MS-LS2-5.	<p>Evaluate competing design solutions for maintaining biodiversity and ecosystem services.* [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]</p>	
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Informational Videos:

How one species affects an ecosystem: How Wolves changed Yellowstone:

<https://www.youtube.com/watch?v=ysa5OBhXz-Q>

Owl pellet dissection song: (we do not wash the remains in our lab)

<https://www.youtube.com/watch?v=FENowCc-A8M>

Experiment: Owl Pellet dissection and presentation of material found

Estimated time: 45 minutes

Materials Needed:

- owl pellets, 1 per two students
- probes, one per student
- magnifying glasses, one per student
- tweezers, one per owl pellet
- black construction paper, one per owl pellet
- white pencils for labeling displayed material
- white glue
- trays, one per owl pellet

Preparation:

- Before class starts have materials at each table group
- Display poster of Food Web, Energy Flow in an Ecosystem

Instructions:

1. Lead class discussion on the owl's role in the food web and Energy Flow as a Carnivore and a Consumer
2. Explain that they will be examining the results of a part of the day's meals for one owl.
3. Explain how the available tools are to be used.
4. Explain that they will have approximately 30 minutes to dissect and examine the contents of the pellet, then they are to arrange their specimens on the black paper, labeling with the white pencil. There are two ways to organize their displays: using the two sorting charts, they may display by type of bone or by organism. Once they decide on a system, they are to use the Elmer's glue (it will dry clear) to mount the specimens.
5. Ask teacher how she wishes students to sit (study partners, or student choice)
6. Keep an eye on the clock so that student have sufficient time to mount their finds.

7. During the wrap-up, ask students to hypothesize what would happen to an ecosystem if the owls disappeared.

Safety Concerns:

1. Remind students of appropriate use of sharp probes
2. Explain that these owl pellets have been especially prepared for student work and have been sanitized for their safety.

Special Clean up Notes:

1. Place black paper results on counter to dry. When dry, display on Student Work Board.