Owl Pellets

Students will discover what owls are and how they live by dissecting owl pellets; they will make the connection that we can learn a lot about animals by making observations of what they ingest, and in this case, regurgitate.

Grade Level: 3rd Grade

Phenomena: What happens to organisms when their environment changes?

Objectives:

- Students will dissect an owl pellet to analyze what owls eat, where they live, and how big they are.
- Students will describe basic owl functions and traits.

Materials:

- Sanitized Owl Pellets (one per 2-3 students)
- Newspaper / tablecloth
- For each student:
  - Skewer sticks
  - Latex or nitrile gloves
  - Pencils
- Owl Pellet Bone Chart & Rat Skeleton sheet (attached)
- Activity Record (attached)
- Dark sheets of plain paper*
- Bags to put bones in*
- Magnifying glasses*
- Pre-Made faux bird pellets*
- Owl Pellet recipe (attached pg. 7)*

* Optional

Appendixes:

- Owl Pellet Record, pg. 7
- Question sheet, pg. 8
- Owl Pellet Bone Chart, pg. 9
- Rat Skeleton, pg. 10

Time Considerations:

- Preparations: 15 minutes
- Activity1: 15 minutes
- Activity 2: 45 minutes

Related Lesson Plans:

Nevada Outdoor School . org

Nevada Academic Content Standard—Science

3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Science and Engineering Practices:
Analyzing and Interpreting Data
Engaging in Argument from Evidence

Disciplinary Core Ideas (lesson specific):
LS2.C: Ecosystem Dynamics, Functioning and Resilience
LS4.C: Adaptation
LS4.D: Biodiversity and Humans

Crosscutting Concepts:
Cause and Effect
Scale, Proportion, and Quantity
Systems and Systems Models

Excellence in Environmental Education Guidelines

- **Strand 1-Questioning, Analysis and Interpretation Skills (A, B, C, G):** Learners are able to develop questions that help them learn about the environment, design simple investigations, locate and collect information about the environment and environmental topics and develop simple explanations that address their questions about the environment.
- **Strand 2.1-The Earth as a Physical System (A, B):** Learners are able to identify changes and differences in the physical environment and in matter.
- **Strand 2.2-The Living Environment (A, C, D):** Learners understand basic similarities and differences among a wide variety of living organisms. They understand the concept of habitat, the basic ways in which organisms are related to their environment and other organisms and know that living things need some source of energy to live and grow.

Background

There's a lot of truth in the saying, "you are what you eat". Owls are carnivores, and like other birds, owls have a unique way of eating their prey. Birds swallow their food whole, either in chunks or if the prey is small enough in entirety. Owl predation is species specific and typically reflects the size of the owl. Larger owls for example can hunt young foxes and small mammals; whereas smaller owls will prey on mice. Owls also can prey on fish, reptiles, other birds, rodents, and invertebrates too.

Fig. 1 - A Great Horned Owl, one of The most common owls in the US. http://animal.discovery.com/guides/wild-birds/d-h/great-horned-owl.html

However, owls are unique in how they digest their food. "Unlike other birds, Owls have no Crop. A crop is a loose sac in the throat that serves as storage for food for later consumption. Since an Owl lacks this, food is passed directly into their digestive system" (Deane P Lewis The Owl Pages). Once swallowed, the food passes down into an owl's digestive tract.

The food is first met with mucus and enzymes that begin to break down the material, then passes to the gizzard. It is here where all of the indigestible parts such as hair, bones, and teeth are kept. The softer, digestible parts leave the gizzard and continue to be broken down to useable energy. The gizzard then compresses the indigestible parts (hair, bones, teeth) together to form a pellet. Hours later the pellet is regurgitated.

Owl pellets are one way for scientists to study owls, their habitat, and eating habits. For example, barn owls almost always have a complete rodent skeleton in their pellets. Every bone, from the skull to the last tip of the tailbone, can be found. A good observer with a little patience will be able to piece together the incredible skeletal masterpiece.

Some of the owls we have in the United States of America are: Snowy Owls, Great Horned Owls, Great Gray Owls, Northern Pygmy Owls, and Short-eared Owls. Common owls found in the Great Basin are the Great Horned Owl and the Long-eared Owl.

Fig. 2—A Great Gray Owl with it's prey—a field mouse. http://www.flickr.com/photos/tylercgrudowskiphotogra-

Owls are not the only birds who produce pellets. Many other birds including; herons, pelicans, falcons, hawks, kestrels, eagles, magpies, crows and some songbirds also produce pellets. Owl pellets are more condensed, and the material contained are more easily recognized because of the way an owl eats its prey.

Preparation

American white pelicans nest on Anaho Island National Wilderness Refuge in Pyramid Lake, NV. The pelicans disgorge indigestible bones, but they are not in the form of a compressed pellet like owls; fish skin is digested so all that is left are bones and sometimes scales. American white pelicans nesting at Anaho Island NWR eat cui-ui (an endangered fish species) and Lahontan cutthroat trout (a threatened fish species) as well as carp.

Also included with the lesson is a worksheet that students dissecting a faux pellet can use.

Tell your class beforehand that you will be doing this activity and as it may conflict with some student's religious or personal beliefs. As an alternative to dissecting owl pellets, have students virtually dissect owl pellets at: http://www.kidwings.com/owlpellets/. This activity also will allow students to look at multiple owl pellets and pellets from other birds.

As an alternative, students who are not participating in the owl pellet dissection, may be given books or other informational materials to read during the activity. There is a "fact-find" worksheet for those students to fill out. Faux pellets can be made by following a similar recipe to the one found here: http://thecraftsdept.marthastewart.com/2010/10/homemade-owl-pellets-yuck.html. Since the pellets dry

very hard it is best to make them the day before they will be used; otherwise the pellet may be too hard to dissect . The bones were made with a homemade clay similar to this recipe: http://www.pottery-on-the-wheel.com/clay-recipe.html and shaped based on the bone charts in this activity. Owl pellets can be purchased from many sources including the following:

- **Acorn Naturalists**
  155 El Camino Real
  Tustin, CA 92780
  (800) 422-8886
  www.acornnaturalists.com

- **Pellet's Inc.**
  P.O. Box 5484
  Bellingham, WA 98227
  1-888-466-OWLS
  www.pelletsinc.com

Make sure to order early, because it often takes a while for the pellets to be shipped. Additionally, be

Fig. 3—Owl pellets of different sizes. http://www.owlpellets.com/specialtyowlpelletcomparison.htm

sure to get sterilized owl pellets (i.e. not from a farm), since there is a danger of Hanta Virus in owl pellets.

Doing the Activity

Make enough copies of the bone charts and the activity record. Obtain other needed materials.

Activity 1: Owl Basics

(SEP: Engaging in Argument from Evidence)

Begin by asking students what they know about owls and going over their daily functions.

- Have any of the students seen an owl before?
- Where do owls live? (*They are found on all continents, but Antarctica).*
- How big are they? (*Owls range in size from sixty inches (wingspan) to as small as four inches. Size varies among species as well as sex. Female owls are often 25% larger than male owls).*
- What do owls do for the winter? (*Some migrate, but most stay where they are and continue to be active and hunt).*
- What do owls eat? (*Invertebrates (insects, spiders, earthworms, snails and crabs), fish, reptiles, birds and small mammals).*
- How do they eat? (*Their food is swallowed whole. The hair, bones, etc. can't be digested so the owl regurgitates a pellet).*
- When are they active? (*They are nocturnal, which means active at night).*
- Do owls hunt? (*Yes. They are birds of prey with exceptional hearing and vision).*
- How do owls hunt at night? (*Owls have many systems that specifically help them hear the slightest movement of their prey. Their satellite-dish-shaped face guides sounds to their asymmetrical or lopsided ears that allow them to hear the slightest movements of their prey—even under leaves or snow).*

Activity 2: Owl Pellets

(SEP: Analyzing and Interpreting Data)

Now that students understand the basic functions of owls, including their eating habits, ask, "What can we tell about an owl's habitat and lifestyle by looking at its pellets?" Students will answer this question as they do the following activity.

Review safety procedures and make sure that every student washes their hands before and after dissecting the pellets.

Divide students into groups of 2-3, and have them cover their work area with newspaper or a disposable tablecloth.

Give each student a skewer, a copy of the Activity Record and one latex or nitrile glove.

Give each group one pellet (still wrapped in foil), one piece of plain dark paper on which to put their bones for easier viewing, a magnifying glass and one copy of each bone chart.

During the activity, have students use the Activity Record as their guide—both to follow

the directions and to record their predictions and findings.

Before the students unwrap their pellet, have them record their predictions about what they will find inside.

Have students carefully unwrap their pellets and separate the bones from the fur and other materials.

Fig. 4—The contents of an owl pellet http://www.msnucleus.org/membership/html/k-6/lc/ntenvn/2/lcne2_5a.html

They should use the owl pellet bone chart (page 7)attached to help identify the type of animal (s) the owl ate by comparing the various skulls and bones found in the pellet. Have them record their findings on the Activity Record (page 6).

Conclusion

Students should be able to determine if there are bones

Assessment

from more than one animal in the pellet. If they are, how many animals are represented?

Use the Activity Record as a guide to get a sense of what the students are learning.

Time permitting: Have students choose **one** bone to take home

Extensions

in small plastic bag.

Conclude with reviewing what owl pellets are and what they can tell us about an owl.

Ask students to share with the class some of their owl pellet findings. Students should be able to label their skeletons (with white pencil or crayon) and/or be able to tell the class which kinds of animals and bones they found.
Assess students on their ability to recognize the different bones in their pellets, as listed on the bones charts.

Food Chain Exploration

- Have students draw a picture of a simple food chain that includes the owl, its prey, and other animal or plant life that may be in the chain.

Owl Facts

- Share the following interesting owl facts with your students:
  - A group of owls is called a parliament
  - Small groups of birds will attack and harass an owl, but the owl rarely responds and is rarely harmed.
  - Most other birds are scared of owls and try to force them into other areas.
  - An owl can only look straight ahead because it doesn't have eyeballs that rotate. It's eyes are like long tubes.
  - Owls can detect a difference of about 30 millionths of a second of sound hitting one ear before the other.

Edible Pellets

- Making edible "pellets" at home can be a great way for students to share with family and friends what they have learned about real pellets. Students will need adult supervision. Instructions for making the pellets are on the attached recipe cards (on page 6), which can be handed out to teachers so they may distribute to students as necessary. (Makes about 36 pellets)

Ingredients needed:

- 6 C crispy rice cereal
- 2 C (12oz) semi sweet or milk chocolate chips
- 1C sugar
- 1C corn syrup
- 1C peanut butter (crunchy adds an "authentic" texture)
- 1 white chocolate candy bar chopped into bone like bits (about 1/3 C)
- Foil for wrapping pellets
- Optional ingredients:
- Oat cereal for vertebrae
- Peanuts for small animal skulls
- Coconut flakes for bird feathers

Pelican Pellets

As described in the background, many other birds produce pellets.

The American White Pelican regurgitates the indigestible material from meals of fish, which is mostly bones and

scales.

Pelicans swallow the fish whole and then most of it is digested. When pelican chicks are young, the adults feed them a gruel of totally digested food. As chicks get older, the adults disgorge bigger and less digested fish.

The chicks stick their heads down the adults' throat to get fed, often staying so long they nearly asphyxiate themselves until the parent shakes the chick loose.

Like owls, pelicans do not have teeth to chew.

Anaho Island Wildlife Refuge has donated real bones disgorged from pelicans nesting at Pyramid Lake. The bones are from carp and other fish the pelicans have eaten and include fins, vertebrae and even scales.

Let students observe these bones. As class review, discuss the bones from the "pelican pellets" and ask what

Sources

- Lesson adapted from: Council for Environmental Education. *Project Wild K-12 Activity Guide*. "Owl Pellets Lesson." Bethesda, MD: Western Regional Environmental Education Council, 1992, pp. 144-5.
- Lewis, Deane. P. (2005, Jul. 30). In *Owl Food and Hunting*. (chap. Owl Articles - Owl Physiology: The Owl Pages) Retrieved Feb. 8, 2011, from http://www.owlpages.com/index.php
- Rettke, Jamie. http://www.lessonplanspage.com ScienceOwlPelletsSkeletalSystem58.htm. Accessed on Feb 4 2009.
- Owl Pellet Bone Chart and Activity Record adapted from: http://www.edb.utexas.edu/faculty/jackson/owlpellet.html
- Edible owl pellet recipe from: http://drrickert.com/edible%20owl%20pellets.html-Owl Pellet recipe
- Definitions adapted from: Editors of Scholastic Inc. *Scholastic Children's Dictionary*. New
- Backhouse, Frances (2008) "Owls of North America"

Images:

Fig. 1— A Great Horned Owl, one of the most common owls in the US. http://animal.discovery.com/guides/wild-birds/d-h/great-horned-owl.html

Fig. 2—A Great Gray Owl with it's prey—a field mouse. http://www.flickr.com/photos/tylercgrudowskiphotography/7469207082/

Fig. 3—Owl pellets of different sizes. http://www.owlpellets.com/specialtyowlpelletcomparison.htm

Fig. 4—The contents of an owl pellet http://www.msnucleus.org/membership/html/k-6/lc/ntenvn/2/lcne2_5a.html

Vocabulary

Carnivore: an animal that eats meat.

Food Chain: an order of animals and plants in which each feeds on the one below it in the chain.

Habitat: the place and natural conditions in which a plant or an animal lives.

Mole: a type of rodent that lives underground, has small eyes, strong front feet, and eats insects.

Nocturnal: active at night.

Owl Pellets: the oval-shaped wad of indigestible materials (fur and bones) that an owl regurgitates after eating.

Pelvic Bone: hip bone.

Predator: an animal that hunts and eats other animals for food.

Prediction: a guess of what will happen in the future.

Prey: an animal that is hunted by another animal for food.

Regurgitate: to spit food or indigestible materials out through the mouth, like vomiting.

Rodent: a mammal with large, sharp front teeth that is uses for gnawing things. Examples: rat, mouse, shrew, mole, vole, hamster, guinea pig, etc.

Scapula: triangular shaped bone also called the shoulder blade.

Shrew: a rodent with a long nose and small eyes that eats insects.

Vertebrae: small bones in the back that fit together in a line to make up the spine.

Edible Pellets

Making edible “pellets” at home can be a great way for students to share with family and friends what they have learned about real pellets. Students will need adult supervision. (makes about 36 pellets)

Ingredients needed:

* 6 C crispy rice cereal
* 2 C (12oz) semi sweet or milk chocolate chips
* 1C sugar
* 1C corn syrup
* 1C peanut butter (crunchy adds an “authentic” texture)
* 1 white chocolate candy bar chopped into bone like bits (about 1/3 C)
* Foil for wrapping pellets
* Optional ingredients:
* Oat cereal (vertebrae)
* Peanuts (small animal skulls)
* Coconut flakes(bird feathers)

In a large bowl, mix cereal and chocolate chips. Set aside. Mix sugar and corn syrup in a small saucepan until bubbling. Remove sugar-syrup mixture from heat and stir in peanut butter. Stir peanut butter mixture into cereal and chocolate chips (chocolate chips will melt). When cereal is completely coated, allow mixture to cool for about 5 minutes. Pick up about 2-3 tablespoons of the mixture and sprinkle 4-5 white chocolate “bones” onto it. Mold mixture with hands until it resembles a pellet. Smooth edges if needed and place on a separate plate. Wrap the chocolate pellets in tin foil and store in the refrigerator until ready to enjoy!

Edible Pellets

Making edible “pellets” at home can be a great way for students to share with family and friends what they have learned about real pellets. Students will need adult supervision. (makes about 36 pellets)

Ingredients needed:

* 6 C crispy rice cereal
* 2 C (12oz) semi sweet or milk chocolate chips
* 1C sugar
* 1C corn syrup
* 1C peanut butter (crunchy adds an “authentic” texture)
* 1 white chocolate candy bar chopped into bone like bits (about 1/3 C)
* Foil for wrapping pellets
* Optional ingredients:
* Oat cereal (vertebrae)
* Peanuts (small animal skulls)
* Coconut flakes(bird feathers)

In a large bowl, mix cereal and chocolate chips. Set aside. Mix sugar and corn syrup in a small saucepan until bubbling. Remove sugar-syrup mixture from heat and stir in peanut butter. Stir peanut butter mixture into cereal and chocolate chips (chocolate chips will melt). When cereal is completely coated, allow mixture to cool for about 5 minutes. Pick up about 2-3 tablespoons of the mixture and sprinkle 4-5 white chocolate “bones” onto it. Mold mixture with hands until it resembles a pellet. Smooth edges if needed and place on a separate plate. Wrap the chocolate pellets in tin foil and store in the refrigerator until ready to enjoy!

Owl Pellet Record

STEP ONE: Before unwrapping your pellet, write a prediction to what may be found in the pellet.

_____

_____

_____

STEP TWO: Write what you found in the owl pellet.

_____

_____

_____

STEP THREE:

How many of the following bones did you find?

Skull: _____

Jaw: _____

Vertebrae: _____

How many animals did the owl eat?

_____

Draw and label the bones you found

What type of habitat do you think this owl hunted and why?

_____

_____

Name_____

Answer the following questions after reading the information provided.

What do owls eat?

What are owl pellets?

When do most owls hunt?

Name an owl that can be found in Nevada

What's your favorite owl? Why?

What type of prey does your favorite owl eat?

Name_____

Answer the following questions after reading the information provided.

What do owls eat?

What are owl pellets?

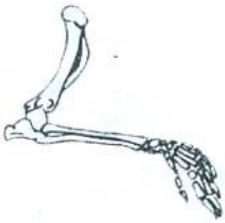
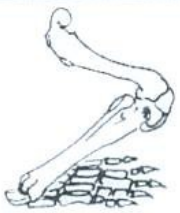
When do most owls hunt?

Name an owl that can be found in Nevada

What's your favorite owl? Why?

What type of prey does your favorite owl eat?

OWL PELLET BONE CHART

	RODENT	SHREW	MOLE	BIRD
SKULL				
JAW				
SCAPULA				
FORE LIMB				
HIND LIMB				
PELVIC BONE				
RIB				
VERTE-BRAE	      			

Rat Skeleton