**Lesson 2: Owl Pellet Dissection (Part 1)**

**Lesson Summary:** In this lesson, students will gain a basic understanding of owls as predators, their eating habits, and the owl pellets that they produce. They will engage in hands-on exploration of owl pellets to draw conclusions about owls’ eating patterns.

**Materials:**

* Owl pellets
* Petri dishes
* Tweezers
* Ziplock bags

**Knowledge and Skills developed:**

* Recognition of an owl as a carnivore.
* Predict/hypothesize an owl’s diet.
* Sort bones found in an owl pellet.
* Owl pellets provide information about owls’ habits, diets, and owls’ position in the food web.

**Next Generation Science Standards**

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| * **Practices** ☐Asking questions ☐Developing and using models  **x** Planning / carrying out investigations ☐Analyzing / interpreting data ☐Math / computational thinking  **x** Constructing explanations ☐Engaging in argument from evidence ☐Obtaining / evaluate / communicate | **Crosscutting Concepts** ☐ Patterns **x** Cause and effect: Mechanism / explanation ☐ Scale, proportion, and quantity  **x** Systems and system models  **x** Energy / matter: Flows, cycles, conservation ☐Structure and function ☐Stability and change |
| **Disciplinary Core Ideas and Concepts**  5-LS2.A: Interdependent Relationships in Ecosystems  MS-LS2.B: Cycle of Matter and Energy Transfer in Ecosystems | |

**Environmental Literacy Strands**

1. Understand the physical and biological world and our interdependent relationship with it

3. Sense of place, region, nation, and global community

**Teacher Background Information:**

Owls are predators that typically feed on small mammals, birds, and reptiles. Owls usually swallow their food whole or in large chunks. The owl’s digestive system cannot digest fur/hair, bones, teeth, feathers, and other parts of their prey. Rather, a portion of the owl’s stomach compresses these parts to form a pellet. The pellet does not pass into the intestine of the owl. Instead, the owl regurgitates (coughs up and spits out) the pellet. You may find the bones of animals in an owl pellet, but you may also find the exoskeletons of insects, feathers, fur/hair, fish scales, small white grubs, and various types of seeds. By examining the contents of the pellet, we can estimate what and how much an owl has eaten. In addition, when the acidity or alkalinity of the pellet is measured, predictions can be made about the pH of the owl’s stomach and its ability to digest harder tissues. In fact, because digestive pH varies across owl species, it is possible to identify the type of owl that made a pellet using patterns of acid etching on the bones. Bone breakage patterns also vary by owl size – big owls break fewer bones and produce bigger pellets than do small owls.

An owl’s stomach has two parts that assist in the creation of pellets. When an owl swallows its prey, the prey first lands in the glandular stomach, which produces enzymes and acids to dissolve and break up the body of the prey. The stomach also contains a lining of mucus that helps move the mess of flesh and bones up to the second part of the stomach, called the gizzard, or muscular stomach. The gizzard catches claws, bones, teeth, fur, feathers, and other parts of the prey that the owl cannot digest. With powerful muscle contractions, the gizzard grinds up the meat of the prey. The softer tissues of the prey pass through the small intestine to finish being digested. All of the indigestible material remains in the gizzard, where hair, feathers, and fur are compressed around bones to form the pellet. This process can take several hours!

Once the pellet is finished forming in the gizzard, it travels back to the glandular stomach. Regurgitation occurs when the owl’s digestive system has finished absorbing all the food nutrients from its meal and the owl is preparing to eat again. To regurgitate, the owl closes its eyes, stretches its neck up and forward, contracts its stomach, and drops the pellet from its mouth. The pellet remains in the owl’s habitat and contributes food and shelter to other organisms in the ecosystem.

**Introduction:**

Let students know that they are going to continue learning about owls through an investigation that will help them learn more about what owls eat.

1. Have students think back to the previous lesson and revisit their hypothesis about what owls eat. Ask students “How can we test our hypothesis?”

* Should we go out and watch an owl at night? That would be very time consuming and difficult to observe without special equipment.
* Should we kill the owl and dissect its stomach contents? That would definitely not be a good way to preserve and protect owls.
* Bring out the owl pellet.

1. One easy way to find out what an owl eats is to dissect an owl pellet. Ask the students if they have seen an owl pellet before? Since owls eat their prey whole, after a night of feeding, an owl will regurgitate a pellet- anything that cannot be digested will be casted or coughed up.
2. Tell students that owl pellets can actually help them discover what their owl ate---and how many different/similar things it ate.
3. Pass out the wrapped owl pellets and ask students to hold the pellet **without unwrapping it**. Ask students to consider what they know about owls. Then ask, “What do you expect to find inside this foil-wrapped package?” Give students a chance to ask questions about the owl that the pellets came from. Is there anything that would be helpful for them to know before making a predication? Have students record predictions onto the ‘owl pellet handout’.

4. Instruct students to unwrap the pellets, but **not break the pellets apart**. Ask them to use their senses to describe the characteristics of the intact pellets. Have students record their findings. Encourage informal sharing of ideas at each table. Have students gather data from the pellets:

* Describe texture, smell, and color.
* Compare sizes of all pellets. Record length/width.
* Students may find other ways to gather data. Encourage them to think like scientists and find new ways to explore the unknown.

1. Let students explore the interior of the pellet. Encourage them to find out all they can. **Note:** A*t this point, students are conducting their own investigation and are* ***not*** *using bone charts.* Allow students the luxury of grouping/classifying bones using student-generated rules. Looking at bones without the bone chart helps them carefully consider form and function instead of simply matching bones to the diagram. Use open-ended questions to encourage thoughtful grouping of the bones.

* How are the bones alike? Different?
* Do any characteristics of this group of bones provide clues about the animal from which they originated? Look at the evidence.
* To what animal might these bones belong? What evidence supports your idea?

1. After allowing ample time for student-generated investigation and grouping of bones, ask students:

* What animal might these bones belong to?
* Are there bones of more than 1 animal?
* What evidence supports your ideas?
* How can we find out with more certainty?

7. Let students know that in the next meeting they will use tools to help determine with some level of certainty what animals they found in their pellets.

**Resources:**

*Whoo’s for Dinner?* Audubon Society of Greater Denver

World Owl Trust - <http://www.owls.org/Information/pellets.htm>

*Owl Puke: The Book* by Jane Hammerslough (2004)

**Next Generation Science Standards:**

**Owl Pellet Handout**

*“Owl Pellets”* parts 1 & 2

**What does an owl eat?**

**Hypothesis:**

**What do you think that you will find in your owl pellet?**

**Prediction:**

**Describe the characteristics of your owl pellet:**

**Smell**

**Color**

**Texture**

**What did you find in your owl pellet?**

**Conclusion:**