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Owl Pellet Dissection: An Opportunity for Discovery

Brenna Towery

INTRODUCTION

There are over 140 different species of owls in the world, and they are found on every continent except Antarctica (Gibbons 2005). Nineteen species of owls live in North America. Owls, among other raptor species, are considered birds of prey because they have a strictly carnivorous diet and hunt for their food by wing. Owls feed on a variety of small mammals, such as mice and shrews, and also birds (Mason 2004). Owls hunt primarily by night, and are skilled in capturing their prey due to exceptional hearing and eyesight. The eyes of owls are proportionally very large compared to other species, which immensely improve their ability to see in the dark. Owls have the best hearing of all the birds of prey and can locate and capture an animal by use of their hearing alone (Mason 2004). Owls have an average minimum threshold of -14 dB (Dyson et al. 1997). Dyson et al. (1997) studied the hearing threshold of the European barn owl (*Tyto alba guttata*) and found the best frequency to be 6.3 kHz and the best intensity to be -14.2 dB. Enhanced hearing, along with other features, allows owls to be very proficient hunters. Once an owl captures its prey, it uses its powerful talons and hooked beak to rip into the flesh or it swallows the prey whole (Mason 2004). This meal then goes through a process of digestion and nutrient extraction. Any bones, teeth, fur, or feathers that are swallowed cannot be digested and are separated from the nutritious parts of the meal (Houghton 2004). These hard pieces are left in the gizzard of the owl's digestive system and, 6-12 hours after ingestion, are formed into a pellet and regurgitated. Usually two pellets are formed within a 24 hour period. Pellets are found most often on the ground below an owl's roost by day and in the debris of an owl's foraging area by night (Houghton 2004).

BACKGROUND

Owl pellets have been dissected in classrooms to teach students about food chains and the diet of owls, predator-prey relationships, and to offer a hands-on learning opportunity (Hammerslough 2004). I was fortunate enough to have an opportunity to dissect owl pellets in the second grade and never forgot the experience I had with science and discovery. As a current student studying zoology at Southern Illinois University Carbondale, I wanted to provide students with an opportunity to have the same experience I had. It is important to introduce young minds to the possibilities of science and research, especially in an area as special as southern Illinois. I established a set of objectives that I hoped to achieve through my project. The objectives were to help the students better understand the anatomy and feeding habits of owls, to educate the students on how and why owl pellets are produces, and to present the students with an opportunity for discovery and research. With much planning and preparation, I was able to complete owl pellet dissection lessons with three local second grade classes.

IMPORTANCE

Studying owl pellets is important, not only in the classroom, but for wildlife management purposes as well. While owl pellets can be used to educate students on predator-prey relationships and digestion processes, they can also provide biologists with information on wildlife population densities and species diversity. Owl pellets are found and collected at ground level below nesting or roosting areas. Nesting spots can be found in tree cavities, buildings, or abandoned nests from other birds. Locations of owl pellets can indicate the home range sizes of certain owl species which is beneficial for management purposes. Martinez et al. (1998) studied pellets of short-eared owls (*Asio flammeus*) in Chile to determine their hunting ranges. Examination of the size of pellets and their contents can indicate which species produced them.

This is useful in estimating the population densities of different bird species in a particular area. Knowing population densities is important in successfully managing wildlife populations. This knowledge can reveal whether a species is declining or abundant. In addition, studying owl pellets can be useful in estimating population densities of the prey that they consume. Lesinksi (2010) conducted a study in Poland on tawny owls (*Strix aluco*) that estimated the abundance of bats based on their presence in the owls' pellets. An owl pellet typically consists of the bones, teeth, and fur or feathers of one individual. By studying the contents within the pellet, the prey species can be determined. Determining the species of prey found in pellets and the species of owl producing the pellets is an indicator of species diversity and richness, both of which are important in wildlife management.

SCHOOLS

The preparation process for the owl pellet dissection project was extensive and detailed. The presentations were in the beginning of October, and I began preparing for them in April. The first step in the process was making sure there were grade school teachers willing to let me teach their class. Teachers at Lewis School and Thomas Elementary School were contacted; none responded with interest in helping me with my project. General John A Logan School in Murphysboro, IL was the first to express interest in my project. It was then determined that I would perform the lesson in the classrooms of Mrs. Krienert, Mrs. Schimpf, and Mrs. Hobbs in the fall of 2010.

COLLECTION

The next step in the preparation process was collecting the owl pellets. I was familiar with where owl pellets are typically found, however, actually locating them was like finding a needle in a haystack. Fortunately, I had the help of Mark Guetersloh with the Illinois Department

of Natural Resources and Beverly Shofstall with Free Again Wildlife Rehabilitation. Mark provided me with numerous owl pellets from Cache River National Wildlife Refuge, and Beverly provided me with the majority of the pellets from her wildlife rehabilitation center. The only drawback to using pellets from Free Again was that the owls that produced them were not foraging for their prey naturally. Almost all of the owls at the rehabilitation center were fed mice and rats. I felt, however, that it was less important that the owls were naturally foraging, and more important that the students gain knowledge from the overall experience. The pellets were from multiple species of owls and ranged in sizes, but they all contained the bones of the owls' prey. In addition to collecting pellets, I borrowed forceps and probes from the zoology department at SIUC for the students to use during the dissection.

LESSON PLAN

After making the arrangements with the teachers and collecting the pellets, I created the lesson on owl hunting techniques and pellet production. Having never taught second graders before, I relied on children's literature and owl pellet dissection teaching guides to help me with the process. The simplified outline of the lesson plan I used in lecturing to the students is in Appendix A. The lesson plan was interactive in order to hold the students attention, as well as involve them by asking questions and defining potentially unknown terms. The sources I used not only provided information for the lecture, but also an owl pellet bone chart from Carolina Biological Supply Company. This chart helped students identify the types of bones they were finding and which prey species specifically the bones belonged to (See Appendix B). I also used pictures in the lesson to demonstrate the different features and processes I discussed. These included pictures of an owl skull, the camouflaging colors of owl feathers, owl bones, talons, and

beak, as well as pictures of owls eating prey. The preparation process required strong organizational skills, but it was all worth it in order to be well prepared for the lessons.

I delivered the lesson to three separate second grade classes at General John A. Logan School, and each one had its similarities and differences. The first lesson was with Mrs. Krienert's class. In addition to being my first teaching experience, it was videotaped for Carbondale's local Channel 3 news. Before starting the lesson I was interviewed by the news reporter about why I was doing the owl pellet dissection and what I expected from the students. I explained that the lesson was part of my Honors Thesis at SIUC and that I wanted the students to have an experience with discovery and research. I was slightly concerned that the cameraman would distract the students from my lecture, but Mrs. Krienert's class was very well-behaved and attentive for the lesson. It was no surprise that some of the students had their own anecdotes they interjected during my lecture. I was appreciative of the fact that Mrs. Krienert had prepped her students with her own lesson on owls and birds of prey prior to my lecture. The students knew most of the answers to my questions and the definitions to most of the terms I used. After my lecture I paired the students with a partner and gave each pair a pellet and two dissecting tools. Once the pellets were distributed the fun really began. Most students were disgusted at first sight of the pellets and in complete shock of the idea of touching the pellets with their hands. Once I showed them how to break into the pellet and get their hands dirty, they were intrigued. Finding and identifying the bones was even more exiting for them. As soon as I showed them how to identify the types of bones, they were finding more of them on their own and showing me what they found. Finding the skulls was the most exciting part for them. It allowed them to determine exactly which animal the owl had eaten. I pointed out the tiny teeth and large incisors of the rodents. Once it seemed as though most of the bones had been found in everyone's pellets, we

ended the lesson and cleaned up. The students were disappointed that the lesson had to end, and seemed to have really enjoyed themselves.

The owl pellet dissection lesson was performed for Mrs. Schimpf's and Mrs. Hobbs' second grade classes as well. Similar to Mrs. Krienert's class, some of Mrs. Schimpf's and Mrs. Hobbs' students spoke out of turn during my lecture. It was frustrating at times, but I had been warned it would happen and tried my best to ignore them until I could answer their questions at the end. Clearly the concept of raising one's hand before speaking hasn't been imprinted on most second graders. As with Mrs. Krienert's class, most students were repulsed at the sight of the pellets. They were also hesitant to touch them with their hands, until I showed them that it was harmless. One student specifically, however, could not force herself to enjoy the experience. At one point she expressed that simply looking at the owl pellet made her "want to throw up." Apparently, science is not for everyone. One difference I noticed between the first lesson and the second two was that the second two teachers did not prepare their students with any information about owls or their eating habits prior to my lesson. The students still understood the concepts however, and knew facts about owls from previous experiences. Most of the students in each of the classes seemed to enjoy the project by the end and did not want to stop dissecting the pellets. It was very rewarding to observe the students gaining knowledge through research.

ASSESSMENT & EVALUATION

Receiving feedback from the teachers and students was important to me and to the learning process. In order to get a clear idea of how the teachers assessed my presentation and what the students took away from the lesson, I created a teacher evaluation form and a student evaluation form. Each form (See Appendix C) was composed of questions that were appropriate for the age level. The evaluation form for the three teachers to fill out listed a set of objectives I

hoped to have met by the end of the lesson, asked if I met the objectives, if my information appeared accurate, if I went into enough detail, and if I taught at the appropriate level. Each of the teachers "strongly agreed" that I did all of those things. Some of the comments on the teachers' evaluation forms were that I "helped create wonderful memories," "The students really enjoyed dissecting," and "Thank you so much for coming to our class." It was comforting to know that the teachers felt I had done a good job with the owl pellet dissection project, however, it was the students' evaluations that I most looked forward to.

The evaluation form that I gave the students to fill out consisted of four simple questions. I presented the lesson to a total of 64 students among the three classes. The first question was "Do you feel like you understand owls better?" I found that 59 (92%) of the students replied "yes" and 5 replied "no." The second question asked "Do you want to learn more about owls and their feeding habits?" 61 students said "yes" (95%) and 3 said "no." For the students that said that they did want to learn more about owls, I specifically asked what they wanted to learn more about. I received many responses. Two students said that they wanted to learn about owl calls. Others replied that they wanted to know what else owls do at night and what time they go to bed. One student said they wanted to know more about owls' eyes. Ten students were curious about where owls live and how to find their own owl pellets. Many students wanted to learn more about the bones of the prey found in the pellets. Two students said that they wanted to know everything about owls. These responses were rewarding for me because it showed that a number of the students were really interested in what I had taught them. The final question on the student evaluation asked "What was your favorite part of the owl pellet dissection project?" The majority of students replied that their favorite part was picking out the bones or picking the fur off of the bones. One student's response was "Bones are the best." While these responses were rather

general, I still felt as though the students truly enjoyed the project. Another popular response to the final question was finding the skull or jaws. It was obvious during the dissection that the students loved finding the skull and seeing the teeth. Finding the skull was the easiest way to identify the prey species, but also had many interesting features that the students could study. It was clear that not all of the students enjoyed the presentation and dissection. However, it seemed as though a large portion of them did enjoy it and even showed an interest in learning more about owls and owl pellets.

CONCLUDING COMMENTS

The owl pellet dissection presentation was a learning experience, not only for the second grade students, but for me as well. First, I had a lesson in networking with teachers in public schools, a wildlife rehabilitator, and a district biologist. In meeting with each of these people I gained a bit of knowledge into a few aspects of their careers and what their jobs require of them. I also had a lesson in organization, writing a lesson plan, and gathering materials that would successfully communicate what I was trying to teach to a group of second grade students. It was an experience that I would not take back. Should I do it again, however, there are things that I would do differently. First, I would only perform one presentation per day. I presented to Mrs. Krienert's and Mrs. Schimpf's classes in the same day and presented to Mrs. Hobbs the following week. The first day of my presentation was very hectic. Not only was it my first time presenting a lesson, I was being filmed for the news as well. Also, there were not enough dissecting tools for both classes, so I had to clean everything up from the first lesson before I could continue to the next one. I presented to the two classes after their lunch breaks so I was only allotted 45 minutes per classroom because of the time constraint between lunch and the end of the school day. Something else I would change for the presentation is the time allotted. It felt

as though 45 minutes was not quite enough time. If I would have had more time I could have included more information about owls and allowed for more questions. I also feel as though I should have repeated some of the information I presented more than once throughout my lecture. Based on the students' evaluation forms, some of the items they listed as wanting to learn more about were items that I had actually touched on in my lecture. Whether they were not listening the first time or I was unclear, I am not sure. In addition, I probably would have liked to have had more pellets available. I paired students for the dissection because I did not have enough pellets for each student to do their own. This worked well, especially for those students who did not want to participate at first glance, and for those that needed assistance. At the end of the lesson, however, many students desperately wanted to keep their bones. This was impossible not only because I was low on pellets, but also because the pellets were not sterilized and could have been unsafe for the students to keep. I had hoped to sterilize them for the students but when I asked a few professionals they said that there was really no way to do it. I, of course, took precautions and had the students wash their hands thoroughly after dissecting the pellets. Had I been able to obtain more pellets and dissect them, I would have liked to have the students try to reconstruct the skeleton and glue the bones on a piece of paper for them to keep. I think they would have really liked to have been able to do that. Overall, I felt the project was successful. I was nervous for the first lesson, but it went well and was the following two presentations were easier. I am grateful to have had the experience and hope that the students took away a lesson in research and discovery.

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APPENDIX A

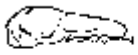
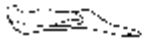
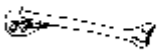
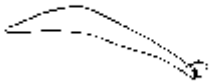
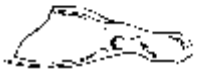
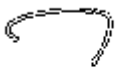
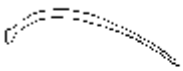
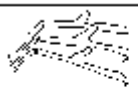
I. Owls are known as birds of prey because they are carnivorous.
    A. They are carnivorous because they only eat meat.
    B. Prey can include mice, shrews, moles, and small birds.
II. Owls have many special features that make them great at capturing their prey.
    A. One example of this is that owls have exceptional eyesight.
        1. Their prey is usually active at night so they must do the majority of their hunting at night.
        2. Owls can see much better at night than people can.
        3. This is because their eyes are so large in their skull.
        4. Owls' eyes do not seem very large because their heads are covered with so many feathers.
        5. If owls were as big as people, their eyes would be nearly as big as softballs.
        6. Owls cannot move their eyes in their eye socket and they do not have peripheral vision.
        7. Owls are able to turn their heads ¾ of the way around, and they do this so fast that it looks like they are turning their heads completely around.
    B. Owls also have the best hearing of all the birds of prey.
        1. Some species are able to locate and catch a mouse in the woods just by hearing it, and without having to actually see it.
        2. Barns owls can hear a human's heartbeat.
    C. Feathers are another special feature that make owls great hunters.
        1. It helps by camouflaging the owls.
        2. Most owls are brown or gray, which helps them blend into their habitat.
        3. Owls' feathers are softer than most other birds of prey, and owls are covered from head to toe with feathers.
        4. Having soft feathers and being covered in them helps make owls nearly silent flyers.
        5. This allows owls to successfully sneak up on their prey.
    D. Owls' bones play an important role in hunting as well.
        1. While human bones are solid and strong, owls and all birds have bones like honeycomb.
        2. This makes their bones much lighter to aid in flying.
    E. Talons are the nails on an owl's feet and, along with their beak, are important tools in capturing prey.
        1. Talons create a strong grip on prey and are used to snatch them from the ground.
        2. Once an animal is caught by an owl, the talons and beak are used like a fork and knife to tear into the prey.
    F. Owls often need to eat their prey quickly and can swallow smaller prey whole.
        1. When owls do this, they eat most of the bones and fur, which their bodies cannot digest.
        2. Owls' bodies form all of the items that cannot be digested into a ball in their gizzard, which is part of the digestive system.

3. Usually between 6 and 12 hours later that ball is regurgitated and what is coughed up is known as a pellet.

III. Owl pellets can be dissected to determine what an owl has eaten and that is what we will be doing today.

APPENDIX B

Owl Pellet Bone Chart

	Rodent	Shrew	Mole	Bird
Skull				
Jaw				
Scapula				
Forelimb				
Hindlimb				
Pelvic Bone				
Rib				
Vertebrae				

CB280780000

Carolina Biological Supply Company 2700 York Road, Burlington, North Carolina 27215

APPENDIX C

Owl Pellet Dissection Teacher Evaluation

Objectives of Lesson:

- To help students better understand the anatomy and feeding habits of owls and other birds of prey

- To educate students on how and why owl pellets are produced

- To present students with an opportunity for discovery and research in dissecting an owl pellet

1) The objectives of the lesson were met.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

2) The information provided by the presenter was accurate.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

3) The presenter went into enough detail.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

4) The presenter taught at the appropriate grade level.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

Additional Comments:

Owl Pellet Dissection Student Evaluation

1) After the presentation, do you feel like you understand owls better?

2) Do you want to learn more about owl and their feeding habits?

If so, what do you want to learn about?

3) What was your favorite part of the owl pellet dissection project?