

# PELLET LAB BOOK

By \_\_\_\_\_



Small Pellet  
=  
Red-tailed  
Hawk

Color \_\_\_\_\_  
Length \_\_\_\_\_  
Width \_\_\_\_\_  
Texture \_\_\_\_\_  
Other \_\_\_\_\_

Large Pellet  
=  
Snowy Owl

Color \_\_\_\_\_  
Length \_\_\_\_\_  
Width \_\_\_\_\_  
Texture \_\_\_\_\_  
Other \_\_\_\_\_



Illustrate  
the pellet

Illustrate  
the pellet



- Step 1: gently break apart the pellets
- Step 2: observe & record similarities & differences between the pellets
- Step 3: gently remove bones & attempt to identify
- Step 4: Record your findings!



Small Pellet  
=  
Red-tailed  
Hawk

What was different about the hawk pellets?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Large Pellet  
=  
Snowy Owl

What was different about the owl pellets?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Hypothesis: Why/what accounts for these differences?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Research: What is the actual reason? Did it prove or disprove your hypothesis?

\_\_\_\_\_

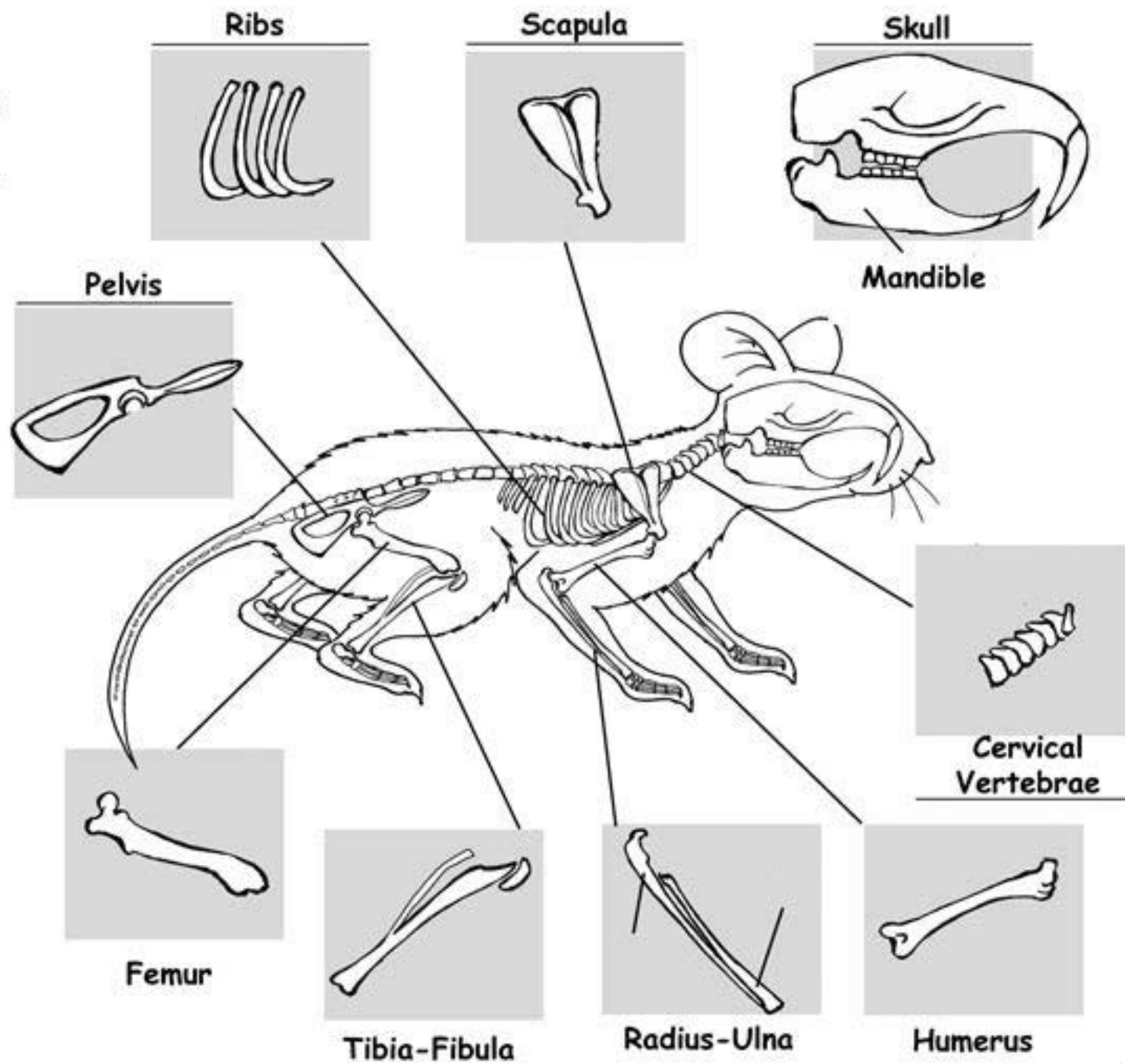
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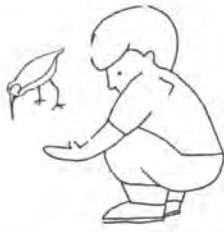
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# Bones of the Mouse





## WHO DID THE OWL EAT?

**Overview:** Through the dissection of owl pellets, students will learn how owls fit into the salt marsh habitat, which animals live in the owls' habitat (by observing what animals the owls have eaten) and about the skeletal bones of the prey.

**Content Standards Correlations:** Science, p. 292

**Grades:** K-6

**Key Concepts:** Owls have specific adaptations that enable them to be superb hunters. These adaptations include: superb hearing, eyesight, wings, and talons. By studying owl pellets we can learn more about the animals that inhabit the salt marsh habitat and about the salt marsh food chain.

**Objectives:**

Students will be able to:

- define several adaptations of owls
- identify rodent and bird bones
- name one thing they can learn about the salt marsh habitat by studying owl pellets

**Materials:**

- *Who Did the Owl Eat?* Video checked out from the Refuge
- owl pellets (1 for every student or 1 for every 2 students - provided by the teachers)
- newspaper or other protective covering
- quartered Petri dishes or other containers
- tweezers
- hand Lenses
- food Web Poster p. 167
- Bone identification chart p. 168 (1 copy for every student)

**Time:** 50 minutes

### SUPPORTING INFORMATION FOR THIS ACTIVITY

- Owls are found all over the world. The Barn Owl has 17 subspecies located throughout the world.
- Owls range in size from 4 ½ inches (least pygmy) to 2 ½ feet (great grey).
- An adaptation is a change in a living thing that helps it survive.
- Owls have very unique adaptations that make them superb night hunters. Their facial disks aid hearing - the round area of feathers on the face directs sound to the ears. (Try cupping your hands around your ears - it's the same idea!)
- A Barn Owl can hear a mouse chewing grass seeds or moving around 40 feet away.
- One ear is higher on the head than the other so that the owl can move their head around too find the exact location of their prey.
- Since an owl's eyes are found on the front of the head (like people) they have binocular vision.
- Owls eyes are large in order to allow a lot of light to enter. Their eyes are so big that they have no room to move up, down or sideways. The owl must keep turning its head to follow a moving object. Owls have 14 bones in their neck so they can turn their neck 180 degrees each direction. (An owl can turn its neck so far and so fast, it sometimes looks as though the head is spinning 360 degrees!)
- The feathers on the owl's wing have soft edges that make their flight silent - another sign of a good hunter.
- Once the owl has located its prey, it swoops down and grabs it with its very sharp "claws" or talons. Owls have four talons at the ends of their feathered legs - two face forward and one backward, while the one the outside can face forward or backward, so they can have opposing pairs of talons. Once an animal is in the owl's grasp, it rarely escapes.
- They swallow their prey head first.
- The prey goes into the first stomach, a wide place in the esophagus, where digestion is started. Later it moves down into a second stomach, called the gizzard. All of the meat is digested and passed through a tiny opening in the gut. The non-digestible items left in the second stomach are formed into a compact clump of bones and fur or feathers (shaped somewhat like egg) which is regurgitated by the owl. This is an owl pellet.

- Indigestible animal parts found in pellets include: mammal bones, beaks, claws and bones of birds; bones of reptile and amphibians; hard portions of insects; and seed husks or other coarse vegetable materials from the stomachs of the prey.
- Digestion requires 12 to 22 hours.
- One meal may include a mouse and a bird or two to three rodents. The marshes around the Don Edwards San Francisco Bay National Wildlife Refuge have five mouse-sized animals including: voles (*Microtus californicus*), house mouse (*Mus musculus*), white-footed deer mouse (*Peromyscus maniculatus*), salt marsh harvest mouse (*Reithrodontomys raviventris*), and the wandering shrew (*Sorex vagrans*). The red-winged black bird is another important prey item that is commonly found in owl pellets.
- Owls help keep the rodent population in check.
- Pellets are often associated with birds of prey, however, 330 species of from more than 60 birds families produce pellets. These families include: robins, starling, king fishers and tree swallows as well as owls, hawks and eagles.

## TEACHING METHOD

### Preparing for the Activity

#### Do

3 weeks prior to conducting this activity check out the *Who Did the Owl Eat?* Video from the Environmental Education Staff at the Don Edwards San Francisco Bay National Wildlife Refuge (510) 792-0222.

### Conducting the Activity

#### Do

Cover the students desks or work tables with newspaper or other protective covering.

#### Read

“Owls are found all around the world. They range in size from 4 ½ inches (least pygmy) to 2 ½ feet (great grey) long. There are a few different types of owls found throughout the San Francisco Bay including, burrowing owls, short eared owls, and barn owls. Today, we are going to be studying owls by dissecting owl pellets.”

#### Ask

? **What is an owl pellet?** (Take different answers.)

#### Read

“We are now going to watch video called *Who Did the Owl Eat?* to learn more about owls and their owl pellets.”

#### Do

Show the 13 minute video *Who Did the Owl Eat?*

#### Ask

? **What do owls eat?** (Small mammals and occasionally small birds.)

? **What is an owl pellet?** (Undigested remains of what an owl ate. It is the bones, fur and feathers which the owl collects in its stomach and clumps up into an egg shaped owl pellet, which it then regurgitates.)

? **What does adaptation mean?** (A change in a living thing that helps it survive.)

? **What types of adaptations would an owl need to be able to hunt at night?** (Take many different answers- improved hearing, eyesight, etc.)

? **Do you think owls are the only type of bird that regurgitates pellets?** (No. Pellets are often associated with birds of prey, however, 330 species of from more than 60 birds families produce pellets. These families include: robins, starling, king fishers and tree swallows as well as owls, hawks and eagles.)

#### Read

“Scientists dissect owl pellets to look at the different bones, fur, or feathers that are inside.”

#### Ask

? **As scientists, what can we learn from owl pellets?** (A scientist might want to study owl pellets to learn how owls fit into the food web, to find what animals live in the owls habitat, and to learn about the skeletal bones of their prey.)

#### Read

“Today we are going to become scientists to find out what species of animals these owls have eaten.”

## Do

Pass out the owl pellets (1 per student or 1 to a pair of student), the quartered petri dishes or other containers, tweezers, and hand lenses.

- Have the students break the pellets apart by grasping each end and then slowly and gently pulling the ends apart.
- Continue to pull mats of fur or feathers apart looking for skulls and bones. (Tweezers are available for removing stubborn fur.)
- The bones from each pellet can be separated by type in the quartered petri dish.
- Give each student a copy of the bone identification chart on p. 168. Have the students place the bones in the appropriate places on the chart.
- Circulate around to the students and help them identify the bones. Bones found in pellets can be from rodents, shrews, and birds. *Note: The salt marsh harvest mouse is found in the salt marshes of the San Francisco Bay, but will not be seen in pellets that are ordered since they come from a different geographic location. If you have owl pellets from the San Francisco Bay Area they still probably will not be seen because this mouse stays under cover and can not ordinarily be caught by an owl.*

## Identification of Some Common Prey Types

**Order Rodentia** consists of small to medium sized mammals, including squirrels, marmots, mice, and rats. These mammals have 2 incisors above and below. Below is a list of mice and rats included in the order Rodentia that may be found in the owl pellets.

**Meadow mouse:** A cleaned skull will show a row of wavy teeth. Pull a molar and note that there are no roots, just a squared off bottom end where it sits in the jaw bone.

**White-footed deer mouse:** Using a cleaned skull, note the opening in the palate. The rear end of the opening goes up to the palate. The rear end of the opening goes up to the end of the row of premolars, but not between the premolars (see house mouse below). Use tweezers to pull a molar and note that there are roots, much like our own teeth.

**House mouse:** Using a cleaned skull, note that the opening in the palate goes back between the first

premolars, unlike the deer mouse (above). Pull a molar and note the roots on the tooth.

**Salt marsh harvest mouse:** You may never see one of these (they hide very well and are not easily captured by owls; in addition they are not found in owl pellets from geographic areas outside of the San Francisco Bay), but if you do, remember that the upper incisors (front teeth) are orange and have a vertical groove in each tooth.

**Roof rat:** These are larger than any of the rodents listed above. The teeth have roots, but not on the mount of sample skulls that the parietal bone in the rear part of the skull is shaped differently between the roof rat and Norwegian rat. Holding the skull facing away from you, note that the parietal of the roof is wider and more narrow, like the roof of a house. Whereas, the parietal of the Norwegian rat is higher in relation to width.

**Norwegian rat:** See above. A parietal bone is wider than that of the Roof rat. This rat also has roots on the molars.

**Gopher:** The skull is much larger than that of the rat or mouse, with sturdy molars that have no roots.

**Order Insectivora** are small mammals that eat insects. These include shrews, moles, and bats. Below is a list of mammals from order Insectivora that may be found in the owl pellets.

**Wandering shrew:** The pointed shape of the nose gives this shrew away. The shrew is a carnivore, so the teeth look like those of a dog or a cat. Most shrews will be smaller than the house or deer mouse.

## Interesting bones to look for include the following:

**Femur and hip bone:** If you find a femur and hip bone, show the students how the ball on the femur fits into the hip bone socket.

**Inner Ear:** Round, looks like a small shell, it is very delicate

**Skull or jaw bone with teeth:** The student attempt to pull out the rodents upper incisors (front teeth) With tweezers. It should pull out very easily and you can see how long the tooth is inside their skull - these are the teeth that constantly grow throughout a rodents life.

**Ask**

? **What kinds of bones did you find in the owl pellets?** (Skulls, femurs, teeth, ribs, etc.)

? **Were they bones from a rodents or a bird? Were you able to identify the particular species of rodent or bird that the bones were from?**

(Take all answers)

? **How are owls important to the salt marsh ecosystem?** (Owls are at the top of the food chain. In the salt marsh habitat they help keep the rodent population in balance. If there were no owls to hunt the rodent population would increase dramatically)

**Do**

Show the students the Food Web poster from p. 167.

**Ask**

? **What would happen to the rodent population if there were no more owls?** (The rodent population would increase dramatically.)

? **What would happen to the owl population if there were no more rodents?** (The owls would not have any food to eat and their population would decrease dramatically.)

? **What happens to owls when their habitats around the San Francisco Bay are destroyed?** (The owls would less areas to hunt or nest. They would compete for food with other owls in different habitat areas as a result there would be less food to support the owl population.)

? **In what ways can we help protect owls?**

(Learn about owls and their habitats and let other people know, write letters to legislators, reduce, reuse, and recycle, participate in Coast Clean-ups, never litter, never dump things down storm drains, and label storm drains with warnings, "Do Not Dump Flows to Bay.")

**Clean up**

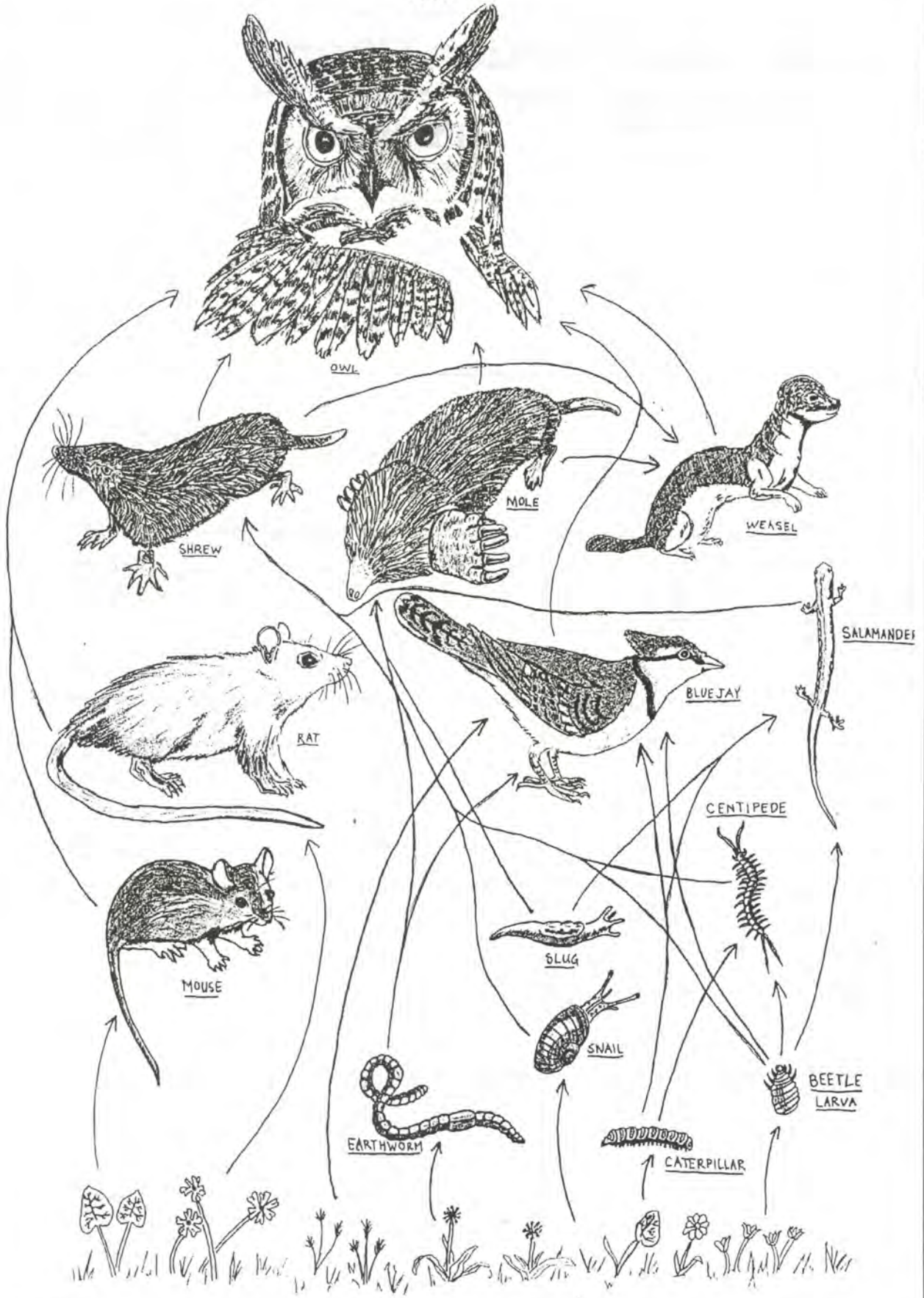
**Do**

Have the students either throw away their bones and fur in a designated trash bag or provide plastic bags the students can save their bones and the remaining owl pellets for further study or other projects. Collect the petri dishes, tweezers, hand lenses from the table, collect and recycle the newspaper from the students desks or work tables. *Have the students wash their hands.*












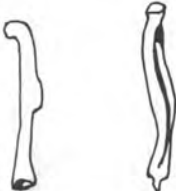





*Barn Owl*

# FOOD WEB





# Bone Identification Chart

	<b>Rodents:</b> Roof rat, Norwegian rat, Meadow mouse, Whitefooted Deer mouse, house mouse, Gopher	<b>Shrews:</b> Wandering Shrew	<b>Birds</b>
<b>Skulls</b>			
<b>Jaws</b>			
<b>Shoulder Blades</b>			
<b>Front Legs</b>			
<b>Hind Legs</b>			
<b>Hips</b>	