# Owl Ears

**Grade:** 4th
**Length:** 30 minutes
**Big Ideas:** Owl Adaptations
**Topic:** Hearing in Owls vs. Humans

**Summary:** Students will learn about owls and their adaptations and play a game that highlights the difference between our hearing and the owl's.

Fourth Grade Strand 1 – Organisms Functioning In Their Environment
Through the study of organisms, inferences can be made about environments both past and present. Plants and animals have both internal and external structures that serve various functions for growth, survival, behavior, and reproduction. Animals use different sense receptors specialized for particular kinds of information to understand and respond to their environment. Some kinds of plants and animals that once lived on Earth can no longer be found. However, fossils from these organisms provide evidence about the types of organisms that lived long ago and the nature of their environments. Additionally, the presence and location of certain fossil types indicate changes that have occurred in environments over time.

**Standard 4.1.2**
Develop and use a model of a system to describe how animals receive different types of information from their environment through their senses, process the information in their brain, and respond to the information. Emphasize how animals are able to use their perceptions and memories to guide their actions. Examples could include models that explain how animals sense and then respond to different aspects of their environment such as sounds, temperature, or smell. (LS1.D)

**Essential Questions:**
- What adaptations do owls have that help them find and catch their prey?
- How are owl ears different from humans? What makes them special?

**Enduring Understandings:**
- Owls have unique adaptations that help them survive in their environments.
- Human and Owl ears share many similarities, but have differences that allow the hearing of owls to be vastly superior to that of humans.

**Objectives:**
**Students will…**
- Students will be able to define nocturnal.

- Students will be able to describe the differences and similarities between owl hearing and human hearing.
- Students will be able to describe at least two owl adaptations.

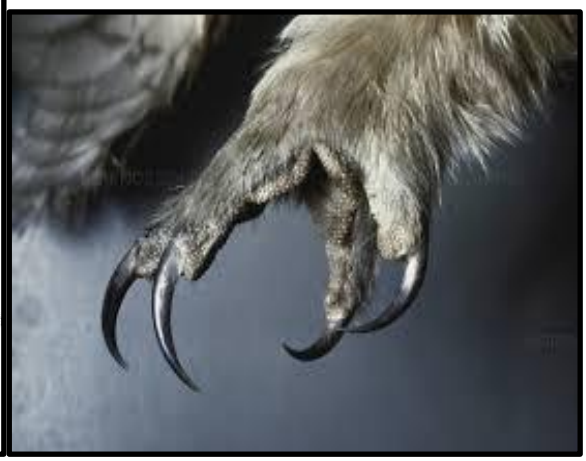
**Materials:**

- Blindfold
- Background Information (provided)
- Student At-Home Worksheet (provided)

**Background Information:**

Owls are a group of nocturnal raptors native to every continent except for Antarctica. They are birds, which means they have feathers, a beak, lay eggs, and are warm-blooded. Raptors refers to a group of predatory birds that share several common adaptations such as talons, designed for capturing prey and defense, and a hooked beak, designed for tearing meat. Raptors are also known for having exceptional binocular vision, which refers to where the field of vision for both eyes overlap and help the organism perceive depth in their surroundings. Raptors eyes are most often situated at the front of their head. Most birds have eyes situated on the sides of their heads, which allow them to see predators sneaking up on them, but limits binocular vision. All raptors, including owls, are carnivores. Owls primarily feed on small mammals, reptiles, and birds. One subgroup of owls feeds primarily on fish, and this group is aptly named the Fish Owls.

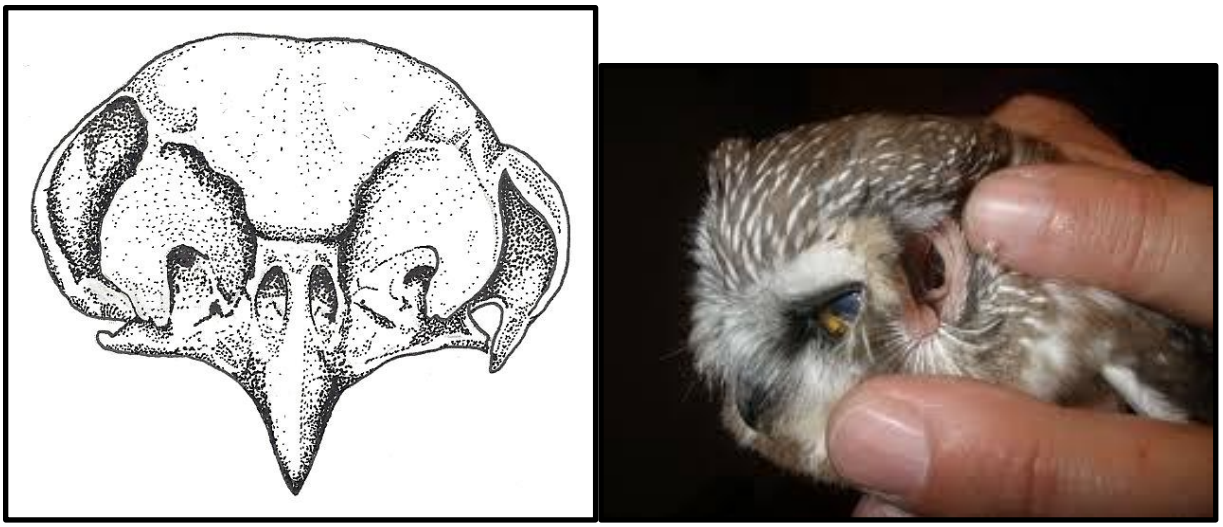
Owls have many adaptations unique among raptors. Their eyes are much larger than ours in proportion to body size. According to the National Geographic Society: Owl's eyes can account for up to 3% of their total body weight, compared to about 0.0003% in humans. That means an owl's eyes are on average 10,000 times larger than humans in proportion to body size! Another unique owl adaption is their feathers, which are softer and lighter than those of other raptors, and allow the owl silent flight. To aid in this, the leading edge of many of their feathers have a comb-like serration that allows the feather to cut silently through the air. Owls are also noteworthy among the raptors for their exceptional hearing, and many owl species, like the Great Gray and Barn Owls, are known to have some of the best hearing in the animal kingdom. Although most owls use a combination of keen hearing and vision to capture their prey, a Great Gray Owl can locate a mouse crawling under two feet of snow!



Left: An image depicting various owl species of North America. Right: A close-up view of the foot and talons of a Barn Owl. Note that the toes are arranged with two in the front, and two in the back. This arrangement is known as zygodactyl.

Owls have a flat facial disk that acts like our own outer ears, that help trap and funnel sound to their ears located on either side, behind their eyes. This facial disc is what often makes their face look round or like it has a border around it. Owl's ears are asymmetric, which means that one ear is positioned higher on their head than the other. This allows them to pinpoint sound much more accurately. Sound will hit one ear before the other, allowing the owl to more accurately pinpoint the location of the sound compared to symmetrical ears. In addition, the eardrum of the owl is much larger than humans in proportion to their body size.

Like humans, owls have three distinct regions to their ears. An outer ear, the middle ear, and the inner ear. The outer ear funnels sound waves into the eardrum located in the middle ear. The eardrum vibrates in relation to the air-borne sound waves, and transfers the energy to the inner ear, which triggers the thousands of tiny sensitive hairs within. Sounds of differing frequencies will reach different parts of the inner ear and trigger different hairs, helping the owl form a picture of its surroundings.



Left: An image showing the position of the asymmetrical ears of a Boreal Owl. Right: The inner ear of a Saw-whet Owl.

Other Owl Facts:

- Owls can turn their head 270 degrees, almost all the way around.
- Owls nest mainly in tree cavities or abandoned nests of other raptors. They rarely build their own.
- The “horns” of a Great Horned Owl, are not horns at all! Nor are they ears. They are tufts of feathers that assist in camouflage.
- Most owls do not hoot. Many communicate through a series of chirps, screeches, whines, barks, and clicks. Hooting owls are mainly found in the Bubo genus, which contains the Great Horned Owl, and the Strix genus, which contains the Spotted and Barred Owls.
- Screech Owls do not screech! Instead, they perform a fast series of hoots that sound like a ping-pong ball bouncing on the ground.
- Owls produce pellets, because they can’t digest the bones, hair, or feathers of their prey.
- The largest owl species is the Blakiston’s Fish or Eagle Owl, whose wingspan can measure up to 6.5 feet! It is also one of the rarest owls in the world, native to Russia, China, and the Japanese island of Hokkaido.
- The smallest owl species in the world is the Whitney Elf Owl, native to the arid deserts of Southwestern US and Mexico, only weighs 1.4 ounces!

**Key Vocabulary:**

- Adaptation: Something that helps an animal live in its environment/home
- Nocturnal: An animal that is active at night
- Carnivore: An animal that eats only meat
- Predator: An animal that kills another animal for food
- Prey: An animal that is killed by other animals for food

**Procedure:**

1. Have the students think-pair-share what they know about owls already. They could also draw a Mind Map about owls.
2. Introduce the lesson using Background Information as a reference. Be sure to talk about the various adaptations of the owl (talons, silent flight, binocular vision, etc.). Put special emphasis on their hearing (i.e. facial disc, asymmetrical ears). Use images to help students understand the adaptations and hearing of owls.
    a. As you go over each adaptation, ask students how they think that adaptation would help owls survive.
3. Explain to students that they will take turns being an "owl" and put their hearing to the test.
4. Choose one student to be blindfolded and have them stand in the middle of a circle of the other students.
5. One at a time, the students around the circle will clap. They can clap high above their head, low around their feet, or right in the middle. The "Owl", or blindfolded student, will have to point in the direction they hear the sound. They must also try to guess if the sound is coming from high, low, or middle. You can do this and keep track of how many times they get it right or wrong. Or you can end that students turn the first time the guess wrong and let the student who stumped them go next. Play several rounds to give students a chance to play the game.
6. Debrief by asking students if they thought it was easy to figure out where the sound came from.
    a. Do they think it would be easier for an owl? Why?
    b. Could the students hunt as well as an owl? Why or why not?
7. Finish by having students fill out the worksheet provided

**Supplemental activity:**

Another way this could be played is to have the "Owl" sit on a chair, and put a stuffed animal under the legs of the chair. The "mice", or other participants, must steal the stuffed animal without the owl noticing them. If the "Owl" hears a "mouse", then they point in the direction they heard the noise. If they point directly at one of the "mice", that mouse has to sit down and let the next person have a turn.

**Ideas for Playing From Home:**

If playing from home, the student will need to select members of the household to play. The more participants, the more fun the activity will be. If your student is having trouble finding participants. One way this could be played is to have a parent or guardian play music or a noise on their phone, hide it, and have the blindfolded student try to discover where it is hidden.