

Oxley Nature Center – High School

Title: Bird Walk at Oxley Nature Center - A Study of Bird Adaptation

Video Title on SDE Website: Bird Walk Oxley HS

Length: 0:04:28

Description of the Bellringer

Guided by Mr. Eddie Reese, Director of Tulsa's Oxley Nature Center, Mr. John Beasley, high school science teacher and his students from Tulsa's Memorial High School, look for birds at Tulsa's Oxley Nature Center. Located within Tulsa's Mohawk Park, Oxley Nature Center provides wetland, forest and prairie habitats which attract a diversity of bird life.

In this bellringer Mr. Reese discusses animal adaptation as demonstrated by several bird species that are observed during their walk.

Curriculum Application

High School Biology I

Content Standard 3.2 Species acquire many of their unique characteristics through biological adaptation.

Supplemental Material

Through adaptation, animal species have developed certain internal and external features. These features are essential to the animal's survival. Among vertebrate animals, birds offer many fascinating examples of animal adaptation.

Did you ever wonder how birds can fly? Here are some of the adaptations that make it possible for this group of animals to fly.

- 1) Birds have wings and feathers. Wings are essential for flight.
- 2) The large bones in birds are hollow. While strong, these bones are also light weight.
- 3) Birds also have an efficient digestive system which quickly processes food.
- 4) Unlike mammals, birds don't have a heavy, toothed jaw.
- 5) Birds don't carry their young during pregnancy; instead they lay eggs. This minimizes the time that the female bird must fly with added weight.
- 6) Most birds have an oil gland, called a uropygial gland. Oil from this gland helps birds to maintain their feathers.

Because most birds can fly, they are mobile. They can quickly move from one habitat to another. In some cases, birds migrate thousands of miles each year in order to improve their chances for survival.

In addition to adaptations for flight, birds have also developed many kinds of beaks, legs and feet. These adaptations allow birds to survive in different habitats. These habitats contain the kinds of food that birds need for survival. These habitats also provide a place for a bird species to raise their young.

Oklahoma's birds offer a fun and fascinating way to study animal adaptation.

Examples of Bird Adaptation

Seed-eating Birds

Seed-eating birds often have short, cone-shaped beaks. These strong beaks can crack open tough seeds. A few examples of seed-eating birds are the cardinal, goldfinch and species of sparrows.

Nectar-sipping Birds

Through adaptation of their wings and tongue, tiny hummingbirds are able to sip nectar from flowers while hovering over a plant. Their long, slender, tongue extends deep into a flower to reach the sugary nectar. Hummingbirds also sip sugar water in bird feeders.

Insect-eating Birds

Most birds, at some time in their life, are insect eaters. Some birds, like our state bird the scissor-tailed flycatcher, are able to catch insects in mid-air. To nab flying insects these birds must be agile flyers.

Because flying insects are not a reliable food source during Oklahoma's winter season, most insect-eating birds must migrate to a warm climate to find insects. Birds like the scissor-tailed flycatcher and purple martin migrate to Central and South America during the winter. Birds that spend part of the year in North America and part of the year in tropical climates are called neo-tropical birds.

Woodpeckers are another kind of insect-eating bird. Woodpeckers use their strong, pointed beaks and long, sticky, tongues to find insects in the wood of a tree. Woodpeckers have a thick skull which cushions their head as they hammer through the bark of a tree. The feet of woodpeckers are also different from most birds. Woodpeckers have two toes that are positioned forward, and two back. This enables these birds to climb up and down trees as they hunt for insects.

Many insect-eating birds have fairly long, slender, legs which allow them to hop on the ground. Robins and mockingbirds eat insects that are on the ground. They also use their sharp beaks to grab earthworms.

Shorebirds are another group of birds that feed on insects and other small animals. Many species of shorebirds find snails, crustaceans, worms and aquatic insects along the shoreline of an ocean or lake, and in the muddy soils of a pond or marsh. Many shorebirds migrate great distances between their winter and summer habitats.

Plant-eating Birds

While geese, wild turkey and cranes will eat small animals, their primary source of food comes from plants. Many birds have a digestive system that contains a chamber called a gizzard. Inside the gizzard are small bits of sand and gravel which the bird has intentionally swallowed. Called grit, these bits of gravel help the gizzard to mash the shells and seeds that a bird has eaten. For example, a wild turkey uses its gizzard to crack open acorns, which they gobble up whole. Humans don't need a gizzard because we use our molar teeth to grind our food before swallowing.

Fish-eating Birds

Some fish-eating birds, like egrets and herons, are called wading birds. Their long legs help them to stalk fish and frogs in the shallow water of a marsh, pond or lake. Wading birds also have sharp bills and long necks so that they can plunge into the water to grab their prey.

Other fish-eating birds, like the American white pelican, have a large pouch that is attached to their long, slender, bill. As the pelican pokes its head into the water, the pouch opens wide, like a balloon. When the pelican closes its bill, it traps any fish that swam into the pouch.

Some birds, like loons, kingfishers, cormorants, and certain species of ducks, dive into the water as they chase and catch fish. Diving ducks include mergansers, bufflehead, goldeneye, redhead and canvasback.

With its keen eyes, bald eagles are able to locate fish that are swimming near to the water's surface. Powerful wings make the eagle a swift hunter. Its sharp and strong talons are just the right tools to nab a fish from the water.

Dabbling Ducks

Some duck species, like mallard, pintail, shoveler, and teal, are called dabbling ducks. These ducks turn their bottoms-up as they feed on vegetation and aquatic animals that are in the water and mud of a pond or marsh. Dabbling ducks have bristles along the edge of their bills. They use these bristles to separate food from the water and mud that fill the duck's beak as it feeds.

Birds of Prey

Hawks, eagles and owls are called birds of prey because they hunt and eat other animals. Through adaptation, these birds have keen eyesight, as well as powerful wings, legs and feet. Nighttime hunters, owls have also developed exceptional hearing so that they can locate their prey in almost total darkness. An owl's feathers have adapted so that these birds can fly without making a sound.

Scavengers

Vultures are nature's sanitation department for they help to remove dead and decaying animal remains, also called carrion.

Vultures have strong wings that allow them to soar great distances with little expenditure of energy. Keen eyesight allow them to spot carrion from high in the sky. While most birds do not have a developed sense of smell, turkey vultures have an excellent sense of smell which helps them to find carrion.

Vultures don't have feathers on their head. This adaptation helps these birds to keep decaying material off of their heads while they are feeding. Vultures also have a specialized digestive system that allows them to eat carrion without getting sick. Carrion is filled with toxins and bacteria, things that can kill other animals.

Oxley Nature Center – High School

Title: Birding at Oxley at Oxley Nature Center; Tips for Viewing Birds

Video Title on SDE Website: Birding at Oxley HS

Length: 0:08:01

Teacher Tool – Primary Focus: Biology I, Process Standards

Description and Possible Use of the Bellringer:

Led by Mr. Eddie Reese, Director of Tulsa’s Oxley Nature Center, and Mr. John Beasley, high school science teacher at Tulsa’s Memorial High School, students from Tulsa Memorial learn how to adjust the eyepieces (oculars) of binoculars for viewing birds. Mr. Reese leads the students on a bird walk through wetland, prairie and forest habitats within Oxley Nature Center. He points out some ways to help in bird identification, such as using field marks. Field marks are not only the color, size and shape of a particular bird species, they also may include a bird’s song/call and other clues that indicate its presence.

Some field marks, such as beak, legs, feet and wings, are also examples of specialized structures of particular bird species. The use of an illustrated field guide also helps in identifying birds.

The students use tally sheets to record the species, number and location of birds that were observed.

Mr. Beasley and his students point out that while birds and other wildlife can be observed at Oxley, state parks and wildlife refuges, many of these animals can also be seen in the communities and neighborhoods where we live. One of the Memorial High School students describes the things that he and other students have done on their high school campus to improve bird habitat and make it easy to observe birds.

Curriculum Application

Biology I – Process Skills

Observation, Experimentation, Interpretation and Communication of Data

Use data from this bellringer, and from the following websites, classroom applications might include: review of data pertaining to population trends for selected bird species; identification of variables that may be affecting bird populations; development of hypothesis regarding population trends for selected bird species, etc.; and the communication of this information through graphs and other methods of communicating data.

Birding at Oxley Cont'd.

Attachments

Attached is an abbreviated summary of Christmas Bird Counts that were conducted by members of the Tulsa Audubon Society at Mohawk Park, which contains Oxley Nature Center. The entire Christmas Bird Count can be found on the Tulsa Audubon Society's website. (www.tulsaaudubon.org/birding.htm).

These bird counts might be used for a classroom activity involving the graphing of this data (counts by bird species over time). These bird counts were conducted in much the same manner as the Memorial High School student's bird walk. These Christmas Bird Counts might also be used to discuss the reasons why many birds must migrate to survive (ex. birds seek those habitats that have needed food, shelter, etc.).

For many of these bird species there is great variation in the numbers of birds that are reported from one year to the next. Classroom discussion might address some of the reasons for this variation (ex. the region's weather for that year; bird behavior – during the winter some species tend to gather in large flocks which may frequently move between habitat locations). Thus, classroom discussion might address the importance of having a broad base of data before conclusions can be drawn regarding population trends for particular bird species.

As an extension of this activity, students might compare the Tulsa Audubon Society's annual bird count with the results of the Oklahoma Department of Wildlife Conservation. The websites for these and other bird conservation organizations are listed at the end of the **Teacher Tool** titled: **Oxley Nature Center – High School, Opportunities for Citizen Science**.

All of these organizations depend upon citizens to assist in the collection of bird population data.

**Partial Results of the Christmas Bird Count at Tulsa's Mohawk Park
As Reported By Members of the Tulsa Audubon Society**

Bird Species	Year				
	2004	2005	2007	2008	2009
Canada Goose	157	254	382	112	345
Mallard Duck	217	172	373	142	386
Hooded Merganser	10	55	37	8	9
Great Blue Heron	0	14	4	7	5
Red-shouldered Hawk	6	11	1	0	6
Red-tailed Hawk	6	4	2	2	1
Ring-billed Gull	45	73	224	147	25
Red-headed Woodpecker	23	2	5	0	4
Downy Woodpecker	2	41	2	14	9
Red-bellied Woodpecker	0	28	7	5	7
Blue Jay	51	13	12	2	8
American Crow	84	54	21	15	14
Carolina Wren	2	38	3	6	4
American Robin	23	329	34	0	0
Swamp Sparrow	15	25	20	0	5
Dark-eyed Junco	86	132	186	84	55
Northern Cardinal	65	60	26	0	34
American Goldfinch	35	7	5	12	12
Eastern Bluebird	0	19	7	4	12
Northern Mockingbird	4	6	3	7	2

Oxley Nature Center – High School

Title: Opportunities for Participating in Citizen Science and Volunteer Programs that Benefit the Environment

Video Title on SDE Website: Opportunities Citizen Science HS

Length: 0:05:03

Teacher Tool – Primary Focus: Biology I, Process Standards

Description of the Bellringer

Mr. Eddie Reese, Director of Tulsa’s Oxley Nature Center, and Mr. John Beasley, high school science teacher at Tulsa’s Memorial High School, and students of Tulsa Memorial High School, discuss opportunities for becoming involved in citizen science and volunteer projects that benefit the environment. Mr. Reese describes the threat of invasive species to native plants within the Oxley Nature Preserve. He invites volunteers to help eliminate Japanese honeysuckle and other non-native plants by assisting park personnel in removing these unwanted plants from Oxley Nature Center.

This bellringer also includes an interview with Mr. Beasley and his students as they discuss their involvement as volunteers in the Oklahoma Conservation Commission’s Blue Thumb water quality monitoring program. **This program offers students real-world applications for certain science process skills.** Contact information for Ms. Cheryl Cheadle, Blue Thumb Coordinator, is provided.

Curriculum Application

High School Biology I: Process Standards 1.2; 2.1; 3.3; 4.8; 6.1, 6.2, 6.3, 6.4

Participation in annual wildlife surveys offers another opportunity for volunteerism. Called citizen science, individuals can help natural resource agencies as they monitor wildlife populations. For example, the Tulsa Audubon Society provides the results of the Christmas Bird Count that is annually conducted by members of this organization. The websites of the Tulsa Audubon Society, the Oklahoma Department of Wildlife Conservation’s Non-Game Program, the U.S. Dept. of the Interior’s Breeding Bird Survey and other wildlife monitoring organizations are provided.

These wildlife monitoring programs provide data that is important to the many efforts that seek to ensure the survival of wildlife species. From a classroom perspective, the information that is collected through these **wildlife surveys can be useful for classroom exercises involving graphing and analysis of data** (i.e. calculation of mean, median and mode for selected species). As well, students might be asked to research certain wildlife species with regard to its estimated population over time and to identify some of the potential causes for a particular species’ population trends.

Citizen Science Cont'd.

To obtain wildlife data for analysis, attached are some of the websites that provide information on bird and butterfly monitoring efforts. All of these projects include the participation of volunteers as citizen scientists.

Tulsa Audubon Society: www.tulsaaudubon.org/birding.htm

Oklahoma Department of Wildlife Conservation Non-Game Program
www.wildlifedepartment.com/amateurbiologists.htm

North American Breeding Bird Survey
<http://www.pwrc.usgs.gov/bbs>

Audubon – Christmas Bird Count
www.audubon.org/bird/cbc/getinvolved.html

Great Backyard Bird Count
<http://birdsource.org/gbbc/>

Citizen Science, Inquiry and the Outdoors – Bird Sleuth
<http://www.birds.cornell.edu/birdsleuth/about/what-is-birdsleuth>

Project Feeder Watch
www.birds.cornell.edu/pfw

Journey North – Migration of the Monarch Butterfly
<http://www.learner.org/jnorth>

Partners in Flight – www.partnersinflight.org

Nature Serve (wildlife data) www.natureserve.org/getData/animalData.jsp