



This activity is adapted from The Shorebird Sister School Arctic Nesting Shorebirds Curriculum.

Description

By doing the student activity sheet, students will learn 3 physical adaptations specific to shorebirds.



Objectives

Students will be able to:

- Describe the 3 adaptations that shorebirds have to live in wetlands

Time Required

Preparation: 15 minutes to make copies, 1 hour or longer to find props which are optional

Activity: 20 to 30 minutes of one class period

Subjects

Environmental Science

Skills

Applying Information, Comparing, Evaluating, Team Work (if students work in groups), Interpreting and drawing conclusions (if students are given props and decide how they relate to shorebirds and they develop explanations for their choices on the student activity sheet.)

National Science Standards

K-4: Life Science

Characteristics of organisms
Unifying Concepts and Processes
Form and function

5-8: Life Science

Structure and function of living systems
Unifying Concepts and Processes
Form and function

Build A Shorebird

Short Version

Materials

Copies of the student activity sheet for each student.

Copies of the student activity answer sheet for each student.

Optional props for demonstration:

Down Jacket

Pictures of down or feathers

Drinking straw

Cardboard paper roll

Chicken bone

Balloons

Scissors and paper

Camouflage clothing

Rubber boots

Drinking straws

Tweezers

Gummy Worms and M&Ms

Bottle of baby oil

Preparation and Procedure

1. Print off the student activity sheet and answer sheet provided on the web. Make enough copies so that each student has an activity sheet.

2. Review the background information on general bird adaptations. If you like, show your students props such as down vest, picture of bird wing, straws, and balloons to help students envision the unique adaptations that all birds have. **Table 1** will explain how the bird uses its adaptations and give you ideas for props to help explain to your students. If you have an advanced group, you could even give each group one prop and ask them how it represents some aspect of bird characteristics. Their answers don't have to be correct but it can start lively conversation and debate among them so that they are eager for the correct answers. *(If you are short on time you can skip step #2 and go to step #3.)*

3. Then, referring to the background information on shorebird adaptations, introduce the unique adaptations that shorebirds have through interactive discussion with your class. You can refer to **Table 2** for explanations and prop ideas and use them similar to step #2.

4. Pass out a student activity sheet to each student. They can work independently or in groups to work through the answers on the work sheet. For advanced groups, have students not only choose which part fits on Maya but have them develop an explanation for their choice. You will see that the activity sheets only highlight some of the shorebird adaptations.

5. Pass out the shorebird activity answer sheets and review with the class. See the quiz on the web page for an evaluation of what they have learned.



Activity

General Bird Adaptations: Table 1

Adaptation	Description	Demonstration
<p>1. Down Feathers Ask students to imagine they are birds in flight. Ask how it feels to be soaring above the earth. Is it cold? Skin isn't enough to insulate you up there. You have had to adapt to temperature extremes. How? With feathers.</p> <p>2. Contour Feathers What sort of material is strong and flexible enough for the wings and tail to help you fly?</p>	<p>Feathers are a unique adaptation found only in birds. Two kinds of feathers are found on all birds:</p> <p>1. Down feathers - fluffy, under-feathers for insulation. These are the bird's underwear. 2. Contour feathers - strong outer feathers for flight. These are also the bird's clothes and coloration.</p>	<p>down jacket</p> <p>make a paper wing</p> <p>Study comparison pictures of down and contour feathers.</p>
<p>3. Hollow bones Ask students to think about how much they weigh. Then ask how much they think a Bald Eagle weighs. It only weighs between 8 - 14 lbs and has a 7 - 8 ft wing span.</p>	<p>Hollow bones help a bird keep its weight low. Most of the bird's weight is in the breast and wings (where the flight muscles are). Our bones are not hollow, but instead are filled with marrow for red blood cell production. Birds have marrow only in their breast bone (sternum).</p>	<p>drinking straw or cardboard paper roll</p> <p>Pass chicken bone around for the students to examine its weight and structure.</p>
<p>4. Air sacs Ask a volunteer to stand up and become a crow by flapping his / her wings 20 times in 10 seconds. Ask how much effort that was on his / her breathing. Harder than walking? Yes!</p>	<p>Air sacs enable a bird to take in enough oxygen to help transfer energy into a usable form for flight. Birds have lungs like humans, but they require more oxygen intake. Air sacs, rather like balloons, extend from the lungs and between, and into, hollow bones. During inhalation and exhalation air flows through the lungs and the air sacs to maximize the absorption of oxygen.</p>	<p>balloons</p>

Special Shorebird Adaptations: Table 2

Adaptation	Description	Demonstration
<p>5. Long, pointed wings Ask students to think about the different shape of bird's wings. Compare the stubby wings of a penguin to the big, broad wings of a soaring eagle. Do you think that wing shape might be related to what the bird uses them for (lifestyle)?</p>	<p>The shorebird way of life includes flying long distances between the summer home where it breeds to shores where it spends the rest of the year just feeding and avoiding the cold weather of the higher latitudes ("North" in the Northern Hemisphere). This is called <i>migration</i>. In order to fly fast and far, having long, pointed wings is helpful.</p>	<p>Use the scissors to shape the tip of the paper wings from above so that they look long and pointed.</p>
<p>6. Camouflage Plumage Ask students to think about how a small bird can protect itself from larger predators. Would small shorebirds have much luck <i>fighting</i> with hawks on the beach or with foxes on the tundra?</p>	<p><i>Cryptic coloration</i>, or <i>camouflage</i> helps these birds be less conspicuous. Because they spend much of their time on mudflats, beaches, or grassy tundra, their <i>plumage</i> is generally shades of brown, black, white, or russet which blends in with their habitat. (Larger shorebirds, like Avocets and Oystercatchers, can't hide as easily, and therefore don't generally bother with camouflage.)</p>	<p>Camouflage clothing</p>
<p>7. Long Legs Ask students if they would need big legs to sit in a tree or fly. Do they need them to walk? How about running from the waves? Next ask students what adaptation humans use to walk and work in wet conditions.</p>	<p>Shorebirds seldom perch in trees, but rather walk or roost on the ground when they are not flying. Many shorebirds walk on shorelines or mud to find food. Having long legs helps them to wade through water or mud. (Actually, the length of the legs of a shorebird gives a clue to where it feeds.)</p>	<p>blue material (water) rubber boots</p>

Special Shorebird Adaptations: Table 2 Continued

Adaptation	Description	Demonstration
<p>8. Long Toes What are your toes for? Toes are for stability in walking.</p>	<p>Shorebirds do not spend much time swimming like seabirds do. Therefore, they don't need webbed feet, just long toes for stability and walking.</p>	<p>drinking straws</p>
<p>9. Bill Ask students what humans use to feed themselves (forks, straws, chopsticks, fingers, lips, teeth, etc.). Do you use different things to help you eat different foods?</p>	<p>Bills, or beaks, are used for picking up food, nest construction, and courtship, as well as preening and defense. Compare the bills of some shorebirds and explain the different feeding niches the birds fit into. For example: <i>Curlews probe deeply into the ground with their long, curved bills to reach buried invertebrates.</i> <i>Plovers and Surfbirds have short, stout bills to pick up prey they spot on the surface of sand or rocks.</i> <i>Sanderlings have tapering, tweezer-like bills to help them "stitch" the sand - a rapid, repeated probing to pull up worms and crustaceans right below the surface of the beach.</i></p>	<p>Tweezers Gummy worms M & Ms or other candy-coated treat, representing crunchy-coated crustaceans like the clams that Maya loves to eat.</p>
<p>10. Oil gland Pour oil (cooking or other oil that is different color than water) and water into a beaker and observe the separation. Does oil get wet? What does "get wet" mean? "Wet" means saturated with water. Ask students how they keep dry in the rain. Is raingear treated with any special coating? Yes!</p>	<p>The oil gland helps keep a shorebird's feathers waterproof. Seabirds have oil glands too. Feathers are kept clean and smooth by constant preening with oil from the oil gland found above the base of the tail. The oil is transferred to the plumage (feathers) with the bill or back of head.</p>	<p>baby oil bottle</p>