



Teacher

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

Description

By dressing a classmate as a shorebird, students will learn about physical adaptations that are unique to all birds and adaptations specific to shorebirds.



Objectives

Students will be able to:

1. Describe adaptations unique to birds
2. Describe adaptations unique to shorebirds
3. List threats to shorebirds and their habitat

Time Required

Teacher Prep: 1 day to find props and prepare flash cards

Activity: One 40 to 60-minute class period.

Subjects

Environmental Science

Skills

Observing, Communicating, Applying Information, Predicting, Evaluating, Team Work, Discussing, Interpreting and applying information

National Science Standards

- K-4: Life Science
Characteristics of organisms
- 5-8: Life Science
Structure and function of living systems
- K-8: Unifying Concepts and Processes
Evolution and equilibrium
Form and function

Build A Shorebird

Long Version

Materials

Color-coded flash cards (download PDF file "flashcards" from website)
Cardboard bill, or tweezers tied on a string necklace
Several drinking straws or cardboard toilet paper rolls
Camouflage-patterned hat, vest, or cloth
Cardboard or paper bottle of baby oil
Picture of comparison between "M & Ms" or "Gummy Worms"
2 large paper bird wings
down and contour feathers
Popcorn
Black paper oil splashes
Blue paper wetland
Chicken bone
6-pack rings or a net
Balloons
String (20 - 40 feet)

Clothespins
Down jacket or vest
Scissors
Spray bottle
Duct tape

Optional:
Electric fan
Rubber boots or waders

Preparation

1. After gathering materials, students or teacher need to construct one student-sized set of paper wings, which will be cut and modified during the activity; one blue paper wetland to stand on; one cardboard bill; one paper bottle of baby oil; and several black construction paper cut-outs of oil spills.
2. Create flashcards in three different colors. "General Bird Adaptation" cards can be yellow. They give the name of the adaptation on one side, and a description on the other. "Special Shorebird Adaptation" cards are blue. "Threat to Shorebird" cards are red. You can use the masters found in the flashcards download. There should be enough cards so that every student besides the bird volunteer has at least one. For large classes, duplicate cards are fine.

Procedure

1. Discuss and define **adaptation** (characteristic or behavior that helps an organism survive in its environment). Explain that the aim of this activity is to explore the world of shorebirds and examine adaptations by building a shorebird.
2. Ask for a volunteer. This person will be turned first into a bird, then into a shorebird, and finally into a Western Sandpiper. He/she will also be subjected to some threats a shorebird may face (the volunteer must have a strong constitution!).
3. Distribute all the flash cards to students to prompt their involvement in the activity.
4. Begin building a bird. Start with the yellow cards. See the chart on the following pages for adaptations. Use the clothes pins to attach most items to the student.
5. Download BASquiz.pdf from website. Have students take the "Build A Shorebird" quiz after the activity is over.



Activity **General Bird Adaptations: Yellow Flash Cards**

Adaptation	Description	Material Needed
<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.</p> <p>2. Contour feathers - strong outer feathers for flight. These are also the bird's clothes and coloration.</p>	<p>Dress bird in down jacket and bird wings.</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>Attach drinking straw or cardboard paper roll to down jacket.</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>Attach balloons with clothespins: each student with a yellow card places one balloon on the bird.</p>

5. Our volunteer has been turned into a bird, and now this bird will become a shorebird. Explain that shorebirds are birds of open spaces which fly long distances (migrate) to spend their winter ("nonbreeding" season) on beaches, mudflats, and estuaries (the "shore").

Special Shorebird Adaptations: Blue Flash Cards

Adaptation	Description	Material Needed
<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 volunteer's paper wings 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>Place the camouflage clothing on the bird.</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>Place the blue material representing a wetland on the ground for the shorebird to walk on.</p> <p>Optional: Put the rubber boots/ waders on the bird.</p>

Special Shorebird Adaptations: Blue Flash Cards

Adaptation	Description	Material Needed
<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>Using duct tape, attach three long drinking straws to each toe of the bird.</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>Attach a cardboard bill to the volunteer bird. Alternatively, tie tweezers on a string necklace around the neck of the bird to represent the shorebird's bill.</p> <p>Place "Gummy worms" in the mouth of the volunteer. These represent the segmented worms or the long, stretchy Nemertean worms that some sandpipers like to eat. May also feed to the bird 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>Attach the baby oil bottle to the back of the down jacket. Ask the bird to try and preen!</p>

6. Shorebirds are adapted for a lot of walking and running, but they have to rest those feet sometime! Have the volunteer stand on one foot, just like a roosting shorebird.

7. Spray the volunteer lightly with the water spray bottle. Our bird is now a wetland-loving shorebird. Discuss the special adaptations of shorebirds as you use the blue flash cards to transform the volunteer.

8. Now discuss the importance of shorebird scat (guano). What goes in must come out! Sprinkle the popcorn around the volunteer shorebird. Guano from shorebirds, just as from other birds and bats, contributes to the chain of life. Nutrients from guano are returned to the wetlands that the shorebird uses. The (elemental and molecular) nutrients in guano are made available for manufacture of food by tiny plants and plankton. These "food makers" (photosynthesizers) become food in turn for small fish, crustaceans, and other animals. The food web is continued, and eventually it includes the shorebirds and even humans. Every organism and its activities plays a part in the chain of life on our planet.

9. Our volunteer shorebird will now become a Western Sandpiper in a huge flock. Western Sandpipers are very small, Arctic-nesting shorebirds with a rufous or chestnut color to their speckled backs. They are familiar to many people because of the huge flocks they form during migration. The teacher selects a few students to join the volunteer shorebird, perhaps holding hands, as members of a Western Sandpiper flock. Western Sandpipers could be chosen based on who is wearing a reddish shirt or the four smallest students, etc..

Alternatively, the volunteer shorebird could become a Dunlin, another flocking Arctic nesting shorebird with a striking black breast during breeding season. Students with black on the front of their shirts could join the flock as other Dunlin.

10. Now we will explore why life is not easy for a shorebird. In addition to the difficulties of migrating long distances over the ocean or in bad weather, shorebirds are also subject to human-caused dangers. Market-hunting for shorebirds killed them by the millions in the past. Shorebirds are no longer killed to be sold as food, but other threats have grown significantly. **Habitat loss** is the biggest threat to shorebird survival today. Discuss this threat and others listed below, while referring students to red flash cards.

Threats to Shorebirds: Red Flash Cards

Threat	Description	Material Needed
<p>11. Habitat Destruction Discuss the terms “estuary” and “wetlands.” Ask students about any places where they see shorebirds locally. What kind of place is it? Is there any threat of it being destroyed? If there is not a local concentration of shorebirds, another well-known local animal can be substituted for discussion.</p>	<p>“Habitat” is where something lives. In any year, most shorebirds depend on at least three habitats: breeding, nonbreeding, and migration sites. Most important migratory stopovers for Arctic-nesting shorebirds are estuaries or other types of wetlands. These fragile areas are also very attractive to humans as water sources or home sites. Water is drained away or its course altered, and bridges, houses, and docks are built. Animals and plants which provide food and shelter for the shorebirds are destroyed.</p>	<p>Restrict the habitat available to the shorebird flock by penning them in with desks, or winding string around the student birds to tie them together.</p> <p>Now say “all the shorebirds with habitat get Gummy Worms!” and pass out treats to those in the habitat. What about everyone else? Ask them “Can we make new habitat. How about fixing ruined habitat?” Ask for ideas.</p>

Threats to Shorebirds: Red Flash Cards

Threat	Description	Material Needed
<p>12. Oil Contamination</p>	<p>Oil spills can be very damaging to estuaries. Devastating oil spills, killing shorebirds and destroying habitat for many years, have occurred in many places in the world when oil tankers were disabled near shores.</p>	<p>Pin oil splashes on the volunteer shorebirds.</p>
<p>13. Disturbance Ask students how disturbing a shorebird or flock could harm it or its young.</p>	<p>When the seasons change, flocks must migrate very quickly, either to take advantage of the short Arctic summer to breed, or to avoid the coming cold of winter in the North. If flocks are disturbed and cannot refuel with food at their traditional stopover points, they may not have another chance to find enough food for the journey. Planes and people approaching can also disturb shorebirds on their nests, exposing eggs and chicks to predators and the weather.</p>	<p>Have the students make noise to simulate ATVs or motorcycles.</p> <p>Alternatively, turn the electric fan on and point it towards the flock to simulate a disturbance.</p>
<p>14. Trash on the beach or in other wetlands Ask students if they have ever seen trash littering their local wetlands. Where did it come from? What should have been done with it? Besides cutting down on the use of “disposable” trash and putting trash in its place, one should also cut up plastic rings or long strings before throwing it away. Never leave tangled fishline behind in the water or on the shore, and cut it into small pieces before disposing of it in the trash.</p>	<p>Plastic debris and other trash can be mistaken for food by birds, and can kill them. Shorebirds can also become entangled in discarded fishline and 6-pack rings. Abandoned cars, appliances, and other trash items can leak poisons into wetlands.</p> <p>What sort of message do people get when they see trash? Seeing trash on the beach can give children and visitors the impression that the land is not valued, or teach them that it's ok to discard more trash.</p>	<p>Place netting or plastic 6-pack rings somewhere on the sandpipers.</p>

11. For an evaluation of the activity, refer to the quiz posted on the web page.