



# Build a Bird: Bird Adaptions

## Teacher/Volunteer Summary Adapted from Shorebird Sister School, “To Build a Shorebird”

### Objectives

Students will 1) demonstrate the physical adaptations that are unique to birds; 2) explore the diversity of bird adaptations to their environments; and 3) identify and describe threats to conservation of birds and their habitats

### Methods

Students will use dress up props to represent the unique adaptations common to all birds.

### Materials

Dress up props, representing various avian and birds of prey adaptations and adaptation cards  
Clothes pins – for attaching adaptive props  
Pillow case – place ‘adaptions’ you want to teach about in the pillow case before the class arrives.  
Biofacts: (if you have them) Bird Parts: 2 heron legs and feet, 2 swan foot, 2 duck feet, fake goose poop...

### Background

An adaptation is a characteristic or change within an animal that helps it better survive in its environment.

A habitat is the place where an animal lives: it contains the food, water, shelter and space in the right arrangement that allows an animal to live.

**Birds have three characteristics that distinguish them from other animals: feathers; hard-shelled eggs; and hollow bones. They also have a variety of other interesting adaptations that aid their survival.**

**Feathers:** Only birds grow feathers. Birds have different types of feathers including stiff contour feathers, which cover the wings and body, and fluffy down feathers, which insulate a bird and keep it warm. Feathers are one of several adaptations that enable birds to fly. They also protect a bird's skin and provide coloration and structures that either camouflage a bird or help it attract a mate.

**Strip of Velcro** – represents contour feathers, which are stiff. Their stiffness and shape is maintained by series of hooklets and barbules on barbs of the feather vane/blade - Allow students to feel down feather example and wing.

**Black down vest:** Down feathers insulate and keep a bird warm. This is necessary for a warm-blooded animal. They are soft feathers near the bird's body. Allow students to feel down feather example.

**Eggs:** Birds are also the only animals that lay hard-shelled eggs. The hard shell protects the developing chick, keeps an egg from dehydrating and allows parents to sit on the eggs during incubation.

**Fake Egg** – represents hard shell of eggs – protection for developing embryo outside of body

**Hollow Bones:** All birds also have hollow bones. Hollow bones are lighter in weight and contribute to a bird's ability to fly. Thin internal braces within the bones allow them to be strong as well as light. Many bones of a bird's skeleton are also fused to increase strength. For example, birds have fused digits—we have five fingers, they have only three bones for what would equate to our fingers. A strong light frame is not only important for birds being able to fly, but is needed to support the large flight muscles of birds and protect their internal organs. Because many bones of a bird's skeleton are fused, the bodies of birds are not as flexible. To increase flexibility, birds instead have extra vertebrae in their necks. Birds have 14 neck vertebrae, humans have 7.

**Garden Gloves and masking tape to tape a couple of fingers making 3 bones instead of 5:**

**Paper towel tube** – represents hollow bones

**Wings:** Birds also possess wings. Wings are streamlined like those of an airplane—curved on top (convex) and flat or slightly curved (concave) on the bottom to provide lift necessary for flight. The type of flying a bird does depends on the size and shape of its wings. Contour feathers make up the wings of a bird. Long broad wings for soaring, short broad wings for maneuverability, long and narrow for speed, etc.

**Fabric Wing** – represents bird wing (plus string to tie it on)

**Air Supply:** Birds also have a very efficient breathing system. They have lungs with special balloon-like air sac extensions. The air sacs spread into different parts of a bird's body and into the hollow parts of larger bones. The air sacs allow birds to bring in more oxygen through their lungs to their body cells. More oxygen allows them to rapidly generate energy they need to fly and maintain a high body temperature. Air sacs also help a bird cool down if necessary and help some that swim stay afloat. Birds have relatively large hearts as well to circulate blood through their body for efficiently. Because of their awesome adaptation birds can fly high in the air. Bar-headed Geese fly over Mt Everest! **Balloons** – represents air sacs (use tape to stick them on);

**Large Heart Shape cut from construction paper** – represents extra-large heart of birds (tape on);

**Vision:** Birds also have much better vision than other animals. They have large eyes that can focus sharply on both nearby and faraway objects. They can see in color, and most have both monocular and binocular vision. They have a third eyelid (nictitating membrane) to keep their eyes clean. This special membrane helps to protect the eyes during flight or diving in water.

**Sunglasses** – represents nictitating membrane.

**Magnifying Hand Lens** – represents exceptionally good vision birds have;

**Beaks/Bills:** Each type of bird also has a different type of beak. Birds use their beaks mainly to gather and eat food and to drink. Since they have no hands, birds also use their beaks to collect nest materials, preen their feathers, scratch their bodies and attack enemies.

**Salad tongs/Slotted spoon** – represents different types of bird bills.

**Oil Gland:** Most birds also have special oil gland (uropygial gland) located just above the base of the tail. Birds rub the oil from this gland over its feathers with its beak to help condition, clean and in some birds waterproof the feathers **Baby Oil** – represents oil gland,

**Digestion:** Many birds also have a large sac, called a crop, at the bottom of their esophagus to store undigested food. The crop allows them carry food away and slowly digest it later. To aid digestion most birds also have a gizzard, a specialized muscular part of the stomach. Birds use gizzards like other animals use teeth (which birds lack)—to grind up hard nuts, seeds, grain and other foods they eat.

**Plastic Baggie with stones** – represents crop;

#### **Other:**

1. Birds have no sweat glands so must cool down by panting like a dog, resting in shade or bathing in water. **Have student pant. Great horned owls pant: it's called gular fluttering.**

2. They have no outer ear flaps, which minimizes weight and air resistance.

**Colored Scarf** -- to cover ears – represents lack of outer ears;

3. They also have no urinary bladder to store waste generated from metabolism. Uric acid is not diluted in water for elimination, but excreted as solid "white wash." Pooping often is an adaptation. The more you can excrete, the less you weigh and the better you can fly.

**Popcorn** – represents the solid waste that birds excrete (uric acid) Drop popcorn around the 'bird'

4. The color of birds feathers are an adaptation. Females are often less brightly colored than males – helps provide camouflage. Males in some species have brightly colored feathers during the breeding season. **(This one is totally fun, kids love it and it helps explain behavior).**

**Camouflage Hat** – represents coloration provided by bird feathers; place it on the 'girl bird'

**Brightly colored 'dress'** – represents bright colors some male birds have to attract a mate. 'boy bird'

#### **Procedure**

**1. Begin discussion on what makes a bird a bird?** What are some characteristics unique to birds?

*Ask Students: What makes a bird a bird? What are some characteristics unique to birds?*

They will have many answers: for example, feathers, hard-shelled eggs and hollow bones.

Perhaps list a few offered by participants on the board and then proceed to the activity. Some things listed will be unique to birds, but others are just interesting adaptations they have but may not be unique. For instance, birds have wings, but so do insects and bats. Perhaps do a venn diagram or graphic organizer to chart features of bird compared to people or to mammals, amphibians, fish, etc.

**2. Read "A Lizard Has No Gizzard"** (If you have time.)

#### **A LIZARD HAS NO GIZZARD**

A lizard has no gizzard, and a camel has no beak.

And you will never see a shark soar above a mountain peak.

Bear bones do not have struts inside, and wallabies do not have wings.

And you will never see a kangaroo that twitters, squawks, or sings.

A cheetah does not ever have a feather or a crop.

And a giraffe cannot fly 500 miles without a single stop.

An octopus has no air sacs, a squid never did have down,

and you will rarely see an earthworm that is any color but dull brown. But birds have feathers and wings, and a crop, gizzard and beak.

With dazzling colors and awesome flight, they really are unique!

**3. Tell class that you will be building a bird in this activity.** Tell them you have a variety of objects that represent a variety of adaptations birds possess that make them unique and interesting. Have one participant be a volunteer to become a bird. Other students will be pulling ‘adaptations’ from the pillowcase.

**4. Build the bird as follows:**

- Walk around the class, have students pull an ‘adaptation’ from the pillow case.
- Ask leading questions for each adaptation: what is that? What might a bird need that for? Do you have any ideas why a bird might need that?
- Some adaptations have cards: students can read the cards aloud. Not all adaptations have cards
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- **Teacher** when an ‘adaptation’ is chosen from the bag, use the information in the background section to explain what it is and how it helps a bird live. Have the students answer
- Attach the ‘adaptation’ to the ‘bird’
- Continue until you are all out of adaptations (or have only 5 minutes left)
- Encourage discussion about each adaptation, use the information in the **background section** to help you.

**Wrap- up by reviewing some of the adaptations.**

For younger students, review bird parts and basic adaptations.

For older students, ask questions like: What does the nictitating membrane do? What do the air sacs do etc.

Re-set for the next session by gathering all props and adaptation cards.

**Literature Connections**

- 1) Amazing Birds by Alexandra Parsons, Eyewitness Jr. Series
- 2) About Birds: A Guide for Children by Cathryn P. Sill
- 3) Eyewitness Explorers: Birds by Jill Bailey and David Burnie

**Grade Levels Goals:**

**Pre-K:** Learn ways birds are different than people and ways they are the same. Learn basic parts of birds: feathers, wings, eyes, beak, feet, heart & lungs, birds need to eat, have homes, family...

**1<sup>st</sup>-3<sup>rd</sup> Grades:** Learn about all bird adaptations: explore form equals function. Ask students to suggest different birds: talk about bill/beak shape and what that bird eats: foot shape and where they live: wing shape and how they fly. Look for examples all over the teaching lab.

**4<sup>th</sup>-6<sup>th</sup> Grades:** Learn about all bird adaptations: explore form equals function. Ask students to suggest different birds: talk about bill/beak shape and what that bird eats: foot shape and where they live: wing shape and how they fly. Look for examples all over the teaching lab.

## Build a Bird Contents List

2 Ring sets of cards with item and description

1 Bag of balloons

1 Magnifying hand lens

1 Bag of popcorn

1 Strip of Velcro

2 Pairs of garden gloves

1 Black down vest

1 Fake egg

1 Paper towel tube

1 Fabric bird wing

1 Bird Wing

1 Red paper heart

1 Pair of sunglasses

1 Set of salad tongs and slotted spoon

1 Camouflage hat

1 Sundress with hearts

1 Black scarf

1 Colorful scarf

1 Tube of baby oil

1 Bag with small rocks

1 Bag with three bird skulls

1 Bag of cheerios

1 Pillowcase filled with adaptations

1 Bag of clothes hangers

1 Down Feather