Birds & Their Adaptations

Habitat lab Field Journal Activity Lesson Plans & Resources

Online Lesson Plans & Resources available on the Alabama Wildlife Federation website

Students will observe the external structures of birds and learn how these adaptations help with their survival, growth, behavior and reproduction. Then the students will observe, identify and research a bird found in the habitat lab to provide evidence for its adaptations.

Materials: Copies of the Activity Pages, Clipboards, Pencils, and Field Identification Guides such as *Birds of Alabama* by Stan Tekiela, the *National Audubon Society Guide to the Southeastern States*, or Cornell University's AllAboutBirds.org website (*Optional: binoculars)*

Duration: Introduction - 40 min. | Outdoor Exploration - 30 min. | Indoor Research & Review - 40 min.

STEP 1: Engage through Discussion

The background information and questions below can be used to help introduce the topic, engage the students, and build a foundation to discuss the topic:

Background Information (online as a PDF)

Over time, all living things evolve and adapt to their environment, enabling them to survive and maintain their populations or they become extirpated (still exist but not found in that region) from that region or in a worst-case scenario, become extinct. Adaptation takes place over many generations in a species (not individuals) through a process called natural selection within a population. Birds have a variety of adaptations that affect their physical external structures such as beaks, talons, wings, coloration, feet, and legs. Through these adaptations, each species is particularly suited for a specific environment and specific food sources. For example, hawks have large, curved, sharp talons (claws) for grasping prey to eat. Hummingbirds have long, thin, hollow beaks that they use to probe flowers for nectar, and the beak protects the tongue which slurps up the nectar.

Example Discussion Questions & Answers (online as an Interactive PowerPoint with photos or as a PDF)

Q: What are the characteristics or traits that make an organism a bird?
A: *Birds are endothermic (warm-blooded) vertebrates (have a backbone) that have feathers, wings, and a beak, and they reproduce by laying eggs. There are approximately 10,500 different bird species in the world.* **Q:** How do biologists (scientists who study living organisms) group birds into different categories? **A:** *To distinguish one species from another, scientists use a taxonomy or classification system with levels that range from broad to very specific.*

Q: Do all birds look exactly alike? How do birds look different from each other?
A: *No, different species of birds look different. The external parts of their bodies look different from one species to another such as their feathers, wings, beaks, legs and feet.*

Q: Why do birds look different from each other?
A: *Over the past 60 million years, birds' bodies have changed and adapted to help them survive in various environments or habitats. These physical and behavioral changes are called adaptations.*

Q: How have birds changed over time?
A: *Scientists believe that dinosaurs evolved into birds! Their forelimbs (arms) slowly lost some of the functions such as grasping and gained other functions as they evolved into wings. Over time, they also grew feathers.*

Q: How do feathers help birds fly?
A: *Feathers have long, thin barbs that come out from the shaft, and they interlock to create a smooth, flexible, and resilient surface that supports flight and sheds water. Although feathers are instrumental in helping birds fly, some birds such as penguins cannot fly. The penguins' feathers help protect their skin from water and provide insulation (like a coat) to keep them warm.*

Q: What other adaptations have taken place with birds' feathers that help them survive?
A: *Feathers can also vary in shape and purpose. For example, owls have nearly silent wing feathers. They have comb-like serrations on the leading edge of their wing feathers that break up the turbulent air that typically creates a swooshing sound when a bird flaps its wings. This helps owls approach their prey undetected.*

Q: How does the color of birds' feathers help them survive?
A: *Sometimes the male and female of the same species can have different coloration (northern cardinals & American goldfinch). The males are brightly colored to attract females, while the females' feathers are drabber and earthtoned to provide camouflage when they sit on the nests.* **Q:** What is another adaptation that helps birds fly?
A: *Birds have hollow bones while most other animals (like humans) have tissue and minerals in their bones. Birds' hollow bones make them weigh less which helps them be able to fly.*

Q: How does the ability to fly help birds survive?
A: *Wings help birds retreat from predators, hunt for food from the sky, and travel long distances in search of habitat. A specific example of a wing adaptation is the hummingbird who can move their wings forward and backward in a figure-8 pattern to allow them to hover and fly backwards as they search for nectar.*

Q: How do birds' feet look different from each other? How do these differences help them survive?
A: *Most birds' feet have three or four toes. Webbing between the toes of ducks help them move quickly through water. Woodpeckers' feet have two toes that point forwards and two toes that point backwards to help them hold on to the side of trees as they hunt for insects to eat. Hawks feet are larger and stronger with talons (claws) to catch prey to eat.*

Q: Are all birds' beaks the same?
A: *No, birds' mouths have evolved into beaks (also called bills) that do not have teeth and differ from one species to another based on what they eat. Hummingbirds have long, then beaks to help them extract nectar from flowers, while woodpeckers have thicker beaks that work like a chisel breaking through the bark on the side of trees as they search for insects to eat.*

Q: What is another adaptation that helps birds survive?
A: *Birds' eyes are larger than ours in comparison to our body size, and this allows birds to see objects in fine detail 2.5-3 times farther away than humans. They can also see a greater number of colors and light.*

Q: What bird species could we find living in our habitat lab? *(pictures included in online Powerpoint)*
A: *Some common backyard bird species include (from the smallest to the largest) ruby-throated hummingbird, Carolina chickadee, American goldfinch, Carolina wren, white-breasted nuthatch, tufted titmouse, Eastern bluebird, killdeer, Northern cardinal, American robin, mourning dove, red-bellied woodpecker, blue jay, and Northern flicker.*

STEP 2: Explore with Literature

These books can be used to further explore the topic with your students:

- *Feathers Not Just for Flying* by Melissa Stewart (ISBN-978-1-58089-431-9)
- *Birdology* by Monica Russo (ISBN-978-1-61374-949-4) **Field Identification Guides:**
- *Birds of Alabama* by Stan Tekiela (ISBN 1-59193-151-7)
- *National Audubon Society Guide to the Southeastern States* (ISBN 978-0679446835)

STEP 3: Explain using Technology

These videos can be used to further explain the topic to your students:

- Birds: Educational Video for Kids by Happy Learning (4:26 min)
  https://www.youtube.com/watch?v=8vL_2rF8JHU

- Bird Evolution and Adaptations by Discovery Channel (3:15 min)
  https://www.youtube.com/watch?v=A5kzxOtvCjc

STEP 4: Elaborate with a Field Investigation in the Habitat lab 

The Habitat lab Field Journal Activity Observation Page(s) allow students to apply what they have learned as they investigate and record their real-world observations in their field journals. Before you go outside, don't forget to review the activity instructions and your Habitat lab Rules:

- **Habitat lab Activity Tip:** Regardless of whether you have a wooded habitat lab or have one limited to a courtyard, varieties of bird species are viewable in your school's habitat lab. Through the establishment of a bird sanctuary or feeding area, you can also increase the variety and number of bird species. Looking for adaptations in other fauna and flora is an extension of this activity that you can do with your students. Don't forget your binoculars if you have some!

- **Instructions for the Birds & their Adaptations Activity:** Take a birding hike in your habitat lab. When you spot a bird, watch it carefully and record your observations below. Identify the adaptations that it has to help it survive and provide evidence (facts that prove the truth) to explain the adaptations. Then use a field identification guide along with your observation notes to identify the bird and learn about it.
  Bird ID Books: *Birds of Alabama* and *National Audubon Society Field Guide to Southeastern States*
  Bird ID Websites: The Cornell Lab of Ornithology's AllAboutBirds.org
  Birding Apps: Merlin Bird ID by Cornell Lab (Free) Peterson Backyard Birds of North America (Free)

- **Example Habitat lab Rules**: The habitat lab is not a playground, so do not run and do not climb on anything. Remember that the habitat lab provides habitat (a home) for local wildlife, and you should not damage the local wildlife habitat. Therefore, do not pick up wildlife, plants, flowers or rocks. Also, do not feed wildlife.

STEP 5: Review and Assess

Review and assess the students' observations and answers on their observation pages. Another extension might be to have students select an adaptation and research examples of birds with the adaptation then share with the class how the adaptation helped the bird to survive and be successful in its habitat.

 **Alabama Course of Study Standards for Fourth Grade**

Language Arts (2016): 12.) Explain the relationships or interactions between two or more scientific concepts. 13.) Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a Grade 4 topics. 16.) Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. 23.) Write informative or explanatory texts to examine a topic and convey ideas and information clearly.
Science (2015): 9) Examine evidence to support an argument that the internal and external structures of plants (e.g., thorns, leaves, stems, roots, colored petals, xylem, phloem) and animals (e.g., heart, stomach, lung, brain, skin) function to support survival, growth, behavior, and reproduction.