madison AUDUBON society

Curriculum Set: Climate Initiative

Young Ambassadors for Birds in the Face of Climate Change

Lesson 6: Bird Adaptations

Goal: Students understand the words "adapt" and "adaptations". They explore the amazing variety of adaptations that birds have evolved.

Science | Art

Adaptable for Grades 4-8

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Audubon

Produced under a 2014-2016 Grant from National Audubon Society and a 2015-2016 grant from the Wisconsin Environmental Education Board.

Total lesson time: 1 hr 10 min

Lesson: 30 minutes
Activity: 40 minutes

Materials needed:

Presentation on Climate Initiative Lesson 6
Projector & laptop/ smartboard for PDF presentation
Printed build-a-bird worksheets
Art supplies (pencils, crayons, markers)

Lesson

Tips:

- Write the new vocabulary words on the board so that kids know how they are spelled AND teachers can refer to them later throughout the day.
- This presentation is built so that kids can guess what the adaptation will be. Present the first one, so they have one example. For the following adaptations, ask the students to try to guess the species (or general type) of bird and what its adaptation could be based on the photo.

PPT Presentation: (30 minutes)

Outline

Background information:

1. Ask students what all animals need to survive:
    a. Food: what kinds of natural food sources are in our neighborhood?
    b. Water: what kinds of natural water sources are in our neighborhood?
    c. Shelter: what kinds of natural shelter are in our neighborhood?
2. What does it mean to adapt?
    a. Adapt: living things make changes in their behavior or body so it is easier to live in their environment.
    b. Depending on the age of the students discuss this:
        i. All adaptations are a result of evolution, and take a LONG time to happen. Some (very quick) adaptations can happen in decades. Most take hundreds or thousands of years.
        ii. Sometimes people use the word “adapt” to describe something very short-term. An example of this is “The students adapted to the substitute teacher’s new rule very quickly.” This is still a good way to use the word, but it is different from what we’re talking about today.
3. Lesson introduction:
    a. Ask students if birds all have the same types of feet, beaks, and wings (no).

b. Ask students why that is (all birds need different tools to find food, water, and shelter. They use these tools in different ways).
c. Tell them that after the lesson today, they will be creating their own birds. While we go through all of the cool adaptations that birds have, have them think about what kind of bird they would like to create.

Eyes

4. Ask students which bird (or what type of bird) this is. What are these eyes adapted to do?
    a. Great horned owl: eyes are adapted to seeing in very low light conditions. They are nocturnal birds, and usually hunt at night. Their eyes help them to see prey when it would be too dark for most other animals.
5. American kestrel eyes are adapted to see long distances
    a. They can spot a half-inch insect from the top of a 60 ft tree.
6. Common loon eyes are adapted for seeing underwater
    a. Most birds have a third eyelid, but loons have one with a little clear window. This third eyelid acts like goggles, helping them to see underwater while they hunt fish or crabs.
7. A better example of the third eyelid. It is called a "nictitating membrane". Ask kids if they can see how it covers the eye to protect it. Can they think of other ways this might be useful (protects the eyes while hawks dive for prey, protects the eyes while birds forage in thick vegetation).
    a. This bird is a masked lapwing and it lives in Australia.
8. Ask students which way this birds eye's point: forwards, sideways, or backwards (sideways). Ask them what this might be good for.
    a. This is a tufted titmouse. Its eyes point sideways to help it look for predators. It can see much better over its shoulders than people can, even without turning its head.
9. Ask students which way this birds eye's point: forwards, sideways, or backwards (backwards). Ask them what this might be good for.
    a. This is the American woodcock. It is a bird that has a very long beak, and spends a lot of time looking for worms in the ground with that beak. While it has its beak in the soil, it still needs to look for predators. This bird can actually see behind itself!
    b. It can see 360 degrees laterally (all around them, front, back, and sides) AND 180 degrees vertically (all above them).

Feet

10. Ask students what they think these feet are used for, and which bird it belongs to.
    a. This bird is an osprey. It is a hawk that hunts fish. The spines on its feet help it to hold onto slippery, wiggly, fish as it flies away.
11. These feet belong to birds that spend a lot of time swimming in the water.

    a. The American coot has lobed feet. They are better at walking on the ground and perching on branches than webbed feet, but they are still good for paddling.
    b. The Mallard has webbed feet. They are very good at paddling, but not as good for walking or gripping branches.
12. The purple gallinule has very big feet compared to its body size. It spends time walking around on top of lily pads, and needs to distribute its weight over a larger area.
    a. This is exactly how it works when people wear snowshoes. People make their feet much bigger by putting on snowshoes, and they don't sink as much into the snow.
13. The snowy egret has very long legs like stilts that allow it to walk through water while it hunts for fish.
    a. It wiggles its bright yellow toes in the water to attract fish.
14. The white-breasted nuthatch looks for insects under tree bark. Its clinging feet help it to walk upside down on tree branches.

Beaks

15. The common nighthawk has a huge mouth like a funnel. It flies around in the night sky catching insects in its mouth.
16. The great blue heron has a strong, pointy bill that it uses like a spear. When it sees a fish swimming near it in the water, it spears the fish with its beak so that it can eat it.
17. The American white pelican has a beak that can turn into a basket. While it is fishing, it can expand a large pocket at in the bottom of its beak, and carry lots of fish at once.
18. The bald eagle has a sharp beak that it uses to tear meat. When it catches an animal, or finds a dead animal, it tears it into small pieces so it can eat it.
19. The common merganser has small ridges on its beak. When it catches slippery, wiggly fish, the ridges help it hold it and eat it.
20. When most birds drink, they need to fill their mouths up with water and tip their head back, before swallowing. Mourning doves are able to drink through their beak like it is a straw.

Wings

21. Barn swallows have long narrow wings that make them very agile. This helps them hunt insects while they are flying.
22. The northern harrier is a large hawk. It is able to fly very slowly and hover in the air just a few feet above the grass. It listens for small rodents hiding in the grass. It has broad wings that are very large for its body. They help it hover over the grass like a kite.
23. The Atlantic puffin has wings that it can use for both swimming and flying! These birds need to fly between land and the sea to find food and bring it back

to their chicks. When they swim to fish for food, they move their wings through the water just like they're flying.

24. The ruby-throated hummingbird has tiny wings that are very flexible. It is able to fly backwards and hover. Its wings help it to fly like a helicopter.

Final Message

25. Birds that specialize are really awesome at one adaptation.
    a. Ask the kids what "specialize" means (these animals are good at one *special* thing, and they have *special* body parts to help them do this.
    b. Common loons have goggle eyes and flipper feet
    c. American woodcock have long chopstick beaks and eyes that see in every direction.
    d. Snowy egrets have stilt legs and lure feet.
    e. Screech owls have eyes that can see in the dark.
26. Ask the kids: What if a bird doesn't need to specialize, but needs to be good at lots of things?
    a. The American crow has feet that are good at standing, gripping branches, and picking things up. They're not good for swimming, but they can do many other things.
    b. Its beak is good at tearing food, picking things up, and can even make tools!
    c. Its wings are great at flying in lots of different ways: it can fly quickly, and make some sharp turns.
27. Tell the kids "We talked about climate change, and what it means for our birds. What is going to happen to them?" Discuss this until they bring up range shifts.
    a. Birds will need to move into new habitats, and possibly live in different conditions: they will have to find food in a new location, and new homes.
    b. If many birds are so very specialized, and so well adapted to their current habitats & homes, do you think they'll do well in a new habitat? (Birds that are generalists, and have generalized body parts will be better at adjusting to a new habitat).
28. Introduce the build-a-bird assignment:
    a. Ask the kids what other kinds of bird body parts can be specialized
        i. We discussed eyes, feet, beaks and wings.
        ii. Other options: necks, tails, legs, hearing, feathers, etc.
    b. Now each student will have the opportunity to design his or her own bird. The two different worksheets will adjust the activity so that children of all ages can complete it.
        i. Focus on how the adaptations the students choose will help the birds in their environment:
            1. How do they use their beaks, feet, wings to find food?
            2. Where and at what time of day do they sleep?