

# Birds, Beaks and Adaptations - 4 hour curriculum

## Habitats

Ask students if they know what a habitat is. (Hint: they each have one!) A habitat is a place where animals (and people) can get everything they need to survive.

What do animals need to survive?

Food- provides energy

Water- can be obtained in different ways i.e. drinking or from food

Shelter- protection from the elements and predators

Space- Enough space to obtain food, water, air and shelter

Do all animals live in the same habitat?

Of course not! Now is the time to compare animals and the different ways they meet their needs. It is easier for children to see the differences between animals by discussing vastly different species. Contrasting fish to foxes, woodpeckers to turtles, and spiders to wolves are good ways for children to understand that not all living creatures are alike, and that not all animals can survive in the same habitat. Comparing similar animals such as songbirds is a good way to discuss how animals use different survival techniques in the same habitat.

Discuss all 3 habitats and the animals that would live in each one. Most kids love dress up costumes, so don't be afraid to use the bison costume (located in the Prairie Trunk) or the fire clothing to illustrate the prairie and some of the management techniques we use here on the Refuge.

Transition: Name one animal that can live in any type of habitat?

## Birds

What makes a bird a bird? Ask students how birds are different from other animals. List them on an easel as they name them. Start with one item such as feathers. Pass out magnifying glasses and have them look for the tiny barbs that hook the feathers together. Show them how to "preen" a feather. Pass around nests. Then discuss feet and beaks. Introduce the word "adaptation". Adaptation means "change to suit their environment". How do people adapt to their environment? We put on coats in winter, and use air conditioning in summer. We have two legs for walking on land, and build our houses on the ground. Can birds do this? NO! A birds' beak and feet are the greatest indicators of where they live, in other words, what habitat they are adapted to. Have an owl mount, duck mount, great blue heron mount, and a songbird set out around the children. Discuss with them the differences in their beaks and feet. Are they all the same? How are they different? What do you think each one eats, bases on the shape of their beak? Where do you think each one lives, bases on its feet? Discuss coloration and camouflage.

Play the Bird, Beak and Adaptation game. Split the group into 2 different groups, allowing one group to do the game while the other group work on *Bird Part Sheets* to figure out what makes and bird, a bird (You will need to make copies of this activity and it is up to you whether the group should work independently or together). Let each group play the game and answer the sheets, then review both at the end as a wrap up.

## Hike

Take the students outside to observe the different habitats and also birds. Review with them what type of birds could live in each habitat. Give the students binoculars and show them the correct way to use them. Take students to hillside, long meadow lake trail or to the river depending on amount of time.

Additional option: Have the students do a scavenger hunt for bird clues while on the hike.

## Rainy Day Activity

Wildlife Jeopardy is a good rainy day activity where the students can compete with each other and learn at the same time. Another option would be *How Many Coyotes Can Live on This Prairie?* or *Owl Pellets* from Project Wild.

## **Background on Habitats:**

### **Prairie**

A prairie is a place where there is grass (short or tall) and many wildflowers that can grow in the hot sun. The prairie produces many seeds that are food to a large variety of birds and small rodents. The insects that depend on these plants for food also pollinate the flowers and grasses. In the past, most of these areas were plowed and turned into farm fields. Many of the mammals, birds and insects that depend on these plants began to disappear. Today, there is a growing concern for the prairie and many are being restored and protected.

The prairie is home to a wide variety of animals. Insects are abundant, especially from early spring to late fall. The Monarch butterfly depends on the milkweed plant to lay its eggs. The larvae then eat the leaves that contain juice, which is poisonous to birds and serves as protection for the caterpillar. The blue spotted winged fly lays its eggs on goldenrod and forms a gall to protect and feed the larvae. Beneath the soil, there is an abundant life as well. Ground squirrels, chipmunks and mice are a few of the animals that make their homes under the prairie. Deer will not only eat the grass and flowers, but will bed down in the tall grass as well.

Prairie plants display a variety of colors. Most of them are even taller and brighter than those in the forest. Examples of these plants include coneflowers, asters, goldenrod and milkweed. Some of the grasses are big bluestem (sometimes called turkey foot), Indian grass and little bluestem. Deep roots (sometimes 3 times as long as the plant) help these plants to survive some of the harshest conditions, such as fire drought.

### **Forest**

A forest is a large area of land where many trees and other plants grow. There are different kinds of forest throughout the world where each has its own special characteristics. Climate, soil and water determine the kinds of plant and animals that can live in a forest. The forest is very important to all living things because the green leaves of plants give off oxygen.

Within a forest there are several layers of plants. The world's forests consist of deciduous and coniferous trees. Deciduous trees have broad, flat leaves and most shed their leaves in the fall and grow new leaves each spring. For example: maples, poplars, beeches and oaks are in some types of broadleaf trees. Coniferous trees have needlelike or scale-like leaves. Most remain green all year round. For example: pines, hemlocks, spruce, firs and cedars are conifer trees. The spreading of branches of the tall trees form a canopy...where an eagle makes its nest. Below the understory is a shrub layer, where sumac and berry bushes may grow...might even spot a deer there too. Next is the herb layer, where fern, grasses, wildflowers and other soft-stemmed plants grow...deer mice sure like to camouflage here. Mosses, leaves and twigs cover the forest floor...even termites, fungi and bacteria help to break down the nutrients on the fallen trees to help keep the forest healthy.

### **Wetland:**

A wetland is a place where the ground is wet, or covered with water, for part of the year. For many years people did not recognize the importance of wetlands, and they were drained to make room for farms and cities. But wetlands are valuable! They help prevent floods by storing large amounts of water, and they provide plants and animals with places to live. Today, people understand that wetlands are important and need to be protected. There are laws to protect wetlands from being destroyed.

Wetlands are rich with animal life. Many fish, invertebrates, reptiles, and amphibians (frogs, toads and salamanders) live in or around them. Over 200 kinds of birds use wetlands for their home and nesting sites. The birds dive, wade or dunk their heads in the water to look for food. Muskrats, otters and beavers are some of the mammals that are residents to wetlands. Deer and other mammals visit wetlands to eat and drink.

Plants are a very important part of the wetland environment. They stabilize the soil, produce oxygen and provide homes and food for wildlife. Cattails, sedges, rushes and arrowheads are a few of the common wetland plants. Water lilies seem to float on top of ponds, but they are actually rooted in the mud at the bottom. Marsh marigolds, irises and other flowers grow along the edges of the water.

## **Background on Birds:**

Birds have several physical adaptations that allow them to fly, find food, and migrate long distances. Feathers help to streamline a bird's body and minimize air resistance for flight. In addition, the long feathers on their wings serve as airfoils to help generate the lift they need for flight. The sternum (breastbone) is greatly expanded to accommodate large, well-developed pectoral (chest) muscles for flight. In fact, all birds that fly have a large keel on the front of their sternum where the strong muscles that move the wings attach.

Most birds have lightweight skeletons made of thin, hollow bones. This lightweight skeleton reduces the amount of energy needed to become and stay airborne. Birds have a very efficient respiratory (breathing) and blood circulation systems to meet the energy needs of flight. Two lungs with special air sacs extend into many parts of the bird's body. The lungs remain inflated at all times, so the air sacs provide a constant supply of air. Birds also have a large, four-chambered heart and rapid heartbeat. A small songbird has a resting heart rate of 400-500 beats per minute as compared to a human's 60-90 beats per minute. The resting heart rate of a hummingbird is about 1,000 beats per minute!

Most birds have a keen sense of sight, which is important as they fly among branches, search for food, and watch for enemies. For example, a Red-tailed Hawk can see a rabbit a mile away. Great Blue Herons use their keen eyesight to spot and catch fish, frogs, and other aquatic animals. Most birds also have an excellent sense of hearing, which helps them communicate with one another, listen for danger, and locate prey. Most birds that hunt for food at night, such as owls, have extremely good hearing and can perceive mice squeaking and leaves rustling at great distances. While most birds do not appear to have a good sense of smell, certain birds (such as Turkey Vultures, Kiwis, and Storm Petrels) use smell to locate food or find their nests.

Many species of birds use their ability to fly to migrate. Migration allows birds to take advantage of seasonally abundant food. Migration also allows birds to avoid the scarcities of food and other resources that occur seasonally in certain regions. While some species of birds migrate only a few miles along mountains slopes, others travel hundreds of even thousands of miles. Many of these birds fly over vast bodies of water or tracts of land that are barren or otherwise inhospitable.

## **Owls:**

Owls tend to eat their prey whole. Like other birds, they have a two-part stomach. Owls do not have a crop. The first stomach is glandular and introduces acids to begin breaking down the food. The second stomach, the muscular stomach, holds the indigestible bits (fur, feathers and bones) and allows the rest of the food to pass through to the intestines where nutrients will begin being spread to the rest of the body. The remnants are then compressed and the muscles of the stomach and esophagus pass this compressed matter, or pellet, up and out. This regurgitating action is called casting. These pellets can be picked apart and studied to learn what owls eat.

Many nocturnal species of owls have asymmetric hearing. This represents itself by each ear being slightly different height on each side of the owl's head. This adaptation helps the owl find prey by triangulating sound with its ears. Some species of owls are able to pinpoint prey using only their sense of hearing and can catch prey in almost total darkness.

# Birds, Beaks and Adaptations Game

**\*\*\*Note\*\*\*** Split the group into 2 different groups, allowing one group to do the game while the other group work on *Bird Part Sheets* to figure out what makes and bird, a bird.

**Objective:** Using different tools, the student will learn and describe how different kinds of bird beaks have adapted to feed on different foods within a specific habitat.



## Materials:

- \* 2 containers of water:
  - 1 = shallow (2" of water)
  - 1 = deep (10" or more of water)
- \* 1 pie pan
- \* 4+ tweezers
- \* 4+ tongs with tape over tong part (duct tape works well)
- \* 4+ long handled salad tongs
- \* 4+ pliers
- \* 1 package rice
- \* 1 package popcorn (or other sinking objects)
- \* 1 package sunflower seeds
- \* 1 stump with holes in it (to hold rice)
- \* Floating objects (cut up ½ inch long straws work well)
- \* Cups to use as a "stomach" to put eaten food in
- \* Habitat Record Sheet (see insert a)

## Background Information:

A bird's beak is a unique and multi-functional tool. It can help a bird gather or capture food, communicate, groom itself, defend territories, and attack rivals.

The shape of a bird's beak will give you a clue to its main food source. Each beak shape is designed for eating a certain type of food such as seeds, fruit, insects, nectar, fish, or small mammals.

Bird beaks have adapted to help birds survive and find food within their habitat. The following examples of birds have beaks that may have evolved over a long period of time and demonstrate a particular adaptation.

Cardinals and grosbeaks have short, thick, cone-shaped beaks for crunching and cracking seeds.

Woodpeckers have thin chisel-type beaks that can search out insects in trees.

Loons, herons, terns, and bitterns use their straight, pointed bills to help spear their prey such as fish.

Hummingbirds have straw-like beaks that can suck up nectar from flowers.

Hawks use their hook-like beak to tear apart small prey such as mice.

## Vocabulary:

**Adaptation** - The process of making adjustments to the environment through behavior, physical feature or other characteristic that will help a living thing survive in its environment.

**Habitat** - The surroundings in which an animal lives where all needs for life are found. This includes food, water, shelter, space in a suitable arrangement.

**Freshwater Marsh** - A wetland where standing freshwater exists year-round in most conditions.

**Pond** - A still body of water smaller than a lake, often shallow enough that rooted plants can grow throughout.

**Forest** - A community of plants and animals in which trees are the most dominant member.

**Prairie** - A grassland community; a vegetative community in which grasses are the most dominant.

**Wetland** - A wet land with specialized soil and plants, frequently or continually flooded, found on edges of rivers, creeks, ponds, lakes, isolated depressions, or along the ocean, bay or estuaries

## Fast Facts:

### Forest Habitat – Woodpeckers

- \* corresponds to tweezers
- \* eats insects

Adaptations:

1. Long, sharp, “chisel” bill for hammering into tree trunks
2. Stiff tail feathers used as prop to hold the bird upright on the side of the tree
3. Long tongue that wraps around inside of skull – aids in extracting insects.
4. Toes – two faced forward, two faced backward for better vertical support on tree trunk.
5. Barbed tongue for extracting insects.

### Prairie Habitat – Grosbeak, sparrow

- \* corresponds to pliers
- \* eats seeds

Adaptations:

1. Heavy, conical bill with sharp edges for splitting seeds open. Strong jaw muscles.
2. Flocking behavior in winter because food may be concentrated in fields or “weed” patches.
3. Toes – three face forward, one behind for perching and hopping.

### Marsh Habitat – American bittern, heron, tern

- \* corresponds to long-handled salad tongs
- \* eats fish, frogs, large insects

Adaptations:

1. Long neck for plunging into water.
2. Sharp bill for spearing fish.
3. Long toes for walking on mud and grasping clumps of vegetation.
4. Coloration for blending into marsh vegetation.

### Pond Habitat – Dabbling duck

- \* corresponds to short tongs with tape
- \* eats aquatic vegetation near the water surface

Adaptations:

1. Fringed or fluted bill for straining food from the water.
2. Webbed feet for propulsion through water. Also acts as “snowshoes” on mud.
3. Legs – short, far back on body for swimming.

**Procedure:**

Tell your students that they are going to “become” different kinds of birds. Show them the different “beaks.” These include the tongs, tweezers, and other utensils. Explain to the students that their job is to find the proper habitat for which each bird is suited. Mention that the tools or “beaks” give some clue to what a bird eats and where it may live.

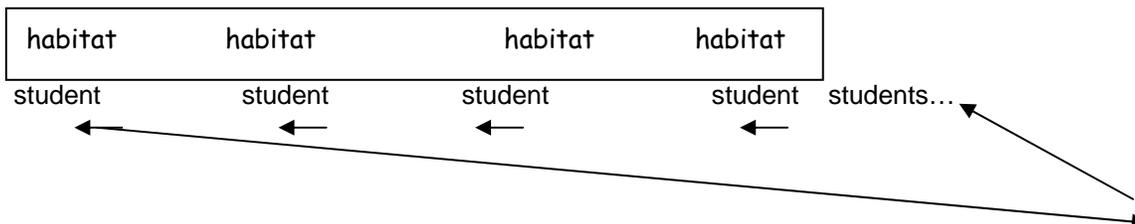
Show the students four simulated habitats (marsh, pond, prairie, forest). As you show each habitat, give a short description of the habitat to create a mood.

**Simulated Habitats:**

Marsh =	container with shallow water and floating objects
Pond =	container with deep water and popcorn at the bottom
Forest =	stump with holes and rice in the holes
Prairie =	sunflower seeds in pie pan

If you have a large class, divide students into groups of four. Each student or group receives a different tool (i.e. one group receives pliers, one group receives tweezers, etc.) and a “stomach”. Students/groups will keep the same tool throughout the whole activity. Have students line up and tell them they will move from one habitat station to the next. They will have 30 seconds at each habitat to “eat” as many food items as possible, but the students must keep one hand behind their backs and cannot let their hand get wet. After the 30 seconds are up, the teacher will say “rotate” and the students will stop “eating” and move on to the next “habitat.” The teacher will then tell the students to “eat” and they will have another 30 seconds at the new habitat. The student who starts at the way left habitat will go to the end of the line after the teacher says “rotate.” Rotations will continue until all students had a chance to try and “eat” at all habitats.

Rotation pattern:



For food to qualify as “eaten”:

Marsh = floating objects must be dropped into “stomach” one at a time and hands can’t touch the water

Pond = popcorn must be dropped into “stomach” one at a time and hands can’t touch the water

Forest = rice must be dropped into stomach and can only come from holes in stump, not from on table

Prairie = sunflower seeds must be crushed and nut dropped into stomach

Emphasize to students that they are not competing against one another. Remind them that they are trying to find the habitat that they are best suited to. Have the students record the number of food pieces eaten on their Habitat Record Sheet.

# Birds, Beaks, and Adaptations

## Habitat Record Sheet

**Directions:** Have all students/groups record the number of food pieces eaten from each habitat with each tool.

		<b>Habitats</b>				
		Pond	Marsh	Forest	Prairie	<b>Results</b>
<b>Beaks</b>	Pliers					
	Short Tongs					
	Long Tongs					
	Tweezers					

Name: \_\_\_\_\_ Grade: \_\_\_\_\_ Teacher: \_\_\_\_\_

## **Background Information on Birds and Beaks**

**BEAKS AS TOOLS:** All birds have beaks. Beaks are like tools. Here are just a few ways that beaks help birds:

- Gather, catch, and eat food
- Talk to other birds
- Clean and preen feathers
- Fight for property
- Show off to attract birds of the other gender

*Can you think of other ways birds use their beaks as tools?*

**BIRD FOODS:** The shape of a bird's beak will give you a clue to what it eats. Each beak is designed for eating a certain kind of food. Different birds eat different foods. Some kinds of foods birds eat are:

- Seeds, nuts, and acorns
- Insects
- Nectar from flowers
- Fish
- Small mammals

*What other kinds of foods do birds eat?*

**BEAK ADAPTATIONS:** Adaptations are changes that an animal makes over time in order to survive in a specific habitat. Bird beaks have adapted to help birds survive and find food within their habitat. Here are some examples:

- Cardinals have short, thick, cone-shaped beaks for crunching and cracking seeds.
- Woodpeckers have thin beaks to search and peck for insects in trees.
- Loons and herons use their straight, pointed bills to help spear fish in the water.
- Hummingbirds have beaks like straws to sip up nectar from flowers.
- Eagles and hawks use their sharp, hook-shaped beaks to tear apart small prey like mice.

*How do these adaptations help birds survive in their habitats?*

# **Fresh Water Marsh:**

A kind of wetland  
with fresh water  
(not salty water)  
in it most of the time.

The marsh stays wet through  
most of the seasons of the  
year, too.

# Pond

A body of water  
that is  
smaller than a lake.

A pond is still,  
which means it does not  
move like a stream or river.

Ponds are often  
shallow enough that plants  
with roots  
can grow in them.

# Forest:

A forest is  
a large group  
of tall trees.

Plants and animals  
are also part  
of a forest.

# Prairie

A prairie is sometimes called  
a grassland.

It is a field with  
lots of grass.

There may be lots of other  
plants and flowers, too, but  
prairies are  
mostly made up  
of different kinds  
of long grasses.

# Wetland

A wetland is  
land that is wet  
a lot of the time.

Wetlands are usually found  
on the edges  
of rivers, creeks, ponds,  
lakes, and oceans.

Wetlands  
are often flooded.

# **River:**

A river is a large, moving stream of water.

Rivers are usually fed by smaller streams or creeks.

They empty into other bodies of water like lakes or oceans.

# Open Air Above River:

The habitat found  
in the air  
above a river.

This can also include  
tall trees, bridges,  
and poles over a  
river.

# Garden or Floral Habitat:

A patch of land that has flowers, vegetables, herbs,  
or fruit  
growing on it.

Gardens can be formed by  
nature  
or by people.

*By Karen Christenson, Teacher*

**Fresh Water Marsh**

# Wetland

## RULES:

- Floating foods must be dropped into your stomach one at a time.
- Hands cannot touch the water.

## Pond

### RULES:

- Popcorn kernels must be dropped into your stomach one at a time.
- Hands cannot touch the water.

## Forest:

### RULES:

- Rice must be dropped right into your stomach and not onto the table.
- If you do drop the rice on the table or floor, you must leave it there.
- Rice can only be picked up from the holes in the tree stump, not from the table or anywhere else.

## Prairie

### RULES:

- Sunflower seeds must be crushed with your beak.
- Then the nut from inside must be dropped into your stomach using your beak.

## River:

## RULES:

- Beak must tear part of the fish or animal before placing it in your stomach.
- Then use the beak to place the food in your stomach one at a time.
- Hands cannot touch the water.

## Open Air Above River:

### **RULES:**

- Floating foods must be scooped up and placed in your stomach.
- Use your beak to drain the water back into the river before placing the food into your stomach.
- Hands cannot touch the water at all.

## Garden or Floral Habitat:

### **RULES:**

- Use your beak to sip up “nectar” (colored sugar water.)
- Pour the nectar from your beak into the clear glass cup to measure how much you drank.
- Write the number of milliliters (written as ml.) you were able to sip up with your beak.

## Garden or Floral Habitat:

### **RULES:**

- Use beak to sip up tiny mustard seeds in water.
- Count how many seeds you took in.
- Hands cannot touch the water.

Name \_\_\_\_\_ Grade \_\_\_\_\_  
Teacher \_\_\_\_\_

## "Common Birds of Your Backyard" Video Guide

Name of Bird	Drawing or Description of Bird	Foods this Bird Eats	Type of Beak	Other Interesting Information?
<b>1.American Robin</b>		Worms Fruits Berries Insects		Call = "Cheery, cheery!" Leave young robins found on the ground.
<b>2.Cardinal</b>		Sunflower seeds Cracked corn Safflower Wild fruit Insects		Call = "Ha-cheer, ha-cheer, burry-burry-burry, Q- Q- Q- Q." Nickname was the Virginia Red Bird.
<b>3.Blue jay</b>		Cracked corn Peanuts Breadcrumbs Sunflower seeds Breadcrumbs Acorns		From the crow and raven family. Can imitate other birds, especially hawks.
<b>4.Black-Capped Chickadee</b>		Insects Suet Seeds Fruit		Call = "Chickadee-dee-deee!" Male = "Phoebe!" Make nests out of mosses and rabbit hair.
<b>5.Nuthatch</b>		Insects Sunflower seeds Suet	Pushes seeds into cracks and hammers open with its beak.	Called the "upside-down bird" because it walks down trees headfirst.
<b>6.Downy Woodpecker</b>		Insects in tree bark Larva Eggs Suet Sometimes seeds	Tongues can stick out 2 inches.	Drums on trees to announce territory. Lets humans get close.
<b>7.Junco</b>		Seeds Insects		

*Continued on back side...*

Name of Bird	Drawing or Description of Bird	Foods this Bird Eats	Type of Beak	Other Interesting Information?
8. Goldfinch		Seeds Insects		
9. Pine Siskin		Seeds Insects		
10. House Wren		Insects		
11. English House Sparrow		Seeds Insects Fruit		*Non-native bird brought from England in 1850. Take food from native birds.
12. European Starlings		Insects Seeds Fruit		*Non-native bird brought from Europe in 1890. Take nests and destroy eggs of other birds.
13. Grackle	Looks like a small crow.	Fruits Seeds Insects		Considered a "bully" of other birds.
14. Mourning Dove		Seeds		
15. Northern Oriole		Insects Fruit Nectar Orange halves Caterpillars		
16. Chipping Sparrow		Insects Seeds		

A. What problems do **NON-NATIVE BIRDS** cause for native birds?

B. What are ways we can help birds in our backyards to survive and thrive?