



TARGET  
GRADES  
6–8

DURATION  
2–3  
Sessions

GROUP SIZE  
Whole  
Class



## LESSON 4

# In Harmony with Habitat, Feeding Adaptations for Birds

### LESSON OVERVIEW

Students collect food using different utensils to illustrate adaptations. They will then learn about Alaska birds and determine which species might be found in their schoolyard habitat.

**SUBJECTS** Science, language arts, physical education

**SKILLS** Describe, compare, comprehend a concept, apply a skill, analyze, synthesize and evaluate data.

**SETTING** Part 1: outdoors on a field or open space; Part 2: indoors; Part 3: outdoors in a natural area nearby school

**TERMS TO KNOW** Trait, population, variation, heredity, competition, adaptation, natural selection

### STATE STANDARDS

Language Arts: Science Language  
SL.6.1b; SL.6.1c; SL.6.1.d;  
SL.7.1.b; SL.7.1.c; SL.7.1.d;  
S.L.8.1b; S.L. 8.1c; SL.8.1.d;  
SL.6.4; SL.7.4; SL.8.4

Math: Statistics & Probability  
6.SP.1; 6.SP.5.a; 6.SP.5.b; 7.SP.1;  
8.SP.1; 8.SP.2

Math: Expressions & Equations  
6.EE.9

Physical Education  
8.E.1.; 8.E.2; 8.E.3

### NGSS STANDARDS

Ecosystems, Interactions,  
Energy and Dynamics:  
MS-LS2-1; MS-LS4-6

### MATERIALS

#### PART 1

- 3 pounds of dried beans
- 25 of each: forks, spoons, knives
- Paper cups (one for each student)
- 1 stop watch
- 1 whistle
- Broom and dust pan for cleanup
- 3 copies of Bird Beak Data Sheets
- 3 clipboards with pencil tied to each

#### PART 2

- Beaks & Feet Worksheets

#### PART 3

- Alaska Ecology Cards
- Pencil
- GPS units and white or colored index cards 4 per group

## GUIDING QUESTIONS

How do physical traits make individual species more suited to their habitat?

What might happen to a species that is poorly adapted to its habitat?

Can species make adjustments to become better adapted to a given habitat? What kinds of changes are possible and how would they occur?

## OBJECTIVES

- Students will investigate physical characteristics of Alaska Birds to make assumptions about food and habitat needs.
- Students will look for appropriate habitat for various bird species in the schoolyard and/or a natural area nearby.



## ALASKA WILDLIFE CURRICULA COMPLIMENTARY ACTIVITIES

- **Habitat is Where It's At** (Section 1, Lesson 1)
- **Mapping Nearby Nature** (Section 1, Lesson 2)
- **Draw Your Tundra Animal** (Alaska's Tundra & Wildlife)
- **Animal Adaptations for Succession** (Alaska's Forests and Wildlife)

## Supporting Information

Organisms continually undergo physical and behavioral changes over time. Ever-adapting with their environment, organisms develop specialized characteristics that make them more suitable for survival. An adaptation is a trait that is very well-suited to a given environment that has, through natural selection, increased in the population over many generations.

There are several factors that influence these changes including variation (when different individuals have different traits within a population), heredity (when traits are passed on from parent to offspring through genes), and competition (when some individuals survive and reproduce more than others).

The end result is natural selection—over long periods of time, the individuals with the traits that best fit the environment are most likely to survive, reproduce, and pass on their traits to the next generation. In this way, future generations, when viewed at the level of an entire population, will have more advantageous traits and fewer disadvantageous traits compared to their parents.

In this activity, students come to understand natural selection based on having adaptations that are more or less compatible with their habitat. They will portray Alaska bird species with different beak traits.

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## LESSON 4

# In Harmony with Habitat, Feeding Adaptations for Birds



## Procedure

### PART 1

1. Make 3 copies of the “\_\_\_\_\_ -Billed Bird Population Data” and fill in the blanks with “Fork,” “Spoon,” and “Blade.” Attach these data forms to clipboards.
2. Open with a discussion on what human traits might help a person be more successful doing their job. Take a basketball player. Is it more advantageous to be short or tall? Fast or slow? What about domesticated animals? Is there an advantage for a dog to be friendly? What does it mean to be more successful? Scientifically speaking, what matters in the long run is whether you survive, find a mate, and reproduce, passing on your genes to the next generation.
3. Introduce the activity. Tell the students that they will investigate a particular habitat where a certain type of food (beans) grows plentiful. They will become birds of three different species, each with a unique beak trait. Birds may be fork-billed, scoop-billed or blade-billed. Each year, the birds forage in their feeding grounds and try to eat as much as possible. For each year, the five birds that eat the most will reproduce and have babies with the same beak trait as their parent. The five birds that eat the least will die (but will be reincarnated as a baby bird of a different species).
4. Give each student a cup (stomach) and a utensil (beak). Quickly go over the rules before heading out to the feeding ground:

#### Rules

- All birds must wait outside the feeding grounds until the teacher blows the whistle.
  - Birds may only touch food with their beaks. No hands!
  - Food must make it into the stomach to count.
  - Stomachs may not touch the ground.
  - Do not hurt other birds or touch other birds’ stomachs.
  - When the teacher blows the whistle, all birds must immediately leave the feeding ground.
5. **Outside Prep:** Mark the boundaries of the feeding ground and sprinkle 300 beans within the boundaries. Place the 4 data clipboards in different locations near the feeding ground.
  6. Have students stand on the edge of the feeding ground, holding their cup in one hand and their utensil in the other. Blow the whistle and give students 20 seconds to “eat” as many beans as possible. Make sure students do not cheat by setting their cups on the ground. Blow the whistle again to signal the end of the year.
  7. Each student should go to the clipboard for their beak type, count the number of beans they ate, and enter

that information in the data table. Each group should calculate the total number of beans eaten by their group (bottom row of table).

8. Finally, all individuals will line up according to how many beans they ate. The five birds that ate the most will reproduce. The five birds that ate the least will die and come back to the next round as bird babies of those which reproduced.
9. Play five or more rounds, each round representing a year. Record the population data each time.

### **Evaluation for Part 1**

1. Indoors: Have students graph the data for each species with years one through five on the x-axis and the number of species along the y-axis. You might consider making a class graph.
2. Discuss the graph(s). Notice patterns such as one species population going up and another going down. See if the population is growing linearly or exponentially. Discuss reasons why one population did well while another did poorly. Is there a different scenario in which a different bird would do best?

### **PART 2**

1. A bird's beak and feet can tell us much about their habitat and lifestyle. If the habitat does not produce the type of food the birds' beaks can manage, they may not be as successful. Most birds are classified according to the structure of their beaks and feet.
2. Using bird species from the Alaska Ecology Cards and the Description and Function Table, make inferences about each bird's habitat and food choices.
3. Work through the Bird Beaks and Feet worksheet.

### **PART 3**

This part of the lesson can be conducted using GPS units (A) and/or colored index cards (B).

1. Break the class into groups of four. Allow each group to select a bird species from the Alaska Ecology Cards.
2. Give each group four blank index cards. Each group should have a different color if you are not planning to use GPS units; however, if you are using GPS units, all cards should be white. Ask the students to write each habitat component—food, water, shelter and space—on a card. Then, in their groups, read the Alaska Ecology Card out loud. Ask them to discuss the bird's habitat needs and predict whether or not the schoolyard is a suitable habitat. The groups should not share which bird species they chose with other groups, but they will report it to you.
3. Move outside to a natural area nearby to your school, ideally an area with multiple habitats (forested, muskeg, stream, pond, etc.).

#### **A. Using colored index cards**

With their unique color of index cards, tell the students they will have 15 minutes to identify habitat components for their bird species within the designated area.

When a group finds a component, they will place the appropriate index card at that location. Students should place their cards in an

inconspicuous way but not so hidden that they would be difficult to find. On the card, they should describe the habitat component, but they should not indicate what bird species they selected. For example, if a group selected the snowy owl and they find a small opening in the ground where small rodents have traveled, they would pull their food card and write the description from the Alaska Ecology Card: "Food. A lemming may be living in this tunnel." If a black-billed magpie were selected, the group might set their habitat card next to a spruce tree and write: "Habitat. This bird builds a domed stick nest in spruce trees." If a habitat component is not evident, ask the group to hold on to the card(s).

Ask the class to reconvene and hand you any extra cards. Now, without indicating the bird species chosen, assign each group a new color. Ask them to track down the remaining cards of that color which now have habitat clues written about a particular bird species. Once they have found and gathered the cards, ask them to return to the large group. Now, announce the possible species selected and ask each group to guess which bird's path they were following.

#### B. Using GPS Units (advanced instructions)

Spend some time familiarizing student with GPS device. What are they used for and how can we use them to help us mark areas of habitat that are important? Practice entering waypoints with the students and show them how to go back to those waypoints for navigation.

Hand each group a GPS unit and tell the students they will have 20 minutes to identify habitat components for their bird species in the designated area.

When a group finds a component, they will take a waypoint with their GPS and place the appropriate index card at that location. On the card, they should describe the habitat component, but they should not indicate what bird species they selected. For example, if a group selected the snowy owl and they find a small opening in the ground where small rodents have traveled, they would pull their food card and write: "Food. A lemming may be living in this tunnel." If a black-billed magpie were selected, the group might set their habitat card next to a spruce tree and write: "Habitat. This bird builds a domed stick nest in spruce trees." If a habitat component is not evident i, ask the group to hold on to the card(s).

Ask the class to reconvene and hand you the GPS units and any extra cards. You can keep track of which GPS unit was assigned to each group (and species), but don't let the students know. Give them a different GPS and ask them to track down each waypoint to habitat clues of a different bird species. Once they have found each waypoint and gathered cards, ask them to return to the large group. Given the species the class selected, have each group guess which bird's path they were on. Now announce the possible species selected and ask each group to guess which bird's path they were following.

### Evaluation PART 3

1. Back in the classroom, discuss whether the natural area you visited is suitable habitat for any of the selected bird species. If not, what was missing? If you broadened the space to include your whole community, would it be suitable habitat? Why or why not? Consider using the maps created in Lesson 2 of this section to notate habitat components found and add to the key.

\_\_\_\_\_ -billed Bird Population Data

**YEAR 1**

Number of birds at the start of year 1 \_\_\_\_\_

Name	Total Beans
<b>Grand Total</b>	

**YEAR 2**

Number of birds at the start of year 2 \_\_\_\_\_

Name	Total Beans
<b>Grand Total</b>	

**YEAR 3**

Number of birds at the start of year 3 \_\_\_\_\_

Name	Total Beans
<b>Grand Total</b>	

**YEAR 4**

Number of birds at the start of year 4 \_\_\_\_\_

Name	Total Beans
<b>Grand Total</b>	

**YEAR 5**

Number of birds at the start of year 5 \_\_\_\_\_

Name	Total Beans
<b>Grand Total</b>	

## Bird Beaks and Feet

Introduction: A bird's beak and feet can tell us a lot about their habitat and lifestyle. Most birds are even classified according to structural similarities between their beaks and feet. In this exercise, you will look at pictures of birds and make inferences about their lifestyles.

Description	Function
<b>Beaks</b>	
Short and rounded	Multipurpose, eating insects and seeds
Spear-shaped	Spearing fish
Chisel-shaped, flat and pointed	Drilling for insects
Flat and square-shaped	Straining algae
Long and fat, like a scoop	Scooping up fish
Hooked	Catching and tearing prey
Long and tubular	Sucking nectar from flowers
<b>Feet</b>	
Long, muscular legs	Running
Long, skinny legs	Wading
Short legs with blunt claws	Scratching, ground walking
Three toes in front, one behind	Perching
Webbed	Swimming
Large, hook-like claws (talons)	Grasping prey
Tiny, short legs	Hovering
Two toes in front, two behind	Climbing

## Bird Beaks and Feet Data Table

Bird	Type of Feet	Type of Beak	Probable Diet	Probable Habitat
Common Raven				
Ptarmigan				
Loon				
Bald Eagle				
Chickadee				
Sandhill Crane				
Belted King Fisher				
Short-Eared Owl				
Tern				
Rufous Hummingbird				
Three-toed Woodpecker				

### Analysis

What features of a hummingbird make it adapted for its style of feeding?

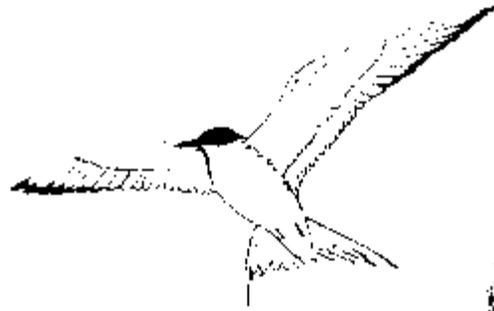
Imagine an ideal flying predator. What type of beak and feet would it have?

Different birds may have similar beaks and diets. Loons and kingfishers, for instance, both have long, sharp-pointed beaks for spearing fish. Their feet, however, are quite different. Describe how the loon, and kingfisher differ in the method by which they hunt for fish.

Owls have large eyes that enable it to see well at night. Both eagles and owls hunt similar things including small rodents. How do the hawk and the owl avoid competing with each other?

Ptarmigan have feathered legs and feet. How does this adaptation help them?

Examine the images of birds and write your inference about what the bird eats, and where it lives.



## Extensions

- A. Draw or find a picture of an animal in a suitable habitat. Identify and describe what the animal needs to survive, and show where and how its needs are met in the picture of their habitat.
- B. Have students explain in essay form how animals' features make them uniquely suited to their habitat and how this may or may not change over time. Have students use the activity to help support their answers.



## Additional Resources

### Books

Collard III, Snead (author); Brickman, Robin (illustrator). **Beaks!** (2002).

### Media

**The Biology Corner.** Biology lesson plans, worksheets, tutorials and resources for teachers and students.

[www.biologycorner.com/worksheets/beaks\\_feet.html](http://www.biologycorner.com/worksheets/beaks_feet.html)

### Credits

Adapted from the following resources:

Salter, Irene. **Bird Beak Buffet. My Science Box Lesson Plan.**

[www.mysciencebox.org/birdbeak](http://www.mysciencebox.org/birdbeak)

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**Bird Beaks and Feet**

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