TheCornellLab of Ornithology

PENNINGTON

Dear educator,

What makes a bird... a bird? With these *Feathered Friends* lessons, your students answer that question and many more, all while feeding birds!

These hands-on activities are easily adapted to fit your teaching objectives, time availability, and all levels of student background knowledge.

American Robin by Evan Barbour

Each month's lesson helps you teach students to identify one or two birds, explore outdoors, and practice STEM skills. We've also provided a family handout each month to send home to boost and support learning.

Every activity meets a variety of the Next Generation Science Standards (NGSS) Disciplinary Core Ideas (DCIs) and Practice Standards at the elementary level.

MONTH	NGSS DISCIPLINARY CORE IDEAS	NGSS PRACTICE STANDARDS
September: What Makes a Bird... a Bird?	LS3.A, LS3.B	4, 7, 8
October: Who's That Up In the Sky?	LS1.A, LS1.B, LS3.A, LS3.B	1, 2, 4, 5, 7, 8
November: What's In a Habitat?	LS2.C, ESS3.A, ESS3.B, ESS3.C	2, 6, 8
December: Behave Like a Bird	LS3.A, LS3.B	3, 4, 6
January: Eat Like a Bird	LS1.A, LS1.B, LS3.A, LS3.B	1, 3, 4, 5, 6, 8
February: Be a Citizen Scientist	LS4.C, LS4.D	3, 4, 5
March: Taking Flight—Flying and Migration	LS4.C, LS4.D	1, 3, 4, 5, 6
April: How Can I Help?	LS2.A, LS2.C, ESS3.A, ESS3.C	1, 2, 4, 6, 7, 8
May: Do You Hear What I Hear?	LS1.D, LS2.D	2, 4
June: Nests and Chicks	LS1.B	1, 2, 5, 6

Getting Prepared

We created these*Feathered Friends* lessons with elementary teachers in mind. They are perfect for classrooms, nature centers, afterschool programs, and anyone interested in teaching kids about birds. Feeding birds is central to*Feathered Friends* . To support your feeding efforts we're offering a free Pennington® Window Bird Feeder! You can order your feeder and access all supplemental resources for the lessons on our website: www.*birdsleuth.org/Pennington*.

Discover Citizen Science

As students will discover in the February lesson, scientists can't be everywhere. Scientists need our help to collect data, such as sharing observations of the natural world. Several of the activities within *Feathered Friends* provide opportunities for students to participate in the Cornell Lab of Ornithology's citizen-science projects and develop science practices. By participating in these real-world science projects, students meet NGSS standards authentically.

Have fun, ask questions, and learn a lot!

Happy Birding!

Red-tailed Hawk
by Evaristo H-F

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Download *Feathered Friends* and request your free Pennington® Window Bird Feeder at *www.birdsleuth.org/Pennington*

PENNINGTON & TheCornellLab of Ornithology

WHAT MAKES A BIRD... A BIRD?

Big Idea

Birds are diverse but have several defining characteristics, such as feathers and beaks.

Learning Objectives

Students will be able to...
- name features that make birds unique;
- identify three common bird groups.

NGSS Disciplinary Core Ideas: LS3.A, LS3.B
NGSS Practice Standards: 4, 7, 8

GETTING STARTED

Visit *birdsleuth.org/Pennington* to find True/False explanations, the Bird Search PDF, and supplemental resources for this lesson. Print the Bird Search PDF, one per student, and be prepared to show images of the three bird groups.

American Crow
by Liz Fuller

Bird of the Month

AMERICAN CROW

A clever species that knows some of the craftiest ways to find food, crows don't limit themselves to roadkill feasts. They steal fish from river otters, pluck fruit from trees, and sometimes eat from outdoor dog dishes. Crows can even use sticks as tools to collect food in places that are hard to reach. Perhaps these birds don't deserve their gloomy reputation—instead, they can be a symbol of creativity.

This Month's Activities

Engage: True or False?

Students will confirm what they know and dispel some myths about birds via this active "True or False" game. Set up a large space (outdoors, gym) with a "True" and "False" side at opposite ends of the space. Invite students to run (or walk) from side to side depending on whether they think the statements you read are true or false. Encourage discussion by asking students to share why they chose "True" or "False." Allow students to change their chosen side based on the different arguments. At the end of each discussion, be sure to reveal the correct answer and, if possible, give an example.

Basic Statements

1. Birds are the only living animals that have feathers.
2. All birds fly.
3. All birds have two wings.
4. Birds lose and replace their worn or damaged feathers.
5. All birds have thick, heavy bones that provide the structure needed to fly.
6. Birds have poor eyesight.
7. Bird hearts beat more slowly than human hearts.
8. All birds lay eggs.
9. Most birds eat worms.
10. All birds sing.

Answers 1) T 2) F 3) T 4) T 5) F 6) F 7) F 8) T 9) F 10) F

Challenge Statements

1. All birds migrate.
2. Birds are vertebrate animals.
3. All birds are warm-blooded.
4. All baby birds hatch covered in downy feathers.
5. Male and female birds of some species look different.

Answers 1) F 2) T 3) T 4) F 5) T

Explore: Bird Search

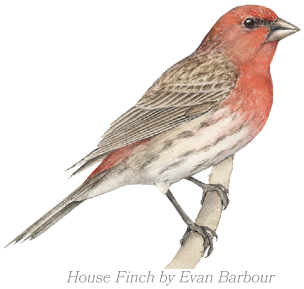
Challenge your students to find birds, or evidence of birds, in your local habitat. Whether you explore a playground, schoolyard, local park, or nature preserve, there are birds nearby. Make copies of the Bird Search PDF for each student. Once outside, have students develop their observation skills by finding birds that fit each category in the Bird Search.

Inquire: Meet Three Feeder-Bird Groups

Black-capped Chickadee by Evan Barbour

CHICKADEES

These black-and-white songbirds are found around the U.S. You will commonly see them visiting feeders and singing their name, "chick-a-dee-dee-dee."



House Finch by Evan Barbour

FINCHES

There are nearly 30 species of finches in the U.S. You can recognize them by their large, seed-crushing bill.

Downy Woodpecker by Evan Barbour

WOODPECKERS

It's hard to miss this group of birds. With more than 20 species found in the U.S., not only can you see them feeding on suet at a feeder, you can also hear them drilling on dead trees in the hunt for insects.

Display or project an image of each bird group, one at a time. As you show each group, ask

- Have you ever seen this bird before? Where did you see it?
- Do you know its name?
- Do you know what sound it makes? What does it sound like?
- How would you know it's a _____?

Make a list of descriptive words the students use for each group. Extend the lesson by showing videos, listening to sounds, and viewing more photos. Ask students to try to mimic the sounds of the birds; for example the chickadee is "chick-a-dee-dee-dee."

After each bird group has been introduced, show the students all three together and ask

- How are these groups different from each other? *(Remember to think about how they look and sound.)*
- What things do these birds all have in common? *(Birds have wings, feathers, hollow bones, and lay eggs. These birds also all visit feeders.)*

Through these activities, students will develop their own list of "What makes a bird... a bird?" Highlight the key points that all birds have two wings, two legs, hollow bones, beaks, and lay eggs. However, emphasize that feathers are what make a bird a bird.

Did You Know?

IF IT HAS FEATHERS, IT'S A BIRD!

Birds are the only living creatures with feathers. Feathers are made of keratin, the same protein that makes up a bird's beak, lizard scales, mammal hair, human fingernails, animal hooves, and horns! Feathers help birds fly and keep them warm and dry. The color pattern of feathers, called "plumage," can help birds stay camouflaged or find mates.

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about wild birds. This sheet offers information and activities so the whole family can enjoy birds too.

WHAT MAKES A BIRD... A BIRD?

Birding in Your Neighborhood

Look for birds on a walk in your neighborhood or sit quietly for 10 minutes to look and listen for birds. Answer the following questions:

How many birds did you see in total?

_____

How many different kinds of birds did you see?

_____

Circle the bird groups you think you observed.

Black-capped Chickadee by Evan Barbour

CHICKADEES

House Finch by Evan Barbour

FINCHES

Downy Woodpecker by Evan Barbour

WOODPECKERS

What were the birds doing? _____

_____

Did you hear a bird? **Yes** **No**

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SKETCH ONE OF THE BIRDS YOU SAW

COOL FACT

Birds Are Descendants of Dinosaurs

Birds are the only living creatures with feathers. But they aren't the only animal to have ever had feathers. From the fossil record we know that birds evolved from dinosaurs, some of which had feathers! But those first feathers had nothing to do with flight. Instead, they probably helped dinosaurs show off, hide, or stay warm.

American Crow by Liz Fuller

Bird of the Month

AMERICAN CROW

Despite its tendency to eat roadkill, the American Crow is not specialized to be a scavenger and carrion is only a very small part of its diet. Though their bills are large, crows can't break through the skin of even a gray squirrel. They must wait for something else to open a carcass or for the carcass to decompose and become soft enough to eat.

Hands-On Activity

BIRD PICTURES

Grab a piece of paper and crayons/markers. Have one person think of a bird and describe it in detail without saying the name of the bird. As the person describes the bird, everyone else is challenged to draw and color it based on the description. Once everyone is finished, compare drawings. Do any of the pictures look like the bird being described?

WHO'S THAT UP IN THE SKY?

Big Idea

By learning the basic groups of birds, anyone can begin to learn to identify species.

Learning Objectives

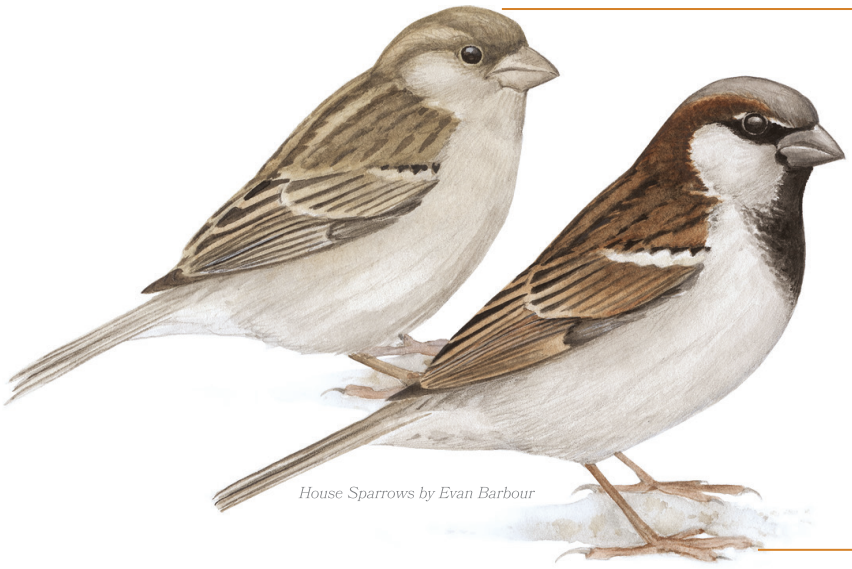
Students will be able to...

- identify silhouettes of eight different groups of birds;
- compare birds they see outside to their Common Feeder Birds poster.

NGSS Disciplinary Core Ideas: LS1.A, LS1.B, LS3.A, LS3.B
NGSS Practice Standards: 1, 2, 4, 5, 7, 8

GETTING STARTED

Visit *birdsleuth.org/Pennington* to order your free bird feeder. Hang this feeder where clearly visible for students. If you cannot use a feeder, check out our feeder cams. Then select the appropriate Common Feeder Bird poster based on your location. Print the Common Feeder Bird and Bird Silhouette posters.



House Sparrows by Evan Barbour

Bird of the Month

HOUSE SPARROW

A non-native species in the United States, the House Sparrow was introduced in 1851 in Brooklyn, New York. By 1900, the species had spread to the Rocky Mountains! Now, this species is one of the most common birds you'll find across the country.

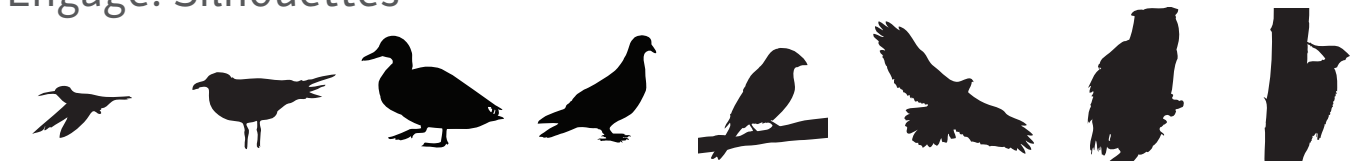
This Month's Activities

LITERACY CONNECTION

AM I LIKE YOU?
By Laura Erickson and Brian Sockin
Illustrated by Anna Rettberg

This wonderfully illustrated text will help you learn to identify some of the most common birds and their characteristics.

Engage: Silhouettes

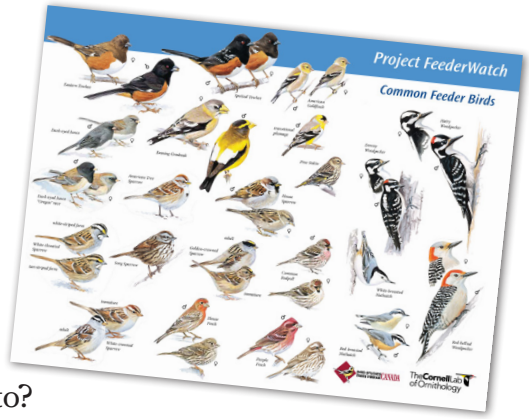


HUMMINGBIRD GULL DUCK DOVE FINCH RAPTOR OWL WOODPECKER

Most students know more birds than they realize. By learning these eight basic silhouettes, even newcomers can begin to separate birds into the right group. This is one of the most effective ways to start learning how to identify bird species. Project or share handouts of the unlabeled silhouettes of the bird groups where everyone can see them. Ask

- Which is the duck? The owl? Hummingbird? ...etc.
- How did you know? Make lists of characteristics for each group of birds.
- Which kinds of birds do you think we might see at a bird feeder? *(hummingbird, dove, finch, and woodpecker)*

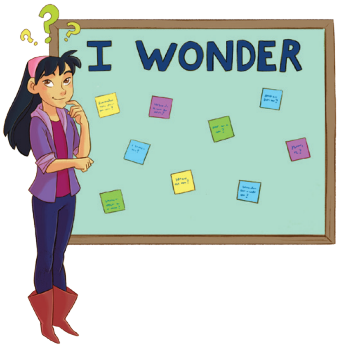
Then show your students the Common Feeder Birds poster, ideally near a window bird feeder. (Don't have a window bird feeder? Schools can order a free feeder through *birdsleuth.org/Pennington*.) Tell students that not all types of birds visit feeders. Challenge students to point out birds on the poster that they have seen before. Ask



- Which of these birds have visited our feeder?
- Are there other birds you see in the schoolyard that aren't on the poster? What groups do those birds belong to?

Explore: Observe Feeder Birds

Take students outside on a bird-watching adventure at the feeder for at least 10 minutes. If you can't go outside, the Cornell Lab's feeder cam is a great alternative. Look for the birds you discussed in class. If none are present, look and listen for other birds and animals. Focus on the similarities and differences between the birds you see. Do they look, sound, or behave differently? Now is a great time to get children in the habit of watching wildlife quietly! Visit the BirdSleuth website to find tips about keeping students engaged and organized on trips outside.



Inquire: "I Wonder?" Board

Now that students have observed birds, there's a good chance questions are starting to arise. Encourage kids to keep asking questions! Document and track these questions through an "I Wonder?" Board. Designate a space in your classroom where students can record any questions they have during the *Feathered Friends* activities.

If you and your students wish to make feeder-bird observations regularly, consider participating in Project FeederWatch. This is a citizen-science project that your class can join to share field observations with scientists at the Cornell Lab of Ornithology.

Did You Know?

BRIGHT BIRDS AND BROWN BIRDS

If you keep seeing brown ducks near green-headed Mallards, chances are those are Mallards too! The green-headed birds we easily recognize as Mallards are males. Female Mallards have a brown and tan pattern, but are basically the same size and shape as the male. This is an example of sexual dimorphism, where the male and female of a species look different from one another. *Di* means "two" and *morph* means "form," so there are "two forms."

Mallards by Evan Barbour

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about the diversity of wild birds. This sheet offers information and activities so the whole family can enjoy birds too.

WHO'S THAT UP IN THE SKY?

Birding in Your Neighborhood

Your child has become familiar with eight groups of birds. Go for a walk and mark the types of birds you see using the checklist below. You can even try to identify species by using the free Merlin Bird ID app (*merlin.allaboutbirds.org*). Want to share your sightings? Go to *eBird.org* to create a family account and enter observations at home!

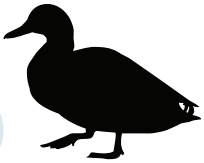
CHECK IF YOU SAW THIS BIRD TYPE

HUMMINGBIRD

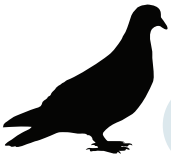
GULL

FINCH

OWL



DUCK



DOVE

RAPTOR

WOODPECKER

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COOL FACT

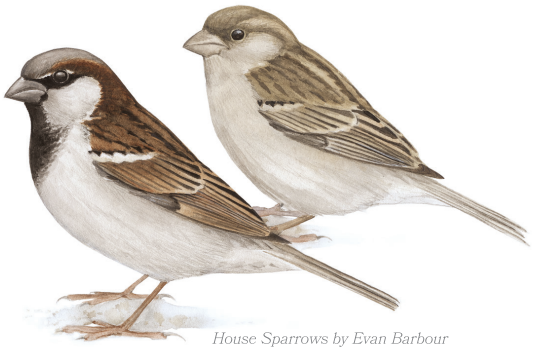
Sexual Dimorphism

Sexual dimorphism is when the male and female of a species look different from one another. *Di* means "two" and *morph* means "form," so there are "two forms." In birds, usually the male is more colorful than the female because the female needs to be camouflaged while sitting on the nest. Also, females usually choose their mate. A brighter male can indicate that he is healthy, good at getting food, or good at evading predators.

Bird of the Month

HOUSE SPARROW

This is such a common bird that you might not notice it. Sometimes you'll see this small bird inside stores, hopping around outdoor restaurants, or flocking in cities. The House Sparrow takes frequent dust baths. It throws soil and dust over its feathers, just as if it were bathing with water, to help maintain oil on its feathers.



House Sparrows by Evan Barbour

Hands-On Activity

BUILDING BIRDHOUSES

Want to attract more birds to your home? Build a birdhouse! A birdhouse is another option for birds that nest in tree holes or other natural cavities, and can attract nesting birds to your yard. Visit *NestWatch.org* and check out the "Right Bird, Right House" interactive tool to get plans for building your own birdhouse.

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WHAT'S IN A HABITAT?

Big Idea

A healthy habitat provides the four essential components all animals need to survive: food, water, cover, and space.

Learning Objectives

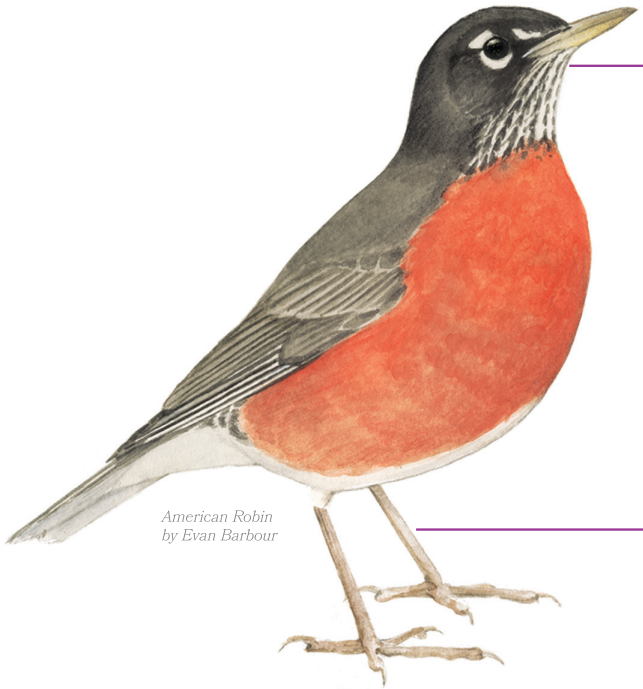
Students will be able to...

- list the four components of habitat;
- identify at least three effects that humans have on the environment.

NGSS Disciplinary Core Ideas: LS2.C, ESS3.A, ESS3.B, ESS3.C
NGSS Practice Standards: 2, 6, 8

GETTING STARTED

Gather materials needed for drawing such as clipboards, blank paper, pens, pencils, crayons, etc. Prepare to take your students outside.



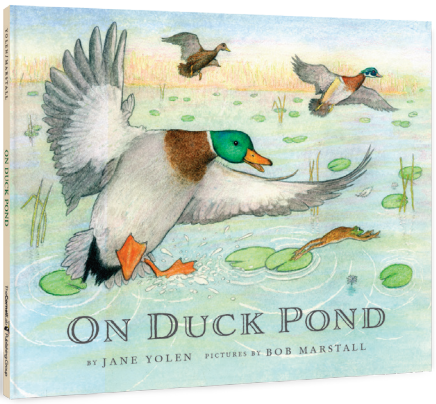
American Robin
by Evan Barbour

Bird of the Month

AMERICAN ROBIN

Not all birds visit feeders, and the American Robin is one such exception. This species is frequently seen in yards where it patiently searches for worms. Its cup-shaped nest is found where limbs join tree trunks. The eggs are a beautiful "robin's-egg" blue.

This Month's Activities



LITERACY CONNECTION

ON DUCK POND
By Jane Yolen
Illustrated by Bob Marstall

See what happens when a flurry of ducks arriving at a pond upsets the morning's stillness.

Engage: Habitat Investigation

Ask your students what they think a habitat is. Make a list on the board of all definitions or words the students mention. If they have problems narrowing it down, use this definition: A habitat provides the food, water, cover, and space each living thing needs to survive and reproduce. Ask

- Do different species need different habitats? *(Yes! Try comparing two different birds, such as a robin and hawk, and go through the four habitat components for each bird.)*
- What happens if a habitat does not provide one or more of the basic needs? *(If a place doesn't provide the proper food, water, space, and cover in the right arrangement for a particular species, the plant or animal can't live there.)*

Explore: Create a Habitat Map

Take your students on a schoolyard field trip. Bring supplies for drawing. Allow students to spread out across the schoolyard to draw quietly while thinking about how birds might use what's found there. Label sources of food, water, cover, and space for a bird.

Next, bring the whole group back together and discuss the habitat components they drew. Ask

- What kind of food, water, and cover is available here for birds?
- What kinds of birds do you think might live here?
- Is there something we could do to make it a more complete habitat for birds? *(Put in a feeder or birdbath, clean it up, plant native plants, etc.)*
- Will all birds use this space in the same way? Will all birds use the same space? (*Think about space vertically. Many animals only use space at ground level, while other animals only like to stay high in the tops of trees.)* What's one example of animals using different areas of vertical space? *(One example is a snake versus a hawk. For birds, think about a duck versus a hawk.)*

Inquire: Human Effect

Ask students to define pollution. Make a list of the words students mention and make a list of locations they say can be polluted. Pollution is the presence of a substance or thing in the environment that is harmful or poisonous. Living things cannot survive without clean water, air, and land. Birds are very sensitive to pollution. Ask

- How do you think pollution affects animals?
- What do you think you can do to help keep habitats from being polluted?

(The most common answer is to pick up garbage that they see, but encourage them to think about other things such as turning off lights when no one is in the room.)

Be a Bird Buddy! To encourage stewardship of the local environment, organize a schoolyard or park cleanup. Consider asking businesses to donate items such as rubber gloves and garbage bags.

Did You Know?

AMERICAN ROBIN

American Robins eat large numbers of invertebrates and fruit. Particularly in spring and summer, they eat large numbers of earthworms, insects, and some snails. Robins also eat an enormous variety of fruits, including chokecherries, hawthorn, dogwood, sumac fruits, and juniper berries. One study suggested that robins may try to round out their diet by selectively eating fruits that have bugs in them. Having a healthy habitat ensures birds like American Robins have a diversity of food options.

American Robin by Evan Barbour

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about wild birds and their habitats. This sheet offers information and activities so the whole family can enjoy birds too.

WHAT'S IN A HABITAT?

Create a Map

With your child, choose a nearby outdoor space to map (a yard, garden, local park, etc.) First, spend time just observing what is there. Are there trees, gardens, structures, or water? Are there flowering plants, shrubs, lawn, bird feeders? Can you or your kids identify any of the plants? (If not, that's ok!) After an initial survey of the yard, draw and label a map of the space. If you want to go further, visit *Habitat.Network* to add your map to an online citizen-science project.

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COOL FACT

Vegetarian Birds

Though we think of many feeder birds as seed-eating birds, most of will eat plenty of insects. Insects are especially important for young chicks as they are developing. However American Goldfinches are among the strictest vegetarians in the bird world, selecting an all-vegetable diet and only inadvertently swallowing an occasional insect.

Bird of the Month

AMERICAN ROBIN

Though commonly thought of as a sign of spring, American Robins are actually found throughout the United States year round. If you don't see these birds in the winter, where might they be hiding in your local habitat?

American Robin by Evan Barbour

Hands-On Activity

MAKING A HABITAT MODEL

Scientists often use drawings and models to help make sense of the things they observe and to share information with others. Use materials you find at home, such as plastic bottles, cardboard, old buttons, small metal pieces, natural objects, or blocks and toys to make a 3-D model of the habitat you mapped earlier or another habitat of your choice.

The habitat we chose is: _____

Some birds that live there are: _____

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BEHAVE LIKE A BIRD

Big Idea

Birds behave in ways that help them survive and reproduce in their environment.

Learning Objectives

Students will be able to...

- name three bird behaviors and give the reasons for those behaviors;
- demonstrate three different ways birds move.

NGSS Disciplinary Core Ideas: LS3.A, LS3.B
NGSS Practice Standards: 3, 4, 6

GETTING STARTED

Visit *birdsleuth.org/Pennington* to find video clips of bird movement and behavior. Practice how you will show videos to students.

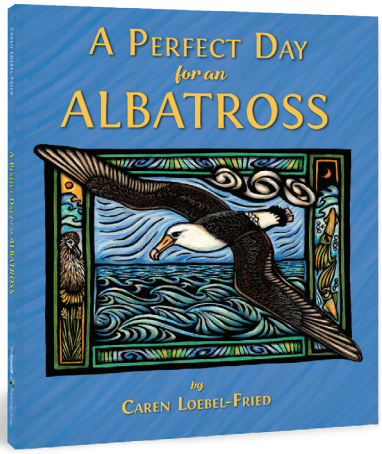
Red-winged Blackbird by Evan Barbour

Bird of the Month

RED-WINGED BLACKBIRD

This is one of the most abundant birds across North America, and one of the most boldly colored. Males have scarlet-and-yellow shoulder patches they can puff up or hide depending on how confident they feel. Females are a subdued, streaky brown, looking almost like a large, dark sparrow.

This Month's Activities



LITERACY CONNECTION

A PERFECT DAY FOR AN ALBATROSS
Written and Illustrated by Caren Loebel-Fried

Mālie, a Laysan Albatross, must protect her egg until her mate returns. Join Mālie as she dances, hunts, and soars over the ocean swells. Discover the behaviors and habits of Laysan Albatrosses, the largest seabirds to make their home in the North Pacific.

Engage: Dance Like An Albatross

Scientists study bird behaviors to gain insight into how birds survive. Some observable behaviors include migration patterns, food storage strategies, nesting patterns, and courtship displays. The Laysan Albatross has a very unique dance that it uses to find and greet its mate. Share the video "How To Dance - 'Tross Style,'" and see if students notice the patterns or "dance moves." Then challenge students to dance like an albatross. If you need help use the chart at *birdsleuth.org/Pennington* for all the moves.

Explore: Birdy Says

In this version of "Simon Says," students will mimic bird behavior. Demonstrate the five movements students will use, or show the students each video and have them develop their own moves that mimic the birds.

- **Pigeon Strut:** Imitate a pigeon. Have students move their heads forward and back as they walk with their hands behind their backs, taking short steps.
- **Soaring Raptor:** Like eagles, have students spread their arms and gently tip their arms and bodies back and forth.
- **Penguin Waddle:** Have students do their best penguin walk by holding their arms at a slight angle away from their bodies and shuffling with small steps, with their feet close together. A little swaying adds to the waddle.
- **Hummingbird Flutter:** Acting like little hummingbird helicopters, have students flap their arms from their elbows as fast as possible.
- **Step-stopping Robin:** Just like robins, have students step, step, step, then stop to listen for worms.

After students are comfortable with their new bird behaviors and names, it's time to play "Birdy Says!"

Explain the rules: You will call out one of the five movements or you may shout "Cooper's Hawk!" (a bird of prey that is a potential threat), and everyone must freeze! Players can only do what you say if you start with "Birdy says _____." If someone does the wrong movement, moves without you saying "Birdy says," or doesn't freeze when you call "Cooper's Hawk," they must take a seat. Encourage students to watch the different ways that birds move the next time they are outside.

Inquire: Backyard Bird Behaviors

Want a challange? Invite students to predict reasons for mystery bird behaviors they observe in videos. First show the videos to students, then ask why they think the birds are behaving this way. After students discuss their reasoning, reveal the true reason for these mystery behaviors.

- Western Grebe (courtship)
- Greater Sage-Grouse (courtship/territory)
- Black Heron (foraging)
- Double-crested Cormorant (drying its feathers)
- Dusky Scrubfowl (foraging)

Did You Know?

STORING FOOD FOR LATER

Many birds cache their food, meaning they will store food when it is abundant. If food is ever scarce, they have reserves. Birds store small amounts of food in many different hiding places, so if one is discovered by another animal, not all the food will be lost. Feeder birds such as chickadees are masters of caching food.

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about bird behavior. This sheet offers information and activities so the whole family can enjoy birds too.

BEHAVE LIKE A BIRD

Walk the Walk

Take a walk around your neighborhood or nearby park and watch birds move. Do you see the Pigeon Strut or Step-stopping Robin? Find a bird performing a different movement. Imitate the movement and create a name for it.

COOL FACT

Now Where Did I Put That?

Many birds like to cache their food, meaning they will store food when it's easy to find so that later, when it's winter and less food is available, they can still eat. Birds store small amounts of food in many places. This means they have to remember all those locations. A Black-capped Chickadee can remember thousands of hiding places!

Bird of the Month

RED-WINGED BLACKBIRD

Male Red-winged Blackbirds fiercely defend their territories during the breeding season, spending more than a quarter of daylight hours in territory defense. He chases other males out of his territory and attacks nest predators, sometimes going after much larger animals, including horses and people.

Red-winged Blackbird by Evan Barbour

PENNINGTON

The Cornell Lab of Ornithology

Hands-On Activity

HOMEMADE WILD BIRD TREATS

Brrr! Winter can be tough for birds. But you can help them with some homemade bird treats. Follow the recipe below, hang your treat outside when it's ready, and enjoy watching the birds!

Ingredients

- 3/4 cup flour
- 1/2 cup water
- 3 tablespoons corn syrup (or pancake/maple syrup)
- 4 cups Pennington® Bird Feed

Instructions

1. Mix ingredients.
2. Press tightly into cookie cutters with spoon.
3. Insert straw or pencil to create hang hole.
4. Let dry for 4-6 hours or overnight. Remove from cookie cutter.
5. Insert string into hanging hole (use natural fibers such as cotton or wool so birds can also use the string in their nests).
6. Hang your new feeder outdoors in a group of trees for birds to enjoy.

Pennington® Feeder Spotlight

NOT INTERESTED IN GETTING YOUR HANDS DIRTY?

You can also help your feathered friends by hanging up a bird feeder. Try using the Pennington® Gazebo Feeder.

PENNINGTON™ TheCornellLab of Ornithology

EAT LIKE A BIRD

Big Idea

Bird beaks come in many different sizes and shapes. Each beak is specialized to help that species get and eat the food they consume.

Learning Objectives

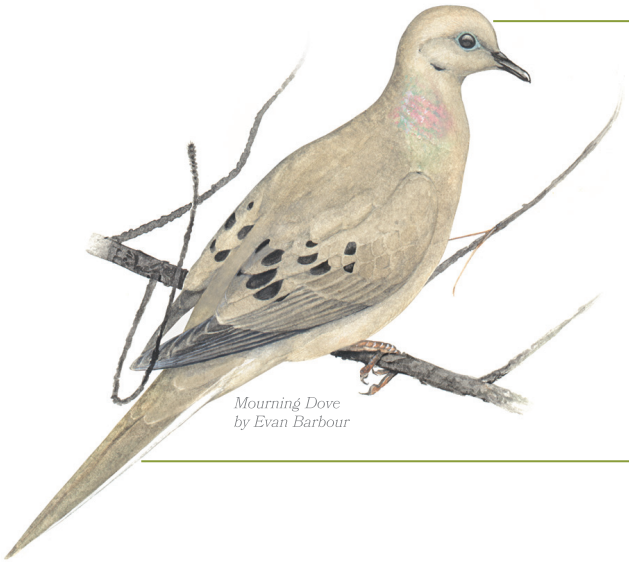
Students will be able to...

- name at least three foods that birds eat;
- name three ways birds have adapted for survival.

NGSS Disciplinary Core Ideas: LS1.A, LS1.B, LS3.A, LS3.B
NGSS Practice Standards: 1, 3, 4, 5, 6, 8

GETTING STARTED

Collect the following materials: sunflower seeds, nuts (such as walnuts and peanuts, in the shell), nectar, fruit, fish, insects, worms, and small animals. These can be the real thing, pictures, or stuffed or plastic animal replicas to help the students visualize the variety of foods available to birds. This is also the perfect time to hang and fill your bird feeder. Don't have a feeder? Order your free school feeder at *birdsleuth.org/Pennington*.



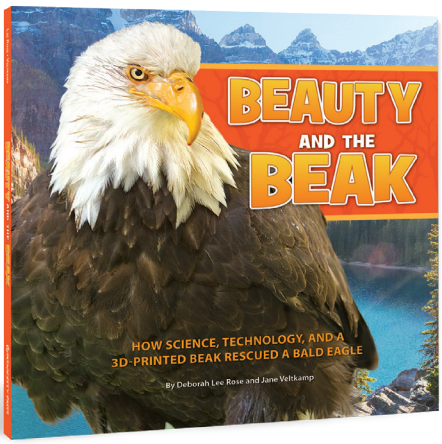
Mourning Dove by Evan Barbour

Bird of the Month

MOURNING DOVE

Mourning Doves tend to feed busily on the ground, swallowing seeds and storing them in an enlargement of the esophagus called the crop. Once they've filled it (the record is 17,200 bluegrass seeds in a single crop!), they can fly to a safe perch to digest the meal.

This Month's Activities



LITERACY CONNECTION

BEAUTY AND THE BEAK
By Deborah Lee Rose and Jane Veltkamp

A Bald Eagle, later named Beauty, was shot by a poacher. Her eye and beak were badly damaged. Learn how a biologist, an engineer, a dentist, and a 3-D printer saved Beauty's life.

Engage: Food Detectives

Start by brainstorming the variety of foods that birds eat and write them on the board. Present students with at least five types of foods (see list in Getting Started). Looking at the food items one at a time, ask your students the following questions for each type:

- Where would you find this kind of food?
- If you are a bird, what are the challenges to getting this food?
- Do you know a bird that may eat this food? How is that bird's beak shaped to obtain and eat it? *(Example: many seed-eating birds have large, thick bills to crush seeds while other birds have narrow bills to catch insects.)*
- What kinds of tools do you, a person, use to eat food more easily? *(fingers, fork or spoon, nutcracker, etc.)*

If possible, show your students images or videos of birds that eat each of these foods. Some are posted at *birdsleuth.org/Pennington*.

Explore: Bird Beak Observations

Have students spend 10-15 minutes outside with a clipboard, paper, and pencil, observing birds eat. Students should choose one bird they see and draw its beak and the food it's eating. Didn't see any birds eating? Ask why that might be*(time of day? not enough food sources?)* . If you didn't see any birds or can't go outside, take time to observe birds visiting the Cornell Lab feeder camera found at*birdsleuth.org/Pennington* .

Bring the class together to discuss the different beaks and food sources they observed. Relate the bird beaks and food sources they saw to those discussed earlier. Make observations with the class and keep questions on the "I Wonder?" Board.

Inquire: Feeder Experiment

Have students conduct a feeder experiment. Refer back to your "I Wonder?" Board to find any questions that might relate to feeder birds. Use these as starting points to conduct a class investigation. Sample investigations could include testing what time of day birds eat the most food from the feeder, if different birds prefer different seed types, or where bird prefer the feeder to be located.

Did You Know?

BE CAREFUL WHAT YOU SPRAY!

Back in 1970, times were tough for many bird species, including Bald Eagles and Peregrine Falcons. A pesticide called DDT had entered the food web after humans sprayed the chemical on farm fields. Though not harmful in small amounts, biomagnification (toxins increasing in concentration as they are consumed through the food web) meant that predators at the top of the food web, such as raptors, ingested harmful amounts of the pesticide. The effects of DDT reduced populations of both species by more than 80 percent. Peregrine Falcon populations were so low that no nesting pairs could be found within the eastern United States. With the ban of DDT, and rigorous bird restoration programs developed in part by the Cornell Lab of Ornithology, these species were able to make a sweeping comeback. Both species are now considered species of "Least Concern" on the IUCN Red List of Threatened Species.

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

Pennington® Window Bird Feeder

Order your free feeder at

www.birdsleuth.org/Pennington

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about feeding habits of wild birds. This sheet offers information and activities so the whole family can enjoy birds too.

EAT LIKE A BIRD

The Beak Game

Gather as many of the following items as you can to represent foods birds eat.

Food Resources: Macaroni (small animals), goldfish crackers (fish), gummy worms (earth worms), chocolate sprinkles (ants), peanuts, sunflower seeds, mini-marshmallows (grubs/caterpillars), dry cereals (insects), fruit juice (nectar).

Beaks (utensils): Clothespin, toothpick, straw, spoon, small plastic scoop, tweezers/small scissors.

Hold one type of "beak" in one hand and keep the other hand behind your back. With one type of food in front of you, try to gather as much food as possible in 15 seconds. Keep in mind, your survival depends on your ability to gather food! After 15 seconds, try another beak and gather food for another 15 seconds. Repeat these steps for each type of beak.

Which beak was most successful in gathering each type of food?

Bird beaks are like the tools you used in this activity. Can you match the shape/function of any of the tools with any real beaks? The shape of a bird's beak is a critical adaptation for their survival because it helps them gather the food within their habitat. Different beaks are better suited for different foods. Next time you see a bird, take a look at its beak and see if you can tell what it eats!

COOL FACT

Woodpecker Drumming

Woodpeckers don't sing songs, but they do use their beaks to drum loudly against wood or metal to achieve the same effect. People sometimes think this drumming is part of the birds' feeding habits, but it isn't. Drumming is the woodpecker's "song," and is used to attract mates and defend territory. When a woodpecker is feeding, it makes surprisingly little noise, even when it's digging vigorously into a tree.

PENNINGTON

The Cornell Lab of Ornithology

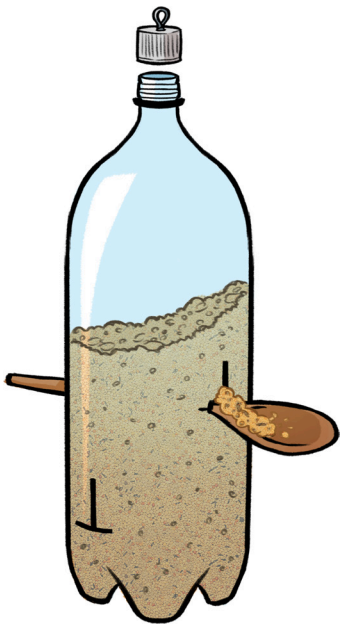
Bird of the Month

MOURNING DOVE

Mourning Dove by Evan Barbour

Mourning Doves tend to feed busily on the ground, swallowing seeds and storing them in an enlargement of the esophagus called the crop. They eat roughly 12 to 20 percent of their body weight per day, or 71 calories on average.

Hands-On Activity



MAKE A PERCH FEEDER

Your winged visitors will love being "spoon-fed" with this simple feeder.

Supplies

- 1-liter soda bottle, thoroughly cleaned
- Craft knife (adult use only)
- 2 wooden spoons
- Small eye-screw
- Twine/string for hanging

Instructions

1. Draw a 1/2-inch asterisk on the side of a clean 1-liter soda bottle (about 4 inches from the bottom).
2. Rotate the bottle 90 degrees and draw another asterisk 2 inches from the bottom.
3. Draw a 1 inch diameter circle opposite each asterisk.
4. Have an adult use a craft knife to slit the asterisk lines and cut out the circles.
5. Insert a wooden spoon, handle first, through each hole and then through the opposite asterisk.
6. Remove the bottle cap and twist a small eye screw into the top of it for hanging.
7. Fill your feeder with birdseed, recap it, and use a length of twine to hang it from a tree.

Check *allaboutbirds.org* under the Feeding Birds tab to find out more about what food to use and what birds you can expect to see in your region.

PENNINGTON™ The Cornell Lab of Ornithology

BE A CITIZEN SCIENTIST

Big Idea

Citizen science provides a unique opportunity for people to share their observations of the natural world with scientists.

Learning Objectives

Students will be able to...

- identify at least one bird species;
- collect data for the GBBC citizen-science project;
- describe "citizen science" and its importance.

NGSS Disciplinary Core Ideas: LS4.C, LS4.D
NGSS Practice Standards: 3, 4, 5

GETTING STARTED

The Great Backyard Bird Count (GBBC) is a citizen-science project hosted by the Cornell Lab of Ornithology, National Audubon Society, and Bird Studies Canada that takes place over four days every February. Visit *birdsleuth.org/Pennington* to become familiar with the Great Backyard Bird Count and how to participate. Carefully review the details about how to conduct and submit counts. Print your regional bird checklist to get an idea of the kinds of birds you're likely to see in your area in February.

by Evan Barbour

Birds of the Month

HOUSE FINCH (TOP) AND PURPLE FINCH (BOTTOM)

You'll have to get a close look at these birds to tell them apart; the House Finch's red is more vivid, but is only found on its head, neck, and rump. The Purple Finch is a more raspberry color which covers its head and spreads back toward the tail.

This Month's Activities

Engage: Become a Bird Expert

Write the words, "citizen science" on the board. Ask your students what they think this means. Explain that in citizen-science projects, people help scientists with studies on everything from birds to butterflies (see the "cool fact" for information). Explain that the Great Backyard Bird Count (GBBC) is an annual four-day event that engages tens of thousands of people in counting birds around the world. This creates a real-time snapshot of where birds are. Anyone can participate, from beginning bird watchers to experts, but it is important for everyone to identify and count the birds accurately.

In preparation for the GBBC, assign each student a study bird so they can become an expert in identifying one bird. This way your whole class will learn a dozen or more birds that they can find, identify, and count together! Have each student draw and color the bird, paying special attention to field marks. Then have students add details such as distinguishable features used to identify it.

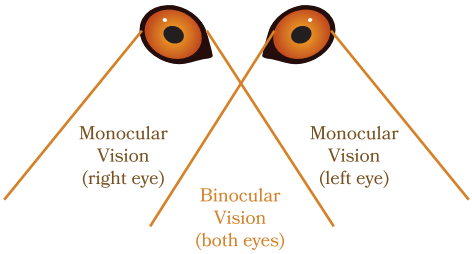
Not sure which birds to select? Look at the top 10 birds commonly seen during the GBBC at *birdsleuth.org/Pennington*.

CREATE A CLASSROOM FIELD GUIDE

You might want to spend more time on this and have it be a small independent research project. Allow students to access *AllAboutBirds.org*, other websites, or the library to create a page in a field guide about their bird. Encourage your students to compare their bird with a peer's bird that looks similar, and share how they are distinguishable. Gather all student pages and display them together as a classroom field guide.

Over the four days of the GBBC, plan to count birds for at least 15 minutes in as many places and on as many days as you'd like. Or just observe your bird feeder for 15 minutes one time. Submit a separate checklist for each time, day, and location. Compile your class results (i.e. the highest count anyone in the group has seen) into one checklist to submit. Enter your results on the GBBC website before the deadline, which is a couple of weeks after the count. Check the site for details.

Explore: Binocular vs. Monocular



Did you know birds have better eyesight than humans? Some birds have eyes on either side of their head so they have a wider field of vision and can easily see an object with only one eye at a time. This is called monocular vision. Other species have eyes in the front of their head, like humans do. This is called binocular vision, which means they can see an object with both of their eyes at once. Go outside with your class and bring a tennis ball or other small, soft ball. Have students toss the ball around with one eye covered (monocular vision). Then have them toss the ball with both eyes open. Ask

- Which was easier? Why?
- Raptors have binocular vision. What other animals (birds or other) have binocular vision? *(Owls, humans, dogs, Green Herons and many more. Hammerhead sharks, on the extreme end, have eyes that allow for 360 degree vision and binocular vision.)*
- Can students find a trend among animals listed that have binocular vision? *(Most of them are predators.)* Why is binocular vision helpful for raptors and other predators? *(Predators need to focus on prey ahead of them and need good depth perception for the hunt.)*
- Why do some animals have monocular vision? *(These tend to be prey animals; they can see better all around their bodies to look out for predators.)*

Inquire: By the Numbers

After participating in the GBBC, take the time to have students reflect on the experience. Ask

- What did you enjoy?
- Did you find anything difficult?
- What was your favorite bird that you saw?

After some time for reflection, review the observations students made. How many species did your group see? If they visited more than one site, can they see any trends in the sites they visited? Follow up by asking how they think their counts will contribute to science. *(For example, these counts help track changes in bird populations from year to year and over long periods of time.)*

Visit the GBBC home page to review the overall stats for the world. Before you show the stats, ask students to guess how many birds species were seen around the world during the GBBC. How many people do they think participated? This is a great opportunity for students to see that they have participated in a global event with hundreds of thousands of other birders. (Statistics will not be final until data entry closes, usually on March 1.)

Did You Know?

CITIZEN SCIENCE IS IMPORTANT—AND YOU CAN TAKE PART!

Citizen science is a partnership between the public and professional scientists which can help answer questions scientists couldn't answer alone. Our citizen scientists help with research tasks such as observation and data collection. We welcome your students' data about the kinds, numbers, and behaviors of birds that they see. These data will help us better understand and conserve birds. Children are really motivated to help scientists answer real-world questions, and have their data used to help protect birds.

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about citizen science and birds. This sheet offers information and activities so the whole family can enjoy birds too.

BE A CITIZEN SCIENTIST

Participating in the Great Backyard Bird Count (GBBC)

Citizen science is a partnership between the public and professional scientists designed to help answer questions scientists alone couldn't answer. Citizen scientists help with research tasks such as gathering data about the kinds, numbers, and behaviors of birds. This data help scientists better understand and conserve birds.

Citizen science isn't just something that happens in schools. You can participate in the Great Backyard Bird Count at home. Visit *Birdcount.org* for information on how you can collect data in your neighborhood. Have the whole family make some predictions about which birds, and how many of each, you might see.

Protect Birds at Home

Birds cannot easily see glass. Up to one billion birds die every year in the United States after flying into windows. But there are many ways to prevent it. One of the easiest ways is to hang objects in the window or attach them directly to the glass. With the help of an adult, make and cut out raptor shapes from black paper and stick them to your large windows.

PENNINGTON™ TheCornellLab of Ornithology

COOL FACT

Citizen Science

Citizen Science makes a difference for bird conservation—and you can take part. During the GBBC in 2015, volunteers, including some beginning birders, reported more than 9.5 million bird observations across the world. Scientists could never have been able to collect all that data without the help of citizen scientists. If you want to be a citizen scientist, it's easy to get started. Visit *birds.cornell.edu* to learn more about our projects.

Birds of the Month

HOUSE FINCH (TOP) AND PURPLE FINCH (BOTTOM)

by Evan Barbour

Both of these birds are found on the eastern and western coasts of the United States, however the House Finch was not always found on the East coast. In 1940 House Finches were introduced to New York. Since then their population has grown, but Purple Finches seem to be declining. Since the introduction of the House Finches to eastern North America, Purple Finches are losing feeding opportunities at feeders more than 95 percent of the time when the two birds encounter each other.

Hands-On Activity

DRAWING LIKE A SCIENTIST

There is room for art and science in the same nest, so to speak. Scientists need images of birds that are accurate to share with the world. Watch your feeder or find some photos of birds you'd like to draw. Really pay attention to the details that you see. You can draw the whole bird or just focus on one part such as the beak, wings, tail, eye, or a tuft of feathers. Maybe you're inspired to draw the same kind of bird in different positions. If you're still looking for inspiration you may want to read *The Boy Who Drew Birds: The Story of John James Audubon*, by Jaqueline Davis, illustrated by Melissa Sweet.

TAKING FLIGHT—FLYING AND MIGRATION

Big Idea

Students will explore the basic principles of flight and learn why some birds migrate.

Learning Objectives

Students will be able to...

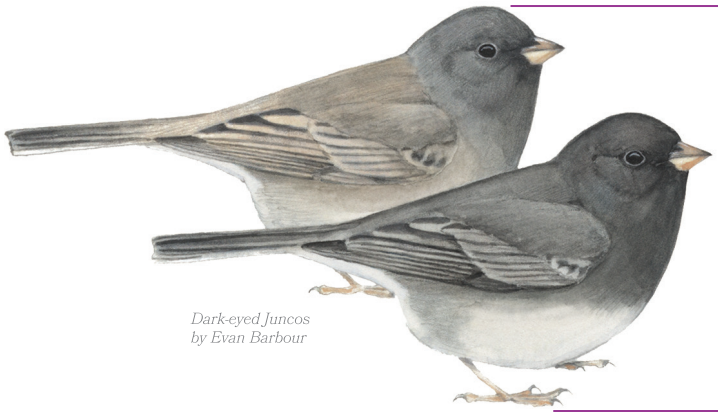
- describe why some birds soar;
- identify at least three hazards that migrating birds face.

NGSS Disciplinary Core Ideas: LS4.C, LS4.D
NGSS Practice Standards: 1, 3, 4, 5, 6

GETTING STARTED

Get background information about bird migration and a list of additional hazards for the Migration Game at *birdsleuth.org/Pennington*.

Gather or purchase at least two different kinds of craft feathers. Find some that are medium length and downy, and some that still have the quill. Gather a box of jumbo paper clips, and some small washers or nuts. Find a location from which you can observe a good "drop," such as a second-story window, stairwell, or stepladder.



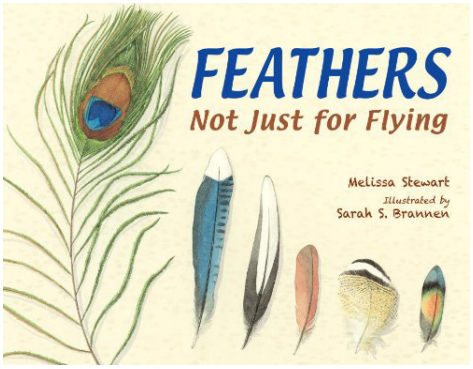
Dark-eyed Juncos by Evan Barbour

Bird of the Month

DARK-EYED JUNCO

A unique way to remember this bird is by its white belly, which has given it the nickname "Snow Bird." It is commonly seen at feeders in winter.

This Month's Activities



LITERACY CONNECTION

FEATHERS: NOT JUST FOR FLYING
By Melissa Stewart
Illustrated by Sarah S. Brannen

This book illustrates the different kinds of feathers and the different jobs they do. This book includes in-depth sidebar information.

Engage: Take Wing

Once they get up in the air, birds such as Turkey Vultures and eagles use their wings to soar. This helps them save energy in flight. This activity demonstrates how birds save energy while flying, and the many challenges of migration.

Have students stand in place and practice flapping their "wings"(arms) for 30 seconds. When time is up, talk about how that felt. (Probably tiring!) Ask, if you had to flap your wings all the way home, could you do it? (Probably not!) Next, have students hold their "wings" out for 30 seconds, rocking gently side to side like a soaring eagle. How did it feel this time? Was soaring easier or harder than flapping? Ask students if they'd prefer to fly to school by flapping their wings or soaring.

Ask students if they know where some birds go in the winter. Explain that some migrate from their breeding grounds in the North to their wintering grounds in the South during autumn. They reverse the trip in spring, returning North. This seasonal movement is migration. In this game there will be both hazards and triumphs.

Tell your students that everyone in the class is a bird migrating to their winter locations. Have everyone start at the "North" end of a large room or outdoor space and progress "South" for migration (not all will succeed). To run the activity, choose a characteristic of the students (i.e. wearing sneakers; blue shirt; brown shorts) and randomly choose an event (suggestions on the next page) that makes them step forward, step back, or sit down. For example, anyone wearing a watch flew into a building, is dazed, and takes a step back. Once a student sits down, he or she fails to safely migrate. End the game when about half the kids are still standing and emphasize how challenging migration is for real birds.

STEP FORWARD

- Favorable winds
- Plenty of insects
- Plenty of water
- Good weather
- Strong tailwind
- Bird feeders

STEP BACK

- Left late
- Strong headwind
- Poor stopover habitat
- Stormy weather
- Got sick on the way
- Inexperienced migrator

SIT DOWN

- Killed in blizzard
- Ran into cell phone tower
- Eaten by a cat

At the end of the game, ask students what they thought of the migration trip with these follow-up questions:

- What were some of the negative things that happened? *(Poor stopover habitat, strong headwinds, bad weather.)*
- Some of the positive things? *(Good weather, plenty of food.)*
- How could humans help? *(Create better bird habitat to provide plenty of food, water, and cover.)*
- Can you name any birds that do not migrate (resident birds)?

1. Northern Cardinal—eastern North America
2. Black-capped Chickadee—northern North America
3. House Sparrow—all of North America
4. Downy Woodpecker—all of North America above Mexico
5. Tufted Titmouse—eastern half of the United States
6. Steller's Jay—western North America

- Can you think of an animal that migrates but is not a bird? (*Monarch butterfly, caribou, whales, earthworms)*
- Do all birds migrate? *(No. Some birds, like feeder birds, can stay.)*

Explore: Flight Observation

Grab a blanket to lie on or find a soft patch of grass and spend 15 minutes outside looking at the sky. Do you see any birds up in the air? Do all birds fly the same way? If not, how are they different? Notice if they are flying in groups or alone. Do some birds fly at different heights? Why do you suppose that may be? Pay careful attention to the movement of their wings. Are they flapping or soaring? Diving or gliding? Once you get back inside, take time to review your "I Wonder?" Board. You may have uncovered answers to a few questions or you may have some new ones to post.

Inquire: Feather Investigation

Are all feathers the same? You will guide your students in creating an investigation on feathers. Display the different kinds of craft feathers and other materials that will be available to them (see Getting Started section).

Guide students by suggesting a test to see how feathers float or "fly." This is easily tested by dropping the feathers from various heights and attaching weights such as paper clips, washers, or nuts. (But don't tell students this.)

Inquiry investigations should be led by the students as much as possible. Provide materials and guidance in the form of probing questions along the way, but be sure not to provide specific steps or directions. Ask students to chart their question, proposed experiment, materials needed, outcomes with supporting data, and any new questions. Give teams time to share their findings. Depending on the time you have available, use one session for generating questions, forming groups, and making a plan, while a second session may be used for conducting the investigation and sharing findings.

Did You Know?

THE FARTHEST FLIER

Arctic Terns make the longest migration of any bird. They follow a zigzagging route from one side of the globe to the other on an annual journey that can end up being more than 25,000 miles! Their migration route begins in Canada, where they breed, and ends in Antarctica every year during winter. The small, slender bird is white with a black cap and a long, deeply forked tail. Because an Arctic Tern can live up to 34 years, it is likely some have flown more than 800,000 miles in their lifetime!

Home Connection

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about migrating and resident birds. This sheet offers information and activities so the whole family can enjoy birds too.

TAKING FLIGHT—FLYING AND MIGRATION

Map Your Migration

Think of a common route you and your family take. Maybe this is your walk or drive to school, to a nearby park, or to a friend's house. If you were a bird, what landmarks would you look for to help you navigate this route? Is there a specific store, statue, or tree that you recognize? What if you had to look for those landmarks from a bird's-eye view?

Use the space below to draw a map from a bird's-eye view, "migrating" from your home to a place you commonly visit. Feel free to use helpful tools, such as Google Maps.

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The Cornell Lab of Ornithology

COOL FACT

How Birds Migrate

Birds can cover thousands of miles in their spring and fall migrations, usually traveling the same route year after year. Even birds migrating for the first time know the way. How birds navigate during migration isn't fully known, but we do know that different birds use different strategies. One strategy is recognizing landmarks. Other strategies include using the sun, stars, and Earth's magnetic field as compasses.

Bird of the Month

DARK-EYED JUNCO

This bird has several color variations that can be seen across the U.S. A Dark-eyed Junco on the West Coast may have more of a brown back compared to the slate-colored look in the East. However, they all have a pink bill and a white belly, which led to its nickname, "Snow Bird."

Dark-eyed Juncos by Evan Barbour

Hands-On Activity

PAPER AIRPLANE CHALLENGE

Experiment with flight by making and testing different paper airplane designs. How will different materials, shapes, and sizes affect the plane's flight? What happens if you cut the ends of the wings in a zigzag shape or throw the plane into or away from a headwind (fan)? Jot down some of your observations.

PENNINGTON

The Cornell Lab of Ornithology

HOW CAN I HELP?

Big Idea

The Earth's habitat are impacted by humans. Some of these changes to habitat affect bird populations.

Learning Objectives

Students will be able to...

- compare and contrast six different habitats, how birds use them, and how humans have impacted them;
- assess their local habitat and how humans have altered it.

NGSS Disciplinary Core Ideas: LSA.2, LSC.2, ESS3.A, ESS3.C
NGSS Practice Standards: 1, 2, 4, 6, 7, 8

GETTING STARTED

Visit *birdsleuth.org/Pennington* to print copies of the six "Habitat Sheets." Test the eBird STEM model map, an animated map representing bird migration, so you can share with students. Become familiar with your local region and what the habitat was like before humans.

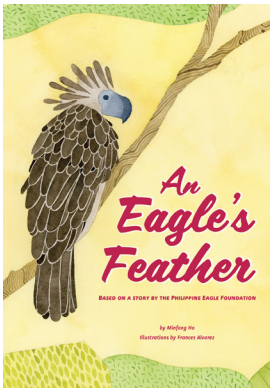
European Starlings by Evan Barbour

Bird of the Month

EUROPEAN STARLING

All the European Starlings in North America descended from 100 birds set loose in New York's Central Park in the early 1890s. The birds were intentionally released by a group that wanted America to have all the birds that Shakespeare ever mentioned. Today, more than 200 million European Starlings range from Alaska to Mexico.

This Month's Activities



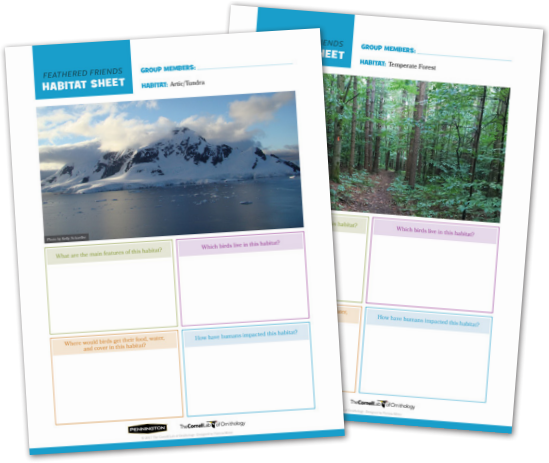
LITERACY CONNECTION

AN EAGLE'S FEATHER
By Minfong Ho
Illustrated by Frances Alvarez

Kaylayaan the Philippine Eagle is shot by illegal hunters. See how this endangered bird is rescued and rehabilitated in this touching story.

Engage: Before Humans

Split students into six groups, with two to five students per group, and assign each group one Habitat Sheet (Antarctica, Grassland, Pond, Rain Forest, Temperate Forest, and City). If needed, have two or more groups assigned to each habitat. Give students 10 to 15 minutes to discuss and answer the questions on the Habitat Sheet.



Have each group present their habitat to their fellow students. As a large group, consider

- How many habitats might a single bird visit?
- How can human impacts on one habitat affect a bird species that visits many habitats? *(Students may think that as long as the bird has one good habitat, they will survive. This isn't necessarily the case. Many birds use different habitats for different purposes. If a bird loses a habitat it depends on, the population will decline.)*

Explore: Human Habitat Assessment

Have students go for a walk around the school or a nearby park; a green space is not required. Give students time to observe the outdoor space for a few minutes. Bring the group together and ask them how humans have impacted the space. How might these alterations impact birds? Examples can be both positive and negative. Now, challenge students to think about what the area would have looked like before humans changed anything. If appropriate, talk about historical events that happened in the region that may have altered the habitat. Finally, challenge students to brainstorm one action they could take to help improve the habitat for birds.

Inquire: eBird STEM Models

Connect migration and citizen science by introducing eBird's STEM map models. These models are created using citizen-science observations and generated with supercomputers.

Show students a STEM model. Do not provide background information about the animation. Have students describe what they observe as it plays. Have students discuss with each other and see if they come to the conclusion that this is a model of a single bird species as it migrates from South America to North America and back.

Ask students

- Are the birds we see "ours?" *(No. We share migrating birds with other countries.)*
- Where do birds spend more time during the year? *(It depends on the species and which STEM model you show. Some species spend only a few months in the United States and leave quite early. Other species, such as the Barn Swallow, spend around six months in the United States and four months in South America.)*

Did You Know?

AMAZING ADAPTATIONS

With humans altering environments more and more, some birds are adapting to their changing home. Before European settlement, Chimney Swifts nested in caves, cliff faces, and hollow trees. As development progressed and natural cavities became less abundant, Chimney Swifts began to nest in new locations, such as chimneys. Chimney Swift populations increased along with the numbers of large, old chimneys. Now people are building special swift towers because there are fewer chimneys.

Home Connection

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about conservation of wild birds. This sheet offers information and activities related to bird conservation around your home.

HOW CAN I HELP?

Make Your Home More Earth Friendly

There are lots of ways you can help reduce, reuse, and recycle. Many communities already support recycling programs. But if we can learn to use less, right from the start, that's even better. Look around your home for ways you can reduce, reuse, or recycle. Record your current habits and your plans for improvement. Share your plan with your family and put it into action.

REDUCE

We use too many/much:

We can stop buying/using:

REUSE

We can reuse or donate:

RECYCLE

We can recycle:

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COOL FACT

Helping Your Birds

There are many ways to help birds, but did you know you can help them by planting native plants? Simply choosing native plants in your yard can increase biodiversity and support bird populations. Combine native plants with a food and water feature, and you've got yourself a good habitat.

Bird of the Month

EUROPEAN STARLING

All the European Starlings in North America descended from 100 birds released in New York's Central Park in the early 1890s. Because of their recent arrival in North America, all of our starlings are closely related. Genetically, individuals from Virginia are nearly indistinguishable from starlings sampled in California, 3,000 miles away.

European Starlings by Evan Barbour

Hands-On Activity

BUILD SOMETHING RECYCLED!

During the course of a week, collect recycled supplies. These can be cardboard boxes, bottles, wires, and cloth. Use these recycled materials to make something beautiful! You could make a bird feeder, nest box, model bird, or whatever your imagination suggests! Bring your bird creation into class to share.

Pennington® Feeder Spotlight

WANT TO ATTRACT SOME FAST FLIERS?

Bring dazzling hummingbirds to your home with the Pennington® Decor Hummingbird Feeder.

PENNINGTON™ TheCornellLab of Ornithology

DO YOU HEAR WHAT I HEAR?

Big Idea

Birds have distinct calls and songs used to defend a territory, attract mates, and warn when a predator is near.

Learning Objectives

Students will be able to...

- recreate the call or song of at least three species;
- match at least five birds to their typical calls;
- explain why birds sing.

NGSS Disciplinary Core Ideas: LS1.D, LS2.D
NGSS Practice Standards: 2, 4

GETTING STARTED

Make sure you are set up to access and play audio from *birdsleuth.org/Pennington*. Familiarize yourself with Bird Song Hero and spectrograms.

AmericanGoldfinches by Evan Barbour

Bird of the Month

AMERICAN GOLDFINCH

American Goldfinches are the only finch that molts its body feathers twice per year, once in late winter and again in late summer. The bright yellow of male goldfinches each year is one welcome sign of spring.

This Month's Activities

LITERACY CONNECTION

THE BACKYARD BIRDSONG GUIDE
(for Western or East/Central)
By Donald Kroodsma

This fully illustrated guide comes with more than 125 recordings of bird songs and calls. Complete with range maps and full descriptions of the sounds and the birds, who make them.

Engage: Listen and Learn

Load the audio from *birdsleuth.org/Pennington*. Play the songs once and reveal which birds make each sound. Then, challenge your students. Replay some of the sounds. Can anyone remember which bird made the sound? Have students practice each song. These song will be used to make a dawn chorus.

The dawn chorus can be heard during early morning as birds are waking up and establishing their territory and singing to attract mates. Have students, in groups of two or three, choose a bird song they recently learned. Now you will act as the conductor. To practice and allow the dawn chorus to warm up, have each bird group recite their song when you point to them. When each bird group is comfortable with their song, have everyone sing together to create a dawn chorus!

Explore: Are You Calling Me?

To demonstrate how birds can find each other using their unique calls, invite students to mimic bird vocalizations to locate members of their species group. Assign each student one of five species, without revealing their assignment to others. Play the song for each of the five species several times, asking students to memorize the one bird vocalization they were assigned. Then, have students spread out in a large space, like a gym or yard, and begin mimicking the call of their bird. Can students find the other members of their group by these vocalizations? After everyone has found their group, ask

- How did having so many birds "talking" at once affect your ability to find your bird group members? Did it make it easier or harder? Why?
- Why do you think different bird species have distinct calls? *(Example: Distinct calls help birds identify potential mates, tell individuals apart, etc.)*
- Did all members of your group mimic the assigned bird call the same exact way? Do you think that means all birds of the same species sound exactly the same?

Make the activity more challenging by adding some noise pollution! Try playing loud music while students look and listen for their group members to represent distractions like cars, trains, airplanes, people talking/yelling, etc. This shows how noise can make it more difficult for birds to communicate.

Inquire: Bird Song Hero

One helpful way to learn bird songs is to visualize them. Spectrograms show sound as a pattern of frequencies. With Bird Academy's Bird Song Hero activity, students will be challenged with a mystery bird song and need to select the spectrogram that matches.

Did You Know?

WHAT'S THAT I HEAR?

Birds use songs, calls, and other sounds for many reasons: to attract mates, to tell other birds that a predator is nearby, to communicate to family members about where they are, to claim territory, or to let other birds know where to find food.

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about bird communication. This sheet offers information and activities so the whole family can enjoy birds too.

DO YOU HEAR WHAT I HEAR?

Bird Sound Matching

Go outside early in the morning and listen to the dawn chorus of birds. Open your ears and maybe even close your eyes to focus on different animal sounds. Write a description of what you hear. If you're up for a challenge, try to identify birds based on some of the sounds learned in class.

Draw lines to match these birds to the way they sing. Listen to these calls at *AllAboutBirds.org*.

BIRD SPECIES	SOUNDS LIKE
Black-capped Chickadee	*"hoo-oo, hoo-hoo-hoo"*
American Crow	*"chick-a-dee-dee-dee"*
Mourning Dove	*"cheer-up, cheer-up"*
American Robin	*"caw, caw, caw"*
Northern Cardinal	*"wa-cheer, wa-cheer"*
Blue Jay	*"o-ka-lee, o-ka-lee"*
American Goldfinch	*"jay, jay"*
Red-winged Blackbird	*"potato-chip, potato-chip"*

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COOL FACT

What's That I Hear?

During the breeding season, male birds sing to attract females and to warn other males to keep out of their territories. These songs are often musical. In addition, birds use a variety of calls to sound alarm, to keep track of each other, and to tell each other about food. These calls are often short and not very musical. Some birds use non-vocal sounds in place of songs or calls. For example, woodpeckers tap rhythms on tree trunks. This drumming may attract a mate or mark territorial boundaries.

Bird of the Month

AMERICAN GOLDFINCH

American Goldfinches move south in the winter following a pattern that seems to coincide with regions where the minimum January temperature is no colder than 0 degrees Fahrenheit, on average.

AmericanGoldfinches by Evan Barbour

Hands-On Activity

SONG VISUALIZATION

Go outside and listen to bird songs and other sounds from nature. Create a picture in your mind of what you hear. Focus on the movement and the mood of the sounds. Get your favorite art materials and use them to make a visual representation of what you heard. If you are still looking for inspiration, check out *MacaularyLibrary.org* for sound and video recordings and spectrograms of bird songs.

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NESTS AND CHICKS

Big Idea

Birds build nests to incubate eggs and raise young.

Learning Objectives

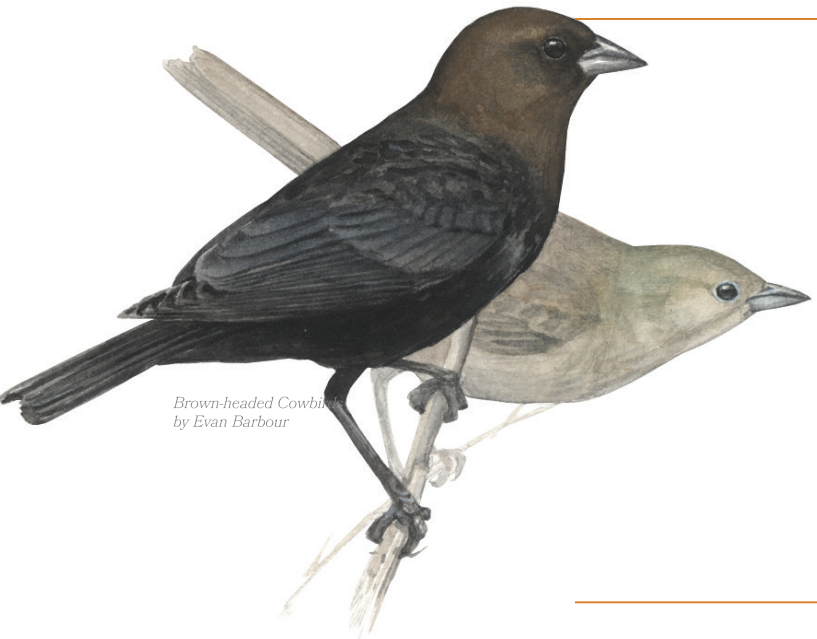
Students will be able to...

- describe when, where, and why birds build nests;
- build a model bird nest.

NGSS Disciplinary Core Ideas: LS1.B
NGSS Practice Standards: 1, 2, 5, 6

GETTING STARTED

Visit *birdsleuth.org/Pennington* to find True/False explanations.



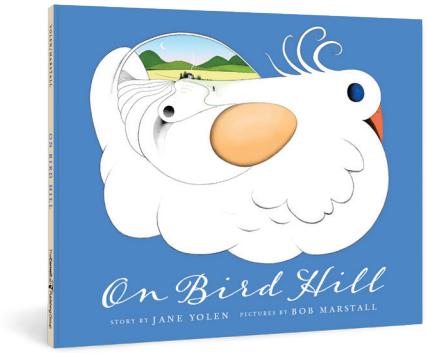
Brown-headed Cowbird
by Evan Barbour

Bird of the Month

BROWN-HEADED COWBIRD

This bird is North America's most common "brood parasite." That means the females lay eggs in the nests of other birds; Brown-headed Cowbirds do not build nests at all! Recent studies have shown that most individual females tend to select one particular host species and often choose to lay their eggs with others that are slightly smaller than their own.

This Month's Activities

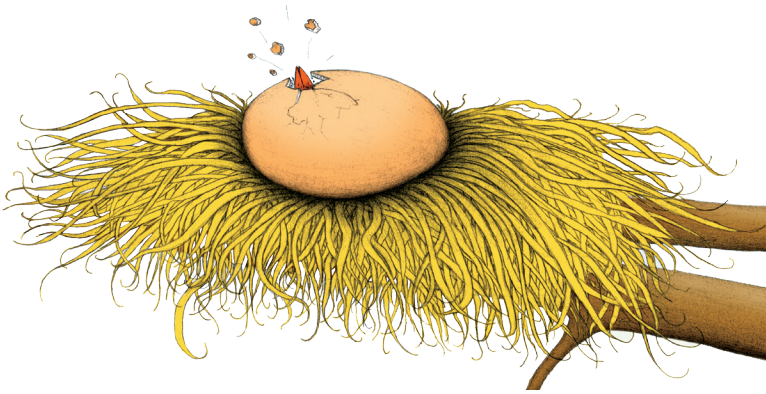


LITERACY CONNECTION

ON BIRD HILL
By Jane Yolen
Illustrated by Bob Marstall

Follow a boy on an imaginative journey that is rooted in science as he observes the hatching of a chick on Bird Hill.

Engage: Why Build A Nest?



As egg-laying animals, birds need to provide warmth and protection while their embryos develop outside the mother's body. Once the eggs hatch, the young need a place to grow until they can care for themselves: that is what a nest provides.

Ask your students

- Why do you think birds build nests? *(A nest is a place for incubation and parental care of young.)*
- Have you seen a nest before? If so, where was it? What was it made out of?

With your students, make a list of locations where you expect to find a nest and then make a list of nesting materials. Once both are complete, assess the list you've developed and ask, "Where wouldn't you find a nest?" The point of this is to teach your students that birds can nest virtually anywhere on land.

Explore: Build a Nest

Have students build their own "nest" from natural materials they gather outside, or that you provide: sticks, twigs, leaves, mud, pine needles, dried grass, plant fluff (cattails, milkweed seeds, etc.). They can test their nest's ability to hold "eggs" by putting two to three small rocks in the nest and then placing it on a y-shaped tree branch. If any nests are well-made, but don't seem strong enough to pass this test, perhaps they are for ground-nesting birds!

Inquire: Nesting True/False

Establish opposite sides of your room (or outdoors) as "True" and "False." Read the statements below and ask your students to move to the corresponding side. Read the answers after the statements.

1. All birds build nests.
2. Some birds give birth to live chicks rather than lay eggs.
3. Eggs and chicks are not always safe in their nest.
4. Most birds live in their nests year round.
5. Only the female incubates the eggs.
6. Most baby birds are fed seeds and berries by their parents.
7. Birds can breathe inside their eggs before they hatch.
8. Eggshells are made out of the same materials as chalk.
9. The egg yolk (yellow) grows into a baby bird.
10. If you find a baby bird you should feed it bread and milk.

Answers 1) F 2) F 3) T 4) F 5) F 6) F 7) T 8) T 9) F 10) F

Did You Know?

A NEST IS A NURSERY

Most birds do not live in their nests year round. Nests are only used for incubating eggs and raising chicks. Some nests aren't made of leaves and twigs—some are burrows in the ground, holes in trees, or just round depressions in sand or rocks.

Home Connections

Keep students thinking about and observing birds by sending the following pages home.

Wrapping up...

Pennington and the Cornell Lab of Ornithology would like to thank you for being such great feathered friends this year. Summer is a perfect time to put your new skills to use. Stay curious, have fun while out birding, and don't forget to participate in citizen science whenever you can!

PENNINGTON & TheCornellLab of Ornithology

FEATHERED FRIENDS

HOME CONNECTIONS

NAME: _____

DATE: _____

Families–Your child has been learning about nesting birds. This sheet offers information and activities so the whole family can enjoy birds too.

NESTS AND CHICKS

Baby Bird Dos and Don'ts

At home, watch one of our online Bird Cams (*cams.allaboutbirds.org*). While watching, look at how the parent birds interact with the young in the nest. Are they resting or is it meal time? Have fun watching the cameras and talk about what you see.

If there are any nests near your home, you can monitor how many eggs are laid, how many chicks hatch, and how many fledge. Report your findings to the Lab's NestWatch project (*NestWatch.org*). This is a great way to continue being active in citizen science.

Here are some FAQs to share with friends and family.

Q If you find a baby bird on the ground, what do you feed it?
A Don't feed it anything. Humans cannot provide the things baby birds need. But don't worry! The vast majority of "abandoned" baby birds are perfectly healthy and learning to fly with parents nearby.

Q If I handle a baby bird, will its parents pick up my scent and abandon it?
A Fortunately, that's just a myth. Parent birds don't recognize their young by smell.

Q Why do birds leave the nest before they can fly?
A Usually, it's to their advantage to leave as soon as they can. Predators can easily find a nest full of squawking baby birds and nests can host parasites. Parent birds work very hard to get their young out of the nest as quickly as possible.

Q I accidentally spooked a nesting mother. She flew away and hasn't returned. Should I try to hatch the eggs myself?
A Hatching eggs is a very delicate process. The right equipment and conditions are essential. In these cases, the best solution is to contact your local nature center or wildlife rehabilitator. They will know how to deal with the situation.

Visit *NestWatch.org* to learn more about nests, incubation, hatching, and first flights.

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COOL FACT

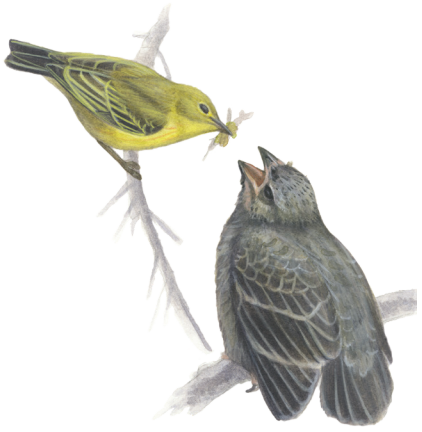
Extreme Nests

Most birds do not live in their nests year round. Nests are only used for incubating eggs and raising chicks. Nests come in many sizes and shapes. Several hummingbird species have nests that are about an inch in diameter. Bald Eagles build incredibly large nests, some more than 12 feet tall! Bald Eagles keep building on top of their old nests every year.

Bird of the Month

BROWN-HEADED COWBIRD

This bird is North America's most common "brood parasite." A female cowbird makes no nest of her own, but instead lays her eggs in the nests of other bird species, who then raise the young cowbirds. Young cowbirds can grow larger and mature faster than their host species and sometimes receive more of the host adults' attention. This gets them more food than the other chicks.



Brown-headed Cowbird (chick) by Evaristo H-F

Hands-On Activity

EGG-SPLORATION

- Everyone should have their own bowl and at least one raw egg. (Wash hands thoroughly before and after the activity.) Gently pick up the egg and take a close look at the outer shell.
  - What color is the shell?
  - What does the shell feel like? Is it rough or smooth?
  - How would you describe the shape of the egg?
  - When we crack the egg, how will the inside of the shell look?
- Gently crack open the egg over your bowl, being careful not to break the yolk. After eggs are broken, look at the inside of the shell.
  - Compare the inside of the shell to the outside. What is similar/different?
  - What color is it?
- Then look at the egg white and yolk of your egg.
  - What color is the egg white? Do you know why it's called "white?" *(Because it turns white when cooked.)*
  - What color is the yolk? What shape is it?
  - What other details do you notice?
- Break the yolk and carefully observe what happens.

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