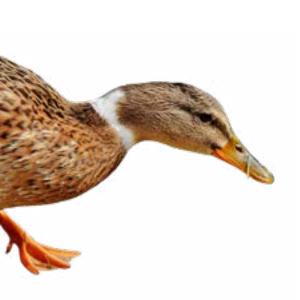
Bird Scouts

Activity Leader Guidebook





This guidebook belongs to: _____eBird username: ___eBird password: Jellyfish123





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WHAT IS SCIENCE ACTION CLUB?

Designed for middle school youth in out-of-school time, Science Action Club (SAC) features hands-on science kits that spark curiosity and inspire wonder for the natural world. Through games, projects, and exciting investigations, youth in SAC explore nature, contribute to authentic science research, and design creative strategies to protect the planet.

What is Citizen Science?

Citizen science is a global movement in which scientists and the general public collaborate to answer some of the most pressing questions about our planet. Many big scientific questions require more data than one single scientist, or even a team of scientists, could collect. In SAC, youth will contribute to the eBird database of observations. Through citizen science, anyone can learn the process of science and make valuable contributions.

What is eBird?

Created by the Cornell Lab of Ornithology and National Audubon Society, eBird provides an easy way for the birding community to report bird sightings. Using the eBird website or mobile app, users easily create bird lists to share observations of species around the world.

School-day Standards

The activities in this guidebook support the Next Generation Science Standards (NGSS).

No Experience Necessary!

Just like citizen science, this guidebook is designed to be accessible to everyone, even those with little-to-no science background. Each activity plan includes step-by-step instructions and techniques for engaging youth in fun science exploration. The focus is on curiosity, investigation, and community. Through these experiences, youth and activity leaders learn and discover together.

Educator Portal

Visit sacportal.calacademy.org to access the Bird Scouts training, flyers, forms, guides, and other helpful resources.



SUGGESTED PROGRAM TIMELINE

Responsibility	Description	Due Date	
Complete the online training	This required online training is interactive, fun, and will help you succeed as an activity leader. Use the SAC guidebook and teaching kit to follow along as you learn.	Before the first club meeting session	
Identify an outdoor location	You are responsible for finding an outdoor space where youth can look for birds. Ideally, the space should be within a five-minute walk of your club. Ask your program supervisor for support, if needed.	Before the first club meeting session	
Secure technology equipment	In order to participate in citizen science, your club will need at least one mobile device and a working internet connection. A projector and speakers are also highly recommended. Check with your supervisor to make sure you have access to digital technology during SAC time.	Before the first club meeting session	
Recruit youth	SAC is more fun when the club is full. Use the <u>Youth Program Flyer</u> to recruit 15 to 20 youth.	Before the first club meeting session	
Connect with families	Once youth are enrolled, send home the <u>SAC Letter to Families</u> . Download and edit the template to fit your audience and include your own details.	Once youth are enrolled	
Lead Science Action Club activities	 There are 12 Bird Scouts activities. To prepare for each activity in advance: Read activity instructions in the guidebook. Gather the materials needed. Revisit the online training, if necessary. 	Before you lead each SAC activity	
Submit citizen science observations	Citizen science is an essential part of Science Action Club. Remember to submit your club's observations to eBird regularly. If you need help navigating eBird, check out the <u>Bird Count video guide</u> .	During Activities 4-12	
Record and share feedback	In your guidebook, jot down any highlights, challenges, or notes to remember for next time. Then, send your attendance and feedback to SAC so we can continue to improve and grow the program. You can do this using the hyperlinks or QR codes in the guidebook.	After completing each activity	
Celebrate!	Invite your supervisor and/or families to stop by your last SAC session and celebrate with your club. Remember to sign SAC certificates of success.		

ACTIVITY SUMMARIES

Title	Activity Mission	Recommended For	
Activity 1: Build a Bird	Investigate bird shapes and features.		&&
Activity 2: Birding Tools	Compare and identify birds using birding tools.		&&
Activity 3: Identifying Birds	Identify at least one bird using field identification tools.		88
Activity 4: Bird Count	Count birds and share your observations.		88
Activity 5: Pollution Control	Understand how pollution affects birds.		<u>&&</u>
Activity 6: Eggsperiment	Design a device that will protect an egg from breaking when dropped from a height.		88
Activity 7: Beneficial Beaks	Experiment with different types of bird beaks and design a bird feeder.		&&
Activity 8: Exploring Flight	Explore how different wing shapes affect flight.		& <u>&</u>
Activity 9: Owl Pellet Dissection	Examine an owl pellet and figure out what the owl ate.		& <u>&</u>
Activity 10: Healthy Habitats	Explore how to keep ecosystems healthy.		88
Activity 11: Be a Bird Hero	Design a plan to make your site more bird-friendly.		88
Activity 12: Combine Your Counts	Review all of your bird observations and create a poster to share your discoveries.		88
	Online Learning Physical Distancing		

KIT MATERIALS

Α

Bird Count and eBird guide 50 Bird Count stickers Bird Identification cards 1 set Build a Bird cards (beaks, body, legs, 1 set and wings) Coffee Berry tokens Observe a Bird cards 4 sets Observe a Bird gull ID Owl Getcha! boards 3 sets Owl Getcha! cards Owl Getcha! tokens 3 sets Owl Pellet Dissection key 10 sheets Owl Pellet bone chart 10 sheets 10 sheets Paper Birds A 10 sheets Paper Birds B Paper Birds tables Pest Busters table SAC certificates 20 SAC stickers 20 Sizable Struggles cards 5 sets Silhouette cards Spot the Differences worksheets

B 30 cups dice feathers 20 measuring tapes Owl Getcha! game pieces 3 sets paper straws popsicle sticks 500 string 100 feet

C

2 packs crayons glue 5 bottles 2 sticks sidewalk chalk 5 rolls tape

D

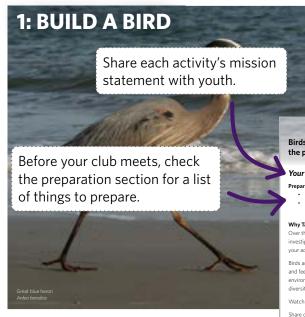
black oil sunflower seeds

Ε

chopsticks 5 pairs $\frac{1}{2}$ cup rice rubber bands sporks tweezers

Loose Items bean bags binoculars Bird Scouts buttons Bird Scouts guidebook 1 tub clay dish soap 1 bottle 1 bottle oil 10 owl pellets paper bags SAC notebooks SAC pencils

HOW TO USE THIS GUIDEBOOK



Time estimates and location suggestions are provided for each part of the activity.

The introduction gives an overview of the activity's goals and purpose.

Birds exist in a diverse array of sizes, shapes, and forms. In this activity, youth begin to explore the physical features that all birds have in common.

Your mission today is to investigate bird shapes and features.

- Load video: Science Action Club Citizen Science.
- Distribute SAC notebooks as youth enter the room. Encourage youth to decorate their notebook cover while waiting for the club session to begin

Why Take on This Mission? 10 min. | inside

Over the next few weeks, you will become expert bird scientists, called ornithologists. Through games and experiments, you will investigate local birds and examine characteristics that make birds unique. Each day, you will get a new mission to help focus your adventure. Your mission today is to investigate bird shapes and features

Birds are fun to investigate because they are easy to find and they display interesting behaviors such as flying, strutting, and feeding. They are also important for science. Changes in hird behavior and seasonal migrations can indicate when the environment and climate is changing. As citizen scientists, you will spend the next few weeks watching birds to study the

Watch Science Action Club Citizen Science (2 min.) to learn more about your mission

Share out: What birds have you seen around your club location and home

- gets one Bird Identification card. Keep the photo and name on the card hidden
- ner. Describe the bird on your card for your partner to draw on a blank sheet of paper, but don't say what kind . Remember to use details. Your partner can ask questions.
- After five minutes, compare the drawing to the photo. How is the bird you drew similar to or different from the bird that
- 4. Then, switch roles. Listen carefully to your partner's details to draw the bird on his or her card. Apply the lessons you

Before your club meets, check the orange box for the supplies you need.

"A" indicates materials found in Bag A of the kit.

Some activities require additional materials that are not included in the kit.



Materials Not Included

and feathers can provide clues about what birds eat and how they behave. Minor differences

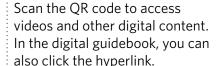
se these key features to devise an original bird that is adapted for its environme

ird card. Then, assemble your bird.



- Feathers can help a bird stand out or blend in. Color your bird to help it attract a mate or hide from predators.

Encourage youth to continue learning with family and friends in their community.







Call to Action:



Birds exist in a diverse array of sizes, shapes, and forms. In this activity, youth begin to explore the physical features that all birds have in common.

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Preparation

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Birds are fun to investigate because they are easy to find and they display interesting behaviors such as flying, strutting, and feeding. They are also important for science. Changes in bird behavior and seasonal migrations can indicate when the environment and climate is changing. As citizen scientists, you will spend the next few weeks watching birds to study the diversity of species in your area.

Watch Science Action Club Citizen Science (2 min.) to learn more about your mission.

Share out: What birds have you seen around your club location and home?

Draw a Bird 20 min. | inside



- 1. Everybody gets one Bird Identification card. Keep the photo and name on the card hidden!
- 2. Find a partner. Describe the bird on your card for your partner to draw on a blank sheet of paper, but don't say what kind of bird it is. Remember to use details. Your partner can ask questions.
- 3. After five minutes, compare the drawing to the photo. How is the bird you drew similar to or different from the bird that was described to you?
- 4. Then, switch roles. Listen carefully to your partner's details to draw the bird on his or her card. Apply the lessons you learned in the first round to improve your communication in the second.

Kit Materials

- Bird Identification cards
- Build a Bird cards
- SAC stickers

C

cravons

Loose Items

SAC notebooks

Materials Not Included

blank paper

Science Action Club Citizen







Build a Bird 30 min. | inside

A bird's body has features specially adapted for the environments in which it lives. For example, birds with webbed feet use them as paddles in the water. The size and shape of beaks, feet, and feathers can provide clues about what birds eat and how they behave. Minor differences in physical features can be major keys to identifying a species.

All birds have a beak, legs, wings, and a body. Use these key features to devise an original bird that is adapted for its environment.

- 1. At random, choose one of each *Build a Bird* card. Then, assemble your bird.
- 2. Describe what its habitat might be based on its body parts. Use your imagination!
 - What does it eat?
 - Where and how much does it walk?
 - Where and how far does it fly?
- 3. Feathers can help a bird stand out or blend in. Color your bird to help it attract a mate or hide from predators.
- 4. Describe your bird to the other members of the club.

Share out: What makes your bird unique? How would someone identify it? How would you sort the birds you created based on similarities?

Call to Action:

As you see birds in your neighborhood, notice differences in their beaks, legs, wings, and bodies. Try your hand at drawing different birds while paying close attention to shapes and features. For inspiration, check out <u>How to Draw Birds</u>.

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.







2: BIRDING TOOLS Lesser black-backed gull Larus fuscus

When viewed from a distance, a bird's features can be difficult to see clearly, but binoculars can help provide a closer look. In this activity, youth develop their observation skills and learn how to use binoculars.



Your mission today is to compare and identify birds using birding tools.

The Big Wind Blows 10 min. | outside or inside

- 1. Gather in a circle with one player in the center. Everyone on the outer circle marks their spot with a bean bag.
- 2. The player in the center says, "The Big Wind blows for anyone..." and completes the sentence with a statement that is true for him or herself. For example, "The Big Wind blows for anyone with curly hair," or "...anyone who likes to swim."
- 3. All players who fit the description—including the one in the middle—must move quickly to a new spot. Players cannot move to a spot right next to them.

As you observe birds, pay attention to what different species have in common as well as what makes them unique.

Sort the Silhouettes 20 min. | inside



- 1. Divide into groups of two to four (maximum five groups).
- 2. Look closely at the Silhouette cards. Pay attention to the size and shape of each bird. Work as a team to circle the picture on each card that you think matches the silhouette.
- 3. Draw arrows pointing to the parts of the bird that helped you select that species.
- 4. Sort the birds into groups of small, medium, and large birds. Then shuffle the cards and try to sort them another way.

Consider habitat, beak, legs, wings, color, markings, or type of bird (songbird, seabird, etc.).

Sort the Silhouettes answers:

1. African penguin 7. Canada goose 2. Common raven 8. Rock pigeon 3. Turkey vulture 9. Western gull 4. Snowy egret 10. American crow

5. American goldfinch 11. Great-horned owl

6. Red-winged blackbird 12. Double-crested cormorant

Share out: Which features of the bird were most helpful for identification? Remember these features when you start to identify birds outside.

Kit Materials

- Observe a Bird cards
- Observe a Bird gull ID
- Silhouette cards

Loose Items

- bean bags
- binoculars
- SAC notebooks

Observe a Bird 30 min. | outside

A pair of binoculars is a tool that scientists use to see faraway birds up close. Where have you seen or used binoculars before?

To use binoculars, follow these steps:

- Wear the neck strap to keep your hands free.
- Adjust the distance between the eyepieces until you see one circular image with both eyes open.
- Look at an object through the left eyepiece with only your left eye. Rotate the center wheel until you see a sharp image.
- Look at the same object through the right eyepiece with only your right eye open. Rotate the focus ring on the right eyepiece until you see a sharp image.

Play Observe a Bird:

- 1. Form groups of two to six (maximum four groups) and distribute materials so each group has at least one pair of binoculars, one set of Observe a Bird cards, and 1 Observe a Bird gull ID. In each group, divide further into Team Gulls and Team ID.
- 2. In each group, teams stand facing each other, about 20 steps apart. Team Gulls holds up a card for Team ID to identify using the binoculars and Observe a Bird gull ID. Team ID must observe and describe features (like leg color or beak shape) to correctly find and name each gull. For an added challenge, Team Gulls can move or cover part of the image to simulate a real bird in flight.
- 3. Take turns using the binoculars. After identifying four to five cards, switch roles.

Share out: What is challenging about using binoculars? What strategies helped you use them successfully?

Explore More: 🖳 🛞



Watch How to get crystal clear focus with your binoculars (3 min.) and keep practicing using binoculars.

Call to Action: 🔲 🛞





Important Bird Areas (IBA) are recognized as being globally important for the conservation of birds and other biodiversity. Look for IBAs near you and learn how to help threatened species.

How did it go?

Explore More:

focus with vour

Call to Action: Important Bird

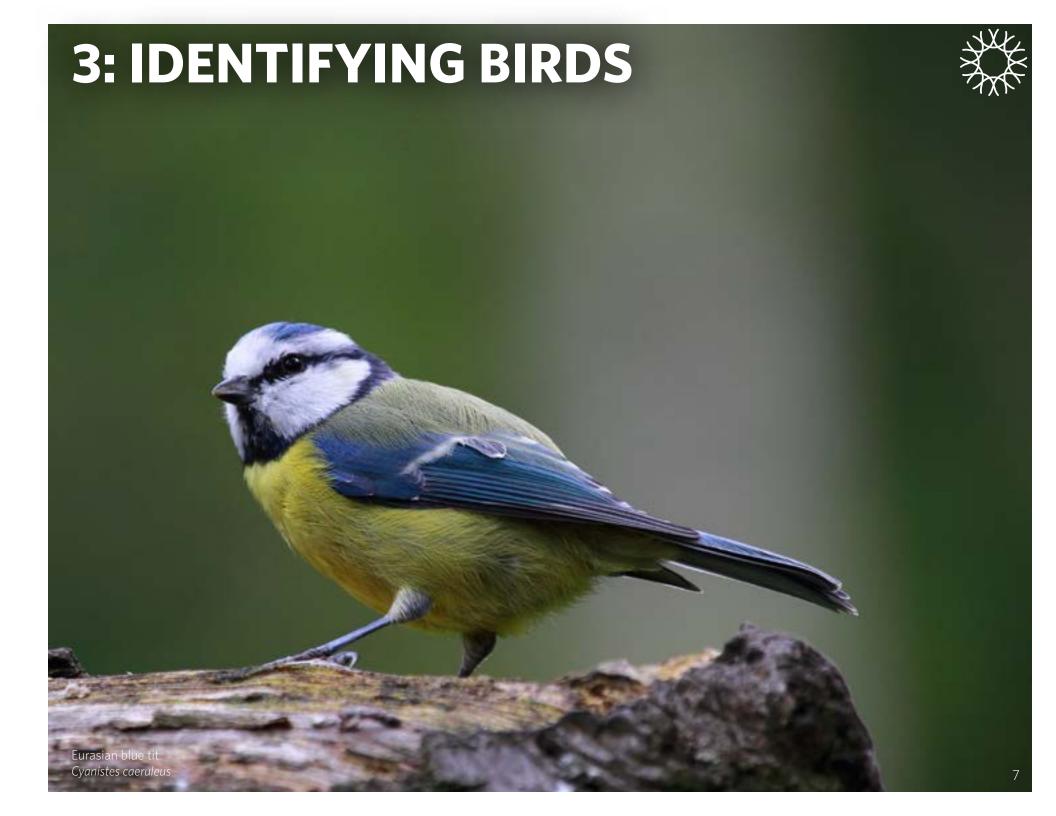
How to get

crystal clear



Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.





Scientists use many tools and strategies to identify and study birds. In this activity, youth learn and practice different bird identification techniques.

Your mission today is to identify at least one bird using field identification tools.

Preparation

- Download the Merlin Bird ID app on your digital device.
- Load video: Merlin Bird ID.

Spot the Differences 10 min. | inside



How can you tell the difference between a house cat and a lion? How about a dog and a coyote? Differences in size, shape, and color provide important clues that help us tell animals apart.

Field marks are unique features that distinguish birds from each other. With a partner, practice recognizing field marks using your *Spot the Differences* worksheet. Compare the similar birds and circle at least five differences between each pair.

Stealthy Birders 20 min. | outside

Birds can be secretive and shy. A skilled birder uses the following stealthy strategies to find and study birds:

- Be quiet.
- Stay still.
- Follow bird sounds.
- Notice movement in bushes or trees.
- Look for the cause of bird behavior (for example, if a flock of birds takes flight suddenly, look for a predator nearby).

Practice by playing Stealthy Birders.

- 1. Choose one person to be the bird. Everyone else is a birder and must line up side-by-side 20 steps away from the bird, facing its back.
- 2. Birders must sneak up and tag the bird without getting caught. The bird may only turn around if he or she hears movement.
- 3. When the bird turns, all birders must freeze. Any birder caught moving gets sent back to the starting line.

Kit Materials

Α

• <u>Spot the Differences</u> worksheets

Loose Items

- binoculars
- SAC notebooks

Materials Not Included

 local bird field guide (recommended)





Field Guides 10 min. | inside



Field guides show images of birds that help birders identify species based on unique field marks.

- Book or pamphlet field guides are often organized by type of bird (for example, ducks, hawks, or gulls).
- Mobile apps, like Merlin Bird ID app, walk you through the identification process step-by-step, using the bird's size, color, behavior, and location to narrow down your local options.

Watch Merlin Bird ID (2 min.) to get started with the app.

Bird Search 20 min. | outside



- 1. Go outside to look for signs of birds. You might spot footprints, poop, nests, or hear bird songs or flapping wings. With practice, you will be able to identify the birds in your neighborhood.
- 2. As you search, record notes that will help you identify birds later. Remember to note specific details about your viewing area, as well as the bird's size, main colors, location, and behavior.
- 3. Take turns using the Merlin Bird ID app (and field guide, if available) to identify any birds you see. You can also practice using Merlin Bird ID app with the Observe a Bird cards, Bird Identification cards, or a field guide.
- 4. Continue practicing using binoculars to look more closely at your surroundings.

Share out: Which birds did you see? What other evidence of birds did you find?

Explore More: L



Head outside for scavenger hunts, bird bingo, and other activities that inspire bird observation. Download the BirdSleuth Explorer's Guidebook.

Call to Action:



Introduce your family and friends to the Merlin Bird ID app. Practice birding together at home or in parks nearby. Challenge yourselves to identify three birds. For each bird you successfully identify, write down its name and something you noticed about its behavior.

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.



To estimate a bird's size, you can think of sports balls:

- Sparrow-size = tennis ball
- Robin-size = softball
- Crow-size = football
- Goose-size =basketball

Explore More:

BirdSleuth Explorer's







Counting the exact number of birds in a flock can be difficult. In this activity, youth practice estimating the total number of moving objects and conduct their first *Bird Count*.



Your mission today is to count birds and share your observations.

Preparation

• Download the <u>eBird app</u> on your digital device.

Bean Bag Flock 15 min. | outside or inside

Counting one bird is easy, but 10 might be tough. Whether birds in a flock are flying or standing, you can estimate their number by making groups of ten. When you see a flock flying over:

- 1. Count the first 10 birds in the flock.
- 2. Estimate how many groups of 10 remain.
- 3. Sum the total for a rough estimate of your bird count.

Your final count doesn't need to be exact. Scientists just want to know if there was one bird, a few, or a lot.

Practice estimating bird counts with a bean bag toss.

- 1. Gather in an open area and give everyone a bean bag.
- 2. Before each round, players must silently decide if they will or won't toss their bean bag in the air. This will keep the number of bean bags in the air random.
- 3. On the count of three, toss—or don't! As the bean bags fly, everyone must call out an estimate of the number of bean bags in the air.
- 4. Once the bean bags fall, count how many were actually tossed and compare that to the estimates made.

Practice until everyone feels comfortable making an estimate. Alternatives:

- 1. A few players can stand aside and count without tossing.
- 2. Players can hold two bean bags and decide each round whether to throw one, both, or none.

Share out: What was challenging about counting the bean bags? What strategies worked for you?

Kit Materials

Δ

- <u>Bird Count and eBird</u>
 guide
- Bird Count stickers

Loose Items

- bean bags
- binoculars
- SAC notebooks

Prepare for Citizen Science 5 min. | outside or inside



You now have the skills to find, identify, and count birds. You are ready to become an expert citizen scientist! Citizen scientists are everyday people who use their science skills to help professional researchers make important discoveries about our planet. For example, in 2015, a 10-year-old citizen scientist shared a photo of a bird she found near her home in Los Angeles. As it turned out, it was the first ever sighting in California of a rare bird called the social flycatcher.

In Science Action Club, you will use your birding skills to find and identify birds, then upload your observations to the online database eBird. Your discoveries will help scientists around the globe better understand bird habitats and behavior.

Get Stealthy 10 min. | outside

Before your Bird Count, play a quick round of Stealthy Birders (see Activity 3) to practice your stealth skills.

Bird Count 20 min. | outside or inside



Watch How to Do a Bird Count (3 min.). Then, follow the steps below for your first Bird Count experience.

- 1. Form teams of four. Each team needs the following Bird Count tools:
 - Bird Count sticker (this goes in the recorder's notebook)
 - a pair of binoculars
- 2. Head outside to start birding. Record the location, date, and start time on your Bird Count sticker.
- 3. Record notes on all the birds you see or hear. Keep track of size, color, field marks, and if a bird was flying, walking, or perched.
- 4. Note the different types of birds you see and the number of individuals of each type. Be careful not to count the same individual more than once.
- 5. After 10 minutes, record your end time.



Example Bird Count notebook entry.







Submit Your List 10 min. | outside or inside

- 1. Use the Merlin Bird ID app to identify your birds. Enter the location, date, bird size, feather colors, and what the bird was doing. The app will use that information to generate a list of options. If you don't see your bird, go back and adjust the size or colors you selected.
- 2. Your club will submit just one checklist each time, so you will need to combine your counts. For each type of bird observed, record your club's best estimate for the total number seen. This is your club list.
- 3. When you are ready, open the eBird app and select **Start New Checklist**.
 - Select Choose a Location From Map and confirm your birding location.
 - Indicate the date and time, then select **Start Checklist**.
 - For each bird on your club list, enter the name and number of individuals recorded. If you are not sure which species you have observed, choose the general species option. For example, if you saw three gulls but aren't sure which kind, enter '3' for gull sp.
 - When you are done, select **Review & Submit** at the bottom.
 - You are submitting a complete checklist, so select **Yes** at the top. Then, select **Stationary** as your Observation Type.
 - Finally, enter the following data:

Number of observers: This is the total number of people who looked for birds today.

Duration (minutes): This is the total number of minutes you spent birding.

Share out: What was challenging about doing a bird count? What might you try to do differently next time?

Explore More:

Play the <u>Bird Song Hero Game</u> to test your bird observation skills.

Call to Action:

Check out other citizen science projects at the Cornell Lab of Ornithology. Is there a project that you would like to try with your family?

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.







Call to Action: Explore Citizen









Oil spills have negative effects on the surrounding environment and its inhabitants. In this activity, youth explore how birds are affected by oil spills and investigate methods for rehabilitation.



Your mission today is to understand how pollution affects birds.

Preparation

• Gather different kinds of soap (dish, bar, hand soap), paper plates, paper towels, and water. Other cleaning products are optional (baking soda, vinegar, disinfecting wipes, cotton balls, etc.).

Bird Count 15 min. | outside



During today's Bird Count, pay close attention to bird feathers.

- 1. Form teams of four. Gather your binoculars, notebooks, and the Merlin Bird ID app.
- 2. Place a new Bird Count sticker in your notebook. Head outside, then record the location, date, and time on the sticker.
- 3. Remember to be stealthy and record everything you see. Use Merlin Bird ID to identify your birds.
- 4. After 10 minutes of bird watching, head back inside and compare your lists.
- 5. Create a single club list and submit your findings to eBird.

Share out: Were there any differences in the feathers of the birds you saw? What could that tell you about those birds?

Oil Spill Tag 15 min. | outside

How might waterbirds be affected by an oil spill in the ocean? This game explores how oil-polluted water affects birds that swim or dive.

Move to an outside area where there is plenty of space to move around.

- 1. Choose two to three people to play the role of an oil spill. Everyone else can choose what kind of waterbird (e.g., albatross, penguin, gull, pelican) they would like to be.
- 2. The oil spills are "it." They try to tag the birds.
- 3. When a bird is tagged, it must move in slow motion for the rest of the round.

Pause after three minutes, or when all of the birds are moving in slow motion. In the second round, a volunteer clean-up crew begins catching birds from oil-polluted waters, washing their feathers, and setting them free again. Play for three minutes.

- 1. The same players can remain the oil spill. Choose two players to be the clean-up crew. Everyone else remains a bird.
- 2. As before, when a bird is tagged by the oil spill, it must move in slow motion.

Kit Materials

A

- Bird Count and eBird
- Bird Count stickers

feathers

Loose Items

- binoculars
- dish soap
- oil
- SAC notebooks

Materials Not Included

- different kinds of soap
- paper plates
- paper towels
- other cleaning products
- water

- 3. When a slow-motion bird is tagged by the clean-up crew, it goes back to normal speed.
- 4. Clean-up crew members can also be tagged and must move in slow motion, but they can also tag each other.

Share out: How does an oil spill affect waterbirds? How can a clean-up crew help out after an oil spill?

Oil Spill Cleanup 30 min. | outside or inside

Some birds have feathers that keep them warm and dry, even as they dive and swim in cold ocean water. An oil spill in the ocean can damage these birds' feathers, impacting their health and safety. In this activity, you will test the effect of oil on feathers and then investigate methods for cleaning them.

- 1. Gather in groups of three. Each group needs three feathers, one cup of water, one cup of water mixed with one tablespoon of oil, and one paper plate.
- 2. Lay the feathers side-by-side on the paper plate and examine them closely.
- 3. Compare the effect of water and oil on feathers:
 - Keep one feather dry. Look closely at its structure and notice any details.
 - Dip a second feather into the cup of water. What changes do you see?
 - Dip the third feather into the cup of water mixed with oil. How does this feather compare to the others?
 - Discuss and write down the differences between your three feathers.

Feathers have tiny hooks that hold them close together, like velcro. Oil separates those tiny hooks. How do you think these effects might impact a penguin's ability to survive an oil spill?

Fortunately, when there are oil spills in the ocean, some organizations send people to help clean the animals. Using the materials available, investigate which products work best to clean feathers of oil.

- Test three or more different soaps and cleaning products. You will need additional feathers dipped in oil.
- Remember to dry your feathers once they're clean.

Share out: How well did each technique work? What products or strategies would you recommend to someone rescuing a bird from an oil spill?

Explore More: \square



Even if we design a method to safely clean animals affected by an oil spill, the issue of polluted water still remains. Watch Bio-inspiration - Hair Mats (4 min.) to learn about a creative solution designed by engineers working to solve this problem.







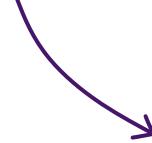
Call to Action:

If you ever see a sick or injured bird in the wild, call your local wildlife hospital. To find your local hospital, visit How to Find a Wildlife Rehabilitator. Always be careful around wild animals. Never touch or move them.

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.







How did it go? Let us know!







Bird eggs are vulnerable to falling, breaking, or being eaten by predators. In this activity, youth learn about different ways to protect an egg, then design and test their own strategies.



Your mission today is to design a device that will protect an egg from breaking when dropped from a tall height.

Preparation

- Buy 1 dozen eggs.
- Collect equal amounts of recycled materials (cardboard, toilet paper rolls, paper).
- Find and prepare an area to drop eggs.
- Load video: ScienceTake: Angry Birds.

Bird Count 15 min. | outside



During today's Bird Count, think about where birds might build their nests.

- 1. Form teams of four. Gather your binoculars, notebooks, and the Merlin Bird ID app.
- 2. Place a new Bird Count sticker in your notebook. Head outside, then record the location, date, and time on the sticker.
- 3. Remember to be stealthy and record everything you see. Use Merlin Bird ID to identify your birds.
- 4. After 10 minutes of bird watching, head back inside and compare your lists.
- 5. Create a single club list and submit your findings to eBird.

Share out: Did you see any nests or eggs?

Guard the Nest 15 min. | outside

All bird species lay eggs. Eggs are especially vulnerable to being eaten by predators. To protect their eggs, many bird species build nests, while others lay camouflaged eggs directly on the ground or on cliffs. As a club, think of three predators that might eat bird eggs.

Birds guarding their nests also face other challenges. One example is **brood parasitism**, which happens when a bird lays its eggs in another bird's nest. Watch Science Take: Angry Birds (2 min.) to learn how cow birds sneak their eggs into other birds' nests.

Play Guard the Nest to see if you can protect your eggs.

Pile a few bean bags in the middle of a square area. These are the eggs in the nest. The corners are safe zones for all players.

Kit Materials

tape

Loose items

- bean bags
- SAC notebooks

Materials Not Included

- recycled materials
- uncooked eggs



Explore More:





Call to Action:



How did it go?



2. First Round: The goal is for predators to steal eggs from the nest and return to any corner without getting tagged.

- Choose two club members to be nesting birds. Everyone else is a predator.
- The birds must be stationed an arm's length away from the eggs. Predators start at one of the four corners.
- Predators can only steal one egg at a time. If they are tagged by a bird, the egg is put back in the nest and the predator is out.
- If all the eggs are stolen, the predators win. If all of the predators are out, the nesting birds win.
- 3. Second Round: The goal is for predators to steal eggs and for cowbirds to try to put their own eggs in the nest without being tagged.
 - Choose a few players to be cowbirds. Cowbirds try to replace the original eggs with their own eggs.

Egg Drop 30 min. | outside L





Why don't eggs break when a bird sits on them to keep them warm? The rounded shape allows the weight of the bird to be distributed over the whole egg, just like arches can support a lot of weight in buildings. But why aren't eggs perfect spheres? If they were, they could easily roll away.

Eggs are strong, but not invincible. Your challenge is to build a device that prevents a raw egg from breaking when dropped from a height. Group into teams of four. Each group will get a roll of tape and the same amount of recycled materials. You must be able to open and close your device to easily access the egg.

- 1. Create a **prototype**, or a rough sample container to test and modify.
- 2. Once every group has a container, put an egg in each.
- 3. Drop containers from standing on a chair, the top of a staircase, or a first story window. All groups should drop their containers from the same height.
- 4. Check your egg. Did it break? If not, you can test how many impacts your device can take before it does break.
- 5. If you have enough time and eggs, make changes and try again.

Share out: What worked? What might you do differently next time?

Explore More:



Watch a chick hatch (2 min.) or examine egg shapes and colors.

Call to Action:



Become a citizen scientist for NestWatch. Help scientists learn which bird species in your area are thriving.

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.





Beak shapes are uniquely designed according to what birds eat. In this activity, youth test out different shapes to see how well they gather food items, then create their own bird feeders.

Your mission today is to experiment with different types of bird beaks and design a bird feeder.

Preparation

Set up island tables for Bird Beak Buffet.

Bird Count 15 min. | outside



During today's Bird Count, keep an eye out for birds eating.

- 1. Form teams of four. Gather your binoculars, notebooks, and the Merlin Bird ID app.
- Place a new Bird Count sticker in your notebook. Head outside, then record the location, date, and time on the sticker.
- Remember to be stealthy and record everything you see. Use Merlin Bird ID to identify your birds.
- 4. After 10 minutes of bird watching, head back inside and compare your lists.
- Create a single club list and submit your findings to eBird.

Share out: Did you see any birds eating? If so, what were they eating? What shape were their beaks? How might that beak shape be useful for that kind of food?

Bird Beak Buffet 20 min. | inside



Birds have beaks to gather food. Much like their feathers and eggs, beaks come in many shapes and sizes, specialized for different environments. Over time, species become adapted to their local habitat and available resources. This is especially noticeable and easy to study on islands.

In this game, you will be a bird traveling to different islands (tables) to gather food.

- 1. Put one kind of food on each island:
 - Table 1 nectar (water in several cups)
 - Table 2 seeds in a field (sunflower seeds spread out on the table)
 - Table 3 bugs in a log (rice in several cups, each on its side)
 - Table 4 fish (game pieces in water in several cups)
- Everyone needs their notebook, a small cup, and a bird beak: either a paper straw, spork, chopsticks, or tweezers.

Kit Materials

- Bird Count and eBird

- cups
- Owl Getcha! game pieces
- paper straws
- popsicle sticks
- string

C

• glue

D

• ½ lbs. black oil sunflower seeds

E

- chopsticks
- rice
- sporks
- tweezers

Loose Items

- binoculars
- SAC notebooks





- 3. Up to five people can start at each island. You will have one minute to collect as much food as possible into your cup using only your beak.
- 4. Count the number of pieces of food you were able to collect and record it in your notebook.
- 5. Reset your island and then rotate to the next one to try your beak with a different food source. Spend 1 minute at each island.

Share out: How did your beak compare to the others? Was there a beak that was most successful with each food source? What would happen if all of the islands only had nectar?

Feed the Birds 25 min. | inside

Birds that eat fruit and seeds might have trouble finding food in residential or commercial areas. People can help by hanging bird feeders in their vards.

Your challenge is to build a bird feeder from popsicle sticks, string, and other recycled materials.

- 1. Create a bird feeder that:
 - Can hold sunflower seeds
 - Has a place for birds to perch as they eat
 - Can hang out of reach of squirrels
- 2. If you have time, add other features like a roof or colors.
- 3. Share your bird feeder design with the club. How did you choose that design? What species of birds do you hope to see?
- 4. Take your feeder and a bag of sunflower seeds home. Find a safe spot to hang it near a window and watch for birds!

Explore More:



Watch how hovering hummingbirds feed (4 min.).

Call to Action:



Watch your bird feeder for a set number of minutes at the same time every week. Keep track of which species you see. When you run out of seeds, try peanuts or non-sugar cereals to see if they attract different birds. You can record your results and submit them to the BirdSleuth Investigator magazine to see if you can become a published scientist!

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.



Explore More: Hummingbird in a Wind Tunne



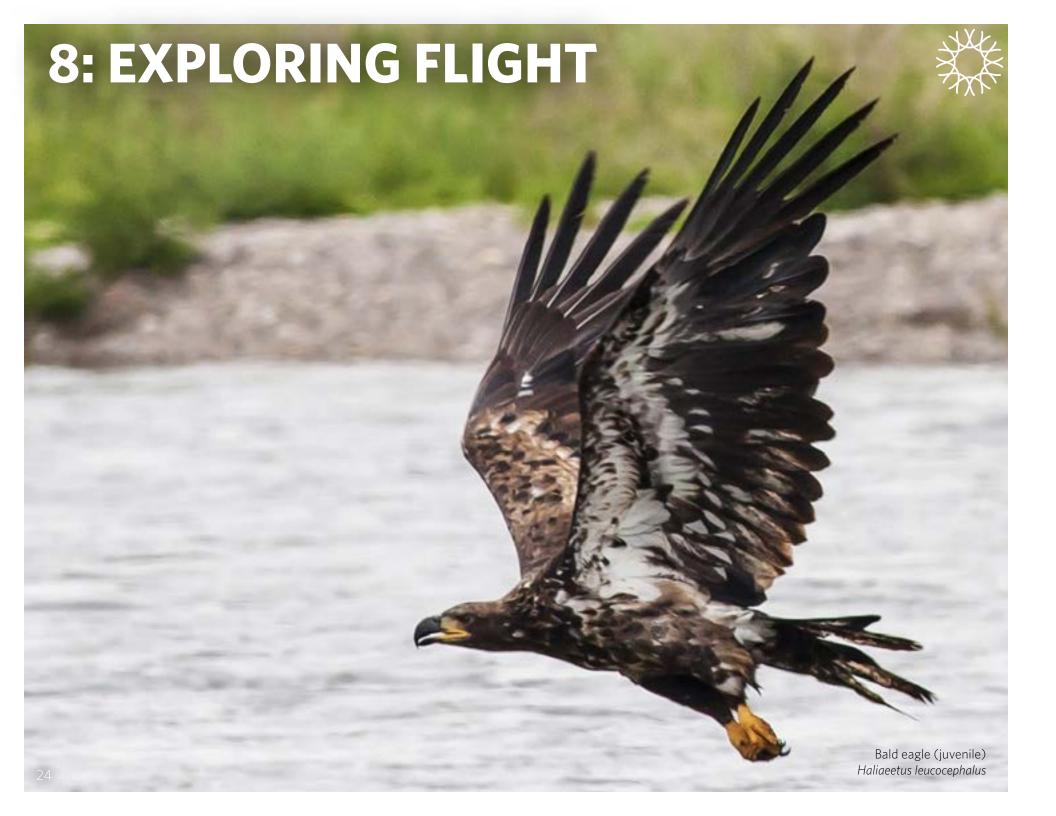
Call to Action:

BirdSleuth_ Investigator



How did it go?





A bird's wing shape determines how it flies and how it interacts with its environment. In this activity, youth investigate flying styles and make paper birds to test different wing designs.



Your mission today is to explore how different wing shapes affect flight.

Preparation

Load video: What Makes Owls So Ouiet and So Deadly?

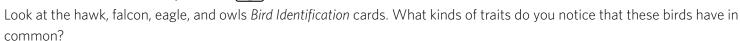
Bird Count 15 min. | outside

During today's Bird Count, pay close attention to any birds flying overhead.

- 1. Form teams of four. Gather your binoculars, notebooks, and the Merlin Bird ID app.
- 2. Place a new Bird Count sticker in your notebook. Head outside, then record the location, date, and time on the sticker.
- 3. Remember to be stealthy and record everything you see. Use Merlin Bird ID to identify your birds.
- 4. After 10 minutes of bird watching, head back inside and compare your lists.
- 5. Create a single club list and submit your findings to eBird.

Share out: Did you notice differences in the flying styles of different birds? How do those compare to other birds you have seen?

Falcon Food Chain 15 min. | outside



They are all birds of prey, which means they are hunters. Among other traits, they have similar beaks, talons, and keen vision. They are also usually apex predators, which means they are at the top of the food chain.

The peregrine falcon is an example of a bird of prey. Peregrine falcons are known for their high-speed dives while hunting and have been recorded diving at 240 miles per hour! They mainly eat smaller birds, such as blue jays.

Think about the rest of this food chain. What might blue jays eat? What might that prey organism eat?

One possibility is: peregrine falcon > blue jay > snail > plant.

In this game, play rock-paper-scissors to move up or down this food chain. Each level of the food chain has a unique motion. Plants sit on the ground. Snails crouch low and raise their hands above their head like eyestalks. Blue jays walk with their elbows out like wings and chirp. Falcons soar with arms outstretched.

Kit Materials

- (hawk, falcon, eagle, and owls only)
- Paper Birds sheets (A and B)
- Paper Birds table

E

rubber bands

Loose Items

- binoculars
- SAC notebooks

- Everyone starts as a plant.
- You can only play rock, paper, scissors with someone at your level of the food chain.
- The winner of each round advances to the next higher level of the food chain. The other player moves one level down in the food chain. For example, the winner of a snail round becomes a blue jay, and the other player becomes a plant. The loser of a plant round remains a plant.
- The first person to become a falcon is the apex predator.

Paper Birds 30 min. | outside or inside



Different wing shapes help make different kinds of flight possible. Think about a bird you have seen. What was the shape of its wings? How might you describe the way it flew?

Watch What Makes Owls So Quiet and So Deadly? (4 min.) to see a comparison of owl and falcon flight.

Share out: What did you notice about the flight and hunting style of the two birds?

This activity will investigate how wing shapes can change flight.

- 1. Divide into two groups. Each member of one group gets Paper Bird A. Each member of the other group gets Paper Bird B. Build the paper birds by folding along the lines.
- 2. Explain the steps of the competition, but don't start yet.
 - Form pairs that have a member from each group. Each pair should have a Paper Birds table.
 - Go outside to launch the paper birds and compare distance, speed, etc. Practice launching the birds and make improvements if necessary. For example, you might curl the wings, change the shape of the nose, or add paper clips for weight.
 - Compete with the other member of your pair and keep track of the results in the Paper Birds table.
- 3. Before going outside, learn how to launch the birds. Since paper birds can't flap their wings like real birds do, you can give them a boost with rubber bands. Poke a hole in the







What Makes Owls So Quiet

and So Deadly?



bottom edge about one inch from the nose. Loop a rubber band through the hole (see photo on previous page).

4. Go outside. Practice for two minutes and then compete for four minutes. Remember to record your data in the Paper Birds table.

Share out: Debrief the results of the competition as a group. Share strategies you used to make the paper birds fly better. Take a vote to see which paper bird wins for each question. Finally, discuss which paper bird is more similar to a falcon or owl.

Paper Bird A is more similar to an owl, and Paper Bird B is more similar to a falcon.



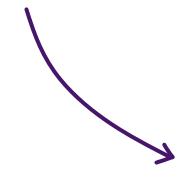
Explore More:

Watch Science Today: Secrets of Flight (5 min.) to learn more about flight in nature.

Call to Action:

Human-made technology like plane wings and helicopter blades are directly inspired by wings in nature. Try building other flying models at home with friends and family, such as this ring wing glider.

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.





Glider



How did it go?



9: OWL PELLET DISSECTION 28

Scientists can learn about an owl's lifestyle by carefully examining the indigestible materials found in owl pellets. In this activity, youth dissect owl pellets and use a dichotomous key to discover the contents inside.



Your mission today is to examine an owl pellet and figure out what the owl ate.

Preparation

Load video: Owl Pellet Dissection.

Bird Count 15 min. | outside |



During today's Bird Count, look for signs of birds like poop, bits of food, or footprints.

- 1. Form teams of four. Gather your binoculars, notebooks, and the Merlin Bird ID app.
- 2. Place a new Bird Count sticker in your notebook. Head outside, then record the location, date, and time on the sticker.
- 3. Remember to be stealthy and record everything you see. Use Merlin Bird ID to identify your birds.
- 4. After 10 minutes of bird watching, head back inside and compare your lists.
- 5. Create a single club list and submit your findings to eBird.

Share out: What evidence did you find that birds have visited your area?

Owl Getcha! 20 min. | inside

Explore what it's like to be owl prey by playing Owl Getcha! The goal of this game is to get yourself and two offspring, or babies, safely to your den.

- Begin with two to four players (or teams) per board. Each player is an owl prey (gopher, mouse, shrew, or vole).
- Each player starts in their den and rolls a die to travel the board clockwise.
- When players land on a red or purple spot, they collect action or event cards and follow the directions to earn food, water, or shelter tokens.
- Players can exchange one food, one water, and one shelter token for one new offspring. Offspring also begin in the den and can travel the board to earn tokens. On each turn, players choose which of their pieces to advance.
- The first player to reach the den with two offspring (three pieces total) wins.

Owl Pellet Dissection 25 min. | inside



An owl pellet might look like poop, but it isn't! Actual owl poop is white. Owl pellets, on the other hand, are more like owl vomit.

What might you expect to find in owl pellets?

Kit Materials

- Owl Getcha! game (three sets: board, cards, tokens)
- Owl Pellet bone chart

В

- dice
- Owl Getcha! game pieces

tweezers

Loose Items

- binoculars
- owl pellets
- paper bags
- SAC notebooks

Owl Pellet

Explore More:

Barred Owl Regurgitates





Owls swallow their prey whole. This means that in addition to nourishing meat, they also swallow bones, fur, and feathers. Owls can't digest these tougher body parts, so they regurgitate them, or spit them out, in a small pellet. The pellets you will dissect today are collected from barn owls. Each pellet has been professionally heat-treated to kill any germs and is safe to handle.

Watch the Owl Pellet Dissection (2 min.) before you start.

- 1. Divide into pairs. With your partner, carefully pull apart one owl pellet using your hands.
- 2. Sort the different pieces you find inside of the pellet. Once you find a skull, use the Owl Pellet Dissection key and Owl Pellet bone chart to identify what type of prey was eaten. This tool is called a dichotomous key, which scientists use to identify species based on distinguishing features.
- 3. Compare with others. Did you find the same types of prey?

Share out: What do you think the owl ate? Do you think there are bones from more than one prey animal in your pellet? What evidence supports your thinking?

- 1. As a club, you can tally how many animals you found.
- 2. Clean your lab area thoroughly and wash your hands.
- 3. Bring your bones home in a paper bag to show your friends and family.

Explore More:



Watch a barred owl regurgitate pellets (3 min.) and explore other resources from BirdSleuth.

Call to Action:





How else can you learn what an animal ate? Animal poop, also called **scat**, can hold many clues. Visit a local park or recreation area to look for scat left by squirrels and raccoons, or even coyote and bobcats. Examine it to discover what the animal ate, but remember to wear gloves or use a stick. Never touch scat with your bare hands because it can carry diseases.

How did it go?



Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.







Ecosystems exist in a delicate balance that can be affected by humans. In this activity, youth explore what it takes to create a sustainable ecosystem that benefits all living things.

Your mission today is to explore how to keep ecosystems healthy.

Preparation

• Gather a few handfuls of potting soil.

Bird Count 15 min. | outside



During today's Bird Count, think about how different birds help maintain a healthy environment.

- 1. Form teams of four. Gather your binoculars, notebooks, and the Merlin Bird ID app.
- Place a new Bird Count sticker in your notebook. Head outside, then record the location, date, and time on the sticker.
- Remember to be stealthy and record everything you see. Use Merlin Bird ID to identify your birds.
- 4. After 10 minutes of bird watching, head back inside and compare your lists.
- Create a single club list and submit your findings to eBird.

Share out: What roles do different birds play in the ecosystem? Which roles are beneficial? Are there any roles that are harmful?

Pest Busters 25 min. | outside

The coffee berry borer is a type of beetle that eats coffee berries. The rufous-capped warbler is a type of bird found in the forests of Costa Rica that eats the coffee berry borer. Coffee farmers in Costa Rica are worried because the beetles are destroying their plants. Play this game to help the farmers use nature to control the pest and save their coffee farms.

- 1. Mark off a large space, about 40' by 20', to represent an area of land in Costa Rica. Designate one quarter of the space (10' by 20') as forest and three quarters (30' by 20') as coffee farm.
- 2. Scatter Coffee Berry tokens all over the coffee farm. The tokens represent coffee berries that are ready for harvest. Do not place any tokens in the forest.
- 3. Designate two players as farmers and distribute the rest of the players uniformly throughout the forest and the farm. The players standing in the farm are coffee berry borer beetles. They eat coffee berries. The players in the forest are rufous-capped warblers. They eat coffee berry borer beetles.
- 4. The beetles must gather as many Coffee Berry tokens as possible without stepping away from their positions. The warblers must try to tag the coffee beetles.
- 5. Once a beetle is tagged, it may not gather any more tokens. When a warbler tags a beetle, it must stay in place and count to 10 before it tags again. Warblers move by flapping their wings.

Kit Materials

- Bird Count and eBird
- Bird Count stickers
- Coffee Berry tokens
- Pest Busters table

• ¼ lbs. black oil sunflower seeds

Loose Items

- binoculars
- clav
- paper bags
- SAC notebooks

Materials Not Included

potting soil





- 6. The round starts when you yell "Coffee Time!" After 30 seconds, call "Stop!" to end the round. At the end of each round, the farmers should fill in the Pest Busters table and share out the results.
- 7. Play more rounds of the game. For each round, reallocate the spaces and repeat the steps above.
 - Round 2: The entire space is a coffee farm (no forest and no warblers).
 - Round 3: Half of the space is forest and half is a coffee farm.
 - Round 4: Three guarters of the space is forest and one guarter is a coffee farm.

Share Out: At the end of the game, ask the two farmers to share the data from their *Pest Busters* table with the group. Discuss what you noticed after each round. How did the amount of land designated for forest affect the beetle population? How did it affect the coffee production? If you were a coffee farmer, how would you set up your land and why?

Seed Balls 20 min. | outside or inside



Migrating birds need a lot of energy for their long journeys. You can help migrating birds by making seed balls to toss in empty areas to grow wild sunflowers, which are native in all of North America. Seed balls are modeled after how birds spread seeds over large distances: they eat berries in one area, fly somewhere else, and poop out the seeds!

- 1. Start with a golf-ball-sized piece of clay. Roll the clay in soil and knead it together to mix it.
- 2. Make a hole to drop 5-10 sunflower seeds into the middle of the ball. Keep rolling and kneading your ball to mix everything.
- 3. Shape your seed ball into any shape! The clay holds it together and the soil will help the seeds grow.
- 4. If you have permission, or you are near an abandoned area, go outside to toss the seed balls. If not, take the seed balls home in paper bags. When it rains, the clay will soften and the seeds will be able to grow into sunflowers.

Seed balls can be thrown in your own backyard, in dirt patches, or planted in a pot, but don't throw seed balls into landscaped areas like parks or residential yards. Your seed balls will help spread wild sunflowers that will provide energy for migrating birds.

Share out: Where can you throw seed balls in your neighborhood?

Explore More:



Watch <u>Bird Migration</u>, A <u>Perilous Journey</u> (4 min.) to learn more about the challenges migrating birds face.

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.



Explore More: Bird Migration, A Perilous



How did it go?







Humans can make positive changes to the environment. In this activity, youth weave together what they have learned and design strategies to support bird diversity and environmental health.

Your mission today is to design a plan to make your area more bird-friendly.

Preparation

- Collect recycled materials.
- Load video: Science Today: Condor Comeback.

Bird Count 15 min. | outside



During today's Bird Count, pay special attention to the size of birds in your area.

- 1. Form teams of four. Gather your binoculars, notebooks, and the Merlin Bird ID app.
- 2. Place a new Bird Count sticker in your notebook. Head outside, then record the location, date, and time on the sticker.
- 3. Remember to be stealthy and record everything you see. Use Merlin Bird ID to identify your birds.
- 4. After 10 minutes of bird watching, head back inside and compare your lists.
- 5. Create a single club list and submit your findings to eBird.

Sizable Struggles 20 min. | outside



Why do scientists study birds? One big reason is that there are many species of birds in North America that are threatened by human impacts and changes in the climate.

The California condor is one example. They feed on dead animals, including those that have been hunted by humans. They are therefore exposed to lead from bullets. Watch the Science Today: Condor Comeback (3 min.) to learn about lead poisoning in condors and how scientists are helping conserve this endangered species.

How big is a California condor?

- 1. Use chalk to mark a line 9.5 feet (2.9 meters) long on a wall or the ground outside. This is a condor's length from wing tip to wing tip.
- 2. Draw the shape of its wings and body. How does it compare to your body? To other birds?
- 3. Explore the Sizable Struggles cards and draw the rest of the threatened birds for comparison. Be sure to include their name and threats so other people who walk by think about it.

Kit Materials

В

measuring tape

sidewalk chalk

Loose Items

- binoculars
- SAC notebooks

Materials Not Included

recycled materials

Science Today: Condor Comeback



Be a Bird Hero 25 min. | inside

Think back to some of the bird challenges we've explored so far in Science Action Club:

- finding food and water
- protecting nests

- predators
- pollution and diseases

Form groups of three to four. Your goal is to come up with a solution to one of these challenges. Your solution can be a physical change, like more bird feeders, or a behavior change, like a social media campaign to encourage people to keep their cats inside. Creating a plan will take a few steps:

- Define the problem. Be as specific as possible.
- Brainstorm ideas. There are no bad ideas at this point!
- 3. Choose one idea and create a prototype. This can be a detailed plan, drawing, or model.
- 4. Test your idea and then improve it.
- 5. Share your prototype with the rest of the club.

Share out: What resources do you need to put your solution into action? How will you share your idea with friends, family, and your community?

Explore More: 🔲 🛞

Watch how climate change is affecting birds (4 min.) around the world.

Call to Action:

Bird tagging programs help scientists track how species are doing over time. You can help identify tagged birds in photos through another citizen science project called Condor Watch.

How did it go?

Explore More:

Call to Action:

Climate Change and Birds



Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.





12: COMBINE YOUR COUNTS





Sandhill crane Grus canadensi Scientists review their data and notes to look for patterns and make discoveries that enhance our understanding of the natural world. In this final activity, youth analyze their Bird Count results and create a poster of their favorite bird. This is also the time to celebrate their accomplishments as citizen scientists.

Your mission today is to review all of your bird observations and create a poster to share your discoveries.

Preparation

- Fill out a certificate for each youth.
- Plan a fun celebration for completing Science Action Club.

Replay 15 min. | outside

Vote to play your favorite game about birds; choose from: Activity 1: Pest Busters, Activity 2: The Big Wind Blows, Activity 3: Stealthy Birders, Activity 5: Oil Spill Tag, Activity 6: Guard the Nest, Activity 8: Falcon Food Chain, or Activity 9: Owl Getcha!

Combine Your Counts 30 min. | inside



Part I. As scientists, it's important for you to summarize your findings and use that data to inform others.

- Look back into your notebook to review the birds you have seen. Do you recognize any species from your early notes?
- Go to eBird and select My Checklists to see your club's birding record.
- 3. On the board, summarize the data from your checklists, including which birds you saw, how many, and how often.

Share out: Review your data as a group. What can you conclude about what lives in your neighborhood? Which species did you see most often and least often? Does anything about your results surprise you?

Part II. Form groups of three to four people. Choose one bird from your list and create a Bird of the Year poster about it (see the example alongside). Your poster can include:

- Bird names and basic information.
- Photo or sketch with field marks.

- Likelihood of seeing it in your area.
- Notes from you, the expert.

Share out: Present your posters to the rest of the club. Which bird did you choose and why? Talk about some of the information you included in the poster.

SAC Ceremony 15 min. | inside



Congratulations on becoming expert birders and scientists! The best part about birding is that you can do it anywhere, so keep practicing your skills. Celebrate your accomplishments by holding a ceremony and distributing Certificates of Success.

Kit Materials

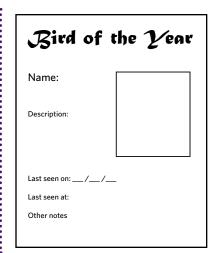
SAC certificates

Loose Items

- binoculars
- Bird Scouts buttons
- SAC notebooks

Materials Not Included

craft supplies







Explore More:

Search for your favorite bird on the interactive bird species occurrence map. The occurrence map shows you where birds can be seen at different times of the year, and it was created using data provided by citizen scientists like you!

Call to Action:



Help other birders in your area by creating a local bird field guide. Your field guide should include basic information about each bird, as well as sketches with field marks and other notes. Think about the information you wanted to know while doing your Bird Counts and be sure to include it in your guide. You can also include visuals of your data, such as a bar graph showing the number of total birds you saw each day.

Attendance & Feedback: How many youth attended? How did it go? Record notes here, then click or scan the link to let us know.





CONNECT TO THE ACADEMY

California Academy of Sciences offers several ways to stay connected:



Flipside Science

These video-based units, designed for middle school educators and students, address food, water, and energy systems, environmental solutions, and design-thinking skills.



Science Films for the Classroom

These award-winning planetarium dome shows have been reformatted for educational use as stand-alone films or as a series of short, modular clips.



Science Video Vault

A collection of high-quality short-length videos to help your students visualize data and scientific and natural phenomena.



bioGraphic for Educators

This multimedia magazine powered by the Academy includes immersive infographics, data visualizations, and videos.



Educator Tab

This is the entry point to all of the educator resources offered by the California Academy of Sciences.



Distance Learning

Distance Learning brings Academy experts, animals, collections, and exhibits to youth the world over, via the internet.



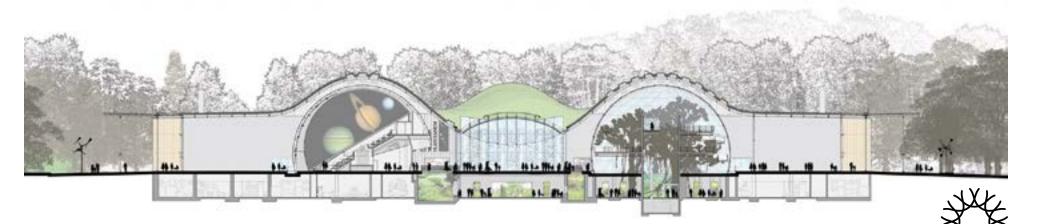
Citizen Science Projects

Learn how the Academy connects with community volunteers to explore and protect biodiversity in California.



Citizen Science Toolkit

This toolkit is designed to help educators integrate citizen science projects into classroom curricula or afterschool programming.



NGSS CONNECTIONS

The Next Generation Science Standards (NGSS) offer a new vision for K-12 science education. Released for states' adoption in 2013, and designed with decades of research on best practices for teaching and learning science, the NGSS offer an opportunity to move science education into the 21st century.

The activities in *Bird Scouts* support youth engagement in some aspects of the three dimensions of the NGSS. Specifically the Science and Engineering Practices (SEPs) are used as strategies for making sense of content that connects to the Crosscutting Concepts (CCCs) and the Disciplinary Core Ideas (DCIs).

Science and Engineering Practices (SEPs)

Planning and Carrying Out Investigations

Activity 5

 Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.

Analyzing and Interpreting Data

Activities 2, 3, 4, 7, 8, 9, 12

- Represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.
- Analyze and interpret data to provide evidence for phenomena.

Constructing Explanations and Designing Solutions

Activities 1, 2, 5, 6, 9, 11

- Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events
- Apply scientific ideas to design, construct, and/or text a design of an object, tool, process or system.

Obtaining, Evaluating, and Communicating Information

Activities 3, 4, 12

- Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts.
- Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.

Disciplinary Core Ideas (DCIs)

LS1.A: Structure and Function

 Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction.

LS2.A: Interdependent Relationships in Ecosystems

 Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors, any of which can limit their growth. Competitive, predatory, and mutually beneficial interactions vary across ecosystems but the patterns are shared.

LS4.D: Biodiversity and Humans

 Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.

ESS3.C: Human Impacts on Earth Systems

 Human activities have altered the biosphere, sometimes damaging it, although changes to environments can have different impacts for different living things. Activities and technologies can be engineered to reduce people's impacts on Earth.

Crosscutting Concepts (CCCs)

Structure and Function

Activities 1, 5, 6, 7, 8

- Different materials have different substructures, which can sometimes be observed.
- Substructures have shapes and parts that serve functions.

Cause and Effect

Activities 7, 8

 Cause and effect relationships may be used to predict phenomena in natural or designed systems.

REFERENCES

Images

Creative Commons Links for images

Hawk: http://www.khosla.com/forthebirds/birdsasart/redtailedhawk4.html

Pigeon: https://commons.wikimedia.org/wiki/File:Rock Pigeon (Columba livia) in Iași.JPG

Red-winged blackbird: https://www.flickr.com/photos/kurt-b/7126286751

American crow: https://commons.wikimedia.org/wiki/File:American Crow SanDiego RWD.jpg Common raven: https://commons.wikimedia.org/wiki/File:Corvus corax ad berlin 090516.jpg

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WEB LINKS

	Attendance and Feedback	http://sciclub.link/birds-feedback
1: Build a Bird	Science Action Club - Citizen Science	http://sciclub.link/sacmission
	How to Draw Birds	http://sciclub.link/birdsa1cta
2: Birding Tools	How to get crystal clear focus with your binoculars	http://sciclub.link/birdsa2em
	Important Bird Areas	http://sciclub.link/birdsa2cta
3: Identifying Birds	Merlin Bird ID	http://sciclub.link/merlin
	BirdSleuth Explorer's Guidebook	http://sciclub.link/birdsa3em
4: Bird Count	eBird	http://sciclub.link/ebird
	How to Do a Bird Count	http://sciclub.link/birdcount
	Bird Song Hero Game	http://sciclub.link/birdsa4em
	Cornell Lab Ornithology Citizen Science Projects	http://sciclub.link/birdsa4cta
5: Pollution Control	Bio-inspiration - Hair Mats	http://sciclub.link/birdsa5em
	How to Find a Wildlife Rehabilitator	http://sciclub.link/birdsa5cta
6: Eggsperiment	ScienceTake: Angry Birds	http://sciclub.link/sciencetakeangrybirds
	Chick Hatching	http://sciclub.link/birdsa6em1
	Bird Eggs	http://sciclub.link/birdsa6em2
	NestWatch	http://sciclub.link/birdsa6cta
7: Beneficial Beaks	A Hummingbird in a Wind Tunnel	http://sciclub.link/birdsa7em
	BirdSleuth Investigator magazine	http://sciclub.link/birdsa7cta
8: Exploring Flight	What Makes Owls So Quiet and So Deadly?	http://sciclub.link/owlstealth
	Science Today: Secrets of Flight	http://sciclub.link/birdsa8em
	Ring Wing Glider	http://sciclub.link/birdsa8cta
9: Owl Pellet Dissection	Owl Pellet Dissection	http://sciclub.link/owlpelletvideo
	Barred Owl Regurgitates Pellets	http://sciclub.link/birdsa9em1
	BirdSleuth Resources	http://sciclub.link/birdsa9em2
10: Healthy Habitats	Bird Migration, A Perilous Journey	http://sciclub.link/birdsa10em
11: Be a Bird Hero	Science Today: Condor Comeback	http://sciclub.link/condorcomeback
	Climate Change and Birds	http://sciclub.link/birdsa11em
	Condor Watch	http://sciclub.link/birdsa11cta
12: Combine Your Counts	Bird Species Occurrence Map	http://sciclub.link/birdsa12em

GLOSSARY

brood parasitism	(n.) a form of social parasitism in which eggs are laid in the nests of other birds, causing them to be hatched and the young reared by the hosts, often at the cost of the hosts' own young			
camouflage	(n.) the ability of an organism to blend into its surroundings			
dichotomous key	(n.) a key for the identification of organisms based on a series of choices between alternative characters			
ecosystem	(n.) an interactive community of organisms that occurs in a natural environment			
food web	(n.) a network of interconnected food chains in an ecosystem			
habitat	(n.) the natural or chosen environment of an organism			
juvenile	(n.) an individual organism that has not yet reached its adult form			
migration	(n.) the seasonal movement of animals from one region to another			
offspring	(n.) an animal's young			
ornithology	(n.) the study of birds			
predator	(n.) an animal that preys upon other animals; an animal that hunts and eats other animals; the top predator in an ecosystem is called the apex predator			
prey	(n.) an animal that is hunted for food by a predator (v.) to seize and eat prey; usually followed by the word on or upon			
prototype	(n.) a rough sample of an idea that you can test and modify			
species	(v.) to seize and eat prey; usually followed by the word on or upon			
sustainability	(n.) the practice of using resources in a controlled manner so as not to deplete them			

NOTES

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The Science Action Club program is generously supported by



















