Activity Leader Guidebook

Bird Scouts

CALIFORNIA ACADEMY OF SCIENCES

SCIENCE

ACTION CLUB

This guidebook belongs to: _____
eBird username: _____
eBird password: **Jellyfish123**

Common kingfisher
Alcedo atthis

Fall 2017

CONTENTS

WHAT IS SCIENCE ACTION CLUB?

Science Action Club Vision and Goals

Science Action Club (SAC) is a nationwide STEM program for middle school youth in out-of-school time. We provide afterschool staff with in-depth training, teaching kits, and best practices for informal STEM education. Our goal is to get middle school youth outside, connected to nature, and contributing to citizen science research.

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 *Birds* online training and other helpful resources.

Gouldian finch
Erythrura gouldiae

SAC TERMS AND DEFINITIONS

Term	Definition	Notes and Examples
activity leader (AL)	Person responsible for leading SAC activities with youth	SAC activity leaders have many titles. Some are afterschool instructors, camp counselors, school teachers, and librarians. Throughout SAC materials, the term activity leader refers to anyone who leads Science Action Club with youth.
trainer	Person responsible for training and supporting SAC activity leaders	Your trainer is your main contact for support. Keep your trainer informed of any changes that come up or questions you may have about Science Action Club.
agency	Name of the organization that oversees your program	The agency might be an afterschool provider, a library system, a school district, parks and recreation, or any other organization through which Science Action Club is offered.
location	Name of the specific program or location that offers SAC	Many agencies have multiple locations. The Oakland Public Library system may offer SAC at several branches and the local YMCA may support several schools. The club location is the specific school, library, or site where SAC meets.
club	Group of youth participating in SAC	Sometimes there is more than one Science Action Club offered at a single location. For example, the Berkeley YMCA at Roosevelt Middle School may run one club with grades 5-6 and another with grades 7-8. In this case, the agency is Berkeley YMCA, the location is Roosevelt Middle School, and there are two clubs at that location.
online training	Required training accessible through the SAC Educator Portal	This interactive training covers all 12 SAC activities, important science concepts, and teaching strategies for the informal STEM learning environment.
activity leader training (ALT)	Required in-person training led by a SAC trainer	This workshop provides hands-on practice for leading the *Bird Scouts* curriculum with youth.

TIMELINE OF EXPECTATIONS

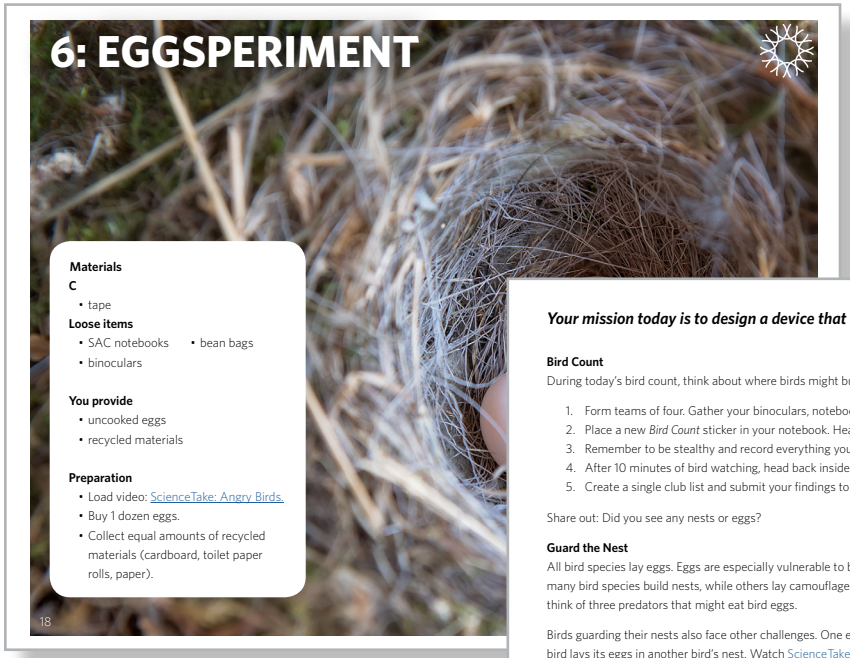
Expectation	Description	Due Date
Complete the online training	This required online training will help you succeed as an activity leader. Use the SAC guidebook to follow along. You must complete this training in order to be eligible to receive the SAC activity guidebook and kit. To learn how to navigate the SAC Educator Portal, see the Guide to the SAC Educator Portal (written guide or video).	Before the ALT
Attend the ALT	Practice leading activities, test out the kit materials, and trade teaching tips with other SAC activity leaders at this required in-person workshop.	Dates vary
Identify an outdoor location	You are responsible for finding an outdoor space where youth can look for birds. Ideally, the space should not be more than a five-minute walk from where your club meets. Ask your program supervisor for support, if needed.	Two weeks after the ALT
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 technology during Science Action Club.	Two weeks after the ALT
Recruit youth	SAC is more fun when the club is full. You are responsible for recruiting 15-20 youth and maintaining strong attendance. Use the *Youth Program Flyer* template to help with publicity.	Two weeks after the ALT
Connect with families	Once youth are enrolled, send home a letter introducing Science Action Club. Use the *SAC Letter to Families* template. Download and edit the template to fit your audience and include your own details.	Two weeks after the ALT
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.	After your kit arrives Complete all activities by __/__/____

Expectation	Description	Due Date
Submit citizen science observations	Citizen science is an essential part of Science Action Club. Please submit club lists to eBird regularly. Your trainer and the SAC Team will periodically check for your club's observations on eBird. If you need access to your eBird account, contact your trainer for the username and password. Never change the username or password of your eBird account, as both your trainer and the SAC team need access to your account. If you need help navigating eBird, check out the *Bird Count* video.	During Activities 4-12
Provide feedback	You are responsible for submitting Attendance and Feedback after each *Bird Scouts* activity. You can do this using the hyperlinks or QR codes in the guidebook, or by accessing Activity Leader Resources on the SAC Educator Portal.	After completing each activity
Administer the SAC Youth Survey	You are responsible for administering the *SAC Youth Survey* during Activities 9, 10, or 11. Let your trainer know when this is complete. All clubs that complete the survey will be entered into a raffle for special prizes.	During Activities 9 - 11 Completed surveys are due by __/__/____
Host a site visit or complete a phone interview	You may be asked to participate in a SAC site visit or phone interview. If you are selected to participate in a site visit, please help arrange the visit with your trainer. Contact your supervisor for help. If you are selected to participate in a phone interview, please help arrange the call with your trainer. Contact your supervisor for support. Ensure you have a quiet space to make the call.	As needed
Celebrate!	Invite your trainer to stop by your last SAC session and celebrate with your club. Remember to print and sign SAC certificates of success.	

ACTIVITY SUMMARIES

Title	Activity Mission	Materials You Provide
Activity 1: Build a Bird	Investigate bird shapes and features.	blank paper
Activity 2: Birding Tools	Compare and identify birds using birding tools.	-
Activity 3: Identifying Birds	Identify at least one bird using field identification tools.	Local bird field guide (recommended)
Activity 4: Bird Count	Count birds and share your observations.	-
Activity 5: Pollution Control	Understand pollution and how to control it.	Water, soaps, other cleaning products
Activity 6: Eggsperiment	Design a device that will protect an egg from breaking when dropped from a height.	Eggs, recycled materials
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.	-
Activity 9: Owl Pellet Dissection	Examine an owl pellet and figure out what the owl ate.	-
Activity 10: Healthy Habitats	Explore how to keep ecosystems healthy.	Potting soil
Activity 11: Be a Bird Hero	Design a plan to make your site more bird-friendly.	Recycled materials
Activity 12: Combine Your Counts	Review all of your bird obseravtions and create a poster to share your disoveries.	Craft supplies

HOW TO USE THIS GUIDEBOOK

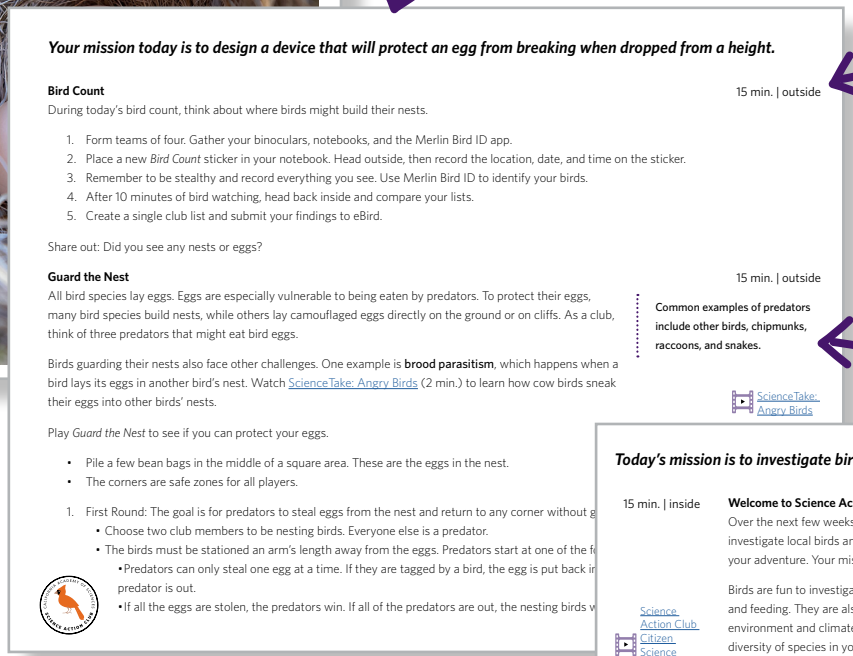


Check the activity title page before your club meets for a list of all materials and preparation.

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

Some activities require additional materials that you need to provide.

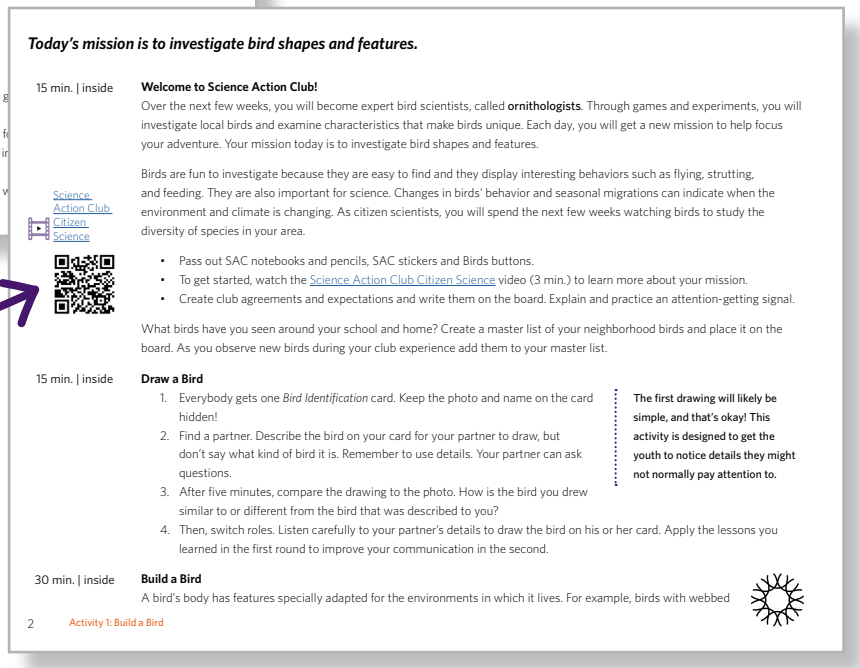
Share each activity's mission statement with youth.



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

Additional tips for activity leaders are included to the right of the dotted line.

This icon indicates a media link. Scan the QR code to access videos and other digital content. In the digital guidebook, you can also click the hyperlink.



KIT MATERIALS

A

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

B

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

C

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

D

½ lb	black oil sunflower seeds

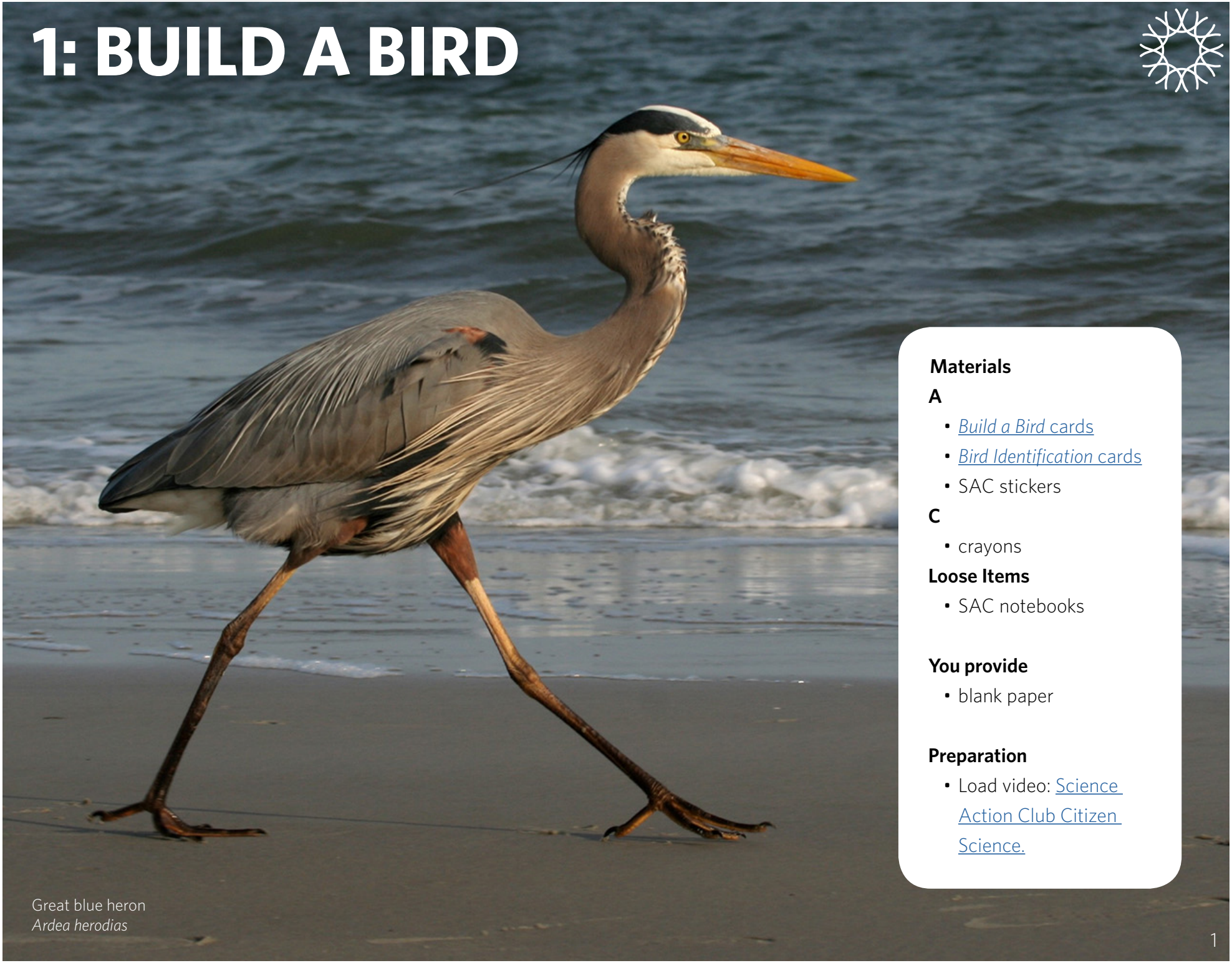
E

5 pairs	chopsticks
½ cup	rice
20	rubber bands
5	sporks
5	tweezers

Loose Items

20	bean bags
5	binoculars
20	*Birds* buttons
1	*Birds* guidebook
1 tub	clay
1 bottle	dish soap
1 bottle	oil
10	owl pellets
60	paper bags
20	SAC notebooks
20	SAC pencils

1: BUILD A BIRD



Great blue heron
Ardea herodias

Materials

A

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

C

- crayons

Loose Items

- SAC notebooks

You provide

- blank paper

Preparation

- Load video: Science Action Club Citizen Science.

Today's mission is to investigate bird shapes and features.

15 min. | inside

Welcome to Science Action Club!

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.

Science Action Club Citizen Science

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 birds' 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.

- Pass out SAC notebooks and pencils, SAC stickers and Birds buttons.
- To get started, watch the Science Action Club Citizen Science video (3 min.) to learn more about your mission.
- Create club agreements and expectations and write them on the board. Explain and practice an attention-getting signal.

What birds have you seen around your program site and home? Create a master list of your neighborhood birds and place it on the board. As you observe new birds during your club experience add them to your master list.

15 min. | inside

Draw a Bird

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, 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.

The first drawing will likely be simple, and that's okay! This activity is designed to get the youth to notice details they might not normally pay attention to.

30 min. | inside

Build a Bird

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 like 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?

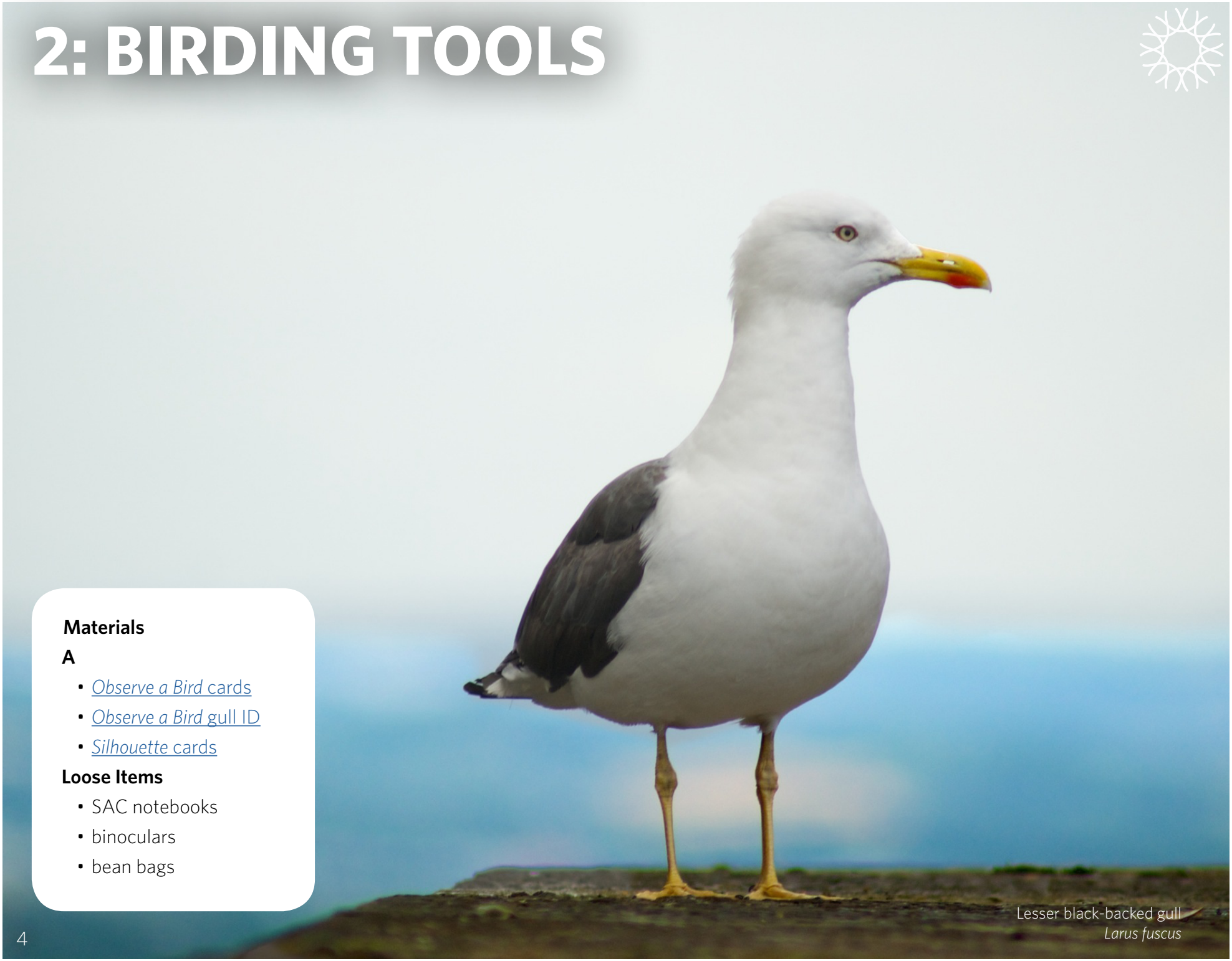
Call to action: As you see birds in your neighborhood, notice differences in their beaks, legs, wings, and bodies. Try your hand at drawing different birds while paying close attention to shapes and features. For inspiration, check out How to Draw Birds.

Call to action:
How to Draw Birds

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!

2: BIRDING TOOLS



Materials

A

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

Loose Items

- SAC notebooks
- binoculars
- bean bags

Lesser black-backed gull
Larus fuscus

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.

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

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

***Sort the Silhouettes* answers:**

1. African penguin
2. Common raven
3. Turkey vulture
4. Snowy egret
5. American goldfinch
6. Red-winged blackbird
7. Canada goose
8. Rock pigeon
9. Western gull
10. American crow
11. Great-horned owl
12. Double-crested cormorant

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.

Explore more: How to get crystal clear focus with your binoculars

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's 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

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.

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!

3: IDENTIFYING BIRDS

Eurasian blue tit
Cyanistes caeruleus

Materials

A

- *Spot the Differences* worksheets

Loose Items

- SAC notebooks
- binoculars

You provide

- local bird field guide (recommended)

Preparation

- Load video: Merlin Bird ID.

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

10 min. | inside

Spot the Differences

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.

20 min. | outside

Stealthy Birders

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.

10 min. | inside

Field Guides

Pocket Naturalist Guides

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, walk you through the identification process step by step, using the bird's

You can create a local bird field guide, check your library, or purchase your own.

size, color, behavior, and location to narrow down your local options.

Merlin Bird ID

Watch the Merlin Bird ID video (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 app (and field guide, if available) to identify any birds you see. You can also practice using Merlin 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.

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

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

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

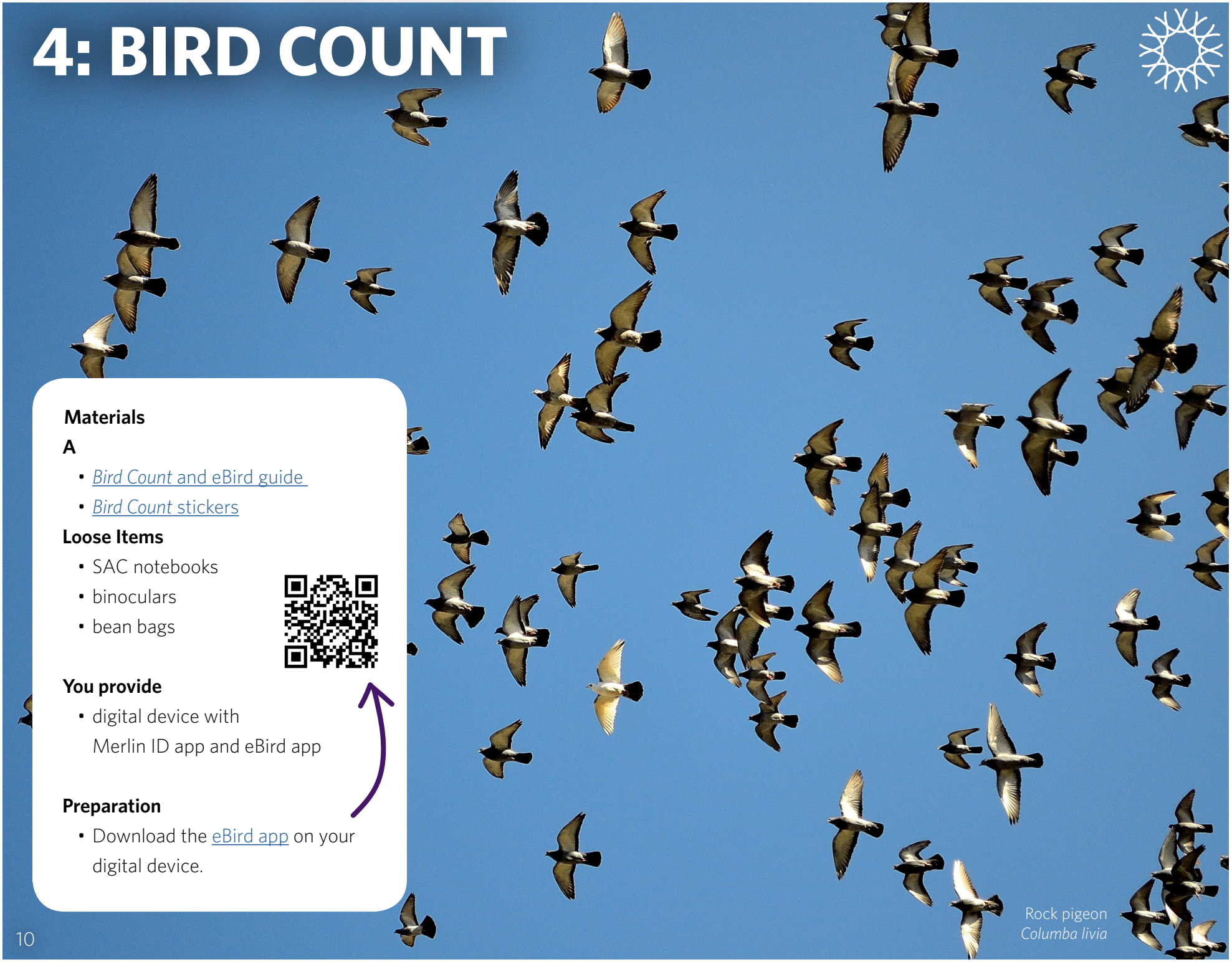
Explore more:
Birdsleuth Explorer's Guidebook

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.

How did it go?
Let us know!

4: BIRD COUNT



Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers

Loose Items

- SAC notebooks
- binoculars
- bean bags

You provide

- digital device with Merlin ID app and eBird app

Preparation

- Download the eBird app on your digital device.

Rock pigeon
Columba livia

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

Bean Bag Flock

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?

Prepare for Citizen Science

15 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.

Investigating Birds

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.

Watch Investigating Birds (3 min.) to get excited about birding!

10 min. | outside

Get Stealthy

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

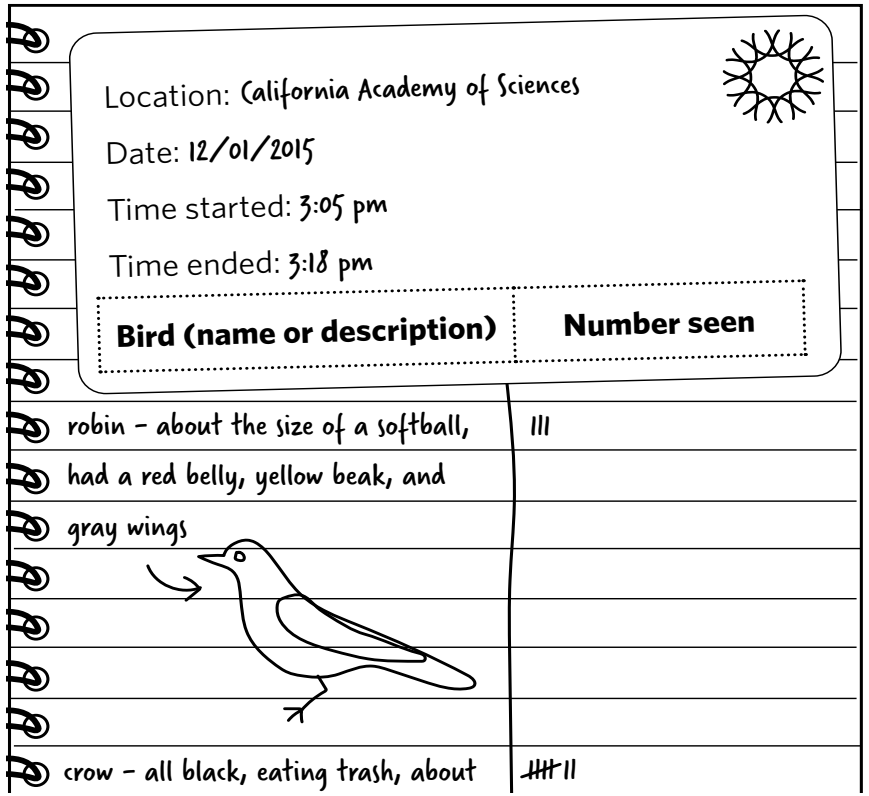
15 min. | inside and outside

Bird Count

How to Do a *Bird Count*

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.

10 min. | outside or inside

eBird

Submit Your List

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'll 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're 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. When you're 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.

If you're not sure which species you've observed, choose the general *sp.* option. For example, if you saw three gulls but aren't sure which kind, enter '3' for *gull sp.*

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

Explore more: Play the Bird Song Hero Game to test your bird observation skills.

Explore more:
Bird Song Hero Game

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?

Call to action:
Mission: Citizen Science

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!

5: POLLUTION CONTROL

Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers

B

- feathers

Loose Items

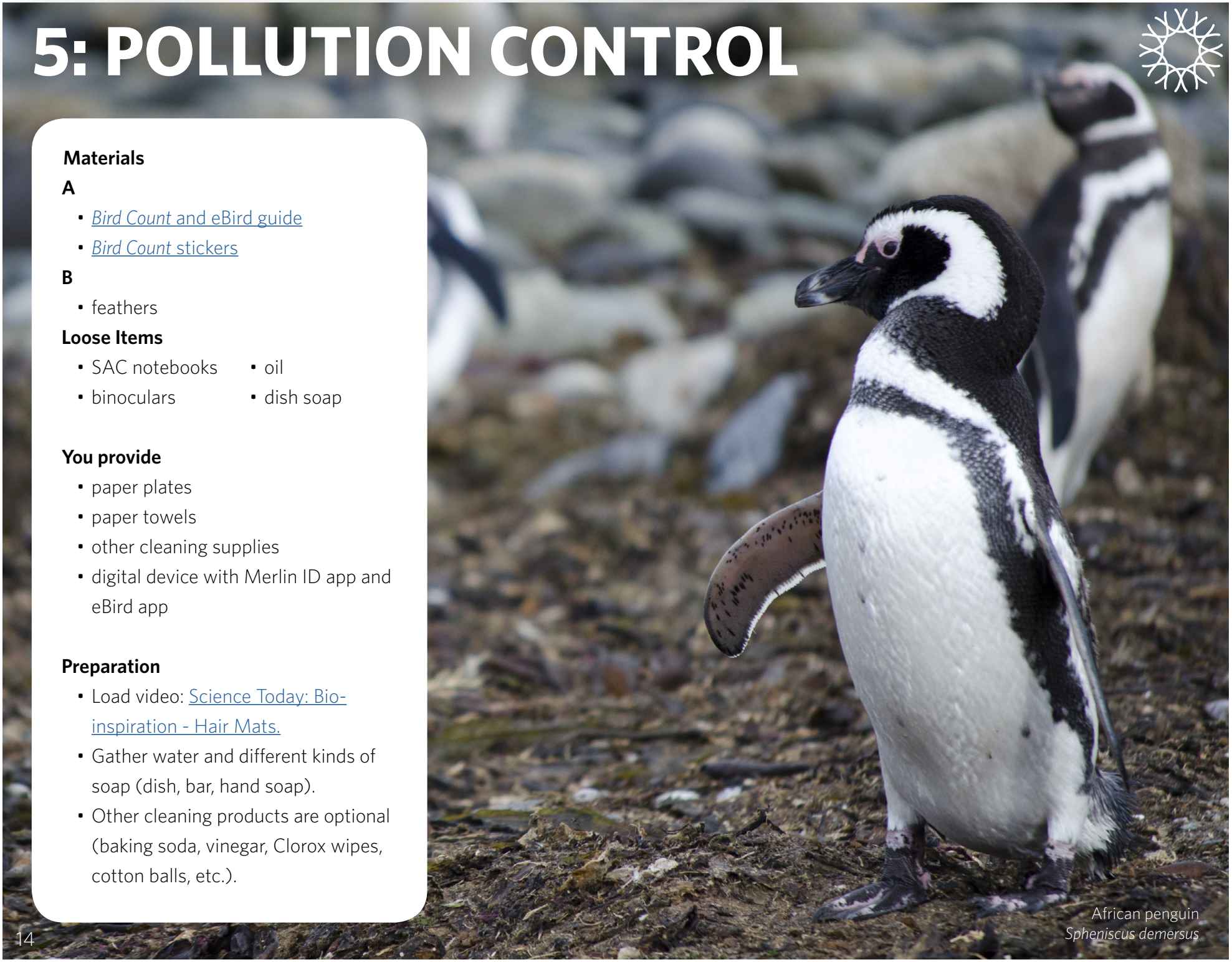
- SAC notebooks
- binoculars
- oil
- dish soap

You provide

- paper plates
- paper towels
- other cleaning supplies
- digital device with Merlin ID app and eBird app

Preparation

- Load video: Science Today: Bio-inspiration - Hair Mats.
- Gather water and different kinds of soap (dish, bar, hand soap).
- Other cleaning products are optional (baking soda, vinegar, Clorox wipes, cotton balls, etc.).



African penguin
Spheniscus demersus

Your mission today is to understand pollution and how to control it.

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 feathers?

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.

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.
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.

Play for three minutes.

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

30 min. | outside or inside

Oil Spill Cleanup

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?

As you go around, encourage the youth to look closely with their magnifying glasses and see this first-hand.

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: 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.

.....

Explore more:
Bio-inspiration - Hair Mats

Call to action:
How to Find a Wildlife Rehabilitator

How did it go?
Let us know!

6: EGGSPERIMENT

Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers

C

- tape

Loose items

- SAC notebooks
- bean bags

You provide

- digital device with Merlin ID app and eBird app
- uncooked eggs
- recycled materials

Preparation

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

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

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.

Common examples of predators include other birds, chipmunks, raccoons, and snakes.

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 ScienceTake: Angry Birds (2 min.) to learn how cow birds sneak their eggs into other birds' nests.

ScienceTake: Angry Birds

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.

1. 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.

2. 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.

30 min. | outside

Explore more: Chick Hatching

Egg shapes and colors

Call to action: NestWatch

How did it go? Let us know!

Egg Drop

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 or examine egg shapes and colors!

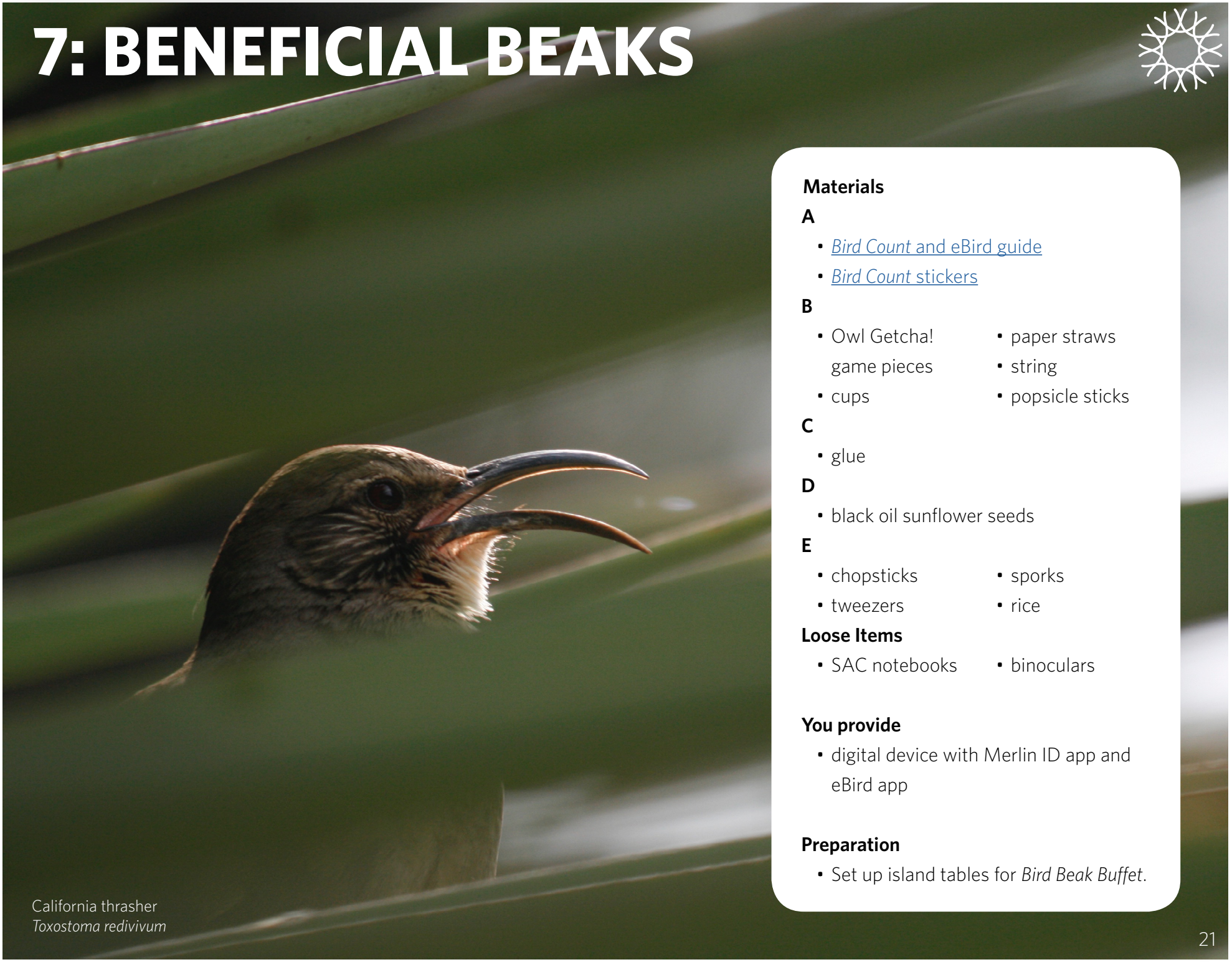
Provide each group with the same materials. Use found objects, if possible. Provide a limited amount of tape to prevent excess usage.

Don't pass out the eggs until groups are ready to test their prototypes. Broken eggs are messy! Use a tray or garbage bag to protect the egg drop area.

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.

7: BENEFICIAL BEAKS



California thrasher
Toxostoma redivivum

Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers

B

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

C

- glue

D

- black oil sunflower seeds

E

- chopsticks
- tweezers
- sporks
- rice

Loose Items

- SAC notebooks
- binoculars

You provide

- digital device with Merlin ID app and eBird app

Preparation

- Set up island tables for *Bird Beak Buffet*.

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

15 min. | outside

Bird Count

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.
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 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?

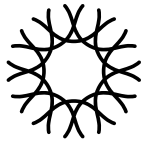
20 min. | inside

Bird Beak Buffet

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)
2. Everyone needs their notebook, a small cup, and a bird beak: either a paper straw, spork, chopsticks, or tweezers.
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 yards.

Explore more: Hummingbird in a Wind Tunnel

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 home your feeder and a bag of sunflower seeds. Find a safe spot to hang it near a window and watch for birds!

Explore more: See how hovering hummingbirds feed!

Call to action: BirdSleuth Investigator magazine

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.

How did it go? Let us know!

8: EXPLORING FLIGHT

Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers
- *Bird Identification* cards (hawk, falcon, eagle, and owls only)
- *Paper Birds* sheets (A and B)
- *Paper Birds* table

E

- rubber bands

Loose Items

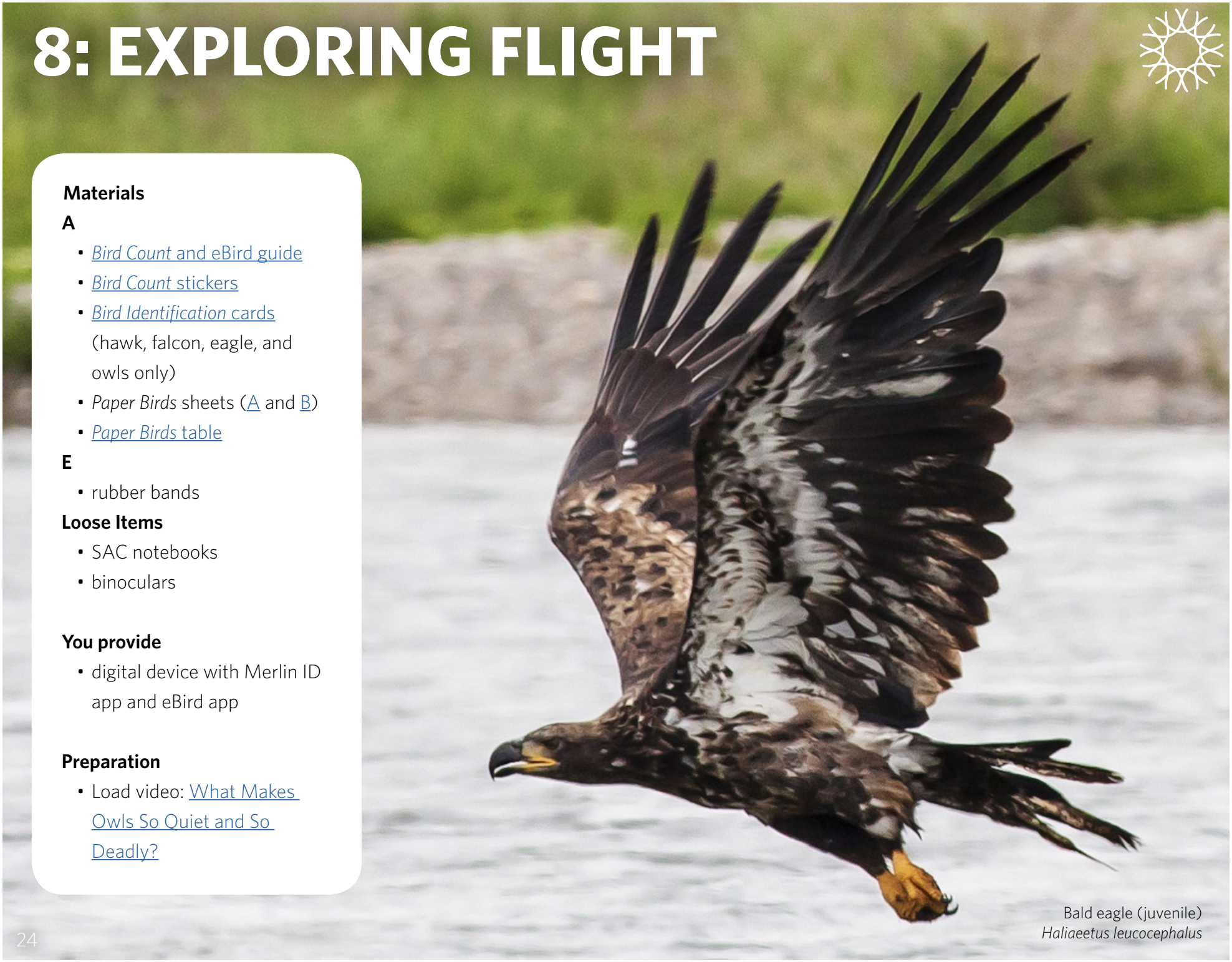
- SAC notebooks
- binoculars

You provide

- digital device with Merlin ID app and eBird app

Preparation

- Load video: What Makes Owls So Quiet and So Deadly?



Bald eagle (juvenile)
Haliaeetus leucocephalus

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

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

Look at the hawk, falcon, eagle, and owls *Bird Identification* cards. What kinds of traits do you notice that these birds have in common?

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.

- 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.

30 min. | outside or inside

Paper Birds

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?

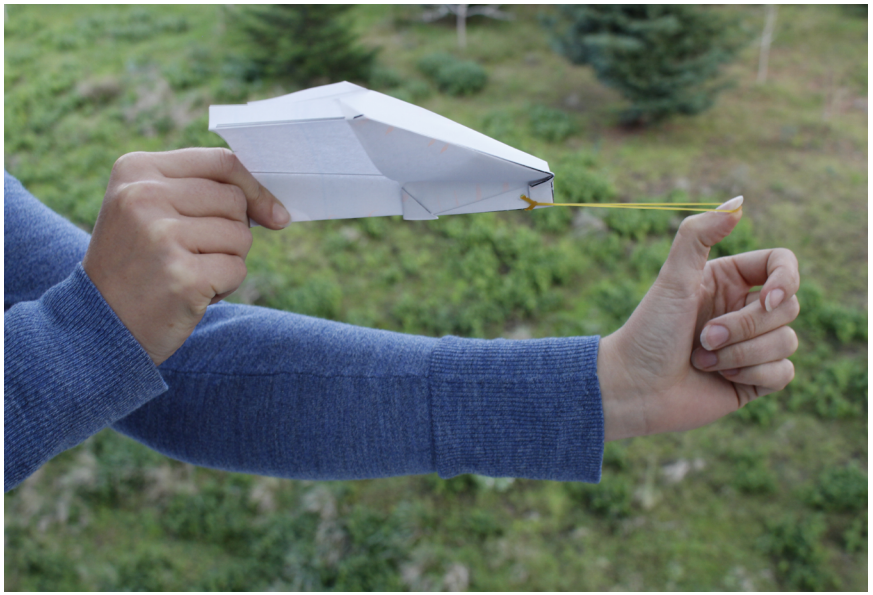
What Makes Owls So Quiet and So Deadly?

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 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.

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

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.

Explore more: 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.

Explore more: Science Today: Secrets of Flight

Call to action: 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.

How did it go? Let us know!

9: OWL PELLET DISSECTION

Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers
- *Owl Getcha!* game (three sets: board, cards, tokens)
- *Owl Pellet Dissection* key
- *Owl Pellet* bone chart

B

- dice
- *Owl Getcha!* game pieces

E

- tweezers

Loose Items

- SAC notebooks
- binoculars
- owl pellets
- paper bags

You provide

- digital device with Merlin ID app and eBird app

Preparation

- Load video: Owl Pellet Dissection.

Barn owl
Tyto alba

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

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 site?

Owl Getcha! 20 min. | inside

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

- Begin with two to four players (or teams) per board.
- 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.

Each game set has one board, 20 colored game pieces, 30 tokens, and 30 cards.

Bonus: have a discussion about why animals need resources before they can have babies.

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?

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

Show youth the photo of a barn owl on the previous page.

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.

Owl Pellet Dissection

Watch the Owl Pellet Dissection video (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?

When you feel like saying "Eww," say, "Wow!"

If youth stop looking too soon, create a competition to find the most bones.

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?

Explore More: Barred Owl Regurgitates Pellets

Birdsleuth resources

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.

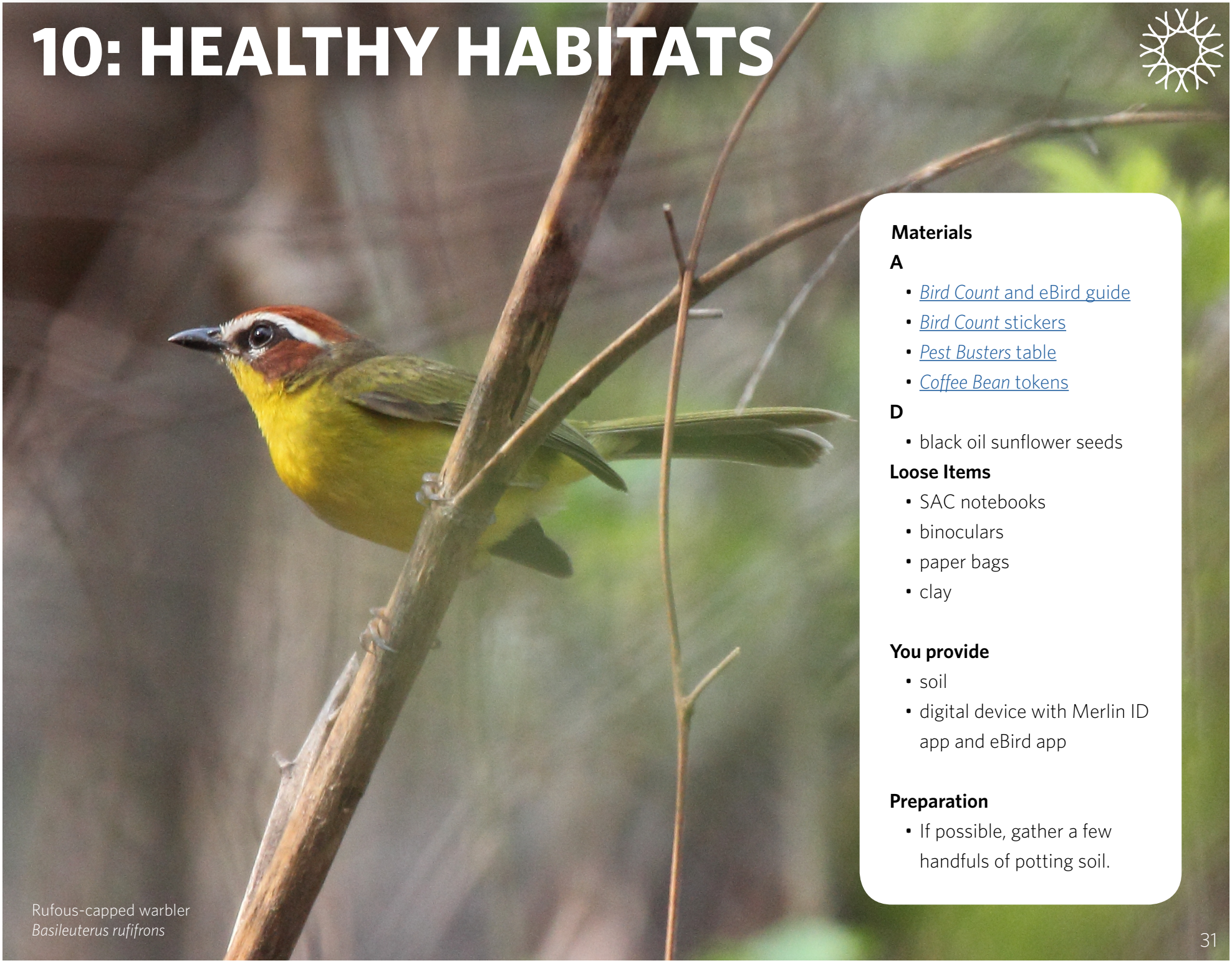
Explore more: Watch a barred owl regurgitate pellets and explore other resources from Birdsleuth.

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? Let us know!

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

10: HEALTHY HABITATS



Rufous-capped warbler
Basileuterus rufifrons

Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers
- *Pest Busters* table
- *Coffee Bean* tokens

D

- black oil sunflower seeds

Loose Items

- SAC notebooks
- binoculars
- paper bags
- clay

You provide

- soil
- digital device with Merlin ID app and eBird app

Preparation

- If possible, gather a few handfuls of potting soil.

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

15 min. | outside

Bird Count

During today's bird count, think about how different birds contribute to maintaining a healthy environment.

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.

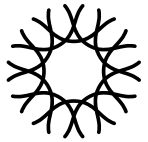
Share out: What roles do different birds play in the ecosystem? Which roles are beneficial? Are there any roles that are harmful?

25 min. | outside

Pest Busters

The coffee berry borer is a small beetle native to Africa. It is also found as a harmful pest on coffee farms in Central America. Coffee farmers in Costa Rica are trying to figure out how to control the pest. Play this game to help them figure out how.

1. Mark off a plot 40 feet long and 20 feet wide. This plot represents an area of land in Costa Rica. Divide the plot into two parts: a 10-feet-by-20-feet forest and a 30-feet-by-20-feet coffee farm.
2. Scatter *Coffee Bean* tokens all over the coffee farm. Do not place any tokens in the forest.
3. Designate two people as farmers. Distribute the rest uniformly throughout the plot. The people standing in the farm are coffee berry borer beetles. Those in the forest are rufous-capped warblers, a type of bird that feeds on coffee berry borer beetles. Here are the rules:
   - The beetles' job is to gather as many *Coffee Bean* tokens as possible without stepping away from their positions.
   - Warblers move by flapping their wings. Their job is to tag the coffee beetles. Once a warbler tags a beetle, it has to count to 10 before tagging the next beetle. Beetles cannot gather *Coffee Bean* tokens once they have been tagged.
4. The round starts when you yell "Coffee Time!" Call out "Time!" after **30 seconds** to end the round. At the end, the farmers should fill in the *Pest Busters* table for that round and share out the data.
5. Play more rounds of the game. For each round, follow Steps 2 through 4 above.
   - Round 2: The entire plot is a coffee farm (no forest and no warblers).
   - Round 3: Half of the plot is forest and half is a coffee farm.
   - Round 4: Three-fourths of the plot is forest and one-fourth 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 number of warblers affect the beetle population?

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?

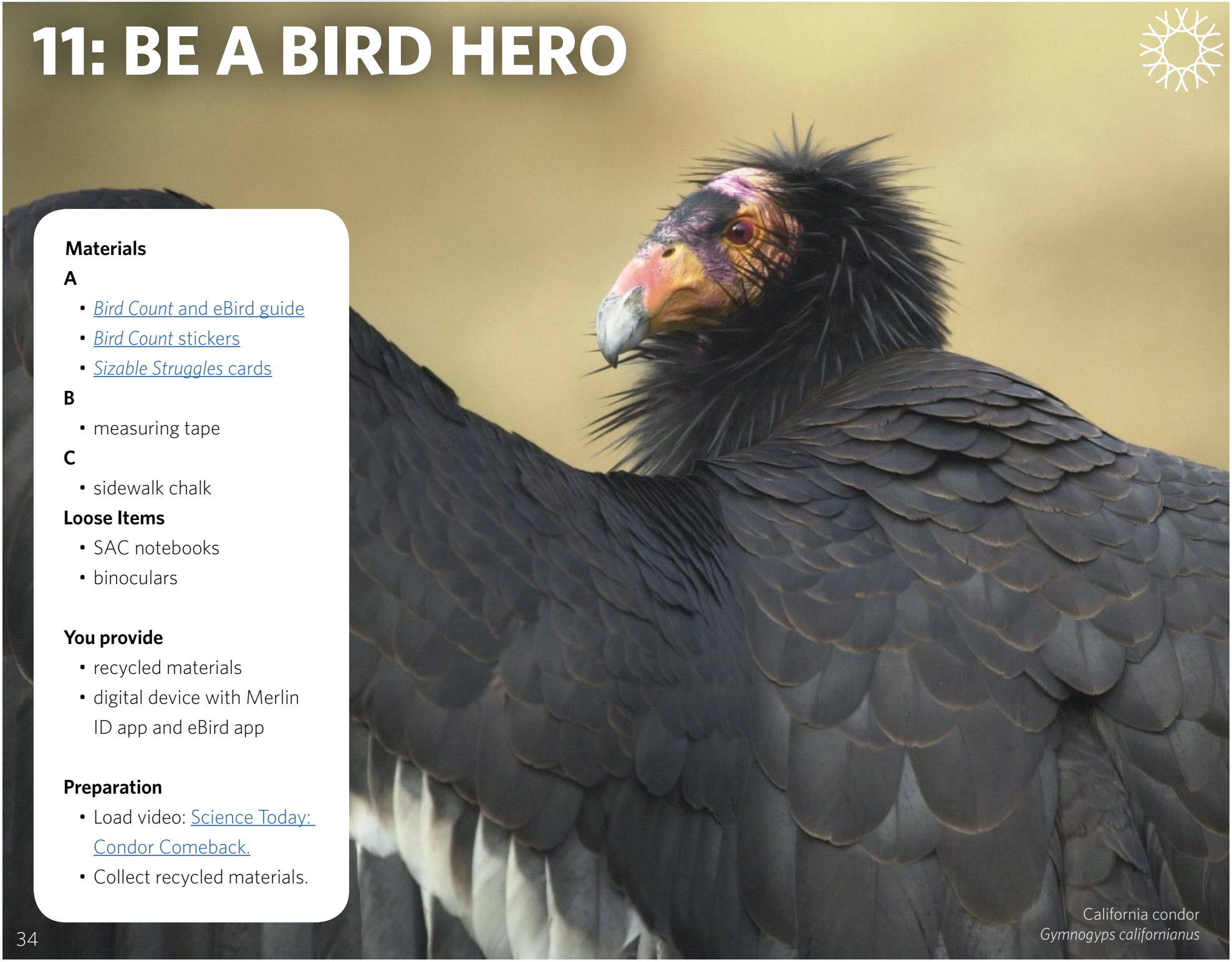
Explore more: Watch Bird Migration, A Perilous Journey to learn more about the challenges migrating birds face.

Explore more: Bird Migration, A Perilous Journey

How did it go? Let us know!

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

11: BE A BIRD HERO



Materials

A

- *Bird Count* and eBird guide
- *Bird Count* stickers
- *Sizable Struggles* cards

B

- measuring tape

C

- sidewalk chalk

Loose Items

- SAC notebooks
- binoculars

You provide

- recycled materials
- digital device with Merlin ID app and eBird app

Preparation

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

California condor
Gymnogyps californianus

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

Bird Count 15 min. | outside

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 video (3 min.) to learn about lead poisoning in condors and how scientists are helping conserve this endangered species.

Show youth the photo of a California condor on the previous page.

Science Today: Condor Comeback

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.

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 hashtag campaign to encourage people to keep their cats inside. Creating a plan will take a few steps:

1. Define the problem. Be as specific as possible.
2. 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 prototypes 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: Climate Change and Birds

Explore more: Watch how climate change is affecting birds around the world.

Call to action: Condor Watch

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.

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!

12: COMBINE YOUR COUNTS

Sandhill crane
Grus canadensis

Materials

A

- SAC certificates

Loose Items

- SAC notebooks
- binoculars
- *Birds* buttons

You provide

- digital device with Merlin ID app and eBird app
- craft supplies

Preparation

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

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

15 min. | outside

Replay

Vote to play your favorite game about birds. (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*, Activity 9 - *Owl Getcha!*, Activity 10 - *Pest Busters*)

30 min. | inside

Combine Your Counts

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

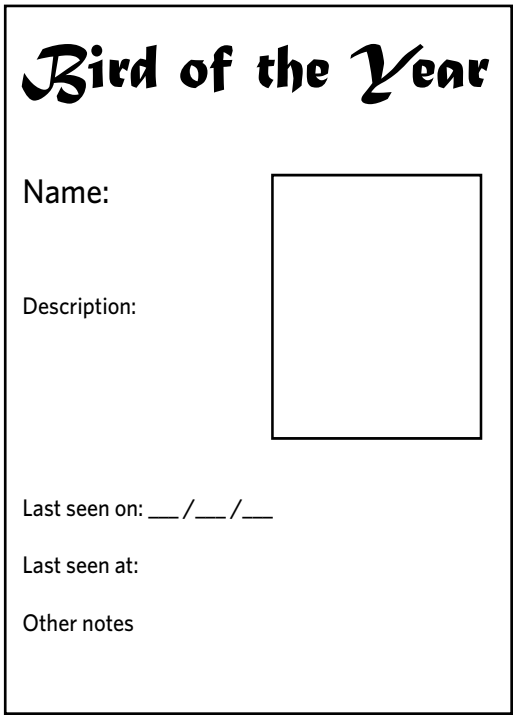
1. Look back into your notebook to review the birds you've seen. Do you recognize any species from your early notes?
2. Go to eBird and select *My Checklists* to see your club's birding record.
3. On the board, summarize the data from your checklists, including which birds you saw, how many, and how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



15 min. | inside

SAC Ceremony

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 (page 40).

Explore more: Check out this occurrence map of the Swainson's hawk, a bird that migrates from the United States to Argentina and back every year. The occurrence map tells you where these hawks 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.

Explore more:
Swainson's Hawk Occurence Map

How did it go?
Let us know!

Swainson's hawk
Buteo swainsoni

California Academy of Sciences

presents this

Certificate of Success

to

_____

Presented on _____ , 20_____

_____

Science Action Club Leader

CALIFORNIA ACADEMY OF SCIENCES

CALIFORNIA ACADEMY OF SCIENCES

SCIENCE ACTION CLUB

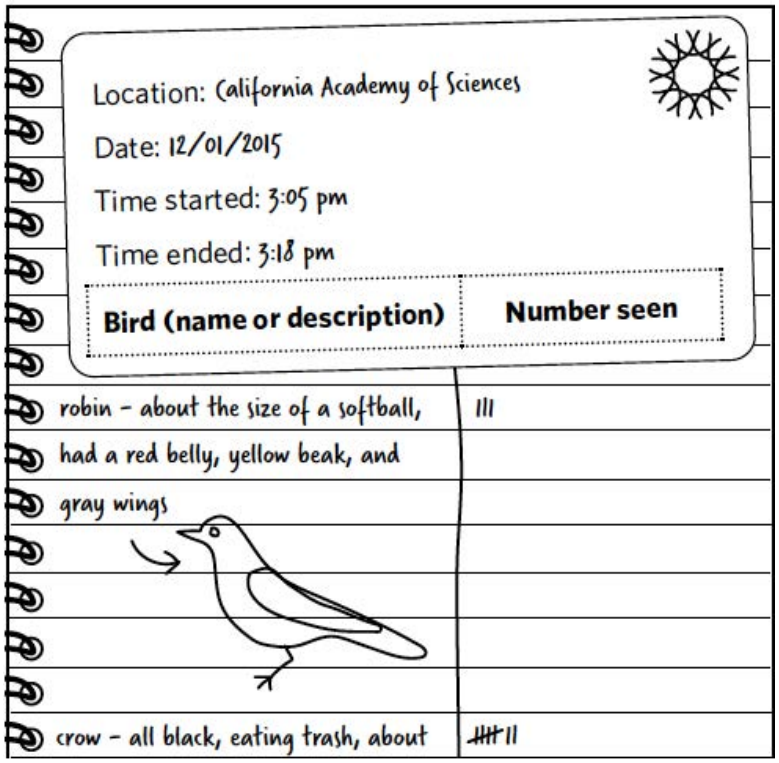
Bird Count Guide for citizen scientists

1 Prepare your notebook.

- Place a *Bird Count* sticker in your notebook.
- Record the *Location*, *Date*, and *Time Started.*

2 Record the birds you observe.

- Record all of the birds you see.
- Make drawings, take photos, and write detailed notes, and tally how many of each bird you see.



3 Identify the birds you observe.

- Use the Merlin Bird ID app or local field guides to identify your birds.

4 Submit to eBird.

- Combine all observations into a single club list.
- Submit your club list to eBird using instructions on the back of this page.

5 Reflect.

- What challenges came up while observing birds?
- What strategies would you recommend for next time?

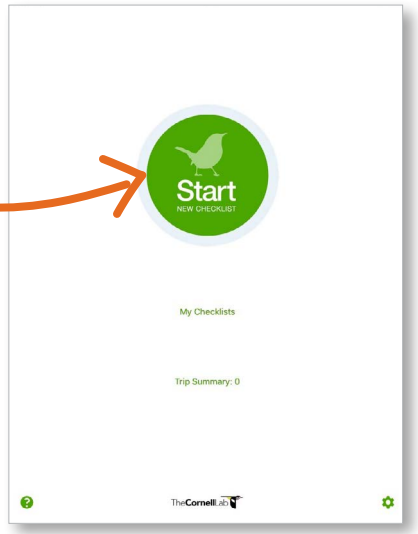
eBird

eBird Guide for Science Action Club

Follow these steps to upload your bird observations.

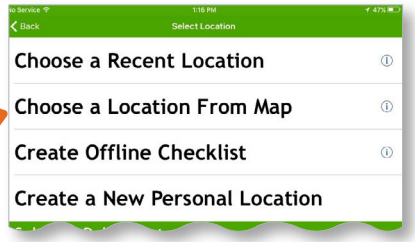
1

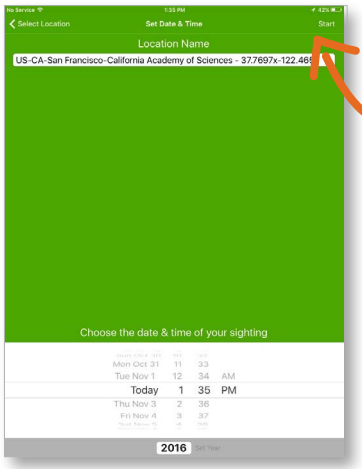
On your homepage, click *Start New Checklist*.



2

Choose your observation location.



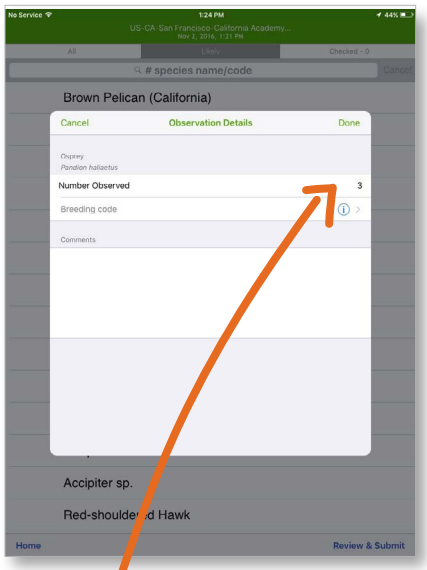


3

Indicate the date and time of your observations, and then select *Start*.

4

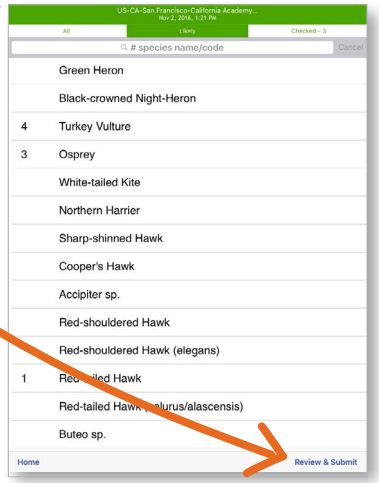
Select the species you observed.



Write the *Number Observed*, or total number from your club list.

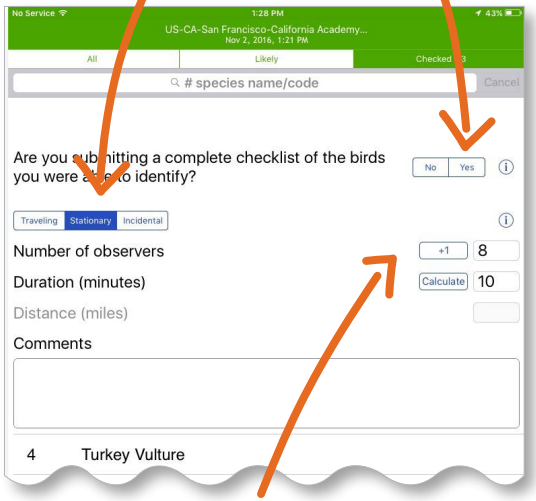
5

Once you have entered all your observations, select *Review & Submit*.

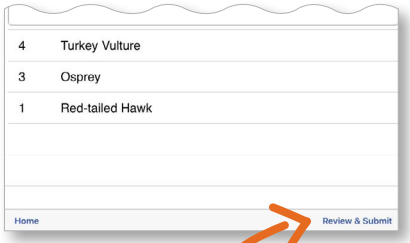


6

On the next page, select *Yes*. Select the *Stationary* tab.



Indicate the *Number of observers* and *Duration*, or time spent observing.



7

Last, select *Review & Submit*.

CONNECT TO THE ACADEMY

California Academy of Sciences offers several ways to stay connected:

Field Trips to the Academy
The Academy is proud to offer special, discounted rates for Science Action Club youth.

Distance Learning
Visit the Academy virtually from anywhere in the world! Our interactive Distance Learning programs connect students and educators to Academy experts, animals, collections, and exhibits via the Internet.

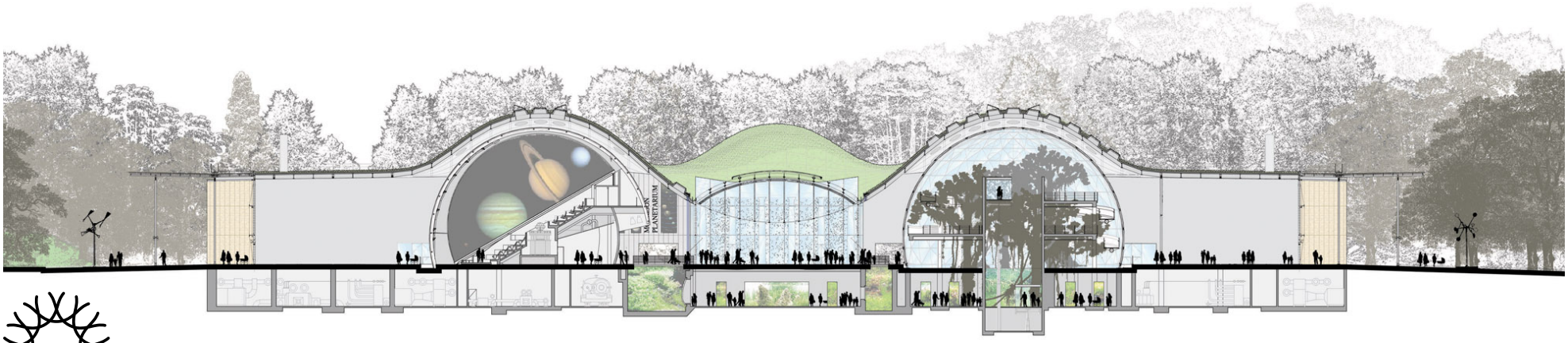
Citizen Science Projects
To protect biodiversity, we need to know more about it. Academy scientists travel the globe to make discoveries, but they can't be everywhere at once. We need your help!

QUICK LINKS

Apply for a Field Trip

Distance Learning Information

Citizen Science Projects



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.

Connections are from 3-5 and MS grade bands. See www.nextgenscience.org for more information.

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

American goldfinch: https://commons.wikimedia.org/wiki/File:Carduelis-tristis-002.jpg

Black-chinned hummingbird: https://commons.wikimedia.org/wiki/File:Archilochus-alexandri-003_edit.jpg

Peregrine falcon: https://commons.wikimedia.org/wiki/File:Falco_peregrinus_-Nova_Scotia,_Canada_-eating-8.jpg

Peregrine falcon flying: https://commons.wikimedia.org/wiki/File:Falco_peregrinus_-Morro_Rock,_Morro_Bay,_California,_USA_-flying-8.jpg

Barn owl: https://commons.wikimedia.org/wiki/File:Tyto_alba_-British_Wildlife_Centre,_Surrey,_England-8a_(1).jpg

Turkey vulture: https://www.flickr.com/photos/deinandra/6744545753

Puffin: https://commons.wikimedia.org/wiki/File:Papageitaucher_Fratercula_arctica.jpg

Canada geese flying: https://www.flickr.com/photos/ddebold/2318104417

House sparrow: https://commons.wikimedia.org/wiki/File:Male_House_Sparrow_(Passer_domesticus),_New_Castle,_Delaware.jpg

Rufous-capped warbler: https://commons.wikimedia.org/wiki/File:Rufous-capped_Warbler_(Basileuterus_rufifrons_delattrii)_(5783245879).jpg

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WEB LINKS

	Attendance and Feedback	http://sciclub.link/birds-feedback
1: Build a Bird	Science Action Club - Citizen Science	https://goo.gl/7ZGz3t
	How to Draw Birds	https://goo.gl/MKpq9j
2: Birding Tools	How to get crystal clear focus with your binoculars	https://goo.gl/MlCSBq
	Important Bird Areas	https://goo.gl/KhdDDP
3: Identifying Birds	Merlin Bird ID	https://goo.gl/cNUIvm
	Pocket Naturalist Guide	http://goo.gl/jnmLIz
	Birdsleuth Explorer's Guidebook	https://goo.gl/c9SSEs
4: Bird Count	eBird	http://www.ebird.com
	Investigating Birds	http://goo.gl/6RKcvv
	How to Do a *Bird Count*	https://goo.gl/USv4mA
	Bird Song Hero Game	https://goo.gl/6Uc5gn
	Mission: Citizen Science	https://goo.gl/dN2PL3
5: Pollution Control	Bio-inspiration - Hair Mats	https://goo.gl/XuweWz
	How to Find a Wildlife Rehabilitator	https://goo.gl/QS2skU
6: Eggsperiment	ScienceTake: Angry Birds	https://goo.gl/44W216
	Bird Eggs	https://goo.gl/2HtTNr
	Chick Hatching	https://goo.gl/DzDNW1
	NestWatch	http://nestwatch.org
7: Beneficial Beaks	A Hummingbird in a Wind Tunnel	https://goo.gl/chRQeb
	BirdSleuth Investigator magazine	https://goo.gl/JsLP3i
8: Exploring Flight	What Makes Owls So Quiet and So Deadly?	https://goo.gl/mpbkQt
	Science Today: Secrets of Flight	https://goo.gl/ZeoLPx
	Ring Wing Glider	https://goo.gl/prSwtI
9: Owl Pellet Dissection	Owl Pellet Dissection	https://goo.gl/86JAeQ
	Barred Owl Regurgitates Pellets	http://goo.gl/Il1IRh
	Birdsleuth Resources	http://www.birdsleuth.org/owlpellets/
10: Healthy Habitats	Bird Migration, A Perilous Journey	https://goo.gl/INH9ak
11: Be a Bird Hero	Science Today: Condor Comeback	https://goo.gl/BO1B9k
	Climate Change and Birds	https://goo.gl/mV6pYD
	Condor Watch	http://www.condorwatch.org
12: Combine Your Counts	Swainson's Hawk Occurrence Map	https://goo.gl/BSQpoc

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

CALIFORNIA ACADEMY OF SCIENCES

ACTION CLUB