

CITIZEN SCIENCE: BIRDING

Introduction to Birds and Their Behavior

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Tennessee 4-H Youth Development

The Need for Birding in 4-H

Tennessee's population is growing rapidly, which is placing heavy demands on all of the state's natural resources. Increased land use pressures are threatening the welfare of many of our unique plant and animal species. In order to properly manage and conserve our wildlife for the enjoyment of future generations, today's children should be educated about the value of our flora and fauna. Youth are naturally curious about their environment. Experiences that make sense of natural phenomena can lead to a heightened environmental awareness, development of more positive environmental attitudes and ultimately lead to taking responsible action (Grimmette, 2014).

Giving youth the opportunity to explore outdoors is becoming critical in our society that increasingly distances itself from nature. This may be due to a variety of reasons such as parental fears, less access to safe natural areas or the increasing consumption of electronic media. In his 2005 book *Last Child in the Woods*, Richard Louv coined the term "nature deficit disorder" to describe how children spending less time outdoors appears to correlate to a wide range of behavioral problems.

Birdwatching is an incredible activity for providing an access point into nature. Birds are some of the most diverse, ubiquitous, interesting and easily observable creatures, even in an urban environment. Studying birds in the field allows youth to make biological connections related to food webs, adaptations and habitat requirements, among a vast array of STEM topics.

4-H clubs are a natural fit for youth to engage in positive experiences in nature through the study of birds. The lessons and resources contained in this *Citizen Science: Birding* series aim to help youth understand their place in the biosphere. Beyond lessons that connect to the natural curiosity that youth have for birds, there are endless service learning possibilities in helping wildlife or educating others. By participating in citizen science work with eBird, youth become knowledgeable about how their own bird data fits in with millions of other bird checklists submitted from around the world.

These lessons and resources of *Citizen Science: Birding* have been applied in schools, 4-H community clubs and camps in Davidson County, Tennessee, since early 2017. As of this publication, over 1700 Nashville youth have participated in the curriculum. Since not all clubs have the same format, needs or time, these resources can and should be adapted. Please feel free to reach out to Davidson County UT Extension Agent Andy Lantz (alantz@utk.edu) for assistance in formatting these lessons to best meet the needs of youth in your county.

Grimme, Katherine A., "Impacts of Environmental Education on Youth and their Environmental Awareness" (2014). Environmental Studies Undergraduate Student eses. 135.

Beginning the Meeting

A great way for youth to become comfortable with local birds as well as the information found in a field guide is to create their own field studies. In club meetings that are longer than an hour, the meeting can begin with a “Bird of the Day.” The birds selected in each of the meetings should be ones that are likely to be seen at your site. When youth enter that day, they can begin sketching the bird using colored pencils and a field guide as reference. This can be done on regular paper, or if the budget allows, waterproof field notebooks. Youth should also add three facts about the bird that they found in the field guide. This activity should take less than 10 minutes. Take a moment before moving on to discuss what made that bird unique.

Another fun activity is “Bird Trivia.” It might be best to pose the question at the end of the meeting, and then discuss the answer at the beginning of the next meeting. If 4-H incentives are available, they can be used to motivate youth to research their answer outside of the club. Here are a couple of questions that have worked well:

- How many species of birds have been seen in TN? 425
- Which type of bird is the state bird for the most states in the US? Northern Cardinal - 7 states
- What green bird is the smallest bird species that breeds in TN? Ruby-throated Hummingbird
- What type of bird relies almost entirely on man-made birdhouses? Purple Martin
- Which mostly blue and white bird is the only species found in TN where the female has more colors than the male? Belted Kingfisher
- What bird has the largest wingspan of any bird in TN? Bald Eagle
- What did Benjamin Franklin want the symbol of the U.S. to be instead of the Bald Eagle? Wild Turkey
- What is the most common type of gull found in TN? Ring-billed gull

Guide to Leading Outdoor Birding Experiences

Each meeting with a 4-H club that centers on the *Citizen Science: Birding* lessons should also include time outside to observe birds. Leading a group of new birders provides many opportunities for scientific observation and practice with a field guide. The 4-H leader should familiarize themselves in advance with the most common five to ten birds that will be seen at the club meeting area. Allow youth to identify the birds to the best of their ability, as this is a crucial part of the value in inquiry-based nature study. Conversations should center on the field marks of the bird they notice, and the evidence they have for why they think a bird that they see matches the one in the field guide. Encourage youth to engage in productive scientific argumentation, and pose questions to them that may challenge which bird they think it might be. Ultimately, it’s best to announce to the group the correct identification if some members of the group figure it out. Clarity by all club members will help them to build their bird identification knowledge so that future walks will be able to focus on more challenging birds.

In addition to identification, make sure to have valuable conversations around the numbers of individual birds being seen. If an individual is seen near where an individual of the same species was seen recently, are you sure it was a new individual? Always be conservative with population estimates. If your group is not sure, round down.

While it sounds easy and straightforward, birdwatching can be a challenging activity at times to get and keep kids engaged. This is especially true on days where very little is being seen. On days like these, instead of looking, use your hearing. Have youth close their eyes and listen for bird calls. How many different individuals can you hear? How many different species do you think it is? Can we identify any of them by call? Also, consider mini-challenges with incentives, such as finding a feather or scat, or finding a bird preening. Some youth will be motivated by having a specific thing to be searching for.

Ensure that youth are writing down their observations while in the field. When bird species are new to them, it can be hard to remember the type and amount seen when you get back inside to compile the checklist into eBird.

Guide to Submitting an eBird Checklist as a Group

Before introducing eBird to your group, be sure to familiarize yourself with the site. Use the “A Walk Through eBird” worksheet designed for youth to get comfortable with eBird’s basic features. A free eBird.org account should be created for the whole group. This will lend itself to a collective debrief at the end of a bird walk, allowing all club members to make sense of the whole group’s sightings. It also serves as important data for the scientists at Cornell Lab of Ornithology and National Audubon Society to use to inform conservation decisions.

The first few times that the club submits a checklist, the leader should guide the group through the basics. This includes entering time, date, miles traveled and finding the location. After youth get comfortable with the process, a youth volunteer can lead the submission process.

When including the birds that were seen, be sure to have conversations about the population numbers to get the best estimate from the group. For the shared account, it is generally a good rule that two people need to have seen it for it to be included. If one person sees a bird that the rest of the club misses, encourage them to make their own individual eBird account, where they can add that bird to their personal data. When a group checklist is submitted, it can be shared with the youth’s personal account (and edited if they did not see all the birds on the whole group list).

A fun aspect of eBird is that you can include comments and additional data about the birds seen. For instance, encouraging youth to notice male and female Northern cardinals helps develop their observation senses with a common bird. When submitting data, include the age and sex of the birds when they are known.

Tennessee 4-H Youth Development

Citizen Science: Birding

Introduction to Birds and their Behavior

Skill Level

Beginner/Intermediate

Learner Outcomes

The learner will be able to:

- identify the physiological traits that distinguish birds from other animals.
- describe the importance of studying birds as an indicator of environmental health.

Educational Standard(s) Supported

4th Grade LS2.3, LS2.5

5th Grade LS4.1, LS4.2

6th Grade LS2.3, LS2.2

7th Grade LS2.1, LS1.3

8th Grade LS4.1

Success Indicator

Learners will be successful if they:

- can recognize the unique aspects birds have in comparison to other classes of vertebrates.
- observe birds and their behaviors in nature.

Time Needed

45-60 minutes

Materials List

Bird Spy Bingo cards, dry-erase markers, small whiteboards

Introduction to Content

Birds are amazing organisms, well-adapted to the environments in which they live. Birdwatching, or birding, has become the fastest-growing outdoor activity according to the US Fish & Wildlife Service, with over 50 million Americans reportedly engaging in it. Interest in birds is likely due to their abundance, diversity, ability to fly and beauty. Birding can be done in the woods or in the city.

Introduction to Methodology

Studying birds in their natural habitat is fun, engages the brain in scientific observation and inferences, gets you outdoors and moving, and can provide interpersonal companionship or solitude. This lesson provides the foundation for bird biology and behavior, as well as training our eyes to notice birds in the wild.

Author

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Terms and Concepts Introduction

Birdwatching – passive observation of birds

Birding – active “hunting” for birds in their natural habitats

Ornithology – the scientific study of bird biology and behavior

Indicator species – an organism that requires a healthy environment in order to survive

Citizen Science – scientific research done by non-professional or amateur scientists

Setting the Stage and Opening Questions

Ask the students, “**Does anybody in here watch birds in your backyard? Why?**”

“**Why do people get interested in studying birds?**” Answers may include colors, fascination with flight, diversity. If students don’t say it, bring up that they are indicators of environmental health. In other words, the diversity and types of birds of an area can tell you about the quality of the habitat.

Experience

Give each child a Bird Spy Bingo card (or one of your own design) and a dry-erase marker. Let them know that their goal is to get four in a row (if time allows only five minutes outside) or to attempt to find all 16 (if up to 15 minutes outside). Keep the group close together when outside. This will come in handy for safety, but also when birding later for being able to more easily point out birds that are seen.

When back in the classroom, have students share observations they’ve made. Ask, “**Did you notice anything about bird behavior that you hadn’t seen before?**” Give incentives to youth who had exemplary focus, or that checked off the most on their bingo card.

Share

Group students into teams of two to four. Hand each group a small whiteboard and a dry-erase marker. Ask the group the question “**What makes birds special compared to other animals?**” Give the students three minutes to work together and write down as many characteristics they can identify in the time allotted.

Tips for Engagement

Youth may have personal stories about birds that they would like to share. If it’s clear that a story may be derailing from the lesson, suggest that they hold it to share it with you later in the class when outside playing Bird Spy Bingo.

Process

Come back together as a class, and ask a spokesperson from each group to **share one unique feature of birds**. Answers should include:

Feathers – this is the one thing that no other animals outside of birds have. Feathers are used to assist in flight, and help maintain heat.

Flight – Most birds can fly. Ask youth if all birds can. Some may know that ostriches, penguins, emus, and kiwis are examples of birds that cannot fly. Are there animals that are not birds that can fly? Answers should include bats and insects including butterflies, bees, moths, etc.

Hollow Bones – For the most part, the bird species that can fly have lightweight bones that can look like straws, or like sponges in their hollowness. This assists with flight. The above examples of flightless birds do not have hollow bones.

Warm-blooded – While humans have a regular temperature of 98.6 F, birds on average have an astounding 104 F temperature. That means they need to eat a lot to maintain that temperature, and their feathers help quite a bit.

Lay Eggs – All birds give birth by laying eggs with a hard outer shell. Amphibians, reptiles, as well as many fish and invertebrates also lay eggs.

Life Skill(s)

4th Grade

Participate in 4-H Club meetings by saying pledges, completing activities, and being engaged.

5th Grade

Communicate information learned from a specific project area to the larger 4-H Club. (Head)

Speak clearly and effectively in group settings. (Hands)

6th Grade

Use the senses to gain new information or find new ways to use information. (Head)

8th Grade

Communicate effectively. (Hands)

Generalize

Ask youth why watching and keeping track of the birds you see could be valuable to scientists. Lead the discussion so that the group gets the idea that scientists can't be studying birds everywhere at the same time. Show this video <https://www.youtube.com/watch?v=O6C3suFPIA4> so youth can see how other young people are studying birds to help with conservation.

Apply

Using the list of features provided in the process section, instruct students to create a Venn diagram that compares birds to other animals. Encourage students to think of other characteristics that birds, other animals, or both have.

Supplemental Information

Educational Standards Met

4th grade

LS2.3 Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web.

LS2.5 Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.

5th grade

LS4.1 Analyze and interpret data from fossils to describe types of organisms and their environments that existed long ago. Compare similarities and differences of those to living organisms and their environments. Recognize that most kinds of animals (and plants) that once lived on Earth are now extinct.

LS4.2 Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.

6th grade

LS2.3 Draw conclusions about the transfer of energy through a food web and energy pyramid in an ecosystem.

LS2.2 Determine the impact of competitive, symbiotic, and predatory interactions in an ecosystem.

7th grade

LS2.1 Develop a model to depict the cycling of matter, including carbon and oxygen, including the flow of energy among biotic and abiotic parts of an ecosystem.

















8th grade

LS4.1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.

BirdSleuth: Nature Detectives

BIRD SPY BINGO

















Find four in a row and you've got BINGO!

			
On a branch	Group of 3 or more	Bird with white	Flying
			
Colorful bird	Carrying something	Eating	Feather
			
Bird sound	With a short tail	Two birds together	Bird that is all or mostly black
			
Droppings	On the ground	On a wire or roof	With a long tail

BirdSleuth: Nature Detectives

BIRD SPY BINGO

















Find four in a row and you've got BINGO!

			
Carrying something	Group of 3 or more	Bird that is all or mostly black	Flying
			
Colorful bird	On a branch	Eating	Feather
			
On a wire or roof	With a short tail	On the ground	Bird with white
			
Droppings	Two birds together	Bird sound	With a long tail

BirdSleuth: Nature Detectives

BIRD SPY BINGO





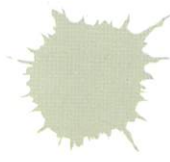











Find four in a row and you've got BINGO!

			
Carrying something	With a long tail	Bird that is all or mostly black	On a wire or roof
			
Bird with white	On a branch	Eating	Feather
			
Flying	With a short tail	Droppings	Colorful bird
			
On the ground	Two birds together	Bird sound	Group of 3 or more

BirdSleuth: Nature Detectives

BIRD SPY BINGO

Find four in a row and you've got BINGO!

			
Feather	With a long tail	Bird that is all or mostly black	On a wire or roof
			
Droppings	On a branch	Colorful bird	Carrying something
			
Flying	Group of 3 or more	Bird with white	Eating
			
On the ground	Two birds together	Bird sound	With a short tail

Tennessee 4-H Youth Development

Citizen Science: Birding

The Science and Use of Binoculars

Skill Level

Beginner/Intermediate (5th-8th Grade)

Learner Outcomes

The learner will be able to:

- recognize the name and function of the parts of a pair of binoculars.
- identify how the specifications of binoculars indicate their magnification and lens sizes.
- effectively set up the binoculars for use, and safely unpack and pack them.

Educational Standard(s) Supported

5th Grade

ETS2.3

8th Grade

LS4.1

Success Indicator

Learners will be successful if they:

- can identify the major parts of the binoculars.
- can carefully unpack, use, and put the binoculars away.

Time Needed

45-60 Minutes

Materials List

Dry Erase Markers
Glass of water with a straw
Binoculars diagram to project or draw
Class set of binoculars
Binocular Diagram Review Sheet

Introduction to Content

In order to make sense of the world around them, scientists use specialized tools. In birdwatching, binoculars are a common tool, as they allow us to observe birds that are far away without getting too close and disturb the animals. Binoculars are essentially two sets of connected telescopes that utilize the science of refraction to bend light.

Introduction to Methodology

Binoculars are easy to pick up, but difficult to master. Many new users can be frustrated by how to make them work best. A step by step introduction and practicing session is critical in helping youth be successful in using binoculars.

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Terms and Concepts Introduction

Ocular Lenses- the two pieces of glass on the front of the binoculars (closest to your eyes) that determine the magnification.

Objective Lenses- the two pieces of glass on the far end of the binoculars (closest to the object). These capture light, and their size determines the field of view.

Focus Wheel- large center knob on the binoculars that is altered to make objects in focus based on their distance away.

Dioptr- adjustment knob that lets you focus for the difference between your two eyes.

Eye Cups- rubber parts covering the ocular lenses. Should be twisted out for use by people who don't use eyeglasses and kept twisted in for people who don't use glasses. This keeps eyelashes from pressing the glass and getting in the way of the object in view.

Setting the Stage and Opening Questions

Set up a glass of water with a straw in it. Ask the youth why the straw appears bent when looking at it from the side. Some youth may know and say that water bends the light in a process called refraction. Explain that the glass in the binoculars we will use for birdwatching also rely on that same principle, making objects appear larger when using them.

Experience

Before handing out the binoculars, explain that you have two expectations: that the neck strap must be around their necks when they have the binoculars, and that when taking them out, all lens caps must be put into the binocular case. Have helpers pass out the binoculars, and positively narrate youth following the directions. Give the students a couple of minutes to play around safely with the binoculars.

When students are outfitted in their binoculars, have students copy a basic diagram of the binoculars from a drawing you put up on the whiteboard.

Ask a volunteer to read out the information that is on the focus wheel of the binoculars. On this model, it says "Eagle Optics Denali 8x42". Explain that Eagle Optics is the company, and Denali is the name of the model.

Ask what they think the 8x42 might say about what the binoculars are able to do. Oftentimes, someone will know that one of them represents the fact that the binoculars will make things appear bigger. Explain that it is the first number, the 8, that denotes this. Objects will appear 8 times bigger than they are in real life. Or, we can see 8 times farther with these binoculars than with our eyes (not accounting for atmospheric particles getting in the way). What might the 42 mean then? If 8 is the depth, then 42 is the width. 42 is how many millimeters wide the back (objective) lenses are. The larger this number, the larger the field of view is or how much peripheral view we will have.

Label the parts of the binoculars with the correct names, explaining details about each part as you go through using the "Terms and Concepts Introduction" information. Use the attached diagram to help with this.

Tips for Engagement

Ask youth if they have used microscopes before, as many often have. Explain that the science and parts of binoculars use the exact same optic principles.

One youth will inevitably turn the binoculars around and notice that looking backwards through them makes objects appear smaller. Use this as a conversation starter as to why this might be. For upper middle grade youth, it may be appropriate to discuss that the ocular lenses are convex, meaning that the light bends towards the middle. The objective lenses are concave and are bent the opposite way, allowing maximum light to be brought into the binoculars.

Share

Have the youth engage in a “turn and talk.” Discuss what they think the hardest part about using the binoculars outside will be. Call on a few youth to share their concerns.

Process

Practice a couple of skills using the binoculars. Have youth focus on an object that you are holding across the room. Once they all have it in focus, move it towards them and have them move the focus knob to keep it in focus the whole time. Go back and forth a couple of times for them to get the hang of it.

One of the challenging aspects of using binoculars is going from seeing an object without the binoculars, to seeing it in the binoculars. Using binoculars is a lot like “keep your eyes on the ball.” Taking our eyes off the object to look at the binoculars will often make us lose sight. Find a fixed point in the room, and have youth look with their bare eyes, and then move the binoculars up without looking away. Try this multiple times to ensure a smooth transition without losing sight of the object.

Generalize

Give the students a few minutes to use the binoculars outside. If there are bird feeders nearby, this would be an ideal place to practice their skills.

Oversee the process of putting the binoculars away. Ensure youth are careful and mindful of these valuable tools.

Apply

Ask students to think of other scientific tools they use on a regular or semi-regular basis. How are those tools similar to binoculars?

Ask students to identify three traits that all scientific tools have in common and then to share those with the class. Responses should include that they make things easier, help us discover new things, etc.

Life Skill(s)

5th Grade

Understand one’s ability, strengths and limitations. (Health)

6th Grade

Use the senses to gain new information or find new ways to use information. (Head, Thinking)

7th Grade

Make appropriate use of equipment, tools and technology. (Hands, Working)

8th Grade

Communicate accurate information on a given topic to someone else. (Head, Thinking)

Supplemental Information

Educational Standards Met

5th Grade

ETS2.3 Identify how scientific discoveries lead to new and improved technologies.

8th Grade

LS4.1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.

Eagle Optics Denali 8x42 Binocular Diagram



Tennessee 4-H Youth Development

Citizen Science: Birding

Using a Field Guide

Skill Level

Beginner/Intermediate (5th-8th Grade)

Learner Outcomes

The learner will be able to:

- explain the purpose of a field guide in nature studies
- navigate the layout of a field guide
- use described field marks to correctly identify three birds

Educational Standard(s) Supported

5th Grade ETS.2.3

8th Grade LS.4.1

Success Indicator

Learners will be successful if they:

- quickly locate the section of the field guide to turn to given a bird's dominant color.
- respectfully argue what they believe an observed species to be, referencing key field marks.

Time Needed

45-60 Minutes

Materials List

A Hike Through Tennessee worksheet
Birds of Tennessee field guides (one per group of two students)
Additional Field Guides

Introduction to Content

A field guide is a reference book or app that helps the user identify things in nature. Many different field guides exist for birds, but also other types of animals, plants, minerals, animal tracks, seashells, and many other things. They are typically designed to be small enough to be convenient to carry in "the field" and help distinguish between similar objects. Bird field guides can be arranged by the color of the bird, or taxonomically, meaning that biologically related species of birds are grouped together. The species page typically has a picture, description and a range map. The pictures in field guides can be a photograph or a painting.

Introduction to Methodology

Being able to quickly navigate through a field guide to narrow down the possible bird being observed takes a long time to master. While there are many different field guides to choose from, it's best to gain the skill of using a field guide by using just one. Advanced nature-enthusiasts will typically gain experience with multiple in order to cross-reference. Stan Tekiela's *Birds of Tennessee* is a great field guide for beginners, as it is arranged by color, and only has the most common 119 of the 424 species recorded in Tennessee.

Author

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Terms and Concepts Introduction

Field Mark – aspect of a bird that helps distinguish it from a similar species. It can be something physical like the color of the wingbar, or the shape of beak. It can also be its song or behavior.

Range Map – a geographical map that shows where a species is likely to be found during different times of the year.

Setting the Stage and Opening Questions

Ask the youth “**How do birdwatchers know the names of the species of birds they’re looking at?**” Answers may include from practice, or that scientists have named them from close studies. If a field guide or book is not referenced, bring it up, and show the students a copy of *Birds of Tennessee*. Explain briefly how it works, using information from the Introduction to Content section. Say to students, “**By the end of this lesson, you will be able to explain the purpose of a field guide in nature studies, navigate the layout of a field guide and use field marks to identify three birds.**”

Experience

Youth will complete “A Hike Through the Birds of Tennessee Field Guide” worksheet. Explain that the first half of the sheet can be answered using the beginning of the book in the Roman numeral section. The bottom three questions will use the main part of the book to identify birds.

Share

Go over the answers for the worksheet. If time is limited, the first half can be skipped, and you can quickly reiterate that the beginning of field guides typically contain general information about basic biology, life cycle information and how the field guide works.

Point out that the parts of a bird diagram is important, as each part of the bird is a “field mark.” When we go out to look for birds, it may be important to notice the wingbar color, or undertail pattern. Knowing the anatomical names, rather than just wings and tail, could be critical information in identifying the bird.

When discussing the bottom three answers from the worksheet, encourage the youth to provide rationale for why they think it’s the bird they selected. Call on multiple students to explain field marks used to determine the bird.

The Great Blue Heron should be an easy practice in using evidence. The second bird description is a bit harder. Youth may come up with two logical choices- Barn Swallow and Eastern Bluebird. Call on students to describe what evidence they have for each. The determining factor for this is the “chur-lee chur” call. The Eastern Bluebird is described as having that call in the “Stan’s Notes” section at the bottom of page 59. The third bird to identify is the hardest. Most youth will likely figure out that it is an oriole, but be divided on whether it is a Baltimore or Orchard Oriole. Allow the youth to advocate for each. Explain that this question was intended to be confusing. Ask them what additional observations should have been noted to make this easier to identify. The defining characteristics differentiating these two species is the tone of orange, the thickness of the white wingbars, and the outer tail color.

Tips for Engagement

As students interact with this field guide, much of the focus should be on reasoning skills. Encourage students to communicate clearly how they were able to identify deductively which bird was being described by explaining the clues used to rule out similar species.

Process

Take some time outside with the binoculars and field guide to practice identifying birds. If there are many species outside, guide the students to focus on one species to have constructive argumentation about.

Generalize

Ask the students to explain the purpose of a field guide, as review. Also, ask “**Besides birds, what other things might there be field guides for?**”

Apply

Hand out the other bird field guides. Give one book to each group of three to four youth. Write these two questions on the board. “How is this field guide different from the Birds of Tennessee field guide we used today?” And “In what way might this guide be more helpful to a birdwatcher?” Give them three minutes to look through the books, being ready to answer two questions when they’re done. After three minutes, have each group share out their responses.

Life Skill(s)

5th Grade

When reading, consider ideas, thoughts, information, or messages that have been written. (Heart)

6th Grade

Show motivation and motivate others. (Hands)

7th Grade

Respond appropriately to communications from others. (Heart, Relating)

8th Grade

Demonstrate perseverance. (Hands)

Supplemental Information

Educational Standards Met

5th Grade

ETS2.3 Identify how scientific discoveries lead to new and improved technologies.

8th Grade

LS4.1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.

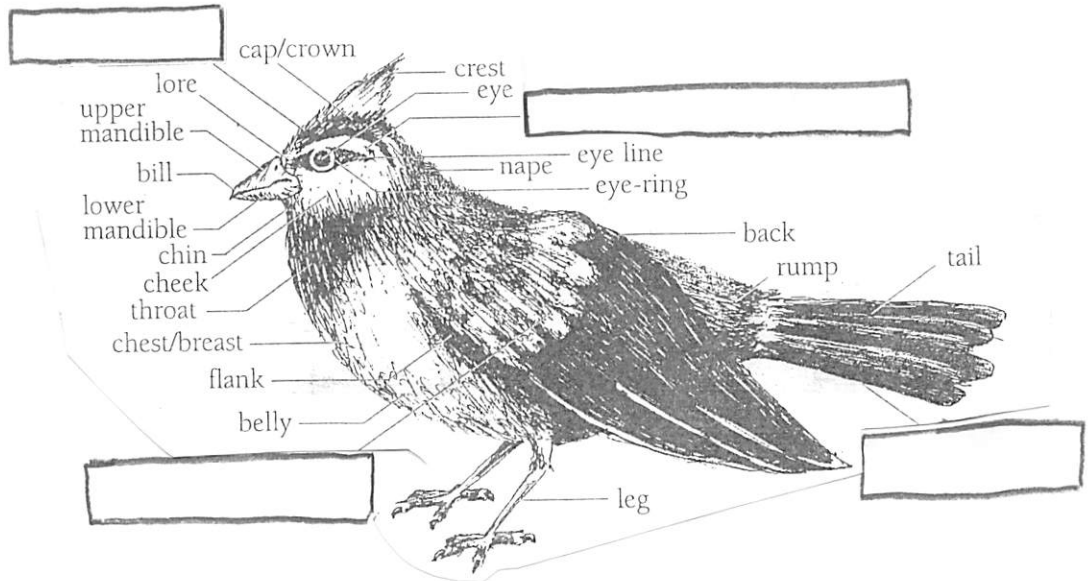
Name: _____

A Hike Through the Birds of Tennessee Field Guide

What do you call a nest that is built into the hole in a tree?

What is the main reason that birds migrate?

Fill in the missing Parts of a Bird:



Using page 1, what does the "Compare" section tell you about the bird?

What color will the TN map be when the bird can be found in summer?

Identifying birds: Use the field guide to help you identify the following birds.

A large bird is standing on the side of a lake in the fall. You notice that it is mostly gray, but has blue markings above its eye, on its wing, and underneath. After it is sitting still for a while, you notice it dart towards the water. In its big orange bill, it has caught a frog! What bird species are you observing?

A small-medium bird with a blue back and orange underneath is flying by you. You notice it land, catch an insect, and fly back up to its perch. It's spring, and you notice it sing a "chur-lee-lur" song. What bird species do you think you are watching?

You notice a medium-sized bird with orange underneath and black on its head, back, and wings sitting in a tree. It's summer, and you notice it has some white wing bars. You also see another bird that it is communicating with that is orange with not much black, but not quite as bright. What bird species do you think you're looking at?

* Answer key

Name: _____

A Hike Through the Birds of Tennessee Field Guide

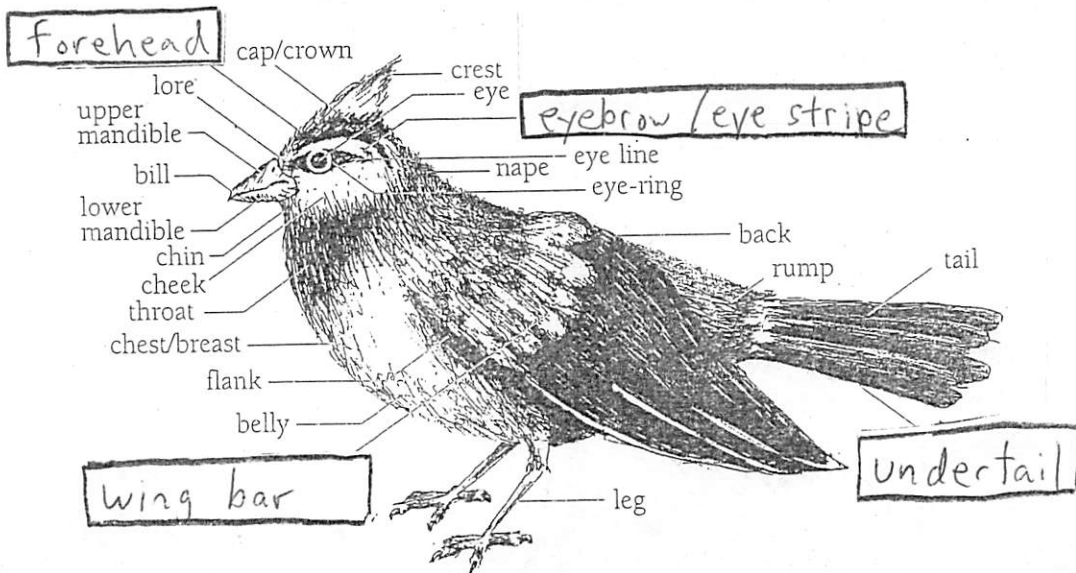
What do you call a nest that is built into the hole in a tree?

Cavity nest

What is the main reason that birds migrate?

to find food

Fill in the missing Parts of a Bird:



Using page 1, what does the "Compare" section tell you about the bird?

birds that look similar, and the pages they can be found

What color will the TN map be when the bird can be found in summer?

green

Identifying birds: Use the field guide to help you identify the following birds.

A large bird is standing on the side of a lake in the fall. You notice that it is mostly gray, but has blue markings above its eye, on its wing, and underneath. After it is sitting still for a while, you notice it dart towards the water. In its big orange bill, it has caught a frog! What bird species are you observing?

Great Blue Heron

A small-medium bird with a blue back and orange underneath is flying by you. You notice it land, catch an insect, and fly back up to its perch. It's spring, and you notice it sing a "chur-lee-lur" song. What bird species do you think you are watching?

Eastern Bluebird

You notice a medium-sized bird with orange underneath and black on its head, back, and wings sitting in a tree. It's summer, and you notice it has some white wing bars. You also see another bird that it is communicating with that is orange with not much black, but not quite as bright. What bird species do you think you're looking at?

Baltimore Oriole

Tennessee 4-H Youth Development

Citizen Science: Birding

Introduction to eBird.org

Skill Level

Beginner/Intermediate (5th-8th Grade)

Learner Outcomes

The learner will be able to:

- recognize the meaning and importance of Citizen Science
- submit observations and explore data on eBird.org
- analyze bird abundance and distribution data from eBird.org
- create a personal eBird account to keep track of personal sightings

Educational Standard(s) Supported

5th Grade

ETS2.3

6th Grade

LS2.1

8th Grade

LS4.1

Success Indicator

Learners will be successful if they:

- can effectively navigate the eBird.org website using the webquest as a guide.

Time Needed

45-60 Minutes

Materials List

A walk through eBird worksheet
Computer Access

Introduction to Content

Citizen science is research that is conducted by amateur, non-professional scientists. Since scientists are unable to be everywhere, all the time, a variety of citizen science projects use public participation to help with the work. Citizen Science projects range from Astronomy (Project Discovery), Botany (Track a Tree), Seismology (Citizen Seismology), to Water Quality (Volunteer Water Quality Monitoring Program). The largest of all biodiversity-related projects, eBird, receives more than 100 million bird sightings contributed per year.

Introduction to Methodology

The Cornell Lab of Ornithology and National Audubon Society collaborated to make eBird.org, which manages and analyzes bird observation data. Youth will learn to submit their data by analyzing data that already exists from previous citizen science work.

Prior to this lesson, youth should have had experience collecting and submitting checklists as a full club. In this lesson, youth will learn how data quality is critical in citizen science programs. By exploring the details that can be included in a sighting checklist, youth will learn to submit higher quality data that includes more details over time.

Author

Lantz, Andy. 4-H Agent, Davidson County.



Terms and Concepts Introduction

Citizen Science – research conducted by non-scientists

Checklist – a complete list of birds observed and identified submitted to eBird

Range Map – a map of where species of birds can be found throughout the year

Hotspots – locations that have historically had high bird diversity

Setting the Stage and Opening Questions

Ask students the question “**What does it mean to be a citizen?**” Allow youth to answer. “**In what ways can someone be a *good* citizen?**” Allow for discussion. If it is not brought up, ask if volunteering is an example. While volunteering is not necessarily engaging with civic institutions and democracy, volunteering provides support for causes that you find valuable. “**In what ways have you volunteered?**” After youth shares out the ways they have participated in volunteer projects, explain that by submitting checklists on eBird, they have been volunteering in Citizen Science. By providing bird data to Ornithologists who can’t possibly be everywhere at once, they are assisting in the collective knowledge of birds, and potentially impacting important conservation decisions.

Experience

Youth will complete “A Walk Through eBird!” worksheet. Help youth along the way, and allow them to team up if needed. If youth have extra time at the end, encourage them to explore other areas of eBird.org, or set up their own free personal account.

Share

After youth have had enough time to work through the sheet, review answers that they had challenges with.

Tips for Engagement

As students interact with this field guide, much of the focus should be on reasoning skills. Encourage students to clearly communicate how they were able to identify deductively which bird was being described by explaining the clues used to rule out similar species.

Process

“What bird species is Tennessee was last seen the longest time ago?” Youth should go to “Explore”, then “Explore a Region” and type in “Tennessee.” Over 420 species show up. Scroll down to the bottom, and notice that the last sighting of a Carolina Parakeet was December 22, 1831. If time allows, give youth time to look through the supporting documents from Alexis de Toqueville’s diaries.

Ask students, **“Why do you think the Carolina Parakeet hasn’t been seen since then?”**

The species was declared extinct in 1939. By keeping track of birds using eBird, we can help to keep other species of birds in Tennessee from suffering the same fate as the Carolina Parakeet.

Generalize

Ask students the following questions:

“Why is engaging in Citizen Science important?”

Possible answers include to help provide scientific data for others to use, to learn more about scientific data collection

“In what ways is the data collected on eBird helpful to scientists?”

Possible answers include to monitor bird migrations, to learn more about bird habitats

Apply

After going on a bird walk, submit the data on eBird.org. Go to “Explore a Region”, and type in your county. Show the youth how our sightings from the day show up on the top. Ask the youth to check this over the next few days, and see how long it takes for each of the birds we listed to no longer be the most recent sighting of that species.

Life Skill(s)

5th Grade

When reading, consider ideas, thoughts, information, or messages that have been written.

6th Grade

Use the senses to gain new information or find new ways to use information.

7th Grade

Understand the obligations of citizenship.

8th Grade

Support the efforts of others to learn.

Supplemental Information

Educational Standards Met

5th Grade

ETS2.3 Identify how scientific discoveries lead to new and improved technologies.

6th Grade

LS2.1 Evaluate and communicate the impact of environmental variables on population size

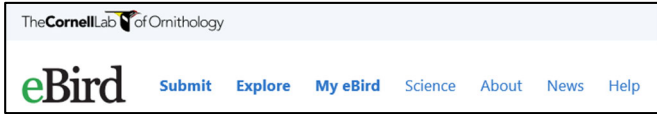
8th Grade

LS4.1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.

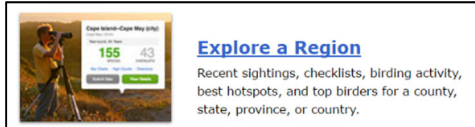
Name: _____ Date: _____

A Walk Through eBird!

- Using a computer, go to www.ebird.org and click on the “Explore” section on the top of the page.



- Click the Explore a Region section.



- Since Nashville is in Davidson County, type “Davidson, Tennessee” to start looking at data about the birds of our area.
- How many species in total have been seen in Davidson County? _____
How many checklists have been submitted in our county? _____
- Look under the “by” section. Who was the last birdwatcher to submit data here?

- What bird species has the highest count of the past week? _____
How many were seen? _____
- Scroll down until you see these symbols.



What do you see when you click on each of them?

- Click on “First Seen”.



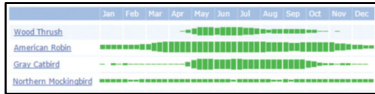
- Scrolling to the bottom, what bird was the first bird reported into eBird for Davidson County?

What date was this reported? _____

10. Now click the bar charts section.



This section shows how common bird species are throughout the year. The wider the green bar, the more common.



Name four species that can be seen in Davidson County throughout every month of the year.

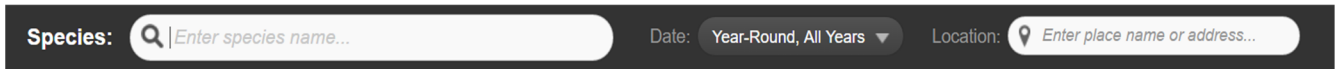
11. Click the “Start Over” link near the top of the page.



12. Scroll down and click on “Species Maps”.



13. In the top “Species” bar, type “Island Scrub-Jay”.



What part of the world would you need to be to see this bird? (Hint: zoom in to where the purple is.)

14. In the same top bar, type in “Long-tailed Duck”. List three countries where you could see this species.

15. With “Long-tailed Duck” still typed in, zoom in to Nashville, TN on the map. Click on one of these shapes near Nashville.

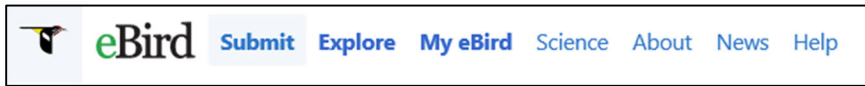


What location is it? _____

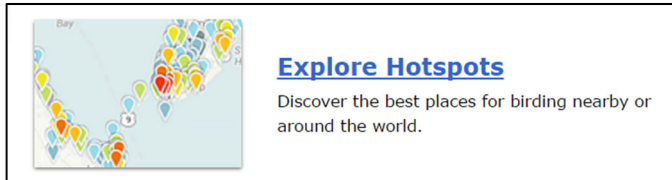
Who was the observer of this duck? _____

What was the date of the observation? _____

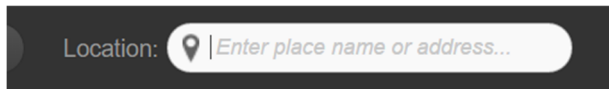
16. Click the “Explore” button near the top of the page.



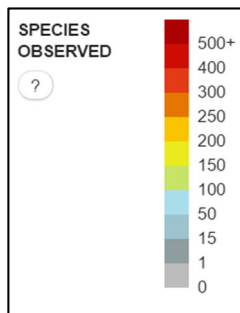
Click on Explore Hotspots” to see some of the places where birdwatchers see the most bird species.



In the top “Location” bar, type “Davidson, TN”.



Click on one of the colorful pins that has had over 150 species observed.



17. What is the name of birding hotspot you clicked on? _____
How many species have been seen there? _____

Nice job! If you have extra time, please explore other areas of eBird.org

Tennessee 4-H Youth Development

Additional Birding Lessons

After youth have experienced the first four lessons of the *Citizen Science: Birding* sequence (Introduction to Birds, Binoculars, Field Guide, and eBird), additional bird lessons can be added. As youth continue to collect wild bird data and enter it into eBird, meetings can include the following supplementary lessons. These lessons are also great to use when inclement weather prevents you from leading the group outside.

Newton, Bernoulli, and Birds

From *Flying WILD: An Educator's Guide to Celebrating Birds*

<http://www.flyingwild.org/secure/documents/NewtonBernoulliandBirds.pdf>

Youth will learn the basics of Bernoulli's Principle, or the science of how the relationship between high and low pressure creates lift. Youth will create an airplane using this principle, and compete to see which student can throw it the farthest.

Bird Beak Buffet

From *Project WILD K-12 Curriculum and Activity Guide*

http://projectwild.org/growingupwild/Bird_Beak_Buffet.pdf

Youth will explore stations of different model foods, and will use a variety of tools that mimic bird beaks to find out which beaks are best adapted to each food type.

Owl Pellet Dissection

Can use *Dissecting the Food Web: An Owl Pellet Investigation*, for purchase

<http://www.birdsleuth.org/owlpelletkit/>

Or purchase owl pellets on Amazon, and use some free resources at

<https://www.carolina.com/teacher-resources/Interactive/basic-information-on-owl-pellets/tr11103.tr>

Allowing youth to explore owl pellets can be a great hands-on study of food webs. Using charts to assist them in categorizing the bones to learn what the owl ate is a helpful exercise in evaluating evidence.

Bird Olympics

From *Flying WILD: An Educator's Guide to Celebrating Birds*

Only the stations at this link: <http://www.flyingwild.org/secure/documents/190-193.pdf>

Youth will explore some bird superlatives through comparing their abilities in these five stations. Youth compare their own flapping rates, flight speed, wingspans, calorie intake, and sense of smell to a variety of birds of the world.

Hopscotch Migration

<http://www.bioed.org/ECOS/inquiries/inquiries/HEHopscotchMigration.pdf>

Youth will mimic bird migration challenges through this fun hopscotch game. Reflecting afterwards on the loss of wetland habitat, youth will brainstorm ways to conserve these resources.

Adaptation Artistry

From *Project WILD K-12 Curriculum and Activity Guide*

https://www.fws.gov/uploadedFiles/Region_1/NWRS/Zone_2/Inland_Northwest_Complex/Turnbull/Documents/EE/Field_Trip/Adaptation%20Artistry.pdf

Youth design their own imaginary bird considering its food sources, habitat and lifestyle. Youth will name the bird, write a description of it and present it to the group.

Some additional useful links for ideas, icebreakers, and lessons

<http://flyingwild.org/resources.htm>

<http://www.birdsleuth.org/>

<http://www.birdday.org/component/resources/>