

Spring Homeschool Day at the Brenton Arboretum

April 23, 2021

Thank you for participating in our Spring Homeschool Day at the Brenton Arboretum! We're so glad you came, and we just know you're going to have tons of fun today.

This year's spring theme is **All About Birds!** April is Global Citizen Science Month, and birdwatching is a wonderful entry into citizen science. In this season's packet, you'll find activities to get you started birdwatching, including several different bird bingo games, lifecycle STEM activities, art incorporation, and resources for reporting your citizen science findings. This information is used by scientists to document how birds are affected by environmental changes.

This packet contains instructions and activities that will guide you on an exploration our trails, trees, ponds, and streams. You may do the activities in any order, and you can do as many or as few as you please. We'd love to see photos of you enjoying your time at the Arboretum, so don't forget to tag us on social media!

Be sure to come back and visit us often. We hope to become your go-to year-round outdoor classroom, always waiting for your next adventure! And while you don't have to be a member to enjoy the Arboretum, you may want to consider joining to gain access to other great **member benefits** such as:

- Dogs are always welcome FREE with members
- FREE admission to over 300 public gardens and arboreta through the American Horticultural Society's Reciprocal Admissions Program (some restrictions apply)
- Special invitations to members-only events
- FREE or discounted class, workshop, and event registration fees
- Rental permission access for Arboretum venues (Pavilion & Vista Room)
- 10% discount at Harvey's Greenhouse in Adel, IA
- Spring and Fall print newsletters mailed, as well as monthly e-newsletters

Before you get started on the activities, please take a moment to review our Leave No Trace policy and reminders on poison ivy, stinging nettles, and ticks & spiders.

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Leave No Trace

Outdoor Ethics at the Brenton Arboretum

Know before you go

- Use maps to plan where you're going. Check them along the way so you'll stay on course and won't get lost.
- Leashes aren't required for pets, but you are required to have them under your control at all times. If you bag their waste, you must take it with you!
- The border fence around the Arboretum is electrified. Keep a safe distance from it at all times.

Choose the right path

- Walk on designated trails to protect trailside plants.
- Don't wander off by yourself.
- Do not step on small flowers or trees. Once damaged, they may not grow back.
- Respect private property by staying on designated trails.

Trash your trash

- Pack it in, pack it out!
- Put litter & trash, even crumbs and food waste, in your bag to carry home.
- Keep water clean! Don't put soap, food, or animal waste in lakes or streams.

Leave what you find

- Leave plants, rocks, and other items as you find them so the next person can enjoy them. Take photos and drawings instead.
- Treat living plants with respect. If you must pick a leaf to make a rubbing, only pick one per tree.
- Picking and peeling at plants and trees can kill them. Don't pick at any loose bark.

Keep wildlife wild

- Observe animals from a distance and never approach, feed, or follow them.
- Human food is unhealthy for all animals and feeding them starts bad habits.
- Protect wildlife and your food by storing your meals and trash appropriately.
- Control pets at all times, or leave them at home.

Be kind to other visitors

- Make sure the FUN you have in the outdoors doesn't bother anyone else.
- Remember that other visitors are there to enjoy the outdoors.
- Listen to nature! Avoid making loud noises or yelling. You will see more animals if you are quiet.

Remember, you'll enjoy nature even more by caring for this special place!

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Toxicodendron radicans (Poison Ivy)

T. radicans is found in many parks and natural areas. Staff, chaperones, and students should learn how to identify this plant and know what to do to counteract the toxin. Remember the phrase:

"Leaflets of three, leave it be."

Poison ivy has three leaflets. It grows as a vine, shrub, or small, short plant. When growing as a vine, it may be found wrapping around a tree. Emergent leaflets are glossy with a reddish tinge when the leaves first emerge in the spring. Autumn foliage also looks reddish.

Some people have a dermal reaction to the plant, while others do not seem to be affected, but an allergy to poison ivy can develop at any time in one's life.

To avoid dermal irritation, wear long pants and sleeves, and wash your hand with warm soapy water and launder clothing in warm water before re-wearing if you think you have come in contact with the plant.



Urtica dioica (Stinging Nettle)

U. dioica or itch weed/stinging nettle grows in many disturbed areas. It ranges from six inches to three feet tall. It has minute hairs along the stem and leaf petiole that contain a mild toxin. When the abrasive hairs are broken (by touch), the toxin often causes dermal irritation. The reaction typically subsides within 30 minutes.



Ticks and Spiders

Ticks can be vectors for harmful bacteria. All ticks should be carefully removed as soon as possible to prevent possible infection. *Ixodes dammini* (deer tick) can transmit the spirochete bacterium that causes Lyme disease. The spirochete is transmitted to people bitten by the *I. dammini*. This tick is much smaller than *Dermacentor variabilis* (American dog tick), which can vector other harmful bacterial diseases.

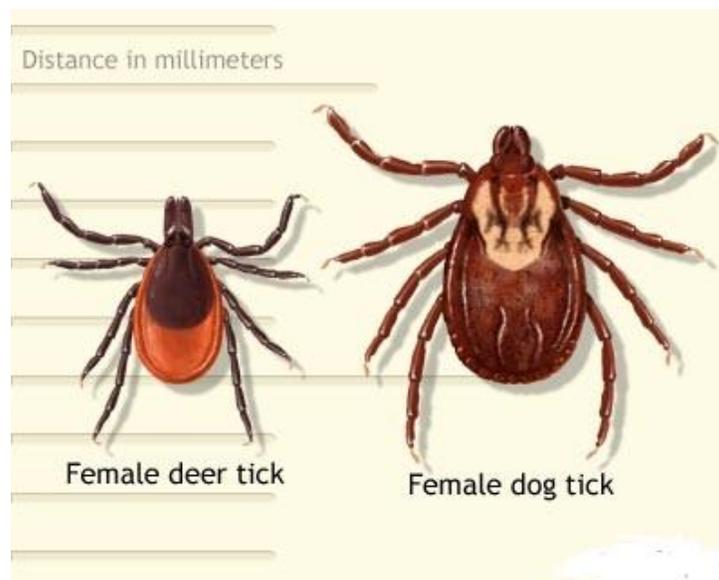
Many spiders are present at the Arboretum. Most bites are toxic but cause only minor skin irritation. If irritation persists or if infection worsens, seek medical attention.

Initial symptoms of Lyme disease may be a bulls-eye rash around the bite area and joint pain and swelling. Later symptoms can include complications of the heart, nervous system, and joints. Seek medical attention if you think you may have been bitten by a tick. Follow a doctor's instructions for tick removal.

If you are bitten by a tick or spider, capture the specimen to bring to a doctor if needed.

Prevention

1. Wear protective clothing such as long pants and closed-toe shoes.
2. Wear light colored clothing. Ticks are easier to spot on light clothing.
3. Check body frequently for ticks. Take care to check body axils and warm areas.
4. Use a tick-repelling bug spray.
5. If you are bitten, do not kill the tick before it has been removed. Follow a doctor's instructions for tick removal. Save ticks in a jar. Monitor the bite area for a few weeks for rash development. Record when and where on your body you were bitten and tell your doctor if a rash occurs.



Important:

U.S. Migratory Bird Treaty Act of 1918

The **U.S. Migratory Bird Treaty Act (MBTA)**, signed into law in 1918, is one of the oldest wildlife protection laws in the United States. The MBTA has saved millions, if not billions, of birds by making it illegal to take (kill) or possess (keep or own) native North American birds and their parts (eggs, nests, and feathers). Almost all native North American Bird species are protected under this act, including birds that are not usually considered migratory. For example, chickadee species are not considered migratory, but they are fully protected by the U.S. MBTA. This act also determines the North American bird species that may be hunted - mainly ducks, geese pigeons, and doves.

The MBTA is enforced by the federal government, and special permits are required to use migratory birds in any way - including live specimens, taxidermy, educational purposes, and transporting birds or bird parts. Even things like removing trees used for nesting, keeping a found feather, or touching an abandoned nest can be considered violations of this law.

While you are exploring the Arboretum and learning about birds:

Do not collect bird parts - leave all nests, eggs, and feathers where you find them.

Do not disturb nesting birds - observe them from a short distance.

Disturbing birds and collecting bird parts without proper permits are **federal offenses**.

For more information:

Migratory Bird Treaty Act

<https://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php>

Federal Register Revised List of Protected Migratory Birds

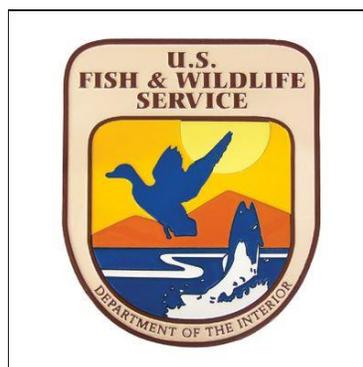
<https://www.federalregister.gov/d/2020-06779>

List of Bird Species to which the MBTA Does Not Apply

<https://www.federalregister.gov/d/2020-06782>

Bird Nests - What you need to know

<https://www.fws.gov/migratorybirds/pdf/education/educational-activities/BirdNestsR8.pdf>



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Bird Behaviors

Walking – while it may not sound interesting, some birds are actually hunting when walking and can quickly accelerate to catch prey. Can you spot what the bird wants to eat before it does?

Resting (Roosting) – Birds put out a lot of energy each day and need a few hours to relax. This one may not be obvious as resting birds can easily become a meal for others so you may have to look carefully to find one hiding out when sneaking in a nap.

Gathering Nesting Materials – Birds make their nests from a variety of materials including grass, spider webs, moss, sticks, and even mud. Find a bird constructing a nest and count the number of trips it makes to get an idea how much work it is to build a nest to raise its family. Make your own nest using things from your yard.

Mobbing – look for smaller birds dive-bombing larger predatory birds to chase them away. Many different species may even work together to protect their nests and/or young from threats. This will likely be a noisy chaotic scene.

Singing – Bird songs have been referred to as the music of the forest and are especially prevalent in the spring and summer. Males sing to impress females and to establish and defend their territory.

Bathing (water/dust bath) – Keeping clean is important for health and well-being. The reasons a bird takes a water or dust bath may not be well understood, but we do know many birds bathe. Some studies suggest that bathing plays an important role in feather maintenance.

Preening – Just like you brush your hair to remove tangles and keep it in the best condition you can, birds “preen” their feathers to keep them aligned and in the best condition they can. After all, a bird only grows new body feathers twice a year, and only gets new flight feathers once a year!

Territory Defense – Resources in a territory are not unlimited and birds defend their territory to preserve access to food and nesting sites. See if you can find fighting birds in your yard. Who is fighting? Are they the same or different species? What are they fighting over?

Climbing – While we typically think of birds flying everywhere, if you pay closer attention you will find many species of birds climbing up and down the trunks and branches of trees.

Foraging – How does your hunger drive what you do in life? For birds, finding food is a critical daily activity. See if you can identify what a specific bird eats and how it eats the foods it finds. Hint: A bird's bill shape will reveal much about where it can forage and what it can eat.

Flying – Many, but not all, birds fly. Have you ever slowed down to actually watch how different birds fly? Some birds are quick, agile, and acrobatic in flight like fighter planes while other birds are slow, awkward, and clumsy flyers more akin to massive cargo aircraft. How easy is it for a bird to take to the skies? Some can effortlessly bounce straight into flight while some large waterfowl must get a running start with much effort before eventually lifting off.

Soaring - To me, soaring seems more like riding a bicycling rather than running down a hill. It still takes effort, but not nearly as much. Soaring birds can travel great distances with minimal effort. Whether searching for food or migrating, birds do their best to save energy however they can.

Hovering - Hovering allows a bird to stay in one location for a short period of time which can be very useful when feeding on flower nectar or hunting prey hidden in the brush below. Not all birds can hover so see if you can figure out which species can. Hint: Windy days might have more hovering birds than calm days!

Hunting - Who is it better to cheer for? Starving predators or elusive prey as they play out a high stakes struggle for life or death? Split second decisions are the difference between eating and being eaten. These hunts occur on countless occasions every day involving cunning, nerves of steel, agility, and stealth. Stay alert as they don't last long.

Caring for Young - Humans are not the only species that cares for its young. Birds go through extraordinary lengths to raise families, sacrificing their own well being for their babies. See if you can find any evidence of good bird parenting.

Perching - Birds feet have tendons that force the toes to close when they sit down, automatically gripping the branch they are resting on (stay apparatus). This is how they can sleep without falling off the branch.

Flocking - Some birds are just social creatures forming huge flocks while others prefer the solitary life. Flocking offers many advantages including following healthy individuals to better feeding spots, hiding from predators in a large group, finding a mate, sharing warmth, or even saving energy during long flights. A flock may not even be all the same species of birds, so look closely to see how many species mix in your flock.

Pecking - Woodpeckers are particularly well adapted to listening for insects beneath the bark, pecking a hole, and using their long, barbed tongues to eat the hidden larvae. Pecking is also a valuable way to excavate a new nest cavity to raise a family.

Nesting - All birds lay eggs and require some sort of "nest" to rear their young. These nests can be simple bare patches on the ground all the way up to ornate structures complete with dummy eggs to avoid parasites. Birds will use any materials at hand, but each species has a distinct and dedicated type of nest you can learn to identify. Watch carefully to see what birds collect which types of nest material.

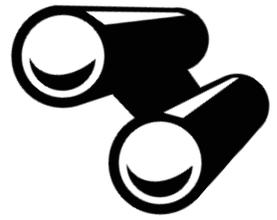
Pooping - What goes in, must come out. Many birders keep lists of things they observe. Which species of birds have they seen in their life, what foods they have seen birds eat, what birds they have seen in various states are but a few of the various types of lists birders keep. My favorite is the "crap list" reserved only for birds observed having a "comfort movement".



Bird Behavior Bingo

Walking	Resting	Gathering Nesting Materials	Mobbing	Long Song <i>Singing 3 or more seconds</i>
Bathing	Preening	Territory Defense	<i>Write in Your Own</i>	Climbing Tree
Bark Feeding	Hunting	Flying	Ground Feeding	Feeder Feeding
Soaring	<i>Write in Your Own</i>	Pecking	Drinking	Perched
Flocking	Hovering	Caring For Young	Pooping	Nest





Bird Color Bingo

Red and Black	Red and White	Rusty	Black and White	Gray and Black
Brown and Tan	Gray and White	Brown	Red	Spotted
White	Green	All Black	Gray	Tan
Brown and Gray	Blue	Orange	Blue and White	Black and Blue
Yellow and Black	Brown and Black	Tan	Green and White	Pink



Backyard Bird Call Bingo

<p>Blue jay</p>  <p><i>Jay, jay, jay</i></p>	<p>Red-winged blackbird</p>  <p><i>O-ka-lee, o-ka-lee</i></p>	<p>American crow</p>  <p><i>Caw, caw, caw</i></p>	<p>Eastern phoebe</p>  <p><i>Feee-beee</i></p>
<p>Pileated woodpecker</p>  <p><i>Kik, kik, kik</i></p>	<p>American robin</p>  <p><i>Cheer-up, cheerily, cheerily</i></p>	<p>Northern flicker</p>  <p><i>Kleeyer</i></p>	<p>Carolina wren</p>  <p><i>Teakettle, teakettle, teakettle</i></p>
<p>Song sparrow</p>  <p><i>Maids, maids, maids, put on your tea, kettle, kettle, kettle</i></p>	<p>American goldfinch</p>  <p><i>Potato-chip, potato-chip</i></p>	<p>Red-tailed hawk</p>  <p><i>Keeeeeeeeer</i></p>	<p>Black-capped chickadee</p>  <p><i>Chick-a-dee, chick-a-dee</i></p>
<p>Mourning dove</p>  <p><i>Hoo-ah, hoo-hoo-hoo</i></p>	<p>Northern cardinal</p>  <p><i>What-cheer, what-cheer</i></p>	<p>White-breasted nuthatch</p>  <p><i>Yank, yank, yank</i></p>	<p>Eastern bluebird</p>  <p><i>Chur-wee</i></p>

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Bird Lifecycle

Which came first? The chicken or the egg?

It's the age-old question concerning birds!

A bird's life cycle begins when a mother bird lays an **egg** in her **nest**. The mother bird protects the egg and keeps it warm while the baby bird develops inside. When it's time, the chick **pips** a hole in the shell of the egg and **hatches**. Outside of the egg, the chick is now called a **hatchling**. Most nest-dwelling birds hatch with their eyes closed. They are naked except for a fine layer of down. As they develop, their feathers start to grow in and eyes open, but they still aren't ready to leave the nest. The chicks are then called **nestlings**. Finally, once most of the adult feathers have grown in, the chick is ready to start leaving the nest and is called a **fledgling**. Fledglings may not be able to fly very well, but they can hop, flutter, and walk. They often leave the nest to take practice flights and forage for food, but they usually stay near the nest for at least a few days. Once the fledgling masters flying and can strike out on their own, they're called a **juvenile**. Juveniles may have different coloring than adult birds of the same species, but by the end of their first summer most juveniles have **molted** and grown adult feathers in adult colors. Now the new adult birds are ready to begin the lifecycle again!

It Starts With A Nest

From the largest nest ever recorded, which was created by pair of bald eagles in Florida and measured 9 feet 6 inches wide and 20 feet deep with an estimated weight of more than 4,400 pounds, to the incredibly tiny nest of the bee hummingbird that is only one inch wide, to simple scrape nests that are just shallow depressions in the ground, nests come in all shapes and sizes - just like birds!

Why do birds build nests?

- To lay their eggs in and keep them safe
- To incubate their eggs
- To raise their chicks
- To protect their eggs and chicks from predators
- To protect their eggs and chicks from bad weather conditions

Where do birds build nests?

- In hedges, bushes, and trees
- Directly on the ground
- In holes in trees
- In reeds by rivers and lakes
- In tunnels in riverbanks and cliffs
- On cliff ledges

- On and in buildings, on ledges and walls and under the eaves of roofs
- In man-made nesting boxes

What materials do birds use to build their nests?

- Sticks and twigs
- Grasses and reeds
- Leaves
- Mosses and lichens
- Seaweed
- Mud
- Feathers
- Bird saliva
- Fur and hair from other animals
- Cocoon silk and silk from spiders
- Man-made materials

How do birds build nests?

Each type of bird builds its own kind of nest in its own way. Some birds simply use their feet to scrape a hole in the ground where they lay their eggs. Other birds make more complex nests by using their beaks and feet to carry materials to a nest-building site. Then they use their beaks, feet, and bodies to shape their nests. Some birds are excellent weavers and are able to make intricately woven nests out of the materials they gather. Birds can also use their bodies to push their nest into shape.

Nesting Challenges:

Challenge #1: Can you construct a small nest that will stay put in the branches of a tree or bush? Gather nesting materials and test your weaving skills!

Challenge #2: Can you build a ground nest to fit your family? Remember not to damage living plants and trees as you complete this challenge. You'll find lots of loose parts for nesting at the Nature Play Area, or you can try making a scrape nest in the sand. You can even try using your body to shape a nest in the meadow or prairie grasses!

Challenge #3: How many types of nests can you spot at the Arboretum? Search high and low, but be sure to leave all nests as you find them. Some may be old and abandoned, but some may be brand new and ready for eggs and chicks! Make a graph on a blank page to show which types of nests were discovered most and least frequently.

- **Scrape nests** are simple hollows scratched into the bare ground, sometimes lined with grass. *Killdeer* are common scrape-nesting birds at the Arboretum. Their nests are usually 3-4 inches across, and once egg laying begins, they sometimes add rocks, bits of shell, sticks, and trash to the nest.
- **Platform nests** are flat nests made of piled twigs, often built high in the tops of trees. *Red-tailed hawks* are common platform nesters at the Arboretum. Their nests are tall piles of dry sticks up to 6.5 feet high and 3 feet across. The inner cup is lined with strips of bark, fresh foliage, and dry vegetation.
- **Cup nests** are shaped like a cup and made from twigs and grass. This is the most common type of bird nest. Many songbirds build cup nests. *American Robins* are common cup-nesting birds at the Arboretum. Their nests are 6-8 inches across and 3-6 inches deep and made of dead grass and twigs that are pressed into a cup shape using their wing. Once the cup is formed, mud is used to reinforce the nest, then it's lined with fine dry grass.
- **Woven nests** are basket-shaped and made from fine fibers of grass, bark, hair, and twine. *Baltimore Orioles* are common nest-weavers at the Arboretum. Their nests are 3-4 inches deep with a small opening on top and a large bottom chamber 3-4 inches across. The nests usually hang beneath a branch and are made by poking fibers in and out with their beak to tangle them. The inside of these nests is lined with downy fibers and feathers.

Baby Bird Buffet

After the nest is built, the eggs are laid inside and **incubated** until they hatch. Hatchlings need help being fed until they can **fledge** and leave the nest.

What do baby birds eat? Mostly the same things their parents do!

- Worms
- Insects
- Grubs
- Seeds
- Plant material
- Fruit
- Berries
- Nuts
- Nectar
- Pollen
- Fish
- Rodents

Challenge: Pretend you are a bird parent with a nest full of hungry hatchlings. You must hunt for ingredients to create a "meal" that would make a baby bird sing for its supper!

Why Do Birds Sing?

Lots of animals use different sounds to talk to other animals, but both people and birds are a little bit different. Most animals are born already knowing how to make the sounds they need to communicate with each other, but baby birds have to learn to sing, just like baby humans learn to talk. Both baby humans and baby birds learn by listening to their families. Baby birds spend a long time learning how to sing, even before they hatch out of their eggs - just like baby humans start listening to their parents before they're born!

Birds make simple sounds called alarm calls that they use to say basic things like "watch out, there's danger" and contact calls to say "hi, it's me" to other birds, but songs are longer and more complicated than simple calls, so scientists think birds mostly sing to show off and impress other birds. The birds you hear singing are usually males trying to impress females and to keep other males away from their **territory** where they live and find their food. Sometimes both male and female birds sing together to make a duet. Birds also might sing sometimes just because it makes them feel good, like how people enjoy making and listening to music!

Bird Song Challenges:

Challenge #1: How many different bird songs can you hear? Can you tell where they're coming from? Close your eyes and listen quietly for one minute, then make a sound map of where you hear different songs. To make a sound map, mark an X in the center of a blank page. This marks where you're sitting. When you hear a sound, make a mark on the paper to represent the sound. The marks should show the direction and distance of the sound from your location. To increase your hearing ability, you can make "deer ears" by cupping your hands behind your ears. Then try cupping your hands in front of your ears to better hear sounds behind you.

- What sounds were most familiar to you?
- What sound had you never heard before? Do you know what made the sound?
- What sound did you like best? Why?

Challenge #2: Adults and baby birds also use their songs and calls to communicate with each other and find each other if they get lost. Try a game of bird call hide and seek to test your sound location skills! To play, have one person close their eyes while the other finds a hiding place. Once hidden, the hiding person should imitate bird calls while the seeking person tries to find where the sound is coming from. Once found, switch roles, calls, and locations and play again!

Challenge #3: Bird songs have inspired many beautiful pieces of art and music, and spring is the perfect time to listen to classical music inspired by birds! Use a smartphone to listen to the following pieces of music and draw what you hear on a blank page.

- Vivaldi - Concerto in D Major, "The Goldfinch" <https://youtu.be/yInnpH9jj0Y>
 - Why is the flute a good instrument for imitating bird sounds?
- Vivaldi - The Four Seasons, "Spring" <https://youtu.be/6LAPFM3dqag>
 - Can you hear the violins sounding like birds?
- Handel - Concerto in F, "The Cuckoo & The Nightingale" <https://youtu.be/oW2Faes1zhs>
 - Listen for the pipe organ and notice how it imitates Cuckoo and Nightingale songs.
- Beethoven - Pastoral Symphony <https://youtu.be/-koZBq0iOrw>
 - Can you imagine the farm or meadow landscape that inspired this symphony?
- Saint-Saens - "The Swan" from The Carnival of the Animals <https://youtu.be/3qrKjywjo7Q>
 - While it doesn't sound exactly like a bird call, can you hear how the cello sounds like the graceful and peaceful movements of a swan?
- Saint-Saens - "The Cuckoo in the Depths of the Wood" from The Carnival of the Animals <https://youtu.be/qOIyzcdjXRM>
 - How many times do you hear the clarinet depicting the cuckoo's call?
- Messiaen - The Blackbird <https://youtu.be/aPn76Pee7Cq>
 - When you hear the play between the piano and the flute, what do you imagine is happening?
- Vaughn Williams - The Lark Ascending <https://youtu.be/OLhpkvQLDt0>
 - What does the word "ascending" mean? Can you hear the violin notes going higher and higher?
- Rachmaninov - The Sea & The Gulls <https://youtu.be/8qvCRwWT97k>
 - Do you hear the sea with gulls soaring overhead? How would you describe the sounds?
- Joplin - The Silver Swan <https://youtu.be/O5LaxEv9Ur4>
 - Why do you think this piece sounds like a swan?

Challenge #4: Try incorporating technology into your birding while contributing to a large-scale citizen science project! Download The Cornell Lab of Ornithology's **BirdNET** app for Apple or Android to collect and analyze recordings of bird songs and identify which birds you're hearing in the field.

The Great Migration

What is bird migration?

Bird **migration** is the regular, repeated, seasonal movement of bird populations from one area to another and back again. Birds require specific resources in their environment for food, shelter, and raising young, so they must move when these resources change with the seasons. The most common migration pattern involves flying north in the spring to raise young and flying south in the fall to spend the winter in warmer places. Many ducks, geese, and swans also migrate, but they only need to go far enough south to find open waters.

How do birds know when to migrate?

Day length is the main environmental factor that signals to birds it is time to prepare for migration. Their bodies respond to changes in daylight by increasing their appetite, which helps them gain weight to survive the journey. Temperature is a secondary factor in knowing when to go. For example, if temperatures are cooler than usual in the spring, birds may delay migration. If temperatures are warmer than normal, they may begin their migration early. Timing of the spring migration must allow birds to arrive at their breeding site with enough time to establish a territory, find a mate, incubate eggs, and hatch their young while there is still plenty of food available to feed the hatchlings. In the fall, birds must prepare to leave before the climate becomes too harsh, or else there would be no time to gain the weight that provides the extra energy needed to fly south.

How do birds know where to go?

Some species such as Canada geese migrate as family units. Several generations travel together, including many birds who have made the trip before. Experienced birds teach younger generations which landmarks to follow. Most birds don't travel as family groups, though, so to navigate they must know three things: where they are now, where they need to go, and the direction to travel to get there. We don't know exactly how they do this, but scientists believe they use a combination of factors and that in their brain they have a kind of internal map. It is possible that birds have the ability to detect magnetic fields to be able to tell north from south. It is also possible that birds use the sun as a compass to find direction. Many birds migrate at night, so it is possible that star patterns - particularly the North Star - may be another navigation tool use for finding their way.

Migration challenge: Can you use your own navigational skills to determine north from south? Figure out which way you need to 'fly', then choose a north and south "home base" to play a migration version of *Red Light Green Light*. Try to fly from one home base to the other and back again! Use "day time" and "night time" instead of red and green lights - you can choose to be a bird that migrates at night, or one that migrates during the day. You can also add in extra challenges that represent the real obstacles birds face by calling out things like "skyscrapers" that must be jumped over, "powerlines" that must be crawled under, "cats" that must be escaped by zigzagging, and "wind turbines" that you must spin to get through.

Citizen Science With eBird

Citizen-science projects like eBird can help make long-lasting connections between classroom learning and life skills, preparing students to thrive in the world. Being an eBird citizen scientist involves bird identification and data entry. One of the keys to enjoying bird identification and citizen science is to embrace the unknown! Don't worry if you don't have all the answers, just maintain a curious mindset.

By following basic scientific protocols and submitting observations, you can become a citizen scientist helping professional scientists answer real-world questions. Citizen science is people-powered science that helps us connect with and understand our natural world.

eBird is the world's largest biodiversity-related citizen science project, with more than 100 million bird sightings recorded each year by eBirders around the world. The Cornell Lab of Ornithology manages eBird in collaboration with other organizations, experts, and users. eBird captures the power of birdwatchers all over the world to document where birds are and when they are using different habitats. With eBird's simple online tools and easy-to-use smartphone apps, you can become part of a larger community of people helping both scientists and birds. For a detailed look into what data eBird collects and how that information is used to help birds, you may be interested in the eBird Essentials online course: academy.allaboutbirds.org/product/ebird-essentials

To participate in eBird, you need to be able to identify birds, which can seem like a challenge when you first start looking around and realizing just how many birds there are, but don't worry - today's tools can make bird ID fun and easy for all ages. The **Merlin Bird ID** app is a free app for iOS and Android that can help you narrow down a mystery bird to just a few possibilities. Merlin asks five basic questions:

1. What is the date?
2. And your location?
3. What is the bird's size?
4. And its color?
5. What was the bird doing?

Based on your answers, the app will provide a short list of possible birds. Even beginner birdwatchers will be successful from the start!

Begin collecting eBird data when you feel confident in your ability to identify and count birds accurately. The data needs to be reliable because professional scientists use it to solve real-world problems. You can collect data on paper sheets to enter through the eBird website or by using the free **eBird** app for iOS and Android. Note that unlikely data may be "flagged" by regional reviewers, and you may be contacted to ask if your report may be a mistake. For example, if you report seeing a bird that is never found in Iowa, the eBird editor might email you to ask if you're sure it wasn't a more common species.

Remember, your data matters! When you submit observations to eBird, you are a citizen scientist! This data helps power the science that policy makers and conservation organizations use to protect birds all around the world.

Write Your Own Owl Prowl

Get your imagination going with this activity! Younger children can dictate their own stories, while older children can write and illustrate theirs. Start by reading this digital book called Rockie's Sagebrush Adventures. Produced by the Audubon society of the Rockies, this illustrated story tells the tale of a young Burrowing Owl born in the sagebrush ecosystem of the western United States. You might want to visit our Owl Bridge to read the story!

<https://tinyurl.com/rk29wuc>

Next, create your own story about what happens when a kid meets an owl in your neighborhood. This story can take place in your own yard, street, park, or even here at the Arboretum!

Here are some story starters to help get you thinking! You can choose one of these or make up your own.

- One day just as the sun was going down, I looked outside and saw an owl land on _____. It was _____ and _____.
- My friend and I were out for a walk at night when an owl _____.
- A _____ owl was flying silently in front of my _____ when suddenly _____.
- An owl came to my window last night. I said, _____.

Once you've started, keep the story going until the end. After the story is written, you can add pictures and illustrations and give your story a title.

You can use the steps for drawing a screech owl on the next page to help illustrate your story.

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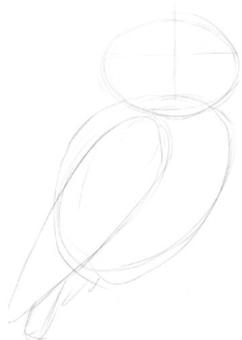
How to Draw a Screech Owl with David Sibley



❶ Owls are unique among birds in having their eyes on the front of their head, facing forward, which makes them a little more tricky to draw. But it's still helpful to start with some simple ovals for body and head. Owls generally perch upright, so I'm drawing an oval for the body just slightly tilted to one side. And owls have large, wide heads, so I've drawn a large and wide oval balanced on top of the body



❷ For the folded wing, a long narrow oval extends from just below the head and out behind the body, and a short rectangular tail sticks out just below the wing



❸ This is an important step! To get the eyes and the bill in the right place, draw a vertical line right down the middle of the head oval, and a horizontal line across the head a little higher than midway.



❹ Draw two circles for the eyes, right along the horizontal line that you've draw, and be careful to make them both the same distance away from the center line. Just below that, right along the center line, draw a small diamond shape for the bill.



❺ Starting from the corner of the bill, draw a line up to the eye, around the top of the eye, and then up again and out the top of the head.



❻ The ear tufts (tufts of feathers, not actually ears) are sort of bulging triangles on top of the head, centered on the lines that you drew in the previous step.



7 Now draw the contours of the body, smoothing out the transition from head to body across the thick neck. The back end of the body is more fluffy. The edge of the wing is a solid line, except at the front end where feathers from the breast overlap the edge.



9 Add details of the head pattern: Color the outer half of each ear tuft dark. Add some markings to suggest the border of the pale eyebrows, and dark streaks on the crown radiating up from the forehead. Add a bold dark line curving down from the ear to form the outer edge of the "facial disks" (specialized feathers that help channel sound into the ears). And a patch of feathers below the bill looking a bit like a bow tie.



11 Finally, add the feet. Owls have relatively large feet, short legs, and large talons. And add a wooden post for the owl to perch on.



8 Add details to the eyes by making the outline thicker especially on the top and outside edges, and add a small diagonal line along the lower edge of the eye.



10 Add details of wing coverts, the big flight feathers as straight lines to the tip of the wing, and some shading on the underside of the body.

Have fun!

Drawings by David Sibley

 Audubon

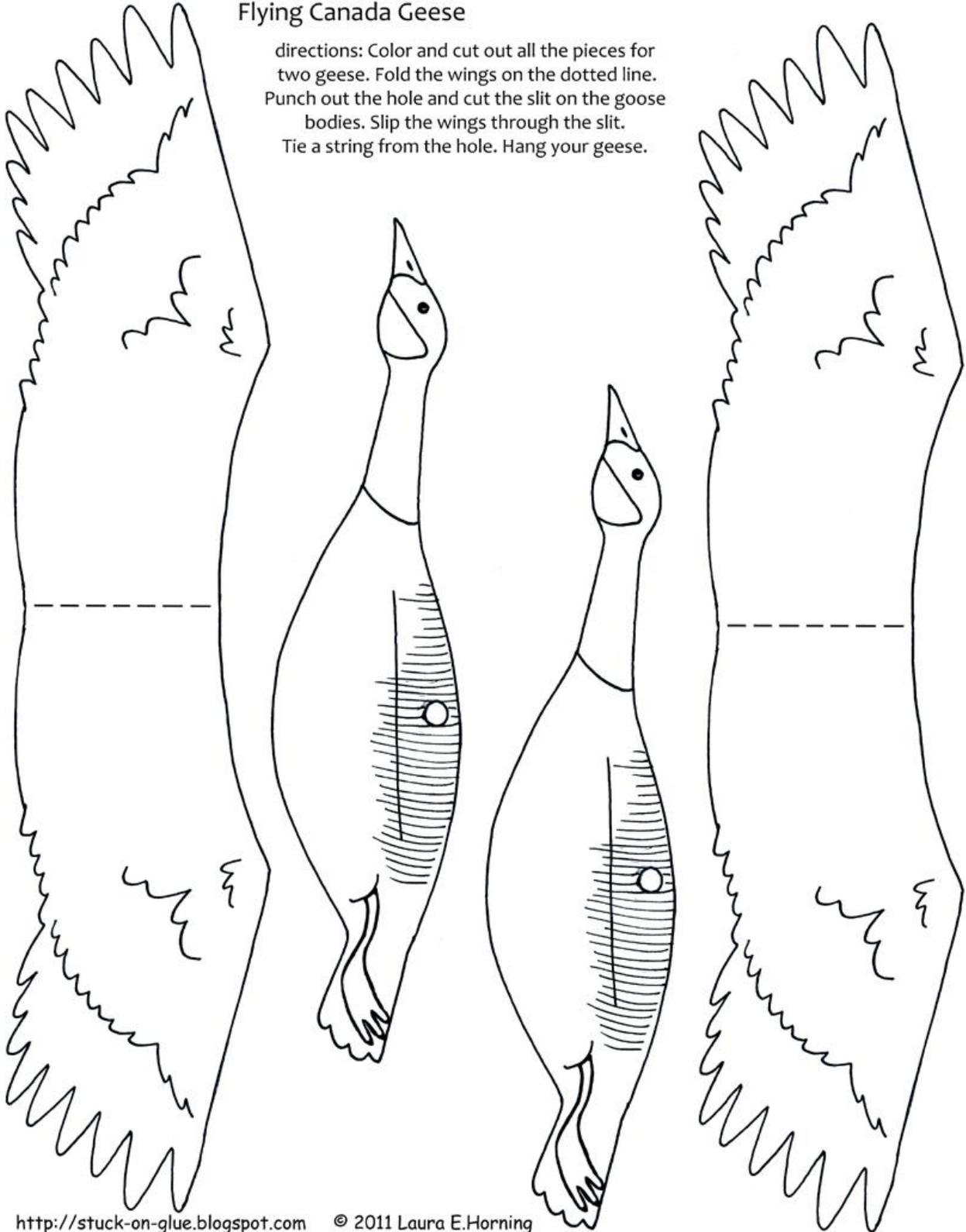
SIBLEY
GUIDES 

Flying Geese

Make a pair of geese or an entire flock! Hang them from your light fixtures, curtain rods, or make a mobile.

Flying Canada Geese

directions: Color and cut out all the pieces for two geese. Fold the wings on the dotted line. Punch out the hole and cut the slit on the goose bodies. Slip the wings through the slit. Tie a string from the hole. Hang your geese.



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Bird Words Glossary

Egg - a hard-shelled reproductive body produced by a bird

Fledge - to develop the feathers necessary for flying

Fledgling - a young bird just fledged

Hatch - to emerge from an egg

Hatchling - a recently hatched bird

Incubate - to sit on eggs to hatch them by warmth

Juvenile - a young animal

Migrate - to pass from one region or climate to another usually on a regular schedule for feeding or breeding

Molt - to shed feathers with the cast-off parts being replaced by new growth

Nest - a place or structure where eggs are laid and hatched or young are raised

Nestling - a young bird not yet able to leave the nest

Pip - to break through the shell of the egg in hatching

Territory - an area that is occupied and defended by an animal or group of animals