

Discover Birds

ACTIVITY BOOK



How do birds fly,
communicate,
stay warm in the winter?

Look inside and
discover an amazing
world of **birds!**

2nd Edition



*Thank You to
Our Sponsor*

The *Discover Birds Activity Book* would not have been possible without the generous support of the **Tennessee Ornithological Society**.

About the Sponsor Tennessee Ornithological Society

Founded in 1915, the Tennessee Ornithological Society is an independent, non-profit, educational and scientific organization devoted to the study and conservation of birds. Organized as a federation of eleven chapters across the state of Tennessee, each chapter holds monthly meetings, offers educational field trips, monitors the welfare of bird populations in their area, and partners with many organizations to promote and protect birds.

Annual TOS events include spring and fall state-wide meetings, the Summer Foray, annual hawk counts, spring and fall bird counts, winter raptor surveys, and annual Christmas bird counts. Additionally, TOS publishes *The Migrant*, an internationally recognized quarterly publication developed to “record and encourage the study of birds in Tennessee.”

TOS has a long and successful history of championing the birds of Tennessee. One notable project included TOS’ sponsoring

and organizing role in the 1933 selection of Tennessee’s state bird symbol. Over a million people were reached during this state-wide educational campaign, resulting in 72,000 school children voting to select the Northern Mockingbird as our state’s bird symbol.

More recently, the Tennessee Breeding Bird Atlas Project involved systematically surveying breeding birds across Tennessee and resulted in a summary of distribution and relative abundance in the publication, *Atlas of the Breeding Birds of Tennessee*. Other projects include ongoing cooperation with many national and international organizations in the collection of scientific data to benefit the knowledge and conservation of avian species.

The membership of TOS includes hundreds of people engaged in the study of birds at all levels, from backyard bird watchers to professional biologists. For each of these members the organization provides opportunities and challenges to help sustain a love and interest in birds.

About the Author/Illustrator



her many talents reflect her enduring love for nature.

The delightful artwork in the Tennessee Ornithological Society’s *Discover Birds Activity Book* was created and contributed by gifted artist **Vickie Henderson**. A resident of Knoxville, Tennessee, Ms. Henderson is also an author, photographer and nature enthusiast. The products of

Inspired by her enjoyment of birds and her desire to make a contribution to their continuing health and survival, she uses her talents to promote conservation, including authoring and illustrating *Red-shouldered Hawk Territory, A sketchbook journey through nesting season*; *Operation Migration’s Whooping Crane Activity Book*; contributing magazine articles to *The Tennessee Conservationist*; and presenting her inspired observations and art in her internationally read blogs, *Vickie Henderson Art* and *Vickie’s Sketchbook*.

Vickie happily dedicates her creative artistry in the *Discover Birds Activity Book* to the imaginations and curiosity of our world’s future conservationists.

Special appreciation goes to Melinda Fawver for her donation of time and talent in creating the graphic layout and design of this book.



Discover Birds

ACTIVITY BOOK

Discover the amazing world of birds!

Birds have fascinated people for centuries and you can find them most anywhere. They are our frequent companions when we step outdoors. Birds are easy to love for their songs and beautiful colors. They make us curious about their behavior, life-styles and their ability to fly and migrate long distances. People enjoy watching birds, feeding them, writing about them, and expressing their love for them in poetry, song and art. Many people travel around the world to see birds. The Discover Birds Activity Book is an introduction to birds--the beginning of a lifetime of enjoyment and discovery!

A Publication Sponsored by the
Tennessee Ornithological Society
<http://tnbirds.org/>

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Graphic design by Melinda Fawver

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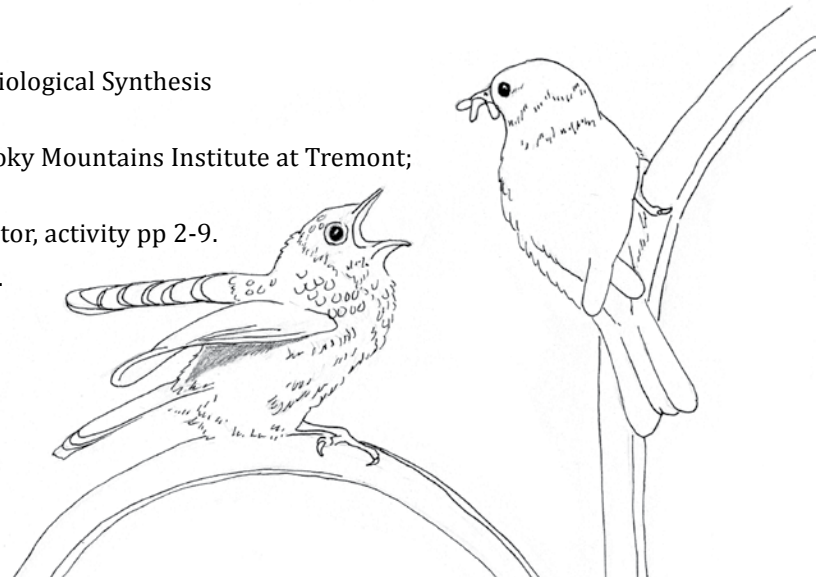
Contributions:

NIMBioS: The National Institute for Mathematical & Biological Synthesis
(Kelly Sturner and Chris Welsh), activity pp 24-29.

Tiffany Beachy, Citizen Science Coordinator, Great Smoky Mountains Institute at Tremont;
activity pp 10-12, 19-20, and resources, p 32.

Paula Schneeberger, Naturalist /Environmental Educator, activity pp 2-9.

Jean J. Alexander, KTOS member, book resources, p 31.



It's A Bird

A bird is a special warm-blooded animal with two legs and a hard beak. Warm-blooded means the animal maintains a constant body temperature even when the environment temperature changes. Humans are also warm-blooded!

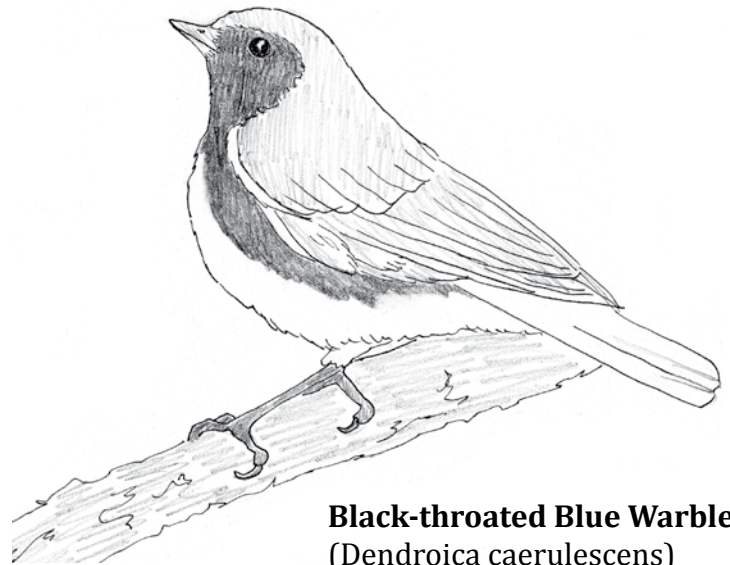
Birds have three remarkable traits that make them different from other animals: **feathers, hollow bones and hard-shelled eggs.**

Feathers make birds special. No other animal has feathers! Feathers help birds fly, protect their skin, and keep them warm and dry. Feather colors help the bird identify their species and attract mates.

Birds have unique bones that are hollow like a straw but have strong inside support structures. These hollow bones make the bird lighter and help them fly. A few birds don't fly, like the penguin and the ostrich.

Birds hatch or are born from hard-shelled eggs that are laid by an adult bird. The hard shell keeps the inside of the egg moist and allows the parent bird to sit on the egg to keep it warm during incubation. The egg shell also has microscopic pores that allow oxygen to enter the shell so the baby bird can breathe before it hatches.

What are three traits of a bird?

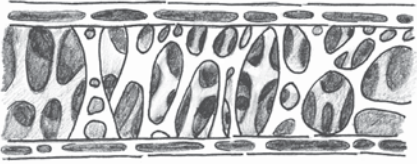


Black-throated Blue Warbler
(*Dendroica caerulescens*)

How do feathers help birds?

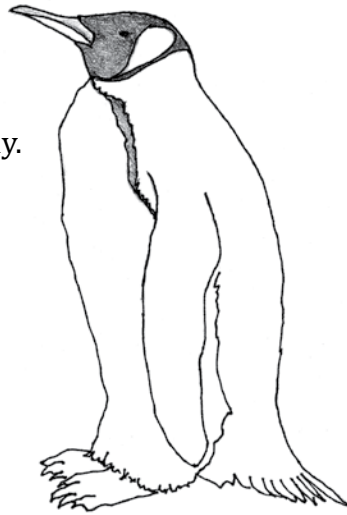


It's A Bird



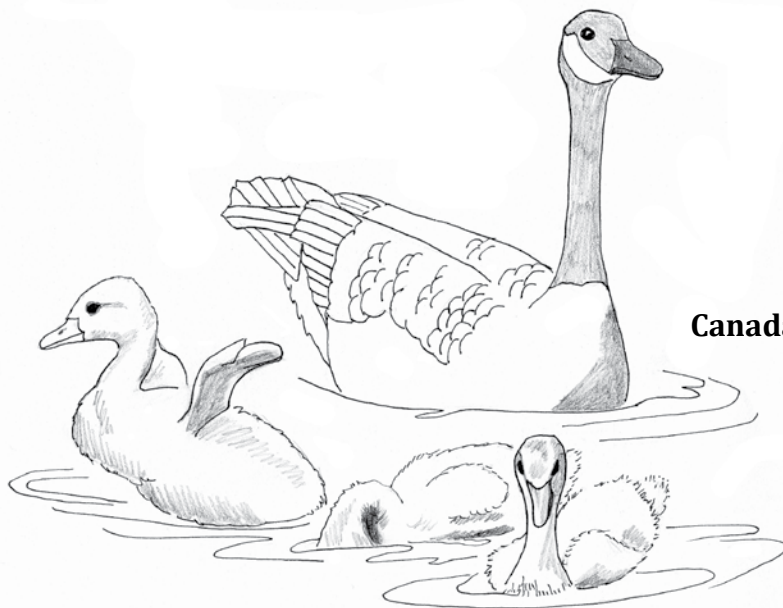
How do hollow bones help birds fly?

Name a bird that cannot fly.



King Penguin (*Aptenodytes patagonicus*)

How do hard shells help birds?

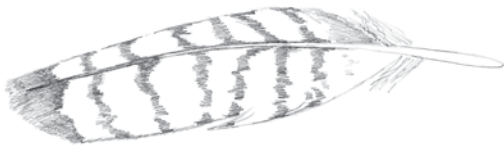


Canada Goose (*Branta canadensis*)

answer key: hollow bones make the bird light weight for flying; penguin or ostrich; hard shells allow incubation

Feathers

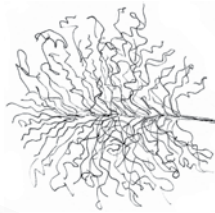
Feathers come in different shapes and have different functions or jobs to help birds. There are six general types of feathers.



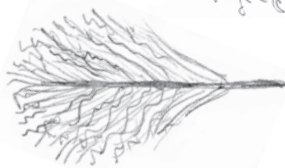
Flight feathers are found on the bird's wing and tail. They are shaped to fan the air and give the bird "lift" to help it take-off and land.



Contour feathers cover the wings, body and tail. They give shape and color to the bird.



Down feathers are fluffy, located close to the body and underneath the contour feathers, and help keep the bird warm by trapping heat close to the skin.



Semiplume feathers combine the qualities of down and contour feathers. These are used for added insulation.

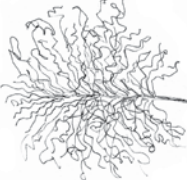
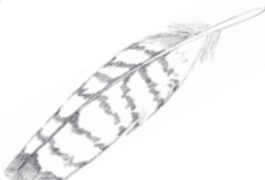

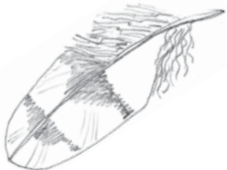


Bristle feathers are very stiff and are found around the mouth acting like a funnel to make the mouth larger. They are also found around the eyes and work like eyelashes.



Filoplume feathers are very small and are attached to the birds nerves. These feathers send messages to the brain about feather placement, insulation, and preening. They help keep the feathers in the right order.







Can you identify the feathers in the box below? Write their names on the lines.

1		2	
3		4	

answer key: 1. down feather, 2. flight feather, 3. bristle, 4. contour feather

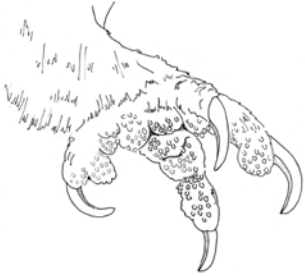


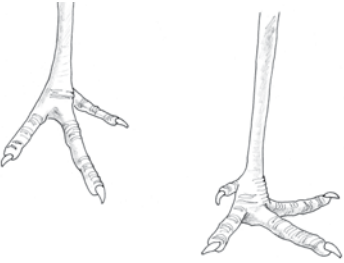

Beaks and Feet

A bird's beak or bill has the primary function of gathering and eating food. A bird's beak is designed to help it eat the foods it needs including tearing, crushing, picking, probing and breaking the shells of food items. Birds also use their beaks to preen or clean and oil their feathers. Preening keeps their feathers healthy and in the right position. Birds use their beaks like humans use their hands when they are building their nests and feeding their young. By looking at a bird's beak we get clues about the bird's lifestyle, where it lives and what it eats.

TYPES OF BEAKS		
	Cone shaped beaks	Strong, short beaks that are used for cracking seeds
	Chisel or drilling beak	Long tapered bill used for drilling holes in trees
	Tubular shaped beak	A long bill used for sipping nectar from flowers
	Sharp hooked beak	A bill used for ripping and tearing meat
	Straining beak	A flat-shaped bill with fringed edges to filter plants and small animals from water
	Probing beak	A long, slender beak used for probing the ground

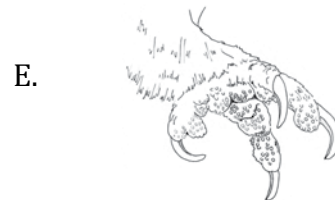
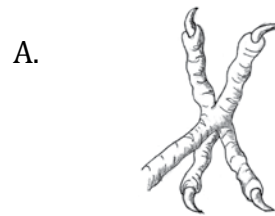
Beaks and Feet

Bird's feet come in different sizes and shapes. A bird's foot is designed to help it navigate its environment and find the food it needs.

TYPES OF FEET	
	Hawks, eagles and owls have strong feet with long claws or talons to help them capture, grasp and kill their prey.
	Woodpeckers have four toes, two pointed forward and two pointed backward. This arrangement helps them grasp tree bark and climb.
	Song birds use their feet for perching and walking or hopping. Three toes pointing forward with one opposing toe helps them grasp their perch.
	Wading birds such as cranes and herons have long toes to help them walk through soft bottoms in wetlands in search of food.
	Swimming birds, such as ducks and geese, have webbing between their toes to help them paddle in water.

Beaks and Feet

Match the bird's beak with the kind of feet it has by placing the right letter in the blank.

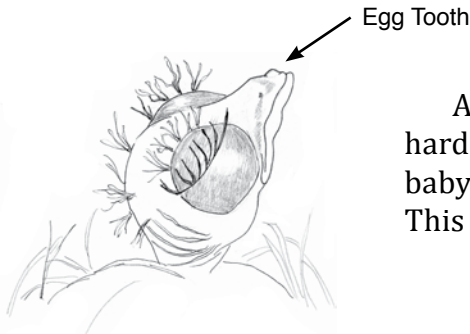


Two of the birds listed are birds of prey. Can you name them? Which one hunts at night?



answer key: 1. C, 2. D, 3. B, 4. F, 5. A, 6. E
 bald eagle or eagle; screech owl or owl; the owl hunts at night

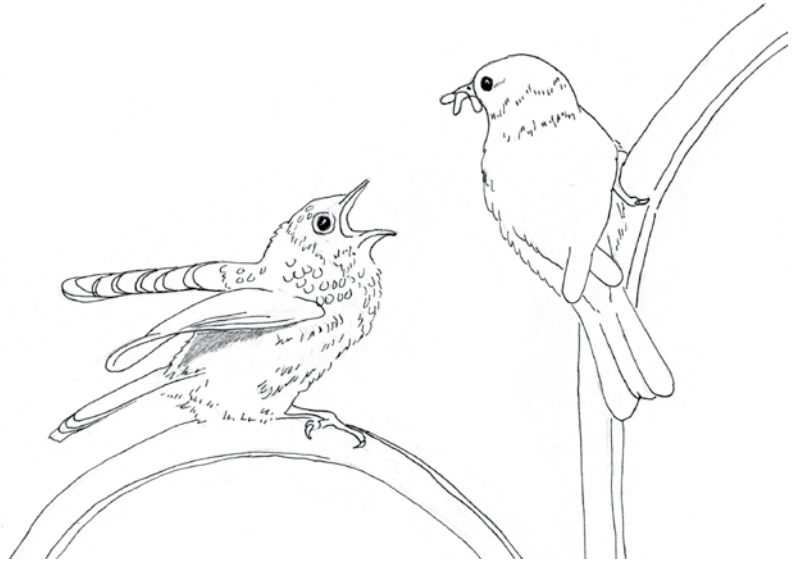
A Bird's Life Cycle



A bird life begins within an egg. A special hard structure called the **egg tooth** forms on the baby bird's beak to help it break the egg shell. This special tooth drops off a few days later.

A baby bird that has just hatched is called a **hatchling**. While the hatchling is growing in the nest and being fed by its parents we call it a **nestling**. When a nestling grows its flight feathers and is ready to leave the nest it takes its first flight or **fledges**. We call a bird that has just fledged a **fledgling**.

A fledgling has fluffy down feathers and is often fed by its parents for several weeks more. Its flight feathers continue to grow and its wing muscles get stronger. When a fledgling or **juvenile** has finished growing it becomes a **mature** or adult bird.



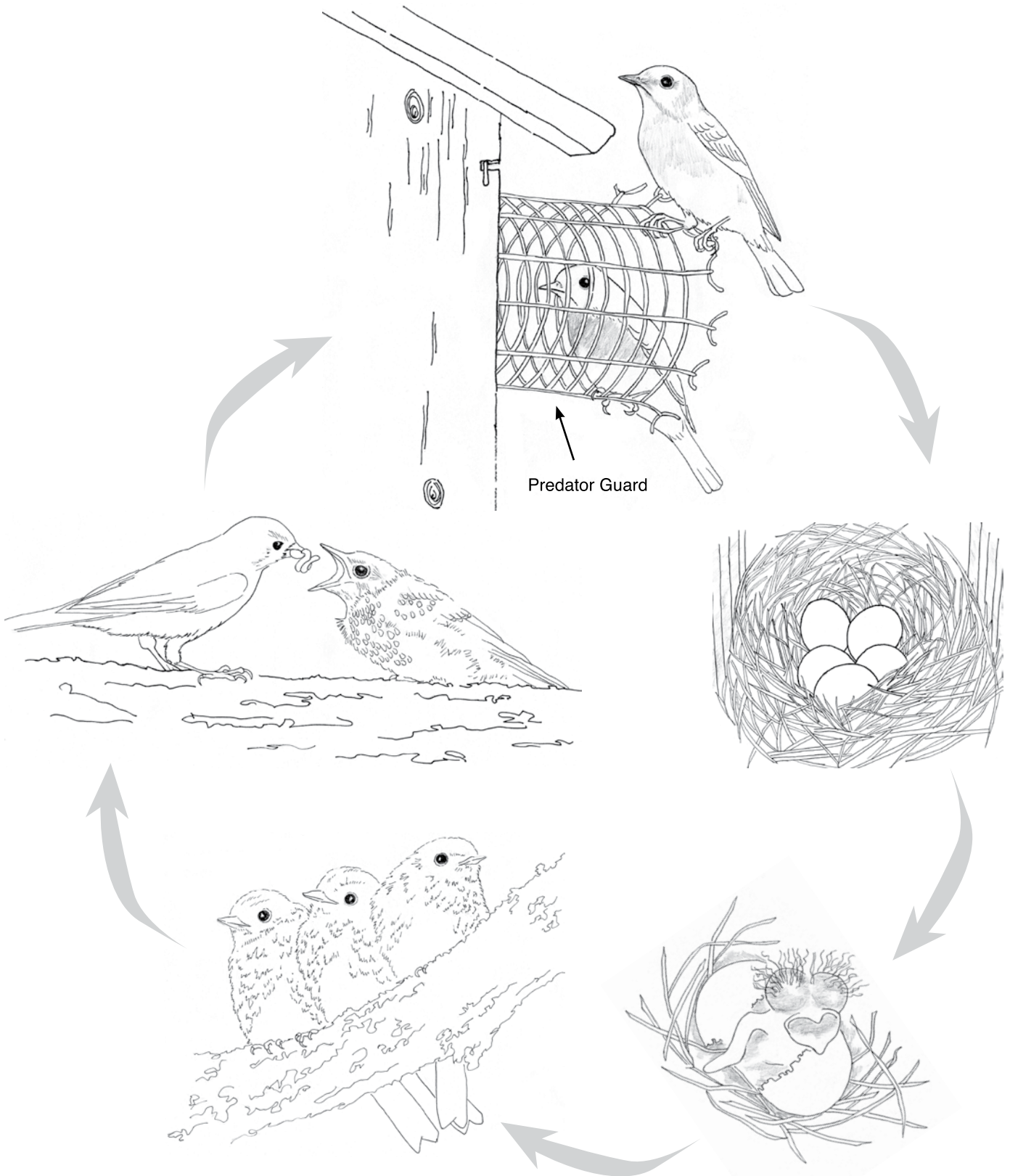
An adult bird attracts a mate, builds a nest and raises young to start the cycle all over again. Some birds migrate or travel long distances as part of their life cycle. Other birds stay in one area throughout the seasons.

Eastern Bluebirds nest in a tree cavity made by other birds or a human-made nest box. Throughout the book you will see the Eastern Bluebird and learn about it's life. Whenever you see a Bluebird, come back to this page and write down the activities you see and the page number where you found it.

What activities in the bird life cycle do you see on the next page? List them.

A Bird's Life Cycle

Life Cycle of the Eastern Bluebird (*Sialia sialis*)



Nests!

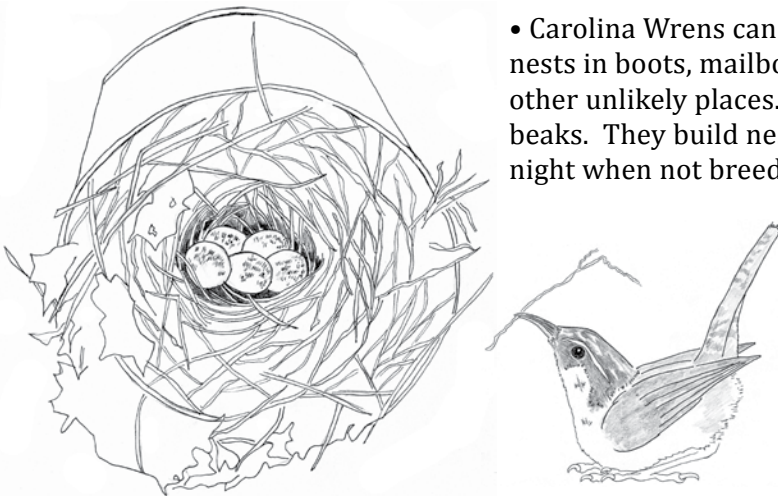
What role do nests play in the life of a bird? Do birds live in their nests all year round, like a house?

Did you know that in many songbird species, it's the female who builds the nest? Sometimes the male helps her find a suitable location and, occasionally, he actually helps build it. After building the nest, the female lays a **clutch** of eggs which she then **incubates** or sits on to keep warm. Once the chicks hatch, both parents usually take turns feeding their hungry **brood**. The chicks grow and develop and eventually are ready to **fledge** or leave the nest! Once songbird fledglings leave the nest, they don't return to it. Their parents busily follow them around for a few weeks, feeding them wherever they go. Soon the fledglings disperse and become independent. Next summer, they will return to the area where they hatched to find mates, build nests and raise chicks of their own!

- Different types of birds make different types of nests.
- Vireos build a nest that is suspended below the branch, often in a fork
- Bald eagles make nests that have sticks as large as a man's arm and can be as big as a house!
- Hummingbirds build TINY nests, about as big as a quarter! They often decorate their nests with lichen.
- Many warblers build a tightly woven cup nest. They often look like knots on a branch! Other birds build their nests on the ground in leaves or hidden in grasses.



- Carolina Wrens can build nests just about ANYwhere! They often build nests in boots, mailboxes, hanging baskets, buckets, garages and many other unlikely places. Woodpeckers make holes in trees with their strong beaks. They build nests in these holes and frequently roost in them at night when not breeding.



What do birds use to make their nests?

Here is a list of possible nesting materials a bird may use:

- Grass
- Twigs for smaller birds, branches for bigger birds
- Dried leaves
- Grapevine bark
- Pine needles
- Moss
- Lichen
- Hair - human, horse, bear, hog
- Trash - yes, they will often add pieces of plastic or other trash



But how do they get all that material to stick to the branch? Many small birds use spider webs as glue to hold the nesting material on the branch. That's pretty resourceful, isn't it?

Build A Nest

Draw your own nest!

Pretend you are a bird – any species, you choose! ‘Construct’ your nest somewhere in this scene. Draw your nest, label it, add a sketch of your bird. Make a list of the materials you used to make your nest. Now you are ready to raise your own brood!



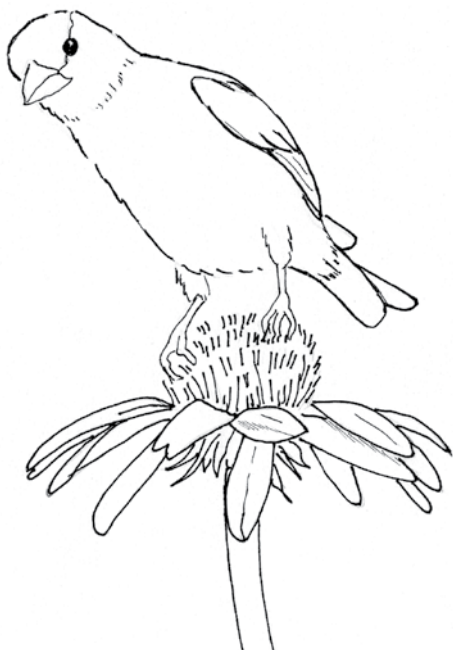
Backyard Bird Habitat!

Do you see birds in your backyard? There are lots of ways you can make your yard attractive to birds. Here are a few:

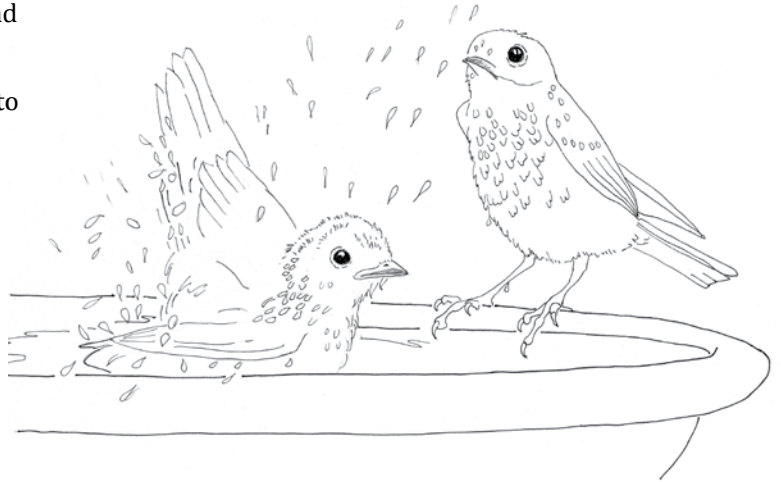
Bird feeders – include seed feeders, suet feeders and hummingbird feeders. Add some corn for the squirrels and wild turkey.

Safe cover--Tree limbs and shrubs give birds a safe place to hide if a cat or hawk comes around.

Native wildflowers that produce seeds for finches and sparrows – these are also great for native pollinators like Bumble bees!



Water – Birds drink lots of water and they LOVE to take baths every day if they can! You could have a simple bird bath or an elaborate water garden. Either way, the birds will relish it!



Brush piles – Don't worry about hauling away piles of branches and woody debris. This could provide great escape cover for many species and nesting cover for birds like wrens. Snakes and rodents also like brush piles!

What else could you do for the birds around you?

“DRINK Your teaaaaa!”

We've all heard birds singing. But what are they saying? What does it mean?

Believe it or not, one of the best ways to learn how to identify birds is to learn their vocalizations. Just think: You can know which bird is singing, even if you can't see it! This is very useful, especially during the summer months when small birds are easily hidden in the leafy vegetation. Imagine walking into a forest and being able to call out each bird by name, just by what they're saying! You CAN!

Why do birds sing? In the songbird world, the male is usually the one who does the singing, and he's trying to attract mates and defend his territory. Sometimes birds make other noises, like short chips and chirps. These are called 'call notes,' and are used by birds to communicate between individuals or to warn of predators.

So how do you learn who sings what? Many birders learn songs by associating them with fun phrases. Here are a few:

- **Eastern Towhee** - “Drink your teaaaaa!”
- **Carolina Wren** - “Tea kettle, tea kettle - or Cheeseburger, Cheeseburger”
- **Tufted Titmouse** - “Peter, Peter, Peter”
- **Red-eyed Vireo** - “Here I am, where are you? Look up, in the tree...”
- **American Robin** - “Cheerio Cheerilee”

Go outside and listen to the birds around you. What are they saying? Come up with your own helpful phrases to learn who's who.

Here is one online resource to help you learn bird songs:

www.allaboutbirds.org – Just type in a bird's name in the 'Find' box and you're on your way!

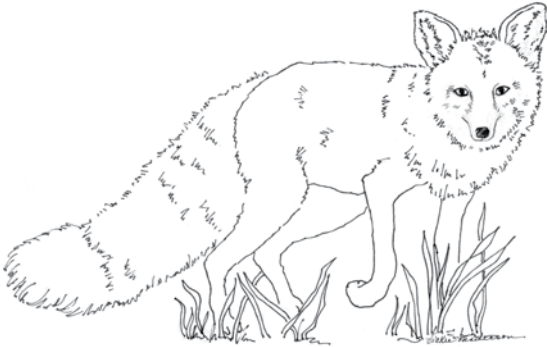
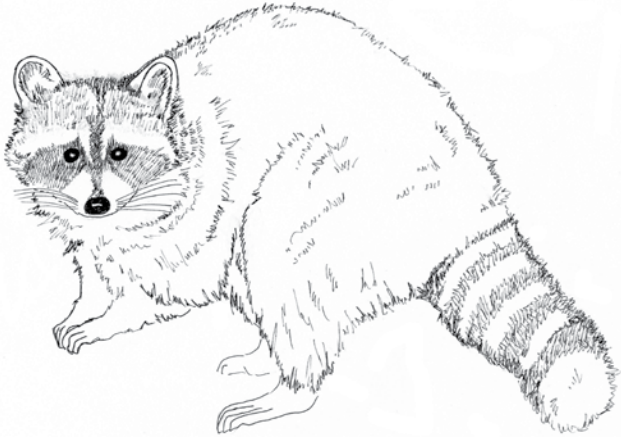
Predator Word Scramble

Unscramble the letters to find out the names of predators that prey on birds, their eggs and nestlings.



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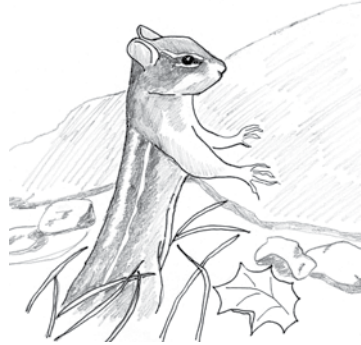
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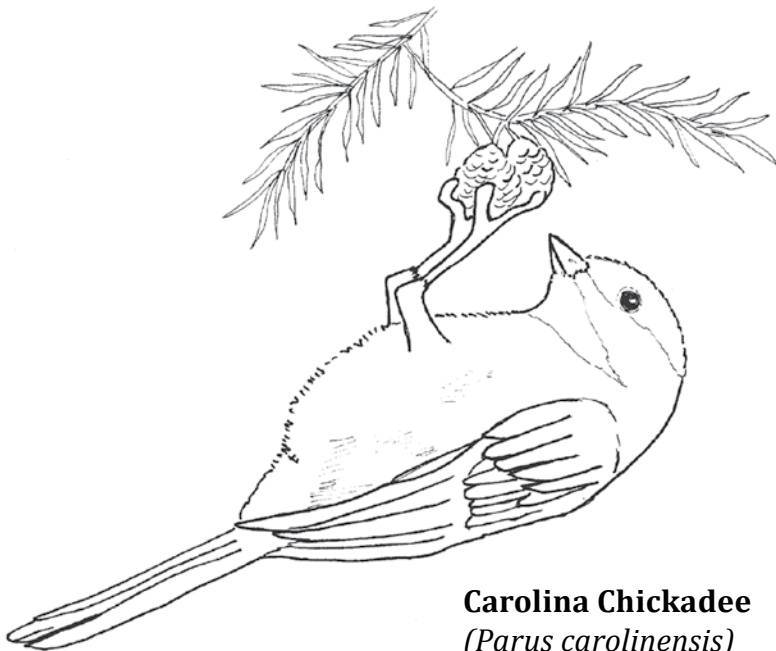
answer key : domestic cat, raccoon, fox, bear, hawk, chipmunk

Winter Survival



Tufted Titmouse
(*Parus bicolor*)

Downy Woodpecker
(*Picoides pubescens*)



Carolina Chickadee
(*Parus carolinensis*)

Changing Seasons and Winter Survival: Year-Round Residents

All birds need food, water and shelter in the right environment or habitat for health and safety. Resident birds remain in the same general area year-round. They breed and raise their young in the same area that they spend the winter. Resident birds change behavior to adapt to winter conditions.

Small woodland birds, like chickadees, titmice and downy woodpeckers, join mixed flocks to locate food. These birds are often seen together at backyard feeders.

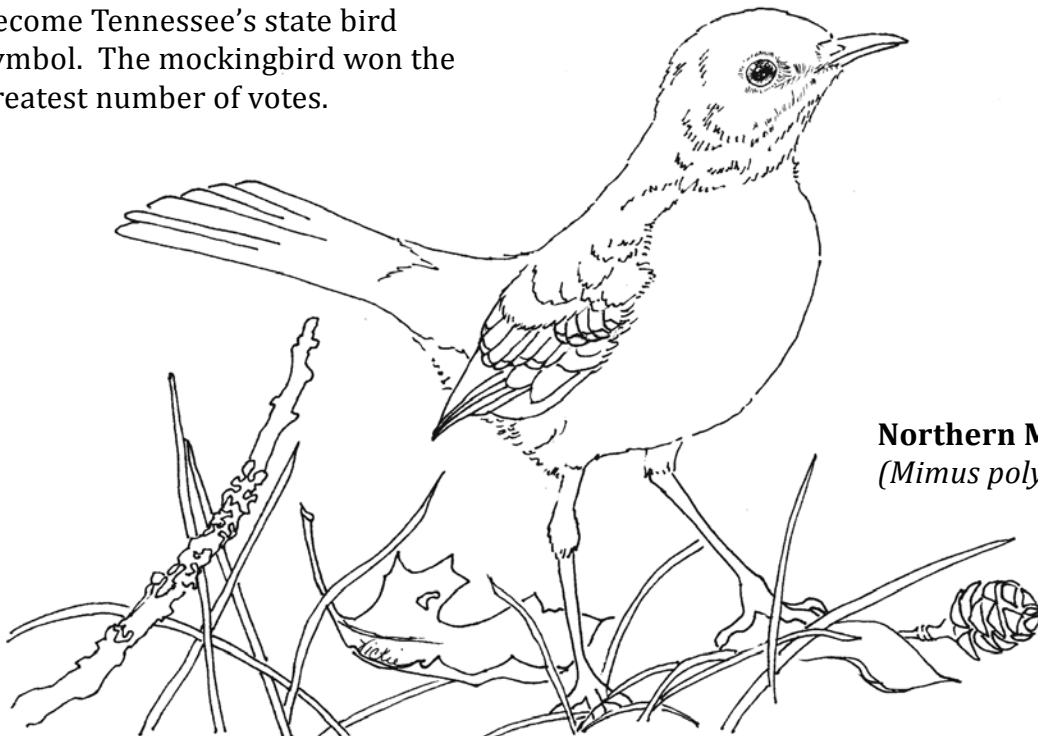
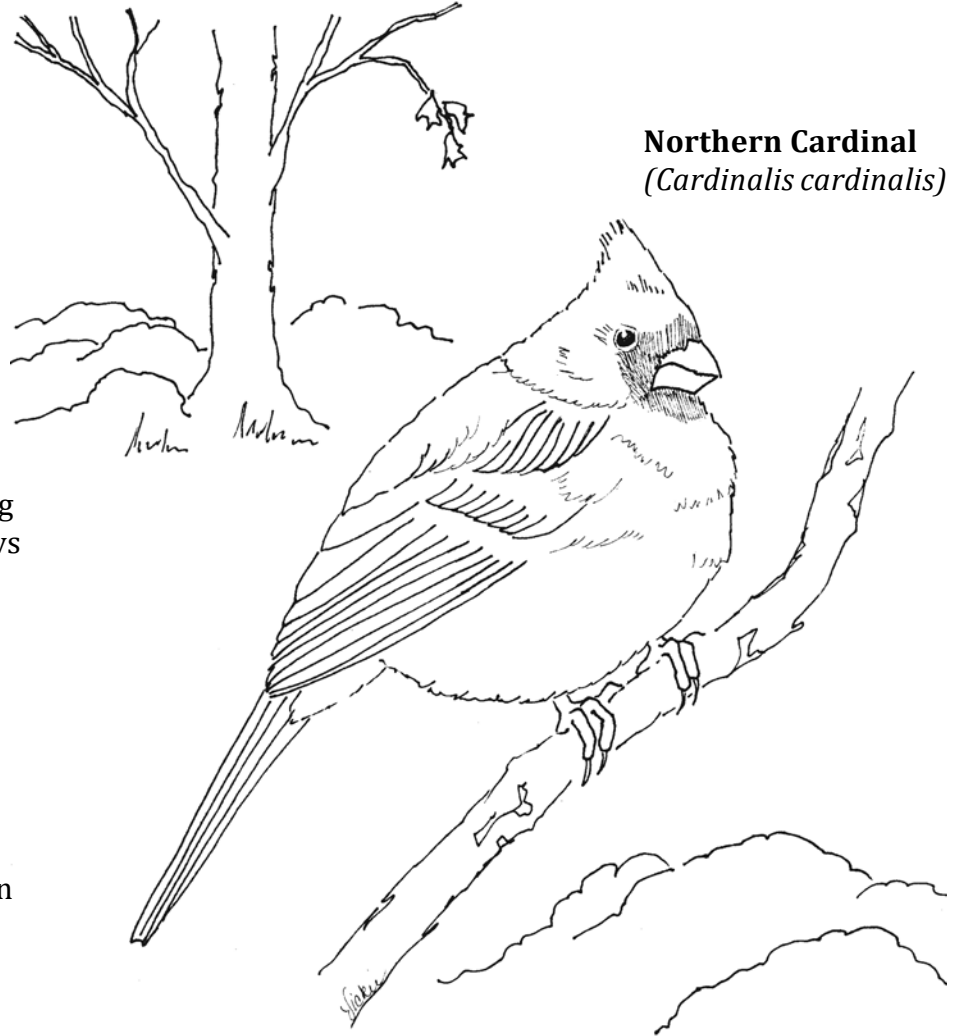
Winter Survival

Many birds grow extra down feathers in a fall molt to insulate against winter's cold. While molting a bird loses worn feathers and grows new ones. Small down feathers grown next to the skin add a thick layer of warmth. By fluffing these feathers to create air pockets, birds can add more insulation and may look twice their normal size!

The resident **Northern Mockingbird** has no song of its own but mimics other bird songs.

In 1933, 72,000 school children voted to decide which bird would become Tennessee's state bird symbol. The mockingbird won the greatest number of votes.

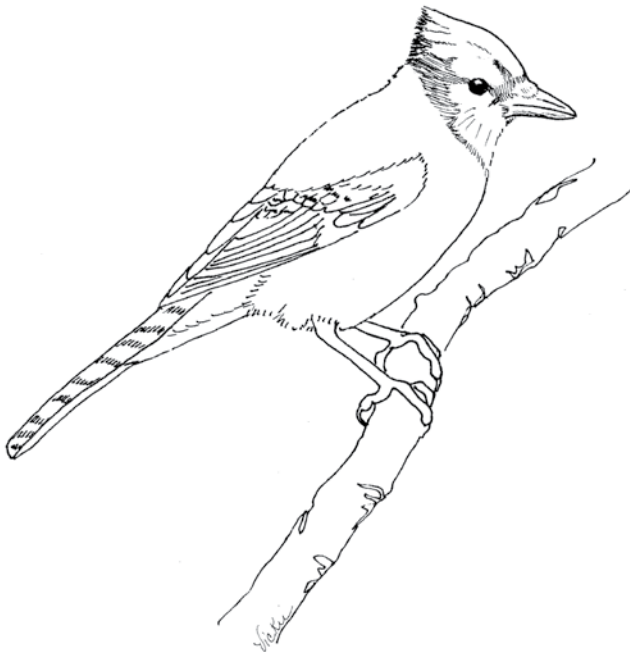
Northern Cardinal
(*Cardinalis cardinalis*)



Northern Mockingbird
(*Mimus polyglottos*)

Winter Survival

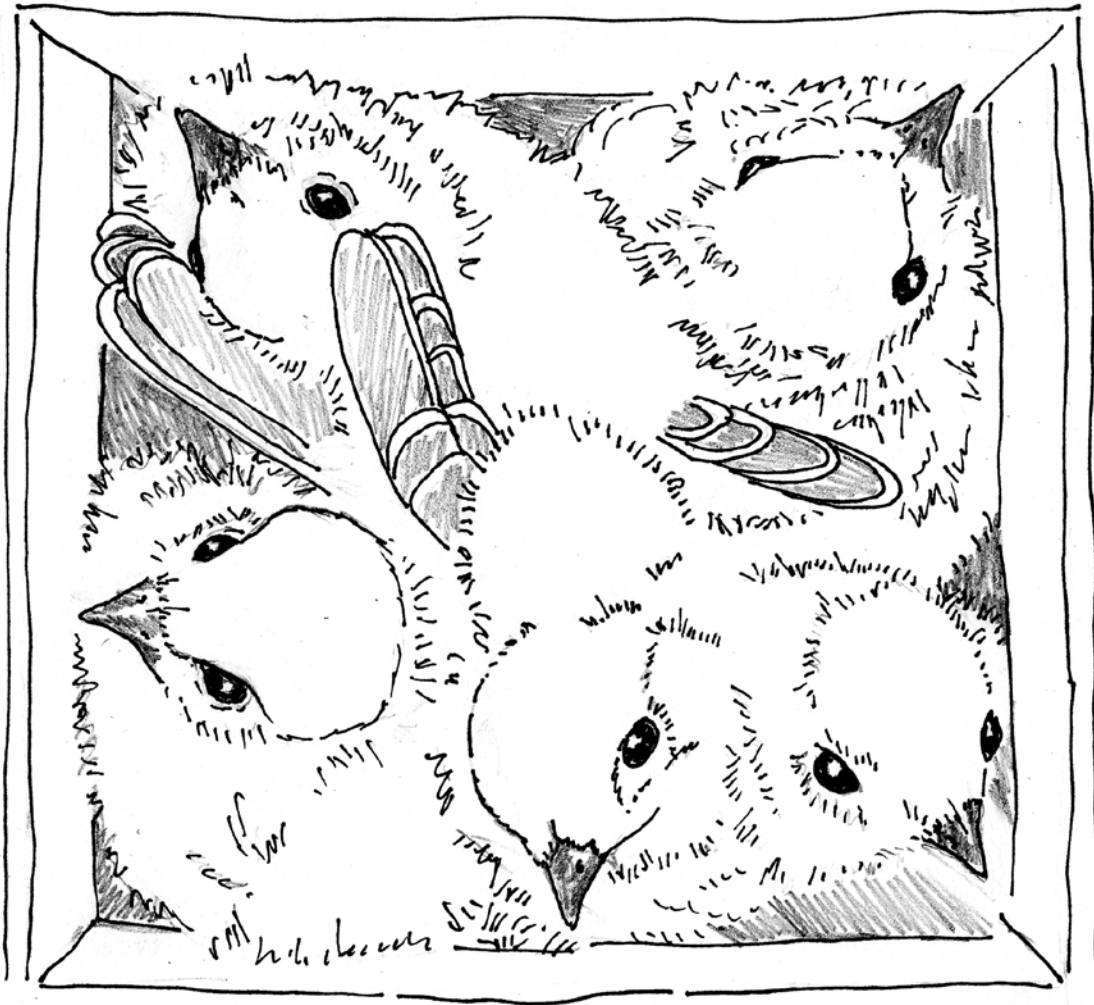
The **American Robin** (*Turdus migratorius*) is a year-round resident in Tennessee. It feeds on insects and worms when these are available. During the fall, large flocks of northern robins migrate or travel to Tennessee to find food. They can be seen eating in fruit bearing trees and shrubs, like dogwood and holly. Robins migrate in large mixed flocks and are noisy when they arrive.



The **Blue Jay** (*Cyanocitta cristata*) is a resident blue bird that is larger than a robin and has a crest. It makes noisy calls and will sometimes mimic the cry of hawks. A Blue Jay's favorite food is acorns, but they also eat insects, grubs and berries. Blue Jays from the north migrate from tree-top to tree-top in large flocks and are quiet while migrating. It is impossible to tell whether a wintering Blue Jay in your yard is a resident bird or a migrant. There is still much to learn about Blue Jay migration.

Winter Survival

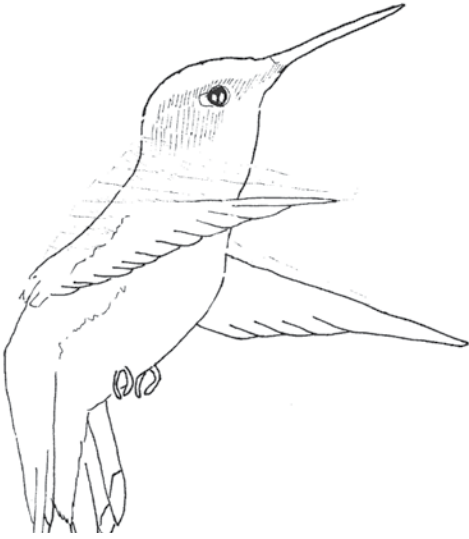
Eastern Bluebirds remain in Tennessee throughout the winter months. They eat insects and spiders when available and add small fruits and berries. They join other bluebirds in small flocks in the winter. Some of these flocks include northern bluebirds that have migrated or traveled south to find food and a warmer climate. When night temperatures drop to 20 F degrees or below, bluebirds roost together in cavities or nest boxes for warmth.



Name three ways that flocking helps birds in winter months.

answer key: more eyes to find food, more eyes to watch and warn of predators, for warmth while roosting on cold nights

Migration: Traveling to Find Food and Warmth



Many birds migrate long distances to find food during winter months. The **Ruby-throated Hummingbird** (*Archilochus colubris*) beats its wings at a rate of 40 to 80 beats per second. That takes a lot of energy! They eat tiny insects for protein and depend upon the sugar-rich nectar in flowers for their high energy needs.

Hummingbirds leave Tennessee in late summer and fall to migrate to southern Mexico and Central America. They travel 500 miles across the Gulf of Mexico without stopping! They know their migration route and the location of their winter home instinctively through genetic information.



Migration Mad Lib

Do this giddy activity in a group with teams of two people. One person reads the sentence and calls out the part of speech requested below each blank and the other supplies creative answers. The key is for those who give the answers to NOT see the story until it is completed. For example, if the sentence asks for a verb, you can call out 'run,' or 'fly,' or 'hop,' and your partner will write down the word in the blank. When you're done filling in all the blanks, have your recorder read your story out loud to the rest of the group for a good laugh!

It's Autumn and the _____ are starting to change color and fall from
(plural noun)
the _____. Days get shorter, the air is _____ and _____,
(plural noun) (adjective) (adjective)
and people start to think about _____, warm fires, and _____.
(plural article of clothing) (food)

Many birds are thinking about something else: migration. They have finished
raising their _____, who are now out on their own. They have grown a whole
(plural noun)
new set of _____ in preparation for the long journey to come.
(plural noun)

_____ are ripe and make a great source of _____
(plural food item) (noun)
to keep the birds going for _____ miles.
(number)

One _____ night, they take flight and head _____,
(adjective) (direction)
using the _____ to guide them. Each day, they come down to _____
(plural noun) (verb)
and _____ and _____ as much as they can so they
(same verb) (same verb)
will have _____ to _____ all the next night. They keep going like this,
(noun) (verb)

fly, eat, fly, eat, until they reach their destination. Some birds fly a short distance,
like from _____ to _____. Others fly a really long way,
(country) (state)
like from _____ to the southern tip of _____!
(different state) (continent)

And that's not all! Once they fly south and spend the _____ in another place,
(season)
they do it all over again in the spring, flying back north to _____!
(verb)

Migration is truly an _____ thing!
(adjective)



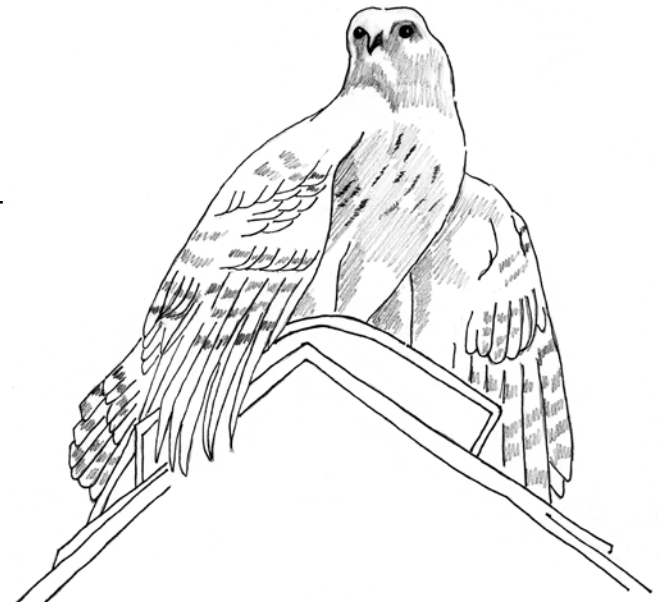
Bird Word Search

Find as many of these birdie words as you can! If you don't know what a word means, look it up in a dictionary. How do all of these words relate to each other?

On a separate piece of paper, try writing a story to connect all of the words.

E D H A T C H R I G L M T B V O A G O H
 V N B E R R Y M N H A T W G G D H A W K
 D A H U L I T M S K W U B F T U A Z K B
 S V D F O R E S T H W I N T E R C U U Y
 M I F O K M F Y I C F R Y A S G Y K X G
 Q G E B X H I K N U P X U L G U S E S J
 L A A I A T E G C M N S U O T L X T Y N
 H T T P N D L S T P H M C N G E O T L Z
 R E H Y I P D N U T K I R F L Y R L I B
 X Y E U F Y A W B L F L F L P F S E S E
 C E R Z M O L T R A V E L E R D T G L A
 R N V W V L Z J H C B S O D E P A O V K
 W O R M R F E T J I C S C G D F R Y N C
 E G G T W L J K W A O B K E A T G K C G
 S O A R N S F A M S P T L U T X M K L B
 V M B C S A U K E T A Z G Y O M X Y S R
 N Q J C Y G U Y D Z G Q V I R G L X X G
 E O L W T R O C E A N T N V O T V O J X
 S J Y G R Q K F A Q C V I T J P R W O T
 T H W U X C P C K H E E L W J D E V N S

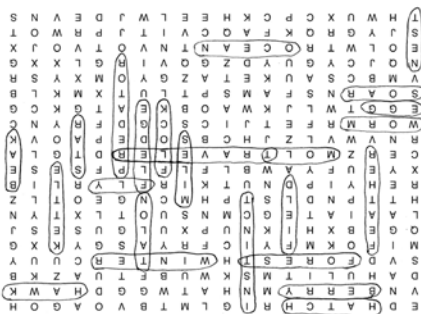
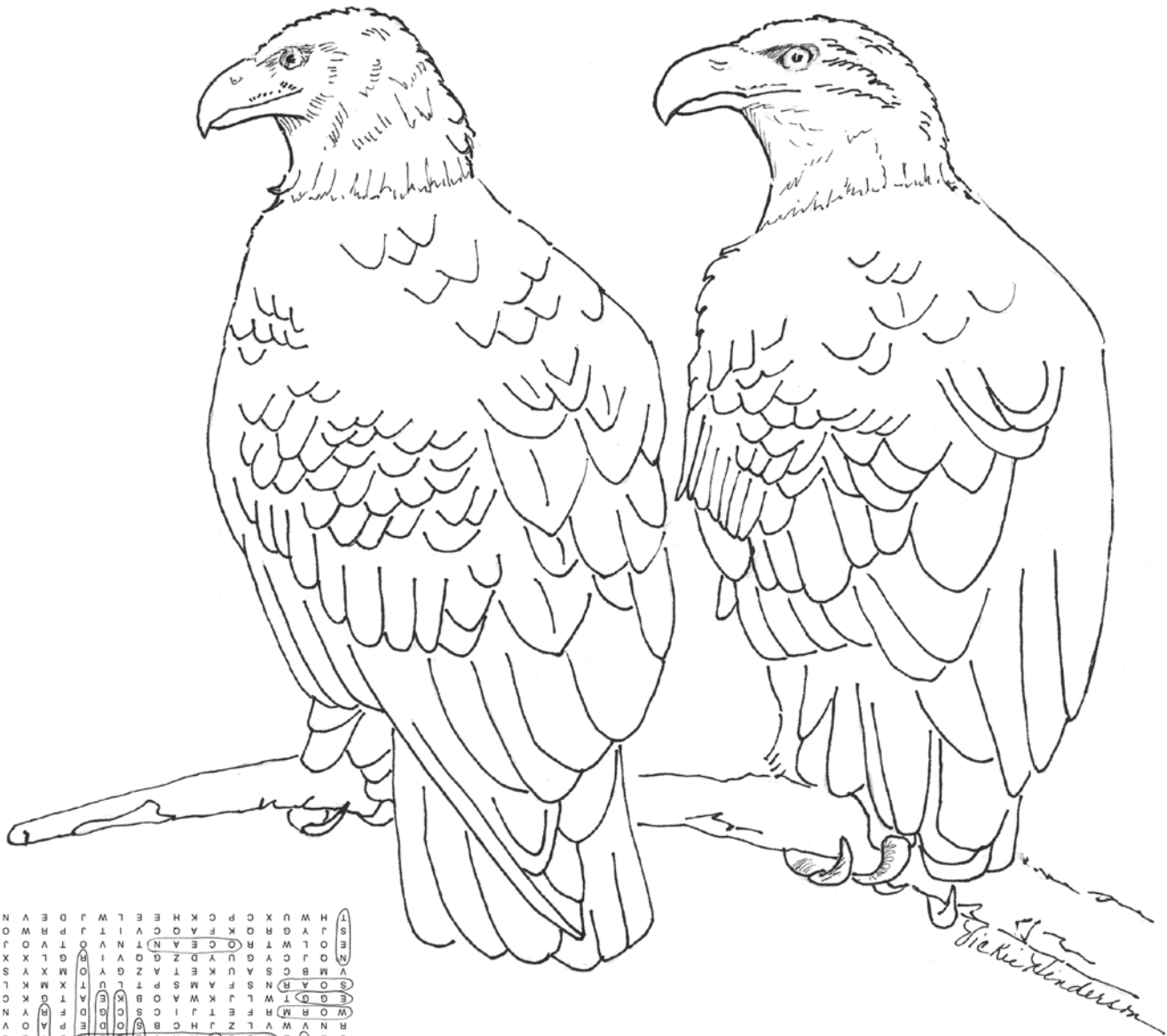
- | | | |
|----------|----------|----------|
| BEAK | BERRY | EGG |
| FEATHER | FIELD | FLEDGE |
| FLOCK | FLY | FOREST |
| HATCH | HAWK | INSTINCT |
| KETTLE | MILES | MOLT |
| PREDATOR | NEST | OCEAN |
| TALON | SOAR | STAR |
| WORM | TRAVELER | WINTER |



Conservation Helps Birds

Conservation is the study of wildlife and habitat in order to protect the earth and its biodiversity. When a plant or animal species numbers so few that we think it is in danger of being lost to the world, we call that species endangered. Many things can cause the decline of a species including chemicals, loss of habitat, disease, over-hunting and man-made changes.

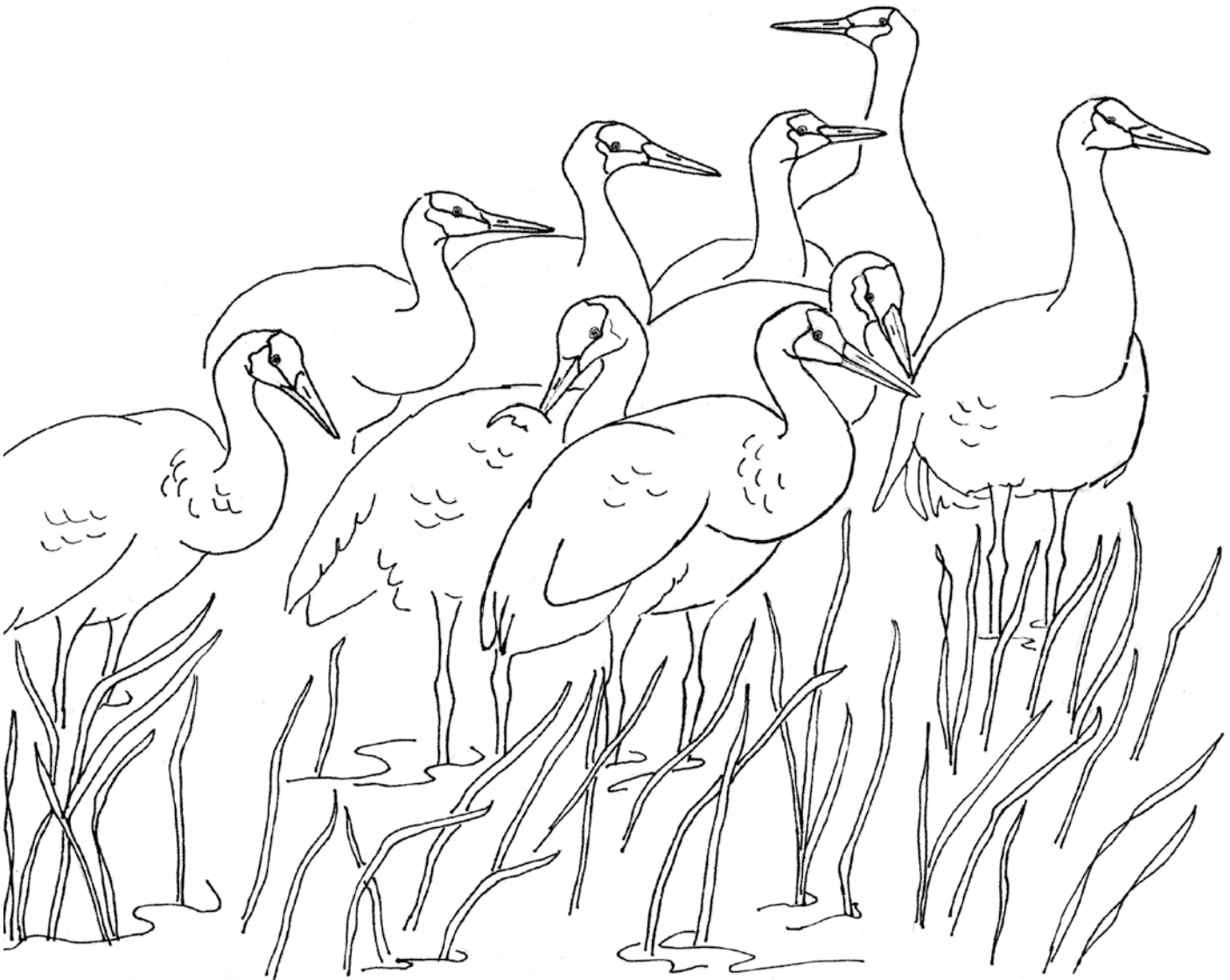
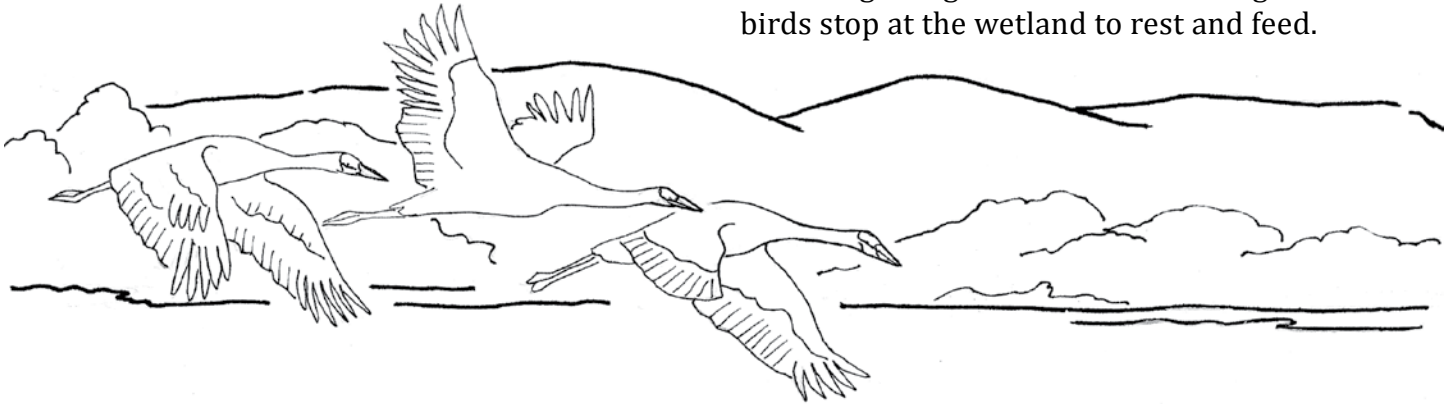
The Bald Eagle nearly disappeared by the early 1960's because of the pesticide DDT and habitat loss. Banning DDT and passing new laws protecting eagles helped. Eagles were also re-introduced or returned to areas where they had been lost. These conservation efforts helped Bald Eagles recover. In 2007, this species was removed from the endangered species list.



Sandhill Cranes

Eastern **Sandhill Cranes** live and breed in areas north of Tennessee. They migrate south to find food. Young birds migrating for the first time must learn the migration route by following their parents.

Sandhill Cranes migrate by soaring. They ride rising warm air currents called thermals without flapping their wings. Tennessee's Hiwassee Wildlife Refuge provides an important wetland stop-over or staging area for sandhill cranes and other migrating birds like ducks and geese. These birds stop at the wetland to rest and feed.



Sandhill Cranes

In the 1940s many biologists believed that the Sandhill Crane would become extinct along with the endangered Whooping Crane. But these cranes inspired human caring and action.

Conservation of wetlands and hunting restrictions helped the recovery of both our North American crane species.



Changing Populations

Eastern Bluebird (*Sialia sialis*)

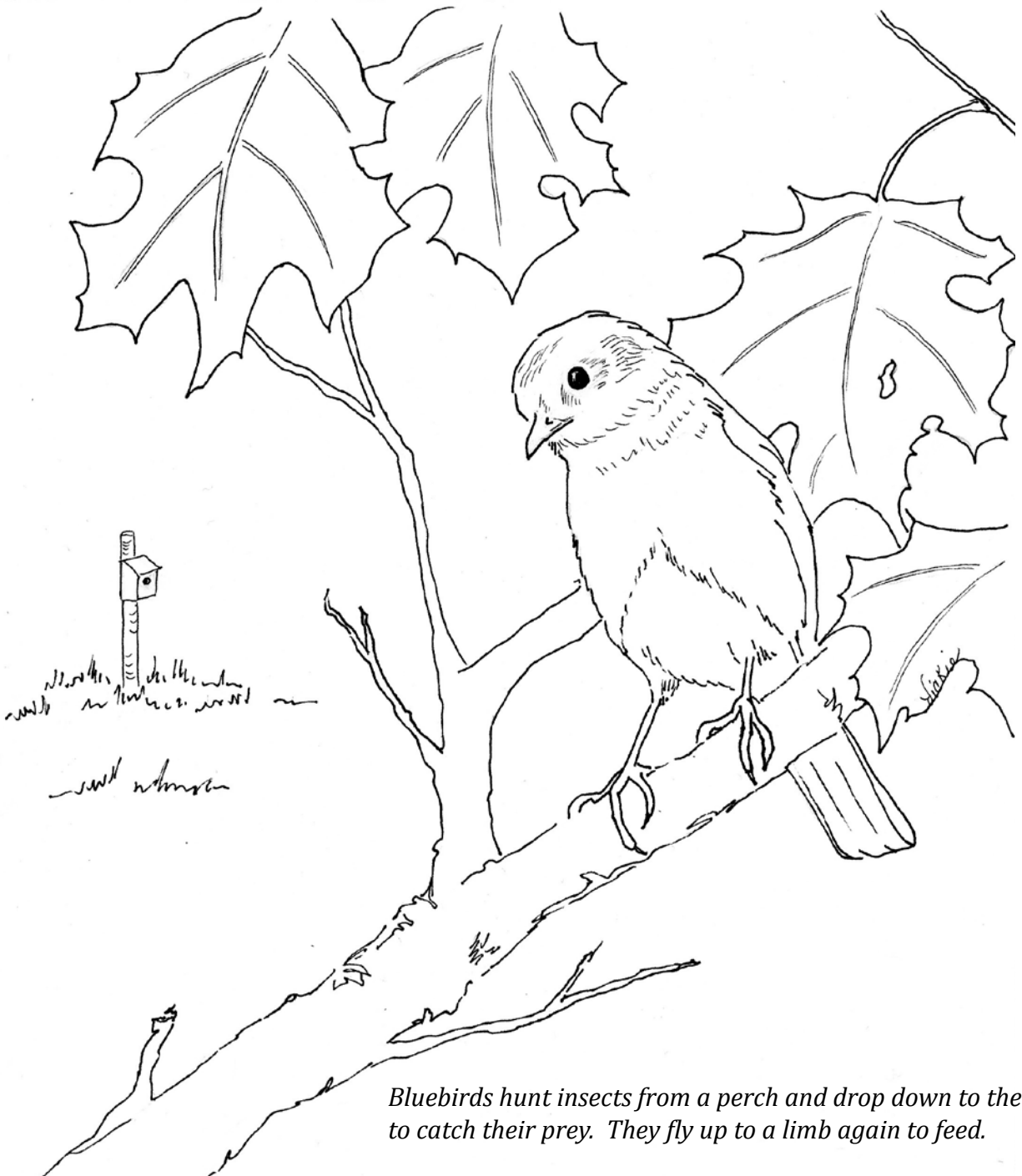
This is the beautiful blue bird you see on Watchable Wildlife license plates in Tennessee. They are year-round residents here.

Habitat: Bluebirds like open habitats without much groundcover such as orchards, open woodlands, parks, and lawns in suburban and rural areas.

Food: Insects and small fruits

Nesting: Bluebirds are cavity nesters, meaning they nest in holes in trees. Nest boxes are a substitute for tree holes, and bluebirds make good use of them. Young leave the nest after 15-18 days.

Conservation considerations: Bluebirds must compete with European Starlings and House Sparrows for available nest sites.



Bluebirds hunt insects from a perch and drop down to the ground to catch their prey. They fly up to a limb again to feed.

Changing Populations

Wild Turkey (*Meleagris gallopavo*)

Turkeys are the largest bird that nests in Tennessee. They spend a lot of time on the ground, but they can fly. They roost in trees at night. Turkeys are often hunted.

Wild Turkey do not grow down feathers. Instead, they have a second feather that grows on the feather shaft. This feather is called an after-shaft feather and may help keep the turkey warm.

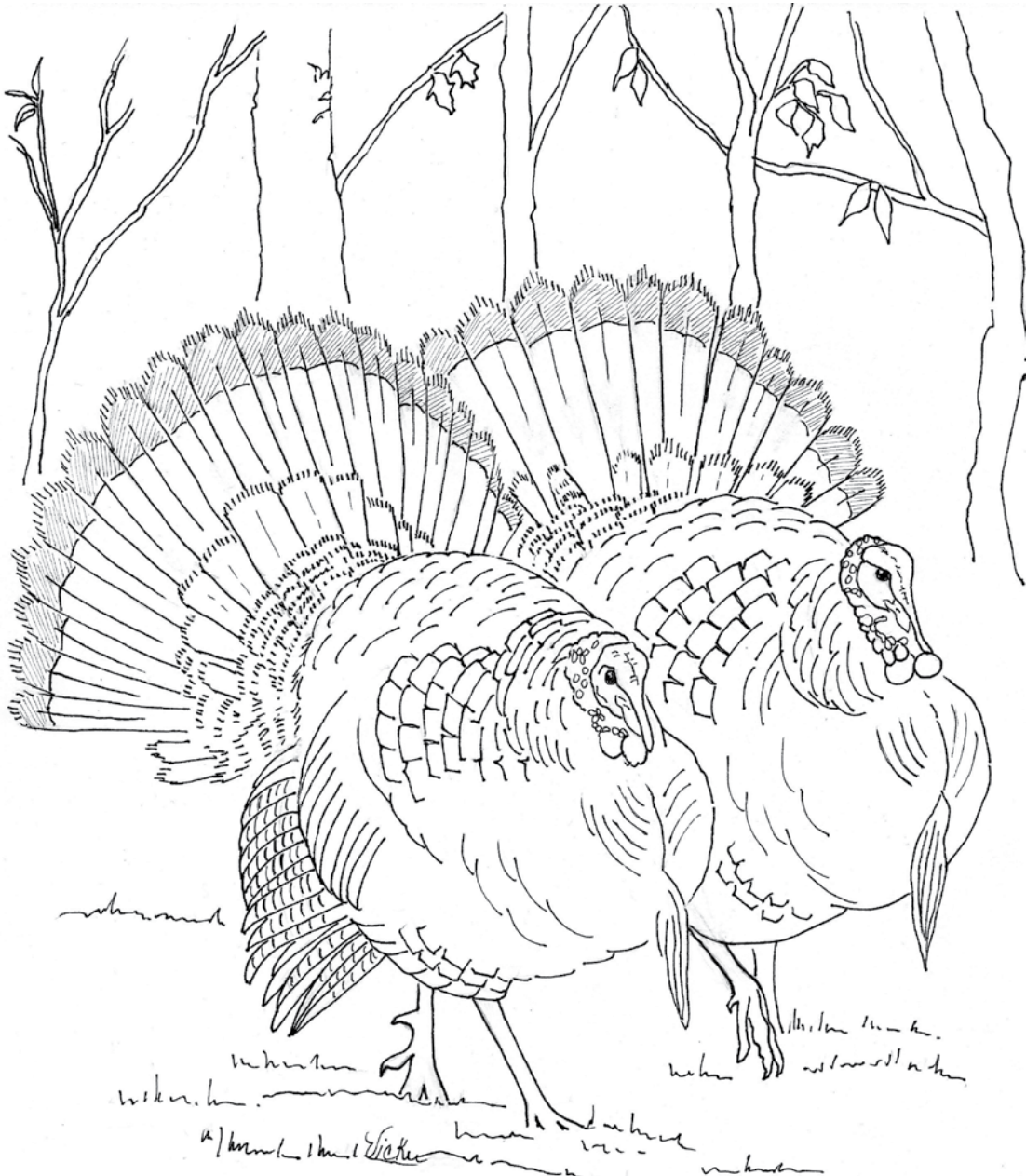


Habitat: Mature woodlands with scattered openings or fields.

Food: Acorns, nuts, seeds, fruits, and insects.

Nesting: Turkeys nest on the ground where they lay 7-14 eggs. The chicks leave the nest shortly after hatching.

Conservation considerations: Over-hunting eliminated turkeys from much of their range in the early 1900s, but modern wildlife management has allowed populations to bounce back throughout Tennessee.



Changing Populations

Ornithologists, people who study birds, count birds to learn how populations are changing. If numbers of a species are going down, ornithologists want to know why. If they can figure out why, it may be possible to solve problems before a species disappears.

The United States Department of the Interior has coordinated Breeding Bird Surveys (BBS) all across the United States, including Tennessee, since 1966. Counters cover a 24.5-mile route, stopping to record all the birds they see or hear for 3 minutes every half mile. The table below shows the number of individuals counted in Tennessee for three species, the Eastern Bluebird, Northern Bobwhite, and Wild Turkey, from 1970-2010.

A good place to look for more information on birds is the Tennessee Wildlife Resources Agency's Tennessee's Watchable Wildlife website (<http://www.tnwatchablewildlife.org/birds.cfm>).

Table 1. Counts of individuals of three species recorded on BBS routes in Tennessee from 1970-2010

Year	# of routes	Bird Species		
		Eastern Bluebird	Northern Bobwhite	Wild Turkey
1970	40	200	1200	0
1975	42	300	1200	0
1980	42	125	1150	0
1985	42	250	900	0
1990	39	425	700	0
1995	40	450	500	0
2000	37	575	300	17
2005	41	675	250	52
2010	38	500	150	50
Total	361	3500	6350	119

Data from USGS BBS, November 2012 (<https://www.pwrc.usgs.gov/bbs/>)
Numbers in the count have been rounded off.



Northern Bobwhite **(*Colinus virginianus*)**

The bobwhite was named for its loud whistled “bob-white” call. Bobwhites are non-migratory. These small chicken-like birds are a popular game bird and are hunted, like the wild turkey.

Habitat: Native grasslands interspersed with dense thickets near woodlands.

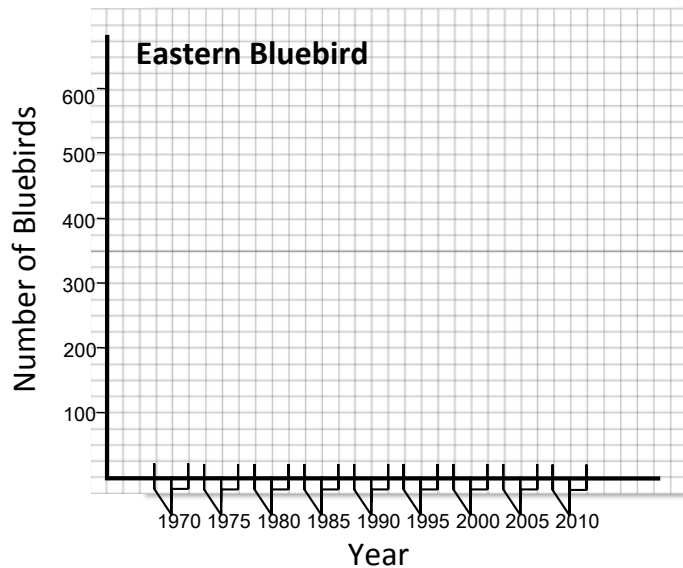
Food: They eat seeds and insects, mostly seeds in winter, and mostly insects in summer while raising young.

Nesting: Bobwhites nest on the ground where they usually lay 12-16 eggs. The chicks leave the nest within one or two days of hatching and can feed themselves.

Conservation considerations: Declining numbers may be due to succession of grasslands and farmlands to forest and changes in agricultural practices.

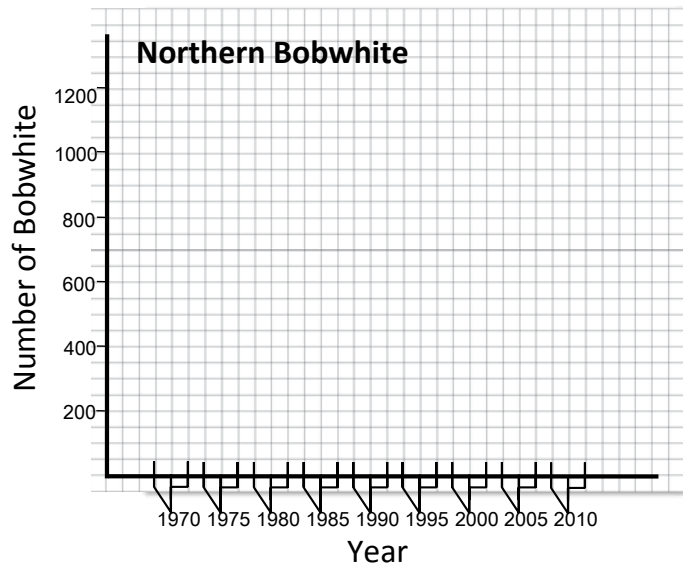
Changing Populations

Make **bar graphs** to represent the counts for each species to see how populations have changed from 1970-2010.



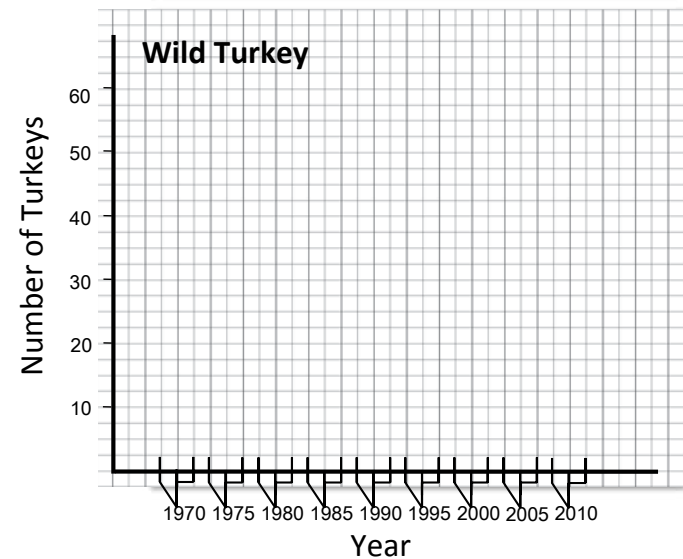
Describe how the number of Eastern Bluebirds has changed over time:

What might have caused this change in Eastern Bluebirds?



Describe how the number of Northern Bobwhites has changed over time:

What might have caused this change in Northern Bobwhites?



Describe how the number of Wild Turkeys has changed over time:

What might have caused this change in Wild Turkeys?

Bird Champions

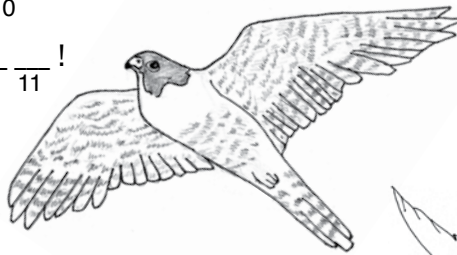
All birds have interesting facts to know about them but some are champions! Who is the tallest, the fastest? What birds really go the distance?

Birds by the Numbers: Break the Code!

You are communicating with a bird expert from the Tennessee Ornithological Society (TOS) via email, but every time she answers your questions some parts are broken up by numbers. It's a secret code! Can you break the code and find out the bird champions?

You: What is the fastest bird in the world?

TOS: $\frac{19}{19} \frac{11}{11} \frac{14}{14} \frac{11}{11} \frac{21}{21} \frac{14}{14} \frac{8}{8} \frac{13}{13} \frac{11}{11} \frac{6}{6} \frac{5}{5} \frac{15}{15} \frac{22}{22} \frac{4}{4} \frac{13}{13}$ — it can $\frac{20}{20} \frac{18}{18} \frac{4}{4} \frac{4}{4} \frac{19}{19} >200 \frac{7}{7} \frac{19}{19} \frac{2}{2}$
 in $\frac{19}{19} \frac{1}{1} \frac{14}{14} \frac{20}{20} \frac{1}{1} \frac{8}{8} \frac{17}{17} \frac{4}{4} \frac{6}{6} \frac{19}{19} \frac{14}{14} \frac{11}{11} \frac{10}{10}$.
 You can see them in $\frac{17}{17} \frac{11}{11} \frac{13}{13} \frac{13}{13} \frac{11}{11} \frac{20}{20} \frac{20}{20} \frac{11}{11} \frac{11}{11}$!



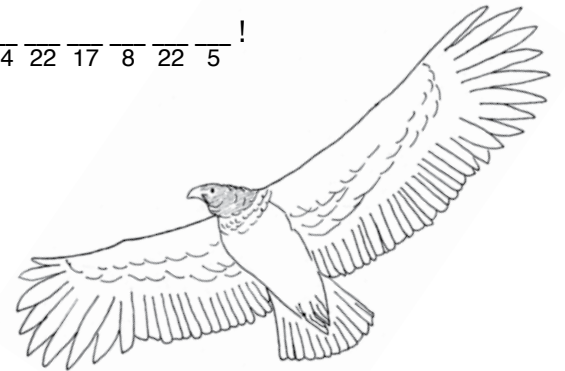
You: What bird migrates the farthest?

TOS: $\frac{5}{5} \frac{14}{14} \frac{22}{22} \frac{17}{17} \frac{8}{8} \frac{22}{22} \frac{17}{17} \frac{11}{11} \frac{14}{14} \frac{13}{13}$ — it weighs less than an $\frac{5}{5} \frac{19}{19} \frac{19}{19} \frac{15}{15} \frac{11}{11}$,
 but travels $> 44,000 \frac{7}{7} \frac{8}{8} \frac{15}{15} \frac{11}{11} \frac{20}{20}$
 $\frac{3}{3} \frac{8}{8} \frac{21}{21} - \frac{3}{3} \frac{5}{5} \frac{21}{21} \frac{21}{21} \frac{8}{8} \frac{13}{13} \frac{21}{21}$ from Greenland to $\frac{5}{5} \frac{13}{13} \frac{17}{17} \frac{5}{5} \frac{14}{14} \frac{22}{22} \frac{17}{17} \frac{8}{8} \frac{22}{22} \frac{5}{5}$!



You: What bird has the largest wingspan in North America?

TOS: $\frac{22}{22} \frac{5}{5} \frac{15}{15} \frac{8}{8} \frac{6}{6} \frac{4}{4} \frac{14}{14} \frac{13}{13} \frac{8}{8} \frac{5}{5} \frac{22}{22} \frac{4}{4} \frac{13}{13} \frac{16}{16} \frac{4}{4} \frac{14}{14}$
 — an $\frac{11}{11} \frac{13}{13} \frac{16}{16} \frac{5}{5} \frac{13}{13} \frac{21}{21} \frac{11}{11} \frac{14}{14} \frac{11}{11} \frac{16}{16}$ bird with wings $\frac{20}{20} \frac{19}{19} \frac{5}{5} \frac{13}{13} \frac{13}{13} \frac{8}{8} \frac{13}{13} \frac{21}{21}$
 $> 9 \frac{6}{6} \frac{11}{11} \frac{11}{11} \frac{17}{17}$, it weighs over $23 \frac{19}{19} \frac{4}{4} \frac{1}{1} \frac{13}{13} \frac{16}{16} \frac{20}{20}$!



You: What is the smallest bird in North America?

TOS: $\frac{22}{22} \frac{5}{5} \frac{15}{15} \frac{15}{15} \frac{8}{8} \frac{4}{4} \frac{19}{19} \frac{11}{11} \frac{2}{2} \frac{1}{1} \frac{7}{7} \frac{7}{7} \frac{8}{8} \frac{13}{13} \frac{21}{21} \frac{12}{12} \frac{8}{8} \frac{14}{14} \frac{16}{16}$ — only 3.25
 $\frac{8}{8} \frac{13}{13} \frac{22}{22} \frac{2}{2} \frac{11}{11} \frac{20}{20}$ long and $0.1 \frac{4}{4} \frac{1}{1} \frac{13}{13} \frac{22}{22} \frac{11}{11} \frac{20}{20}$. You could $\frac{7}{7} \frac{5}{5} \frac{8}{8} \frac{15}{15}$
 10 for the price of $1 \frac{19}{19} \frac{4}{4} \frac{20}{20} \frac{17}{17} \frac{5}{5} \frac{21}{21} \frac{11}{11} \frac{20}{20} \frac{17}{17} \frac{5}{5} \frac{7}{7} \frac{19}{19}$.



Bird Champions

You: What is the tallest bird in North America?

TOS: $\frac{18}{2} \frac{4}{4} \frac{19}{8} \frac{13}{21} \frac{22}{14} \frac{5}{5} \frac{13}{11}$ — almost

$5 \frac{6}{11} \frac{11}{17} \frac{17}{5} \frac{15}{15}$, a very rare endangered bird

you can sometimes see at the $\frac{2}{8} \frac{18}{5} \frac{20}{20} \frac{11}{11}$

$\frac{14}{11} \frac{6}{1} \frac{21}{11} \frac{17}{11} \frac{13}{13} \frac{11}{20} \frac{20}{11} \frac{11}{11}$!



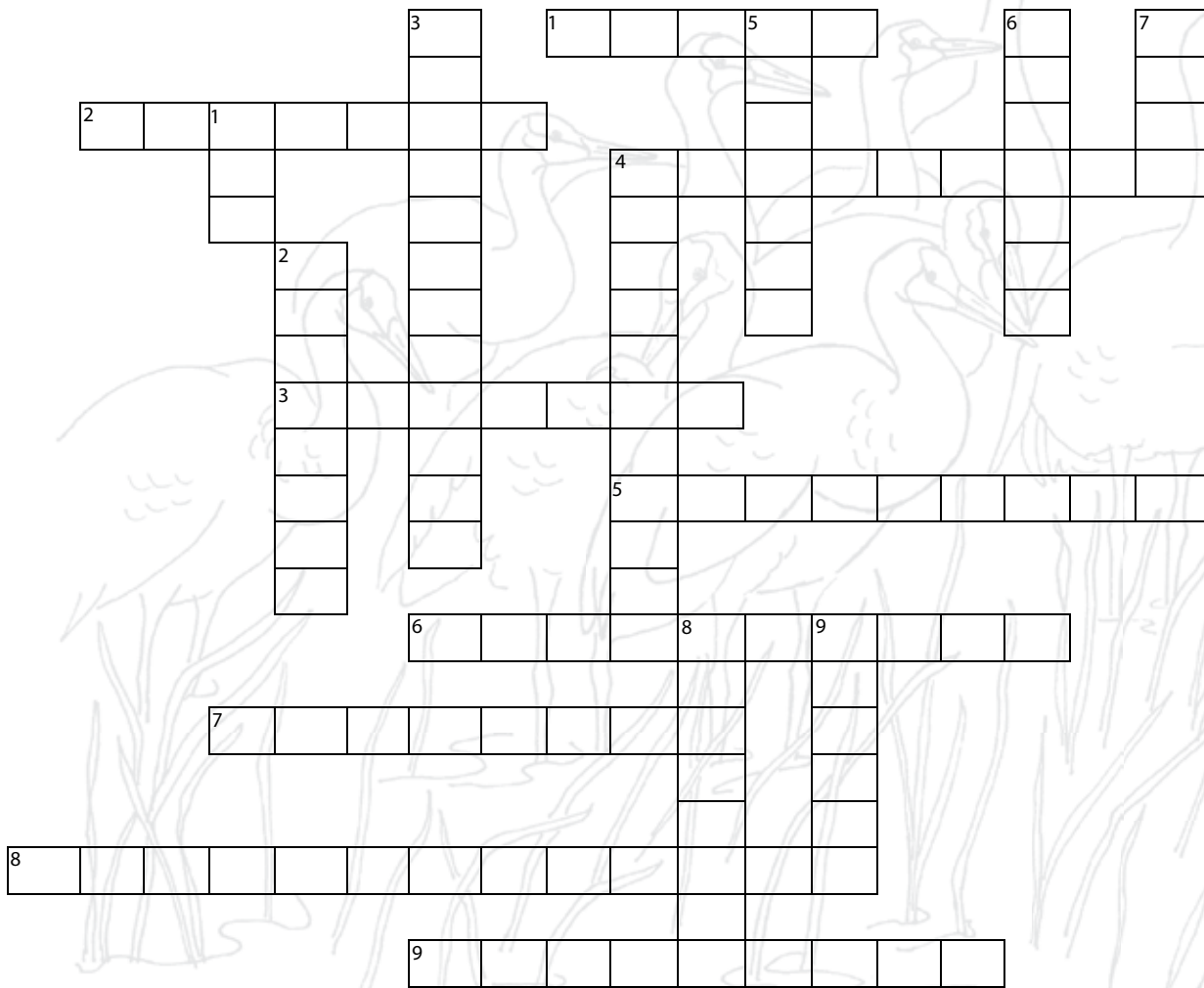
Break the Code!

LETTER	ANSWER THESE QUESTIONS TO FIND THE CODE	CODE
A	$(15 \div 5) + (1 \times 2)$	
B	$(26 \div 2) - 1$	
C	$(2 \div 0.5) + 18$	
D	$9 + (7 \times 2) - 7$	
E	$(5 \times 3) - 4$	
F	$1 + 9 - 4$	
G	$(7 \times 4) - 7$	
H	4×0.5	
I	$(9 \times 0) + 8$	
L	$(4 \times 4) - 1$	
M	$(7 + 7) - (14 \div 2)$	
N	$20 - 10 + 3$	
O	16×0.25	
P	$(5 \times 4) - 1$	
R	$(3 + 4) \times 2$	
S	$(12 \div 3) \times 5$	
T	$(5 + 2) + (20 \div 2)$	
U	$(5 - 4) \times 1$	
V	$(16 \div 8) + 7$	
W	$3 \times 3 \times 2$	
Y	$(11 \times 2) - 12$	
Z	$(7 \times 2) - (11 \div 1)$	

Make Your Own Coded Message!

TOS wants to know ... what's your favorite bird? Put it in code here:

Crossword



DOWN

1. Birds fluff their feathers to trap _____ and increase warmth in cold weather.
2. A grassland bird that is declining due to habitat loss.
3. The protection of birds and other wildlife species and their habitat.
4. Tennessee's state bird.
5. A wetland where migrating birds stop to rest and feed is known as a _____ area.
6. A specific environment that is needed for a bird's survival.
7. Tiny feathers that grow next to a bird's skin and add warmth.
8. High rising columns of air that birds use for soaring are called _____.
9. A large area of land that is preserved for wildlife is called a _____.

ACROSS

1. Cranes must _____ in water so predators can't sneak up on them while they sleep.
2. Flight that uses wind currents and is accomplished without wing flapping.
3. A habitat with land and water for at least part of the year.
4. Moving from one area to another in search of better climate and food.
5. A large bird that was once endangered due to pesticides.
6. A bird that does not grow down feathers.
7. A small gray bird with a pointed crest that travels in mixed winter flocks.
8. The endangered _____ may be found staging with Sandhill Cranes.
9. A habitat that is dominated by grasses.

titmouse
 wild turkey
 roost
 soaring
 habitat
 migration
 wetland
 refuge
 bobwhite
 bald eagle
 whooping crane
 conservation
 grassland
 air
 mockingbird
 staging
 down
 thermals

answer key on p 32

Discovery Notebook

For hundreds of years scientists and explorers have observed nature and recorded what they learned in notebooks with words and drawings. Join them and start your Discovery Notebook now!

Discovery Notebook

What you need:

Backpack or bag (to hold supplies), notebook or sketchbook, pencil, colored pencils or small paint kit, hat, sunscreen, water and your curiosity! Dress warmly in winter months. (Add other items of your choice.)

What you do:

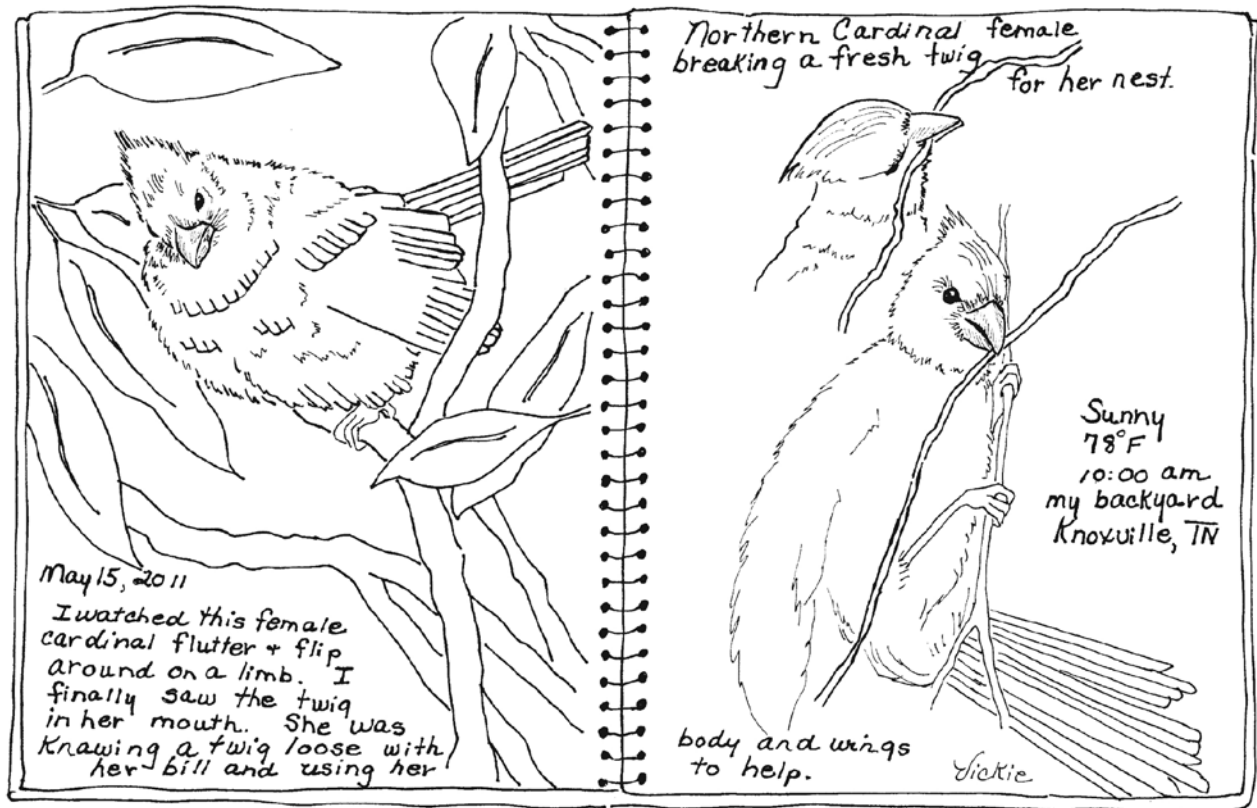
In your notebook write the date, time, weather and location. Now you're ready to start observing and recording what you find.

Describe what you see and experience with pictures and words. As a silent observer, you can see how birds and animals interact in their natural world.

Where do they live? What do they eat? How do they move? What sounds do they make? What surprises you?

Practice staying the right distance away. What do you notice happening when you are too close?

When you are unseen and unheard, you have the best chance of seeing the funny, the fun and the amazing things that happen in our natural world! Bring along your curiosity and your notebook, and anything — anything can happen!



Young Birder's Reading List:

1. *Flute's Journey, The Life of a Wood Thrush* by Lynne Cherry
2. *A Temperate Forest Food Chain, A WHO-EATS-WHAT Adventure in North America* by Rebecca Hogue Wojahn and Donald Wojahn; www.lernerbooks.com
3. *Birds, Nests and Eggs* by Mel Boring; NorthWord Press www.northwordpress.com
4. *Birds At My Feeder* by Bobbie Kalman; Crabtree Publishing Company www.crabtreebooks.com
5. *Bald Eagle Road to Recovery* by Susan H. Gray; Cherry Lake Publishing www.cherrylakepublishing.com
6. *The Peterson First Guides: Birds, The concise field guide to 188 common birds of North America* by Peterson Field Guides; <http://www.amazon.com/Peterson-First-Guide-Birds-America/dp/0395906660>
7. *Whoop Dreams: The Historic Migration* by Jane Duden www.perfectionlearning.com/viewProduct.php?productID=3957201
8. *The Young Birder's Guide to Birds of North America* by Bill Thompson III <http://www.birdwatchersdigest.com/shop/>

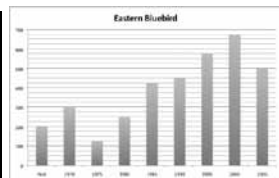
Resources and Answer Keys

Vocabulary words:

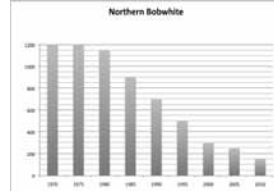
resident extinct decline feather preen habitat conservation insulation
 hatch talon molt refuge pesticide incubation hatchling migration
 staging roost microscopic nestling instinct flock re-introduction pores
 fledge thermals down lichen oxygen brood soaring endangered
 warm-blooded hard-shelled suet wetland grassland vocalizations beak ornithologist

Answer key pg 27:

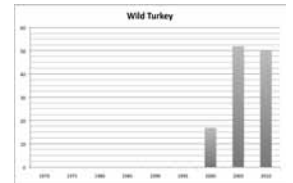
Year	Eastern Bluebird
1970	200
1975	300
1980	125
1985	250
1990	425
1995	450
2000	575
2005	675
2010	500



Year	Northern Bobwhite
1970	1200
1975	1200
1980	1150
1985	900
1990	700
1995	500
2000	300
2005	250
2010	150



Year	Wild Turkey
1970	0
1975	0
1980	0
1985	0
1990	0
1995	0
2000	17
2005	52
2010	50



Answer key pg 28-29:

Birds by the Numbers: Bird Champions

Peregrine Falcon – it can stoop >200 mph in pursuit of prey. You can see them in Tennessee!

Arctic Tern – It weighs less than an apple, but travels 44,000 miles zig-zagging from Greenland to Antarctica.

California Condor – an endangered bird with wings spanning > 9 feet, it weighs over 23 pounds.

Calliope Hummingbird – only 3.25 inches long and 0.1 ounces. you could mail 10 for the price of 1 postage stamp.

Whooping Crane – almost 5 feet tall, a very rare endangered bird you can sometimes see at the Hiwassee Refuge in Tennessee!

Break the Code!		
LETTER	ANSWER THESE QUESTIONS TO FIND THE CODE	CODE
A	$(15 \div 5) + (1 \times 2)$	5
B	$(26 \div 2) - 1$	12
C	$(2 \times 0.5) + 18$	22
D	$9 + (7 \times 2) - 7$	16
E	$(5 \times 3) - 4$	11
F	$1 + 9 - 4$	6
G	$(7 \times 4) - 7$	21
H	4×0.5	2
I	$(9 \times 0) + 8$	8
L	$(4 \times 4) - 1$	15
M	$(7 + 7) - (14 \div 2)$	7
N	$20 - 10 + 3$	13
O	16×0.25	4
P	$(5 \times 4) - 1$	19
R	$(3 + 4) \times 2$	14
S	$(12 \div 3) \times 5$	20
T	$(5 + 2) + (20 \div 2)$	17
U	$(5 - 4) \times 1$	1
V	$(16 \div 8) + 7$	9
W	$3 \times 3 \times 2$	18
Y	$(11 \times 2) - 12$	10
Z	$(7 \times 2) - (11 \div 1)$	3

Answer key pg. 30:

down: 1. air 2. bobwhite 3. conservation 4. mockingbird 5. staging 6. habitat 7. down 8. thermals 9. refuge

across: 1. roost 2. soaring 3. migration 4. wetland 5. bald eagle 6. wild turkey 7. titmouse 8. whooping crane 9. grassland

More About Birds!

Website Resources:

Tennessee Ornithological Society: http://www.tnbirds.org/birding_tn.htm

Vickie Henderson Art: <http://vickiehenderson.blogspot.com/>

Eastern Bluebird Family Videos: <http://vickiehenderson.blogspot.com/search/label/bluebird%20family%20video>

Tennessee Watchable Wildlife: <http://www.tnwatchablewildlife.org/birds.cfm>

Cornell Lab of Ornithology

All About Birds: <http://www.allaboutbirds.org/Page.aspx?pid=1189>

Getting Kids Involved: <http://www.birds.cornell.edu/education/kids>

NestWatch: <http://nestwatch.org/>

Project FeederWatch: <http://www.birds.cornell.edu/pfw/>

The Great Backyard Bird Count: <http://www.birdsource.org/gbbc/>

eBird: <http://ebird.org/content/ebird/>

Project RubyThroat: <http://www.rubythroat.org/>

Project Beak: <http://projectbeak.org/index.htm>

Bird Watching for Kids: <http://www.biglearning.com/treasurebirds.htm>

Bird Watching Activities for Kids: <http://tlc.howstuffworks.com/family/bird-watching-activities-for-kids.htm>

Audubon Adventures in School: <http://web4.audubon.org/educate/aa/in-school.html>

Journey North, A Global Study of Wildlife Migration and Seasonal Changes: <http://www.learner.org/jnorth/>

Bird Watchers' Digest--Young Birders http://yb.birdwatchersdigest.com/youngbirders/index.php?sc=bwd_home

Sandhill Cranes and Whooping Cranes at the Hiwassee Wildlife Refuge



Photo credit: Cyndi Routledge

The Eastern Population of Greater Sandhill Cranes is a unique population that breeds and migrates only in the east. By the 1930s this population of cranes had declined to only 25 known breeding pairs in Wisconsin and biologists feared it would become extinct. Hunting restrictions, conservation of wetlands, and the Sandhill Crane's ability to adapt to smaller breeding territories and feed in waste grain fields brought this population back from the brink of extinction.

In the early 1960s the Sandhill Crane was suspected as migrating through Tennessee but rarely observed. Today the population migrating through Tennessee is estimated to number 75,000.

The Hiwassee Wildlife Refuge is located at the confluence of the Tennessee and Hiwassee Rivers and provides vital habitat for many migrating waterfowl and shorebirds. The refuge is managed by the Tennessee Wildlife Resources Agency and was historically planted in corn and other grains to attract migrating ducks and geese. The combination of shallow wetlands that cranes need for safe roosting and a readily available food source made the Hiwassee Wildlife Refuge a perfect resting place for migrating cranes. It is now one of the largest Sandhill Crane staging areas in the east, second only to Jasper-Pulaski Fish and Wildlife Area in Indiana.

In 2001, the Whooping Crane Eastern Partnership began its ultralight-led Whooping crane re-introduction project. In the fall of that year, Operation Migration's piloted ultralights successfully led five captive-reared juvenile Whooping Cranes on their first 1285 mile journey south from Necedah National Wildlife Refuge in Wisconsin to wintering grounds in Chassowitzka National Wildlife Refuge in Florida, stopping at the Hiwassee Wildlife Refuge midway through their journey. In the spring, these five cranes migrated north again without human assistance, returning to their fledging grounds in Necedah. This marked the first time that migrating Whooping Cranes had been present in the east in over one hundred years. Today, more than 100 endangered Whooping Cranes migrate through the east each fall and spring.

Photo credit: David Roemer



Tennessee's Hiwassee Wildlife Refuge provides a vital staging area for Sandhill Cranes and Whooping Cranes and offers a spectacular viewing opportunity for the public to celebrate the recovery of both these majestic crane species.



Bald Eagle



Downy Woodpecker



Peregrine Falcon



Sandhill Crane



Carolina Chickadee



Carolina Wren



Northern Bobwhite



Northern Cardinal



Northern Mockingbird



Tufted Titmouse



American Robin



Eastern Bluebird



Blue Jay



Ruby-throated Hummingbird



Wild Turkey

Just cut out this ID card and fill in your name!

Students of all ages are using their creativity and passion to help birds.

From science projects to senate resolutions, letter writing campaigns to Discovery Notebooks, from building nest boxes to making paper cranes, youth are teaching others about birds and making a difference in our world!

Become a citizen conservationist and have fun discovering birds!

Tennessee Ornithological Society
<http://tnbirds.org>

Vickie Henderson Art
<http://vickiehenderson.com>




I am watching and helping birds!

Name: _____

★ OFFICIAL MEMBER ★

The Tennessee Ornithological Society and Vickie Henderson Art invite you to Discover Birds!