This book belongs to _____

My age is _____

Junior Scientist



Heartland Network

National Park Service
U.S. Department of the Interior

How to Become a Junior Scientist:

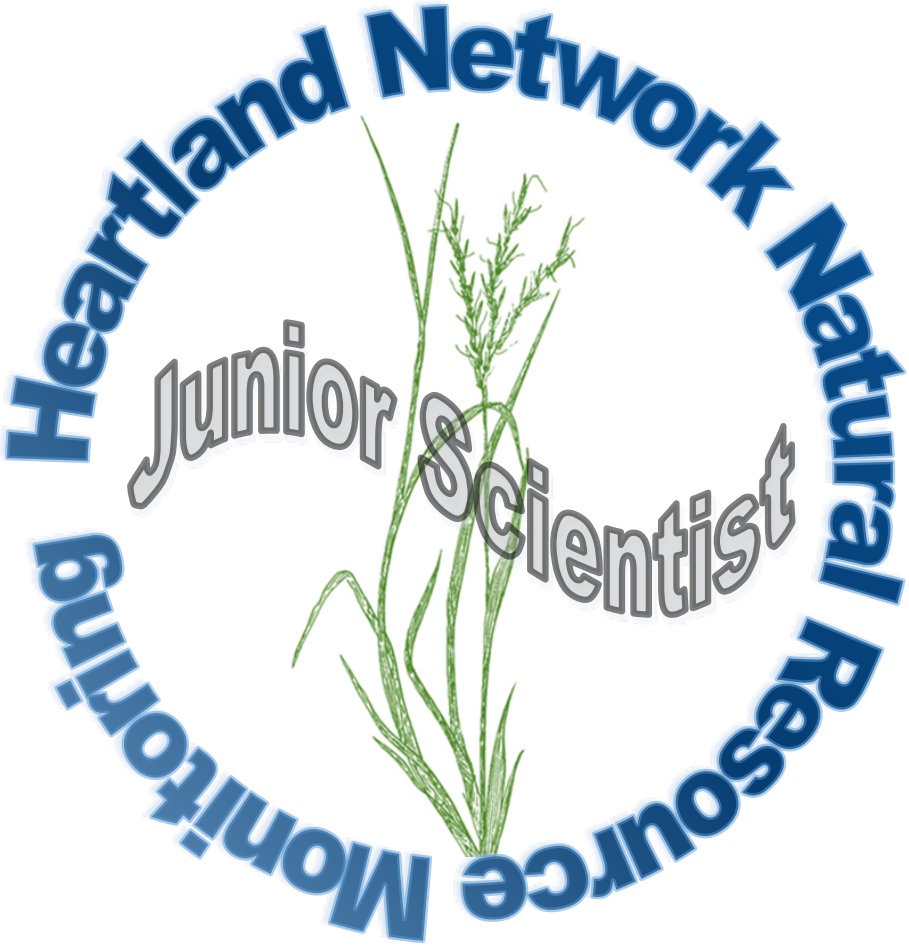
1. Complete this activity booklet. Each age group has a minimum number of activities to complete. Some activities are multiple pages. When you are finished, fill in your name on the certificate at the end of this booklet.

   For **ages 8 and under**, please complete at least **5** activities.

   For **ages 9 to 12**, please complete at least **8** activities.

   For **ages 13 and over**, please complete at least **10** activities.

2. If you are filling in this booklet at one of the 15 Heartland Network parks, you can show your completed booklet to the front desk ranger to get your badge. The ranger will sign and date the certificate. If you are completing the booklet at home, fill in your name and the date on the certificate.



What Is the Heartland Network?

There are many scientists that work for the National Park Service. The Heartland Network is a group of scientists that inventory and monitor natural resources for 15 Midwestern parks in eight different states. The map below shows the state each park is located in. Inventories are one-time counts of items, like how many and what type of bats are in a park. Monitoring means to study something over a long time. We monitor plants, animals, and how clean the water is in streams and rivers. Some of the animals that we monitor are birds, fish, insects, and deer. Many different plants that live in prairies, forests, wetlands, and other habitats are also studied. Learn more at the Heartland Network website (www.nps.gov/im/htln).



Examples of some of the things Heartland Network scientists inventory and monitor:







Parks That Make Up the Heartland Network:

Arkansas Post National Memorial is located a short drive from Gillett, Arkansas. It was the first European settlement in the lower Mississippi Valley. This park is mainly about the history of the United States and Arkansas. Six different flags have flown here, including the French and Spanish flags. American alligators are some of the wildlife you will find here!

Buffalo National River preserves one of the few free-flowing undammed rivers in the lower 48 states. Located in northern Arkansas, it is a great place to go floating down the river, hiking, or camping in the Ozark Mountains.

Cuyahoga Valley National Park is along the Cuyahoga River between Akron and Cleveland, Ohio. There are many different things in one area. You can see historical farms, villages, youth camps, and a section of the Ohio & Erie Canal. There are also sandstone cliffs, forests, wetlands, and streams with diverse plants and animals. The park has trails for hiking, biking, horseback riding, and paddling. You can even take a scenic train ride.

Effigy Mounds National Monument is a place in northeast Iowa that overlooks the Mississippi River where indigenous people engineered earthen mounds arranged with great precision, beauty, purpose, and meaning. Mound construction started about 2,500 years ago. Some mounds are in the shape of animals, such as birds and bears, which are often called effigy mounds. This special place is within the traditional land of many tribal nations. It continues to be a place of great reverence, ceremony, and celebration.

George Washington Carver National Monument preserves the birthplace and childhood home of George Washington Carver who was born enslaved on this property during the Civil War. Located in the southwest corner of Missouri, this 240-acre farm is where Carver lived and learned in his early years before leaving to pursue a formal education. It is also the first national park site dedicated to an African American.

Herbert Hoover National Historic Site preserves the birthplace of Herbert Hoover, the 31st President of the United States and the first president born west of the Mississippi River. The park, located in Iowa, is also home to about 80 acres of reconstructed tallgrass prairie.

Homestead National Historical Park shows us an example of what the land looked like when millions of people claimed land grants across the United States. Located in southeast Nebraska, the park commemorates the Homestead Act of 1862 and the far-reaching effects it had upon the landscape and people.









Hopewell Culture National Historical Park lies in the heart of southern Ohio where Native Americans built dozens of monumental mounds and earthen enclosures nearly 2,000 years ago. These enormous Hopewell earthworks were built with geometric precision and aligned with the patterns of the sun and moon. This Native American religious movement spread across half the continent, and these earthworks were the gathering site for feasts, funerals, and rites of passage.

Hot Springs National Park, located in the beautiful Ouachita Mountains in Arkansas, is filled with a rich history. The grand architecture of 20th century bathhouses along with the thermal springs, forested hiking trails, and creeks makes it a wonderful place to visit.

Lincoln Boyhood National Memorial cares for the site where Abraham Lincoln spent his youth. In southern Indiana, our 16th president learned many of the character and moral traits that helped make him a respected leader.

Ozark National Scenic Riverways is the first national park to protect a river system. Located in southeast Missouri, the Current and Jacks Fork rivers are two of the finest floating rivers you will find anywhere. The rivers are spring fed and are a delight to be on or around.

Pea Ridge National Military Park commemorates the Civil War battle that occurred here on March 7 and 8, 1862. Although in Arkansas, the Union victory at Pea Ridge helped the federal government maintain physical and political control of the state of Missouri for the remainder of the war. Today the 4,440-acre battlefield preserves the cultural and natural landscape as it would have looked in 1862.

Pipestone National Monument is a sacred site used by Indigenous people for over 3000 years as a quarry for the red stone used to make pipes for prayer and ceremony, a tradition that continues today. Located in the southwestern corner of Minnesota, the Monument is largely covered in tallgrass prairie, which is a vanishing ecosystem.

Tallgrass Prairie National Preserve is located in the Flint Hills of Kansas. Tallgrass prairie once covered 170 million acres of North America. As our country was settled, most of the prairie was transformed to cities, farms, and roads. Less than 4% of the prairie remains today. The preserve protects a remnant of this once vast tallgrass prairie ecosystem, while telling the story of the 1880s ranching legacy.

Wilson's Creek National Battlefield is the site of the second major battle of the U.S. Civil War. It was fought in southwest Missouri on August 10, 1861. Missouri ranks 3rd with the number of battles fought within its borders. General Nathaniel Lyon died at this battle, becoming the first Union general killed during the Civil War. The Southerners won the battle but could not pursue the Union Army. Lyon lost the battle and his life but achieved his goal: Missouri remained under Union control.










Location

A main activity of a scientist is knowing where they are. Increasing your knowledge about something or discovering something new has less meaning if scientists cannot document where that discovery happened. Location helps put things into context.

Armadillos do not like the cold. You will not find them in areas that have long, cold winters. The northern parts of the United States have longer and colder winters than the southern parts.

A scientist reports that an armadillo was seen. Which park do you think the scientist works in? Put an X next to the park that has armadillos. If you need help, refer to the map on page 3.

Pipestone National Monument

_____

or

Arkansas Post National Memorial

_____

Knowing where you are is always helpful! It can help you know if a plant or animal has moved in or out of an area.

In the following activity, match the park with its state. If you need help, you may want to go back to the park summaries at the beginning of this document.



Park/State Match:

Listed below are the 15 parks that make up the Heartland Network. Each one has a letter next to it. Match the park to the state where it is located by writing the letter of the park on the arrow that points to each state. Hint: Some states have multiple parks.

A. Arkansas Post National Memorial

B. Buffalo National River

C. Cuyahoga Valley National Park

D. Effigy Mounds National Monument

E. George Washington Carver National Monument

F. Herbert Hoover National Historic Site

G. Homestead National Historical Park

H. Hopewell Culture National Historical Park

I. Hot Springs National Park

J. Lincoln Boyhood National Memorial

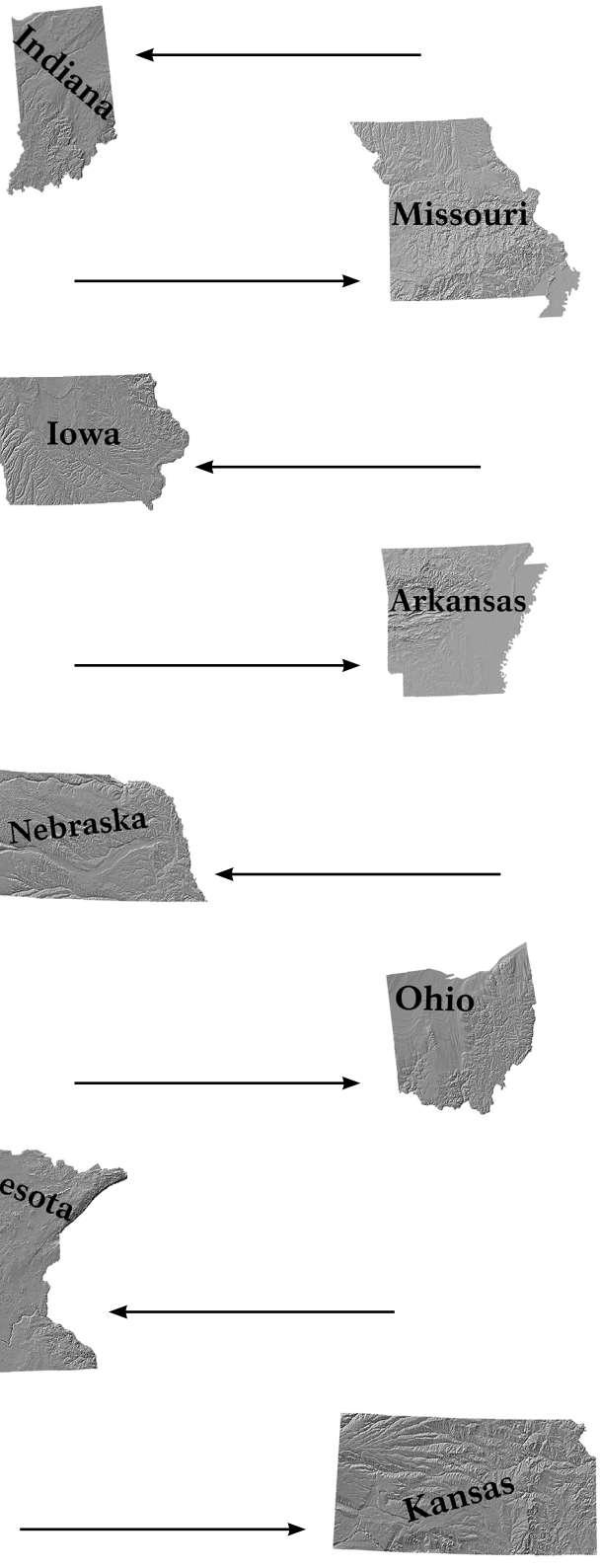
K. Ozark National Scenic Riverways

L. Pea Ridge National Military Park

M. Pipestone National Monument

N. Tallgrass Prairie National Preserve

O. Wilson's Creek National Battlefield



Observation

Scientists observe and write down what they notice. This is done to compare time periods, such as years or seasons. Reviewing observations, such as notes, measurements, and photos, allows you to determine if change is happening.

Have you ever measured how tall you are? Did you measure again a month or year later to see if there was a change? If you have, that is a form of observation.

Observing also allows you to understand the larger picture. For example, if you observed a squirrel gathering acorns and taking them somewhere else, it could mean the squirrel is preparing its food for winter.

Explore the park grounds or somewhere else outside and spend 5 to 15 minutes observing the things around you.

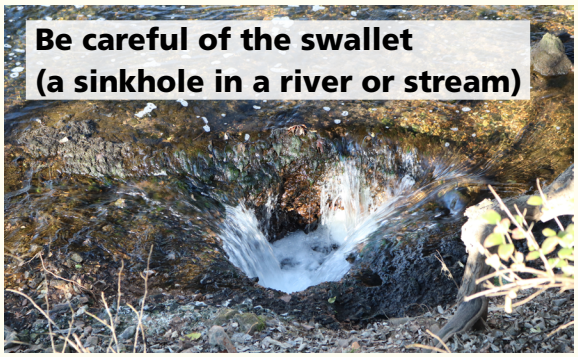
What did you observe? Write your observations or draw a picture.

What were the thing(s) you observed doing?

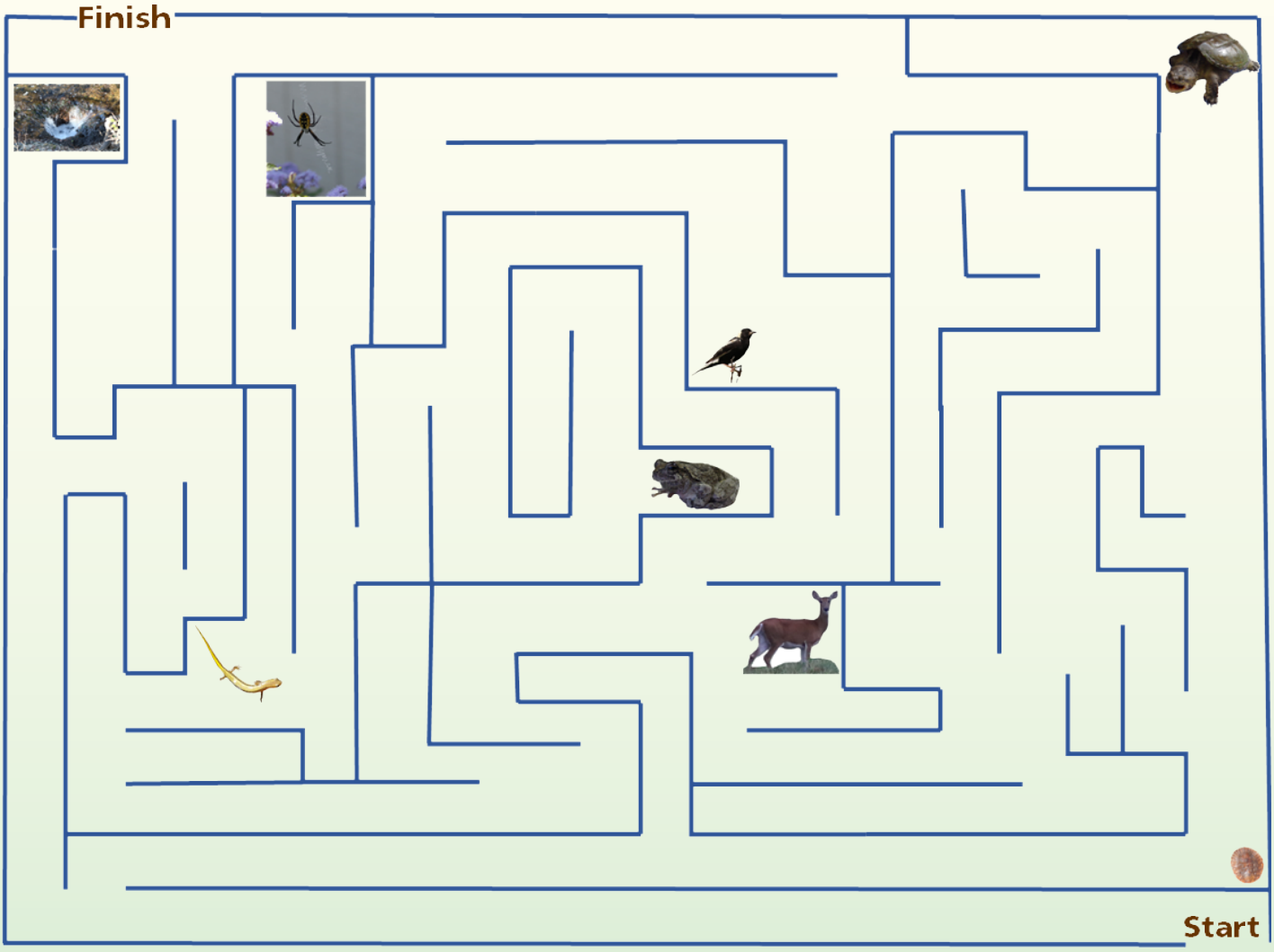


Critter Maze

Help Thomas Turtle find his way to the woodland (from start to finish) passing some critters along the way. Don't get stuck in the swallet, which is an underground opening that streams can disappear into.







Alternate activity: What kinds of things do you think a scientist might observe when watching a turtle, a frog, or a bird?



Animal Tracks

While walking on dirt, sand, snow, or mud we leave tracks—footprints showing where we have been. Animals do the same thing. Below are a few animals found in the Midwest and their tracks.



Greater prairie chicken was once common to see or hear across much of central and eastern North America. Currently an uncommon sight, they live in prairies and other grasslands. Loss of habitat is the main reason for this animal's decline. The presence of the greater prairie chicken tells you that the grassland is a healthy ecosystem with a connected community of plants and animals.



Elk, also called Wapiti, is an ungulate. This means that it has hooves. Elk hooves leave heart-shaped impressions with a gap down the middle. Their tracks are larger and less pointed than white-tailed deer tracks. Sometimes in snow or mud, the dewclaws leave 2 dots behind the track.





Coyote is a nocturnal mammal that you may hear howling at dawn or dusk. The track of the coyote has 4 toes that are about 2½ inches long. Their weight is mostly on the middle two toes making them look slightly pinched inward. The claws on the outer two toes rarely show in the footprint.







American mink is a mostly brown-furred mammal that lives along rivers and other permanent water sources. They have short webbing between their toes to help with swimming. Mink have 5 toes but only 4 may show in a track. The footprint is 1 to 2 inches long, depending on whether it is a front or hind paw.



American black bear is the most common bear species in North America. The black bear comes in more colors than black. It can also be brown, blond, or cinnamon. Footprint sizes can vary by age, but all have 5 toes with the claws often not showing. Sometimes the 2nd toe of the back foot does not show.







American coot is a duck-like water bird in the rail family. Coot feet are different from duck feet because they are lobed and not webbed. The lobed feet help the coot swim in water and walk on land. Each toe has 2 or 3 lobes. An interesting fact is that coots are able to weave nests that float on the water.





Answer as many questions as you can below.

What animals do you think would be good at swimming and why?

Which animal is an ungulate? BONUS: Can you think of other animals you might find in a midwest park that are also ungulates?

What are some animal tracks you have come across?

Draw or describe an animal track here:

What Is an Organism?

An organism is anything that is living. Things like cats, flowers, ants, and mushrooms are organisms. However, items like rocks, sunlight, clouds, and water are **not** organisms. There are millions of different organisms on Earth. Scientists classify organisms into groups based on similar features. That means living things are put into groups. For example, grasses and flowers are in the plant group.

Organism Match

Write the letter from the picture on the right next to the group it belongs to on the left.

_____ **Reptiles**

Cold-blooded vertebrates that generally have dry skin covered in scales or bony plates.

_____ **Amphibians**

Cold-blooded vertebrates that don't have scales.

_____ **Birds**

Warm-blooded vertebrates with wings and feathers.

_____ **Plants**

Photosynthetic organism with cellulose walls that typically cannot move on its own.

_____ **Mammals**

Warm-blooded vertebrates that generally have hair or fur.

_____ **Invertebrates**

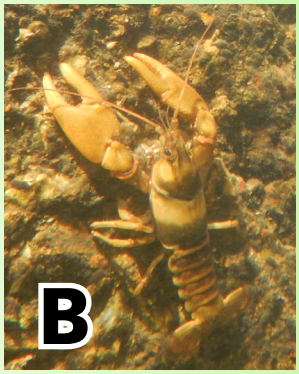
Animals without backbones.

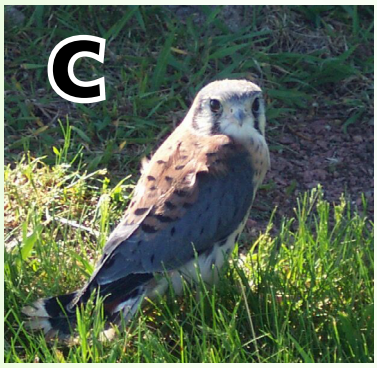
_____ **Fish**

Vertebrates that live in water and breathe using gills.

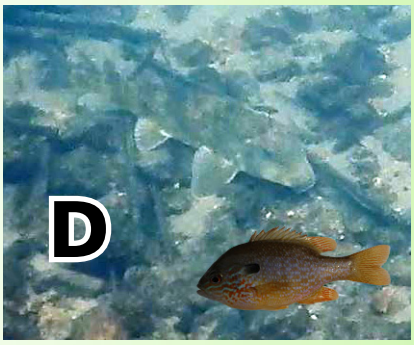


Fun fact: Invertebrates come in a wide range of sizes, from smaller than an ant to larger than a giant squid.





Fun fact: Warm-blooded organisms maintain a steady body temperature. Cold-blooded critters have body temperatures that change with external air and water temperatures.



Fun fact: Photosynthesis is when sunlight is used to produce chemical energy to help an organism grow.







Fun fact: If it has a backbone, then it is a vertebrate.

Damselfly vs. Dragonfly

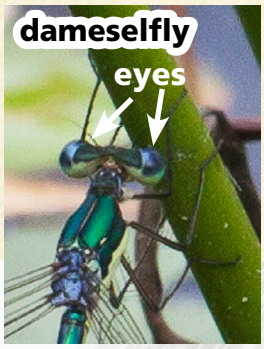
Can You Spot the Difference?

Damselflies and dragonflies are flying insects in the Odonata order. Did you know that both have existed on Earth since before the dinosaurs? They come in a wide range of colors—even metallic tones! You can find damselflies and dragonflies hovering around ponds and streams. Both insects prefer clean water to thrive, so their presence tells us about the health of the water around us. While there are many similarities between the two, there are some easy ways to tell them apart!

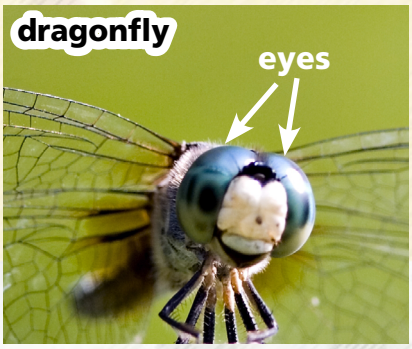
Dragonflies are the stronger fliers and generally larger than damselflies. In fact, dragonflies are the fastest insect fliers in the world—clocking in at 35 mph! When at rest, the dragonfly will hold its wings open and out from its body. Damselflies hold their wings together above their body.

Another difference is the eyes. Dameselflies have round and separated eyes on the side of their head. Dragonflies have larger eyes that are fused together on their head.

Fun Fact: There are over 5,000 species of dragonflies and almost 3,000 species of damselflies.

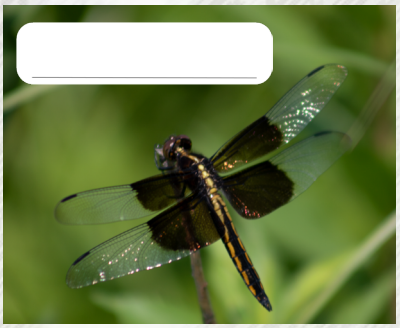


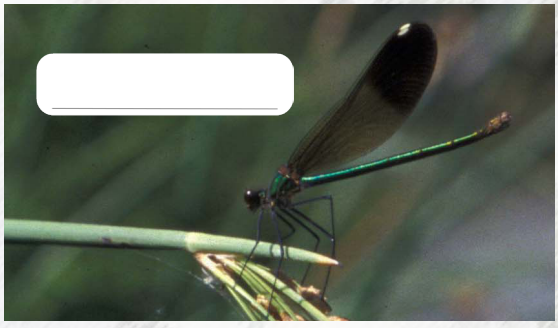






Use the information above to identify the pictures below. Write damselfly or dragonfly in the box in each picture.

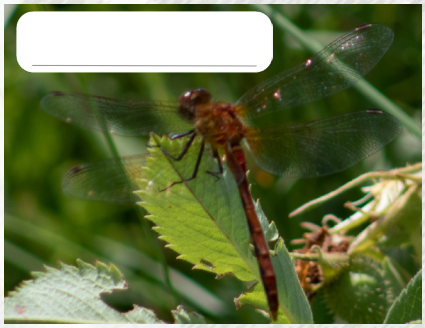












Hide and Seek

Many animals use impressive camouflage tactics to remain hidden. Animals use their body colors or shapes to disguise themselves in their environment. This camouflage helps the animal avoid being seen by a predator or their prey. Different habitats call for different types of camouflage. White fur may help in a snowy ecosystem. The same white fur would not be a good disguise in a brown, muddy environment.

Some animals do the opposite. Animals that have toxins in their bodies are colorful to let predators know that they are unsafe to eat. Some species are not toxic themselves but have similar, bright colors to avoid being eaten.

Monarch butterflies are toxic to predators.

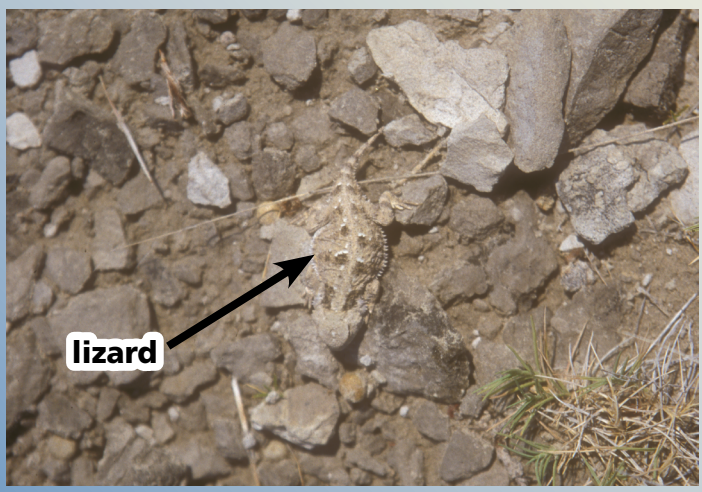


Viceroy butterflies have a black line on the bottom 2 wings and monarchs don't.



Viceroy butterflies mimic monarchs to avoid predators.

Below are a caterpillar, a short-horned lizard, and a cave salamander. Notice how they are using camouflage to blend into their surroundings.







Examine these pictures of animals camouflaged in their habitats. Can you find all nine hidden animals? Circle them (or point to them): rabbit, beaver, lizard, sculpin (fish), katydid, frog, walking stick, deer, and bird.

















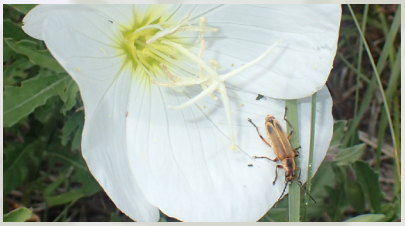


Who Pollinates This Flower?

Have you ever noticed a bee swarming around a flower in the summertime? These insects are not just hanging out—they have an important job to do! Pollinators find the pollen in one flower and then move it to the next flower they visit. This activity allows flowers to grow fruits and seeds, which then creates more plants. What do pollinators get out of this arrangement? They visit flowers in the hope of finding a snack of pollen or nectar. Without pollinators, we would not have many important foods and the beautiful flowers that bloom in our parks. Chocolate, bananas, apples, berries, pumpkins, and many more fruits would not be possible without the work of pollinators. In the Midwest, the most common pollinators are insects, such as bees, flies, beetles, butterflies, and moths. Hummingbirds can also be seen using their long tongues to drink nectar out of flowers. Not all plants need animals to pollinate them, however. Wind and water can also carry pollen grains to other flowers.

You can often tell what type of pollinator will visit a plant by the shape and color of the flower. Explore the pictures of some common pollinators and their descriptions below.

Beetles visit larger, open flowers with places for them to stand. These flowers are usually white or pale colored.



Butterflies are typically attracted to brightly colored red, yellow, or orange flowers.



Hummingbirds generally choose to visit flowers that are tube shaped and red.



Bees prefer bright blue, purple, or yellow flowers. These flowers sometimes have nectar guides, which are lines that guide the bee to the center of the flower.



Moths are the main nighttime pollinators of the Midwest. Because they're mainly active at night, they pollinate flowers that open in the afternoon or evening.



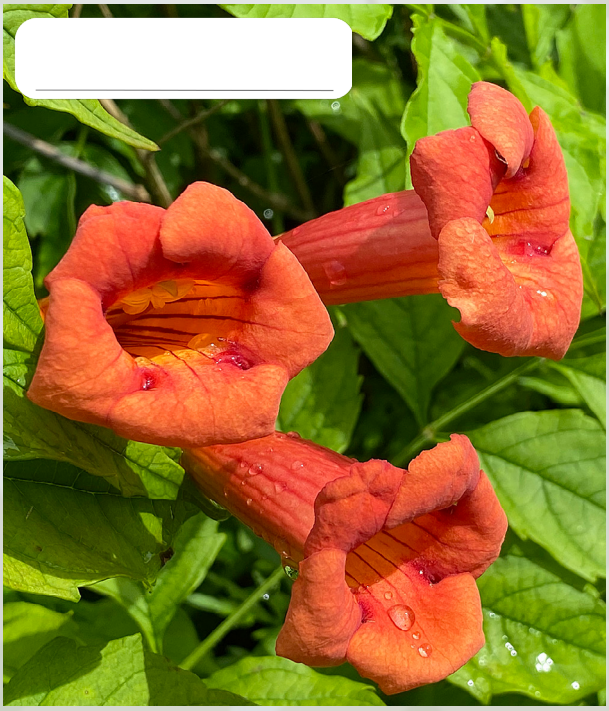
Use the pollinator descriptions on the previous page to help fill in the name of the critter that pollinates each flower below. Write the name of one pollinator in the box for each flower.

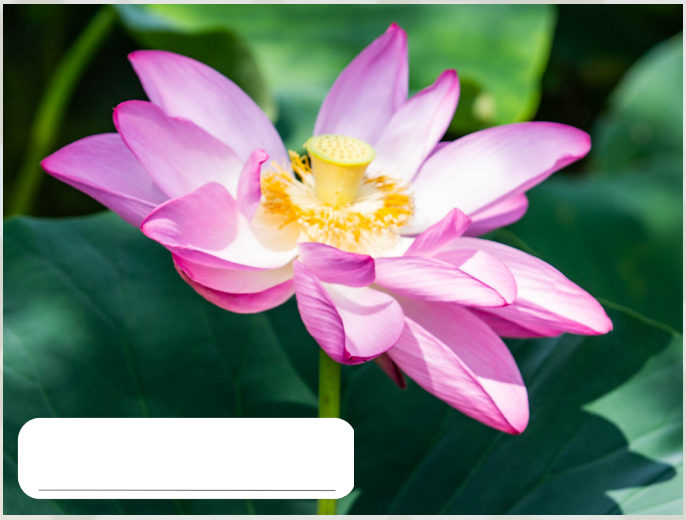
Critters: **beetles**, **butterflies**, **hummingbirds**, **bees**, and **moths**











The Story Is in the Bark

There are over 100 different tree species within the 15 Heartland Network parks! Below we highlighted some of the common trees you may find in these parks.



Hackberry (*Celtis occidentalis*) is a native tree that can grow to be large. When the tree is young, the bark looks like it has warts. As the tree grows, the pattern turns into cork-like ridges. Many wild birds enjoy eating hackberry fruit.



American beech (*Fagus grandifolia*) is a medium to large tree with smooth bark that is light in color. It is a slow growing tree that will take years to achieve a height of 50 to 70 feet. Both mammals and birds like to eat the beechnuts from this tree.



Shagbark hickory (*Carya ovata*) is a medium-sized tree. The gray bark separates into long, thick, shaggy strips, hence the name. Some bat species find shelter under the peeling bark during the summer months. Shagbark hickories can be found in both wet and dry soil areas. Many mammals, including humans, enjoy eating the sweet nuts.



Osage orange (*Maclura pomifera*) bark becomes deeply grooved with age. The bark color ranges from brown to orange, hence its common name, “Osage orange.” The orange roots can often be seen, and the bark peels into thin, long strips. Another common name for this tree is “hedge apple” because it usually has multiple trunks, making it ideal for creating a living fence or hedge between different fields. It is also called bow-wood because it was used by the Osage Nation to make bows.



Green ash (*Fraxinus pennsylvanica*) has brown bark that is grooved with interlacing ridges that form diamonds or X-shaped patterns. This tree is often found along streams because ashes prefer wet soils. This tree grows fast. Since the wood is hard, flexible, and strong, it is often used to make boat oars/paddles. Currently, many of these trees are under attack from the emerald ash borer, an invasive beetle that has caused the destruction of many ash trees over the last few decades.





Sycamore (*Platanus occidentalis*) has a unique bark that is smooth-ish. When younger it is greenish but turns reddish-brown or gray when older. The bark peels off in plates that reveal a distinctive new white bark. This tree is the largest deciduous tree in the United States. Sycamores can be found in bottomlands by streams. They are fast growers that like wet soil.





Cottonwood (*Populus deltoides*) is a large tree in the willow family. This tree has a straight, long trunk that helps support massive branches. When young, the cottonwood has thin, smooth, yellow-green bark. As it ages, the bark becomes thick, corky, and brown to gray in color with deep, straight grooves and wide, flat ridges. This tree also likes wet soil, so it can often be found along streams. It is frequently used to prevent stream banks from eroding because it grows very fast. It can reach a height of 50 feet in as little as 6 years. The cottonwood is the tree you are most likely to see in a majority of the Heartland Network parks, even in the prairie parks if you are by the streams. Out of the 15 parks, the cottonwood is on 13 park species lists.

Fill in the blanks for the following seven statements about trees.

1. The _____ tree has smooth bark.

2. The _____ tree has bark that some say looks like cork.

3. What tree has very dense wood that was used in hedge rows or fence breaks?

_____

4. The bark of the green ash tree has a pattern that looks like _____ .

5. The new bark of the sycamore tree is _____ in color.

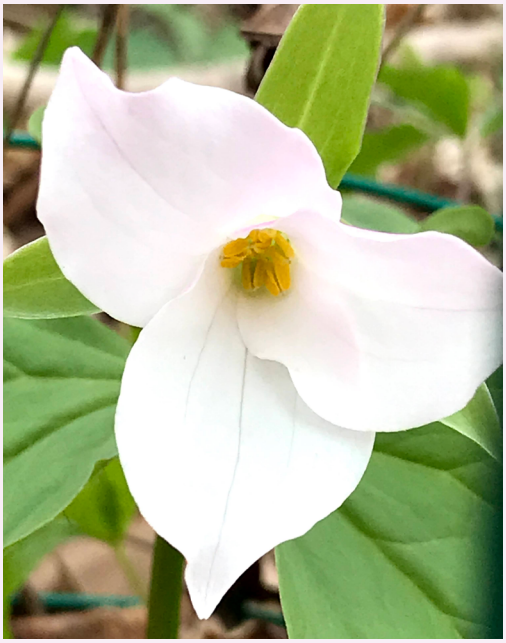
6. The cottonwood tree can be _____ feet tall by 6 years of age.

7. Bats sometimes sleep under the bark of the _____ tree.

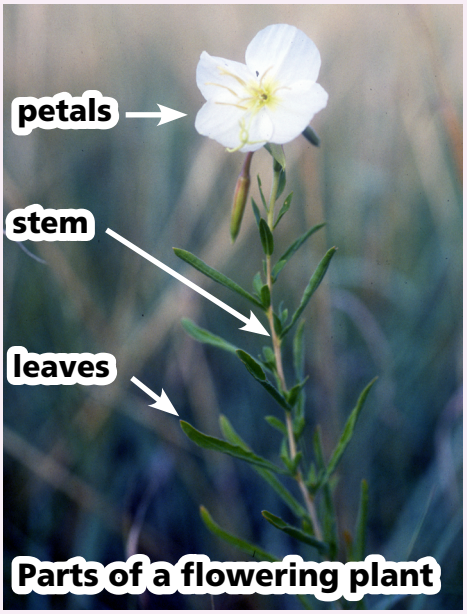
The Key Is the Key!

How do scientists identify so many different types of organisms in our natural world? How do they know this plant is poisonous or that snake is nonvenomous? One of the tools they use is a dichotomous key. "Dichotomous" means two parts, and a key is used to unlock a mystery. Put together, a dichotomous key helps unlock a mystery by breaking it down into two parts. I bet you are wondering how this works...let's try it out!

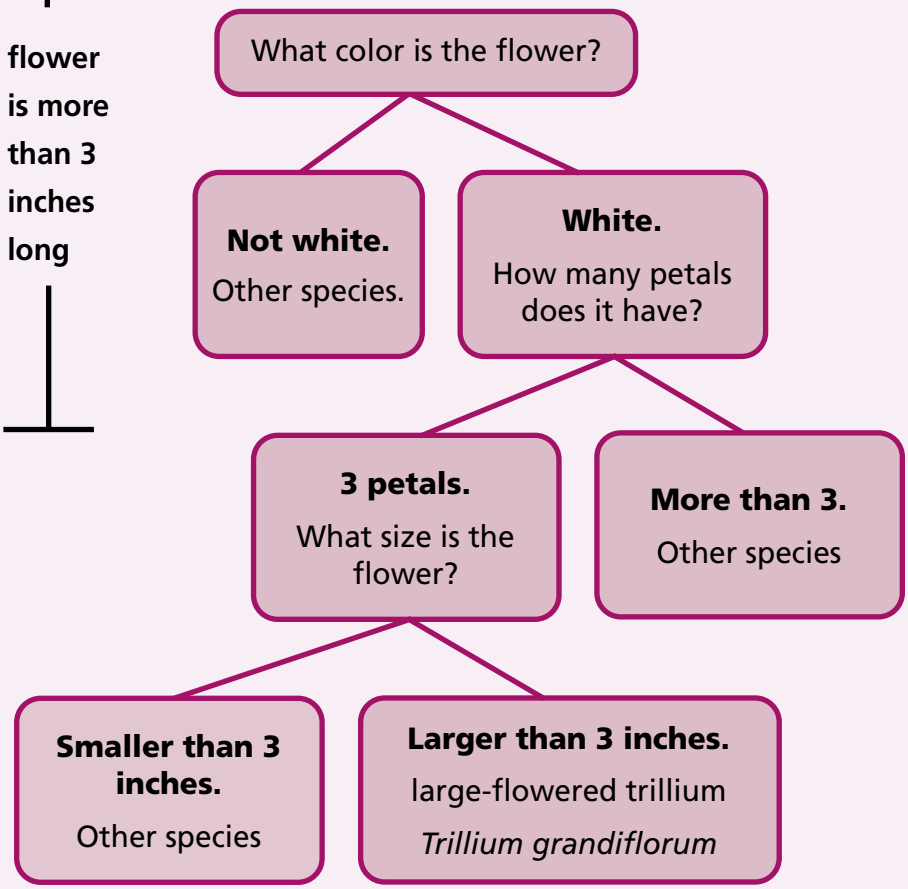
To begin, let's take a look at this flower...



flower is more than 3 inches long

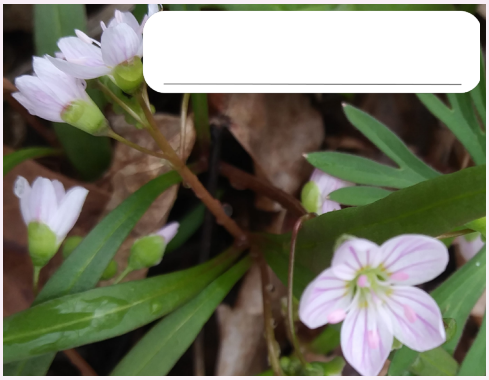


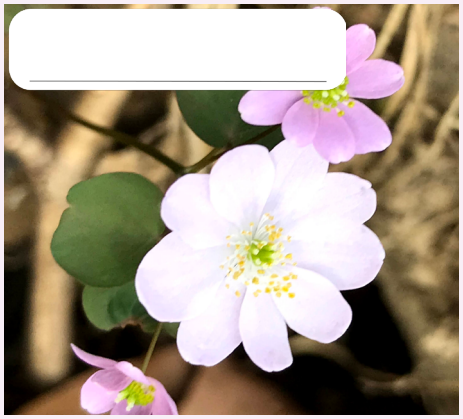
Now answer a question that has a pair of answers—known as a couplet. Follow where the answers lead you, and hopefully you'll unlock the identity!



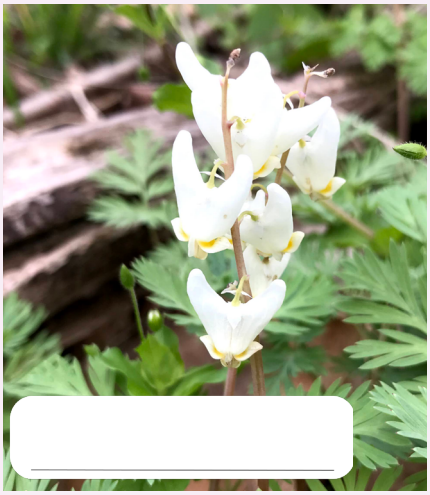
This key was simplified but shows how answering questions in succession can lead you to the answer! On the next page we'll focus on identifying plants with white flowers, and with a few observations, you can try your hand at unlocking these various mysteries using a dichotomous key! Write the name of each plant on the seven plant pictures on the next page.

1. How many petals does it have?
   A. No visible petals: go to step **2**.
   B. 4 or more petals: go to step **3**.
2. What shape is the flower?
   A. V-shaped: **Dutchman's breeches**
   B. Fluffy ball: **white snakeroot**
3. Does the flower have 4 petals or more?
   A. 4 petals: go to step **4**.
   B. More than 4 petals: go to step **5**.
4. What shape are the leaves of the plant?
   A. Skinny and long: **cut-leaf toothwort**
   B. Wider leaves: **garlic mustard**
5. Does the flower have 5 petals or more?
   A. 5 petals: **spring beauty**
   B. More than 5 petals: go to step **6**.
6. Does the flower have less than 15 petals?
   A. Yes, 8–10 petals: **rue anemone**
   B. No, more than 15 petals: **aster**















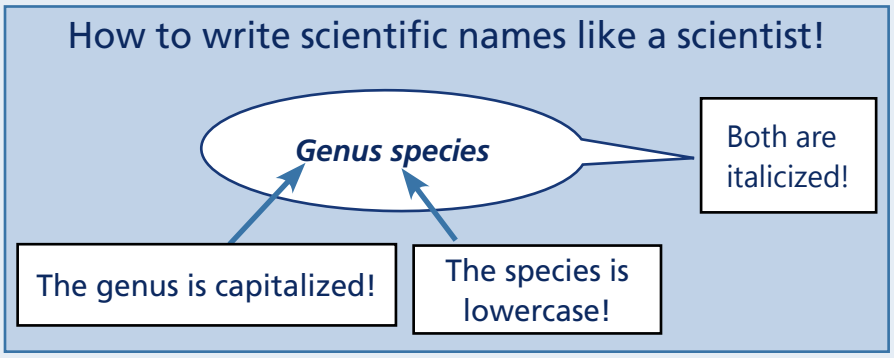
What's in a Name?

There are often two or more names that mean the same plant or animal. Sometimes the same common name was given to more than one organism, and sometimes an organism has multiple common names. An example of this is the groundhog, which is also called woodchuck, whistlepig, marmot, and many other names.

This can be confusing to scientists. To make sure that everyone is talking about the same plant or animal, scientists use the scientific name of the organism. The scientific name, which is based on **taxonomy**, is usually in Latin and consists of the genus and species. The scientific name for the groundhog is *Marmota monax*.

Taxonomy:
the classification of organisms







Common and *scientific* names for other animals:

great spangled fritillary—*Speyeria cybele*

wild bergamot/bee balm—*Monarda fistulosa*

speckled kingsnake/salt-and-pepper snake—*Lampropeltis holbrooki*

cave salamander—*Eurycea lucifuga*

common snapping turtle—*Chelydra serpentina*

wake robin trillium/toadshade—*Trillium sessile*

eastern bluebird—*Sialia sialis*

American bison—*Bison bison*

banded sculpin—*Cottus carolinae*

bald eagle—*Haliaeetus leucocephalus*

white-tailed deer—*Odocoileus virginianus*

yellow morel/common morel—*Morchella esculentoides*




Speyeria cybele perched on Monarda fistulosa


Sialia sialis


Cottus carolinae


Odocoileus virginianus


Morchella esculentoides

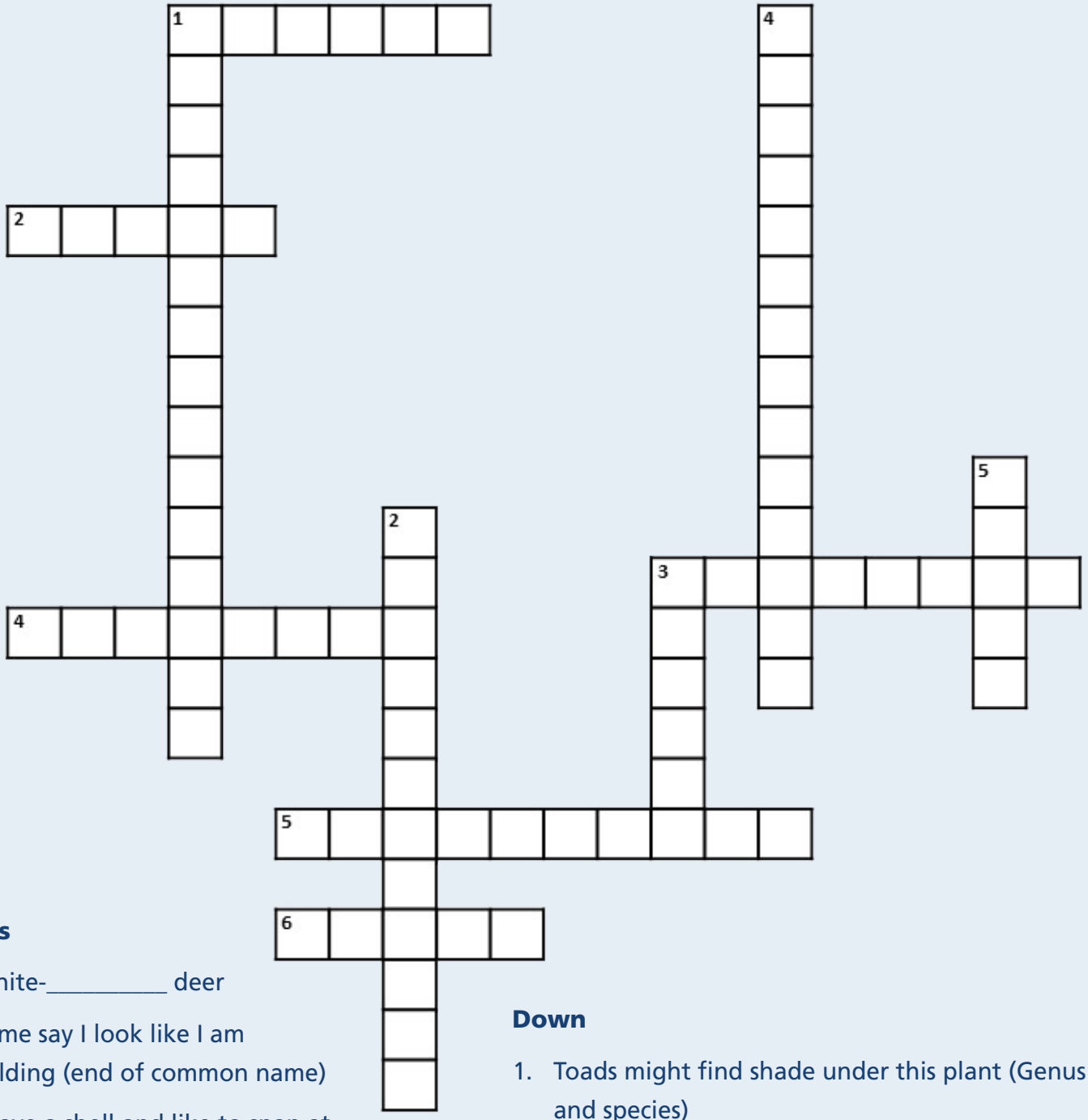

Trillium sessile


Eurycea lucifuga


Bison bison


Haliaeetus leucocephalus

Fill in the crossword clues below.



Across

1. White-_____ deer
2. Some say I look like I am balding (end of common name)
3. I have a shell and like to snap at others (Genus only)
4. Species part of the scientific name for a cave salamander
5. So nice, I was named the same twice (Genus and species)
6. I am speckled and some say I look like salt and pepper (common name end)

Down

1. Toads might find shade under this plant (Genus and species)
2. I'm blue and like to sit on tree branches (Genus and species)
3. I like to swim and hang out on the bottom of a stream bed (Genus only)
4. I like to drink the nectar of *Monarda fistulosa* (Genus and species)
5. Common name for *Morchella esculentoides* (last part of common name)

What's That Flying in the Sky?

If something's bugging you on a walk during a warm summer evening, chances are it's a bug! But what's that slightly bigger thing flying in the air after them? It could be a bat! Two species you may encounter are the little brown bat and big brown bat! The wingspan of little brown bats can stretch about 10 inches, but these skillful insect hunters stand only 2 to 4 inches tall—a bit longer than the width of your smartphone! No surprise, big brown bats are longer, usually about 4 to 5 inches—closer to the length of your smartphone. Their wingspan can stretch to about a foot! Using echolocation to expertly home in on their prey, these social creatures get their fill of beetles, moths, flies, midges, mayflies, caddisflies, and mosquitoes every summer night!

Unfortunately, white-nose syndrome—a disease caused by a fungus that infects our native bat species—and habitat destruction have decreased their populations. During the winter months, brown bats hibernate in caves. The fungus interrupts their hibernation, and this burns energy. For animals that barely weigh as much as the change in your pockets, they do not have excess stores of fat. Big brown bats weigh about 0.55 ounces, almost the weight of 3 quarters, and little brown bats weight in at 0.35 ounces, about the weight of 2 nickels!

So, how many bat species have been found among the 15 parks of the Heartland Network? Because there is such a diverse array of habitats among the parks, 14 bat species have been documented! However, no single park has all of them.

Did You Know?





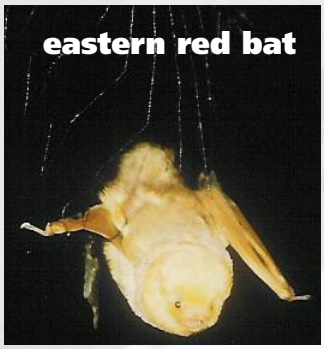
Hoary bats are the largest bat found in these parks and can be found in all 50 states!

Bats are the only mammals capable of true flight!



During the winter, some bats hibernate while others migrate.





Our smallest bat found here is the tri-colored bat, and it focuses on small flying insects, such as flies, moths, and beetles.

All our midwestern bats are insectivores—they feast on insects and can eat half their own body weight in food every night.

During the summer, some species, like the red bat and hoary bat, are somewhat solitary and roost in woodlands.

All 14 species in Heartland Network parks are active at night and are microbats—small, insect-eating bats.

Mexican free-tailed bats, found at Hot Springs National Park, can roost in caves in massive numbers. They have the largest known bat colony (20 million individuals) in Bracken Cave, Texas.

Dead or dying trees provide important roost sites for some bats like the Indiana bat.







Some bats are listed as Federally Endangered. This means they are in danger of becoming extinct! For these 15 parks, this includes the Indiana bat, gray bat, northern long-eared bat, and Ozark big-eared bat.

Scientific Name	Common Name
Eptesicus fuscus	big brown bat
Lasionycteris noctivagans	silver-haired bat
Lasiurus borealis	eastern red bat
Lasiurus cinereus	hoary bat
Myotis austroriparius	southeastern myotis
Myotis grisescens	gray bat, gray myotis
Myotis leibii	eastern small-footed bat
Myotis lucifugus	little brown bat, little brown myotis
Myotis septentrionalis	northern long-eared bat, northern myotis
Myotis sodalis	Indiana bat, Indiana myotis
Nycticeius humeralis	evening bat
Perimyotis subflavus	tri-colored bat, eastern pipistrelle
Plecotus townsendii ingens	Ozark big-eared bat
Tadarida brasiliensis	Mexican free-tailed bat, Brazilian free-tailed bat



About 3 inches long

During the summer, some species, like the little and big brown bats, form larger colonies. They can be found in the woods and in human-built structures, such as barns, abandoned buildings, and attics.

Some bats are listed as Federally Threatened. This means if their numbers keep dropping, they may become listed as Endangered.



Fill in the blanks to decode our secret message about bats!

1. Largest bat in these 15 parks: ___ ___ ___ ___ ___(15)   ___ ___(5) ___(33)

2. Bat species that is a bit longer than the width of your smartphone:

___(14) ___ ___(3) ___(24) ___ ___(7)   ___ ___(10) ___ ___ ___   ___ ___(2) ___

3. What disease caused by a fungus is hurting bat populations?

___ ___ ___(16) ___ ___(26) - ___ ___ ___(21) ___   ___(34) ___ ___ ___ ___(6) ___ ___ ___(22)

4. What bat is known for its long ears?

___(17) ___ ___(25) ___ ___ ___ ___ ___(20)   ___(29) ___ ___ ___ - ___(28) ___ ___(11) ___ ___   ___(1) ___ ___

5. What can bats do that other mammals can't? ___(8) ___(30) ___(12)

6. What is the scientific name of the Ozark big-eared bat?

___(27) ___ ___ ___ ___ ___ ___(9) ___   ___ ___ ___ ___ ___ ___ ___ ___ ___ ___(19)   ___ ___ ___(18) ___ ___ ___

7. What do these bats eat? ___ ___(32) ___ ___ ___(23) ___ ___(4)

8. How many bat species live within the Heartland Network? ___(13) ___ ___ ___ ___ ___(31) ___ ___

Message: ___(1) ___(2) ___(3) ___(4)   ___(5) ___(6) ___(7)   ___(8) ___(9) ___(10) ___(11) ___(12),

___(13) ___(14) ___(15) ___(16) ___(17) ___(18)

___(19) ___(20) ___(21) ___(22) ___(23) ___(24) - ___(25) ___(26) ___(27) ___(28) ___(29) ___(30) ___(31) ___(32) ___(33) ___(34)!

Congratulations on becoming a Junior Scientist for the Heartland Network

As a Junior Scientist, I _____, will do all I can to take care of and protect parks within the Heartland Network and the plants and animals that live in them. I promise to explore, learn about, and respect the natural world wherever I go.

_____

Park Ranger **Date**

Heartland Network
Natural Resource Monitoring

NATIONAL PARK SERVICE

Arkansas Post National Memorial ♦ Buffalo National River ♦ Cuyahoga Valley National Park ♦ Effigy Mounds National Monument ♦ George Washington Carver National Monument ♦ Herbert Hoover National Historic Site ♦ Homestead National Historical Park ♦ Hopewell Culture National Historical Park ♦ Hot Springs National Park ♦ Lincoln Boyhood National Memorial ♦ Ozark National Scenic Riverways ♦ Pea Ridge National Military Park ♦ Pipestone National Monument ♦ Tallgrass Prairie National Preserve ♦ Wilson's Creek National Battlefield