



Wildlife and Habitats of the Tennessee River

Educator Resource Packet

Muscle Shoals National Heritage Area

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Introduction

This curriculum packet is designed to provide resources and suggest activities for 4th grade classes studying the wildlife and habitats of the Tennessee River in the North Alabama counties of Colbert, Franklin, Lauderdale, Lawrence, Limestone and Morgan. Many of the activities may be adapted for use with students at higher or lower grade levels, or for use with individual students. Teachers should feel free to select from those parts of the packet that best suit their classroom needs.



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Water and Land Resources

The River



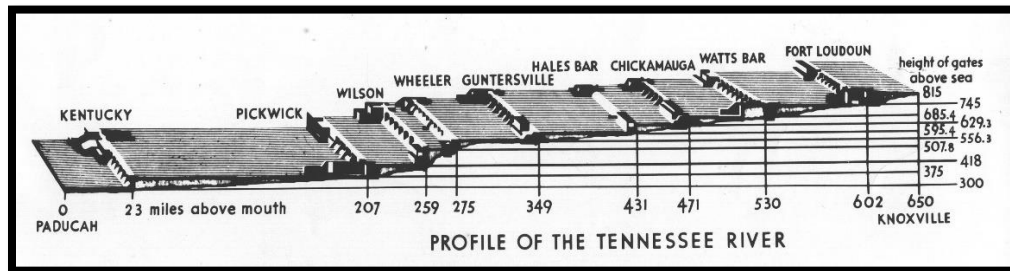
The **Tennessee River** originates near Knoxville, Tennessee, at the **confluence** (or meeting place) of the Holston and French Broad rivers and flows southwest into Alabama near the Georgia state line. In Marshall County, it makes a northwest turn and loops through north Alabama, exiting the state near the Alabama-Mississippi-Tennessee border. From there, it heads north and crosses back into the state of Tennessee before emptying into the Ohio River near Paducah, Kentucky.

The Tennessee is one of the most significant river systems in the United States, with a length of approximately 652 miles and a watershed, or **basin**, covering roughly 41,000 square miles in parts of seven states. It enters Alabama with an average flow of more than 37,600 cubic feet per second (cfs) and adds about 14,000 cfs of stream flow on its journey through the state. Within Alabama's boundaries, the Tennessee River drains approximately 6,800 square miles of land, or 13 percent of the state's total land area.

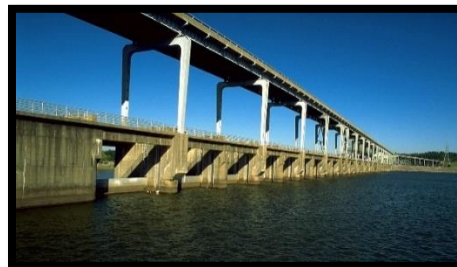
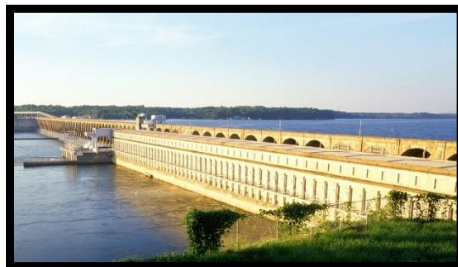


Tennessee River
(right) at McFarland Park in
Florence, Alabama

The water level drops dramatically as the river progresses through the state, resulting in long stretches of shallow water and **rapids** which were, at one time, nearly impossible to navigate by boat. The **Muscle Shoals**, where the rapids fell 137 feet over the course of 37 miles, were particularly hazardous for boat traffic, and historically served as a dividing line between the Upper Tennessee and the Lower Tennessee. This situation began to improve with the construction of canals and dams around the turn of the 20th century and the establishment of the **Tennessee Valley Authority (TVA)** in 1933. Over time, these projects transformed the river into a series of **reservoirs**, or lakes, impounded (or held back) by nine major dams.



Four of the nine TVA reservoirs on the Tennessee River are in the state of Alabama, and three of these four are located within the **Muscle Shoals National Heritage Area (MSNHA)**. Together, they cover the Muscle Shoals, making river navigation easier and providing a habitat for numerous wildlife species. The resulting increase in river traffic has encouraged the development of a water-based recreation industry and made the north Alabama portion of the Tennessee River world-famous as a top fishing and boating destination.



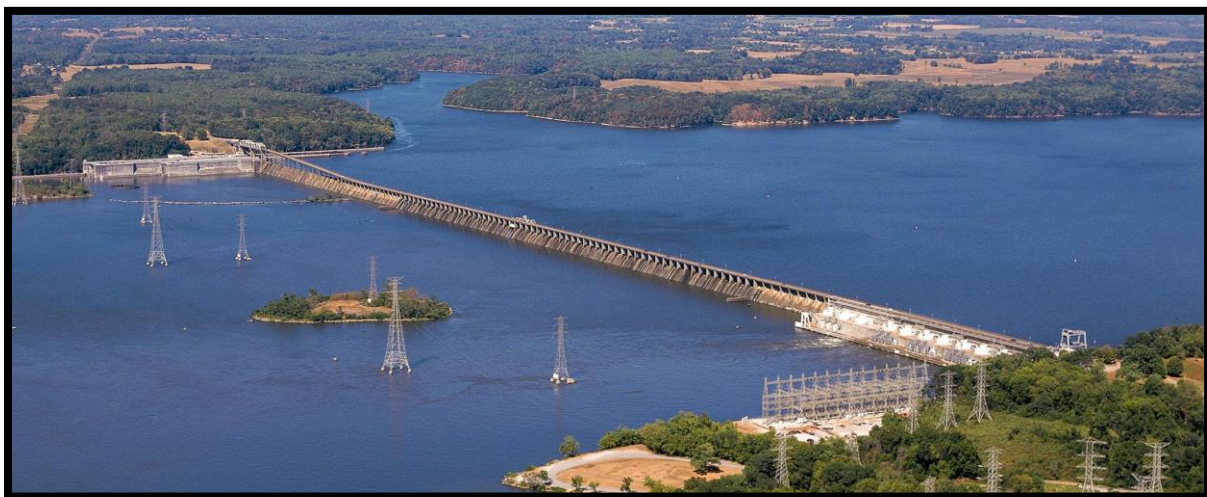
TVA Dams

Wheeler (top), Wilson (bottom left),
and Pickwick (bottom right)

Reservoirs



Wheeler Lake (*below*) is the second-largest lake on the Tennessee River in north Alabama, with the largest being its upstream neighbor, Lake Guntersville. Wheeler Lake is impounded on its downstream side by Wheeler Dam. Completed in 1936, it was the second dam constructed by the Tennessee Valley Authority (TVA) after its establishment in 1933. The dam and its reservoir are named for Joseph "Joe" Wheeler, a Confederate general who later served with the United States Army during the Spanish-American War and became an early advocate for federal development of the Muscle Shoals area during his tenure as a U.S. congressman.



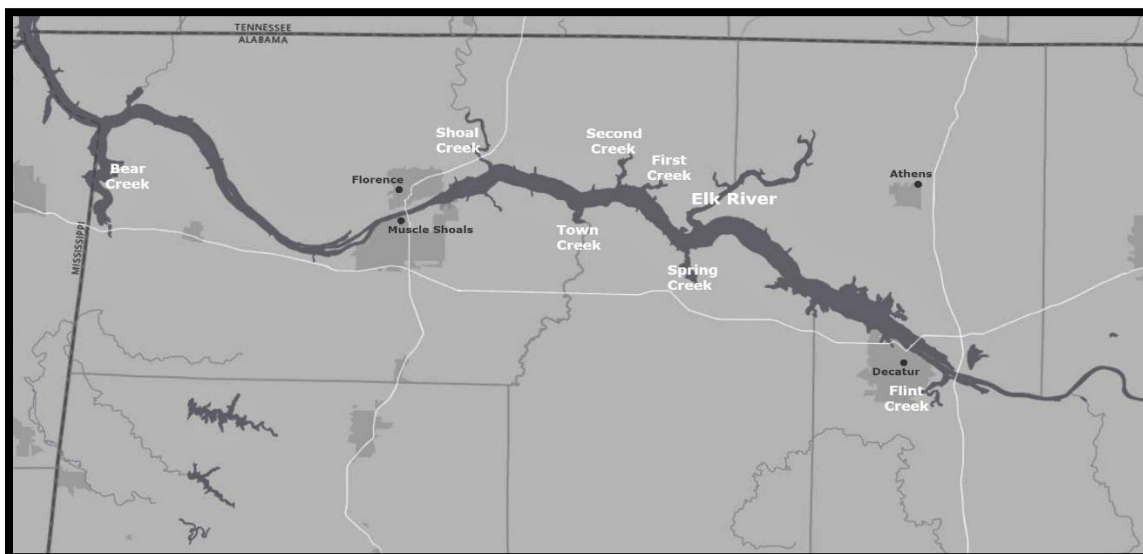


Wilson Lake (*left*) covers 15 miles of the Tennessee River, stretching downstream from Wheeler Dam to Florence and Muscle Shoals, where it is impounded by Wilson Dam. The largest conventional **hydroelectric** dam in the TVA system, Wilson Dam stands 137 feet high and stretches 4,541 feet across the river, with more than 3,700 watercraft passing through its locks each year. Wilson Lake boasts 166 miles of shoreline and 15,500 acres of water surface for recreational use. Like Wheeler Lake, it is a popular spot for bass fishing, and its numerous feeder creeks provide an ideal habitat for a variety of ferns, including the rare walking fern.

Pickwick Lake (*below*) stretches downstream and northward from Wilson Dam to Pickwick Landing Dam in Hardin County, Tennessee. It has a length of 53 miles, an average surface area of 43,000 acres, and maximum depth of 59 feet. Pickwick is an ideal location for smallmouth bass fishing because it is situated at the southern boundary of the **habitable** climate for smallmouth, where a longer growing year produces larger fish. Other species found in large numbers in Pickwick Lake include largemouth bass, crappie, sauger, and channel catfish.



Tributaries



Dozens of **tributaries** feed into the Tennessee River as it winds through the MSNHA, as the map above illustrates. Smaller tributaries are typically called creeks, while larger tributaries are generally known as rivers in their own right.



The **Flint River** is the largest tributary of the Tennessee River in the state of Alabama, with a total length of 66 miles and a drainage basin that covers most of the land area in Madison County. Another major tributary of the Tennessee, the **Elk River** (*left*), empties into Wheeler Lake roughly ten miles upstream from Wheeler Dam. The scenic 22-mile stretch of the Elk between the Tennessee state line and Wheeler Lake is designated as the **Limestone County Canoe and Kayak Trail** and attracts thousands of paddlers each year.

Unlike the Flint and Elk rivers, which flow southward into Alabama from their origins in the state of Tennessee, **Bear Creek** originates in Alabama and flows northward before emptying into the Tennessee River at Pickwick Lake. As it winds through Franklin and Colbert counties (with a brief detour into the state of Mississippi), Bear Creek is fed by its own network of tributaries, which including Cedar Creek, Little Bear Creek and Upper Bear Creek.

Bear Creek Lakes

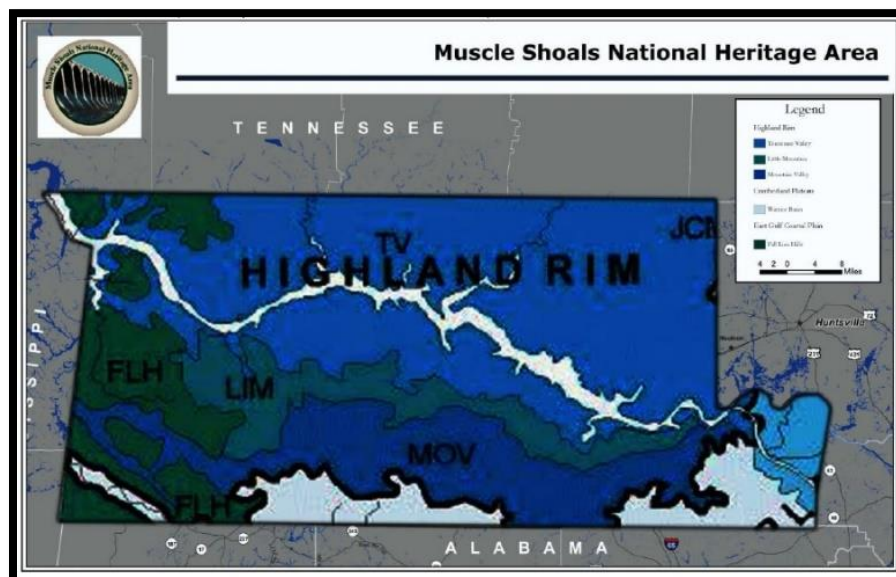
The Bear Creek Water Control Project was launched by TVA during the late 1960s and is operated today by the Bear Creek Development Authority (BCDA). The primary goal of the project was to reduce flooding on more than 15,000 acres of surrounding farmland. The project consists of four dams and their associated reservoirs, a nine-mile floodway below Bear Creek Dam, and a 30-mile recreational floatway between the Upper Bear and Big Bear lakes.

With a combined surface area of 8,300 acres and a shoreline length of roughly 284 miles, the four Bear Creek lakes are among the cleanest recreational waters in the southern United States. Like the three major TVA reservoirs along the main channel of the Tennessee River, these lakes are major fishing destinations, with smallmouth bass as large as five pounds and largemouth reaching fifty pounds. Other recreational opportunities include the Bear Creek Floatway below Upper Bear Creek Dam, which is considered one of the top canoeing destinations in the state.



Bear Creek

The Landscape



The study of the physical features of the earth's surface is known as physiography, or physical geography. Most of the MSNHA is located within the **Highland Rim**, one of six **physiographic provinces** in the state of Alabama. The Highland Rim is distinguished by its underlying rocks, mostly limestones and cherts. The erosion of these rocks over time created the MSNHA's distinctive landscape of low, rounded hills and rich, red soil. Differences in the durability (or resistance to erosion) of these rocks have shaped the Tennessee River and guided its course as it winds through the counties of North Alabama.

In addition to its six physiographic provinces, the state of Alabama has seven distinctive **soil areas**. The soils within each area were produced by materials with similar characteristics. The largest soil area within the MSNHA, the **Limestone Valleys and Uplands** region, encompasses most of Lauderdale and Limestone counties. Soil in this area consists primarily of red clay and is produced by the erosion of **limestone**. Composed of calcium carbonate from the shells and body parts of aquatic animals, limestone is responsible for the formation of many distinctive landscape features within the MSNHA because of its tendency to dissolve in water.



Limestone Bluffs
along Wilson Lake in Colbert County

Caves are among the most distinctive of these features, produced as limestone dissolves in ground water. The caves of the MSNHA are home to some of the rarest and strangest creatures on earth. The Alabama cave fish, for example, can only be found in Key Cave in Lauderdale County. A new species of blind cave shrimp has also been discovered in McKinney's Pit, a limestone sinkhole in Colbert County.

The dozens of prominent peaks found within the MSNHA also contribute to its distinctive landscape. Most of these peaks are referred to as mountains, while terms such as knob, hill, or point are used to describe others. Many of the highest peaks can be found in southeastern Morgan County, including Whitesburg Mountain, which is 391 feet high. Prominent peaks can also be found in Lawrence County, southeastern Franklin County, and southern Colbert County.



Rattlesnake Saloon

Situated beneath a natural limestone rock shelter in Colbert County

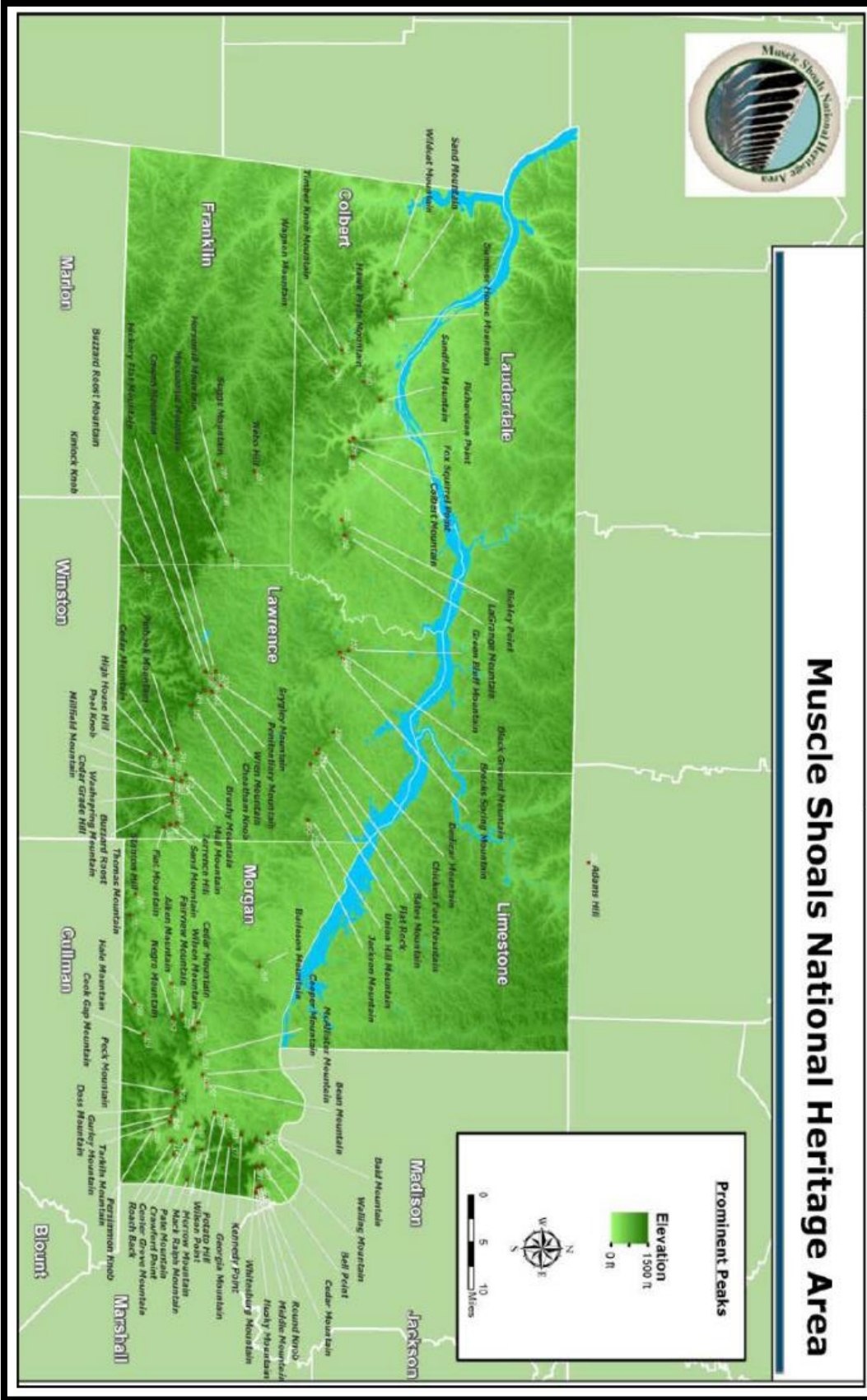
These areas with prominent peaks are, in turn, home to some of the steepest slopes in the MSNHA. The **slope**, or pitch, of land refers to the amount of vertical increase that occurs within a given increment of horizontal distance. Disturbances of steep slopes can lead to erosion and sedimentation of soil into underlying areas, including streams. Erosion and sedimentation can negatively impact the environment, threatening the health of plants and animals.



Wagon and Hawk Pride

mountains, as seen from Point Overlook, Cane Creek Canyon Nature Preserve, Colbert County

Muscle Shoals National Heritage Area



Glossary

Confluence: the place where two rivers meet.

Basin: all of the land surrounding a river from which rainwater and other surface water drains into the river.

Rapids: a section of a river where a steep slope creates turbulence and causes water to flow more rapidly.

Reservoir: an artificial lake, or impoundment, created by a dam or lock.

Hydroelectricity: electricity produced by harnessing the energy from running or falling water.

Habitability: the ability of a given place to support life.

Tributary: a river or stream which flows into a larger river or lake.

Physiographic province: a region differentiated from surrounding regions based on geographic features such as rock type.

Soil area: a region differentiated from surrounding regions based on soil type.

Limestone: a rock composed of calcium carbonate from the shells of aquatic animals, which tends to dissolve in water.

Slope: the steepness, or pitch, of land or a geographic feature such as a mountain.



Riverfront Park
in Sheffield

Biological Resources

Endangered and Threatened Species

The Tennessee River basin is among the most biologically diverse river systems in North America. It also harbors more threatened and endangered species than any other large river basin on the continent, including 57 species of fish and 47 mussel species. **Endangered** species are organisms that are in danger of becoming extinct, while **threatened** species are at risk of becoming endangered in the near future. The most biologically imperiled section of the river in the MSNHA is Wheeler Lake, with nine fish and mussel species classified as threatened or endangered.

Fish

Fish are a group of cold-blooded, water-dwelling **vertebrates**. They can be found in almost all of the world's aquatic habitats, from high-elevation mountain streams to the farthest ocean depths, and have a greater species diversity than any other class of vertebrates. Of the more than 450 fish species found within the state of Alabama, 176 are known to inhabit the Tennessee River system. A total of six endangered or threatened fish species have been identified within the MSNHA portion of the Tennessee system, including the slackwater darter, the spring pygmy sunfish (*left*), and the Alabama cavefish.



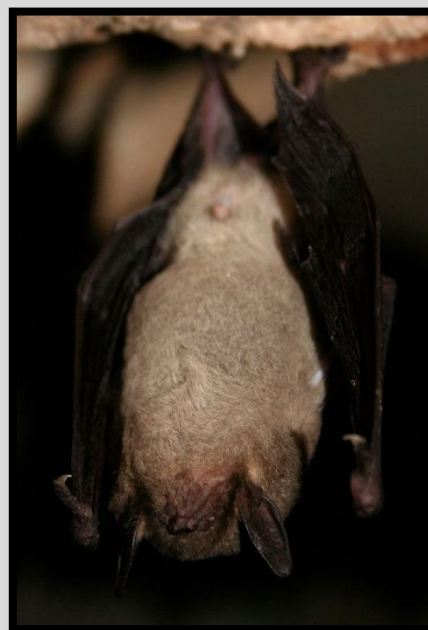
Key Cave National Wildlife Refuge in Lauderdale County is home to the world's only known population of **Alabama cavefish** (*below*). One of the rarest cave-dwelling fish species in North America, and among the rarest of all freshwater fish, the Alabama cavefish reaches a maximum length of one to two inches. It has an elongated, flattened head, and uses its large mouth to incubate its eggs and shelter its offspring as they grow and develop. Having no eyes, it uses a system of hair-like sensory papillae to navigate the dark environment in which it lives. Because its known range is limited to a single location, and because the growth rate of the population is lower than that of most other cave-dwelling organisms, the Alabama cavefish is listed as an endangered species by the U.S. Fish and Wildlife Service.



Mammals

Mammals are warm-blooded, air-breathing vertebrates with several distinct characteristics, including **mammary** (or milk-producing) glands, sweat glands, hair, and specialized teeth. Two endangered mammals, the gray bat and the Indiana bat, have been identified within the MSNHA, and populations of one or both can be found in each of the heritage area's six counties.

The endangered **gray bat** (*right*) is found only in limestone karst areas of the southeastern United States, and the largest population in the state of Alabama occurs within the Tennessee River basin. With a diet consisting primarily of aquatic insects, gray bats have been known to travel as far as 20 miles in search of food. However, they spend most of their lives in caves, roosting in riverside caves during the summer months and hibernating through the winter in deep, vertical caverns. As a result, gray bats are very vulnerable to human disturbance. Many important cave habitats have been flooded and submerged by man-made reservoirs, while others are threatened by natural flooding. The increasing popularity of recreational caving also threatens the gray bat, as human visitation can drive them out of their homes, while attempts to secure cave entrances can alter environmental conditions or impede access.



Mussels



Mussels include several families of clams which are distinguished from other clams by their elongated, **asymmetrical** shells. A total of 18 different mussel species found within the MSNHA portion of the Tennessee River system are designated as endangered, and each of the six MSNHA counties is home to at least one endangered freshwater mussel species. Examples include the pink mucket (*left*), the southern clubshell, and the sheepsnose. Two additional mussels found in the heritage area, the Alabama moccasinshell and the orangenacre mucket, have been classified as threatened.



Crustaceans

Crustaceans are **arthropods**, members of a class of **invertebrate** animals which have exoskeletons, segmented bodies and jointed appendages, or legs. They are distinguished from other groups of arthropods by their limbs, which are **bimartous**, meaning two-parted. Common examples of crustaceans include crabs, lobsters, crayfish, and shrimp. One endangered crustacean, the Alabama cave shrimp (*above*), is found in the freshwater pools of five Madison County caves and is not known to exist anywhere else in the world.

Snails



Snails are **mollusks** and members of the class *Gastropoda*. Unlike the other members of this class, known as slugs, they have a distinctive, spiral-shaped, external shell during the adult stage. One endangered snail species, the Anthony's riversnail (*left*), has been identified within the MSNHA portion of the Tennessee River basin. Among the largest of aquatic snail species, it is known to exist in only two locations, one of which is Limestone Creek.

Birds

Birds are a group of warm-blooded vertebrates with distinctive feathers, toothless beaked jaws, and strong but lightweight skeletons, which reproduce by laying hard-shelled eggs. Birds also have wings, and most (but not all) are capable of flight. The MSNHA boasts a remarkably rich diversity of resident and transient bird species, thanks to its comparatively mild winters, variety of bird-friendly habitats, and proximity to numerous migration routes. Federally designated areas along the Tennessee River, such as Wheeler National Wildlife Refuge, provide important sanctuaries for waterfowl, woodland birds, and songbirds. The Tennessee basin also hosts the largest population of bald eagles in the state of Alabama.

Dismalites

Dismalites (*right*) are closely related to the rare “glowworms” of Australia and New Zealand. They are not worms, in fact, but insect larvae which emit a bright blue-green light as a means of attracting prey into their spider-like webs. The light is produced by a chemical reaction in two pairs of light-producing structures, one in the thorax and one near the tip of each insect’s tail.



Dismalites are only found in a few places on earth because they require a very select habitat in order to survive. They need high humidity levels to keep their bodies from drying out, hanging surfaces from which to dangle their webs, a minimum of wind disturbance to keep webs from becoming entangled, and an abundance of prey in the form of fellow insects. Dismals Canyon in Lauderdale County meets all of these conditions, and the spectacle of the dismalites’ fluorescent green light show attracts hundreds of nighttime visitors to the conservatory each year.



Glossary

Endangered: at risk of becoming extinct.

Threatened: at risk of becoming endangered.

Mammary: milk-producing.

Vertebrate: having a spine or backbone.

Invertebrate: having no spine or backbone.

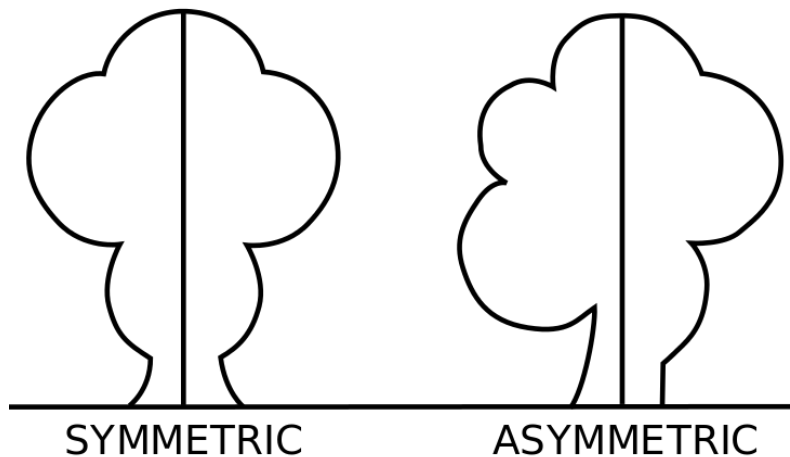
Arthropods: invertebrate animals with exoskeletons, segmented bodies and jointed appendages, or legs.

Mollusks: invertebrate animals with soft, unsegmented bodies that live underwater or in wet habitats.

Bimariuous: made up of two parts.

Symmetric: made up of two similar or identical halves.

Asymmetric: made up of two dissimilar or non-identical halves.

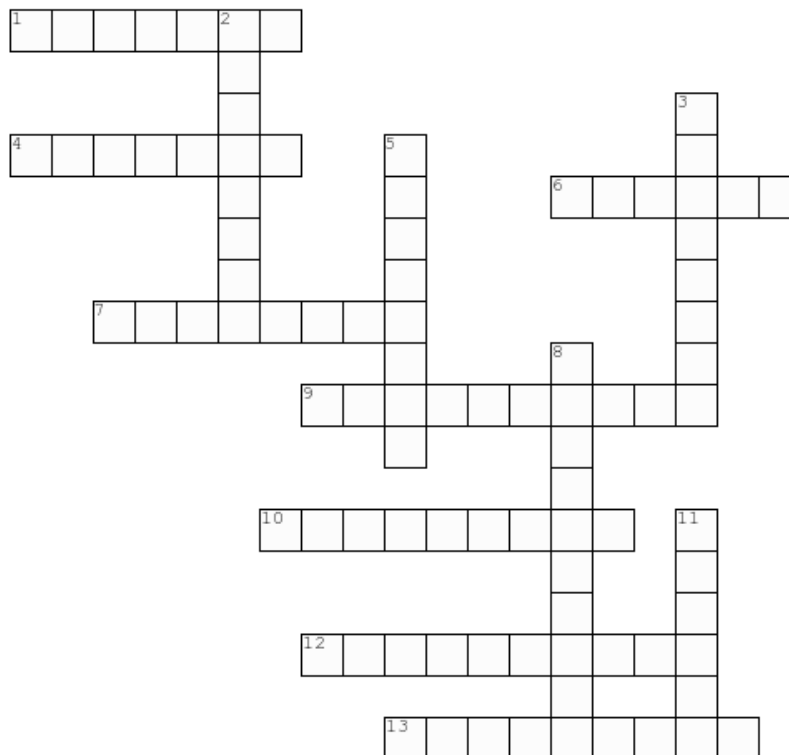


Activities

Name: _____

Tennessee River Crossword

Complete the crossword below



Created with TheTeachersCorner.net [Crossword Puzzle Generator](#)

Across

1. Endangered species are in danger of becoming _____.
4. _____ Lake is the second largest lake on the Tennessee River in Alabama.
6. The pink mucket is an endangered species of _____.
7. Most of the Muscle Shoals National Heritage Area is located within the _____ Rim physiographic province.
9. A place where two rivers meet.
10. The Flint River is the largest _____ of the Tennessee River in Alabama.
12. Insect larvae which use a bright blue-green light to lure prey into spider-like webs.
13. Rock composed of calcium carbonate from the shells of aquatic animals.

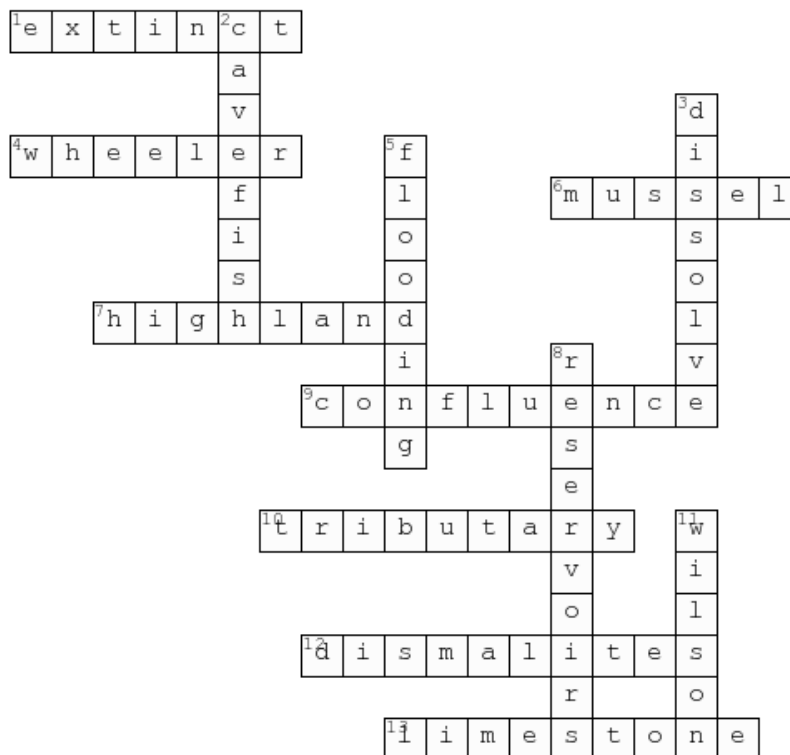
Down

2. Key Cave is home to the world's only known population of the Alabama _____.
3. Limestone tends to _____ in water.
5. The main goal of the Bear Creek Water Control Project is to reduce _____.
8. Dams have transformed the Tennessee River into a series of _____, or lakes.
11. _____ Dam is the largest conventional hydroelectric dam in the TVA system.

Name: _____

Tennessee River Crossword

Complete the crossword below

Created with TheTeachersCorner.net [Crossword Puzzle Generator](http://www.theteacherscorner.net)

Across

- Endangered species are in danger of becoming _____. (**extinct**)
- _____ Lake is the second largest lake on the Tennessee River in Alabama. (**wheeler**)
- The pink mucket is an endangered species of _____. (**mussel**)
- Most of the Muscle Shoals National Heritage Area is located within the _____ Rim physiographic province. (**highland**)
- A place where two rivers meet. (**confluence**)
- The Flint River is the largest _____ of the Tennessee River in Alabama. (**tributary**)
- Insect larvae which use a bright blue-green light to lure prey into spider-like webs. (**dismalites**)
- Rock composed of calcium carbonate from the shells of aquatic animals. (**limestone**)

Down

- Key Cave is home to the world's only known population of the Alabama _____. (**cavefish**)
- Limestone tends to _____ in water. (**dissolve**)
- The main goal of the Bear Creek Water Control Project is to reduce _____. (**flooding**)
- Dams have transformed the Tennessee River into a series of _____, or lakes. (**reservoirs**)
- _____ Dam is the largest conventional hydroelectric dam in the TVA system. (**wilson**)

Name: _____

Created with TheTeachersCorner.net [Word Search Maker](http://www.TheTeachersCorner.net)

Tennessee River Word Search

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

BASIN
 VERTEBRATE
 THREATENED
 MAMMARY
 FISH

RAPIDS
 SLOPE
 TRIBUTARY
 CONFLUENCE

LIMESTONE
 ENDANGERED
 RESERVOIR
 MUSSEL

Name: _____

Created with TheTeachersCorner.net [Word Search Maker](http://www.TheTeachersCorner.net)

Tennessee River Word Search

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

BASIN
 VERTEBRATE
 THREATENED
 MAMMARY
 FISH

RAPIDS
 SLOPE
 TRIBUTARY
 CONFLUENCE

LIMESTONE
 ENDANGERED
 RESERVOIR
 MUSSEL

Tennessee River Bingo

Instructions:

1. Make a template for the Bingo card by using a ruler to divide a sheet of paper into 25 squares (five squares across by five squares down). Write "Free Space" in the center square.
2. Make one copy of the template for each student in your class.
3. Write one vocabulary term, place name, or plant/animal species in each square (except for the "Free Space" center square). See the blue text in the Background Information section of this resource packet, and the terms listed in the Word Search and Crossword answer keys, for suggestions. The terms should be ordered differently on each Bingo card, so that no two students have identical cards.
4. Write a definition/clue for each term on an index card, with one definition/clue per card. Fold all of the index cards in half so that the clues cannot be seen.
5. Choose an index card, unfold it, and read the definition/clue aloud. Have each student mark the square on his/her Bingo card where the corresponding term appears. The first student to correctly mark five squares in a row and yell "Bingo!" is the winner.

Wildlife and Habitats of the Tennessee River

Materials:

- printed handouts
 - 3 illustrated “Group” handouts (x1 each)
 - 3 “Leader” worksheets (x1 each)
 - 3 “Species” worksheets (x8 each)
- computer lab with student internet access (optional)
- large-screen computer display or digital projector (optional)
- classroom maps (optional)

Instructions:

1. Divide students into three groups of nine or less. Assign each group one of the three illustrated handouts which follow these instructions.

- Group 1: “Endangered Species of the Tennessee River”
- Group 2: “A Trip Down Cypress Creek”
- Group 3: “Animals of Wheeler Wildlife Refuge”

2. Have each group select a leader. Provide each group leader with a copy of the “Leader” worksheet for his/her group. Have the group leaders complete both pages of the “Leader” worksheet.

3. Have the remaining students from each group select a species from their group’s handout. Provide each student with a copy of the “Species” worksheet for his/her group. Have these students complete both pages of the “Species” worksheet.

4. Have all three groups present their findings to the class. Have the group leader begin each group presentation by reading the first page of his/her “Leader” worksheet, followed by other group members reading the second page of the “Species” worksheet.

If student internet access is not available:

Links to the online resources needed for the worksheets can be found on page 43 of this resource packet. These may be printed (one copy of each) and distributed to students along with the worksheets.

If you have classroom maps:

Have each group leader begin his/her group's presentation by locating the group's habitat on the map. Have the leader of Group 1 locate the Tennessee River on a map of the United States or Alabama and trace it from beginning to end with his/her finger. Have the leaders of Group 2 and 3 trace the visible portions of the Tennessee River on a map of Alabama or north Alabama, then point to the locations of their respective habitats.

If you have a digital projector or large-screen computer display:

Call on students individually while they are filling out their worksheets. Help each find and download a high-quality image of their subject. Save images on the teacher computer, in the same folder, and name them sequentially as they are downloaded. (e.g. For Group 1, name the group leader's image "1a," and name the remaining images "1b," "1c," etc.) When the groups do their presentations, you can illustrate by scrolling through the images in full-screen mode using the space bar or the right arrow key.

Group #1: Endangered Species of the Tennessee River



Alabama Waterdog



Flattened Musk Turtle



Alabama Cavefish



Alabama Cave Shrimp



Slackwater Darter



Spring Pygmy Sunfish



Grey Bat



Pink Mucket

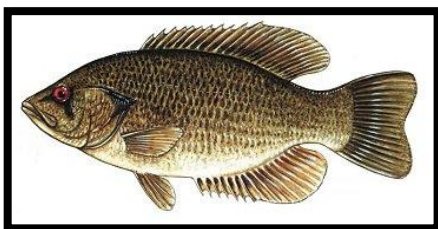
Group #2: A Trip Down Cypress Creek



Great Blue Heron



Longear Sunfish



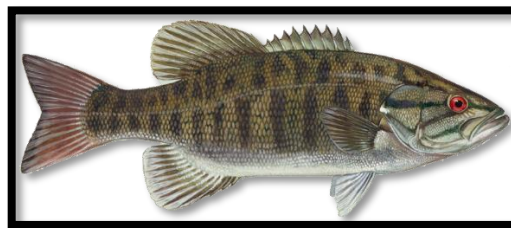
Rock Bass



Crown Darter



Largemouth Bass



Smallmouth Bass



Greenside Darter



Southern Water Snake

Group #3: Animals of Wheeler Wildlife Refuge



Sandhill Crane



Wood Duck



Mallard



Red-Tailed Hawk



Yellow-Bellied Pond Slider



Copperhead



Cottonmouth



Ground Skink

Name: _____ Date: _____

Worksheet: Group Leader #1

INSTRUCTIONS: Use Volume 4 of the "Citizen Guide to Alabama Rivers" at http://www.ag.auburn.edu/fish/wp-content/uploads/formidable/tennessee_pub.pdf to fill in the blanks below. You will then be asked to read the completed worksheet in front of the class, at the beginning of your group's presentation. (The numbers in brackets are hints! They are page numbers of the "Citizen Guide" telling you where to look. Mark these numbers out after you have filled in all the blanks.)

The Tennessee River originates near _____, Tennessee, where the _____ River meets the _____ River. [4]

The rivers of the Tennessee Basin flow through _____ counties of _____ states. [4]

The mainstem of the Tennessee River is _____ miles long. [4]

There are three dams on the Alabama portion of the Tennessee River: Guntersville, _____ and _____. These dams generate hydroelectric power, and together they create _____ acres of lakes. [5]

One downside to the human alteration of river systems has been the endangerment of wildlife. In the Tennessee River alone, _____ tons of mussels were killed in a single year. [7]

These organisms are important, not only as a source of food for humans and other animals, but also because _____. [10]

The Tennessee Basin is one of the most biologically diverse in the nation, but it also has a large number of threatened or endangered species, including _____ species of fish and _____ species of mussel. [10]

INSTRUCTIONS: Use Google Earth, Google Maps, or an atlas to find the Tennessee River. Illustrate the location of the river by tracing its outline on the map below.



Image source: <https://wall.alphacoders.com/tags.php?tid=47205>

Name: _____ Date: _____

Worksheet: Group Leader #2

INSTRUCTIONS: Open <http://www.outdooralabama.com>. Type "Cypress Creek" in the search box near the top of the page and click "Search." Open the page for "Cypress Creek" and read the article. Then use the article to answer the following questions.

Cypress Creek begins in _____, then flows south through _____ County, where it empties into the Tennessee River.

The upper section of the creek is an excellent spot for _____ fishing.

The lower section of the creek is easily traveled by _____.

However, the lowest section of the creek has a _____ that can be dangerous.

Fish species found in Cypress Creek include _____ bass, _____ bass, _____ bass, and _____ bass.

Cypress Creek is the only known location of the _____.

The last recorded sighting of the _____ was also reported at Cypress Creek.

Finally, Cypress Creek is an important stronghold for the _____.

INSTRUCTIONS: Use Google Earth, Google Maps, or an atlas of the United States to find Cypress Creek. Illustrate the location of Cypress Creek by circling it on the map below.

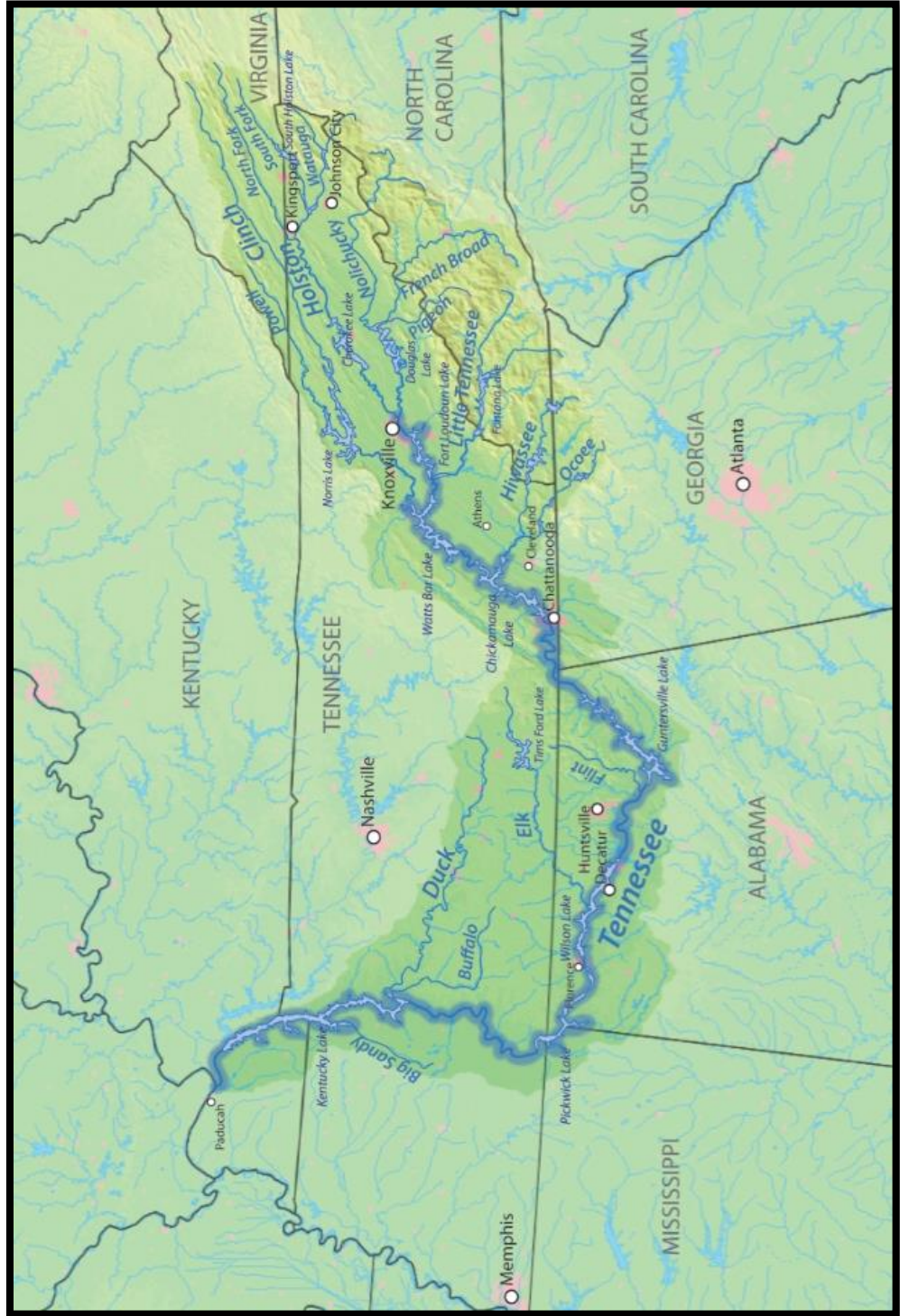


Image source: Wikipedia

Name: _____ Date: _____

Worksheet: Group Leader #3

INSTRUCTIONS: Open <https://www.fws.gov/refuge/Wheeler> and click "Wildlife & Habitat" at the top of the page. Read the article, then use what you've learned to answer the following questions.

Wheeler National Wildlife Refuge was established along the Tennessee River near Decatur as a refuge and breeding ground for _____ and other wildlife.

The refuge provides an excellent habitat for many species of native wildlife, including _____ bird species, _____ species of mammals, _____ species of reptiles and amphibians, and _____ species of fish.

Every year, the refuge supports Alabama's largest concentration of wintering _____.

While winter populations of _____ have dropped dramatically, the number of _____ at the refuge have been increasing.

About 2,000 acres of _____ habitat can be found at the refuge.

There are also several caves on the refuge, formed by water dissolving away _____ over a large period of time.

The goal of the farming program at the refuge is to provide _____ and _____ for migratory birds and other wildlife.

INSTRUCTIONS: Use Google Earth, Google Maps, or an atlas of the United States to find Wheeler National Wildlife Refuge. Illustrate the location of the refuge by circling it on the Tennessee River map below.

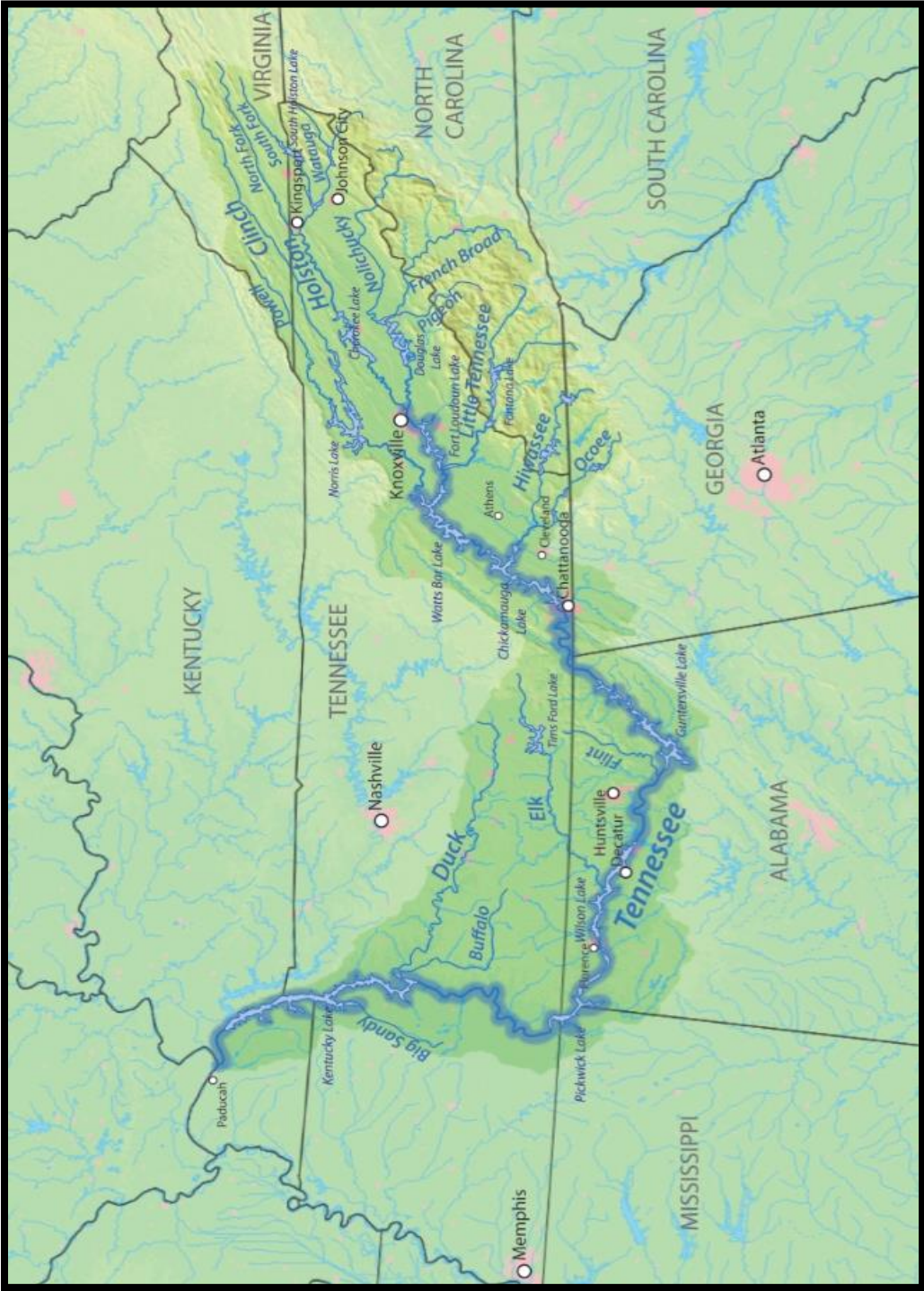


Image source: Wikipedia

Name: _____ Date: _____

Species Worksheet: Group #1

INSTRUCTIONS: Open <http://www.iucnredlist.org>. Type the name of your animal in the search box near the top of the page and click "Go." Once you have found the page for your animal, click the link and read the article. Then use the article to answer the following questions.

1. What is the name of your animal? _____

2. What is its scientific name? _____

3. What is the animal's "Red List Category"? _____

4. Why was the animal placed in that category? (See "Justification.") _____

5. Where does the animal live? (See "Range Description.") _____

6. Describe the animal's habitat. _____

7. What ecological system(s) does the animal inhabit? _____

8. What are two major threats to the animal? _____

INSTRUCTIONS: Use your worksheet answers to complete the following sentences. You will then be asked to read this page to the rest of the class when your group presents. (The numbers in brackets are hints! Mark these out after you have filled in all the blanks.)

The [1] _____ can be found in [5] _____
_____.

Its natural habitat is [6] _____

_____.

It is classified as [3] _____ because [4] _____

_____.

One of the major threats facing the [1] _____ is [8] _____

_____.

Another major threat is [8] _____

_____.

Name: _____ Date: _____

Species Worksheet: Group #2

INSTRUCTIONS: Open <http://www.outdooralabama.com>. Type the name of your animal in the search box near the top of the page and click "Search." Once you have found the page for your animal, click the link and read the article. Then use the article to answer the following questions.

1. What is the name of your animal? _____

2. What is the animal's scientific name? _____

3. Does the animal have any other names? If so, what are they? _____

4. How long is the animal? _____

5. What color is the animal? _____

6. What are two special features of the animal? _____

7. What is the animal's distribution? _____

8. What kind of habitat does the animal live in? _____

9. What does the animal eat? _____

INSTRUCTIONS: Use your worksheet answers to complete the following sentences. You will then be asked to read what you've written to the rest of the class when your group presents. (The numbers in brackets are hints! Mark these out after you have filled in all the blanks.)

The [1] _____ lives in Cypress Creek. It can also be found in [7] _____.

It is [4] _____ inches long.

It is [5] _____ in color.

One of its distinctive features is [6] _____.

Another distinctive feature is [6] _____.

Its natural habitat is [8] _____.

It eats [9] _____.

Name: _____ Date: _____

Species Worksheet: Group #3

INSTRUCTIONS: Open <http://www.outdooralabama.com>. Type the name of your animal in the search box near the top of the page and click "Search." Once you have found the page for your animal, click the link and read the article. Then use the article to answer the following questions.

1. What is the name of your animal? _____
2. What is the animal's scientific name? _____
3. Does the animal have any other names? If so, what are they? _____

4. How long is the animal? _____
5. What color is the animal? _____
6. What are two special features of the animal? _____

7. What is the animal's distribution? _____

8. What kind of habitat does the animal live in? _____

9. What does the animal eat? _____

INSTRUCTIONS: Use your worksheet answers to complete the following sentences. You will then be asked to read what you've written to the rest of the class when your group presents. (The numbers in brackets are hints! Mark these out after you have filled in all the blanks.)

The [1] _____ lives in Wheeler Wildlife Refuge. It can also be found in [7] _____.

It is [4] _____ inches long.

It is [5] _____ in color.

One of its distinctive features is [6] _____.

Another distinctive feature is [6] _____.

Its natural habitat is [8] _____.

It eats [9] _____.

Online Resources:

“Leader” Worksheets

- Group 1: http://www.ag.auburn.edu/fish/wp-content/uploads/formidable/tennessee_pub.pdf
- Group 2: <http://www.outdooralabama.com/cypress-creek-0>
- Group 3: https://www.fws.gov/refuge/Wheeler/wildlife_and_habitat/index.html

“Species” Worksheets – Group 1

- Alabama Waterdog: <http://www.iucnredlist.org/details/59430/0>
- Flattened Musk Turtle: <http://www.iucnredlist.org/details/20824/0>
- Alabama Cavefish: <http://www.iucnredlist.org/details/20467/0>
- Alabama Cave Shrimp: <http://www.iucnredlist.org/details/15887/0>
- Slackwater Darter: <http://www.iucnredlist.org/details/8110/0>
- Spring Pygmy Sunfish: <http://www.iucnredlist.org/details/202436/0>
- Grey Bat: <http://www.iucnredlist.org/details/14132/0>
- Pink Mucket: <http://www.iucnredlist.org/details/11249/0>

“Species” Worksheets – Group 2

- Great Blue Heron: <http://www.outdooralabama.com/great-blue-heron>
- Longear Sunfish: <http://www.outdooralabama.com/longear-sunfish>
- Rock Bass: <http://www.outdooralabama.com/rock-bass>
- Crown Darter: <http://www.outdooralabama.com/crown>
- Largemouth Bass: <http://www.outdooralabama.com/largemouth-bass>
- Smallmouth Bass: <http://www.outdooralabama.com/smallmouth-bass>
- Greenside Darter: <http://www.outdooralabama.com/greenside>
- Southern Water Snake: <http://www.outdooralabama.com/southern-water-snake>

“Species” Worksheets – Group 3

- Sandhill Crane: <http://www.outdooralabama.com/sandhill-crane>
- Wood Duck: <http://www.outdooralabama.com/wood-duck>
- Mallard: <http://www.outdooralabama.com/mallard>
- Red-Tailed Hawk: <http://www.outdooralabama.com/red-tailed-hawk>
- Yellow-Bellied Pond Slider: <http://www.outdooralabama.com/pond-slider>
- Copperhead: <http://www.outdooralabama.com/copperhead>
- Cottonmouth: <http://www.outdooralabama.com/cottonmouth>
- Ground Skink: <http://www.outdooralabama.com/ground-skink>



Canada Geese

in Cypress Creek, near Florence

Appendix

Additional Resources

Muscle Shoals National Heritage Area

<http://msnha.una.edu>

Encyclopedia of Alabama

<http://www.encyclopediaofalabama.org>

Outdoor Alabama

<http://www.outdooralabama.com>

Alabama State Parks

<http://www.alapark.com>

Alabama Forever Wild Land Trust

<http://alabamaforeverwild.com>

North Alabama Birding Trail

<http://www.northalabamabirdingtrail.com>

Alabama Birding Trails

<http://alabamabirdingtrails.com>

Tennessee Valley Authority

<http://www.tva.gov>

U.S. Fish and Wildlife Service

<http://www.fws.gov>

IUCN Red List of Threatened Species

<http://www.iucnredlist.org>

Curriculum Standards

Alabama Course of Study (2010)

4th Grade: Alabama Studies

4.) Relate the relationship of the five geographic regions of Alabama to the movement of Alabama settlers during the early nineteenth century.

- Identifying natural resources of Alabama during the early nineteenth century
- Describing human environments of Alabama as they relate to settlement during the early nineteenth century, including housing, roads, and place names

16.) Determine the impact of population growth on cities, major road systems, demographics, natural resources, and the natural environment of Alabama during the late twentieth and early twenty-first centuries.

Alabama Course of Study (2015)

4th Grade: Science

5) Compile information to describe how the use of energy derived from natural renewable and nonrenewable resources affects the environment (e.g., constructing dams to harness energy from water, a renewable resource, while causing a loss of animal habitats; burning of fossil fuels, a nonrenewable resource, while causing an increase in air pollution; installing solar panels to harness energy from the sun, a renewable resource, while requiring specialized materials that necessitate mining).

14) Explore information to support the claim that landforms are the result of a combination of constructive forces, including crustal deformation, volcanic eruptions, and sediment deposition as well as a result of destructive forces, including erosion and weathering.



O'Neal Bridge
near McFarland Park, Florence

Sources

Water and Land Resources

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U.S. Department of Agriculture, "Soil Areas in Alabama," https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/office/ssr7/?cid=nrcs142p2_047868

Muscle Shoals National Heritage Area, "Management Plan: Background Report," revised December 14, 2013, <http://msnha.una.edu/about>

Auburn University Water Resources Center, "Tennessee River Basin," <http://aes.auburn.edu/wrc/resource/rivers-of-alabama/tennessee-basin>

Tennessee Valley Authority, "Bear Creek Reservoirs Land Management Plan," March 2001, https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Land%20Management/Land%20Plans/Cedar%20Creek%20RLMP.pdf

Tennessee Valley Authority, "Wilson Dam," <https://www.tva.gov/Energy/Our-Power-System/Hydroelectric/Wilson-Reservoir>

Patrick E. O'Neil, "River Systems and Watersheds of Alabama," <http://www.encyclopediaofalabama.org/article/h-1627>

Bear Creek Development Authority, "Bear Creek Lakes," <http://www.bearcreeklakes.com>

Biological Resources

Muscle Shoals National Heritage Area, "Management Plan: Background Report," revised December 14, 2013, <http://msnha.una.edu/about>

Auburn University Water Resources Center, "Tennessee River Basin," <http://aes.auburn.edu/wrc/resource/rivers-of-alabama/tennessee-basin>

U.S. Fish and Wildlife Service, "Gray Bat (*Myotis grisescens*)," https://www.fws.gov/midwest/endangered/mammals/grbat_fc.html

Dismals Canyon, "Dismalites," <http://www.dismalscanyon.com/dismalites/index.html>

Outdoor Alabama, "Alabama Cavefish," <http://www.outdooralabama.com/non-game-fish/alabama-cavefish>

Alabama Water Watch Program, "Citizen Guide to Alabama Rivers: Tennessee," http://www.ag.auburn.edu/fish/wp-content/uploads/formidable/tennessee_pub.pdf

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International Union for Conservation of Nature and Natural Resources, "Alabama Waterdog," <http://www.iucnredlist.org/details/59430/0>

Outdoor Alabama, "Cypress Creek," <http://www.outdooralabama.com/rivers-and-mobile-delta/cypress-creek>



Tennessee River
at Riverfront Park, Sheffield

Image Sources

All photos taken by Brian Corrigan except those listed below.

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Wheeler Dam:

https://en.wikipedia.org/wiki/Wheeler_Dam

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https://en.wikipedia.org/wiki/Wilson_Dam

Pickwick Dam:

https://en.wikipedia.org/wiki/Pickwick_Landing_Dam

Wheeler Lake:

<https://www.tva.gov/Energy/Our-Power-System/Hydroelectric/Wheeler-Reservoir>

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http://www.visitflorenceal.com/things_to_do/wilson-lake

Pickwick Lake:

https://en.wikipedia.org/wiki/Pickwick_Lake

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<http://www.bearcreeklakes.com/about-us.html>

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<http://msnha.una.edu/about>

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<https://rootsrated.com/stories/cane-creek-nature-preserve-loop-a-history-rich-hike>

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<http://msnha.una.edu/about>

Biological Resources

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<http://www.iucnredlist.org/details/202436/0>

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McFarland Park
in Florence

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Cypress Creek
at Wildwood Park, Florence