

Chapter 3

The Land of Missouri



On the North American continent, Missouri is located on the edge of the Great Plains and at the confluence of the Missouri and Mississippi rivers. These are just two of the many physical features that define our state.





Opposite Page, Top: Girl fishing from shore of lake. Middle Left: Common skink. Bottom: Prairie chicken. This Page, Above: A stream in the Ozarks, an area of Missouri known for its beauty. Left: Tornado over the Plains.

Missouri Close Up



Missouri Numbers

Number of geographic regions: 4

Number of caves: More than 6,000

Highest temperature on record:
118°F in Warsaw and Union on July 14, 1954

Lowest temperature on record:
-40°F in Warsaw on Feb. 13, 1905

**In a typical year, the warmest
and coolest months:** July and January

**In a typical year, the wettest
and driest months:** May and February



Missouri Plants & Animals

Number of plant species: More than 3,200

Number of native orchid species: 35

Proportion of state covered by forests: One-third

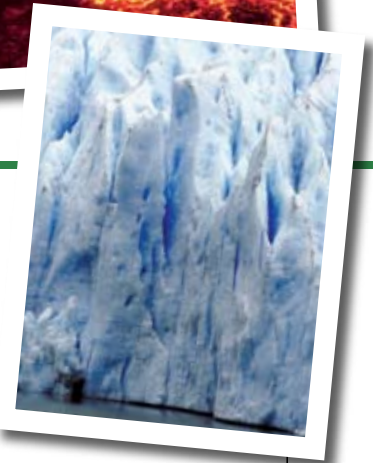
Number of species of mammals: Nearly 70

Number of species of birds: More than 400

**Number of species of amphibians
and reptiles:** 43 and 63, respectively

Section 1

The Regions of Missouri



As you read, look for the following:

- the four geographic regions of Missouri
- the effect of glaciers on Missouri's landscape
- the effect of oceans and volcanoes on Missouri's landscape
- vocabulary terms **glaciers, Ice Age, delta, agriculture, prairie**

Missouri can be divided into four geographic regions, each with its own physical features shaped by different forces of nature.

Above: Glaciers and cracks in Earth's crust that let lava flow to the surface helped form our current landscape.



Map 9

Regions of Missouri

Map Skill: Which is the smallest region?

The Glacial Plains Region

The Missouri River forms the northwest border of Missouri, separating it from Nebraska and a portion of Kansas. It runs south to Kansas City and then cuts eastward across the state to join the Mississippi near St. Louis. The river also marks the southern edge of the Glacial Plains region, which covers the northern part of the state and stretches beyond the border with Iowa far to the north into Canada.

Glaciers are large sheets of ice found where the temperature rarely rises above freezing. Beginning 1.6 million years ago, the climate of the Northern Hemisphere turned cold enough to allow glaciers to stretch from the Arctic all the way south into Missouri to about where the Missouri River flows today. We call this cold time on Earth the **Ice Age**. It lasted in some parts of the world until about 10,000 years ago. In Missouri, however, the glaciers began melting about 500,000 years ago.

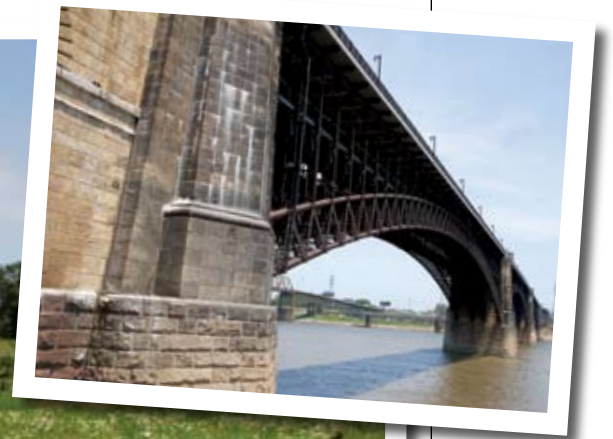
As the glaciers grew, they pushed the soil before them. The weight of the heavy ice also crushed the rocks beneath it and dragged large pieces of these rocks along, carving and scratching the surface of the Earth to form valleys and riverbeds. As the glaciers melted, the water filled the riverbeds and also filled holes to form lakes. In northern Missouri, the glaciers left behind large deposits of crushed soil and rocks that further eroded to form a fine-grained soil that was blown by the wind into gently rolling hills.



Above: The Missouri and Mississippi Rivers join together near St. Louis.

Below: A lovely prairie near the Prairie Fork Conservation Area.

Right: The Eads Bridge crosses the Mississippi River at St. Louis.



We call this wind-blown soil *loess* (pronounced low-ess). The loess is very deep in some places, and it is very good for farming. It also is easily washed away by water erosion. That is one reason the water in many rivers in northern Missouri looks so brown—because it is filled with dirt that has been washed away by wind and water.

Over the hundreds of thousands of years that the Missouri River has been flowing across the state, it has created a valley. In some places, the valley is very wide and the sides are gentle hills. But in some stretches, it runs beneath high bluffs that it cut into the layers of rock.

The Ozark Highlands Region

Long before the Ice Age, Missouri was shaped by two other forces—volcanoes and oceans. About 500 million years ago, an ocean covered much of the middle part of North America. One reason we know this is because of the layers of sedimentary rock found in the Ozark Highlands, a region that covers most of the southern and southeastern part of the state.

Sedimentary rock is formed when creatures living in the ocean die. Their skeletons sink to the bottom. Over millions of years, these skeletons form layers that are crushed together into rock. Sometimes you can see these layers where a highway or river has cut through a hillside. In some layers, you will find fossils of sea creatures whose skeletons make up the rock. Water seeping through the rocks for millions of years has dissolved the softer sedimentary rocks, leaving the harder surrounding rock and creating caves. Missouri has so

many caves (an estimated 6,200) that it is sometimes called “the Cave State.”

When the water flowing underground reaches the surface, it comes out in springs. There are more than 600 large springs in Missouri, some of them putting out millions of gallons of water every day. Most of the large springs in Missouri are in the Ozark Highlands region.

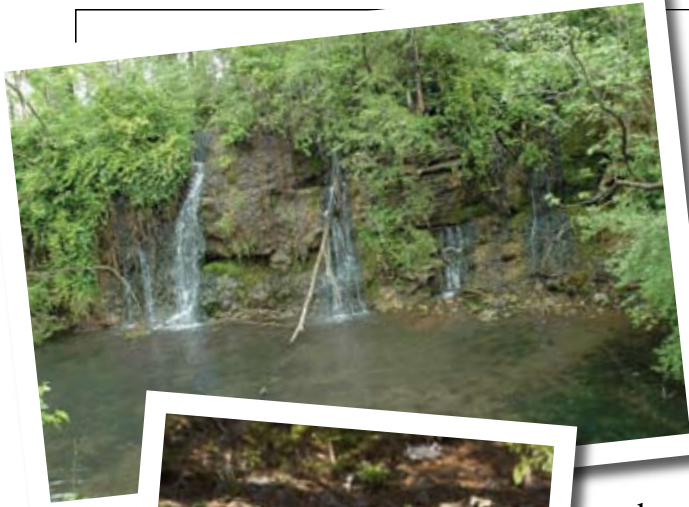


Above: A river cuts through the landscape.
Left: Caves are found throughout our state.



Did you know?

On average, 286 million gallons of water a day flow from Big Spring in Carter County.



But how did this region become dry land? In this part of Missouri, volcanoes beneath Earth's surface pushed up against the rock layers, raising them out of the sea. This happened several times in the state's geologic history. Each time it happened, the water drained through the rocks, forming caves. The draining water also was forced into cracks in the uplifted land, where it formed streams and rivers. The hot, liquefied rock (called *magma*) from the volcanoes cooled into *igneous rock*. The igneous rock in Missouri is among the oldest in the world and contains many minerals, including iron and lead ore and granite. That is why there are so many mines in this region. You can also see igneous rocks where the magma broke through the surface. One such place is Elephant Rocks State Park. There, large granite rocks that weigh hundreds of tons were worn down by erosion and look like a herd of elephants.

This uplifted land was once much higher and looked more like the mountains we see in pictures. But over millions of years, wind and water have worn them down into the steep, but not so high, hills we still call the Ozark Mountains. The highest of these is Taum Sauk Mountain in Iron County. Its elevation is 1,772 feet—the highest point in Missouri. The Ozarks stretch from Arkansas across southern and southeastern Missouri into Illinois. They get their name from a French map abbreviation, *aux arcs*, meaning “to the Arkansas” River.

Because the Ozark Highlands region is so hilly and rocky, farming is very hard. Instead, the land is used for lumbering, mining, and recreation. The hills are not only scenic but also great for hiking and camping. The rocky stream bottoms keep the spring-fed waters clear, cold, and rapidly moving, making them great for canoeing and fishing.



The Southeast Lowlands Region

Just a few hours by car from Taum Sauk Mountain is Missouri's lowest point. It is near Caldwell in Dunklin County, where the St. Francis River crawls into Arkansas. Its elevation is only 230 feet. This area is part of the Southeast Lowlands region in the southeast corner of the state.

The Southeast Lowlands were not pushed as high by the same volcanoes that formed the Ozark Highlands. The region remained covered by an ocean for a longer time, and it was where rivers to the north, including what is today the Mississippi River, flowed into the sea. This is called a **delta**. Rivers flowing into a delta deposit layers of soil. As the seas receded (covered less land), the delta moved southward, leaving the soil deposits behind and just above sea level. Today, the Mississippi Delta (where the river flows into the Gulf of Mexico) is south of New Orleans. But we still refer to all of the lands along the Mississippi, from the Gulf to the Bootheel, as The Delta.

The soil deposits in a delta are very rich in the nutrients needed by plants, making the region very good for farming. In Missouri, the land is so low that swamps and forests covered it until the early 1900s. Lumber companies cut down most of the trees. Then farmers drained the swamps so that they could farm the land. Today, the Southeast Lowlands region is among the best **agricultural** (farming) land in the state.



Opposite Page, Top: Ozark streams are kept clear and cold by springs like these. **Middle:** Canoeing is a popular activity in the Ozarks. **Below: Elephant Rocks State Park.** **Bottom of Page: Taum Sauk Mountain.** **This Page, Below Left:** Crops from the Southeast Lowlands help feed the nation. **Below:** Children learn to farm at an early age.

Spotlight

The Cave State



There are more than 6,000 caves in Missouri. And more are discovered each year. Only Tennessee has more caves than Missouri.

Most of the state's caves are in the Ozarks, but 78 of the state's 114 counties have at least one cave. Perry County has the most, with more than 650 at last count.

Missouri's geology is responsible for there being so many caves. The layers of limestone left behind by ancient seas are ideal for cave development. This layer is known as *karst*, a German word and the name of a limestone region in Slovenia in eastern Europe. Some of the minerals in the karst easily dissolve in water. It takes millions of years, but eventually water seeping through the karst dissolves the softer minerals, creating tunnels and passages. The harder minerals that do not dissolve form the walls and ceilings of caves. Where the ceilings have collapsed, you will often find sinkholes that allow water into the caves.

Caves are important for many reasons. Groundwater that we depend on for use in our homes, farms, and businesses often flows through caves. Unfortunately, these passages also allow pollutants to travel underground. Pollution in one place can seep into the ground and travel through a cave system, contaminating groundwater many miles away.

Caves are home to many creatures. Vultures often build their nests in the entrances of caves high on bluffs. Salamanders and snakes live near the entrances, retreating into the cave to stay warm or to cool off, depending on the weather. Bears often use caves to hibernate and to give birth. Fossils of saber-toothed tigers and giant lions, both now extinct, have been found in Missouri caves.

The most familiar creatures we find in caves are bats, which hang from the ceiling during the day and fly out at night to catch insects. In the winter, the bats hibernate in the caves.

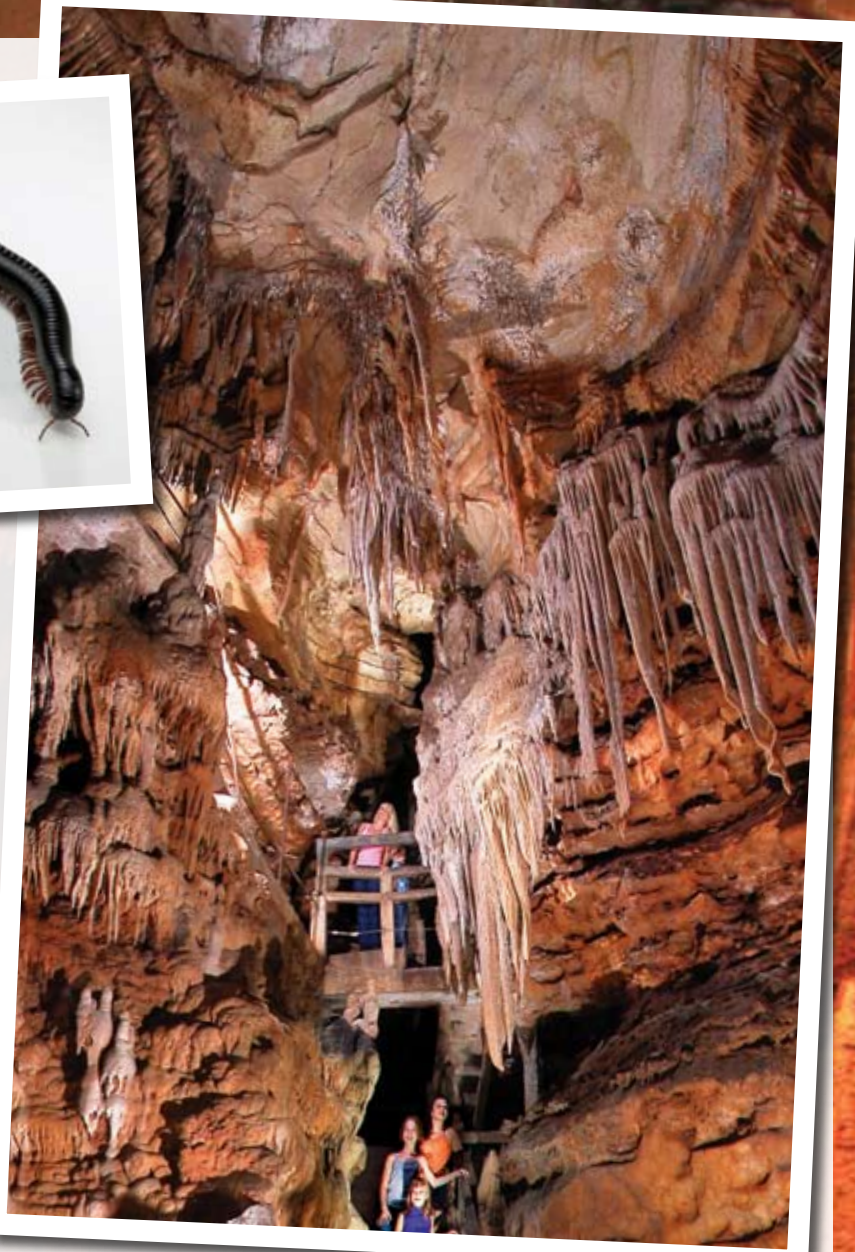


Farther into the cave, where there is no light, we find few plants and several strange-looking creatures. Because there is no light, these creatures do not have color in their skins or shells and they do not need eyes. Often their antenna or legs are much longer than similar creatures above ground. Among these creatures are the blind cave fish, millipedes, and crayfish with white shells.



People also use caves. The temperature underground remains fairly constant—between 55 and 58 degrees Fahrenheit. This makes the cave a good place to find shelter, as many ancient peoples did, and to store food and beverages that are best if kept cool.

These days, the most popular use of caves is for exploring and tourism. You can visit caves in two state parks, Onandaga near Leasburg and Rock Bridge Memorial near Columbia, and at Round Spring Cavern in the Ozark National Scenic Riverways. Missouri also has twenty commercial caves, which are caves owned by people who charge an admission fee. You may have seen signs painted on barns along the highway for Meramec Caverns, or you might have read about Mark Twain Cave in books Twain wrote about Tom Sawyer, Huckleberry Finn, and Becky Thatcher.



Opposite Page, Top: Interesting cave formations. Bottom: Bats are common cave inhabitants. This Page, Above Left: Millipede. Above Right: Take a tour through Missouri's Talking Rocks Cavern near Branson.

The Western Plains Region

The southwestern third of Missouri is the Western Plains region. Like the Southeast Lowlands, this region was not pushed as high by the volcanoes that formed the Ozarks. It is on the eastern edge of the Great Plains—a huge, mostly flat land that slopes upward toward the Rocky Mountains far to the west and stretches from Texas in the south into Canada in the north.

The Great Plains were once covered by **prairie**—land with few trees but with tall grasses that have roots reaching down through the deep, rich soil. Those deep roots help them survive long dry spells and the frequent wildfires caused by lightning. The roots also hold the soil together and keep it from blowing away in the wind that seems to blow constantly on the prairie. Today, much of Missouri’s prairie is gone. You can find small patches of it in state parks or in old cemeteries on land that was never farmed. The flat lands of this region are still good for growing pastures of grass to feed cattle and other farm animals and for orchards of fruit and nut trees.

Mining is an important activity in the Western Plains. Sandstone, limestone, and clay deposits formed in the region when ancient seas repeatedly covered the region. When the waters receded and the lakes of trapped water dried up, minerals remained. Plants grew during periods when the land was not covered by water. When the seas returned, water and layers of sediment covered the plants. The decaying plants were crushed under great pressure into layers of coal. (This also happened in the Glacial Plains before the Ice Age, leaving coal deposits below the loess.) Much deeper below the surface, magma was forced into cracks in the limestone by geological forces that created the Ouachita Mountains in Arkansas. The igneous rocks formed by the cooling magma are rich in lead and zinc ore. Deep mine shafts were once dug to reach these deposits.

Do You Remember?

1. Select and describe a landform that represents each region.
2. Explain how each region got its name.



Top: This prairie land is typical of the Western Plains region. **Bottom:** Children enjoy time in a Missouri apple orchard.

Did you know?

Less than one-tenth of one percent of the native prairie in Missouri remains untouched.

Section 2

The Climate of Missouri

As you read, look for the following:

- the difference between climate and weather
- the type of climate Missouri has
- what causes our four seasons
- vocabulary terms **weather, climate, precipitation, tornado**

Mark Twain once said that if you didn't like the weather in Missouri all you had to do was "wait a minute or two" and it would change. There are times in the spring and fall as one season is ending and another beginning when it does seem that the weather can change from nice and warm to cold and wet in a couple minutes' time.

Weather refers to the current temperature, precipitation, and wind. **Climate** refers to the weather over a period of years. People who study the climate are called *climatologists*. Climatologists classify Missouri's climate as *humid continental* because we are located between the cold arctic regions in the north and the tropical regions to the south and because our summers are hot. This means that the four seasons in Missouri are very different from each other.



The Changing Seasons

Spring begins in March, with gradually warmer weather and frequent rains, and lasts into June. The days of summer are hot and humid with less rainfall. Summer gives way to fall or autumn in September, when the nights are cooler and the weather drier. By the end of October, we begin to feel the first cold weather of winter. As the season continues through December, the days grow colder and the **precipitation** (rain,

snow, sleet, and ice) increases, often in the form of snow or ice. The coldest days are in January and February. By the end of February, we begin to have hints of the coming spring with warmer days.

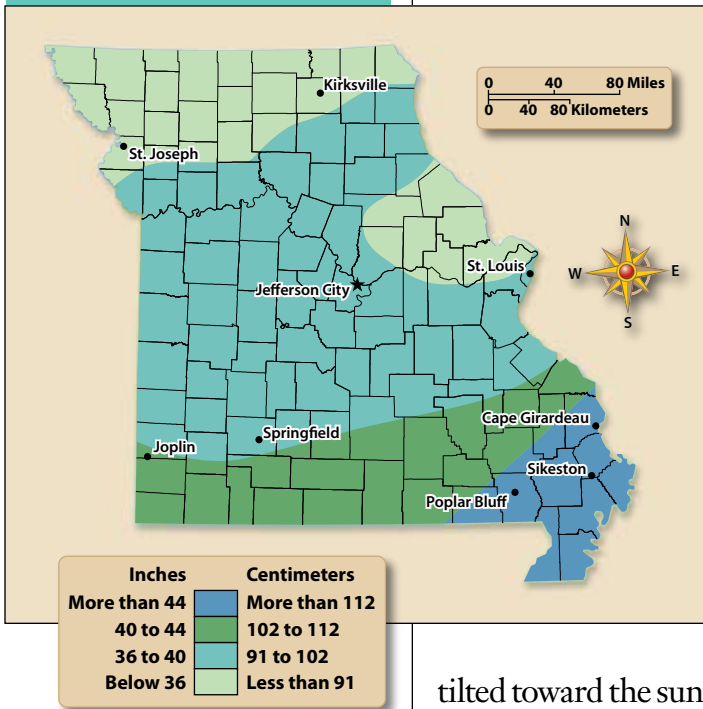
The seasons are caused by the tilt of the earth on its axis. At the *winter solstice* (the first day of winter), the Northern Hemisphere is tilted away from the sun, making the days shorter and the nights longer. It also means the warming rays of the sun don't hit our hemisphere as directly as they do in the summer, so they don't warm our hemisphere as much. At the *summer solstice* (the first day of summer), the Northern Hemisphere is

tilted toward the sun, the days are longer and the nights shorter, and the sun's rays hit us more directly and warm us.

Map 10

Average Annual Precipitation

Map Skill: Which part of Missouri gets the most precipitation?



Bottom, Left: The sun warms Missouri and the rest of the world.

Bottom, Right: Winter fun is found throughout our state. **Opposite Page:** Springtime in Missouri is beautiful.



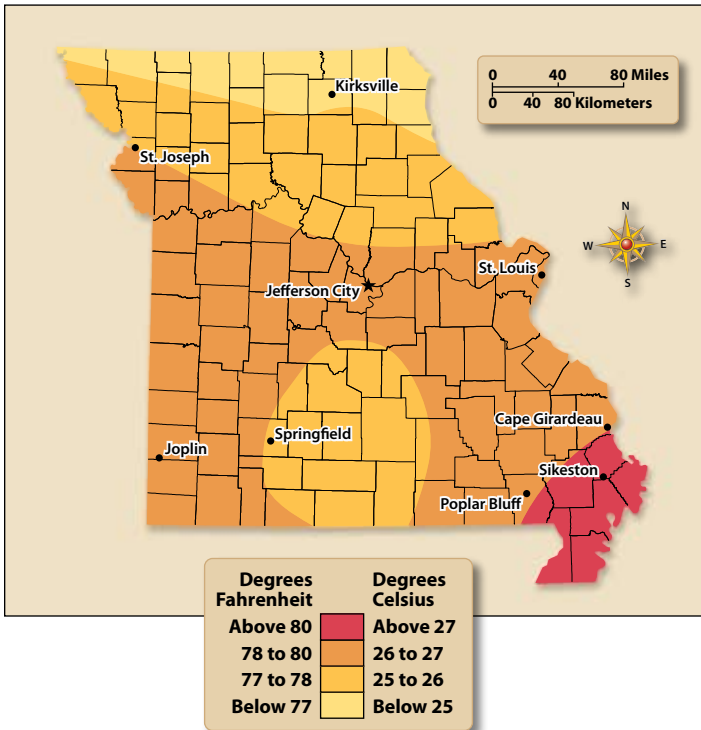
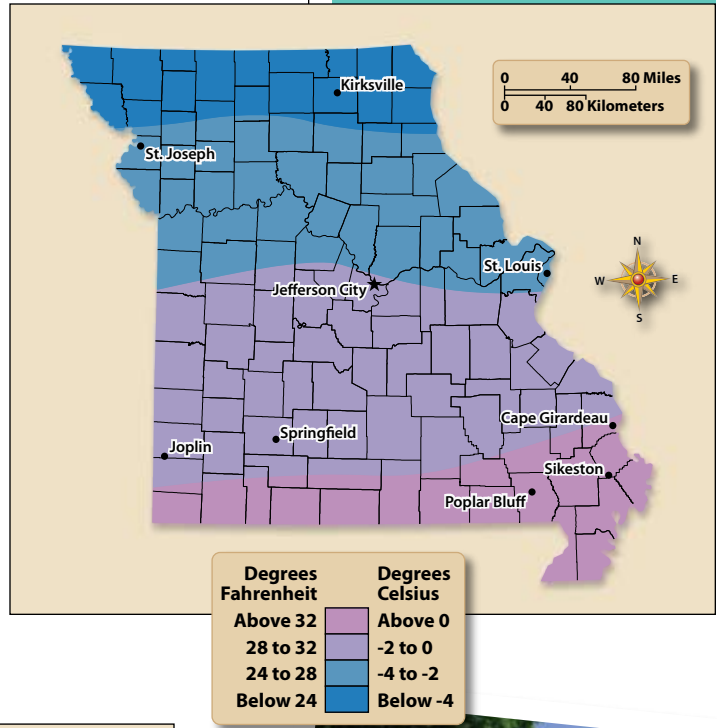
The effect of the Earth's tilt on the weather is felt more the farther from the equator a place is. The closer to the equator a place is, the warmer the weather. That is why the weather in Springfield in southwest Missouri can be 10 degrees warmer than the weather in Kirksville in northeast Missouri on the same day.

Missouri's location in the center of the country means its weather is also influenced by many other factors. In the winter, cold arctic winds blow down from Canada or from the mountains in the western United States. If they collide with moisture carried northward from the Gulf of Mexico, we have snow and ice. The arctic winds come south when the *jet stream*—a high-speed current of wind high above Earth that moves in an eastward direction—is located above the United States. When the jet stream moves back north over Canada, warmer weather from the west and the south flows over Missouri.

Map 11

Average January Temperatures

Map Skill: What is the average January temperature in the Bootheel?



Map 12

Average July Temperatures

Map Skill: What is the average July temperature where you live?



Right: Tornadoes can cause a lot of damage.

Did you know?

Missouri ranks eighth among the states in the average number of tornadoes it has each year.

Storms

Wind currents moving across the warm waters of the Gulf of Mexico bring with them warmer temperatures and large amounts of moisture. When this warm, wet air from the south collides with cold air from the north, the weather can be very violent with thunderstorms, hail, and sometimes tornadoes. **Tornadoes** are violent windstorms with heavy rain, lightning, and thunder. Tornadoes can happen any time of the year, but most often happen in the spring in Missouri.

Most of the time, we just have rain showers. In an average year, Missouri receives 40 inches of precipitation—more to the southeast and less to the northwest.

Missouri's climate, with its hot summers and frequent rainfall, makes it ideal for growing crops. The climate is also similar to that found in northern Europe. When Europeans first settled in Missouri, they discovered they could continue farming just as they had in their old countries.



Figure 4
Enhanced Fujita Scale for Tornadoes

Category	Wind Speed	Potential Damage
EF0	65-85 mph	Light Damage
EF1	86-110 mph	Moderate Damage
EF2	111-135 mph	Considerable Damage
EF3	135-165 mph	Severe Damage
EF4	166-200 mph	Devastating Damage
EF5	Over 200 mph	Incredible Damage

Do You Remember?

1. Pick one of the seasons in Missouri and describe its weather.
2. During which season does Missouri experience the most tornadoes?

Section 3

The Rivers and Lakes of Missouri

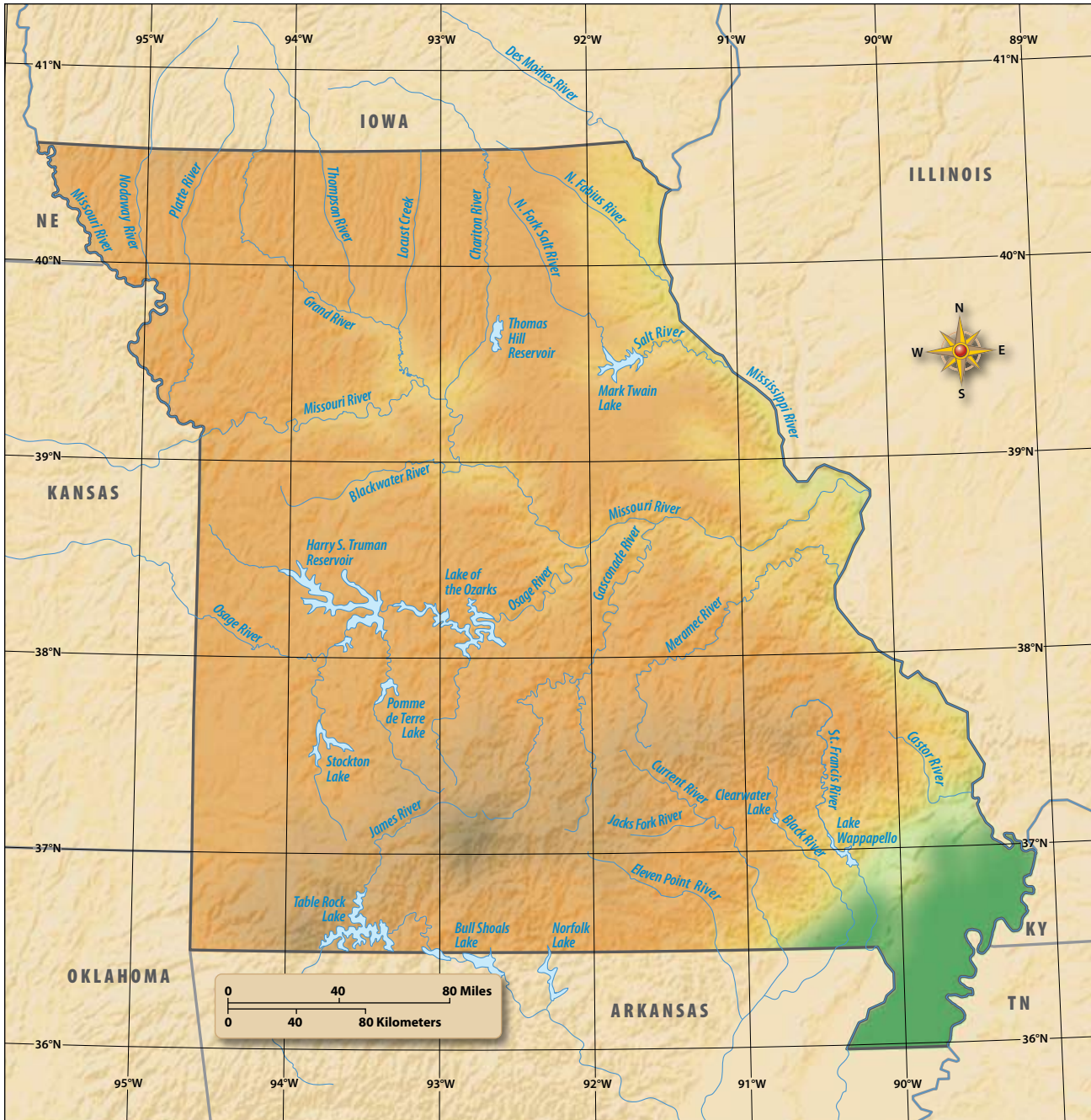
As you read, look for the following:

- the location of the Missouri and Mississippi rivers
- how the state's rivers are used
- how the state's major lakes were formed
- how the lakes are used in Missouri
- vocabulary terms **headwaters, dam, lock, tributary, hydroelectric**

Missouri owes a lot to its rivers and lakes. Not only have they shaped the land, but they have also shaped the state's history and its economy. Missouri even owes its name to its heritage of rivers and lakes. The state was named after the river that the early French explorers called "Missouri." It was how they pronounced the Algonquin word the Illinois tribe used for its neighbors. The Missouri, in their Siouan language, called themselves Níúachi (Nee-ooH-ah-chee).



Top: The Jacks Fork River. Middle: An Algonquin Indian village. Left: Father and son enjoy fishing from a canoe.



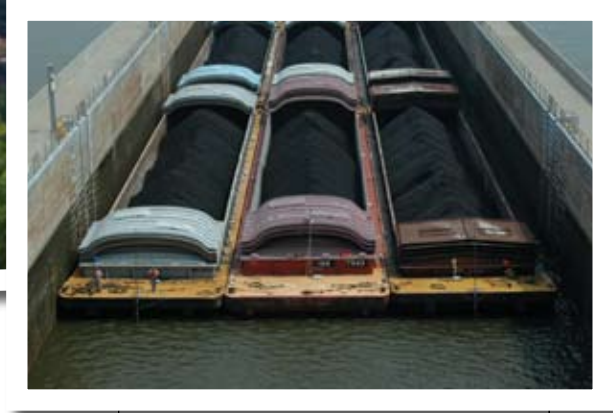
Map 13

Missouri's Rivers and Lakes

Map Skill: Which of Missouri's rivers is closest to where you live?

Missouri's Rivers

You have already read that the Missouri River flows from west to east across the state. The **headwaters** (the place where a river begins) of the Missouri are in Montana. By the time it reaches our state, the Missouri River has already traveled 1,800 of its 2,341 miles. The river first touches the state at the far northwest corner. At Kansas City, it makes a sharp turn toward the east and then crosses the state until it reaches the Mississippi River near St. Louis. As the crow flies, that is about 280 miles. But the



river winds back and forth so much it covers a distance of 350 miles—and that is after engineers straightened out parts of the river with dikes and new channels!

The Mississippi River's headwaters are in Minnesota. The river runs for about 300 miles along the eastern edge of Missouri. Along the Mississippi between St. Louis and Minnesota are 26 dams and locks. Seven of them are along the river in Missouri. The **dams** hold back the water and make it possible to keep the river deep and slow enough for towboats to push barges up and down the river. The **locks** allow the barges and other boats to get around the dams.

The locks are like large bathtubs that have gates on each end. Imagine a towboat pushing barges upstream toward a dam. The gates on the downstream end of the lock open, and the towboat pushes the barges into the lock. When the gates close, water is added to the lock. This raises the water level in the lock to the same level as the water on the upstream side of the dam. Then the upstream gates of the lock open, and the towboat pushes the barges out of the lock. For barges going downstream, the process is just the opposite, with water let out of the lock to lower its water level to the same level as the water on the downstream side of the dam.

Top: Table Rock Dam located near Branson.
Above: a coal barge enters a lock at the Melvin Price Dam on the Mississippi River.



Barges also travel up and down the Missouri River, but dams and locks are not necessary. The slope the Missouri River flows down is not as steep as the slope of the Mississippi. This is because the Missouri River, by this point, is flowing across the eastern Great Plains. As a result, the Missouri River carries away much more soil and is muddier than the Mississippi. One of the Missouri River's nicknames is "The Big Muddy." Farmers along the Missouri sometimes say it is "too thick to drink and too thin to plow."

The Missouri and Mississippi are, of course, not the only rivers in our state. There are hundreds of rivers large and small. Most flow into either the Missouri or the Mississippi. We call a river that flows into another river a **tributary**. The Missouri is a tributary of the Mississippi.

Some of the tributaries of the Missouri include the Platte River in northwest Missouri. It flows into the Missouri near the town of Platte City. The Grand River and the Chariton River both flow across north-central Missouri. The Grand enters the Missouri near Brunswick. The Chariton enters the Missouri about a dozen miles downstream near Glasgow.

Did you know?

At its headwaters in Kansas, the Osage River is called the Marais des Cygnes, French for "marsh of the swans."





The Osage River begins in Kansas and flows across western Missouri before joining the Missouri River near Bonnots Mill. A little farther downstream, the Gasconade River ends its long journey from southwest Missouri, flowing into the Missouri near the town of Gasconade.

Two important tributaries of the Mississippi River in Missouri are the Salt River in northeast Missouri and the Meramec River. The Salt River enters the Mississippi near Ashburn. The Meramec comes out of the Ozarks and joins the Mississippi near St. Louis. Two other rivers in Missouri both begin as Ozark streams. They enter the Mississippi, but not before they flow into Arkansas. One is the Black River and the other is the St. Francis River. Both are in southeast Missouri.

Three Ozark streams in south-central Missouri are very well known for their beauty and their canoeing. They get a lot of their water from large springs. The Jacks Fork River flows into the Current River, which eventually flows into the Black River in Arkansas. The Eleven Point River flows into Arkansas before it joins the Black River. Both the Jacks Fork and the Eleven Point are protected as part of the Ozark National Scenic Riverways.

Opposite Page, Top: The Paseo Bridge in Kansas City spans the Missouri River. Middle: The Clark Bridge, near West Alton, keeps traffic moving between Illinois and Missouri. Bottom: The Missouri River in St. Joseph. This Page, Top: A picturesque stream in the Ozarks.



Top: Lake of the Ozarks provides plenty of wet fun. **Above:** Bagnell Dam at the Lake of the Ozarks provides hydroelectric power.

Did you know?

The French named the Pomme de Terre River for the potatoes, "earth apples," the Osage Indians grew.

Missouri's Lakes

Three of the rivers just mentioned are important for another reason. All three are dammed along their paths to form some of Missouri's largest lakes. The Osage River, in fact, is dammed twice. The Harry S. Truman Dam near Warsaw forms Truman Reservoir. The Bagnell Dam near the town of Bagnell forms the Lake of the Ozarks. A dam on the St. Francis River creates Lake Wappapello, named after the nearby town in southeast Missouri. In northeast Missouri, the Clarence Cannon Dam near Monroe City makes Mark Twain Lake.

A dam on the Sac River near Stockton creates Stockton Lake in west-central Missouri. Not too far away, the Pomme de Terre River is dammed near Hermitage to form a lake by the same name.

Several Ozark streams along the state line with Arkansas have been dammed to form lakes that stretch across the line into both northwest Arkansas and southwest Missouri. The White River helps to form Table Rock Lake, Lake Taneycomo, and Bull Shoals Lake. A branch of the White River is dammed to create Norfolk Lake, most of which is in Arkansas.

Two large lakes in northern Missouri are reservoirs created by dams. One is the Smithville Reservoir near the town of the same name. It provides drinking water and recreation for the area. The other is the Thomas Hill Reservoir between Moberly and Macon. It was created to provide cooling water for a nearby power plant.

Along with creating recreation areas and sources of drinking water, lakes created by dams in Missouri help control flooding by holding back water during wet times. Several large dams in Missouri have an additional purpose—to generate electricity. Water flowing through gates in the dams turns generators that create electricity. We call this **hydroelectric** power.

Do You Remember?

1. Choose one of the rivers in Missouri and describe how it affects the surrounding area.
2. Name two of Missouri's largest lakes.

Section 4

The Plants and Animals of Missouri

As you read, look for the following:

- where we find plants and animals
- how some species are native, while many are not
- how some species are endangered
- how conservation is helping to restore some species
- vocabulary terms **flora, fauna, native species, migrate, endangered, habitat, conservationist**

Because Missouri has such a wide variety of weather and geographic regions, it also has a wide variety of plants and animals. We call the plant life **flora** and the animal life **fauna**. An example of the many plants and animals in Missouri can be found in Big Sugar Creek State Park in McDonald County in southwest Missouri. Biologists (scientists who study plant and animal life) have counted 345 different plants and 134 different birds in the park. They have also made lists of more than 30 different fish, 16 mammals, and 47 amphibians, including 5 different kinds of salamanders and 19 different kinds of snakes.

Above: Be careful of poison ivy.
Bottom Right: Copperhead snakes inhabit Missouri.



Plants

Botanists (scientists who study plants) have counted more than 2,000 kinds of flowers in Missouri, including the state flower, the white hawthorn. Dandelions grow in yards all over the state. Bright blue chicory can be found along rural roadsides. Cottontails grow well in swamps, and poison ivy seems to be everywhere. Deep in the woods are rare orchids, and water lilies cover ponds in city parks. Don't forget all the different types of plants grown on farms and in gardens for food. You'll learn more about them in a later chapter.

Many of the plants and flowers we see in Missouri are **native species**, meaning they have always grown here.

Some are only found in Missouri, like the Ozark corn salad wildflower. But people brought many other plants and animals here, either on purpose or by accident. They might have wanted to grow the same plants as they did in their native lands. Sometimes, however, seeds hitched rides in their wagons or cargo and found fertile land where they fell.

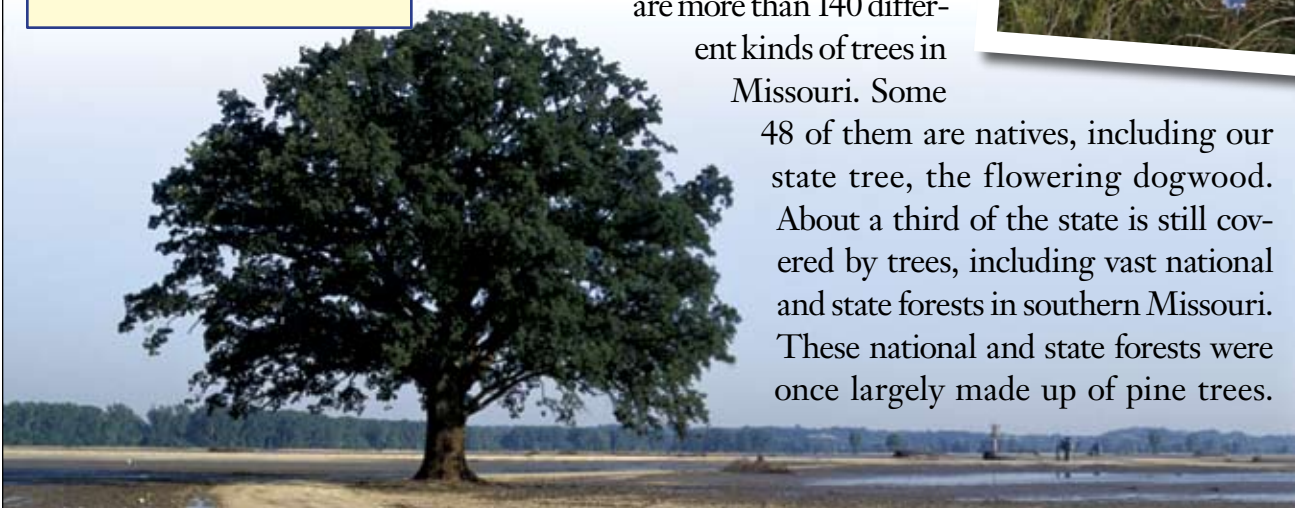
When the first European explorers arrived in Missouri, trees covered two-thirds of the state. There are more than 140 different kinds of trees in

Missouri. Some

48 of them are natives, including our state tree, the flowering dogwood. About a third of the state is still covered by trees, including vast national and state forests in southern Missouri. These national and state forests were once largely made up of pine trees.



Top: A youngster blowing a dandelion. **Above:** Native orchids. **Bottom:** This oak tree in Boone County survived several floods. **Right:** Wild chicory.



Lumber companies cut down most of the pine trees, making room for other trees, like oak and ash. Lumber companies still harvest trees in Missouri, providing many jobs.

Maple trees not only produce shade for our yards, but also are tapped for their sap to produce maple syrup. A wide

variety of nut trees are found in Missouri, including walnut and pecan. There are also

orchards of fruit trees growing apples, peaches, pears, apricots, and other fruits.

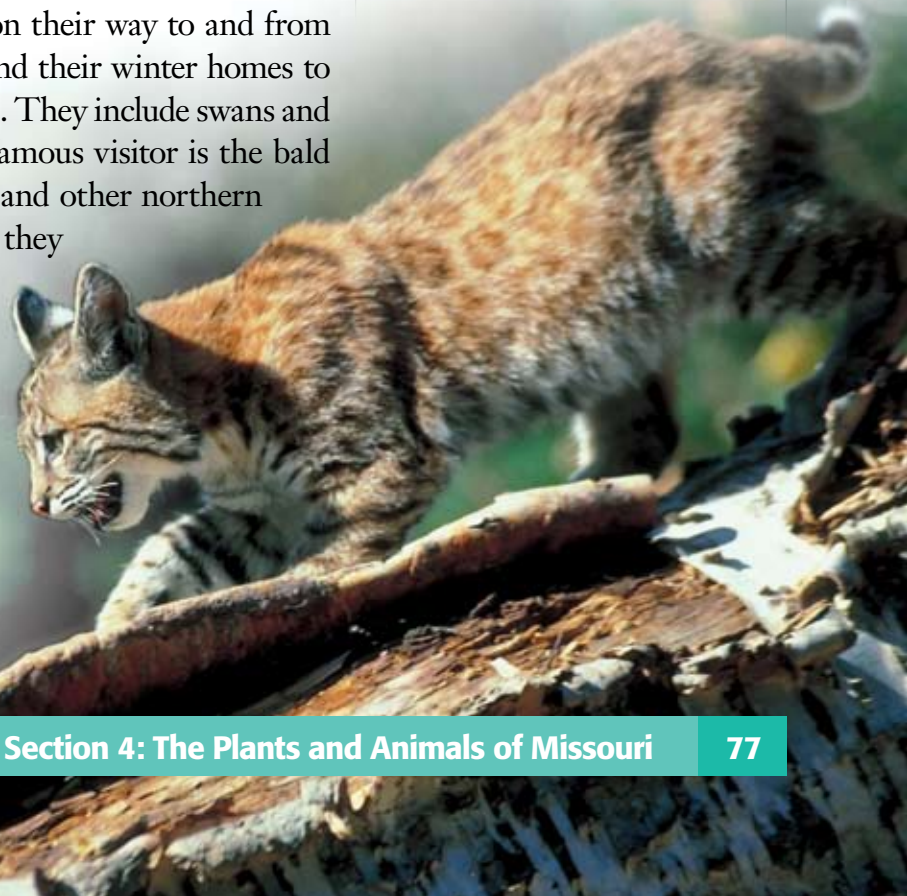
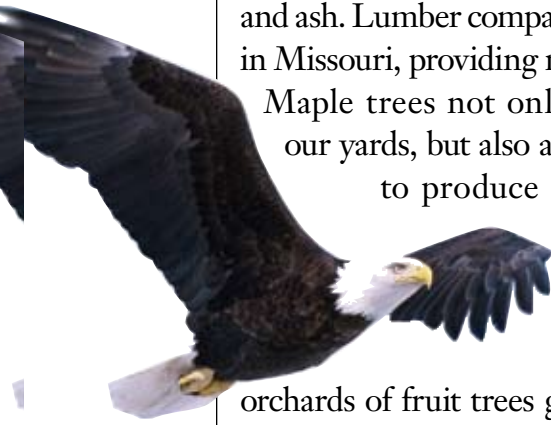
Birds and Mammals

Trees also provide homes for a large number of mammals and birds in Missouri. Squirrels live all over the state, as do deer, opossum, raccoons, rabbits, and skunks. Some of them may have even visited your backyard or city park. Birds like blue jays, cardinals, and sparrows are also found all over the state. You might have to go into the woods to see other animals like the bobcat and black bear or birds like turkeys and the state bird, the eastern bluebird. On the prairies, you can find prairie chickens, quail, and grouse and a type of crayfish that lives far from water.

Several birds only visit Missouri on their way to and from their summer homes to the north and their winter homes to the south. These are **migrating** birds. They include swans and cranes and snow geese. Our most famous visitor is the bald eagle. Eagles fly south from Alaska and other northern states looking for open water where they can catch fish. Remember the dams along the Mississippi River? The water below the dams is rarely covered by ice, and the eagles find open water and plenty of fish. You can see them sitting in the trees waiting for a meal. Some of the eagles have started living in Missouri year-round, joining other large birds like hawks and turkey vultures.



Top: Quail are found on our prairies. Left: Majestic bald eagles are found in Missouri. Bottom: Our woods are home to bobcats.



Below: A catfish swims in a stream. **Center:** Garter snakes are commonly found in our state. **Bottom:** Where there is water, you can find bullfrogs like this one.



Fish, Amphibians, and Reptiles

Missouri's rivers, streams, and lakes are filled with all sorts of fish and amphibians. These include catfish—some of them as large as pigs—that feed along the river bottoms, blue gill that fill farm ponds, large-mouthed and small-mouthed bass in lakes, and trout in streams. Even the smallest ponds and creeks boast frogs and turtles. If you look closely in the garden, you may find toads and perhaps a garter snake. Missouri has more than two dozen species of snakes. Most are harmless to humans, and all help

control rodent and insect populations. Among the rocks of a glade, you will find lizards and skinks. Closer to the water, you will find their cousins the salamanders.



Did you know?

Missouri's largest native snake is the bullsnake, which grows to a length of 50 to 72 inches. The smallest is the flat-headed snake, which reaches only 7 to 8 inches in length.



Endangered Species

A number of Missouri's plants and animals are **endangered**, meaning that they are in danger of disappearing or becoming extinct. The causes are many. Some causes are natural, but most often the problem is caused by humans. Pollution, changes in **habitats** (the places where animals, fish, and birds live), and overharvesting (hunting and fishing) are some of the causes.

A good example is the hellbender. The hellbender is a prehistoric creature. It is the largest salamander in North America, growing as large as two feet long. It was once very common in Missouri's Ozark streams. These days it is rare and in danger of disappearing altogether. Biologists are studying the reasons why the hellbenders are disappearing. They suspect that human-caused pollution in the streams is killing the hellbenders or keeping their eggs from hatching.

Humans are also helping many species by restoring their habitats, passing laws to protect them, and bringing some species back to Missouri. You might find it hard to believe, but not so long ago there were few, if any, wild turkeys left in Missouri. A combination of too much hunting and the destruction of forests had made them rare. **Conservationists** (people who work to protect species and their habitats) brought wild turkeys from other states and released them in Missouri forests. Laws were passed protecting the turkeys' habitat and putting limits on how many could be hunted each year. These days, seeing a wild turkey is common.



Top: A Missouri hellbender, the largest salamander in North America. **Bottom:** Beautiful wild turkeys.



Do You Remember?

1. Why does Missouri have so many different plants and animals?
2. Why are some of Missouri's plants and animals endangered?

Spotlight

The New Madrid Earthquakes

Settlers near the small village of New Madrid along the Mississippi River in southeast Missouri, were thrown from their beds in the early hours of December 16, 1811. The earth was shaking violently in what was the first of a series of strong earthquakes that continued through the following February. *Seismologists* (people who study earthquakes) believe they may have been the strongest earthquakes to strike North America in recorded history.

The Earth's crust or outer layer is made up of large sections of rock called *plates*. These plates are constantly moving or trying to move—pushing against each other, sliding past each other, or sliding beneath another plate. Where these plates meet is called a

fault line. When one plate gives way, allowing one or both to suddenly move, the result is an earthquake.

Earthquakes are measured with an instrument called a *seismograph* (see below left), which records the vibrations or shock waves caused by the movement of the plates. A measurement called the Richter scale is used to describe the magnitude or strength of the shock waves. An earthquake with a Richter scale magnitude of 4 is strong enough to be felt if you are nearby. An earthquake with a 5 magnitude can cause damage to buildings and is 10 times stronger than a magnitude 4 earthquake. The earthquakes that destroyed San Francisco in 1906 and caused the Indian Ocean tsunami (large ocean waves) in 2005 measured between 6 and 7 on the Richter scale.

It is estimated that the biggest of the many earthquakes that struck southeast Missouri in 1811-1812 measured more than 8 on the Richter scale—meaning that they were about 100 times stronger than the San Francisco or Indian Ocean earthquakes. But while those smaller earthquakes killed many people and destroyed whole cities and villages, the New Madrid earthquakes killed few people and did



very little damage to buildings or other property. That is because, in 1811, few people lived in the area and there were few buildings.

Still, for the people who did live there, the three months of shaking were terrifying. Eliza Bryan was one of those who lived along the Mississippi in what is now New Madrid County. She wrote about the earthquakes.

About two o'clock, A.M., we were visited by a violent shock of an earthquake, accompanied by a very awful noise resembling loud but distant thunder, but more hoarse and vibrating, which was followed in a few minutes by the complete saturation of the atmosphere, with sulphurous vapor, causing total darkness. The screams of the affrighted inhabitants running to and fro, not knowing where to go, or what to do—the cries of the fowls and beasts of every species—the cracking of trees falling, and the roaring of the Mississippi... formed a scene truly horrible.

Eliza described how the Mississippi River ran backward and how the water sloshed from

bank to bank like water in a shaken cereal bowl. Boats were left sitting on the suddenly dry river bottom and then, just as suddenly, were swallowed up as the river rushed back into its bed. Fish were thrown up on the banks along with boats. In other places, sand from deep within the earth sprayed into the air, forming a ridge that runs from southwest to northeast across the Bootheel. You can still see what is now called Crowley's Ridge as you travel, especially in Dunklin and New Madrid counties.

Seismologists believe another large earthquake can happen along what is now called the New Madrid Fault. They are constantly studying it to try and predict when that might happen. Unlike in 1811, many people now live in southeast Missouri, and there are many buildings, schools, homes, power lines, pipelines, highways, and railroads that could be damaged. If your school is near the fault—and even if it isn't—the school probably has a plan to keep you safe in case there is an earthquake. Do you know what to do if you're at school or at home when an earthquake happens?

Figure 5
Earthquake Magnitudes

Richter Magnitude	Description	Effects
Less than 2.0	Micro	Not felt
2.0-2.9	Minor	Generally not felt but recorded
3.0-3.9	Minor	Often felt, but rarely causes damage
4.0-4.9	Light	Shaking of indoor items, rattling noises
5.0-5.9	Moderate	Major damage to poorly constructed buildings; slight damage to well-designed buildings
6.0-6.9	Strong	Destructive in populated areas up to 100 miles across
7.0-7.9	Major	Serious damage over larger areas
8.0-8.9	Great	Serious damage in areas several hundred miles across
9.0-9.9	Great	Devastating in areas several thousand miles across
More than 10.0	Epic	Never recorded

Chapter Review

Summary



In this chapter, you learned that Missouri has four geographical regions created by volcanoes and other upheavals, ancient oceans, glaciers, and erosion. Each region has special features that make it home to different kinds of plants and animals. Some of these flora and fauna are native to Missouri. Others have been introduced by humans, either on purpose or by accident. Changes in habitat, pollution, and other causes are endangering some species.

You also learned that Missouri's combination of cold, wet winters and hot, humid summers is known as a humid continental climate. Because of Missouri's location in the Northern Hemisphere and the tilt of the Earth on its axis, the state has four seasons. Missouri's climate makes it good for farming.

Missouri is rich in rivers and lakes that provide habitats for a wide variety of creatures. They are also used for recreation, drinking water, transportation, and hydroelectric generation.

Remember



Write a sentence or two explaining how the following groups of terms are related.

1. glacier
Ice Age
2. agriculture
prairie
delta
3. weather
climate
precipitation
4. headwaters
tributary
5. flora
fauna
native species
6. migrating
endangered
7. habitat
conservationist

Understand



Answer the following in complete sentences.

1. What was the Ice Age? How long did it last?
2. Why is Missouri known as “the Cave State?”
3. How did the Ozark Highlands become dry land?
4. What is the highest point in Missouri? Where is it located?
5. Name the four geographic regions of Missouri.
6. What effect did oceans and volcanoes have on Missouri’s landscape?
7. Why is southwest Missouri usually warmer than northeast Missouri?
8. How were many of Missouri’s large lakes formed?
9. How is conservation helping to restore some species?

Think About It



1. Think about the area of Missouri in which you live. Draw or write about its physical features, climate, landforms, wildlife, and natural vegetation.
2. Compare two of Missouri’s geographic regions. Describe how they are alike and how they are different.

Write About It



1. Choose an animal that is native to Missouri. Describe how its habitat is important to its survival.
2. Write a letter to the author of this textbook. Describe what you like best about the region where you live. What is something that you want others to know about your region that is not included in this book?

Use The Internet



Use the Internet to research the New Madrid earthquake and fault line. Then write a short report to share your findings with the class.

Work Together



1. Work in pairs to write notes on the key ideas of Chapter 3. Use your notes to write a short paragraph summarizing the chapter.
2. Work in pairs or in a small group. Use such things as magazine pictures, your own artwork, and photographs to create a display on one of the following: (a) Elephant Rock, (b) the caves of Missouri, (c) Missouri state parks.