Our Cumberland River Basin

Part Three: from Carthage to Ashland City

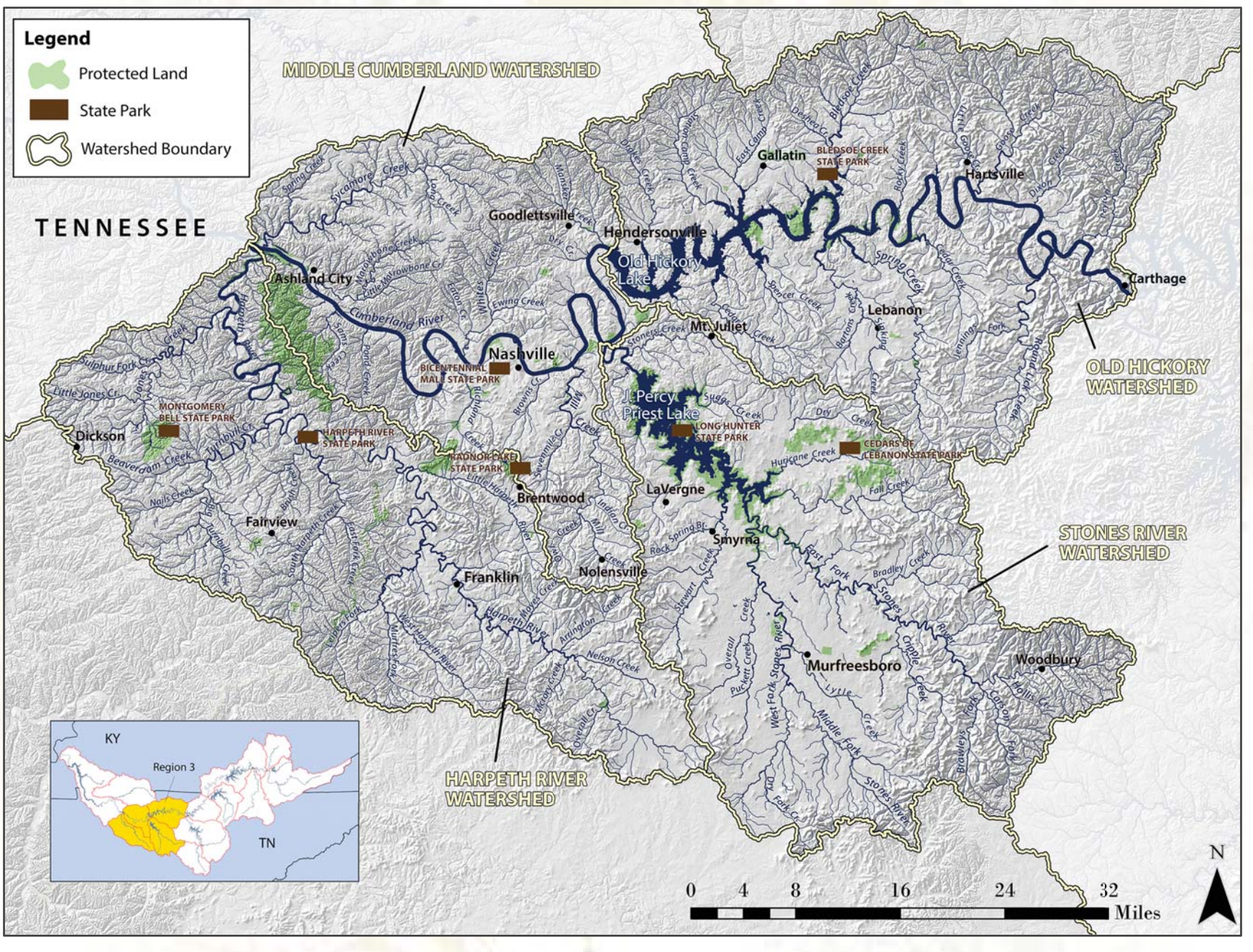
Executive Summary

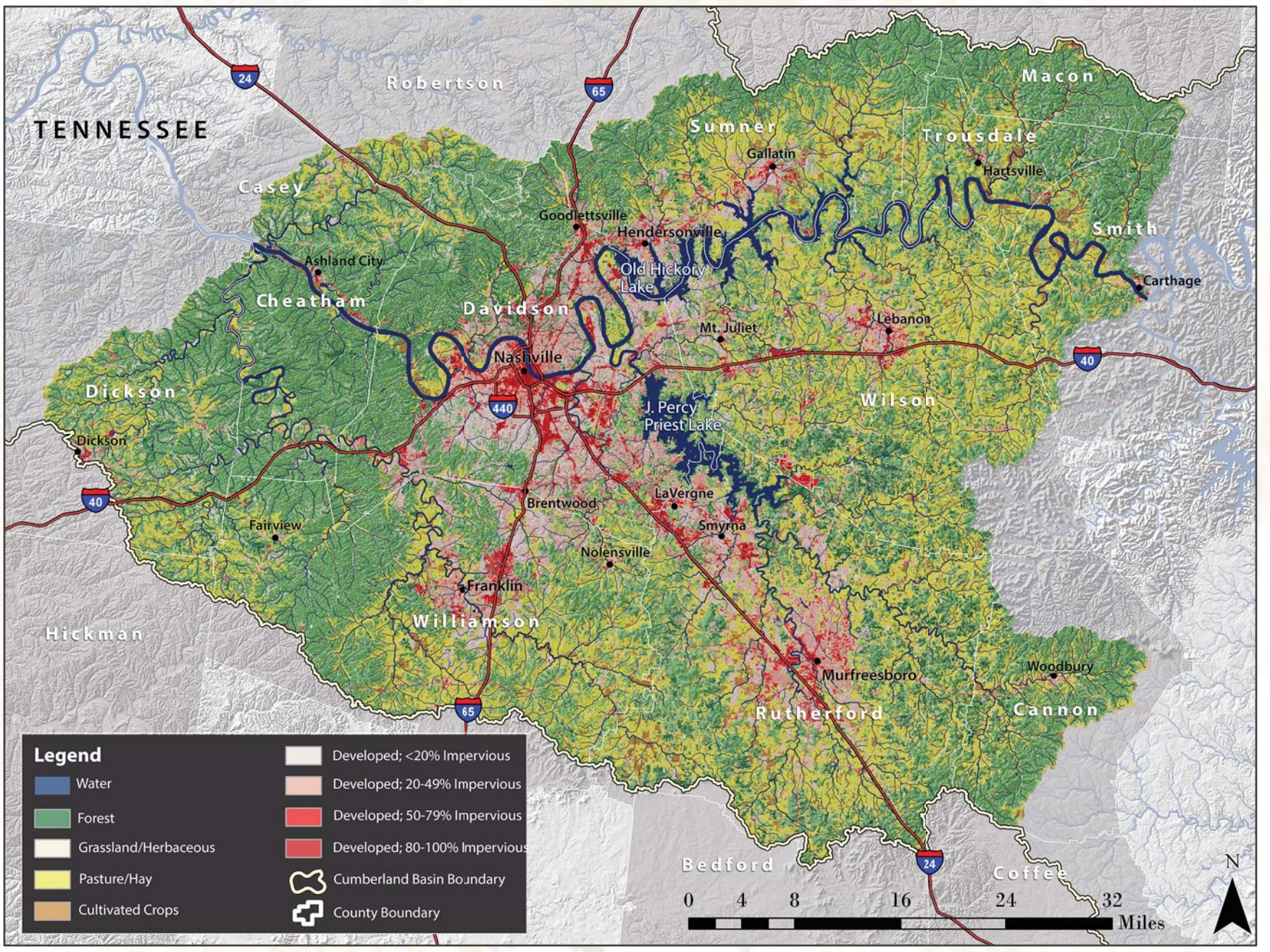
This is the third in a series of four introductory profiles of the Cumberland River basin. In partnership, the Cumberland River Compact and The Nature Conservancy of Tennessee have developed these profiles to celebrate the Cumberland basin and to encourage stakeholders across the basin to join together and develop a more comprehensive and action-oriented State of the Basin resource. Such a resource would explain in greater detail critical issues in the Cumberland basin, identify opportunities for resource stewardship, and prioritize shared watershed stewardship strategies. The State of the Basin would also provide a platform for annually updated "report cards," which would establish health indices, benchmarks and goals for these indices, and track progress or decline in these indices over time.

In this third profile, we provide an introduction to the lower middle region of the Cumberland basin. This region is defined by four watersheds in middle Tennessee. It is home to 155 miles of the Cumberland River, major tributaries such as the Stones and the Harpeth, and the Percy Priest, Old Hickory, and Cheatham reservoirs. Throughout the region's history, water has been essential to the area's communities, economies, and ecologies, and will continue to be essential in the years to come. The conditions of many of the rivers and streams in this region are healthy. That said, over 900 miles of rivers and streams are currently impaired and represent a potential threat to either human health, ecosystems, or both. Many individuals, government agencies, and nonprofit citizen groups work to promote and protect water quality in the region. Working together, we can better understand our water resources and collaboratively focus our efforts in a way that will have the greatest impact for the greatest good.

Join the Cumberland River Compact and The Nature Conservancy's efforts to become better stewards of our basin's precious water resources.

(Photo by J.W. Randolph)





Our Cumberland River Basin: from Carthage to Ashland City

By the time the Cumberland River rolls into Music City, it knows a thing or two about covering classic country. At this point, the river has collected waters that have fallen on and drained off of 54 counties and 12,000 square miles of Tennessee and Kentucky land. So, next time you're out honky-tonking on Lower Broadway in Nashville, raise a glass of ice cold H_2O to the region's longest running country star – the Cumberland River! And remember, just as your drinking water is impacted by residents in every one of those 54 counties, the drinking water of all who live downstream of Nashville is impacted by each and every Nashvillian. We're all in this together! How are you making an impact?

This part three of the Our Cumberland River Basin series covers the region that drains to the Cumberland River between Carthage and the Harpeth River's confluence with the Cumberland just northwest of Ashland City. Between these small cities, the Cumberland River runs 155 miles,

Sevenmile Creek is a tributary of Mill Creek in the Middle Cumberland Watershed. (Photo by Jed Grubbs)

Downtown Nashville (Photo by James Duckworth)

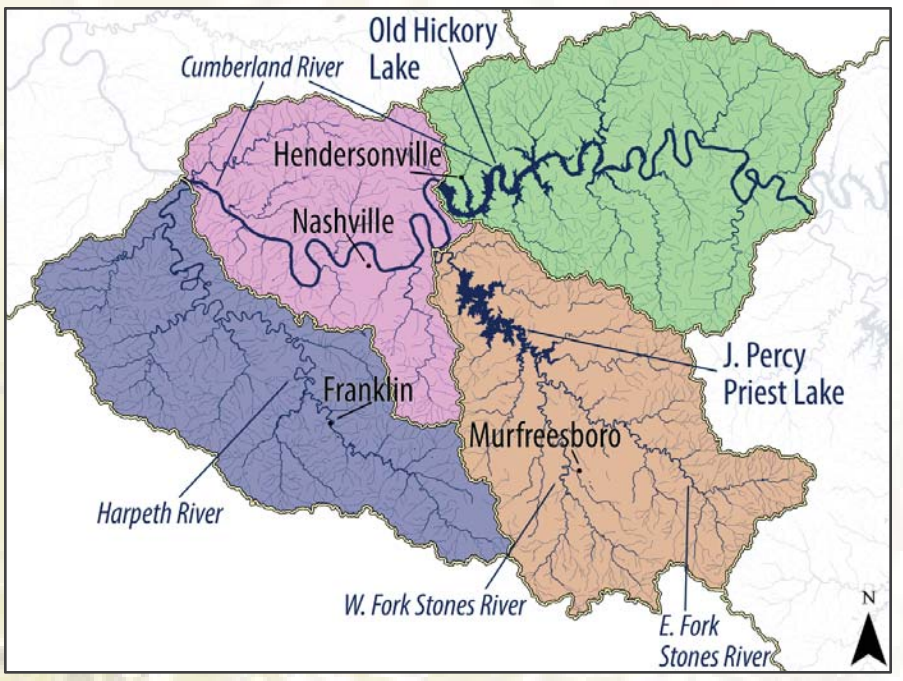
receiving water from 3,400 square miles of land and 4,400 miles of tributary streams and rivers. Within this gently rolling landscape of middle Tennessee, not a single mile of the Cumberland River flows freely. The entire stretch is reservoir, resulting from Cheatham and Old Hickory dams. With 1.4 million people, it's the most populous and fastest growing area of the basin. Already, it has more people than all other regions of the basin combined.

Natural Features of the Region

A mosaic of plains and rolling hills characterize the landscape of the region. Placid streams ease their way down to the Cumberland, flowing over limestone bedrock and gravelly substrates. Some steeper gradients and incised escarpments do exist in places, especially west of Nashville, and in these areas, one finds some moderately graded streams. Land use is a blend of forested, urban, residential, and agricultural pasture and cropland uses. The region's forests protect water quality in many ways. They filter pollutants from stormwater runoff, prevent erosion, and allow rain to infiltrate groundwater reserves. They also provide habitat and shade streams – a valuable service for temperature sensitive species. Oak-hickory forests are found throughout, and several cedar glades grow atop shallow soils in southeastern portions of the region.

Four major watersheds are found here: the Old Hickory, Stones River, Middle Cumberland, and Harpeth River watersheds. The eastern-most of the four is the Old Hickory watershed. Waters that fall upon and flow through this watershed make their way to an impounded section of the Cumberland River known as Old Hickory Lake, a reservoir created by an Army Corps of Engineers dam in 1954. The reservoir and watershed are named for our nation's seventh president, Andrew Jackson, whose nickname was Old Hickory. At 983 square miles, the watershed is the largest of the four in the region. It is home to Bledsoe Creek State Park, the Taylor Hollow State Natural Area, and several state wildlife management areas including the 6,000 acre Old Hickory Wildlife Management Area. Sections of Goose Creek and Bledsoe Creek are listed on the Nationwide Rivers Inventory – a federal listing of streams with outstanding scenic, recreational, or cultural attributes. A number of endangered species are found in the watershed, including 10 species of freshwater mussels and the Spring Creek bladderpod, a flower that only blooms in the floodplains of three Old Hickory watershed creeks.

South of Old Hickory is the Stones River watershed. Water here drains to the Stones River, named for long hunter Uriah Stone who explored the river in 1767. In 1968, the Army Corps of Engineers dammed the Stones, and J. Percy Priest Lake is the resulting reservoir. Within the watershed, sections of Cripple Creek, Overall Creek, and the east, west, and middle forks of the



The region includes four watersheds: Old Hickory in green, Stones River in brown, Middle Cumberland in pink, and Harpeth River in purple.

Stones River are all found on the Nationwide Rivers Inventory. Both Cedars of Lebanon and Long Hunter state parks are found here, as well as Cedars of Lebanon State Forest and ten state natural areas – more designated natural areas than any other watershed in the entire Cumberland River basin. Its many cedar glades represent one of rarest habitat types in the southeastern United States and support a rich array of biodiversity. In Cedars of Lebanon State Park alone there are 350 species of plants and 29 are endemic to cedar glades. Every spring, endemic wildflowers, such as yellow sunnybells, blanket the shallow soils and wet, gravelly limestone of these glades.

The Middle Cumberland watershed drains to an impounded section of the Cumberland River known as Cheatham reservoir. This reservoir is a result of another Army Corps of Engineers dam completed in 1952. The watershed's area includes an extensive Metro Nashville parks system that includes Shelby Bottoms, Bells Bend, Beaman, and Peeler parks, as well as portions

Left: Within the region's cedar glades, freshwater springs emerge from exposed limestone only to disappear into underground streams and downstream sinkholes. (Photo by Jed Grubbs) Below: A wide variety of fish can be found in the Harpeth River, including longnose gar. The gar is an ancient species of fish that has existed in North America for 100 million years! (Illustration by Ellen Edmonson and Hugh Chrisp)

and two state wildlife management areas are here, as well as a majority of Nashville's Warner Park system and Bowie Park in Fairview. Keep an eye out for river otter within the watershed. They're making a comeback, and families of as many as 17 have been spotted! If it's birding you're into, head to Radnor. Many species of waterfowl have made the park their winter destination of choice and species include wood duck, canvasback, gadwall, bufflehead, American black duck, and more.

of the 3,100 acre Warner Parks, and over half of the 32,000 acre Cheatham State Wildlife Management Area. Sycamore Creek flows in a northern arc over much of watershed and is listed on the Nationwide Rivers Inventory. The Middle Cumberland is home to nearly 600,000 people, but humans aren't the area's only inhabitants. Urban canoers can spot federally endangered Nashville Crayfish scuttling across the Mill Creek's slabby bedrock. Visitors to Shelby Bottoms are serenaded by a chorus of frogs from the Cumberland's floodplain. Singers include spring peepers, southern leopard frogs, green frogs, tree frogs and others at different times of the year. Even within many of the region's heavily urbanized streams, resilient species of fish, like rock bass, manage to survive.

The Harpeth River watershed is south of the Middle Cumberland, and includes all lands and waters that drain to the Harpeth River. The Harpeth River itself is 125 miles long, originating in headwater streams near the small town of Eagleville. En route to the Cumberland, the Harpeth takes on the Little Harpeth, Big Turnbull Creek, and Jones Creek – all streams (along with the Harpeth itself) listed on the Nationwide Rivers Inventory. The watershed is home to the Natchez Trace Parkway, a linear national park, and it's where you'll find Radnor Lake, Montgomery Bell, and Harpeth River state parks. Harpeth River State Park is a linear state park that follows 40 miles of the Harpeth River, linking natural, historic, and archaeological points of interest along the way. Four state natural areas

Whites Creek's confluence with the Cumberland is home to a great blue heron communal nesting ground or "rookery." (Photo by Mila Zinkova)

The Value of Our Water Resources

For over a millennium, water has played a central role in the lives and livelihoods of the region's inhabitants. Mound Indians flourished in the region from roughly 900 to 1600 A.D. These Mississippian peoples were named for the Mississippi River, which, along with tributaries like the Cumberland, sustained their agrarian lifestyle and trade-based economy. In the 1700s, French fur trappers and Virginia-based long hunters plied their trade along the region's waterways, encountering nomadic groups of Cherokee, Creek, Shawnee, Chickasaw, and Chickamauga who also used the area primarily as hunting grounds.

In the winter of 1779-1780, James Robertson founded Fort Nashborough on the banks of a frozen Cumberland River. Robertson's journey had taken him overland from North Carolina. John Donelson, Nashborough's cofounder, made the journey by water. With a flotilla of roughly 30 boats and the wives and children of men who'd travelled with Robertson, Donelson's group navigated down the Holston and the Tennessee rivers, before paddling and poling their way upriver against the current for 200 miles of the Ohio and Cumberland rivers to the new community that would become Nashville.

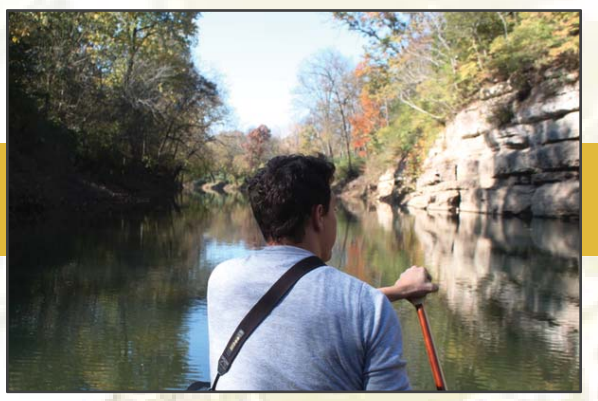
Over the many decades that followed, area waters supported the region's growth and prosperity. Like the Mississippian peoples who came before them, early settlers grew corn on the fertile bottomlands of the Cumberland and its tributaries. Thanks to their location on the Cumberland, Nashville and Carthage became major shipping ports, carrying tobacco, cotton, hemp, and other products as far downstream as New Orleans. Neither the North nor South failed to recognize the region's importance as a transportation hub during the Civil War. One of the conflict's bloodiest battles was fought between Union General Rosecrans' Army of the Cumberland and Confederate General Bragg's Army of Tennessee along the Stones River. Following the Civil War, the railroad and river combined to make Nashville the commercial capital of the upper south.

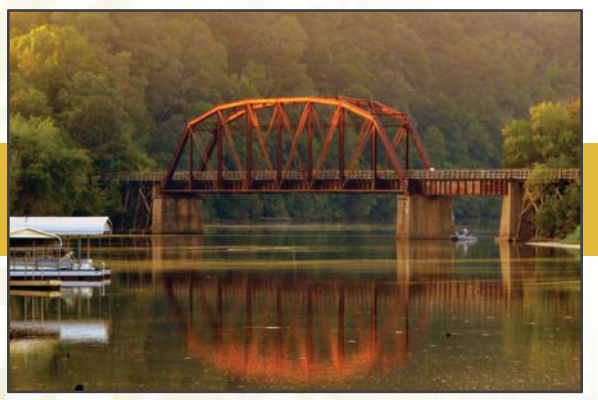
Today, the region is home to 1.4 million people and counting. This growing populace makes use of an estimated 140,000,000 gallons of water everyday! For the majority of these residents, this water comes out of the Cumberland River. This is true for residents of Nashville, Brentwood, Hendersonville, and other cities. Franklin receives the majority of its water from the Cumberland, but also withdraws from the Harpeth. Murfreesboro withdraws water from J. Percy Priest Lake on the Stones River, and Ashland City gets its water from Marrowbone Creek.

Beyond the public supply needs of today's communities water continues to support important industries. Farmers still grow corn here, as well as tobacco, soybeans, and hay and also raise cattle. Commodities continue to be transported on the Cumberland, and in 2008 alone, these shipments were valued at nearly $4 billion dollars. Barges ship coal by river to the Gallatin Fossil Plant on Old Hickory Lake, which also requires great amounts of water for cooling purposes. Gallatin consumes 180 million gallons per year, as it generates enough electricity to meet the needs of roughly 480,000 people. Old Hickory and J. Percy Priest dams use water to generate hydroelectricity and produce enough to meet the needs of 117,000.

Even the region's auto and healthcare industries rely on the Cumberland and its tributaries. The E.P.A. estimates that roughly 39,000 gallons of water are needed for every car manufactured in the United States, while the U.S. Energy Information Administration estimates that the average large U.S. hospital consumes 44 million gallons of water every year.

Water powered a number of historic 19th century mills. Montgomery Bell, the "Iron Master of the Harpeth," harnessed the power of the Harpeth River to produce wrought iron at Pattison Forge. (Photo by Brent Moore)





Top: Barges ship billions of dollars in commodities on the Cumberland River every year. (Photo by Gregory Thorp) Center: The excellent paddling afforded by Mill Creek may be one of Nashville's best-kept secrets. (Photo by Jed Grubbs) Right: Ashland City's bicentennial trail converted sections of an old railroad, including this 1901 bridge across Sycamore Creek, into a public pedestrian trail. (Photo by Brent Moore)

Water also supports regional health by providing area inhabitants with outstanding opportunities for recreation. Over one million people hike at Radnor Lake State Park every year. Other great waterside hikes can be enjoyed at Bledsoe Creek and Montgomery Bell state parks, Beaman and Bells Bend parks in Metro Nashville, or Bowie Park in Fairview. If you prefer a paved trail, area greenways may be your best bet. With some free time and a bicycle and you can pedal 13 miles from East Nashville all the way to Percy Priest Lake on the Stones River Greenway. Both Bicentennial Trail in Ashland City and Shelby Bottoms Greenway in Nashville are exceptionally pretty and make for prime strolling or biking along stretches of the Cumberland River. Additional shorter greenways shouldn't be missed and can be enjoyed along other sections of the Cumberland, as well as Mill Creek, Whites Creek, Richland Creek, Sevenmile Creek, Brown's Creek, the West Fork of the Stones River, and the Harpeth River.

Paddlers know there's no better way to appreciate the region's waters than to grab a boat and a buddy and get out on them. The Harpeth River makes for a picturesque, historic float and a number of outfitters make renting canoes here easy. Don't stop your exploring with this river, though. The East Fork of the Stones River comes highly recommended by those in the know, and Mill Creek may be one of Nashville's best-kept secrets. Your paddling options aren't limited to canoes and kayaks, of course. Standup paddle boarding is increasingly popular on J. Percy Priest and Old Hickory lakes, and rowing continues to be popular on J. Percy Priest.

The Cumberland River basin is a fishing mecca, and this region is no exception. Choice catches include catfish, large and smallmouth bass, catfish, crappie, perch, bream, sauger, and many more. Try your luck at Long Hunter State Park, J. Percy Priest or Old Hickory lakes, Bledsoe Creek State Park, or even the Cumberland River in downtown Nashville. If it's trout you're after, head to the Stones River beneath Percy Priest Dam. The Tennessee Wildlife Resources Agency stocks rainbow trout in the dam's cold tailwaters from December to March.

The Cumberland, Tennessee, and Mobile river basins contain more aquatic species than all other freshwater systems in North America. Several of these basins' rivers contain nearly 200 different native fish species and dozens of mussel species. When our freshwater ecosystems are diverse and healthy, they provide a tremendous array of benefits to our communities. They provide us with sources of food and medicine, as well as inspiration and wonder. Yet, we live in a world today where over 20% of all freshwater species are either threatened or extinct and where we continue to lose species at an alarming rate. Within the region, a startling 93 different species are at risk.

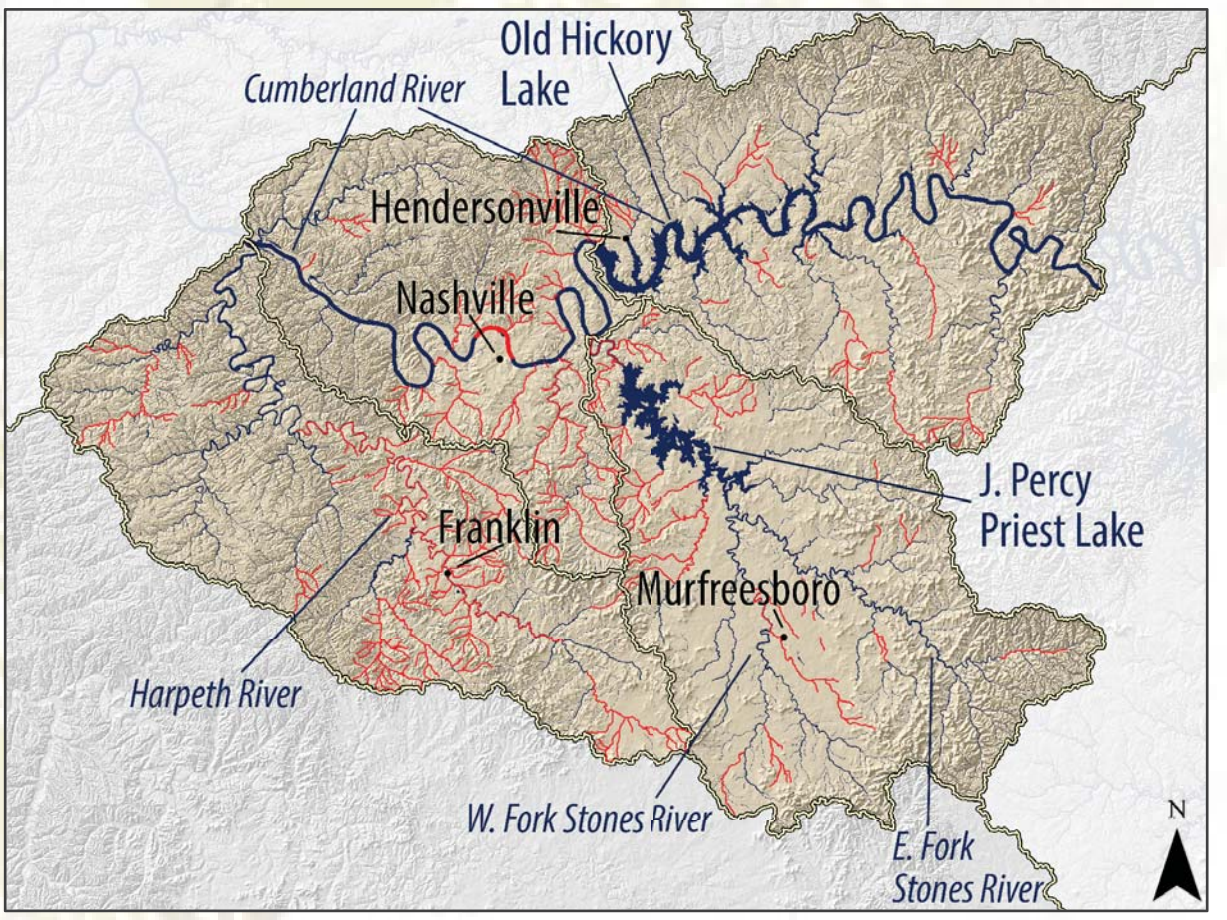
Our Impacts

Whether they are being used for drinking and public supply, local industries, or for producing hydropower, our lives are enriched by the valuable uses we make of the region's water resources. Yet, while many waterways in the region remain healthy, past and current human practices have significantly degraded others, compromising the ability of our communities to use this essential resource in the future.

Across the region, the Tennessee Department of Environment and Conservation reports that over 900 miles of streams and rivers are impaired. Impaired waters represent a threat to people, ecologies, or both. Most commonly, impairments are a result of excess sediment and bacteria.

Watershed	Most Common Impairments	Most Common Sources of Impairment
Old Hickory	Bacteria, Alteration of Streamside Vegetation, Sediment	Agriculture and Urban Stormwater Runoff
Stones	Sediment, Alteration of Streamside Vegetation, Bacteria, and Nutrients	Urban Stormwater Runoff, Pasture Grazing, and Land Development
Middle Cumberland	Bacteria, Sediment, and Nutrients	Urbanization, Collection System Failures, and Urban Stormwater Runoff
Harpeth	Sediment, Alteration of Streamside Vegetation, and Bacteria	Agriculture, Urban Stormwater Runoff, and Land Development

Shown in red, over 900 miles of streams and rivers are impaired in the region.



What Human Activities Are Having the Greatest Impact?

Tennessee reports that the most common sources of river and stream pollution are certain agricultural practices, urban stormwater runoff, and land development.

Top: Without safeguards on development sites, sediment-laden stormwater can find its way to nearby streams and smother aquatic ecosystems. (Photo by Paul Sloan)
Bottom: Stormwater drains can quickly convey polluted runoff to a nearby stream. (Photo courtesy of CO Department of Transportation)

Certain agricultural practices have impaired many stream miles in the region. On farms where overgrazing is practiced, loosened topsoil can easily wash into nearby streams during heavy rainfall. This sediment smothers aquatic life and habitat and the muddied water prevents sunlight from reaching plants. Poor feeding, watering, and waste management locations for livestock can also lead to sediment problems and can enable bacteria to reach water. When bacteria impair surface or groundwater, people who come into contact with that water are at risk of ear or eye infections, vomiting or dysentery. The adverse impacts of these grazing practices are especially pronounced where streams and rivers lack sufficiently forested stream banks. Without these natural forest buffers, rainfall can quickly and easily wash pollutants into nearby waters.

In urban areas, impervious surfaces, such as roads, buildings, and parking lots, negatively impact water quality. Water rushes off these surfaces, rather than slowly infiltrating the soil as it would in a forest or field. As it runs off, trash, petrochemicals, pet waste, sediment, nutrients, or other pollutants are quickly conveyed into nearby waterways. This rush and volume of stormwater erodes banks, and the conveyed pollutants can kill aquatic life and alter freshwater habitats. In addition, they can make water unsafe to swim in and make treating drinking water more difficult and expensive.

The region is experiencing accelerating land development. When natural areas are developed, the valuable services once provided by these natural areas are lost. Forests, wetlands, and floodplains work for our communities and do so free of charge. They mitigate flooding, control erosion, filter pollutants, and allow rainwater to infiltrate and replenish groundwater reserves. Once this "green infrastructure" is lost, expensive gray infrastructure must be built and maintained to provide many of the same services. The development of natural lands also exacts a price on aquatic and terrestrial ecosystems. Native flora and fauna suffer from the loss, alteration, and pollution of their habitat.

Dams are another significant source of impairment. J. Percy Priest, Old Hickory, and Cheatham dams all provide the region with many benefits, including hydropower, flood protection, drinking water, and lake recreation. However large dam projects also drastically alter river habitats as they create reservoir pools, or lakes, behind them – tempering flow, altering temperatures and dissolved oxygen levels. Not a single mile of the Cumberland River is unaltered within the region. The entire stretch is reservoir – a result of Cheatham and Old Hickory dams. Many freshwater plants and animals have been adversely impacted as a result. In addition to the region's large federal dam projects, the Tennessee Department of Environment and Conservation has inventoried an additional 112 smaller dams across the region that are either 20 feet or greater in height and retain 30-acre feet of water or greater. All of these dams impact water quality, and some neglected dams longer serve any practical purpose. Neglected dams may even exacerbate flooding or represent safety hazards to paddlers or other river users.

What Challenges Are on the Horizon?

The region is expected to see rapid growth in the coming decades. By 2050, E.P.A. estimates that the region's population could rise by as many as one million people. This increased population will place significant strain on the quality and quantity of the area's water resources. Aging sewer systems can fail, especially if they handle flows that are beyond their designed capacity, and this can cause bacteria impairments. When floodplains and streambanks are deforested and developed, communities face increased risk of flood damage, erosion, and water pollution. Regional collaboration, public education, and careful land management are essential if the region hopes to maintain or improve its water quality in the coming years.

Average air temperatures are already measurably increasing in the region. By 2080, the Global Change Research Program (GCRP) predicts that average temperatures in the Southeast will rise between 4.5 and 9 degrees Fahrenheit. Higher ambient air temperatures warm waters and can lower dissolved oxygen levels, causing stress to stream and river plants and animals. Hotter weather also increases evapotranspiration rates and dehydrates soils. Already, the GCRP reports, the frequency of spring droughts in the Southeast has increased by 12% and summer droughts have increased by 14% since the 1970s. Coupled with an increasing population, this trend could increase competition in the region for finite water resources. The GCRP also reports that storm intensity is increasing. This is troubling news for a region that already suffered billions in damages and 12 deaths as a result of the May 2010 flood.

Emerging contaminants are another rising concern. These contaminants are chemicals found in pharmaceuticals, personal care products, pesticides, and elsewhere. They can find their way into our water – when we wash medicine or shampoo down the drain, for example, or when rainwater washes insecticides or fertilizers from our gardens into a nearby creek. Once they're in water, the chemicals (or new combinations of chemicals) threaten our drinking water and stream ecologies.

Like many other aquatic species, streamside salamanders are negatively impacted by temperature increases. (Photo by John P Clare)

Middle Tennessee experienced catastrophic flooding in May 2010. (Photo by Jett Loe)

Protecting Our Water Resources

Many local, state, and federal agencies work to enhance the health and enjoyment of water resources in the region. At the local level, cities develop and implement stormwater management programs to reduce stormwater runoff pollution and illegal discharges from entering the region's waters. Riverside greenways protect floodplains from development and provide treasured public trails. Metro Nashville's extensive park system covers 13,000 acres of land many streams and rivers flow through or adjacent to these areas. In recent years, Nashville has invested millions in its downtown waterfront.

Beautiful new public spaces are providing citizens with access to the Cumberland River and are attracting talent and capital to the growing region.

There are seven Tennessee state parks in the region, six state wildlife management areas, and Cedars of Lebanon State Forest. Tennessee's Natural Areas Program protects some of the best examples of intact ecosystems within Tennessee, and there are 19 State Natural Areas in the region. The Harpeth River is one of thirteen rivers in Tennessee that enjoys protections provided by the State's Scenic Rivers Program.

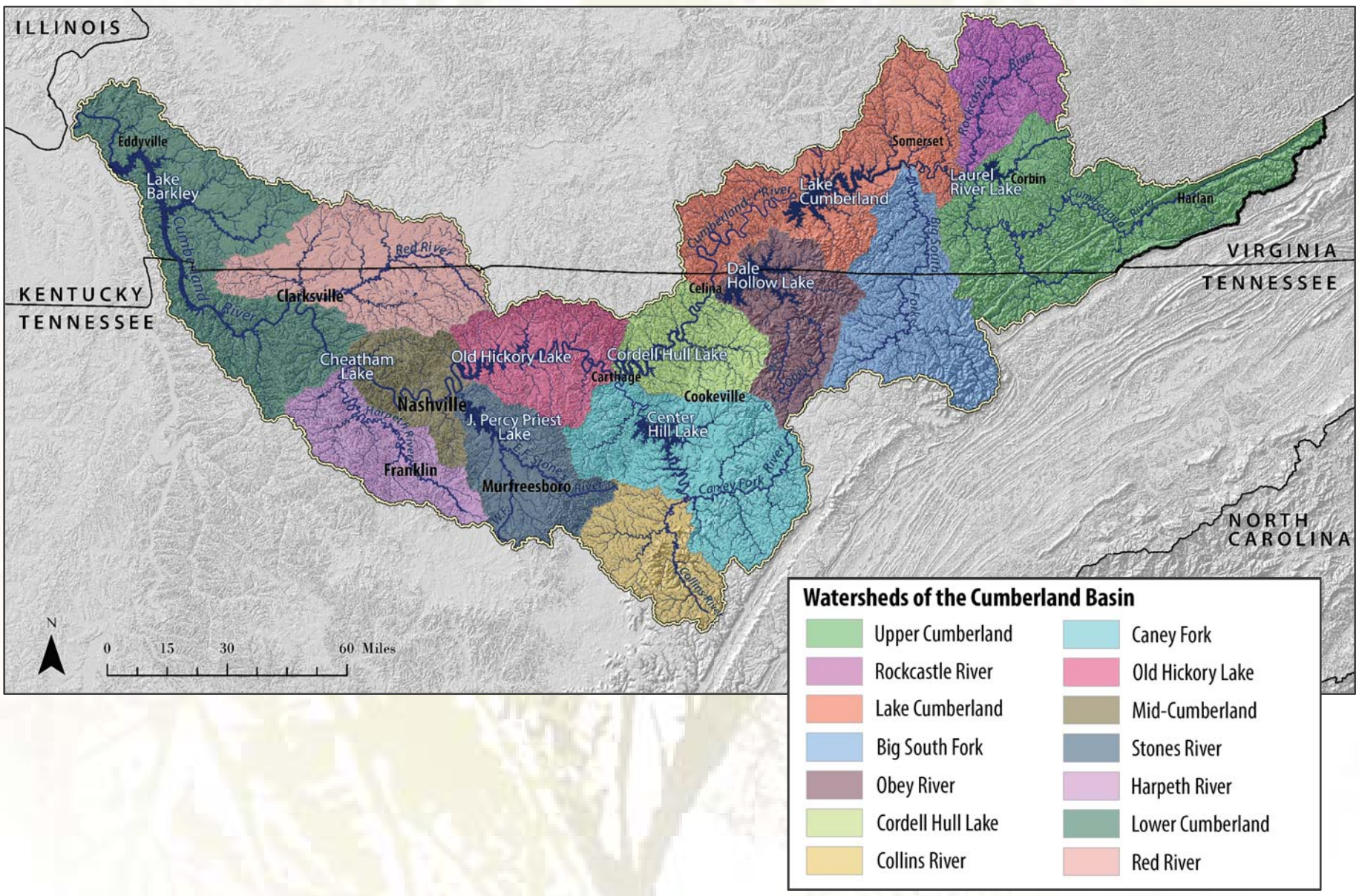
At the federal level, nine waterways in the region are on the National Rivers Inventory. This inventory lists rivers that have one or more exemplary natural or cultural values. Federal agencies must attempt to avoid or mitigate actions that would impact these waters. Also at the federal level, the Army Corps of Engineers manages a number of recreation areas in the region and employs measures to improve water quality at its dams and reservoirs. The agency, for example, uses turbine venting and auxiliary air supply valves to improve dissolved oxygen levels below its dams for the benefit of aquatic animals. It also maintains minimum flow levels needed by aquatic life on rivers below its reservoirs.

In addition to the Cumberland River Compact and The Nature Conservancy of Tennessee, many other nonprofit citizen groups, as well as private landowners and businesses, also promote water quality. The Tennessee Scenic Rivers Association is dedicated to the preservation, protection, and restoration of waters across the state.

Tennessee Scenic Rivers Association is working towards the goal of safe public access roughly every five miles on Tennessee's streams, rivers, and lakes. (Photo by Jed Grubbs)

Watershed associations include the Harpeth River Watershed Association, the Stones River Watershed Association, the Richland Creek Watershed Alliance, and Stream Watch. Thousands of members and volunteers support the efforts of these organizations, working to promote water quality in their local streams and watersheds. Every day, more landowners, local businesses, and farmers are planting rain gardens and trees, harvesting rainwater in rain barrels, and protecting natural lands within conservation easements, and the region's water stands to benefit.

State, federal, and local government agencies, as well as area non-profits have partnered to successfully reintroduce endangered Lake Sturgeon back into the Cumberland River within the region. (Photo by Todd Stailey, TN Aquarium)



Join Us!

The future of the Cumberland River basin offers countless possibilities for its residents. From our earliest arrival, water has been our lifeline; and it will continue to be the lifeline of future generations. Our water nourishes and feeds us, transports our commodities, defines our cultural heritage, and allows us to teach our children the joy of fishing, swimming, and exploration. Our basin is also home to some of the earth's most diverse communities of freshwater animals that depend on clean water every second of every day in order to survive.

Recognizing our basin's extraordinary value, the Cumberland River Compact and The Nature Conservancy of Tennessee have come together to publish this profile and to urge stakeholders throughout the basin to help develop a comprehensive, action-oriented *State of the Cumberland Basin* resource. The *State of the Basin* will identify and explain critical issues in the region, identify opportunities for resource stewardship, and prioritize shared watershed stewardship strategies. A "report card" will be included with health indices, benchmarks and goals for these indices, and a report of progress or decline in these indices over time. We invite you and members of your community to join us in this effort.

We believe this work will significantly deepen our understanding of the basin, from the Cumberland's headwaters in eastern Kentucky to its confluence with the Ohio, and will allow the many stakeholders and agencies working in the basin to collectively make strategic decisions that target implementation efforts on those that will have the greatest impact for the greatest good. Working together, we can make great strides in improving water quality. As a result, our region will be a healthier place for our people, economy, and environment.

Please join us in our efforts to become better stewards of the Cumberland basin. For more information or to get involved, please contact the Cumberland River Compact at 615-837-1151 or The Nature Conservancy of Tennessee at 615-383-9909.

CUMBERLAND RIVER COMPACT & The Nature Conservancy
Protecting nature. Preserving life.®

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Cover photo: Erwan Le Belleguy

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