

CITIZEN GUIDE
TO
ALABAMA RIVERS

Tennessee

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Citizen Guide to Alabama Rivers

- Volume 1 Black Warrior and Cahaba*
- Volume 2 Alabama, Coosa and Tallapoosa*
- Volume 3 Chattahoochee and Coastal Plain Streams*
- Volume 4 Tennessee*
- Volume 5 Escatawpa, Mobile and Tombigbee*

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COVER PHOTO. *Bear Creek at State Route 13 in Marion County, AL.* PHOTO: BRYAN W. PHILLIPS

About these Guides

Alabama's rivers, streams and lakes are priceless in terms of their ecological, economic and social benefits.

The purpose of this guide is to provide an introduction to the unique history and environmental significance of Alabama's River Basins and invite further investigation into our abundant but vulnerable water resources.

It is hoped that these guides will enhance the dialogue among citizens and key decision makers and help us move toward strategies of how to best manage and protect Alabama's waters.



LEAFY PRAIRIE CLOVER, *Dalea foliosa*. *This endangered plant lives on the edges of limestone cedar glades, barrens and calcareous prairie habitats in Alabama, Tennessee and Illinois. It can grow to 20 inches.* PHOTO: DAREL HESS, www.2bnthewild.com

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Unlabeled Photos and Graphics: Alabama Water Watch Program

THE WATER ENVIRONMENT

The World's Water Supply

If all the Earth's water fit into a **one liter** container,

- ❖ 970 mL of the container would be saltwater.
- ❖ 30 mL (nail polish container) would be freshwater in the atmosphere, lakes, rivers, polar ice caps, and groundwater.
- ❖ Only 2 drops of the freshwater would be in lakes and rivers.



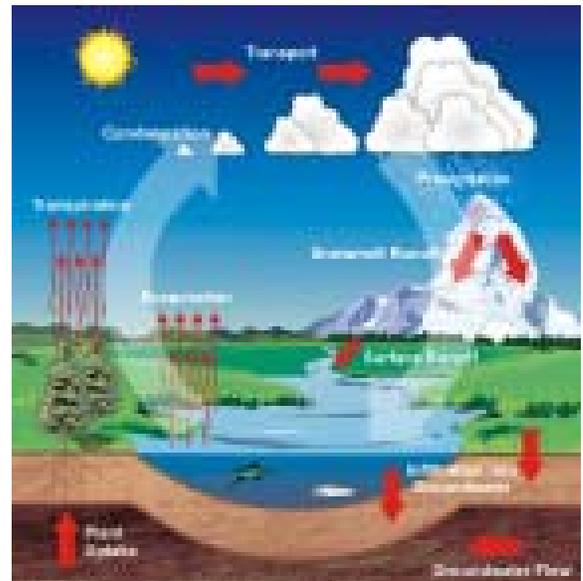
Alabama's Rich Water Resources

- 💧 Alabama contains more than 77,000 miles of streams, 3.6 million acres of wetlands and 560,000 acres of lakes, ponds and reservoirs.
- 💧 Alabama has more miles of navigable rivers (1,438 miles) than any other state.
- 💧 About 8% of the water in the continental U.S. originates in or flows through Alabama.
- 💧 The Tennessee River is a tributary of the Mississippi River. The Mississippi Basin is the third largest drainage in the world (1.24 million square miles); only the Congo and Amazon Rivers have a larger drainage area.

What is a Watershed?

A **watershed** is the total land area that drains to a common point, such as a river, a lake or the ocean. Watersheds come in many sizes and small watersheds are contained within larger ones.

Very large watersheds are also called **basins**. The Coosa, Tallapoosa, Alabama, Cahaba, Black Warrior and Tombigbee River watersheds are all part of the greater Mobile Basin. We all live in a watershed, no matter how far we are from a river or lake.



The Hydrologic Cycle, or the Water Cycle, links land, air and water within a watershed. GRAPHIC: <http://www/oa.gov>

Nature's Water Recycling Program

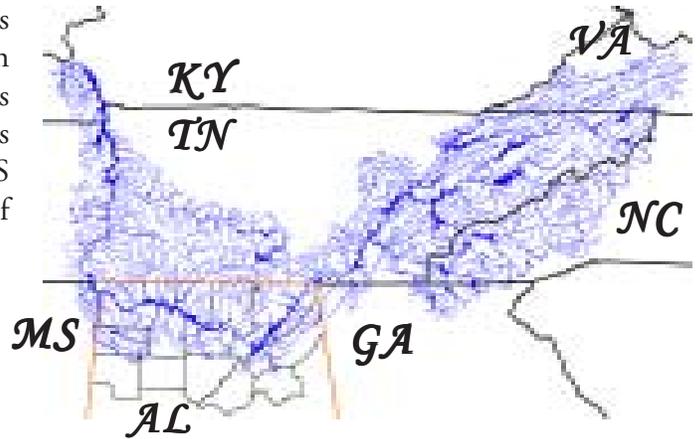
When rain falls to the earth, it sinks into the ground (**infiltration**), returns to the air (**evaporation** and **transpiration**) or flows over the land surface (**runoff**). Surface runoff carries dissolved and suspended substances, such as chemicals and sediment. Land use activities in a watershed directly affect both *water quality* and *quantity*. Water is never created, it only recycles.



Major watersheds of Alabama.

The Tennessee River begins at the confluence of the Holston and French Broad Rivers near Knoxville, TN. It then bends south out of the Appalachian Mountains, cuts across the northern quarter of Alabama and turns north to join the Ohio River near Paducah, KY. The rivers within the Tennessee Basin flow through 123 counties of 7 states (11 VA, 63 TN, 15 NC, 9 GA, 15 AL, 3 MS and 7 KY). Its mainstem is 652 miles long and 17% of its 40,908 square-mile watershed is in Alabama.

THE RIVER BASIN



1 Pickwick Lake has been designated as the "Smallmouth Bass Capital of the World" and is one of the world's most important sources of commercial mussels.

7 The Tuscumbia Courtland and Decatur RR (1832) was a vital line in the Civil War and ran a total of 45 miles through Colbert, Morgan and Lawrence Counties, AL, to bypass the shoals of the Tennessee River. It was the first railroad west of the Allegheny Mountains.

9 Today, the industrial facilities in Decatur represent the largest concentration of waterfront industrial development in the Tennessee Valley Region.

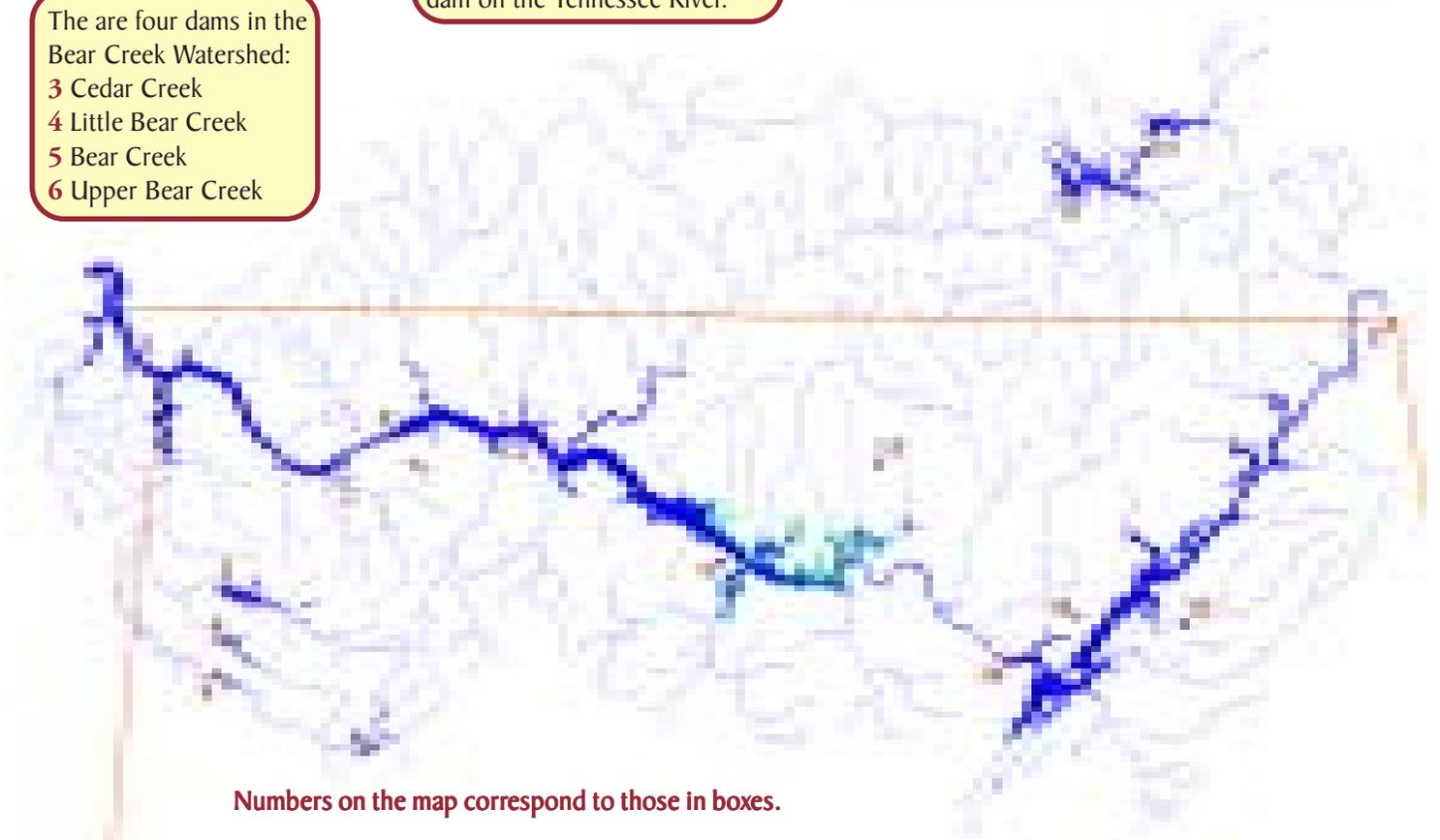
2 At Muscle Shoals the Tennessee River crosses the Fall Line, demarcating the coast of an ancient sea that is almost 400 miles from the present-day Gulf of Mexico.

8 Wilson Lock and Dam has a lift of 93 ft. and services more than 15 million tons of barge goods per year. Its 13 generators produce more electricity than any other dam on the Tennessee River.

Woods Reservoir (**10**) and Tims Ford (**11**) dams are located in Tennessee on the Elk River. The Elk is a major tributary to the Alabama portion of the Tennessee River. Tims Ford Lake is regarded as one of the top bass fishing and recreational lakes in the southeast.

The are four dams in the Bear Creek Watershed:

- 3** Cedar Creek
- 4** Little Bear Creek
- 5** Bear Creek
- 6** Upper Bear Creek



Numbers on the map correspond to those in boxes.



WHEELER NATIONAL WILDLIFE REFUGE (on map in green near #9). *Alabama's largest refuge covering 35,000 acres of bottomland hardwoods, pine uplands, agricultural fields, and backwater embayments.* PHOTO: KEVIN MCIVER

There are nine dams on the mainstem of the Tennessee River. The first four dams are in Tennessee (Fort Loudon, Watts Bar, Chickamauga, and Nickajack). The next three in Alabama are Guntersville (14), Wheeler (12), and Wilson (8), which together create 150,500 acres of lakes. A large portion of Pickwick Lake (1) formed by Pickwick Dam in Tennessee backs up into northwest Alabama. The last dam, Kentucky Dam, forms the largest reservoir on the Tennessee River (160,300 acres).

13 Huntsville, designated as the first Alabama capital in 1819, is the 4th largest Alabama city and overlooks the Tennessee River. Marshall Space Flight Center, an important research and development site for NASA, as well as the U.S. Army's Redstone Arsenal are located here.

14 Guntersville Lake is the largest Alabama reservoir (67,900 acres), stretching for 76 miles but with a retention time of only 12-13 days.

15 Buck's Pocket State Park sits in a narrow gorge cut into Sand Mountain by South Sauty Creek. The park covers 2,000 acres and offers some of Alabama's most unique views.

16 Cathedral Caverns in Grant holds many world records including: widest entrance (128 ft.) of any commercial cave, largest stalagmite (45 ft. tall, 243 ft. circumference) and largest "frozen waterfall."

17 There are numerous caves in the Tennessee Basin. Cavers from around the globe come to explore the area located in the three corners where Tennessee, Alabama and Georgia meet. Within this area, there are more than 5,500 caves in Tennessee, over 2,000 caves in Jackson County, AL, (highest subterranean diversity in the U.S.), and the deepest cave east of the Mississippi River (Ellison's Cave) in Georgia. The National Speleological Society (cave explorers) located its headquarters near this cave-rich area in Huntsville.



NEVERSINK PIT. *Located in Jackson County, AL, the 162 ft. deep sinkhole is considered a "classic" by cavers for its stunning beauty. It is home to rare and endangered ferns which thrive on the pit's ledges in the moist micro-climate.* PHOTO: BRUCE BREWER, www.brucebrewer.com

OLD NATCHEZ TRACE. *The Natchez Trace Parkway covers a distance of 445 miles from Natchez, MS, to Nashville, TN, through forests, cypress swamps, streams, and farmland.*



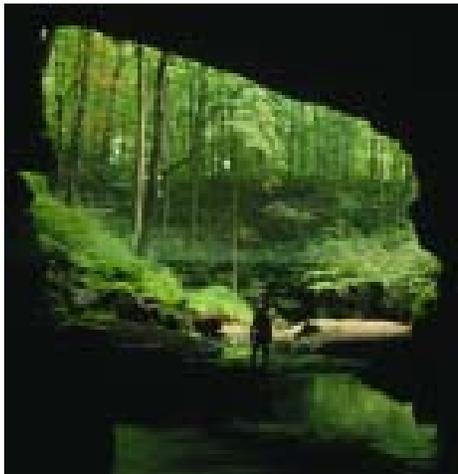
Numerous species of plants (800), mammals (57), birds (216), reptiles (57), and amphibians (36) call this home. PHOTO: www.byways.org

Life Along the River

Native Culture and European Contact

Paleo-Indians were the first inhabitants of the Tennessee Valley, with artifacts dating back 12,000 years. The region was probably attractive for them because it lies at the southern edge of the hardwood forests where nuts, acorns, fish, mussels, and game were plentiful and the climate warmer. Later Native American cultures built earthen mounds which served as bases for ceremonial temples or chiefs' houses. The Florence Indian Mound in Lauderdale County, AL, (42 ft. high and 180 ft. wide at the base) is the largest domiciliary mound in the Tennessee Valley and was built between 1200-1500 A.D.

In 1540 Hernando DeSoto's Spanish expedition traveled from the present-day location of Chattanooga, TN, to Guntersville, AL, on the Tennessee River. This was the first European record of Cherokee, Creek, and Chickasaw tribal land exploration. Between 1786 and 1816 much of the Indian land was ceded to the U.S.



RUSSELL CAVE NATIONAL MONUMENT.
This cave offers one of the most complete archeological records in the eastern U.S. Artifacts found here indicate intermittent human habitation for 9,000 years.

PHOTO: STEVE TAYLOR

Early Agricultural Trade

In the early 1800s flour was brought to Ditto Landing (near Huntsville, AL) on flatboats and keelboats in such quantities that the U.S. government made Ditto Landing a "Port of Entry." Government inspectors were sent to the landing where all flour sales were inspected, graded and stamped. The Moulton Valley, west of Moulton, AL, was an important southern fruit supplier, and so much grain was produced in this area that it became known as the South's "Cereal Belt."

"Fighting Joe"



1836-1906, circa 1862.

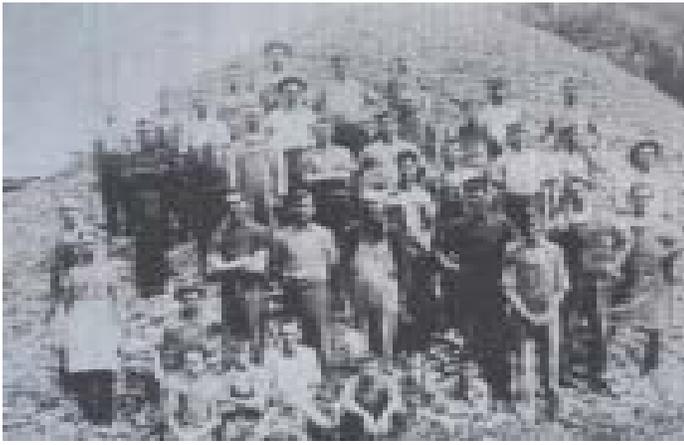
PHOTO: LIBRARY OF CONGRESS

Joseph Wheeler was a soldier, lawyer, U.S. Congressman and planter. He received the nickname "Fighting Joe" while serving in the New Mexico Territory after he and a teamster fought off a band of Indians who were attacking a wagon bearing a pregnant woman. During the Civil War he was in more than 500 skirmishes, commanded in 127 full-scale battles, had 18 horses shot out from under him, and lost 36 staff officers from his side. In 1869 General Wheeler moved to Alabama, practiced law and operated his plantation in Lawrence County. It was his intense desire to show that Southerners could be counted on as citizens of the U.S. that prompted him to volunteer, at 62, for service in the Spanish-American War. Alabama honored its beloved fighting man by placing his bust in Statuary Hall, Washington, D.C., and the nation honored him in 1937 by naming the dam across the Tennessee River near Muscle Shoals for "the South's fightingest General." Joseph Wheeler was the only Confederate General to attain the same rank later in the United States Army.

NATIVE SONS AND DAUGHTERS

Famous folks from the Tennessee Basin include:

- ❖ **William Christopher Handy** (Florence) - composer, "Father of the Blues," *Memphis Blues*
- ❖ **Tammy Wynette** (Red Bay) - singer, 2 Grammy Awards, *Stand By Your Man*
- ❖ **Joe Louis** (Lexington) - boxer, held world heavyweight championship longer than any man in history
- ❖ **Helen Adams Keller** (Tuscumbia) - author, educator, 1st deaf and blind person to attend college and receive a B.S.
- ❖ **Jesse Owens** (Oakville) - track star, 1936 Olympic Gold Medal winner in four events
- ❖ **Sequoyah, a.k.a. George Gist** (Tuskegee, TN) - developed the Cherokee alphabet



CLAMMERS, circa 1911. *Standing atop a mound of dead mussels used to make mother-of-pearl buttons.* PHOTO: CONCHOLOGISTS OF AMERICA, <http://coa.acnatsci.org/conchnet/>

The Great Mussel Demise

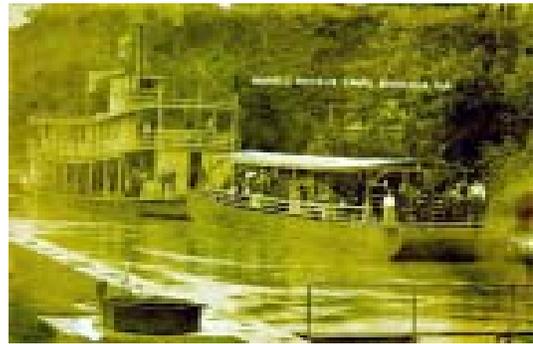
Over the last century, freshwater mussel populations in the Tennessee Basin have been decimated, largely due to ignorance and greed. Four episodes stand out: the Pearl Rush, the Button Industry, the Cultured Pearl Industry and the damming of rivers. In 1857 a freshwater pearl was found in a New Jersey stream and sold to Tiffany's for \$2,500. Soon after, millions of mussels, particularly in the southeast, were shucked to find pearls, depleting some streams entirely of mussels. In 1891 button factories began making mother-of-pearl buttons from freshwater mussel shells. By 1916, the \$12.5 million industry employed 20,000 people and as much as 1,800 tons of living mussels were discarded per day. In the 1950s mussels again became the target of commercialism for the Japanese cultured pearl trade, the main source being mussels from the Tennessee, Cumberland, Mississippi and Wabash rivers. In the Tennessee River alone, 4,750 tons of mussels were harvested in 1990. By far, the largest number of mussels have been lost due to human alterations of river systems. Damming and siltation have contributed to the extinction of 10 mussel species.



WHEELER LOCK AND DAM. PHOTO: TVA

Treacherous Shoals and River Commerce

One of the most treacherous stretches of Tennessee River travel was known as the "Muscle Shoals." This area was marked by a series of rapids, shoals and shallow water, stretching from the mouth of the Elk River between Florence and Decatur, AL, downstream to almost Waterloo, AL, and comprised Elk, Big Muscle, Little Muscle and Colbert Shoals. Here the river fell 137 feet in 37 miles. The first attempt to overcome the Shoals began in 1836 when the state of Alabama built a canal around them. The canal was very limited in its success, but portions of it can still be seen today. River commerce began in earnest with the advent of the steamboat and then by diesel-driven barges. River commerce is now possible throughout the entire length of the Tennessee due to the construction of locks and dams. Today, 34,000 barges carry 50 million tons of goods on the Tennessee River annually.



MUSCLE SHOALS CANAL AT SHEFFIELD, AL. PHOTO: COLLIER LIBRARY SPECIAL COLLECTION, www2.una.edu/geography/tn_web/history

TVA

The most dramatic change in Valley life came in 1933 after a series of devastating floods. The federal government then established the Tennessee Valley Authority (TVA) to build and manage a series of dams on the mainstream and tributaries of the river. These dams were to provide navigation, protection from floods, erosion control, and electrical power for the rural south. Electric lights and modern appliances made life easier and farms more productive. Electricity drew industries into the region, providing desperately needed jobs. TVA also developed fertilizers, taught farmers how to improve crop yields, helped replant forests, and controlled forest fires. Electricity made possible the large-scale refining of aluminum, a vital commodity during World War II. Currently, TVA is the largest electricity producer in the U.S., providing power to nearly 18 million residents.

Land Use in the River Basin

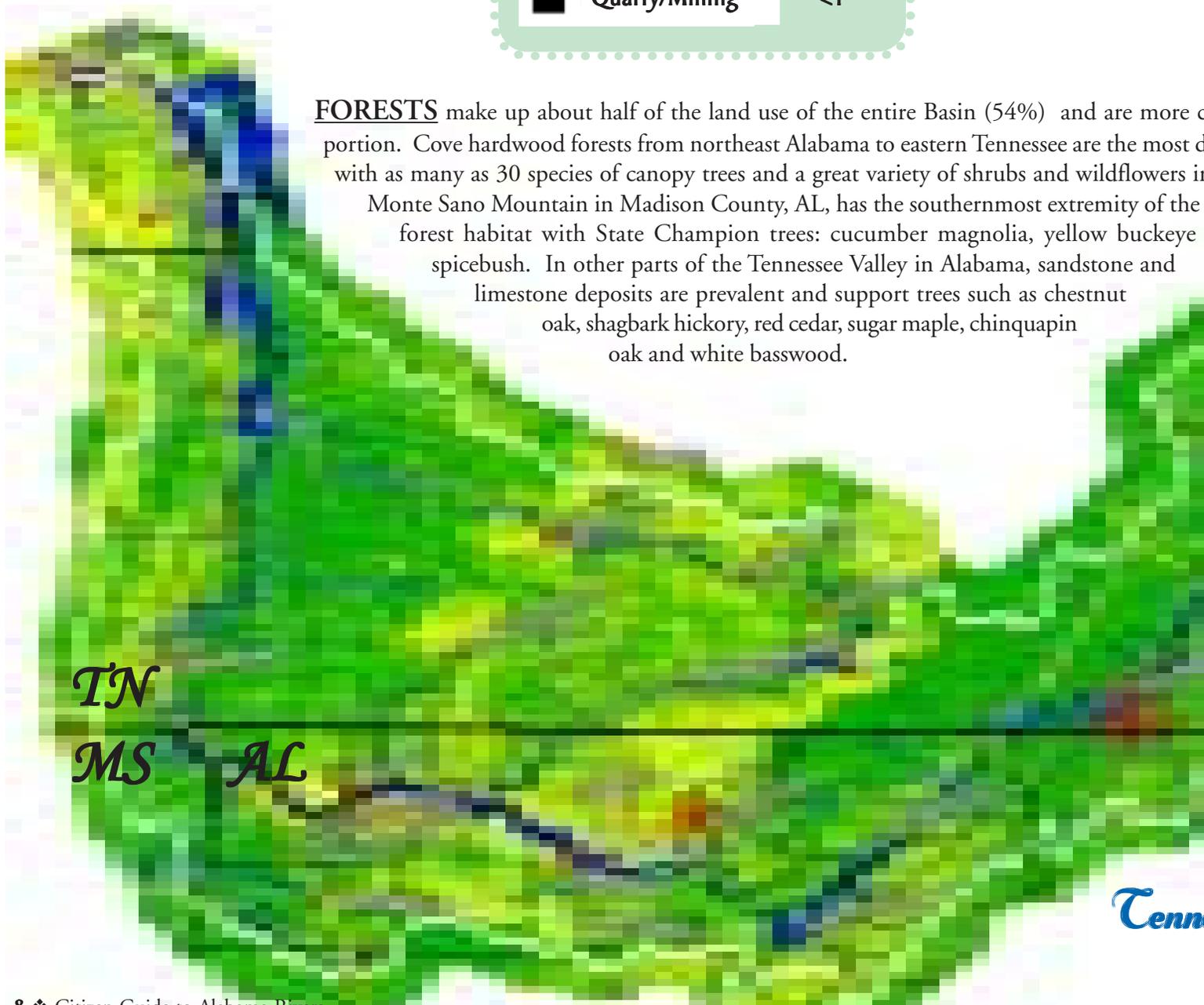
The water quality and quantity of the Tennessee Basin is influenced by a variety of urban and rural land uses. The land use map was generated from 1992-93 satellite images. The river basin is outlined in white and Alabama counties are designated in black. The orange line represents the Fall Line, which is the border between the East Gulf Coastal Plain to the west and the Highland Rim to the east. Other physiographic provinces in the Tennessee Valley (west to east) include Cumberland Plateau, Valley and Ridge and the Blue Ridge.

LAND USE PERCENTAGES

		Tennessee
	Forests	54
	Agriculture	35
	Urban/Suburban	2
	Clearcut/Barren	<1
	Wetlands	4
	Water/Lakes	4
	Quarry/Mining	<1

URBAN/SUBURBAN cities have historically impacted water quality through municipal effluents. For many years, the basin was designated the dirtiest in the nation. The Clean Water Act has done much to reduce point source pollution from urban and suburban areas but non-point source pollution from agriculture and urban drains remains a challenge. Urban sprawl and impervious surfaces have resulted in increased runoff, sewage overflow, and local flooding.

FORESTS make up about half of the land use of the entire Basin (54%) and are more diverse in composition. Cove hardwood forests from northeast Alabama to eastern Tennessee are the most diverse with as many as 30 species of canopy trees and a great variety of shrubs and wildflowers in the understory. Monte Sano Mountain in Madison County, AL, has the southernmost extremity of the cove forest habitat with State Champion trees: cucumber magnolia, yellow buckeye, and spicebush. In other parts of the Tennessee Valley in Alabama, sandstone and limestone deposits are prevalent and support trees such as chestnut oak, shagbark hickory, red cedar, sugar maple, chinquapin oak and white basswood.



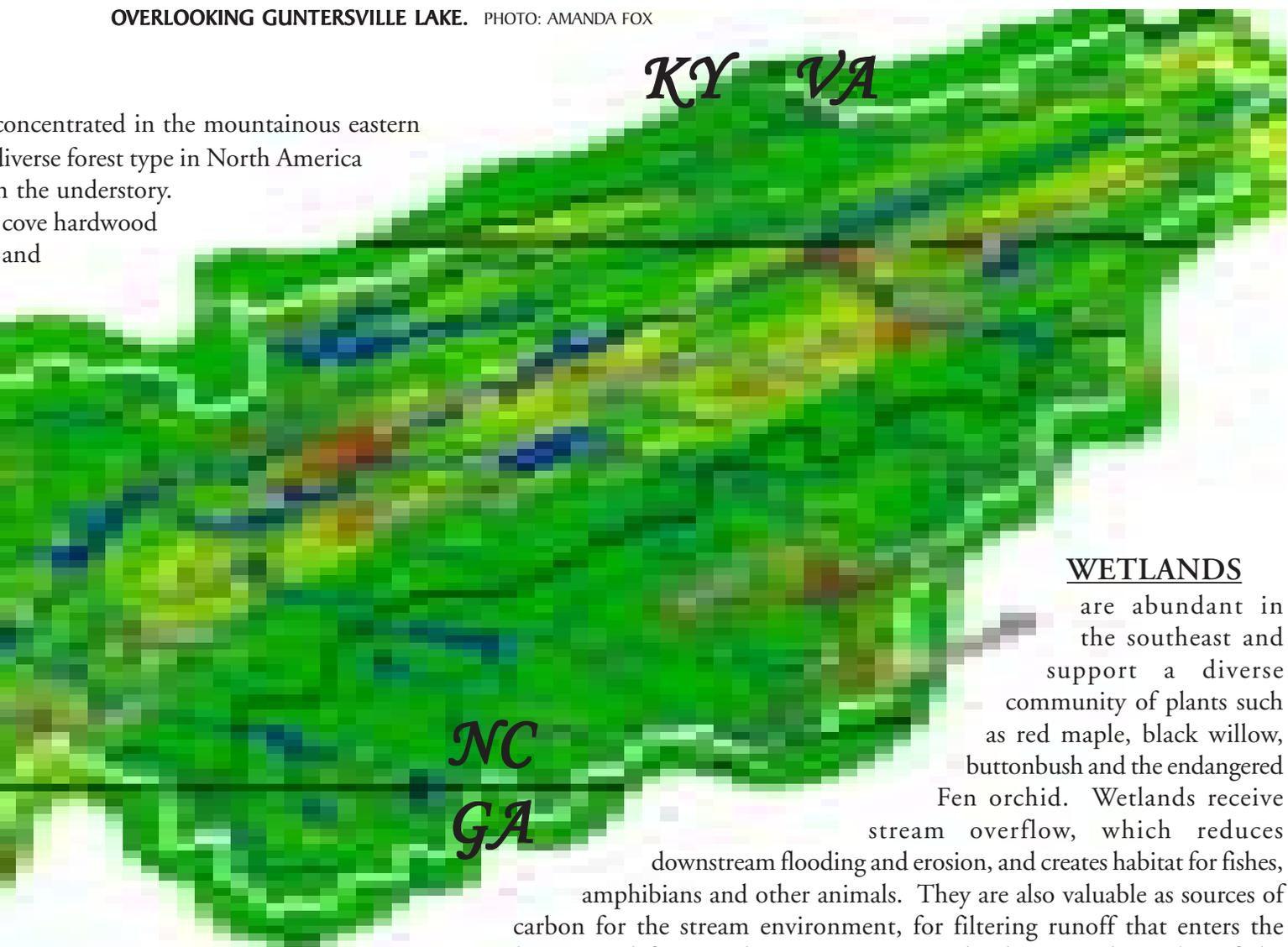
Urban areas make up only 2% of the land use in the entire Basin, however, impacted the Tennessee River with pollution from industrial and agricultural activities. For example, Chattanooga, TN, polluted the river and air so much that it was named the dirtiest city in America by EPA in 1969. In 1984, the city worked with the federal government on a massive clean-up and in 1995, EPA pronounced Chattanooga an environmental success story. The federal Clean Water Act was amended to regulate nonpoint runoff from urban/developed areas to reduce stormwater runoff and the amount of sediment and debris that can be carried in runoff flows and



OVERLOOKING GUNTERSVILLE LAKE. PHOTO: AMANDA FOX

are concentrated in the mountainous eastern portion of the basin. The most diverse forest type in North America is found in the understory. The cove hardwood forest and

AGRICULTURE forms a higher proportion of land use in the Tennessee Basin (35%) than in all other river basins of Alabama. It is particularly concentrated in Madison, Limestone, Lauderdale and Lawrence Counties. Principle farm products in the Alabama portion of the basin include cotton, cattle, corn, wheat, soybeans and poultry. Rachel Carson's 1962 classic, *Silent Spring*, documented the serious environmental problems caused by DDT pollution in the Flint Creek watershed near Decatur, AL. Since that time, many farmers have adopted the practice of integrated pest management (IPM), where a combination of physical, biological and chemical control with limited use of pesticides is more cost-effective and environmentally friendly.



WETLANDS

are abundant in the southeast and support a diverse community of plants such as red maple, black willow, buttonbush and the endangered Fen orchid. Wetlands receive stream overflow, which reduces downstream flooding and erosion, and creates habitat for fishes, amphibians and other animals. They are also valuable as sources of carbon for the stream environment, for filtering runoff that enters the groundwater, and for recycling nutrients. Wetlands cover about 4% of the Tennessee Basin and many were created or enlarged by impoundments. For example, Alabama's largest wetland was greatly expanded by the construction of the Wheeler Reservoir.

SPECIAL PLANTS AND ANIMALS

Alabama ranks in the top ten in the nation for the most types of native plants and animals. According to The Nature Conservancy of Alabama, there are over 4,000 species of plants, 850 species of vertebrates and nearly 250 species of freshwater mollusks (snails and mussels) in Alabama. In spite of high biodiversity, Alabama has more threatened or endangered species than any state except Hawaii.



CUMBERLAND MONKEYFACE, *Quadrula intermedia*. Historically found in streams of Limestone County, AL, but was extirpated by damming.

BIRDWING PEARLYMUSSEL, *Lemiox rimosus*. Historically found throughout the Tennessee River in Alabama, Tennessee and Virginia but is now only found in Duck River, TN. PHOTOS: CONCHOLOGISTS OF

AMERICA, <http://coa.acnatsci.org/conchnet/>



PRICES'S POTATO BEAN, *Apios priceana*. This threatened vine blooms from mid-June through August. The large tubers are edible and may have been used by early settlers as food.

PHOTO: KIMBERLIE MCCUE, CENTER FOR PLANT CONSERVATION

Many rare, protected fish in the Tennessee Basin have interesting names such as the Boulder darter (*Etheostoma wapiti*), the Palezone shiner (*Notropis albizonatus*), the Spottfin chub (*Cyprinella monacha*), and the Mountain madtom (*Noturus eleutherus*).

Why Worry about Loss of Species?

All creatures are interconnected in the web of life. For example, freshwater mussels rely on certain fish species to complete their life cycles. In turn, these mussels provide benefits to other aquatic organisms. Mussels filter the water for food and at the same time, remove organic particles and pollutants. This helps to clean and clarify streams, keeping them healthy for both humans and wildlife. Mussels are also a food source to many animals. Their shells provide cover for aquatic insects, crayfish and fish and they are good indicators of a stream's condition. Historically, Alabama had about 350 mussel species but many have become extinct. Each time a species disappears both known and undiscovered benefits are lost forever.

THE TENNESSEE BASIN...

- Is acknowledged as one of the most biologically diverse and threatened river basins in the nation.
- Harbors a high number of imperiled species including 57 fish species and 47 mussel species considered at-risk.
- Has the highest diversity of freshwater mussels in North America.



HELLBENDER, *Cryptobranchus alleganiensis*. This large North American salamander is found in clean, cool, rocky-bottomed streams of the eastern U.S. It grows up to 29 inches and feeds on crayfish and aquatic insects. Hellbenders have a flat head, lidless eyes and wrinkled fleshy folds of skin which absorb oxygen from the water.

PHOTO: JOHN WHITE, <http://mysite.verizon.net/vzelm6wp/>

The National Register of Trees lists a September elm, *Ulmus serotina*, found in Colbert County, AL, as the largest of its kind, measuring 150 ft. tall and 105 in. diameter with a 64 ft. spread.



MALE AND FEMALE SLACKWATER DARTERS, *Etheostoma boschungii*. These federally threatened fish live in a few small tributaries (designated critical habitat) of the Tennessee River in Alabama and Tennessee. They have separate breeding and non-breeding habitats. PHOTO: J.R. SHUTE, www.conservationfisheries.org



ALABAMA CAVEFISH, *Speoplatyrhinus poulsoni*. A small, colorless, blind fish that exists in Key Cave National Wildlife Refuge in Lauderdale County, AL. The Alabama cavefish is less than three inches long and is considered to be the rarest freshwater fish in the world. No more than 10 have ever been observed in a single visit. This fish is threatened by pollutants filtering down to the cavewater within Key Cave's recharge area. PHOTO: RICHARD L. MAYDEN, SAINT LOUIS UNIVERSITY



BALD EAGLE CHICKS, *Haliaeetus leucocephalus*. This slowly recovering species can be seen throughout the Tennessee Basin. Guntersville State Park is a winter migration home for these birds as well as many others including herons and ducks. PHOTO: DAVE MENKE, <http://images.fws.gov>

INDIANA BAT,

***Myotis sodalis*.** This bat eats up to half its body weight in insects each night. It congregates in a few large caves with as many as 125,000 bats per cave. Fern Cave and Sauta Cave National Wildlife Refuges in Jackson County, AL, are critical habitat for the endangered Indiana and Gray bats. Over a million Gray bats hibernate in Fern Cave, as do several hundred endangered Indiana bats.



PHOTO: RICH FIELDS, <http://midwest.fws.gov>

"DISMALITES," *Orfelia fultoni*. These unique glow worms are the 6-9 month larval stage of the fungus gnat. They display a bright blue-green light to attract food like midges, mayflies and caddisflies. These cave-dwelling creatures are found in many caves but extraordinary concentrations in Dismals Canyon near Phil Campbell, AL, provide impressive nighttime displays. PHOTO: RONNIE HARRIS, www.dismalscanyon.com



Anthony's riversnail, *Atheurnia anthonyi*, lives only in the shoal areas of Limestone Creek in Limestone County, AL, and a short reach near the mouth of the Sequatchie River, TN. It is relatively large in comparison to other aquatic snails (1 inch long). Most of its historic range has been altered by impoundments.

The Wheeler Refuge hosts numerous species of fish (115), reptiles and amphibians (74), mammals (47) and birds (285). The Refuge also manages and protects 10 federally listed species. It supports the southern-most migration of wintering Canada geese and serves as winter habitat for the state's largest duck population.

Balancing Economy and Environment in the River Basin

Abundant water, timber, rich soils, minerals, and other natural resources have been important for boosting Alabama's economy, creating jobs and providing necessary products for all of us. The way these natural resources are extracted, managed and used can cause environmental problems that negatively affect human health and our quality of life. More than half of these problems come from nonpoint source pollution that enters streams from broad areas of both urban and rural portions of a watershed. Possible problems may include...

Agriculture

- ❖ Excess nutrients and bacteria from animal wastes, including wastes from CAFOs (Concentrated Animal Feeding Operations)
- ❖ Runoff of pesticides, fertilizers, and other chemicals from cropland and pastures

Nitrogen and phosphorus are essential nutrients for plant and animal growth, but excessive amounts in waterbodies can stimulate algal blooms and aquatic weeds. These blooms as well as decomposing plants can impair water suitability for uses including drinking, swimming and fishing.



POULTRY CAFO. PHOTO: LARRY RANA

Dams

- ❖ Change natural river flow patterns and levels
- ❖ Drastic water temperature and oxygen changes in streams from dam releases
- ❖ Alter wetland habitats



WILSON DAM, 1926. PHOTO: O.T. ERICSON, DLC/PP-1926:46931, <http://memory.loc.gov>

Forestry Practices

- ❖ Erosion and runoff from improper logging practices
- ❖ Alter vulnerable headwater stream ecosystems

Erosion and sedimentation have been a problem in Alabama as far back as colonial settlement. In the 1930s, the Soil Conservation Service, now called the Natural Resources Conservation Service (NRCS), was formed to address erosion problems and other land use issues.



SOIL EROSION AND STREAM SEDIMENTATION FOLLOWING A FOREST CLEARCUT. PHOTOS: RUSSELL WRIGHT

Invasive Exotics

- ❖ Replace native plant and animal communities
- ❖ Harm ecosystem functions
- ❖ Expensive to control

Invasive exotics are introduced into ecosystems where they did not evolve and often spread rapidly replacing native species. People are usually the culprits for introduction of nonnatives. Examples of invasive species include hydrilla, Eurasian milfoil, kudzu, purple loosestrife, privet, common carp, Asian clam, and zebra mussels. TVA works with local groups to manage hydrilla and Eurasian milfoil which can be so dense they reduce the use of reservoirs.



EUROPEAN ZEBRA MUSSELS, *Dreissena polymorpha*. These exotics pose a multi-billion dollar threat to all types of water supplies. They multiply rapidly and settle on

top of any hard surface, like metal, wood, other mussels and even each other to form dense colonies. They can clog intake pipes for power plants, water treatment plants and other industries. Since the early 1990s, zebra mussels have been present in the Tennessee River but have not caused as great a problem as in other drainages.

PHOTO: KEN GARDNER, <http://images.usace.army.mil/>

Industrial Discharge

- ❖ Toxic chemicals
- ❖ Heavy metals
- ❖ Thermal pollution



AN INDUSTRY PIPE IS A POINT SOURCE DISCHARGE.

From 1947-71 Olin Corporation's Redstone Arsenal facility in Huntsville discharged 1,000's of tons of the pesticide DDT into the Huntsville Spring Branch, which flows into Indian Creek. A 1979 TVA study found fish from these creeks had DDT levels of 200 ppm, 40 times the federal limit. Nearly 1,200 residents of Triana relied heavily on fish from this creek and had high DDT levels in their bodies. In the early 1980s the creek was designated one of EPA's top-priority hazardous waste sites for clean-up under the Superfund program and required clean-up as well as healthcare for the victims.

Urban/Suburban/ Rural Development

- ❖ Concrete and asphalt reduce infiltration of water to soil, inhibiting groundwater recharge
- ❖ Runoff from paved areas and lawns, including pet wastes, enters storm drains and flows directly to streams untreated
- ❖ Inadequate and failing septic systems contaminate water with pathogens



ERODED SOIL WASHING TO STORM DRAINS AND CREEKS.

PHOTO: MICHAEL MULLEN



BMPs CAN DRAMATICALLY REDUCE EROSION AND STREAM SEDIMENTATION.



INADEQUATE BMPs CONTRIBUTE TO SOIL EROSION. PHOTOS: ADEM

Solutions to many environmental problems are achieved through Best Management Practices (BMPs), education, good planning, and enforcement. Specific BMPs for each land use activity may be obtained from the NRCS, Office of Surface Mining, Alabama Forestry Association, Alabama Cooperative Extension System and ADEM.

WATER POLICY, LAW AND CITIZEN INVOLVEMENT

There are many water policies and laws from various federal, state and local agencies that are sometimes difficult to understand. Virtually all water quality protection laws in Alabama stem from the federal Clean Water Act, passed by the U.S. Congress in 1972. Since that time the quality of our nation's waters has improved dramatically with cooperative effort by federal, state, tribal and local governments and the general public. Much cleanup work remains to be done, however.

The Clean Water Act is subdivided into many sections that influence Alabama's water. Three of the main sections are:



Section 319
Provides federal funds through the U.S. EPA to ADEM for educational and technical assistance and programs such as Alabama Water Watch and the Clean Water Partnerships.
(www.epa.gov/region4/water/nps/grants/index.htm)

Section 305
Requires an assessment of waterbodies every two years to determine whether designated uses are being met. The Biennial Water Quality Report to Congress, or the 305(b) Report, provides summary information about the quality of the state's waters.

Goose Shoals on Shoal Creek is a tributary of the Tennessee River in Lauderdale County, AL.

PHOTO: DAVE WERNEKE

Section 303
Charges states and tribes with setting specific water quality criteria and developing pollution control programs to meet them. Designated uses may include drinking water, recreation, aesthetics, irrigation, fishing, swimming or a combination of these and other activities.
Waterbodies that do not meet water quality standards for their designated water use classification are included in a 303(d) list (www.epa.gov/waters). EPA requires ADEM to develop total maximum daily loads (TMDLs) for each waterbody included on the 303(d) list. The TMDL is the maximum quantity of a pollutant that can enter a waterbody without adversely affecting the designated use classification of the waterbody.

Partnerships of local citizens, landowners, business, industry and governmental agencies have a high potential for restoring degraded habitats and protecting water quality.

Citizens can do much to protect their watershed by:

- ❖ Becoming aware of key water issues
- ❖ Neighbor-to-neighbor persuasion to reduce pollution
- ❖ Public outreach and education
- ❖ Participating in watershed-based protection plans, including the TMDL process
- ❖ Becoming part of a citizen group
- ❖ Being the “eyes and ears” for environmental changes and pollution
- ❖ Advocating policy changes and enforcement

The Alabama Clean Water Partnership (ACWP) was created in 1998 to coordinate stakeholders for the restoration and protection of river basins in accordance with the Clean Water Act. A resulting Watershed Management Plan will represent the diverse interests of all stakeholders. Citizens may contact ACWP or ADEM to get involved in the:

Tennessee River Basin Clean Water Partnership



Ducks, geese and herons are protected on land devoted to wildlife management in the Tennessee Basin.

PHOTO: GEORGE GREEN, <http://images.usace.army.mil/>

Many water-related citizen groups have formed within the Tennessee Basin. Several monitor water quality as Alabama Water Watch volunteers (marked with*). Although citizen groups come and go, most groups listed here have existed for several years and have significantly improved environmental education and protection.

- Academy for Science & Foreign Language**
- Bear Creek Water Watch**
- Cotaco School Environmental Club**
- Elk River Users Group*
- Flint River Action Team**
- Flint River Conservation Association**
- Fort Payne High School Science**
- Friends of Keel Mountain*
- Friends of Shoal Creek Nature Preserve*

- Friends of the Tennessee River*
- Lake Guntersville Watershed Group*
- Lawrence Countians for a Safe Environment*
- Limestone County RSVP**
- Muscle Shoals Parrot Head Club*
- North Alabama Sierra Club**
- North Sand Mountain School**
- Phi Theta Kappa - Calhoun Community College**
- RSVP of Marshall County**
- Sand Mountain Concerned Citizens*
- Shoals Environmental Alliance*
- Tennessee River Preservation Foundation*
- The Gorham's Bluff Institute**
- Scott Branch Water Watch**
- Three Springs School**



SWIMMER BRINGS AWARENESS TO TENNESSEE RIVER. *One simple action can inspire others to take responsibility for improvement.* ARTICLE: www.americanprofile.com

More Info

For further information about Alabama's waterways or how to get involved in protecting your watershed, contact:

Alabama Clean Water Partnership

205-266-6285 www.cleanwaterpartnership.org

Alabama Cooperative Extension System

334-844-4444 www.aces.edu

Alabama Department of Agriculture and Industries

334-240-7100 www.agi.alabama.gov

Alabama Department of Conservation and Natural Resources

334-242-3420 www.dcnr.alabama.gov

Alabama Department of Economic and Community Affairs

334-242-5694 www.adeca.alabama.gov

Alabama Department of Environmental Management

334-271-7700 www.adem.alabama.gov

Alabama Department of Industrial Relations

334-242-8990 www.dir.alabama.gov

Alabama Forestry Association

334-265-8733 www.alaforestry.org

Alabama Land Trust

256-782-3737 www.allandtrust.org

Alabama Soil and Water Conservation Committee

334-242-2620 www.swcc.alabama.gov

Alabama Surface Mining Commission

205-221-4130 www.surface-mining.alabama.gov

Alabama Water Watch

888-844-4785 www.alabamawaterwatch.org

Geological Survey of Alabama

205-349-2852 www.gsa.alabama.gov

Legacy, Inc.

800-240-5115 www.legacyenvd.com

National Agricultural Library Water Quality Information Center

(301) 504-5755 www.nal.usda.gov/wqic



In 1819, when Alabama entered the Union, its leaders designed a great seal that featured the state's waterways. In adopting this symbol they affirmed their belief that the future of Alabama lay with its rivers. It did, and it still does.

*Harvey Jackson, III
Rivers of History*

Natural Resources Conservation Service

334-887-4552 www.nrcs.usda.gov

The Nature Conservancy of Alabama

205-251-1155 <http://nature.org/states/alabama>

The Natural Heritage Program

334-834-4519 X29 www.natureserve.org/nhp/us/al

Northwest Alabama Resource Conservation and Development Council

256-383-1446 www.rcdnet.org

The Water Course (Alabama Power Company)

800-280-4442

Tennessee Valley Authority

256-386-2601 <http://tva.com>

Tennessee Valley Resource Conservation and Development Council

256-353-6146 www.rcdnet.org

U.S. Environmental Protection Agency (Region 4)

404-562-8357 www.epa.gov

U.S. Fish and Wildlife Service

251-441-5181 <http://daphne.fws.gov>

U.S. Geological Survey

334-213-2332 www.usgs.gov

