

**Citizen's Guide
to Water Quality
in the
Yazoo River Basin**

Contents

Water—Our Precious Natural Resource	3
Mississippi’s Water Resources	4
Welcome to the Yazoo River Basin	6
Special Plants and Animals in the Yazoo	10
Land Use and Its Effects on Water Quality	12
Water Quality in the Yazoo River Basin	16
Mississippi’s Basin Management Approach	21
Priority Watersheds	22
What Agencies and Organizations Are Working to Improve Water Quality?	30
Sustaining Our Environmental Resources and Economic Development	31

About this Guide

Mississippi’s Citizen Guides to Water Quality are intended to inform you about:

- Mississippi’s abundant water resources,
- Natural features, human activities, and water quality in a particular river basin,
- The importance of a healthy environment to a strong economy,
- Watersheds targeted for water quality restoration and protection activities,
- How to participate in protecting or restoring water quality, and
- Who to contact for more information.

It is hoped that these guides will enhance the dialogue between citizens and key decision makers to help us improve our management of Mississippi’s precious water resources. We encourage you to invest in this effort—read this guide and get involved in restoring and protecting our water resources for future generations.

Acknowledgments

This guide is a product of the Yazoo River Basin Team, consisting of representatives from 29 state and federal agencies, and stakeholder organizations (see page 30 of this document for a complete listing). The lead agency for developing, distributing, and funding this guide is the Mississippi Department of Environmental Quality (MDEQ). This effort was completed in 2006 under a Clean Water Act Section 319 Nonpoint Source grant, and included publication services from Tetra Tech, Inc.

Copies of this guide may be obtained by contacting:

Information Center
**Mississippi Department of
Environmental Quality**
PO Box 10385
Jackson, MS 39289-0385
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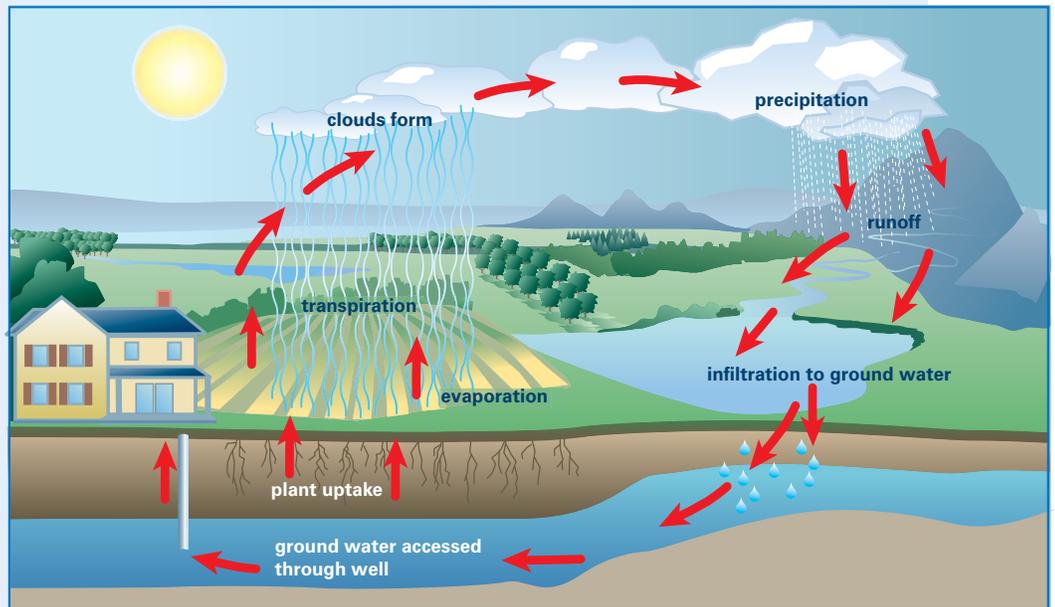
or by accessing MDEQ’s website at:
www.deq.state.ms.us

Water

Our Precious Natural Resource

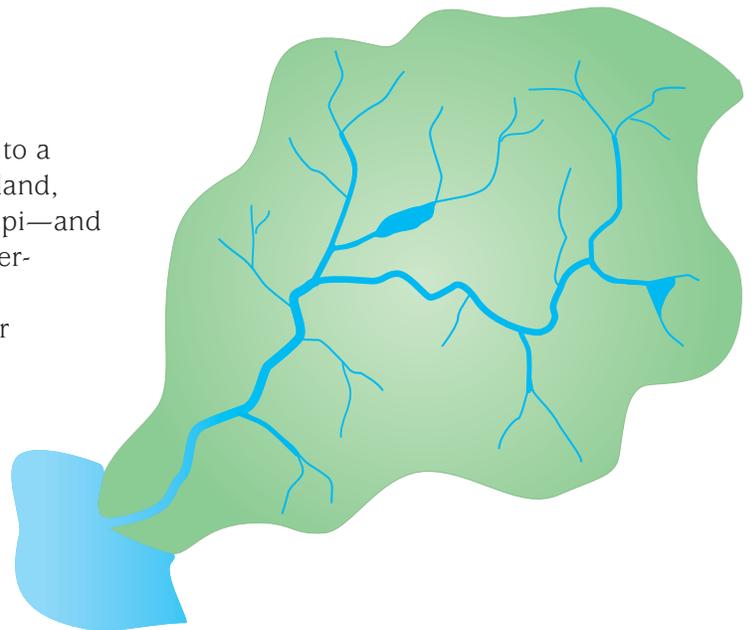
The water cycle.

Nature has its own recycling program. You see it in the fog, cloud, and rain. When rain falls to the earth, it sinks into the ground (infiltration), returns to the air (evaporation and transpiration) or flows over the land—called stormwater runoff. Stormwater runoff carries dissolved and suspended particles, such as chemicals and sediment. So the way we use the land directly affects both the quality and the quantity of water in our streams and lakes.



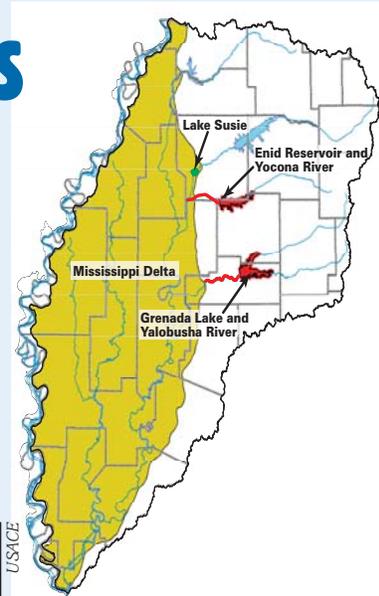
What is a watershed?

We all live in a watershed—the area that drains to a common waterway, such as a stream, lake, wetland, estuary or large river like the Yazoo or Mississippi—and our individual actions can directly affect it. Watersheds come in all shapes and sizes. Very large watersheds are often called river basins. Smaller watersheds nest within large river basins. For example, the Abiaca Creek, Hickahala Creek, and Bee Lake watersheds are all within the Yazoo River Basin. Watersheds can cross county, state, and national boundaries. No matter where you are, you're in a watershed!



Mississippi's water resources

- Mississippi has 10 major river basins with 86,000 miles of streams.
- Most of our streams (63%) flow only during rainy periods, and are called intermittent streams.
- The rest of our streams flow year round, with a baseflow fed by ground water.
- The state is covered with hundreds of lakes, reservoirs, and ponds that provide wonderful recreation, as well as irrigation for farmers and habitat for fish and wildlife.
- There are over 2,400 miles of man-made ditches and canals used for drainage and transportation, such as the 164-mile Tennessee-Tombigbee Waterway.



Fishing at John Stennis Lake, Columbus, MS



Sailing on Jamie Whitten Lake



Piny Grove Beach on Jamie Whitten Lake, Dennis, MS



Chunky River at Dunns Falls



Polypipe irrigation



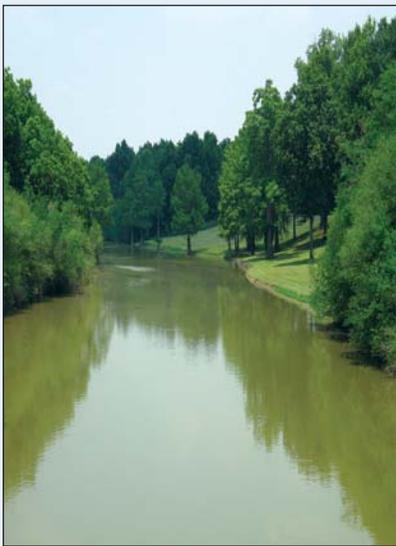
Aberdeen Lock and Dam on the Tennessee-Tombigbee Waterway



USDA NRCS

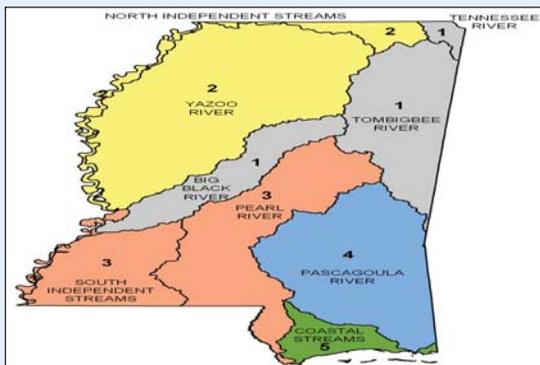
Our economy and quality of life depend on this network of waterways.

Remnant of a cypress/tupelo wetland in an oxbow in central Mississippi



Cypress swamp in the Tenn-Tom Waterway

- Wetlands cover about 2.7 million acres, providing habitat for wildlife and natural filters for cleaning stormwater runoff on its way downstream.
- Most of the water in our streams and rivers flows to some point along Mississippi's 86-mile coastline. Many flow into estuarine embayments—St. Louis Bay, Back Bay of Biloxi, and Pascagoula Bay—before entering the Mississippi Sound. Those waters then flow past our barrier islands out into the Gulf of Mexico. Other waters, like the Yazoo River, flow into the Mississippi River which discharges directly into the Gulf of Mexico south of New Orleans. In total, Mississippi's estuarine waters cover over 750 square miles.



Gulfport Harbor

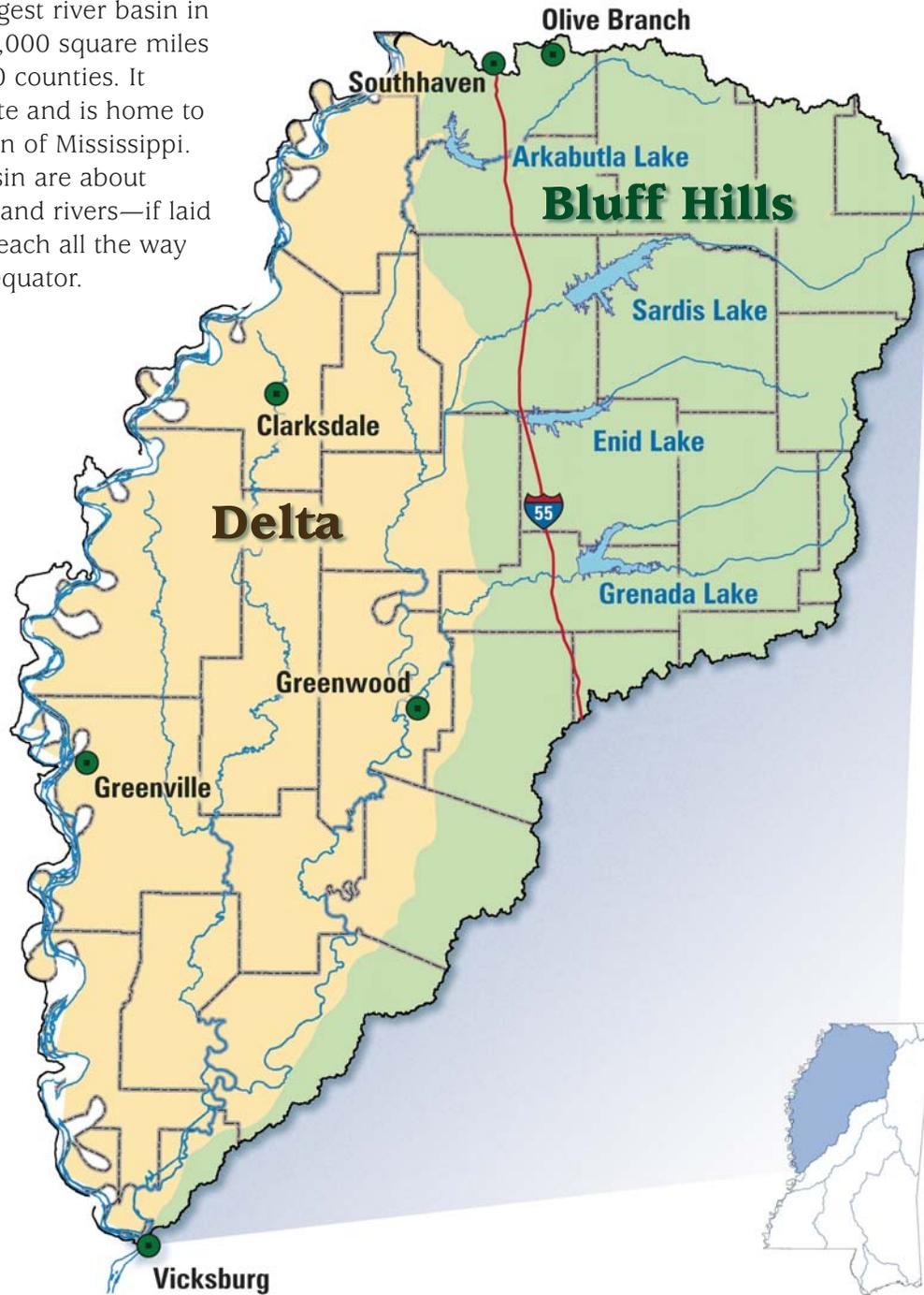


Mississippi River Bridge at Vicksburg

Welcome

to the Yazoo River Basin

The Yazoo is the largest river basin in Mississippi, with over 13,000 square miles draining all or parts of 30 counties. It makes up 30% of the state and is home to one-fifth of the population of Mississippi. Winding through this basin are about 25,000 miles of streams and rivers—if laid end to end, they would reach all the way around the Earth at the equator.





Grenada Tourism Commission, Grenada, MS

Fishing rodeo at the "Thunder on the Water" Festival

Well-Known Fishing and Recreation Areas

Many of the lakes in the Yazoo Basin are a fisherman's paradise, and offer all around fun for the whole family. One well-known recreation area is Grenada Lake, on the Yalobusha and Skuna rivers—home to the "Thunder on Water" Festival held annually in June. Enid Lake has lots of equestrian trails, swimming beaches, and boat ramps, and Payne Cossar State Park. Enid and Grenada lakes draw fishermen from miles around to catch large mouth bass and crappie. Arkabutla Lake is known for its abundant crappie, camping, swimming, and sailing. Lake Chotard and Tunica Lake have bluegill breems and crappie. And if you want catfish along with your crappie, go to Lake Washington!



Grenada Lake

The Yazoo Basin is primarily a rural area; more than 60% of the basin area is used for farming. The basin has two distinct regions, each with its own story about water quality:

- **Bluff Hills**—the hilly upland area where the streams originate among lush oak and hickory forests, and where pastures dominate the rural landscape. There are four major reservoirs in this portion of the basin important for recreation and flood control—Sardis, Grenada, Arkabutla, and Enid.
- **The Delta**—the flat lowland area between the Yazoo and Mississippi rivers characterized by slow moving water and an extensive system of oxbow lakes. This highly productive agricultural region is known for its cotton, corn, soybeans, rice, and catfish.



Crop dusting, Holmes County

The Yazoo River Basin



Port of Vicksburg on Yazoo River

Yazoo Communities



Photo courtesy of Oxford Tourism Council

Oxford

The City of Oxford is home to the University of Mississippi, which opened in 1848. With a year-round population of 12,000 people, the City draws tourists to the Oxford Conference for the Book, Oxford Film Festival, Ole Miss and its sporting events, as well as the City's popular downtown square. Recently, Oxford has become a popular retirement area because of its cultural events, reasonable cost of living, fine restaurants, and other amenities important to retirees.



CSA Cairo, Vicksburg National Military Park

Vicksburg National Military Park

The park was established in 1899 to commemorate one of the most decisive battles in the American Civil War. Located high on a bluff, Vicksburg, “the Gibraltar of the Confederacy,” was the fortress guarding the Mississippi River. The Vicksburg Campaign began March 29, 1863. It went on to include battles at Port Gibson, Raymond, Jackson, Champion Hill, and the Big Black River, and 47 days of Union siege operations against the Confederate forces defending the City of Vicksburg. Its surrender on July 4, 1863 divided the South and gave the North undisputed control over the Mississippi River. The battlefield has been preserved in excellent condition as part of our national heritage.

Yazoo Communities

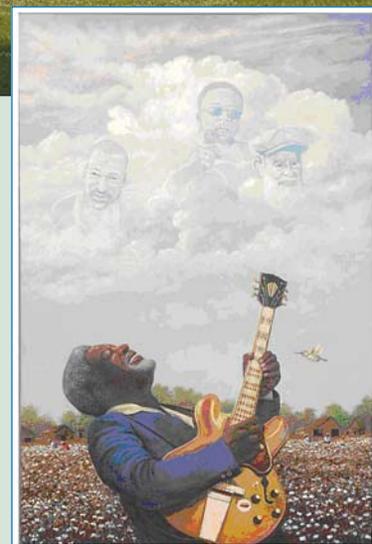
Greenville

Greenville, in Washington County, is the Delta’s largest city (about 42,000 residents). As Mississippi’s largest river port, Greenville is known for its shipping and towboat industry, and also has a diverse manufacturing economy. Two nearby universities, Delta State and Mississippi Valley State, provide opportunities for higher education. Lake Ferguson is home to dockside gaming facilities and is also popular for sport fishing. *Sports Afield* magazine named Greenville as one of the nation’s most popular outdoor communities. The Delta Blues and Heritage Festival in September draws people from around the world to pay tribute to a unique style of music born in the Mississippi Delta.



Belmont Plantation

Greenville Washington County CVB



Mississippi Delta Blues and Heritage Festival

Special Plants and Animals in the Yazoo

The Yazoo River Basin provides homes to several endangered plants and animals. Good water quality and protection of habitat are essential to support these species.

Why do some plants and animals become rare or endangered? In most cases, they have special needs that compete with our uses of the land. Black bears need large forests, and agriculture and development limit the area where they can live. Least terns and pallid sturgeons are both affected by the hydro-modification of the Mississippi River. Some, like the bald eagle, are susceptible to toxic chemicals. Others, like the pondberry, grow in the lowland forests of the Delta and have become rare as these forestlands were converted to agricultural lands. As we learn what leads to the decline of certain species, we can take the necessary steps to help restore and sustain them.



USFWS

Least Tern, *Sterna antillarum*

These birds nest on coastal beaches and sandbars of large rivers. In Mississippi, they live along the Gulf Coast and along the banks of the Mississippi River. They hover about 40 feet over the water and dive into the water to capture small fish. Least terns are endangered along the Mississippi River because their habitat is disturbed by hydromodification and recreational use of sandbars.

Bald Eagle, *Haliaeetus leucocephalus*

This majestic animal is our national bird, and became endangered due to the effects of DDT. After DDT was banned in the U.S., the bald eagle has gradually recovered. It is a huge bird, with a wing-span of over six feet! Bald eagles live near large bodies of water such as the Mississippi River and large lakes in the Yazoo River Basin. They have incredibly sharp vision and swoop down and snatch fish out of the water with their powerful talons. They also eat reptiles, small mammals, and waterfowl. Protection of our national bird should be a priority for all of us.



Pondberry, *Lindera melissifolia*

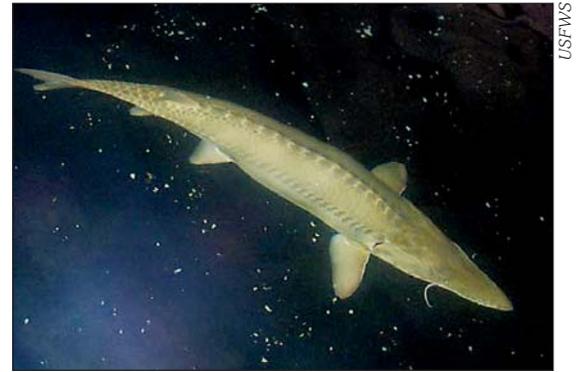
This shrub, which can attain a height of six feet, is found in isolated locations within seasonally flooded forests of the southeastern United States. In the Yazoo River Basin, it is found in just a few locations, most notably in the Delta National Forest. It reproduces mainly by growing runners in the soil that root and produce new stems. This plant was listed as endangered primarily due to the clearing of its forested habitat for other uses. The population in the Delta National Forest is being studied by scientists in order to learn how to maintain and enhance pondberry to insure its long-term survival.



USFWS

Pallid sturgeon, *Scaphirhynchus albus*

Little is known about this big, strange-looking fish. It lives in the main channels of large rivers, and is found primarily in the Mississippi and Missouri rivers. The pallid sturgeon has a flattened shovel-shaped nose, boney plates on its body, and can grow to six feet in length! Its decline and listing as an endangered species was likely due to loss of spawning habitat, changes in food sources, and competition from shovel-nosed sturgeon. There is one report of pallid sturgeon in the Yazoo River Basin. Scientists are studying the fish to better understand how to protect it.



USFWS



USFWS

Black Bear, *Ursus americanus luteolus*

While the black bear is common throughout much of the U.S., it is very rare in Mississippi—only 25 to 50 black bears are believed to be here. The Louisiana Black Bear is an endangered species found in the Yazoo River Basin south of US Highway 82, while the American Black Bear is a protected species in Mississippi found north of Highway 82. Temperatures in Mississippi are warm enough that black bears do not truly hibernate, but become inactive for short periods of time. In the Yazoo River Basin, most bear sightings have been in lowland forests near the Mississippi River. Black bears like a variety of foods, such as fruits, nuts, fish, eggs, and insects. They usually use brush piles on high ground or hollows in big trees for their winter dens.

Southern Redbelly Dace, *Phoxinus erthrogaster*

Breeding males of this minnow develop bright red color on their undersides, thus earning their name. The Yazoo River Basin has two isolated populations that could be threatened by habitat changes such as erosion and removal of stream bank trees.



William Roston

Other Special Animal Species

Gulf Sturgeon, *Acipenser oxyrinchus desotoi*

A fish species listed federally as threatened, with one documented occurrence in the Delta.

Piebald Madtom, *Noturus gladiator*

A fish species listed by the State as vulnerable.

Red-Cockaded Woodpecker, *Picoides borealis*

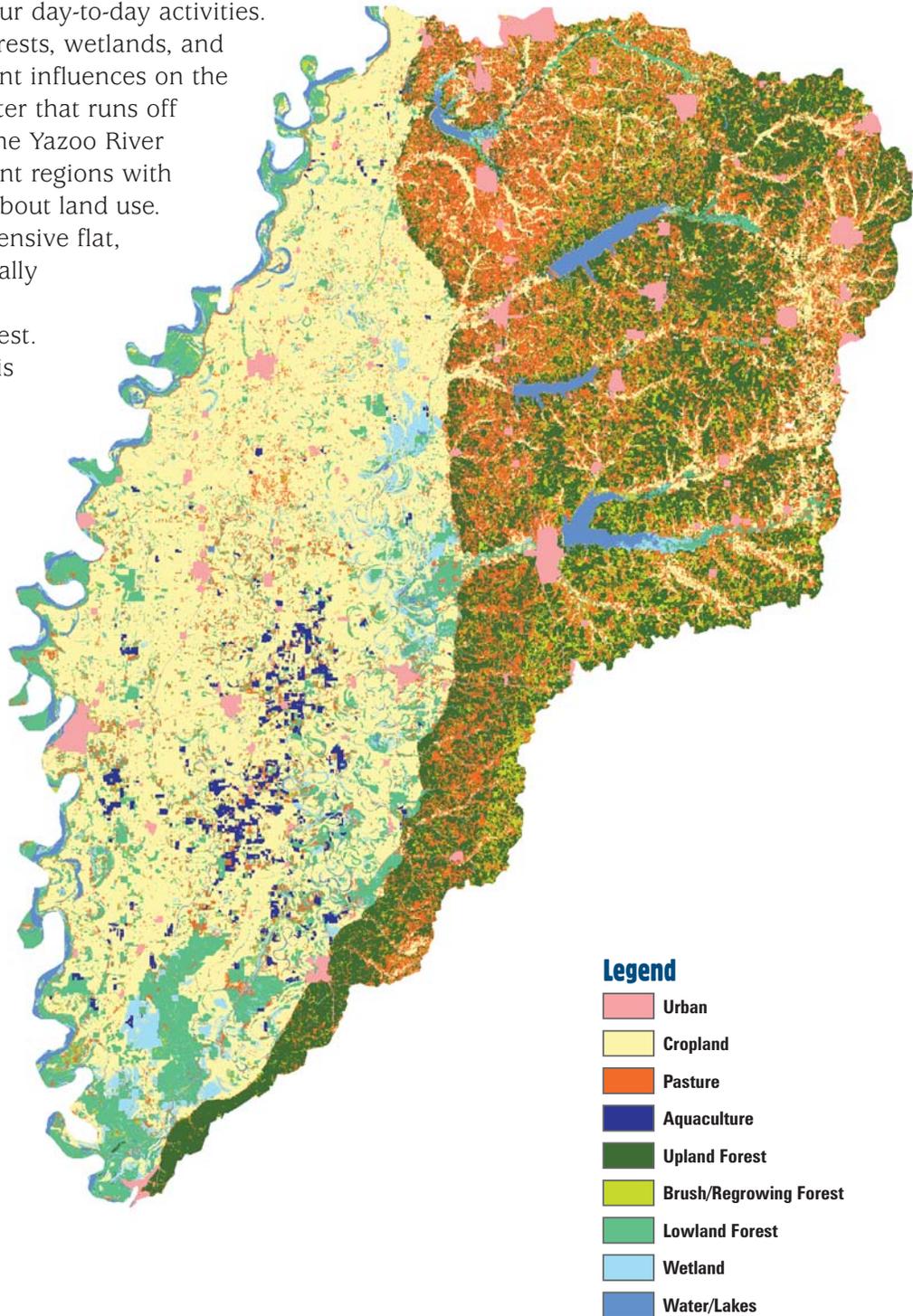
This bird used to thrive throughout the southeastern United States.

Bewick's Wren, *Thryomanes bewickii*

A state endangered bird species.

Land Use and Its Effects on Water Quality in the Yazoo River Basin

Our water is affected by our day-to-day activities. Urban areas, highways, forests, wetlands, and agriculture all have different influences on the amount and quality of water that runs off into streams and rivers. The Yazoo River Basin has two very different regions with their own unique stories about land use. The Delta occupies an extensive flat, low-lying floodplain generally between the Yazoo and Mississippi rivers to the west. The Bluff Hills to the east is made up of hilly upland areas where most of the rivers originate.



Agriculture/Aquaculture

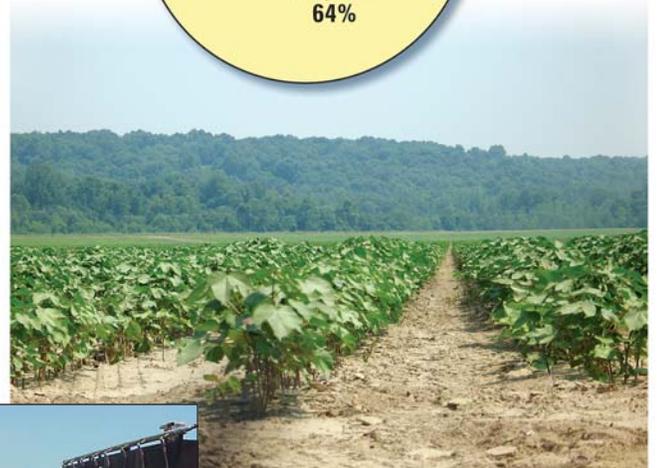
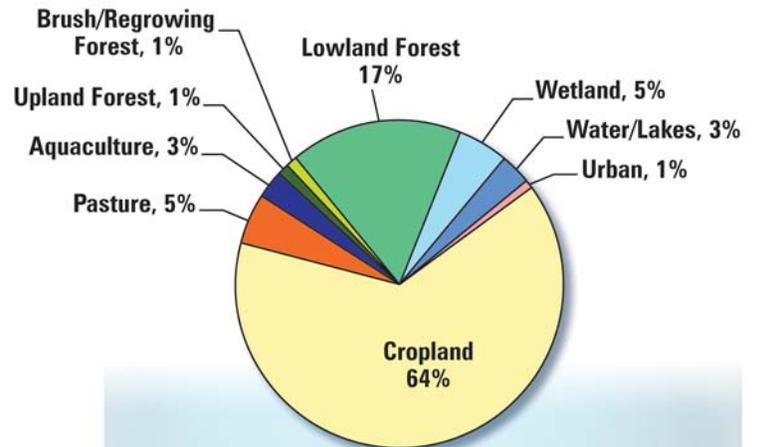
Most of the land in the Yazoo is used for farming. The Delta holds some of the world's most fertile soil, supporting crops of soybeans, cotton, corn, and rice. In recent years, state and federal agencies have stressed the need for soil conservation and good farm practices, such as no till farming, strategic tree planting, and vegetated stream buffers, which can keep the topsoil in place and sediment out of the streams. Many of these same practices help reduce the runoff of nutrients from fertilizers and harmful pesticides or other farm chemicals that can attach to the sediment and can be carried by rain into our streams, rivers, and lakes.

In the Delta, with its extensive row cropland, many irrigation, drainage, and flood control structures have been built. These long-used practices can alter the natural stream flow—a flow critical for everyday support of aquatic life. Even use of ground water for irrigation is connected to low stream flows because it can deplete the stream's baseflow (or stream flow when it's not raining).

If you enjoy catfish, it probably came from the Delta. Catfish farming now covers 135 square miles of the Delta, and is concentrated in its central portion. Like cropland, it also needs proper management to keep nutrients and organic matter from entering streams and depleting dissolved oxygen.

In the Bluff Hills region, livestock and pastureland form the backbone of the rural economy, with farms totaling over 200,000 head of cattle. One source of stress to water quality in the region occurs when cows graze near streams; the stream banks and channels often become unstable and erode. Portions of the downstream

Delta Region

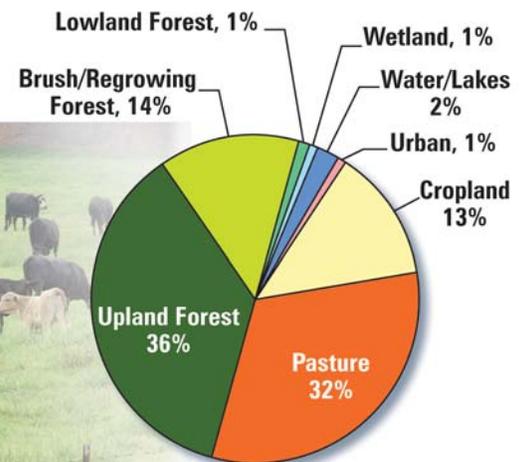


Eagle Bend Road-Highway 3



Harvesting catfish

Bluff Hills Region



Yazoo River Basin cattle ranch



Northern end of
Lake Washington



Bluff Hills meet the Delta

channels subsequently fill with sediment, which can affect habitat for fish and other aquatic life. Additionally, nutrients and bacteria from the animal wastes can get into the streams causing low dissolved oxygen levels and other water quality problems. As you will see in the section on Priority Watersheds, our Basin Team and the farming community are already at work on these problem areas, using pollutant reduction best management practices, fencing to limit cattle access to streams, improved stream crossings, prescribed grazing, and other good management measures.

Forests

The history of the Delta's agriculture is linked to its history of forests. Once covered with oak, gum, hickory and cypress forests and swamps, much of the Delta's lands have been cleared and drained to support row crop agriculture. The lowland forests that remain in the Delta, also called "bottomland hardwood forests," are found in river floodplains.



Delta Wildlife

Tupelo
gum tree
swamp

Wetlands make up 1% of the Bluff Hills Region, and 5% of the Delta Region. The national and Mississippi wetland management goal is no net loss. Why? Because wetlands are natural sponges and filters that trap and transform pollutants, store and infiltrate rainwater, and help replenish ground water and streamflow. Plus, they provide a home to diverse birds, animals, and plants. The U.S. Army Corps of Engineers manages a permitting program (called 404 permits) to mitigate impacts on wetlands and prevent their loss. The permitting program protects much more area in the Yazoo River Basin than the percentages listed above, especially in the Delta where many lowland forest areas are also classified as wetlands.

These forests, which now cover almost 17% of the Delta, are subject to seasonal flooding as well as periodic droughts. Because of where many of these lowland forests are located, they are also considered to be wetlands.

The Bluff Hills, on the other hand, have extensive upland forest areas—most of the Yazoo River Basin's forests are found here. Forestry is one of the major industries of the Bluff Hills. Loblolly pine, shortleaf pine, oak, and other trees are harvested to make lumber and wood pulp products. Regrowing forests (commonly referred to as cut-over) are so extensive, they make up almost one-third of the forest land in the Bluff Hills. Erosion and runoff from unprotected clearcuts can load sediment into the streams, destabilize stream channels, and substantially reduce or eliminate aquatic habitat. MDEQ and the Mississippi Forestry Commission offer guidance for

road building and tree harvesting that protects water quality such as improved stream crossings, stream buffers, and select cutting.

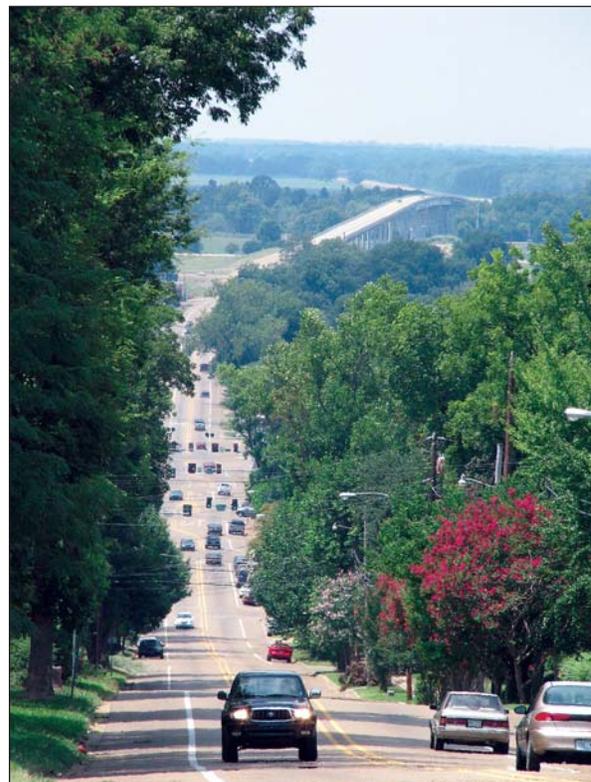
Cities and Suburbs

Urban areas make up a small portion of the Yazoo River Basin. Population in the basin was stable between 1950 and 1990, but rapid growth is now occurring in the northern counties near Memphis, TN. DeSoto County alone has nearly doubled its population between 1990 and 2004, adding over 58,000 residents.

Where urbanization has occurred or is occurring, it can have a big affect on water quality. During highway and building construction, land disturbance produces sedimentation and erosion if the site is not properly managed. Once construction is complete, stormwater runoff from streets and parking lots can increase pollution in the streams as well as the volume and velocity of stream flow, causing scouring, erosion, and sedimentation. The runoff frequently contains increased amounts of pesticides, herbicides, and nutrients from fertilizers applied to managed lawns and other landscaping. Another source of nutrients is inadequate and failing wastewater treatment from septic systems. To help curb these stormwater impacts on water quality, the State has recently begun a regulatory program for urban areas and requires Phase II NPDES Stormwater Permits (for a description of the MDEQ permitting program, see the section on Water Quality).

Cities and towns bring industry, and these industries often generate pollutants as by-products such as toxic chemicals and heavy metals. These have the potential to negatively impact our streams and air. Mercury and other pollutants discharged into the air can travel many miles before settling out onto the ground and washing into the Yazoo Basin's streams and lakes. Both air and water discharges are regulated by MDEQ through permits to limit them to acceptable levels.

Nitrogen and phosphorus are essential nutrients for plant and animal growth. However, excessive amounts can stimulate harmful blooms of algae and other aquatic plants in water bodies. These blooms can make lakes and rivers unsuitable for fishing, swimming and boating.



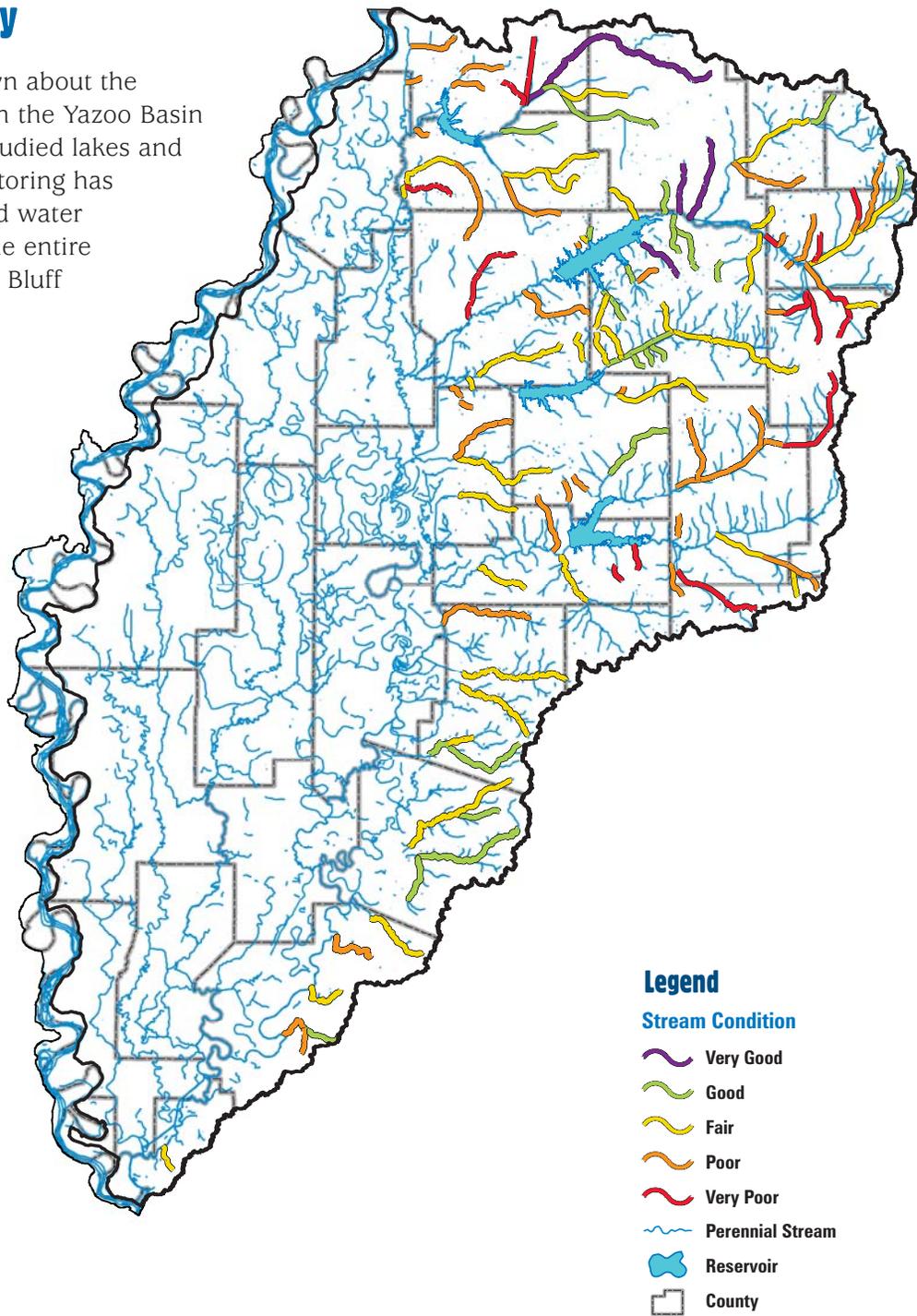
Broadway Street, Yazoo City

Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

Water Quality in the Yazoo River Basin

Surface Water Quality

In the past, what was known about the condition of water bodies in the Yazoo Basin was limited to a few well-studied lakes and streams. More recent monitoring has helped us better understand water quality conditions across the entire basin, and especially in the Bluff Hills region.



Of streams monitored in the Bluff Hills region, 23% are rated good or very good and adequately support aquatic life (from aquatic insects to fish). Another 36% are rated fair. They have aquatic life that is only somewhat impacted by pollution. Of major concern are the 41% of streams in poor or very poor condition, where the aquatic life is significantly impacted by pollution. Pollutants include organic and nutrient enrichment from animal wastes and failing septic systems, bacteria from those same sources, and sediment from eroding lands (pasture, timber operations, new development).

In the Delta, experts are currently determining the best way to monitor water quality conditions. Even though general water quality conditions across the Delta have yet to be fully determined, fish tissue has been analyzed for toxic chemicals. Based on the results, a Delta-wide fish consumption advisory recommends that people limit the amount of carp, buffalo, gar, and catfish (larger than 22 inches) they eat to no more than two meals per month. The advisory includes all natural waters including lakes, rivers, bayous and sloughs. In addition, the advisory recommends that people not eat any buffalo fish from Roebuck Lake in Leflore County. Commercial fishing is also banned

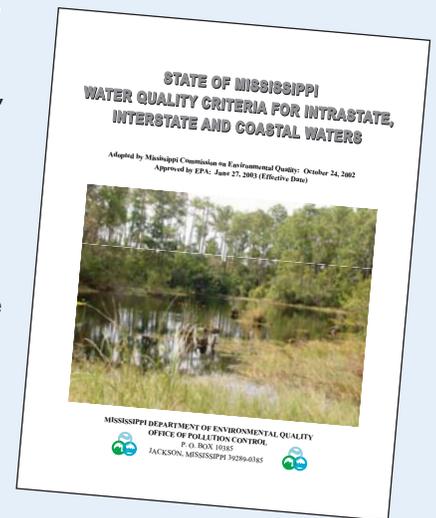


Roebuck Lake

Surface Water Quality Standards

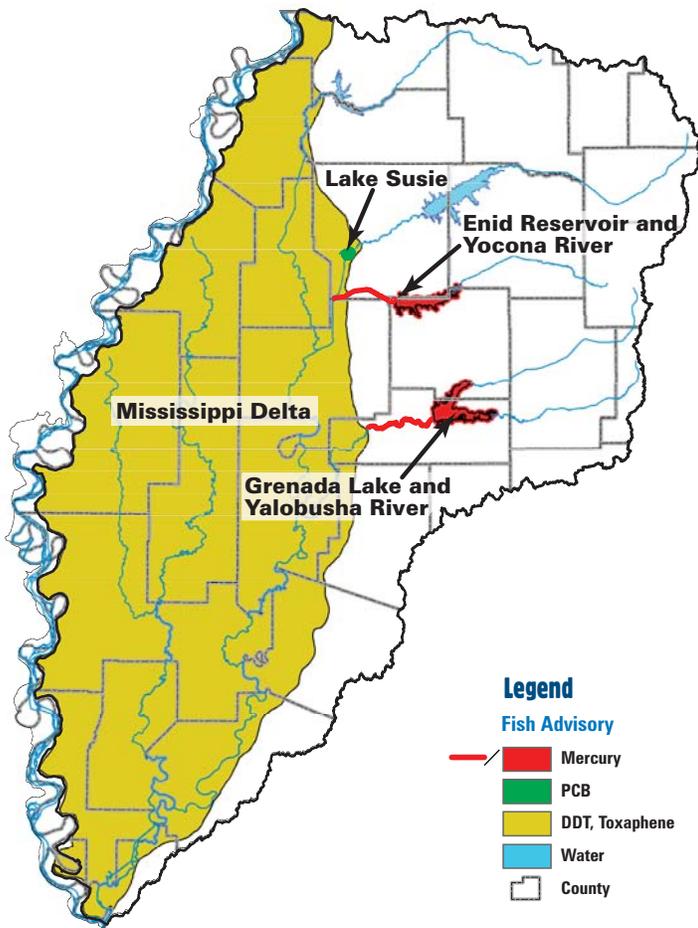
Mississippi water quality standards establish the goals for protecting and maintaining the quality of our surface waters (streams, lakes, and estuaries) so that they will support their intended or designated uses. In Mississippi, **designated uses** are fish and wildlife support, public water supply, recreation, and shellfish harvesting. With the exception of fish or wildlife support, not all uses apply to each water body—rather each is assigned specific uses.

Criteria are set for a large number of water quality parameters in order to protect each use. Monitoring is then performed to compare conditions in individual streams, lakes or estuaries to the criteria to assess whether the waters are supporting their designated uses. The criteria are also utilized to set limits on the amount of pollution that can be put into a water body while still protecting its uses.



How can I learn more?

For more information on Mississippi's water quality standards, visit www.deq.state.ms.us or contact MDEQ's Watershed Management Branch.



from Roebuck Lake. Likewise, two rivers and several other lakes in the basin have specific consumption advisories or fishing bans.

The advisory does not apply to the Mississippi River or the oxbow lakes located west of the Mississippi River levee. The advisory also does not apply to bass, bream, crappie, freshwater drum and smaller catfish, nor does it apply to farm-raised catfish. All of these fish are safe to eat.

Fish consumption advisories for the Yazoo River Basin are shown on the adjacent map and listed in Table 1.

MDEQ and other agencies have recently conducted extensive water quality monitoring on a number of lakes in the basin. Results are still being tabulated and have not yet been released.

How can I learn more?

For more information on water quality in the basin, see the state's 2004 Water Quality Assessment at www.mdeq.state.ms.us or contact MDEQ's Field Services Division.

Table 1. Yazoo Basin Fish Consumption Advisories

Water Body	Chemical	Date Issued	Action
Lake Susie, Oxbow Lake of Old Tallahatchie River in Panola County west of Batesville	PCB's	Nov. 1989	Consumption Advisory All Species Commercial Fishing Ban
Enid Reservoir	Mercury	May 1995	Limit Consumption Advisory for largemouth bass and large catfish (>27 in.)*
Yocona River from Enid Reservoir downstream to the confluence with the Tallahatchie River	Mercury	Sept. 1996	Limit Consumption Advisory for largemouth bass and large catfish (>27 in.)*
Grenada Lake and Yalobusha River from the dam downstream to Holcomb	Mercury	June 2001	Limit Consumption Advisory for largemouth bass and large catfish (>27 in.)*
Mississippi Delta—all waters from the mainline Mississippi River Levee on the West to the Bluff Hills on the East	DDT, Toxaphene	June 2001	Limit Consumption Advisory for carp, buffalo, gar, and large catfish (>22 in.)**
Roebuck Lake, LeFlore County	DDT, Toxaphene	June 2001	Limit Consumption Advisory for carp, gar, and large catfish (>22 in.)** No Consumption of Buffalo Commercial Fishing Ban
Yazoo National Wildlife Refuge (all waters)	DDT, Toxaphene	1975	Closed to fishing***

* The Mississippi State Health Department recommends that people limit the amount of bass and large catfish that they eat from these areas because of high levels of mercury in the fish. Children under seven and women of child bearing age should eat no more than one meal of these fish every two months. Other adults should eat no more than one meal of these fish every two weeks.

** The Mississippi State Health Department recommends that people limit their consumption of these fish to no more than one meal every two weeks.

*** Precautionary advisory issued by U.S. Fish and Wildlife Service.

Ground Water Protection

Ground water supplies all of the drinking water in the Yazoo River Basin and a good portion of the water used for irrigation. There are more than 15,000 irrigation and fish culture wells located in the Delta. The water used for over 95% of the irrigation and 100% of the fish culture is derived from the shallow Mississippi River alluvial aquifer (MRVA). Estimated ground water usage from the MRVA averages approximately 1.3 to 1.5 billion gallons per day.

Drinking water resources are protected by the federal Safe Drinking Water Act (SDWA). The SDWA establishes safe drinking water criteria (referred to as maximum contaminant levels or MCLs) and it requires source water assessments. Under this program, the level of protection of drinking water resources is evaluated.

The public drinking water wells in the Yazoo Basin are deep and draw from aquifers protected naturally by thick layers of clay. Likewise, the MRVA is overlain with a clay layer that protects it from any significant impacts. MDEQ has sampled 657 water wells in the Yazoo Basin. Of this number, 505 were irrigation and fish culture wells pumping from the MRVA and 152 were from deeper drinking water wells. Analyses of samples included 100 widely-used pesticides and



Center pivot irrigation

various other constituents including volatile organic compounds and inorganic compounds. No chemicals that exceeded Primary Drinking Water Standards (MCLs) established by EPA were detected. Although ground water is generally of good quality in the basin, natural coloration occurs in certain areas of the region.

How can I learn more?

For more information on ground water protection, contact Charlie Smith with the MDEQ Office of Land and Water Resources, Water Resources Management Division, 601-961-5395 or visit the MDEQ website at www.deq.state.ms.us.

As authorized by the federal Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating “*point sources*” that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In Mississippi, the NPDES permit program is administered by MDEQ. Since its introduction in the 1970s, the NPDES permit program is responsible for significant improvements to our Nation’s and Mississippi’s water quality.

How can I learn more?

For more information on NPDES Permitting, contact Harry Wilson with the MDEQ Office of Pollution Control, Environmental Permits Division, 601-961-5190 or visit the MDEQ website at www.deq.state.ms.us.

TMDLs

Total Maximum Daily Loads, TMDLs, are pollution budgets.

A TMDL determines how much of a pollutant can be present in a stream, river, or lake without affecting aquatic life or public health. TMDLs have been developed for 165 streams, rivers, and lakes in the Yazoo River Basin. Most of these TMDLs have estimated the amount of sediments, persistent pesticides or bacteria entering the waters and how much these pollutants should be reduced to restore healthy conditions. Rural and urban communities will need to work in partnership with resource management agencies to maintain and even restore the water quality necessary to support aquatic life and safe recreation in these waters. Table 2 provides a summary of completed TMDLs. An additional 385 TMDLs will be developed by 2008 for the water bodies remaining on the state's impaired waters list.

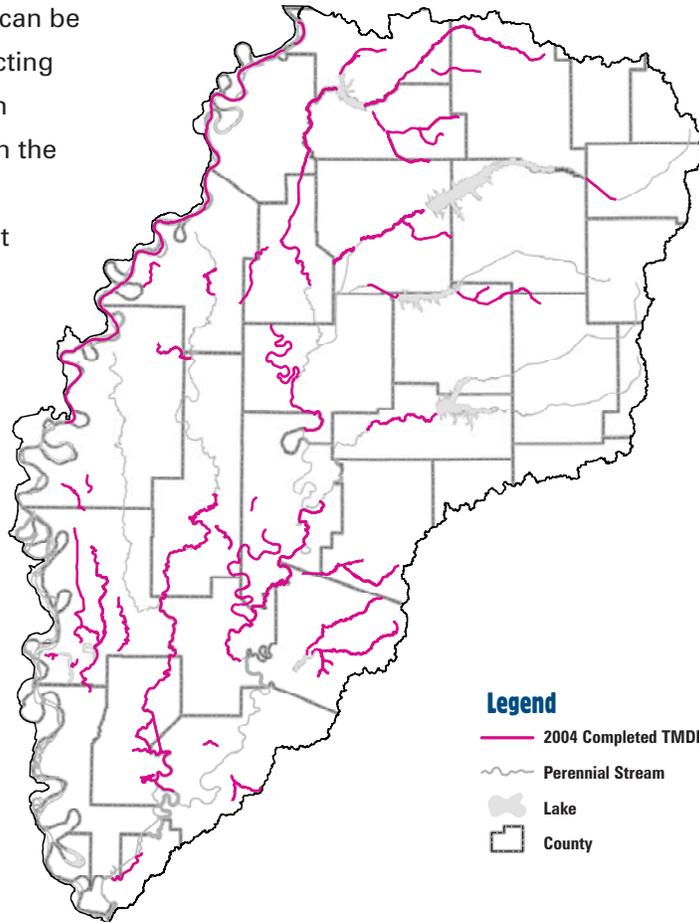


Table 2. Yazoo River Basin TMDL Summary

	TMDLs Completed	TMDLs Needed by December 2007		
		Monitored	Evaluated	Total
Biological Impairment	6	50	0	50
Mercury	2	0	1	1
Metals (Aluminum, Copper, and Lead)	0	0	1	1
Miscellaneous	4	0	5	5
Nutrients	34	0	83	83
Organic Enrichment/Low DO	28	0	64	64
Pathogens	41	3	5	8
Pesticides (including DDT and Toxaphene)	19	0	87	87
Sediment/Siltation	30	1	83	84
Toxicity (Total Toxics and Unknown Toxicity)	1	0	2	2
Total	165	54	331	385

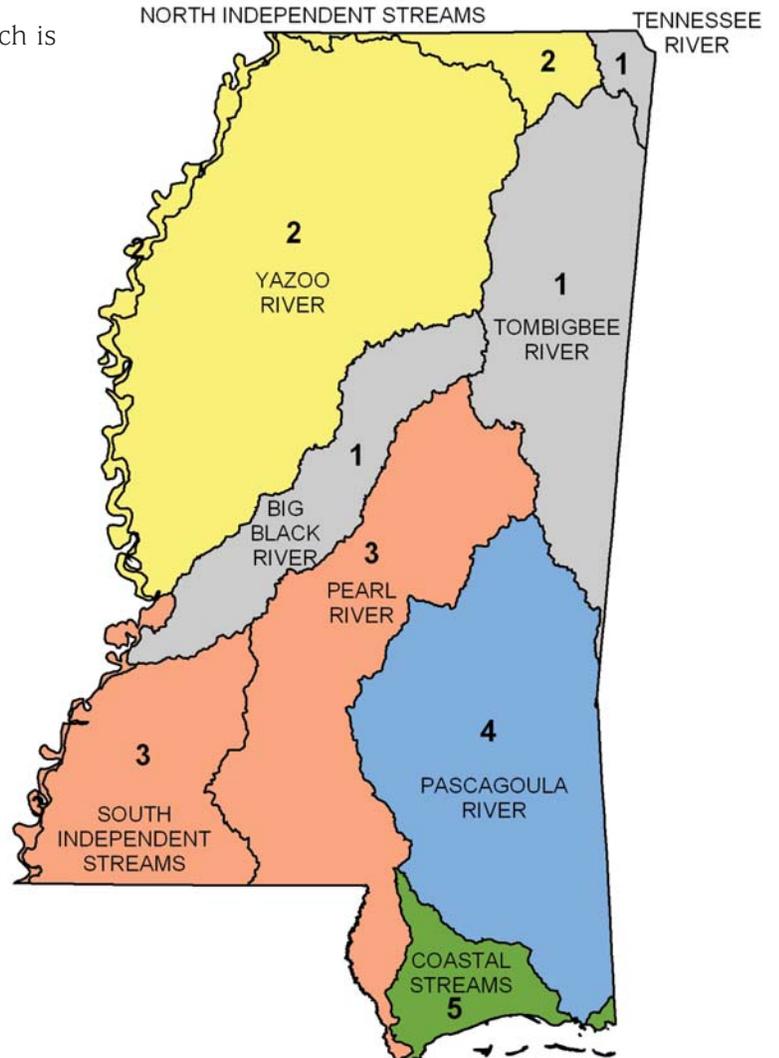
*Miscellaneous: Cause Unknown, Oil and Grease, PCBs, pH, and Salinity/TDS/Chlorides

How can I learn more?

For more information on TMDLs, contact Greg Jackson with the MDEQ Office of Pollution Control, Surface Water Division, 601-961-5098 or visit the MDEQ website at www.deq.state.ms.us.

Mississippi's Basin Management Approach

The mission of the Basin Management Approach is to foster stewardship of Mississippi's water resources through collaborative watershed planning, education, protection, and restoration initiatives. To accomplish this mission, Mississippi's 10 major river basins have been organized into five basin groups (see map inset). Each basin group has a Basin Team of state and federal agencies and local organizations. This provides the opportunity for multiple levels of government and local stakeholders to coordinate their efforts. Together, Basin Team members help assess water quality, determine causes and sources of problems, and by consensus prioritize watersheds for water quality restoration and protection activities. The Basin Management Approach also encourages and provides the opportunity for Basin Team members to leverage resources to address prioritized watersheds.



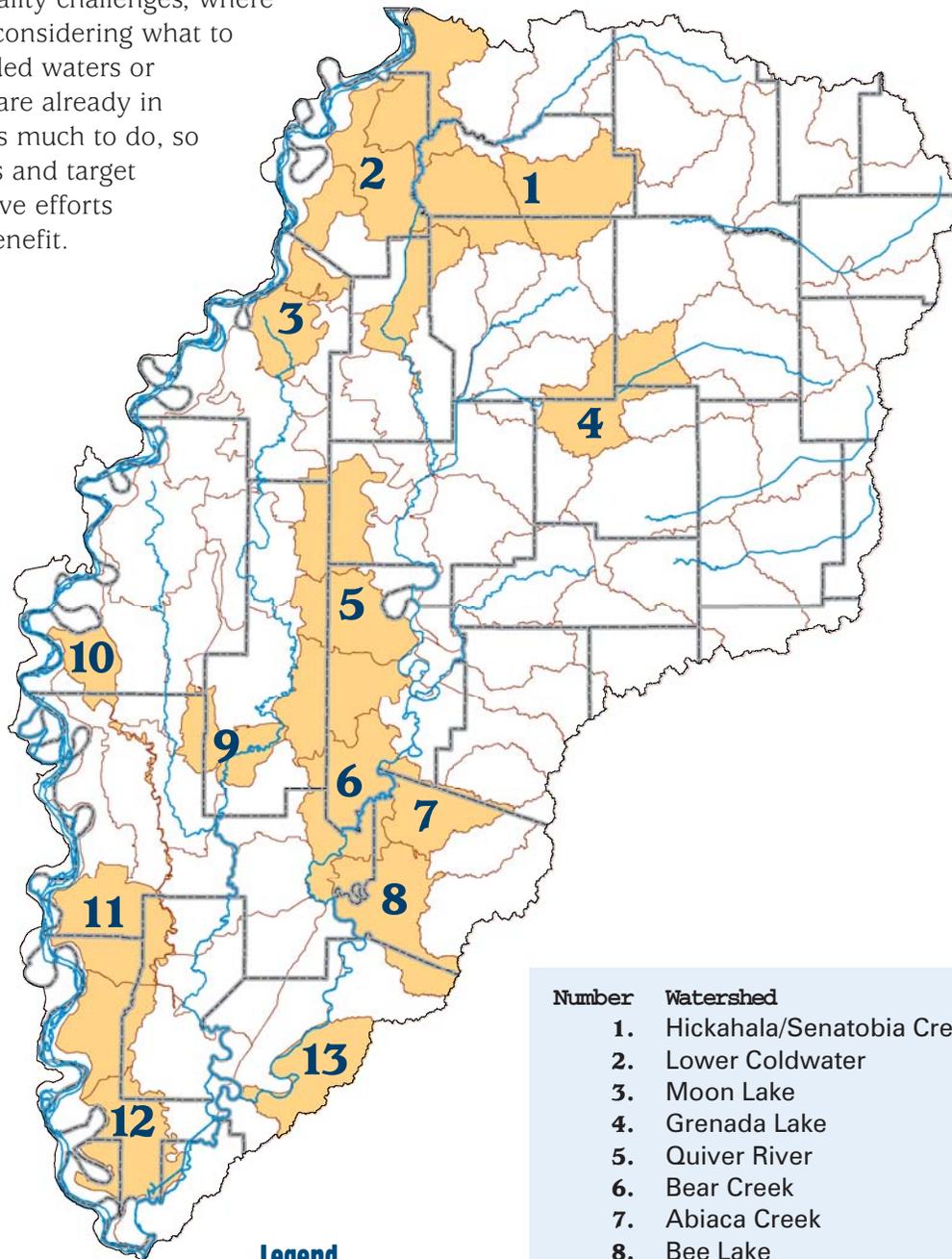
How can I learn more?

Contact your Basin Coordinator:

- Group 1** *Big Black River, Tombigbee River, & Tennessee River*
Mary Katherine Brown (601) 961-5348 • mary_k_brown@deq.state.ms.us
- Group 2** *Yazoo River & N. Independent Streams*
Steve Goff (601) 961-5238 • steve_goff@deq.state.ms.us
- Group 3** *Pearl River & S. Independent Streams*
Janet Chapman (601) 961-5266 • janet_chapman@deq.state.ms.us
- Group 4** *Pascagoula River*
Larry Estes (601) 961-5057 • larry_estes@deq.state.ms.us
- Group 5** *Coastal Streams*
Larry Estes (601) 961-5057 • larry_estes@deq.state.ms.us

Priority Watersheds

With so many water quality challenges, where should we begin when considering what to do to restore our degraded waters or protect our waters that are already in good condition? There is much to do, so we need to set priorities and target areas where our collective efforts will have the greatest benefit.



Number	Watershed
1.	Hickahala/Senatobia Creek
2.	Lower Coldwater
3.	Moon Lake
4.	Grenada Lake
5.	Quiver River
6.	Bear Creek
7.	Abiaca Creek
8.	Bee Lake
9.	Indian Bayou
10.	Deer Creek
11.	Lake Washington
12.	Steele Bayou
13.	Dump Lake



Bee Lake



Bee Lake WIT



Management planning

A Yazoo River Basin Team of 25 local, state, and federal resource agencies, with strong input from the general public and active local stakeholder organizations, has developed a list of priority watersheds for the Yazoo River Basin. The team reviewed information on the basin's streams and lakes, and ranked watersheds based on several factors. These included resource value, type of water quality data, level of support for management measures, and expected benefits. This resulted in the targeting of watersheds for management planning and implementation activities.

The Basin Team selected five Phase 1 Priority Watersheds: Bee Lake, Bear Creek, Hickahala/Senatobia creeks, Abiaca Creek-Tchula Lake,

and Lake Washington. In each of these priority areas, watershed implementation teams are being formed to coordinate restoration efforts throughout the watershed. Delta Wildlife, Mississippi Soil & Water Conservation Commission (MSWCC), local Soil and Water Conservation Districts (SWCD), Natural Resources Conservation Service (NRCS), and other team members are identifying where to locate the best cost-effective projects to improve water quality. Each team is incorporating this information into implementation plans that will identify what each agency, organization, and landowner is willing to do to address identified problems. Highlights of five of the priority watersheds follow.



Bee Lake

Bee Lake

Bee Lake, a scenic Delta oxbow lake next to Highway 49W, is in Holmes County. An excellent crappie fishery has drawn fishermen to the lake for years. Public boat ramps, fishing camps and cabins on the lake support recreation. The watershed has some of the most productive soils in the state, supporting significant farming operations. In addition to serving as an important fishery, water from the lake is also used for an irrigation source.

Sediment loading and low dissolved oxygen—due to overabundance of nutrients—threaten this popular fishing resource, as does an invasive species of aquatic vegetation.

Restoration efforts in this watershed will employ the following management practices to improve water quality and the recreational use of the waters:

- Bank stabilization projects
- Grade stabilization structures
- Water control structures
- Riparian forest buffers (shrub and tree planting)
- Grass filter strips and stiff grass hedges
- Repaired septic systems
- Aquatic vegetation control



Water control structure—slotted board riser



Planting a buffer zone

How can I learn more and get involved?

Local participation and support are essential for the success of any restoration project. Join the team and make a difference! For information about restoration activities for the Bee Lake watershed, contact Trey Cooke, (662-686-3370), Watershed Implementation Team Leader.



Bear Creek at Swifftown

Bear Creek

Bear Creek is a large Delta watershed in Sunflower, Leflore, and Humphreys counties. It has over 16 oxbow lakes and numerous cypress/tupelo gum brakes (areas thickly overgrown with these plants) stretching from Itta Bena to Belzoni. These lakes and brakes are popular to fishermen and duck hunters. The watershed is dominated by agricultural lands. Its wide range of soils allows all major commodity types to be grown, from catfish to rice to cotton and soybeans. Farming in the areas with more sandy soils and hilly alluvial floodplains makes it difficult to control sediment and erosion.

MDEQ has completed TMDLs for several problem areas of the watershed and set pollution reduction goals for nutrients, organic enrichment, sediment, and pesticides. Restoration efforts in this watershed will focus on reducing these pollutants to improve water quality. The following types of management practices are planned:

- Hydrology (stream) restoration
- Reforestation
- Sediment retention structures
- Riparian forest buffers
- Grass filter strips



Switch grass planted for erosion control near the creek

How can I learn more and get involved?

Bear Creek is a watershed with many needs. It will take all of us—local stakeholders, resource agencies and organizations—working together to improve the quality of its waters to maximize the recreation and economic potential of the watershed. Why don't you join with us? For information about restoration activities for the Bear Creek watershed, contact Trey Cooke, (662-686-3370), Watershed Implementation Team Leader.



Hickahala Creek



Senatobia Creek

Hickahala Creek and Senatobia Creek Watersheds

Located in Tate, Panola, and Marshall counties in the Bluffs Region, over 80% of these watersheds are used for agriculture (approximately 60% for pasture and 20% for growing corn, cotton, and soybeans). Hickahala and Senatobia creeks are also important tributaries for Arkabutla Lake, a well-known recreational and flood-control reservoir managed by the U.S. Army Corps of Engineers. Portions of three cities are located in the watershed: Coldwater, Senatobia, and Como.

Restoration efforts in this watershed will focus on reducing organic enrichment caused by animal waste nutrient loadings, and reducing bacteria from animal wastes and failing septic systems. Removing these pollutants will improve water quality and the recreational use of the waters.

Anticipated management measures include:

- Fencing to limit cattle access to streams
- Strategic tree and hay planting
- Grade stabilization structures
- Water and sediment control basins
- Prescribed grazing
- Improved stream crossings

How can I learn more and get involved?

A successful restoration effort in the Hickahala Creek and Senatobia Creek watersheds will not only improve water quality in those watersheds, but will also benefit water quality in Arkabutla Lake. Local stakeholder involvement is the key! Join the team and make a difference! For information about restoration activities in either of these watersheds, contact Mark Gilbert (601-354-7645), Watershed Implementation Team Leader.



Pier at Tchula Lake



Abiaca Creek

Abiaca Creek and Tchula Lake Watersheds

Abiaca Creek and Tchula Lake are adjacent rural watersheds located mostly in Humphreys County in the southern portion of the Delta. Abiaca Creek flows through Morgan Brake National Wildlife Refuge—an important conservation area. Restoration efforts in the Abiaca Creek watershed will focus on reducing sediment and animal waste nutrient loadings and bacteria from animal wastes and failing septic systems. The reduction or elimination of these pollutants will improve the quality of the waters in the watershed.

Anticipated management measures include:

- Strategic tree and cover crop planting
- Grade stabilization structures
- Water and sediment control basins
- Filter strips
- Field borders and riparian buffer improvement
- Livestock pollutant reduction BMPs

Tchula Lake is an important irrigation source for agriculture in the area. A significant effort is underway, led by the Town of Tchula and supported by numerous state and federal agencies, to develop wastewater and

recreational infrastructure and improve the water quality of Tchula Lake. To accomplish this task, the Tchula Lake Restoration Task Force and its partners are working to identify resources and develop a watershed implementation plan.

How can I learn more and get involved?

Restoration of Abiaca Creek is an important component in improving water quality and habitat in the Morgan Brake National Wildlife Refuge. Restoration of Tchula Lake is an important component for economic development for the City of Tchula and the Tchula Lake watershed. It will take local stakeholders participating in restoration efforts for success to occur. Join in the effort to make a difference! For information about watershed activities in the Abiaca Creek watershed, contact Patrick Vowell (601-354-7645). For information about restoration activities for Tchula Lake, contact Steve Goff, (601-961-5238), Watershed Implementation Team Leader.



Looking at the day's catch

Lake Washington Watershed

Lake Washington is located in Washington County approximately 20 miles south of the City of Greenville. The lake is an oxbow formed by an abandoned meander of the Mississippi River and is one of the most well-known fishing areas in Mississippi. The watershed has a complex series of natural levees, slack water areas, and shallow depressions. Ditches and other hydrologic modifications have significantly altered natural drainage to Lake Washington. Farming dominates the watershed, with cotton, soybeans, and corn as the primary crops.

The Lake Washington watershed has been designated as Mississippi's nutrient reduction showcase project. A Watershed Implementation Team is forming to develop a plan that will identify resources and practices to be used to reduce nutrient and sediment runoff into the lake and improve water quality and the recreational use of the lake. TMDLs and additional monitoring developed by MDEQ will be used to provide load reduction targets for the watershed.



View of Lake Washington

How can I learn more and get involved?

A successful restoration effort in the Lake Washington watershed will improve water quality for this well-known fishing resource. Join the team and make a difference! For information about restoration activities for the Lake Washington watershed, contact Blake New, (662-332-8616, ext. 3), Watershed Implementation Team Leader.

Planning and local team building efforts are also underway in additional watersheds. To get involved in implementation planning for these watersheds, contact the following:

Indian Bayou

For information on how to join the Indian Bayou Watershed Implementation Team, contact Paula Weaver (662-379-2910).

Moon Lake

For information on how to become involved in a restoration effort for Moon Lake, contact Dean Pennington (662-686-7712).

Lower Coldwater River (below Arkabutla Lake)

For information on how to become involved in a restoration effort for the Coldwater River watershed below Arkabutla Lake, contact Dean Pennington (662-686-7712).

Deer Creek

For information on how to become involved in restoration efforts for the Deer Creek watershed, contact Dean Pennington (662-686-7712).

Deer Creek – Rolling Fork/Cary

For information on how to become involved in a local restoration effort for Deer Creek at Rolling Fork and Cary, MS, contact Meg Cooper (662-873-6261).

Quiver River

For information on how to become involved in a water conservation and restoration effort for the Quiver River watershed, contact Dean Pennington (662-686-7712).

Upper Coldwater River

For information on how to become involved in a restoration effort for the upper Coldwater River above Arkabutla Lake, contact Chad Pope (662-252-1155).

Deer Creek – Arcola

For information on how to become involved in a local restoration effort for Deer Creek at Arcola, MS, contact Ronnie Yarborough (662-827-5884).

Tchula Lake

For information on how to become involved in a restoration effort for Tchula Lake, contact Steve Goff (601-961-5238).



Moon Lake

What Agencies and Organizations Are Working to Improve Water Quality?

Numerous state and federal agencies and stakeholder organizations are working together to support the managed protection of the Yazoo River Basin. These include voluntary and/or assistance programs that encourage the implementation of best management practices, regulatory programs, monitoring and assessment programs, and watershed management efforts. For more information on water quality activities or how to get involved in protecting your watershed, contact:

State of Mississippi Agencies

Mississippi Agricultural and Forestry Experiment Station (MAFES)

662-325-9803 www.msucares.com

Mississippi Board of Levee Commissioners (MBLC)

662-334-4813 www.msleveeboard.org

Mississippi Department of Agriculture and Commerce (MDAC)

601-359-1100 www.mdac.state.ms.us/index.asp

Mississippi Department of Environmental Quality (MDEQ)

601-961-5171 www.deq.state.ms.us/mdeq

Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP)

601-432-2400 www.mdwfp.com

Mississippi Development Authority (MDA)

601-359-2832 www.mississippi.org

Mississippi Emergency Management Agency (MEMA)

601-352-8314 www.msema.org/index.org

Mississippi Forestry Commission (MFC)

601-359-1386 www.mfc.state.ms.us

Mississippi Soil & Water Conservation Commission (MSWCC)

601-354-7645 www.mswcc.state.ms.us

Mississippi State Department of Health, Bureau of Environmental Health (MSDH/BEH)

601-576-7400 www.msdh.state.ms.us

Mississippi State University Cooperative Extension Service (MSU/CES)

662-325-8747 www.msucares.com

Yazoo Mississippi Delta Joint Water Management District (YMD)

662-686-7712 www.ymd.org

Yazoo-Mississippi Delta Levee Board (YMDLB)

662-624-4397 www.leveeboard.org

United States Government Agencies

U.S. Army Corps of Engineers, Vicksburg District (USACE)

601-631-5000 www.mvk.usace.army.mil

U.S. Army Corps of Engineers, Waterways Experiment Station (WES)

601-634-6111 www.erdc.usace.army.mil

U.S. Department of Agriculture (USDA) Farm Service Agency

601-965-4300 www.fsa.usda.gov

Natural Resource Conservation Service (USDA/NRCS)

601-965-4940 www.ms.nrcs.usda.gov

Forest Service (USDA/USFS)

601-965-4391 www.fs.fed.us

Agricultural Research Service, National Sedimentation Lab (USDA/ARS/NSL)

662-232-2900 www.ars.usda.gov

U.S. Environmental Protection Agency, Region 4 (EPA/R4)

404-562-9900 www.epa.gov/region4

U.S. Environmental Protection Agency, Gulf of Mexico Program (EPA/GMPO)

228-688-3726 www.epa.gov/regionr/programs

U.S. Fish and Wildlife Service (USFWS)

601-965-4900 www.fws.gov

U.S. Geological Survey (USGS)

601-933-2900 www.usgs.gov

Stakeholder Organizations

Delta F.A.R.M.

662-686-3370 www.deltafarm.net

Delta Wildlife (DW)

662-686-3370 www.deltawildlife.org

Ducks Unlimited (DU)

601-206-5446 www.ducks.org

Wildlife Mississippi

662-686-3375 www.wildlifemiss.org

The Nature Conservancy (TNC)

601-713-3355 www.nature.org

Mississippi Association of Soil and Water Conservation Districts (SWCDs)

601-354-7645 www.mswcc.state.ms.us/macd.html

Sustaining Our Environmental Resources and Economic Development

Citizens of Mississippi understand the importance of their natural resources, both for their environmental and economic values. Locally led teams are working to identify concerns and develop watershed implementation plans. These plans will not only protect, restore, and sustain environmental resources, but also provide opportunities for economic development and community growth. The Mississippi Department of Environmental Quality and its resource agency partners are actively involved with these local watershed teams through Mississippi's Basin Management Approach. Collaborative watershed planning, education, protection, and restorative initiatives are all important tools for carrying out this important work. Mississippians are working hard to preserve their abundant natural resources that provide the outstanding fishing, hunting, economic development, and quality of life they enjoy.



Fishing for generations



Irrigating a rice field

Citizens Can Do Much to Protect Their Watershed by:

- ***Getting involved with a local watershed team.*** The success of the team will be greatly enhanced by active local involvement.
- ***Requesting education and outreach materials that will help them become better stewards of their natural resources.*** A wide range of materials and resources are available from numerous sources—contact your local NRCS or Extension Service office or Basin Coordinator.
- ***Implementing Best Management Practices to reduce sediment, fertilizer, and pesticide loading to adjacent streams.*** Technical and funding resources are available—contact your local NRCS, Extension Service office, or Basin Coordinator.
- ***Properly disposing of pesticide containers and household chemicals.***
- ***Inspecting and servicing septic systems at least every two years.***
- ***Recycling used oil and antifreeze.***
- ***Properly disposing of garbage, nonhazardous household wastes, and wild game carcasses.*** Report incidents of illegal dumping.



Information Center
Mississippi Department of Environmental Quality

PO Box 10385
Jackson, MS 39289-0385
601-961-5171

www.deq.state.ms.us