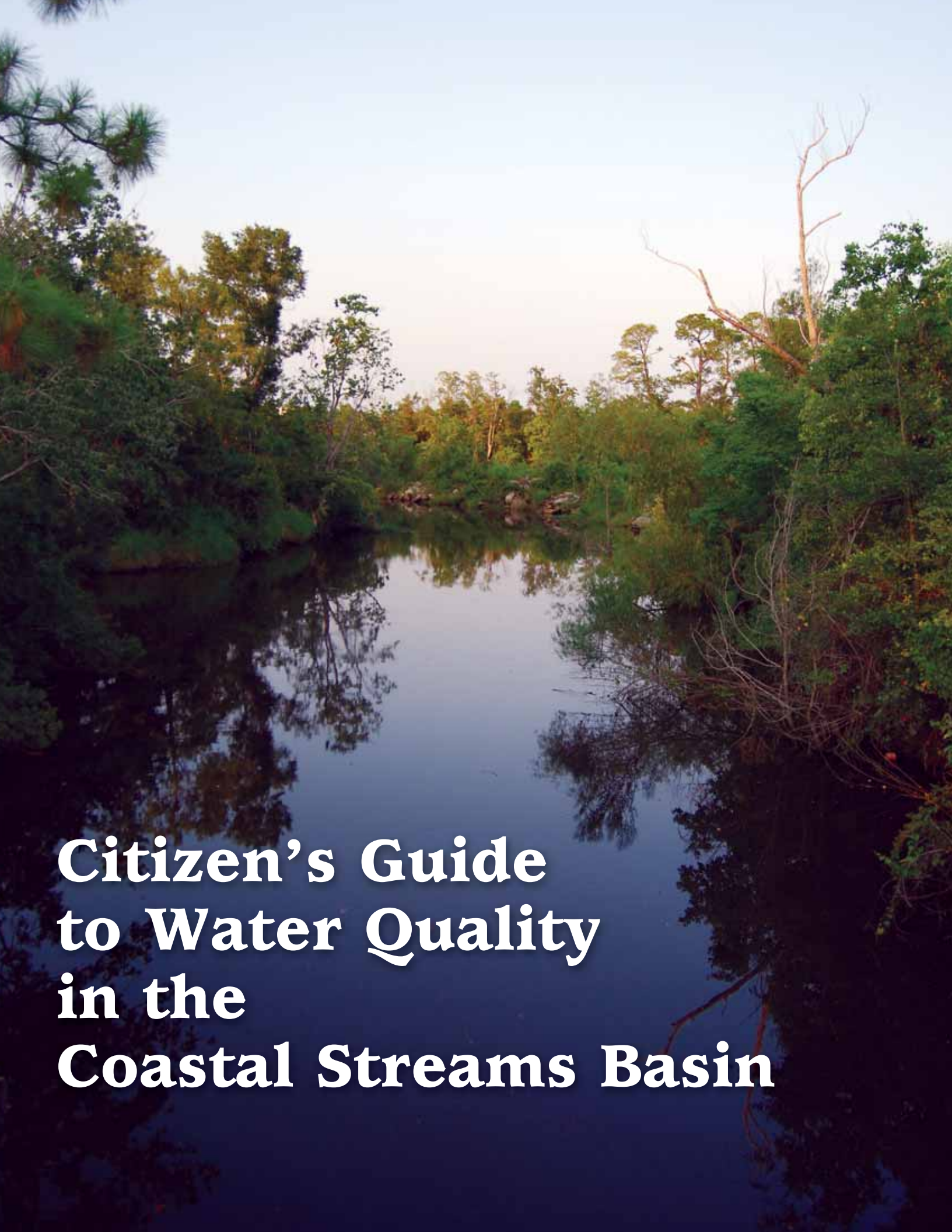


Citizen's Guide to Water Quality in the Coastal Streams Basin

Contents

About this Guide

Mississippi's Citizen's 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
- Whom to contact for more information

We hope these guides will enhance the dialogue between citizens and key decision makers to help improve our management of Mississippi's precious water resources. We encourage you to invest in this effort—read this guide and actively restore and protect our water resources for future generations.

Acknowledgments

This guide is a product of the Coastal Streams Basin Team, consisting of representatives from 40 state and federal agencies and stakeholder organizations (see page 34 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 2008 under a Clean Water Act Section 319 Nonpoint Source grant, and includes publication services from Tetra Tech, Inc.

Copies of this guide may be obtained by contacting:

Mississippi Department of Environmental Quality
Office of Pollution Control
515 East Amite Street
Jackson, MS 39201
601-961-5171

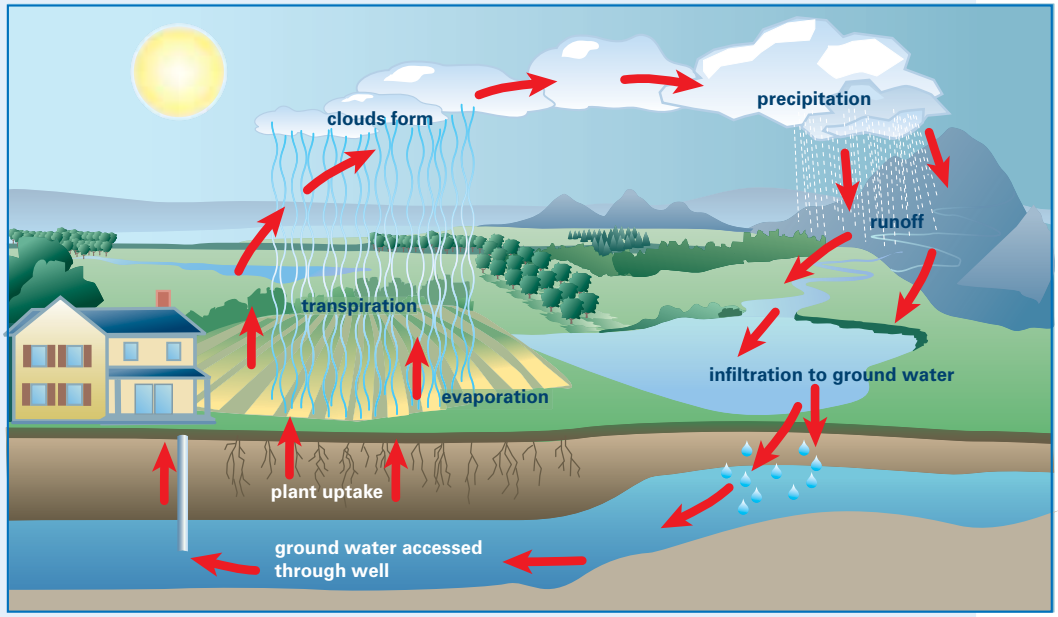
or by accessing MDEQ's website at:
www.deq.state.ms.us

Cover photo: Peter Cada, Tetra Tech, Inc.

Water
Our Precious Natural Resource

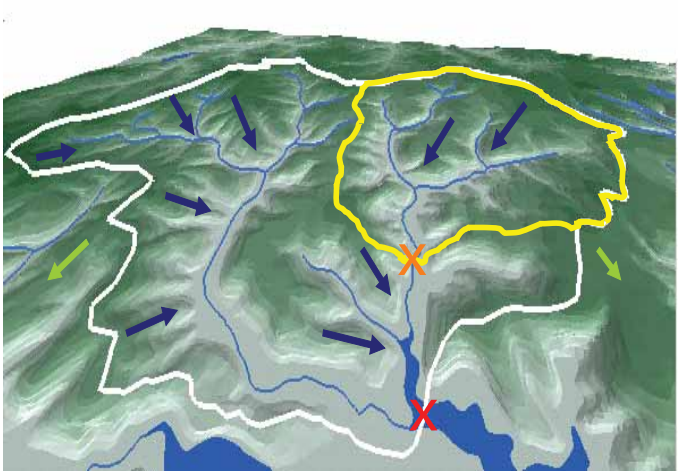
The Water Cycle and Water Quality

Clouds, rain, runoff, rivers, lakes, marshes, ground water, oceans—what's the common thread? All have their place in the earth's water cycle. After rain has fallen to the earth, it either remains in a water body, goes up into the atmosphere (evaporation and transpiration), goes down into the ground (infiltration) or flows over the land (runoff). Stormwater runoff is the link in the water cycle most likely to degrade water quality. Runoff often carries dissolved chemicals, bacteria, and suspended matter like sediment (sand, silt, and clay soil particles) into our water bodies. In fact, many kinds of pollutants in the path of runoff may be transported to our streams and rivers. The proper care of the land, therefore, is essential for protecting water quality.



What is a watershed?

A watershed is the area of land that drains to a common water body, such as a stream, large river, lake, wetland, bayou, or estuary. Smaller watersheds join to form larger watersheds. For example, the Upper Jourdan River and Biloxi River watersheds are smaller watersheds that empty into the Mississippi Sound. Since watershed boundaries are determined by stream drainage areas rather than political delineations, a watershed can cross county or state boundaries. All of the watersheds in the Coastal Streams Basin lie wholly within Mississippi.



Center for Watershed Protection

Mississippi's Water Resources

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

Janet Chapman, MDEQ

Gulfport Beach sunrise

USACE

Sailing on Jamie Whitten Lake

Janet Chapman, MDEQ

Shrimp boat anchored in Pearl River

Chunky River at Dunns Falls

Janet Chapman, MDEQ

Polypipe irrigation

USACE

Aberdeen Lock and Dam on the Tennessee-Tombigbee Waterway

USDA NRCS

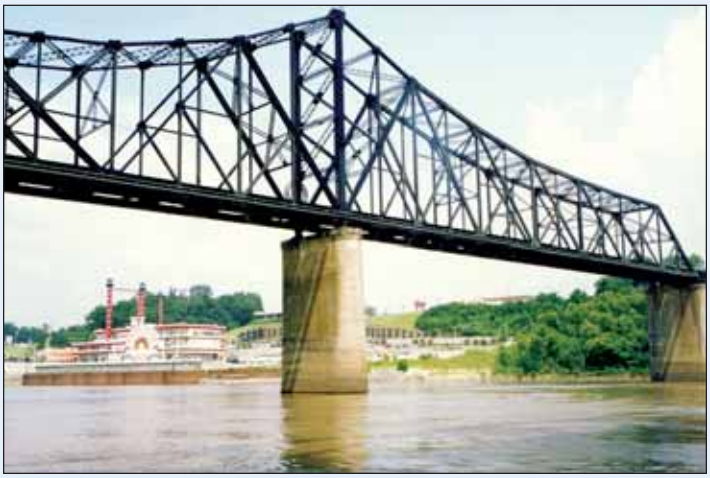
Remnant of a cypress/tupelo wetland in an oxbow in central Mississippi

Mississippi's economy and quality of life depend on our water resources.

Cypress swamp in the Tenn-Tom Waterway

- Wetlands cover about 2.7 million acres throughout the state, providing habitat for wildlife and natural filters for cleaning stormwater runoff on its way downstream.
- Most of our streams and rivers flow to some point along Mississippi's 86-mile coastline. Many flow into estuarine bays (a mix of fresh and salty water)—St. Louis Bay, Back Bay of Biloxi, and Pascagoula Bay—before entering the Mississippi Sound. Those waters then flow past our barrier islands 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 all, Mississippi's estuarine waters cover over 750 square miles.
- Barrier islands and coastal estuaries reduce the impacts of hurricane storm surges and provide the nursery habitat needed by both commercial and non-commercial fisheries.

Gulfport Harbor



Mississippi River Bridge at Vicksburg

Welcome to the Coastal Streams Basin

The Coastal Streams Basin is unlike any other river basin in the State. Made up of several smaller independent watersheds rather than one large river, it is laced with rivers, streams, creeks, bayous, and bays, and drains an area of 1,545 square miles. The waters wind their way to the Mississippi Sound along about 2,660 miles of streams. The main water bodies you might know are the Bayou Casotte, Wolf River, Rotten Bayou, De Lisle Bayou, Bayou La Croix, Bayou Bacon/ Jourdan River, Turkey Creek/Bernard Bayou, Biloxi River, and Tuxachanie Creek. These are the watersheds that form the Coastal Streams Basin. The Basin also includes the Barrier Islands (Cat, Ship, Deer, Horn, Round, and Petit Bois).

The topography of the land in the Basin ranges from extensive pine forests and low rolling hills in the upper basin to low-lying flatlands and salt marsh on the coast. In the northern part of the Basin, the streams are shallow and clear, with moderate flow. Gradually they become wider and deeper with a more sluggish flow as they move toward the coast due to the tidal influence and the flatter landscape.

The Coastal Streams Basin begins in Lamar County and includes five other counties: Pearl River, Hancock, Stone, Harrison, and Jackson. Approximately 425,000 people live in the Basin, about one-fifth of Mississippi's population. On the whole, the Basin is rural, with most people living along the coast in the urban and industrial areas like Biloxi and Gulfport. In the past, commercial and recreational fishing, gaming, tourism, energy production, manufacturing, and shipping have formed a diverse and vibrant coastal economy. Although Hurricane Katrina had enormous effects on the Mississippi coastal region, the resiliency of the major industries in the region (e.g., manufacturing and hospitality) coupled with the construction industry is helping the economy to rebound quickly. The inland areas are rural, with crop production, livestock, and silviculture being a vital part of the local economy.

Gulf Streams Communities

Gulfport and Biloxi

Peter Cada, Tetra Tech, Inc.

Rebuilding the Highway 90 bridge over Biloxi Bay looking towards Ocean Springs from Biloxi

Gulfport is the second largest city in Mississippi with over 70,000 residents. The city is located at the intersection of Interstate 10 and Highway 49 along the Gulf Coast, and is home to the region's largest international airport (Gulfport-Biloxi International Airport). Bernard Bayou, Turkey Creek and Brickyard Bayou all converge at Big Lake on the eastern edge of Gulfport. Gulfport is also home to the "World's Largest Fishing Rodeo" which has occurred annually in the beginning of July for decades.

Biloxi, just east of Gulfport, has a population of about 50,000 people. The city is home to Keesler Air Force Base. Water is an important feature of Biloxi, with Bernard Bayou forming part of the boundary with Gulfport, and Tchoutacabouffa River and Tuxachanie Creek flowing through the north of the city into Big Lake and the Back Bay of Biloxi. The City offers many attractions for a variety of visitors from far and near. Historical sites such as the Biloxi Lighthouse, sporting attractions such as boat charters, and barrier island tours are just a few of the many activities that have helped Biloxi recover from Hurricane Katrina.

Ocean Springs

Downtown Ocean Springs

Ocean Springs is known as the City of Discovery due to its place in history as the first permanent French outpost in French Louisiana (established back in 1699), and is considered to be one of the oldest cities in the U.S. With a population of nearly 20,000 people, it has the charm of the small town with all of the advantages of being in the heart of the Mississippi Gulf Coast. Ocean Springs has become known as an "arts community", with Live Oak lined streets that are home to several art galleries and shops offering wares of all sorts, new and old. There are also several unique ethnic restaurants providing cuisine that is difficult to find in the surrounding areas. The old Highway 90 bridge that connected Ocean Springs to Biloxi to the west was decimated by Hurricane Katrina; however, a new six lane bridge with a 95-foot high main span will provide an accessible gateway to the beautiful community of Ocean Springs.

Downtown Ocean Springs

Grand Bay NERR

The Grand Bay National Estuarine Research Reserve (GBNERR) is located in southeast Jackson County adjacent to the Alabama state line. The reserve includes coastal wildlands and water-ways that fall within the boundaries of Mississippi's Grand Bay Savanna Coastal Preserve and a portion of the Mississippi lands of the Grand Bay National Wildlife Refuge. This 18,000 acre reserve represents one of the largest, relatively undisturbed estuarine marsh/pine savanna habitats remaining along the northern Gulf of Mexico.

Jennifer Buchanan, Grand Bay NERR

Wildflowers in a freshwater slough running through a pine savannah

Diverse habitats such as salt pannes, salt and freshwater marshes, bayous, oyster reefs and seagrass beds provide critical habitats for many of the region's important commercial and recreational species of fish and migratory birds. These habitats serve as nursery areas as well as breeding and feeding grounds for shrimp, red drum, speckled trout, oysters, Wilson's plovers, peregrine falcons, Alabama red-bellied turtles and other species of concern.

The Reserve's rich coastal resources provide visitors with a wide variety of adventures such as birding, fishing, crabbing, paddling, bicycling, hunting, boating, botanizing and nature photography. Public facilities such as the Oak Grove Birding Trail, a boat launch and a fishing pier are free to the public. Remember, take only pictures and leave as few footprints as possible, when you travel through some of Mississippi's most pristine coastal wetlands!

Popular Fishing and Recreation Areas

Dave Menke, US Fish and Wildlife Service

Recreational Boaters enjoying the sunset

The Coastal Streams Basin is a recreation paradise for outdoor enthusiasts, offering spectacular hunting, fishing, canoeing, kayaking, camping, and hiking. State parks, wildlife management areas, and state lakes are found throughout the basin. For example, the GBNERR is made up of over 18,000 acres, providing many locations for fishing, boating, and oystering. You'll also find areas on "dry land" for hunting, hiking, and natural exploration. If you are a bird watcher, you'll find numerous opportunities to view migratory and non-migratory birds at GBNERR. The Mississippi Audubon Society (*www.msaudubon.org*) is a great resource for learning more about bird watching here and throughout Mississippi. The Coastal Streams Basin is home to some of the best paddling and kayaking destinations along the Gulf Coast, like those around Deer Island, located just south of Biloxi. The **Mississippi Outdoor Club** (*www.msoutdoorclub.org*) can help you find out more about recreational boating, hiking, cycling, outfitters, and rentals. Also, visit the Mississippi Tourism website at *www.visitmississippi.org/outdoor_rec/index.asp*. For details about camping, swimming, boating and other recreational opportunities, see the map and charts on the following two pages.

Peter Cada, Tetra Tech, Inc.

Jourdan River at McLeod Water Park Campground

Peter Cada, Tetra Tech, Inc.

Entrance to Mississippi Sandhill Crane National Wildlife Refuge

Donna Dewhurst, US Fish and Wildlife Service

Elegant Mississippi Sandhill Cranes

Legend

- City
- County
- Interstate
- US Highway
- Major River
- Waterbody
- National Forest/National Wildlife Refuge
  - De Soto National Forest
  - Mississippi Sandhill Crane National Wildlife Refuge
  - Grand Bay National Wildlife Refuge/NERR
- National Forest Service/Recreation Area
- State Wildlife Management Area
- Gulf Islands National Seashore
- State Parks
- Water Parks

	Trailer Camping	Tent Camping	Concessions	Drinking Water	Toilets	Lodge	Cabins	On Lake	On River/Marsh	Swimming	Recreational Room/Facility	Boating	Picnicking	Fishing	Golf	Hiking Trails
State Parks																
Buccaneer	Park is closed but will reopen after repairs are made from result of Hurricane Katrina															
Shepard	■	■		■	■								■			
For more information contact: MS Dept. of Wildlife, Fisheries & Parks - mississippistateparks.reserveamerica.com/ or **1-800-GO PARKS**																
State Wildlife Management Areas (WMAs)																
Little Biloxi		■											■			■
Red Creek		■											■			
For more information contact: MS Dept. of Wildlife, Fisheries & Parks - www.mdwfp.com/Level2/Wildlife/wma.asp or **601-432-2400**																
National Forest Service																
De Soto – Airey Lake	■	■		■	■			■				■	■	■		■
De Soto – Bethel ATV Trail		■			■											
De Soto – Big Foot Horse Trail		■			■								■			■
De Soto – Big Biloxi Campground	■	■		■	■				■			■	■	■		■
De Soto – POW Lake	■	■						■					■	■		■
De Soto – Tuxachanie Hiking Trail				■	■				■			■	■	■		■
For more information contact: National Forest Service - Mississippi - www.fs.fed.us/r8/mississippi/ or **601-965-1600**																
National Wildlife Refuges																
Grand Bay NWR/Grand Bay NERR				■	■				■			■	■	■		■
For more information on Grand Bay NWR: www.fws.gov/grandbay or **228-497-6322** For more information on Grand Bay National Estuarine Research Reserve: www.grandbaynerr.org or **228-475-7047**																
Mississippi Sandhill Crane NWR				■	■				■		■	■	■			■
For more information on Mississippi Sandhill Crane NWF: www.fws.gov/mississippisandhillcrane or **228-497-6322**																
National Parks																
Gulf Islands National Seashore	■	■		■	■				■	■		■	■	■		■
For more information on Gulf Islands National Seashore: www.nps.gov/guis or **228-875-9057, extension 100**																
Water Parks																
McLeod Water Park	■	■	■	■	■				■		■	■	■	■		■
For more information on McLeod Water Park: **228-467-1894**																
Other Recreational Resources																
Canoeing & Kayaking	For more information on recreational boating, hiking, climbing and cycling, contact the MS Outdoor Club at www.msoutdoorclub.org															
Birding	For more information on birding and bird watching activities in the basin, contact Mississippi Audubon Society at www.msaudubon.org															
Hiking, Climbing & Cycling	For more information on recreational boating, hiking, climbing and cycling, contact the MS Outdoor Club at www.msoutdoorclub.org															

Special Plants and Animals of the Coastal Streams Basin

The rivers and streams and the surrounding landscapes of the Coastal Streams Basin are home to a remarkable variety of plants and animals. A large number of threatened and endangered species are found here—not just because the basin is heavily impacted by human activities—but also because the basin represents one of the most biologically diverse regions in North America. Not only is the Coastal Streams Basin nationally ranked among the top ten ecological regions for the number of amphibian, reptile, and bird species, it also ranks in the top ten for endemic species (animals that reside exclusively in this region) of reptiles, amphibians, butterflies, and mammals. The beauty of the Basin's landscape that makes this area so popular for outdoor recreation also provides safe haven for the plants and animals that live there. 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. The pine savanna of the Mississippi sandhill crane habitat was largely developed or converted to pine plantations during the last 50 years. Gopher tortoises are important because their burrows provide habitat for nearly 400 other species—for example, Mississippi gopher frogs are known to inhabit abandoned gopher tortoise burrows. When development reduces Gopher tortoise habitat, many more species are affected as a result. As we learn more about what leads to population decline, we can take the necessary steps that will support species success.

Jerry L. Litton

Iron Color Shiners

Iron Color Shiner, *Notropis chalybaeus*

This small shiner grows to two and a half inches and has a thick black band along its side. Breeding males develop an orange to rosy hue giving the fish its name. It can be found in streams with abundant aquatic vegetation, open swamps, and dense forests like those in the Jourdan and Biloxi watersheds. The Iron color shiner is sensitive to channel and floodplain alteration, as well as loss or removal of streamside vegetation. Practices that protect stream channels and control runoff from development will be especially important to help sustain the Iron Color Shiner.

Mississippi Gopher Frog, *Rana sevosa*

This amphibian, also referred to as the dark gopher frog or dusky gopher frog, is a medium sized frog with a large head. The gopher frog can be found across the coastal plain from the parishes of Louisiana all the way to Alabama's Mobile River. However, its habitats are limited to areas that can provide temporary pools for breeding as well as upland foraging sites with small burrows for refuge underground where adults often live feeding off of arthropods and other frogs. Because of the discovery that Glen's Pond, located in Harrison County, is supporting the last known population of the gopher frog, efforts are underway to unveil or restore other ponded areas suitable for sustaining additional populations of the frog.

Jerry L. Litton

Mississippi Gopher Frog

Mississippi Sandhill Crane, *Grus Canadensis pulla*

U.S. Fish and Wildlife Service

Mississippi Sandhill Crane

The Mississippi sandhill crane is a four-foot tall, slender bird with a red forehead and a wing span of over five feet. Historically, it inhabited coastal pine savannas of Louisiana, Mississippi, and Alabama, but the only remaining population resides in a small area in Jackson County. As of 2000, only 110 to 120 cranes lived in the wild. Much of its habitat has been altered or destroyed by urban development, pine plantations, and drainage canals, and the cranes are highly vulnerable to hunting by humans, coyote and other predators. To protect them from extinction, the U.S. Fish and Wildlife Service breeds Mississippi sandhill cranes in captivity and regularly introduces them into the wild population. The Mississippi Sandhill Crane National Wildlife Refuge is currently restoring about 18,000 acres of this majestic bird's habitat.

Gulf Sturgeon, *Acipenser oxyrinchus desotoi*

Jerry L. Litton

Gulf Sturgeon

The Gulf sturgeon is a large fish, attaining an average length of six to eight feet. It has an elongated head and the body is covered with rows of bony, scale-like plates. Gulf sturgeon are anadromous fish—they live in salt water, but migrate to freshwater to breed. They eat tiny crustaceans and worms by siphoning them off the bottom with a tube-like mouth. Heavy fishing reduced their numbers through the early 1900s; few have been seen in Mississippi since that time. Since its listing as a threatened species is based on a low population, fishing for Gulf sturgeon is now prohibited. Current threats include pollution and habitat loss. The Pascagoula Bay and Mississippi Sound systems were designated by the U.S. Fish and Wildlife Service and National Marine Fisheries Service as critical habitat for the Gulf sturgeon.

Jerry A. Payne, USDA ARS, Bugwood.org

Piping Plover

Piping Plover, *Charadrius melodus*

This beautiful bird migrates from areas in central Canada and the northern United States to the Atlantic and Gulf Coast regions for the winter. It is commonly seen on coastal beaches and barrier islands flitting about; however, this important winter habitat is threatened by urban and industrial development. Protection of their habitat is essential to ensuring that wintering areas are always available in Mississippi.

Gopher Tortoise, *Gopherus polyphemus*

Chris Evans, River to River CWMA, Bugwood.org

Gopher Tortoise

This land-based turtle inhabits sandy areas in southeastern Mississippi. It is named for the large, deep burrows it digs, which can reach 40 feet long and 10 feet deep! The burrows themselves provide important habitat for over 300 animal species. Gopher tortoises can grow to be over a foot long and can live 60 years or longer. Their numbers are declining for several reasons, including habitat loss, disease, predation of young tortoises by fire ants, and being struck by vehicles. Protection and proper management of existing habitat is essential for recovery of this unique turtle. Of particular importance is the minimizing of further fragmentation on U.S. Forest Service lands where relatively large parcels of land may be the best hope for continuation of the Gopher Tortoise populations in Mississippi.

Other Special Plant and Animal Species

- Alabama Red-bellied Turtle, *Pseudemys alabamensis*
- Atlantic (or Kemp's) Ridley, *Lepidochelys kempi*
- Bald Eagle, *Haliaeetus leucocephalus*
- Bewick's Wren, *Thyromanes bewickii*
- Black Bear, *Ursus americanus*
- Black Pine Snake, *Pituophis melanoleucus lodingi*
- Brown Pelican, *Pelecanus occidentalis*
- Eastern Indigo Snake, *Drymarchon corais couperi*
- Florida Panther, *Puma concolor coryi*
- Green Turtle, *Chelonia mydas*
- Hawksbill, *Eretmochelys imbricata*
- Leatherback, *Dermochelys coriacea*
- Loggerhead, *Caretta caretta*
- Louisiana Quillwort, *Isoetes louisianensis*
- One-toed Amphiuma, *Amphiuma pholeter*
- Peregrine Falcon, *Falco peregrinus*
- Rainbow Snake, *Farancia erytrogramma*
- Red-Cockaded Woodpecker, *Picoides borealis*
- Snowy Plover, *Charadrius alexandrinus*
- Eastern Hognose Snake, *Heterodon platyrhinos*
- West Indian Manatee, *Trichechus manatus*
- Wood Stork, *Mycteria Americana*
- Yellow-blotched Sawback, *Graptemys flavimaculata*

Gary Stolz, USFWS

Louisiana Black Bear

Jerry A. Payne, USDA Agricultural Research Service, Bugwood.org

Green Sea Turtle

Steve Leonard

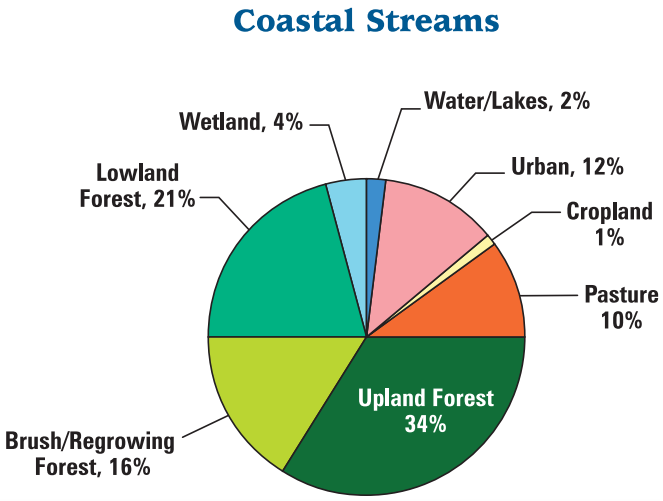
Louisiana Quillwort

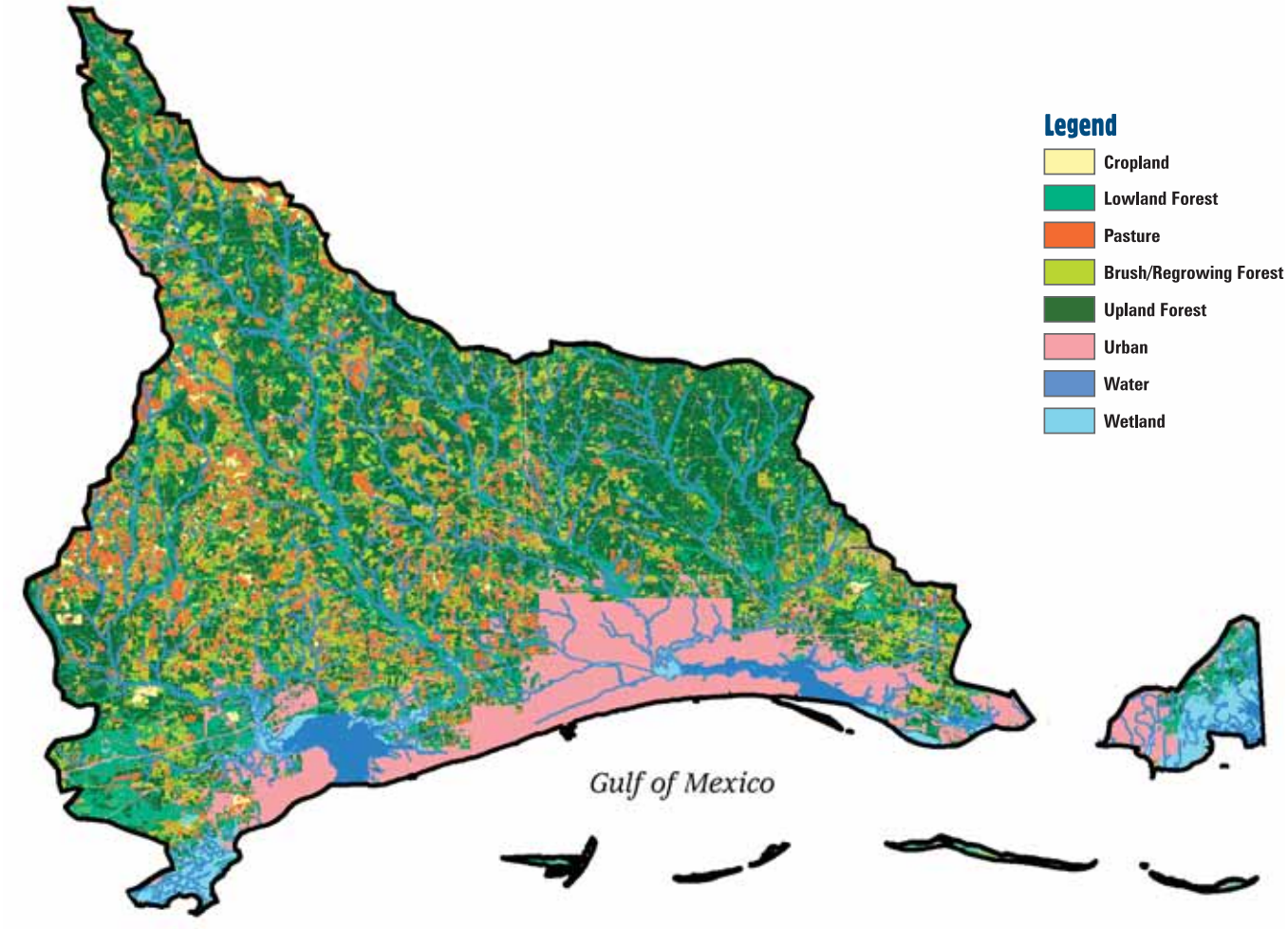
Jerry L. Litton

Yellow-blotched Sawback

Land Use and Its Effects
on Water Quality in the Coastal Streams Basin

Forests, agriculture, urban areas, and highways all have different influences on the amount and quality of water that runs off into streams and rivers. The Coastal Streams Basin supports a great diversity of animals and habitats. It is home to several cities and numerous small towns. In the northern part of the basin, extensive pine forests, gently rolling hills and broad, flat river valleys provide the backdrop for the rural landscape. Moving towards the coastline, the basin flattens out, and the meandering rivers become wider, deeper and slower moving.





Forests and Timberlands

Prior to Hurricane Katrina about 55% of the Coastal Streams Basin was covered by upland and bottomland hardwood (or lowland) forests. It is estimated that 35% of the forest was moderately to severely impacted by Katrina. Most of the damaged trees in the impacted areas within the National Forests have been identified and inspected for timber sales. Timber in many of these areas has been removed, or is ready for removal, and replanting has already begun in many areas. The majority of the forested land is privately owned, but government-owned and protected forest land occupies a significant area, nearly 91,000 acres. The diverse holdings of public lands include the De Soto National Forest, three state-owned wildlife management areas, 17 state-owned coastal preserves, the Grand Bay National Estuarine Research Reserve, and the Mississippi Sandhill Crane National Wildlife Refuge.

Recovery efforts in the Coastal Basin include removal of large tracts of damaged trees—especially those on Forest Service lands. Additionally, over 80 Red Cockaded Woodpecker inserts have been installed to replace tree cavities destroyed by the storm. Erosion control measures have been implemented for 303 subdivisions where timber removal is either in the planning stages or is already completed. Six National Forest trails have been reopened and numerous others are currently being worked on to make them safe again for public use.

Historically, longleaf pine savannas were an important feature in a majority of the basin. Frequent fires were crucial for maintaining these unique forests by removing competing brush and small trees, while leaving the tall, fire-tolerant longleaf pines. Wiregrass grew under the pines, creating a park-like atmosphere. Over time most of the longleaf pines were cut for timber, and in their place, timber plantations were established. Fire control during the past century prevented the re-growth of longleaf pines, even in forested areas that were allowed to grow back naturally without timber management.

Similar factors have changed the makeup of forests in the northern part of the basin.

Wetlands

Wetlands are among a river's greatest assets, and Mississippi's wetland management goal is no net loss of wetlands. Wetlands filter pollutants, replenish ground water and stream flow, and act like sponges to reduce flooding by storing runoff. As an enormous water cleaning facility, wetlands remove pollutants using no electricity, and have no filters to maintain. Free of charge, wetlands do the work of treatment plants that would cost tens of millions of dollars to build. In addition to the economic benefits to society, wetlands provide essential habitat for animals, birds, plants and trees. The Coastal Streams Basin has many types of wetlands making up about 4% of the land area, including floodplain swamps, oxbow lakes and sloughs, and coastal marshes.

Through its 404 Permitting Program, the U.S. Army Corps of Engineers protects against the loss of wetlands and mitigates impacts to these systems. The permitting program also protects many bottomland hardwood forest areas, some of which are classified as wetlands.

Peter Cada, Tetra Tech, Inc.

Riverine Wetland near Gulfport

Peter Cada, Tetra Tech, Inc.

Forestry access road bridge over Dead Tiger Creek

Historically, this region supported a mix of oak, hickory, pine, and other tree species. As a result of fewer fires, timbering, and agriculture, the northern basin forests are less diverse than in pre-settlement times—nowadays, pines typically dominate the younger forests, and oaks grow more densely in older forests.

Forestry practices can degrade water quality, especially if timber land is not properly managed. Unprotected clear cuts and unpaved forest roads produce erosion and runoff that add sediment to streams, destabilize stream channels, and damage or eliminate aquatic habitat. Many landowners have voluntarily installed practices designed to protect and restore water quality including improved stream crossings, selective cutting, and streamside buffers. Streamside buffers reduce sediment running into the stream and provide shade that keeps the water cooler. Intact stream-side forests also protect and hold bank soils in place and provide excellent wildlife habitat. When properly managed, timber-lands have less severe effects on water quality compared to other agricultural or urban land uses.

Agriculture

Livestock production is the most important agricultural activity in the Coastal Streams Basin. Pasture and rangeland for cattle and livestock are found throughout the basin as well, accounting for 10% of the land use. Nutrients and bacteria from animal wastes often get into the streams either from pasture runoff or directly from the animals themselves, resulting in low dissolved oxygen levels and other water quality problems. Additionally, when cows graze near streams, the stream banks and channels may become unstable and erode. Bank erosion causes portions of the downstream channels to fill with sediment, affecting habitat for fish and other aquatic life. The basin team and the farming community are already at work on these problem areas, using waste management plans, restricting cattle access to streams, and improving stream crossings. The Priority Watersheds section beginning on page 26 includes details of these activities.

Row crop production is much less prevalent, occupying less than 1% of the basin. Since the 1930s, state and federal agencies have stressed the need for soil conservation and good farming practices, such as no till farming and maintaining vegetated stream buffers. By keeping topsoil in place, these practices help keep sediment out of the streams. Many of these same practices also reduce fertilizer and pesticide runoff.

Peter Cada, Tetra Tech, Inc.

Grazing Cattle

Cities and Suburbs

In the northern part of the Coastal Streams Basin, urban areas make up a small portion of the sparsely populated landscape, with small towns dotting the countryside. However, a number of urban areas are found in the southern part of the basin, most notably Gulfport, Biloxi, and Bay St. Louis, contributing over 12% of the Basin's land area. Most people in the basin live in or near these cities.

Peter Cada, Tetra Tech, Inc.

Highway 90 near Gulfport

Before Hurricane Katrina, the urban areas had experienced a steady growth in population, especially in Hancock, Harrison, and Jackson counties at the coast. One of the largest industrial areas in the state can be found in the lower part of the basin where major industries include timber products and energy production, as well as chemical, agricultural, and metal manufacturing.

Urban centers impact water quality in many ways. During highway and building construction, disturbed land erodes and runoff carries excessive sediment if the site is not properly managed. Once construction is complete, stormwater runoff from developed areas flows into streams more quickly, and with a higher volume. As a result, urban streams have larger and more frequent floods than undisturbed rural streams. The increased flow and velocity also causes scouring, erosion, and sedimentation in the stream channel. Urban runoff frequently contains pesticides, herbicides, and fertilizers from lawns and other managed landscapes. To help address these impacts, the state now requires stormwater permits for many communities.

Cities and towns attract industry, and sometimes these industries generate pollutants as by-products. These by-products have the potential to negatively impact our streams and air. Mercury and other pollutants discharged into the air can travel many miles, even across state boundaries, before settling onto the ground and washing into streams and lakes. Regional solutions are necessary to address these interstate problems. Both air and water discharges are regulated by MDEQ through permits to limit them to acceptable levels.

Polluted runoff comes from many scattered sources. As runoff from rainfall moves over and through the ground, it picks up and carries natural and man-made pollutants, depositing them into streams, lakes, wetlands, coastal waters, and even underground aquifers. Runoff from yards washes excess fertilizer, pesticides, and sediment into storm drains that flow untreated into streams. Runoff also flushes litter and leaked motor oil on streets and parking lots into streams.

Janet Chapman, MDEQ

Storm water runoff site

Sediment (soil material composed of sand, silt, and clay particles) naturally moves off the land into water bodies. However, excessive sediment from construction sites is filling in lakes and streams in parts of the basin. Sediment clouds the water reducing the amount of light reaching aquatic plants, covers fish spawning areas and food supplies, and clogs the gills of fish. In addition, other pollutants like phosphorus, pathogens, and heavy metals are often chemically attached to the soil particles and are carried into water bodies with the sediment.

Peter Cada, Tetra Tech, Inc.

Re-vegetation of stream banks can help reduce sedimentation to rivers and streams

Surface Mining

Surface mining operations

About 100 sand and gravel surface mines operate within the Coastal Streams Basin. Although surface mines have a very small footprint in the basin, they can have a significant effect on water quality if proper storm water controls are not put into place and maintained. Runoff from these operations can also cause water bodies to become more acidic, harming fish and other aquatic life. Surface mining can disrupt wildlife habitat if buffer zones are not protected following a thorough survey by a qualified biologist.

Hurricane Katrina

Peter Cada, Tetra Tech, Inc.

Trees recovering amidst house remnants near Highway 90

On August 29, 2005, ***Hurricane Katrina*** ravaged the Gulf Coast and delivered a blow to the entire Coastal Streams Basin area. Though wind damage was significant, the legacy of Hurricane Katrina will be the horrific surge which accompanied the storm. A surge of 24–28 feet was estimated along the western Mississippi coast across a path of about 20 miles.

The extensive damage along the coast resulted in a large scale population shift within the Mississippi Gulf Region. Population decreased in the three coastal counties (Hancock, Harrison, and Jackson) as people relocated inland or out of the state. However, estimates by regional planners indicate that all six coastal counties are expected to exceed pre-storm population levels by 2010.

Additional effects of Hurricane Katrina include damage to the basin's timberlands. It is estimated that 35% of the basin's timberland was damaged by Katrina. Trees along the banks of streams that help buffer water quality impacts were especially hard hit, and extensive fish kills resulted from reduced dissolved oxygen in streams. The Mississippi Department of Wildlife, Fisheries and Parks and the U.S. Fish & Wildlife Service have worked together to help restore the fish populations in many of the impacted streams. In the aftermath, the federal government responded with the following assistance programs:

- Emergency Watershed Protection Program for timber debris removal
- Emergency Conservation Program for replanting assistance
- Emergency Conservation Reserve Program for long-term cost-share conservation
- Installation of 143 inserts on Forest Service property for Red Cockaded Woodpeckers to replace the loss of natural cavities in trees.
- Over 55,000 acres surveyed for threatened and endangered species.
- Erosion control measures completed on 303 Forest Service subdivisions.
- Over 44,000 acres of archaeological survey completed with another 35,000 acres remaining.

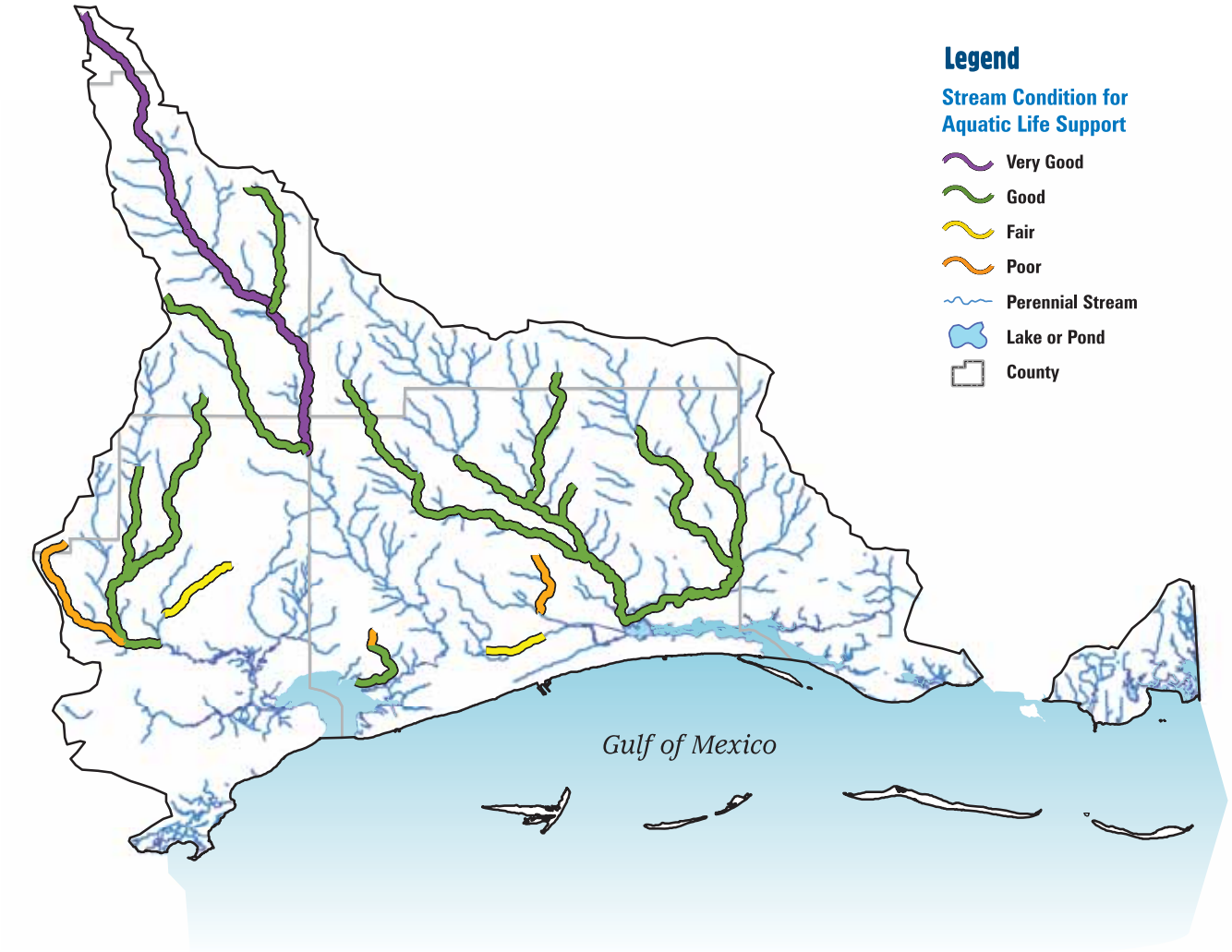
(For more information on these programs, contact your county USDA Farm Services Agency office.)

Water Quality in the Coastal Streams Basin

Surface Water Quality

In the past, what was known about the condition of water bodies in the Coastal Streams Basin was limited to a few well-studied bayous and streams. Recent monitoring has provided a better understanding of water quality conditions across the entire basin.

Of streams monitored in the Coastal Streams Basin, 89% are rated good or very good and adequately support aquatic life such as aquatic insects and fish. Another 4% are rated fair. They have aquatic life that is only somewhat impacted by pollution. Of major concern are the 7% of streams in poor condition, where the aquatic life is significantly impacted by pollution.



Major pollutants and their sources in the Coastal Streams Basin include the following:

- Pathogens/bacteria from animal wastes and failing septic systems
- Eroded sediment from agricultural, timber harvesting, and construction sites
- Organic and nutrient enrichment from agricultural and urban runoff, animal wastes and failing septic systems

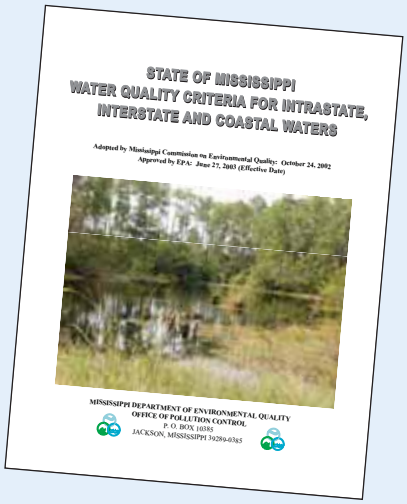
Field water quality monitoring

Technicians performing aquatic insect inventory

While no inland streams and lakes in the Coastal Streams Basin are impacted by mercury—a toxic metal—the waters of the Gulf of Mexico are impacted by other river basins that feed into the Gulf. Mercury is thought to originate from widely distributed sources such as air emissions from incinerators and coal-fired power plants. It can travel many miles before settling on the ground and being washed into streams and lakes that eventually drain to the Gulf of Mexico.

Surface Water Quality Standards

Mississippi water quality standards establish the goals for protecting and maintaining the quality of our surface waters (streams, lakes, estuaries, etc.) 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 and 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 used 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, 601-961-5171.

Once in the water, mercury enters the food chain and may accumulate in fish. Fish tissue studies have led MDEQ to issue fish consumption advisories for some areas in the Gulf of Mexico. Only the fish listed in the advisory are subject to the consumption limitations. The advisories do not apply to farm-raised catfish. A fish consumption advisory for the Coastal Streams Basin is shown on the map below and listed in detail in Table 1.

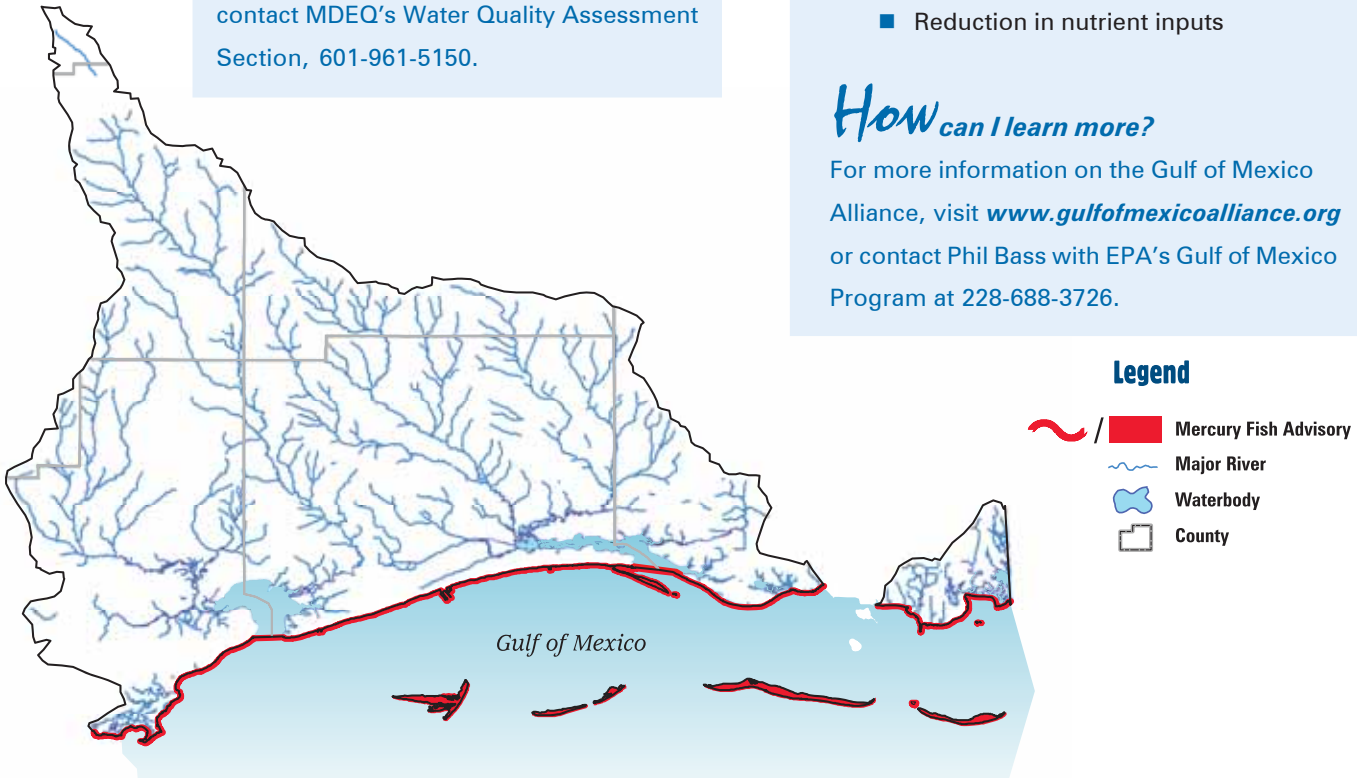
Table 1. Coastal Streams Basin Fish Consumption Advisories

Stream Reach	Chemical	Action
Gulf of Mexico	Mercury	King Mackerel: less than 33 inches—no limit 33 to 39 inches—limit consumption* greater than 39 inches—do not eat

* The Mississippi State Health Department recommends that people limit the amount of 33- to 39-inch King Mackerel they eat from the Mississippi Gulf Coast. 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.

How can I learn more?

For more information on water quality in the basin, see the state's latest Water Quality Assessment at ***www.mdeq.state.ms.us*** or contact MDEQ's Water Quality Assessment Section, 601-961-5150.



The Gulf of Mexico Alliance

The Gulf of Mexico Alliance was formed in 2004 to lead a regional effort to protect the Gulf waters. In the spring of 2005, thirteen federal agencies convened to support the Gulf of Mexico Alliance led by the U.S. Environmental Protection Agency and the National Oceanic and Atmospheric Administration. The Alliance has become nationally and internationally renowned for its model of cooperation. By sharing science, expertise and financial resources, the Alliance has helped to better protect the environmental and economic health of this complex water resource. In addition to addressing the issue of hypoxia (very low oxygen levels in the water) the Alliance is being challenged to tackle the following issues:

- Water quality
- Wetland and coastal restoration
- Environmental education
- Characterization of Gulf habitats
- Reduction in nutrient inputs

How can I learn more?

For more information on the Gulf of Mexico Alliance, visit ***www.gulfofmexicoalliance.org*** or contact Phil Bass with EPA's Gulf of Mexico Program at 228-688-3726.

TMDLs

Total Maximum Daily Loads (TMDLs) are pollution budgets. A TMDL determines how much of a pollutant can be present in a stream, river, lake, or other water body without affecting aquatic life or public health.

A total of 85 TMDLs have been developed for water body segments in the Coastal Streams Basin. Most of these TMDLs state the estimated amount of bacteria, sediment, or nutrients entering the waters and how much these pollutants should be reduced to restore water quality conditions. Rural and urban communities will need to work in partnership with resource management agencies to restore and maintain the water quality necessary to support aquatic life and safe recreation in these waters.

An additional 15 TMDLs remain to be completed for the Coastal Streams Basin water body segments on the state's impaired waters list based on the 2006 §303(d) list. As ongoing monitoring activities find additional impaired streams, these will be added to the list for TMDL development as well. Table 2 provides a summary of completed and needed TMDLs in the Coastal Streams Basin.

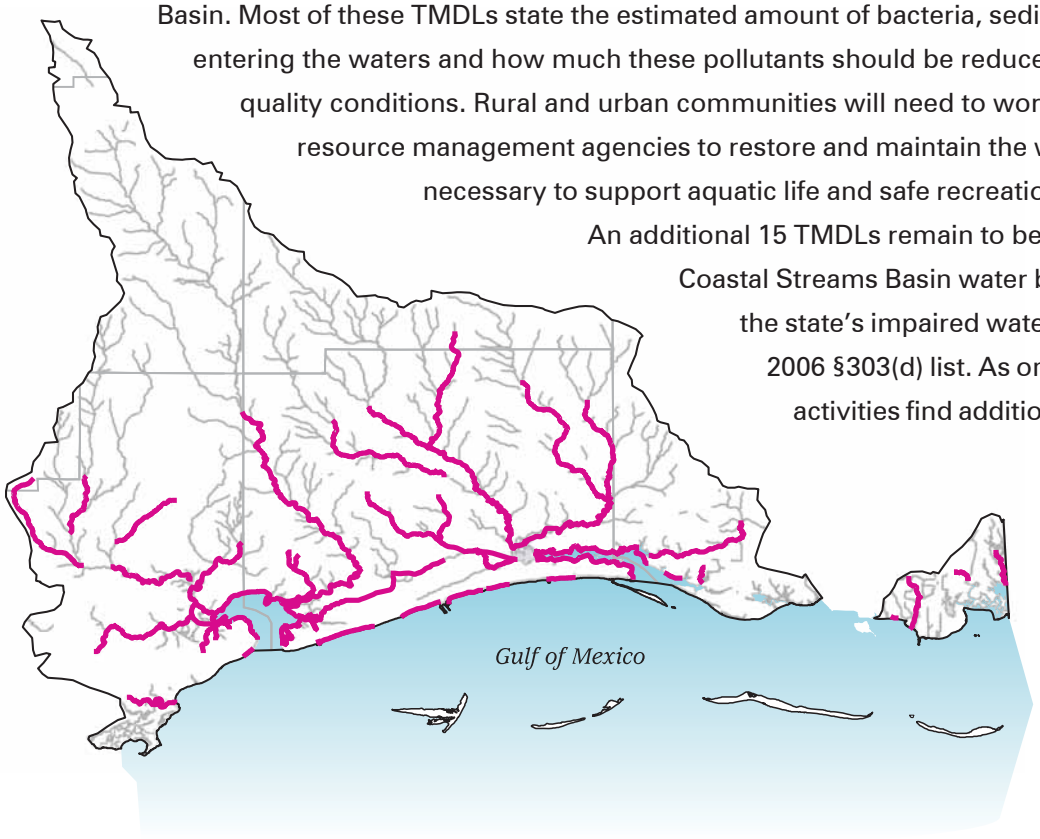


Table 2. Coastal Streams TMDL Summary

	TMDLs Completed	TMDLs Remaining
Biological Impairment	NA	3
pH	1	0
Nutrients	18	0
Organic Enrichment/Low DO	5	2
Pathogens	40	9
Unionized Ammonia	2	0
Sediment/Siltation/Turbidity	5	1
Hydrocarbons/Phenols	3	0
Toxicity (Total Toxics and Unknown Toxicity)	11	0
Total	**85**	**15**

How can I learn more?

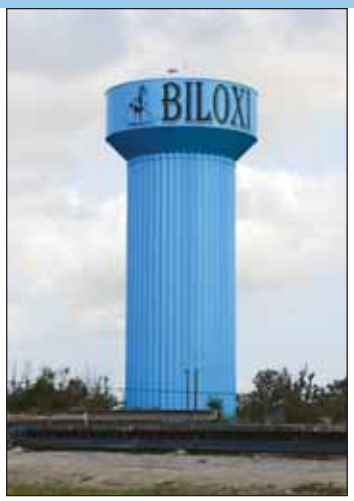
For more information on TMDLs, contact Kay Whittington with the MDEQ Office of Pollution Control, Surface Water Division, (601) 961-5729 or visit the MDEQ website at ***www.deq.state.ms.us***.

Drinking Water Protection

Ground water supplies all of the drinking water consumed in the Coastal Streams Basin. Abundant ground water resources from several aquifers allow for a large number of domestic wells throughout the rural areas of the basin. These wells are often relatively shallow and may be susceptible to contamination from a variety of sources. Improperly sited and poorly maintained septic systems are usually the biggest health concern.

There are also 320 public water systems serving the Coastal Streams Basin area. The water wells used by these systems generally pump from deep aquifers naturally protected by thick overlying layers of clay. The only real ground water protection concern is abandoned wells, which are potential conduits for contamination. These wells should be plugged to protect ground water resources.

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 assessments of the areas around supply sources to evaluate potential threats and levels of protection that may be needed. In Mississippi, the State Department of Health regulates public water systems operating in the state, and MDEQ assists in the protection of drinking water sources through the Source Water Assessment/ Protection Program.



Peter Cada, Tetra Tech, Inc.

Biloxi Water Tower

MDEQ has sampled 48 drinking water wells in the Coastal Streams Basin over the past 16 years. Analyses of these samples included testing for the presence of 100 widely-used pesticides and various constituents, including volatile organic compounds and inorganic constituents. Analytical results of this sampling indicated no chemical detections exceeding MCLs. Although ground water generally is of good quality in the basin, natural coloration can occur locally in certain aquifers.

How can I learn more?

For more information on drinking water assessments, visit ***www.deq.state.ms.us***, or contact the MDEQ Office of Land and Water Resources, 601-961-5395.

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 do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their treated wastewater goes into state waters. These permits specify the types, quantity, and concentrations of pollutants that may be discharged by a facility. Since its introduction in the 1970s, the NPDES permit program has led to significant improvements in our nation's and Mississippi's water quality.

Before beginning work, a developer must obtain permits specifying temporary management practices that must be in place to keep excessive sediment from leaving the construction site. After construction is complete, permanent detention basins or similar measures may be required to treat the increase in storm-water runoff and pollutants as a result of the development.

How can I learn more?

For more information on NPDES Permitting, visit ***www.deq.state.ms.us***, or contact the MDEQ Office of Pollution Control, Environmental Permits Division, 601-961-5702.

Gulf Region Water and Wastewater Plan

With the post-Katrina population shift from the coast to more inland areas comes the challenge of providing enough clean drinking water and wastewater treatment for the current and future residents of the Gulf Region. The purpose of the Gulf Region Water and Wastewater Plan is to identify the infrastructure needs for providing water (e.g., water mains) and wastewater (e.g., sewer lines) services to the six Gulf region counties of Hancock, Harrison, George, Jackson, Pearl River, and Stone. The plan was created by Governor Haley Barbour, and uses Congressional money to aid long-term Hurricane Katrina recovery efforts.

MDEQ is responsible for developing the plan to provide storm-proof solutions for the region's water and wastewater infrastructures. Any priority projects identified by the Plan will be eligible for funding. The Plan will incorporate short and long-term projections of population growth in the region to identify where potential infrastructure may be needed.

A regional plan provides a more comprehensive approach for protecting infrastructure from storm events, providing a higher level of public safety, and supporting economic development. An important part of the process was ensuring the involvement of local community stakeholders throughout the Plan's development.

Governor Barbour and others break ground for the Moss Point Water Treatment Plant

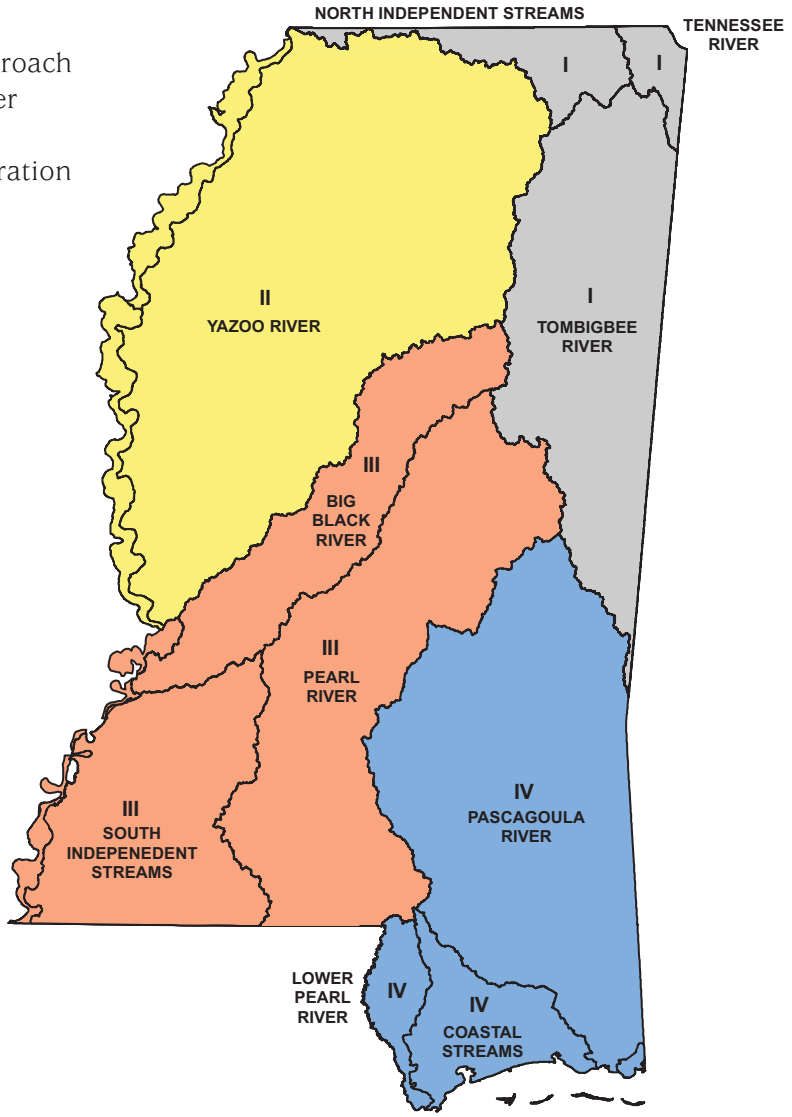
Janet Chapman, MDEQ

How can I learn more?

For more information on the Gulf Region Water and Wastewater Plan, visit ***www.msgulfregionplan.org***, or contact Ray Eaton with MDEQ at 601-961-5171, or Jim Hust with MSEG at 601-355-3518.

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, nine of Mississippi's major river basins have been organized into four basin groups (see map inset). Each basin group has a basin team of state and federal agencies and local organizations. This team 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 prioritize watersheds for water quality restoration and protection activities. The Basin Management Approach also encourages and provides the opportunity for basin team members to pool both technical and financial resources to address priority watersheds.



How can I learn more?

Contact your Basin Coordinator:

Group I — **North Independent Streams, Tennessee River & Tombigbee River**
Janet Chapman (601) 961-5266 ● janet_chapman@deq.state.ms.us

Group II — **Yazoo River**
Richard Ingram (601) 961-5078 ● richard_ingram@deq.state.ms.us

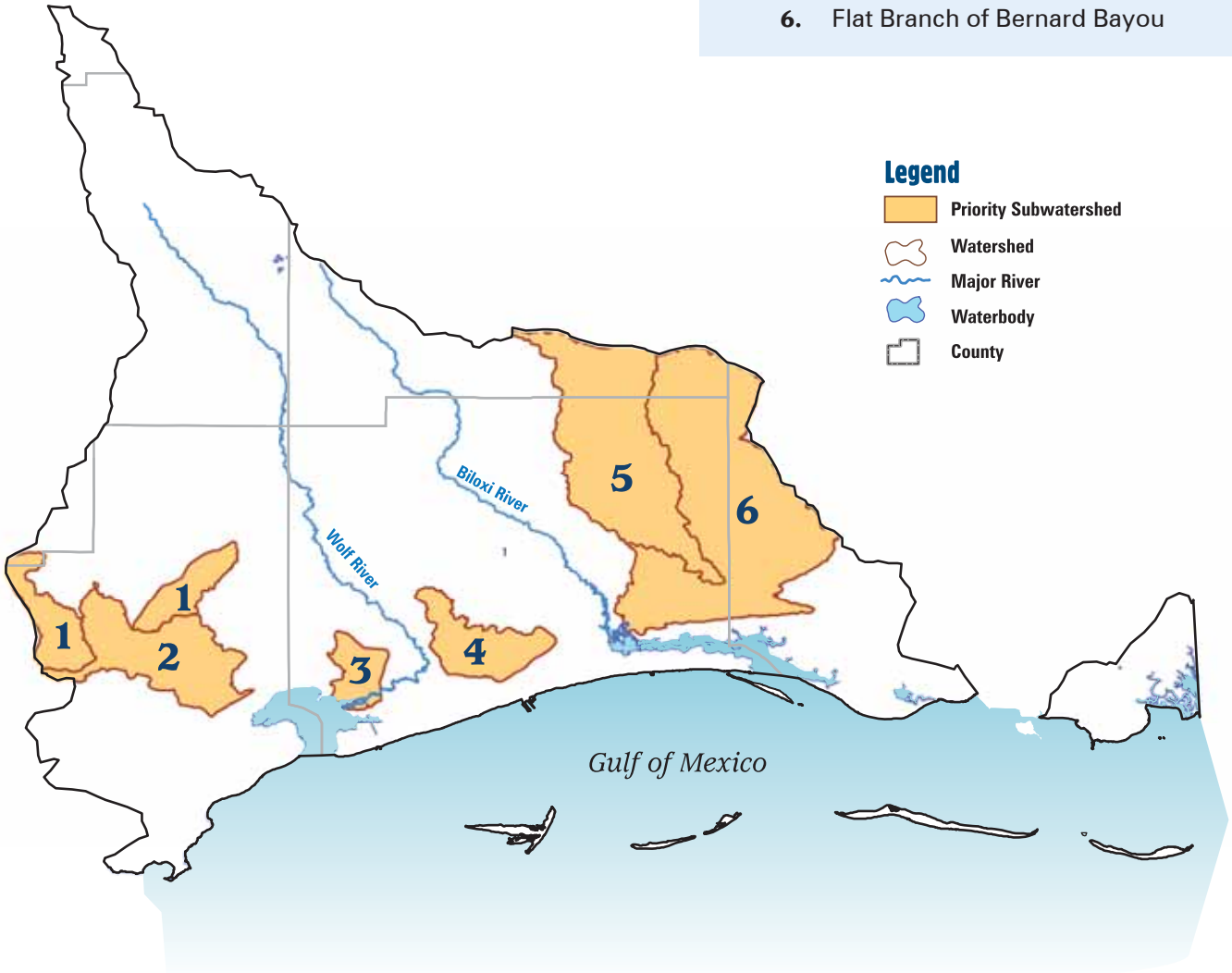
Group III — **Pearl River, South Independent Streams & Big Black River**
Richard Ingram (601) 961-5078 ● richard_ingram@deq.state.ms.us

Group IV — **Pascagoula River, Coastal Streams & Lower Pearl River**
Richard Ingram (601) 961-5078 ● richard_ingram@deq.state.ms.us

Priority Watersheds

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

Number	Watershed
1.	Dead Tiger and Orphan Creek
2.	Jourdan River
3.	De Lisle Bayou
4.	Turkey Creek
5.	Tuxachanie Creek/ Tchoutacabouffa River
6.	Flat Branch of Bernard Bayou



Watershed Teams are formed to actively engage stakeholders

A Coastal Streams Basin Team of 23 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 Coastal Streams Basin. The team reviewed information on the basin's streams and lakes, and ranked the watersheds based on resource value (intrinsic benefit to the citizens of the state), integrity of water quality data, TMDL data, degree of impairment of the watershed, level of support for implementing management measures, historical/cultural/scenic qualities, and expected benefits. This resulted in the targeting of watersheds for management planning and implementation activities.

The Basin Team selected six priority watersheds: Dead Tiger and Orphan Creeks, DeLisle Bayou, Flat Branch of Bernard Bayou, Jourdan River, Turkey Creek, and Tuxachanie Creek/Tchoutacabouffa River. In several of these priority watershed areas, watershed implementation teams are being formed to coordinate restoration and/or protection efforts throughout the watershed. Watershed Forums have taken place for Tchoutacabouffa River and Tuxachanie Creek and a watershed team has been established for Turkey Creek. These forums and teams have the support of several organizations, including the Land Trust for the Mississippi Coastal Plain, Mississippi Soil and Water Conservation Commission, local Soil and Water Conservation Districts, Natural Resources Conservation Service, MSU Department of Wildlife and Fisheries and other team members who are identifying where to improve water quality. Each team is developing implementation plans that will identify what each agency, organization, and landowner is willing to do to address identified problems. Highlights of six of the priority watersheds follow.

Peter Cada, Tetra Tech, Inc.

Jourdan River near McLeod Water Park

Peter Cada, Tetra Tech, Inc.

Jourdan River near Highway 43

Jourdan River Watershed

Jourdan River begins just north of Hancock County, and continues south through the county before meeting the Bay St. Louis. Outside of Kiln and Bay St. Louis, the watershed is mostly rural with agriculture, livestock, and timber land uses. The 16-mile section of Jourdan River targeted for restoration is found just north of the rapidly developing business corridor around Interstate 10. The primary water quality concerns for Jourdan River are faulty septic and wastewater systems, sediment from soil and stream bank erosion and nutrient enrichment. Restoration and protection efforts in this watershed may employ one or more of the following management practices to improve water quality:

- Repaired septic systems
- Riparian forest buffers—shrubs and tree planting
- Prescribed burning
- "Green" stormwater management
- Bank stabilization projects
- Low-Impact Development

A Jourdan River Watershed Team was established in 2006 to develop a program to help restore and protect the lands and waters along Jourdan Creek. The team meets quarterly to discuss and address the above pollution issues and other issues impacting the river.

How can I learn more and get involved?

Jourdan River 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 recreational and economic potential of the watershed. Why don't you join with us? For information about restoration activities for Jourdan River, contact Judy Steckler with the Land Trust for the Mississippi Coastal Plain at 228-435-9191.

Dead Tiger and Orphan Creeks

Dead Tiger Creek is a small tributary of Jourdan River that lies entirely within Hancock County. While this watershed includes a significant amount of rural area its proximity to the rapidly developing business corridor around Interstate 10 makes it likely that it will be developed in the near future. The entire watershed of Dead Tiger Creek is targeted for restoration activities.

Orphan Creek, a larger tributary of Jourdan River located entirely in Harrison County, drains about 42 square miles before connecting with Bayou Bacon west of Kiln. The easy access to Interstate 10, via Highway 43 and 603, increases the chance that the Orphan Creek watershed will continue to be developed. The entire watershed of Orphan Creek is targeted for restoration activities.

Water quality in Dead Tiger Creek and Orphan Creek is affected by bacteria, sediment, and low dissolved oxygen due to nutrient enrichment. Restoration and protection efforts in these watersheds may employ one or more of the following management practices to improve water quality:

- Repaired septic systems
- Riparian forest buffers—shrubs and tree planting
- Prescribed burning
- "Green" stormwater management
- Bank stabilization projects
- Low-Impact Development

The Jourdan River Watershed Team, established in 2006, will also develop a program that will help restore and protect the lands and waters along Dead Tiger and Orphan creeks. The Jourdan River Watershed Team meets quarterly to discuss and address the above pollution issues and other issues impacting the creeks.

Peter Cada, Tetra Tech, Inc.

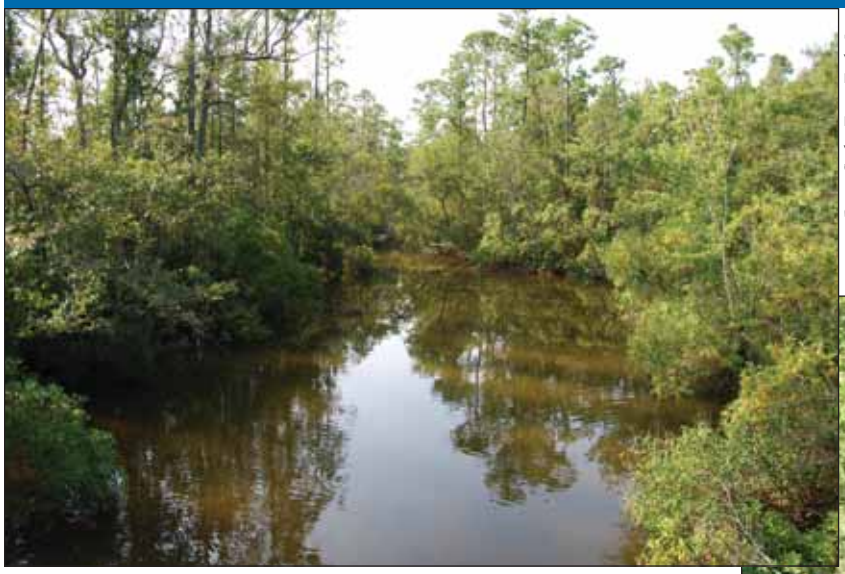
Dead Tiger Creek near McLeod Water Park

Peter Cada, Tetra Tech, Inc.

Erosion and sedimentation control on road construction projects limit water quality impacts

How can I learn more and get involved?

The Dead Tiger and Orphan Creek watersheds have 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 recreational and economic potential of the watershed. Come join with us to make a difference. For information about restoration activities for these watersheds, contact Judy Steckler with the Land Trust for the Mississippi Coastal Plain at 228-435-9191.



Peter Cada, Tetra Tech, Inc.

De Lisle Bayou near Cuevas De Lisle Road

Peter Cada, Tetra Tech, Inc.

Forest buffer along streams prevents erosion, filters pollutants and provides shade to keep temperatures cool and algae growth to a minimum

De Lisle Bayou

De Lisle Bayou is a small tributary of the Wolf River system lying within Harrison County, with headwaters reaching just north of Interstate 10. Like many of the priority watersheds, De Lisle Bayou's watershed is near the rapidly developing business corridor around Interstate 10, and will likely be developed in the near future. There are no watershed teams or forums established for De Lisle Bayou nor restoration activities planned at this time but may be in the near future as interest develops. Water quality in the De Lisle Bayou watershed is most affected by bacteria from faulty septic and waste-water systems, sediment from soil and stream bank erosion, and low dissolved oxygen due to nutrient enrichment from over-fertilization. Restoration and protection efforts in these watersheds may employ one or more of the following management practices to improve water quality:

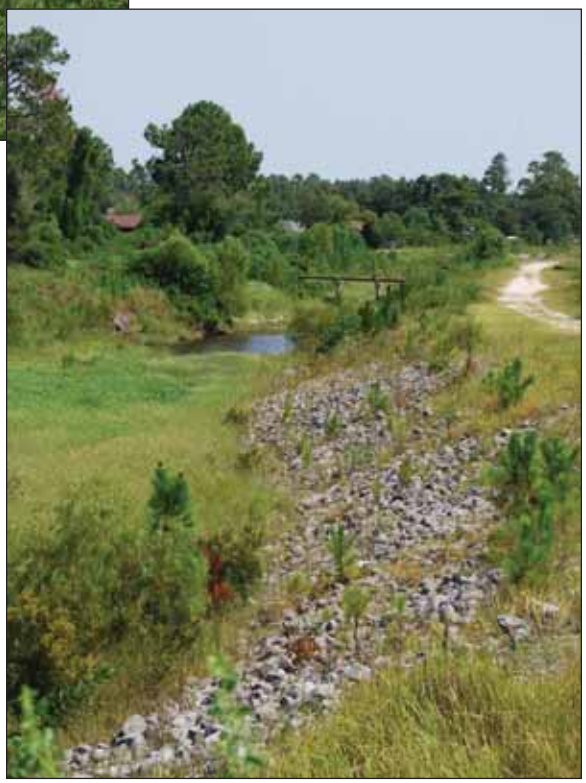
- Repaired septic systems
- Riparian forest buffers—shrubs and tree planting
- "Green" stormwater management
- Bank stabilization projects
- Low-Impact Development

How can I learn more and get involved?

De Lisle Bayou 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 recreational and economic potential of the watershed. Join the team and make a difference! For information about restoration activities for De Lisle Bayou, contact Judy Steckler with the Land Trust for the Mississippi Coastal Plain at 228-435-9191.

Peter Cada, Tetra Tech, Inc.

Flat Branch near O'Neal Road



Peter Cada, Tetra Tech, Inc.

Bank stabilization reduces risk of stream bank erosion and collapse

Flat Branch of Bernard Bayou

Flat Branch begins near Lyman in Harrison County and flows southeasterly to its confluence with Bernard Bayou. Suburban and commercial land uses dominate much of the watershed, and development pressure will continue along the Interstate 10 business corridor. There are no watershed teams or forums established yet for Flat Branch as well as no restoration activities planned at this time but may be in the near future as interest develops. Water quality in Flat Branch is most affected by nutrients and sediment from surface runoff. Restoration and protection efforts in this watershed may employ one or more of the following management practices to improve water quality:

- Critical area planting
- Sediment basins
- Repaired septic systems
- Riparian forest buffers—shrubs and tree planting
- "Green" stormwater management
- Bank stabilization projects
- Low-Impact Development

How can I learn more and get involved?

Flat Branch 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 recreational and economic potential of the watershed. Why don't you join with us? Contact MDEQ's Basin Management Approach Branch for more information on getting involved in watershed planning activities.

Peter Cada, Tetra Tech, Inc.

Tchoutacabouffa River near Skeet Hunt Road

Peter Cada, Tetra Tech, Inc.

Tuxachanie Creek near Highway 15

Peter Cada, Tetra Tech, Inc.

Sediment fences help to control soil erosion during construction of land development projects

Tuxachanie Creek/Tchoutacabouffa River Watershed

The Tchoutacabouffa River begins near the Jackson County line and drains just over 242 square miles emptying into the Big Lake just west of D'Iberville. While this watershed includes considerable area located in De Soto National Forest, its rural landscape is quickly converting to suburban land uses with a rapidly developing business corridor near Interstate 10. The section of Tchoutacabouffa River that will be targeted for restoration activities is split evenly between Jackson and Harrison counties, and is about 23 miles long.

Tuxachanie Creek, located within the Tchoutacabouffa watershed, is a major tributary draining approximately 94 square miles before connecting with the Tchoutacabouffa River just north of D'Iberville. The section of Tuxachanie River targeted for restoration activities is located entirely in Harrison County and is about 16 miles long.

Water quality in the Tuxachanie Creek and Tchoutacabouffa watersheds is most affected by nutrients and sediment. Restoration and protection efforts in these watersheds may employ one or more of the following management practices to improve water quality:

- Boat Operating Regulations
- Riparian forest buffers—shrubs and tree planting
- "Green" stormwater management
- Bank stabilization projects
- Low-Impact Development

A Tchoutacabouffa River Watershed Team was established in 2004 to develop a program to help restore and protect the lands and waters along the Tchoutacabouffa River and the Tuxachanie Creek. The team meets quarterly to discuss and address the above pollution issues and other issues impacting the river.

How can I learn more and get involved?

The Tuxachanie Creek and Tchoutacabouffa River watersheds have 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 recreational and economic potential of the watershed. Join the team and make a difference! For information about restoration activities for these watersheds, contact Judy Steckler with the Land Trust for the Mississippi Coastal Plain at 228-435-9191.

Peter Cada, Tetra Tech, Inc.

Turkey Creek near Old Highway 49

Peter Cada, Tetra Tech, Inc.

Storm water management structures help reduce pollutants that may enter downstream waterways

Turkey Creek

Turkey Creek begins in central, rural Harrison County halfway between Interstate 10 and Highway 53 northwest of New Hope and flows toward its confluence with Bernard Bayou just north of the Gulfport-Biloxi International Airport. The Creek is popular for fishing, swimming and canoeing and is a historic and present contributor to the local culture and quality of life. Turkey Creek watershed drains just over 17 square miles of land that has relatively flat topography creating a slow-moving coastal stream with tidally influenced areas near the coast. The upper watershed is composed mostly of rural lands covered by wet-pine savannas and forests whereas the lower portion of watershed has a lot of developed lands. This more developed area includes Gulfport-Biloxi International Airport, Gulfport and Long Beach, and the Interstate 10 business corridor.

Water quality in Turkey Creek is most affected by pathogens, nutrients and sediment. It is believed that failing septic systems (considered to be close to 50% by MDEQ) and urban development are the two major sources of water quality degradation in the Turkey Creek watershed. Restoration and protection efforts in this watershed may employ one or more of the following management practices to improve water quality:

- Urban forest renewal program
- Sediment basins
- Repaired septic systems
- Riparian forest buffers—shrubs and tree planting
- "Green" stormwater management
- Bank stabilization projects
- Low-Impact Development

A Turkey Creek Watershed Team was established in 2005 to develop a program to help restore and protect the lands and waters along Turkey Creek. The team meets quarterly to discuss and address the above pollution issues and other issues impacting the river. Additionally, local citizens have been getting involved with the Turkey Creek and North Gulfport Neighborhoods Community Plan to help promote intelligent urban planning that incorporates conservation and ecological restoration in the Turkey Creek watershed.

How can I learn more and get involved?

Turkey 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 recreational and economic potential of the watershed. Why don't you join with us? For information about restoration activities for Turkey Creek, contact Judy Steckler with the Land Trust for the Mississippi Coastal Plain at 228-435-9191.

Agencies and Organizations Cooperating for Improved Water Quality

Numerous state and federal agencies and stakeholder organizations are working together to protect the quality of the Coastal Stream Basin's waters. These organizations have voluntary management and/or assistance programs that encourage the implementation of best management practices, regulatory programs that focus on permitting and compliance requirements, wetland and other habitat restoration programs, monitoring and assessment programs, and other watershed management efforts. For specific information on water quality activities or how to be involved in watershed protection, contact:

State of Mississippi/Alabama Agencies

Alabama Department of Environmental Management
251-450-3408 *www.adem.state.al.us*

Auburn University Marine Extension & Research Center
251-438-5690 *www.ag.auburn.edu/fish/aumerc*

Mississippi-Alabama Sea Grant Consortium (MASGC)
228-818-8836 *www.masgc.org*

Mississippi Department of Agriculture and Commerce (MDAC)
601-359-1100 *www.mdac.state.ms.us*

Mississippi Department of Environmental Quality (MDEQ)
601-961-5171 *www.deq.state.ms.us/mdeq*

Mississippi Department of Health, Bureau of Environmental Health (MSDH/BEH)
601-576-7400 *www.msdh.state.ms.us*

Mississippi Department of Marine Resources (MDMR)
228-374-5000 *www.dmr.state.ms.us*

Mississippi Department of Transportation (MDOT)
601-359-9815 *www.mdot.state.ms.us*

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 National Guard
601-313-6138 *www.ngms.state.ms.us*

Mississippi Soil & Water Conservation Commission (MSWCC)
601-354-7645 *www.mswcc.state.ms.us*

Mississippi State University Coastal Research & Extension Center
228-475-7047 *www.msstate.edu/dept/crec/crec.html*

Mississippi State University Cooperative Extension Service (MSU/CES)
662-325-8747 *www.msucares.com*

Mississippi State University Department of Wildlife and Fisheries
601-325-6768 *www.cfr.msstate.edu/wildlife*

University of Southern Mississippi Gulf Coast Research Lab (GCRL)
228-872-4203 *www.usm.edu/gcrl*

United States Government Agencies

National Weather Service
601-936-2189 *www.srh.noaa.gov*

U.S. Agricultural Research Service, National Sedimentation Lab (USDA/ARS/NSL)
662-232-2900 *www.ars.usda.gov*

U.S. Army Corps of Engineers, Mobile District (USACE)
251-694-3861 *www.sam.usace.army.mil*

U.S. Department of Agriculture Farm Service Agency (USDA/FSA)
601-965-4300 *www.fsa.usda.gov*

U.S. Department of Interior, National Park Service (NPS)
228-875-9057 *www.nps.gov/guis*

U.S. Environmental Protection Agency, Gulf of Mexico Program (EPA/GOMP)
228-688-3726 *www.epa.gov/gmpo*

U.S. Environmental Protection Agency, Region 4 (EPA/R4)
404-562-9396 *www.epa.gov/region4*

U.S. Fish and Wildlife Service (USFWS)
601-965-4900 *www.fws.gov*

U.S. Forest Service (USFS)
601-965-4391 *www.fs.fed.us*

U.S. Geological Survey (USGS)
601-965-2900 *www.usgs.gov*

U.S. Natural Resource Conservation Service (USDA/NRCS)
601-965-4139 *www.ms.nrcs.usda.gov*

Stakeholder Organizations

Audubon Mississippi
228-475-0825 *www.msaudubon.org* & *www.mscoastaudubon.org*

Chevron Pascagoula Refinery
228-938-4563 *www.chevronpascagoula.com*

Land Trust for the Mississippi Coastal Plain
228-435-9191 *www.ltmcp.org*

Mississippi Association of Soil and Water Conservation Districts (SWCDs)
601-354-7645 *www.mswcc.state.ms.usmacd*

Mississippi Farm Bureau Federation
800-227-8244 *www.msfb.com*

Mississippi Fish & Wildlife Foundation
662-686-3375 *www.wildlifemiss.org*

Mississippi Forestry Association
601-354-4936 *www.msforestry.net*

Mississippi Power Company
228-865-5152 *www.mississippipower.com*

Mississippi Wildlife Federation
601-206-5703 *www.mswildlife.org*

Pascagoula River Basin Alliance
228-475-0825 *mlasalle@audubon.org*

The Nature Conservancy-Mississippi Chapter
601-713-3355
www.nature.org/wherewework/northamerica/states/mississippi

Sustaining Our Environmental Resources and Economic Development

Some 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 restore, protect, 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 local watershed teams through Mississippi's Basin Management Approach. Watershed planning, education, protection, and restorative initiatives are all critical tools for carrying out this important work. Mississippians are working hard to preserve their abundant natural resources that provide outstanding fishing, hunting, economic development, and quality of life.

Fishing for generations

Janet Chapman, MDEQ

Storm drain marking

Citizens Can Help Protect Their Watershed:

- **Return your old car battery** when buying a new one.
- **Mulch your garden**—mulching conserves water, moderates soil temperatures, and controls weeds.
- **Water slowly and thoroughly.** Over-watering wastes water and can carry pollutants such as insecticides and fertilizer to streams or lakes.
- **Plant vegetation along stream banks.** If you have a creek running through your property, maintain a vegetated buffer zone along the waterway. This improves infiltration of water into the ground, helps filter runoff entering the stream, holds soils in place, and slows down flowing water in flood conditions.
- **Participate in school programs.** Learn about an environmental topic and volunteer to make a presentation at a local school.
- **Join an Adopt-A-Stream program** and help clean a water body in your area.
- **Donate a tree or trees** to a school, public building, or park. Trees generate oxygen while consuming carbon dioxide, and provide shade and cooling.

US Forest Service, De Soto Ranger District

Spring cleaning

Mississippi Department of Environmental Quality
Office of Pollution Control
515 East Amite Street
Jackson, MS 39201
601-961-5171

www.deq.state.ms.us

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