

Mississippi's Nonpoint Source Management Program



Buffalo River, Wilkinson
County, MS
Coleman Leach, MDEQ

2014 Annual Report



MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY

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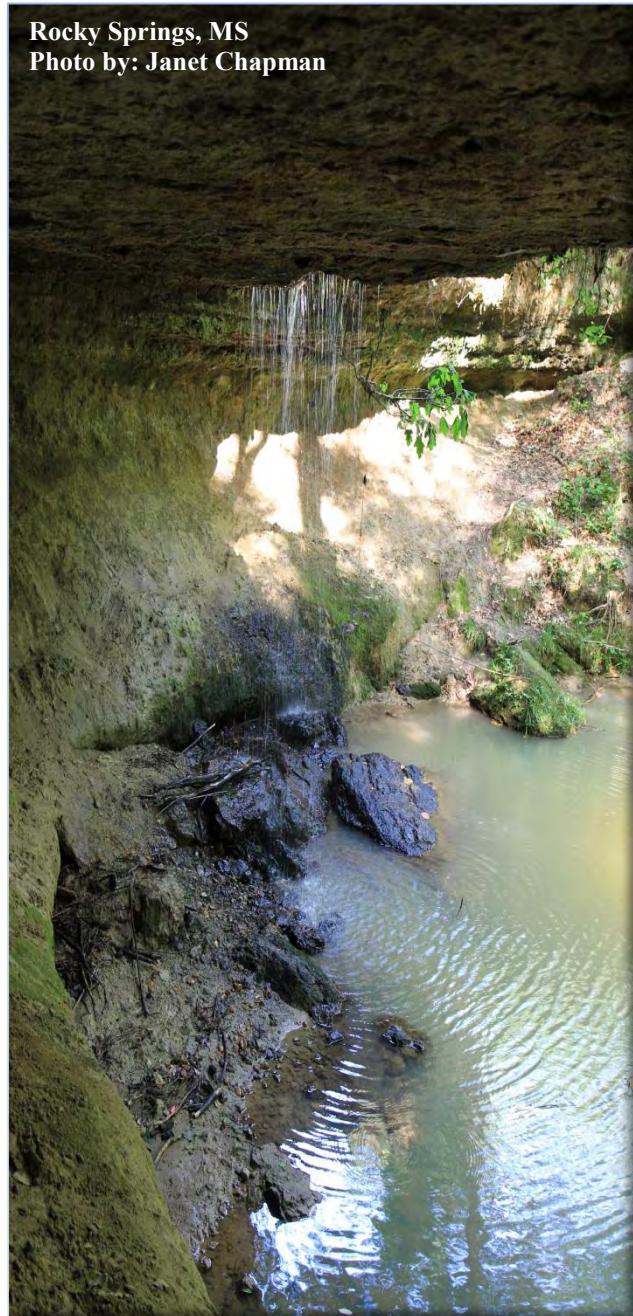
Mississippi's 2014 Nonpoint Source Program Annual Report

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Rocky Springs, MS

Photo by: Janet Chapman



Executive Summary

Nonpoint Source (NPS) Pollution, also known as polluted runoff, has an adverse impact on the State's water resources. Unlike pollutants from point sources that enter the environment from well-defined discharge points, pollutants from nonpoint sources find their way to surface and ground waters via rainwater runoff or percolation. The polluted runoff can contain sediment, nutrients, bacteria, or toxic materials. Runoff from the seven major land-use categories listed below potentially impacts the State's water bodies. These categories consist of agriculture, forestry, mining, construction activities, urban runoff, hydrologic modifications, and land-disposal activities. Polluted runoff is a significant cause of water-quality problems in Mississippi. The NPS Pollution Control Program seeks to reduce or eliminate polluted runoff that degrades water bodies in Mississippi.

The State's NPS Management Plan incorporates a strategy for the management and abatement of NPS pollution and relies on statewide and targeted watershed approaches. These approaches are implemented through both regulatory and non-regulatory programs on the federal, state, and local levels. Some of the activities regulated by the State include: construction, stormwater, mining, and hydrologic modifications. The strategies for the management of these activities are to continue developing and implementing educational programs and to continue issuing permits and maintaining compliance and enforcement activities. The implementation of program activities for land-use categories that are not regulated will rely primarily on the voluntary cooperation of stakeholders and will be supported financially through federal assistance programs such as Section 319 and other state resources. The strategies for addressing NPS pollution on a statewide level include education/outreach, assessment and monitoring, use of Best Management Practice (BMP) and nutrient reduction demonstrations, BMP compliance, technology transfer, consensus building, and partnering.

The NPS Management Program also implements a strategy that targets priority watersheds. Prioritization of these watersheds is done by multi-agency teams in the Basin Management Approach (BMA). Within priority watersheds, activities will be implemented to address parameters of concern that appear on the State's 303(d) list. The State's NPS Program also incorporates *Mississippi's Strategies to Reduce Nutrients and Associated Pollutants*, and the State's strategy for the development and implementation of NPS Total Maximum Daily Loads (TMDLs).

The NPS Program continues to be implemented in cooperation with several agencies, organizations, and groups at all levels of government and in the private sector. A great focus is given to activities that promote consensus building and partnering to increase the overall effectiveness of the State's NPS Program. One key partnership to increase this overall effectiveness is with the USDA Natural Resources Conservation Service (NRCS). In 2012, MDEQ and NRCS signed a three-year \$600K per year memorandum of agreement (MOA). The MOA provides for Section 319 funds to be used for assessment and monitoring of National Water Quality Initiative (NWQI) sites where the NRCS has or will implement various conservation practices such as cover crops, filter strips, and terraces.

MDEQ's program strategy will be implemented to meet the long-term goals of the program. The long-term goals will, in turn, be achieved by implementing five-year action plans. These plans will be modified as more data and new issues are identified under the BMA.

This report relates several accomplishments during calendar year 2014 that directly relate to and support the long-term and short-term action strategies identified in the State's NPS Management Program. These accomplishments include characterization, assessment/monitoring, and protection/restoration of impeded

water bodies. Of course, education and outreach activities are inherent to each protection/restoration project so as to gain local stakeholder support and involvement.

Characterization/Assessment/Monitoring. Major assessment and monitoring accomplishments include two systems: 1) the further development, refinement, and use of the *Mississippi Benthic Index of Stream Quality (M-BISQ)*; and 2) an *Index of Biological Integrity (IBI)*, which is used to assess all wadeable, non-tidal streams in Mississippi with the exception of those located in the Mississippi Alluvial Plain (aka The Mississippi Delta). Monitoring within the Mississippi Delta has been occurring since 2002 when MDEQ began collecting biological community, physical, chemical, and habitat data on the Delta's wadeable streams. Both of these major assessment/monitoring systems have greatly increased the number of biological assessments conducted on State waters.

Protection/Restoration. In addition to the above activities, there continues to be much progress in the protection and restoration efforts of specific watershed projects. Three projects are showcased in this report: 1) Porter Bayou; 2) Rotten Bayou; 3) Ross Barnett Reservoir.

Porter Bayou is a watershed in the Mississippi Delta comprised mainly of productive agricultural land, having about 80 % of its watershed consisting of these types of lands. Naturally, there are much nutrient-laden sediments that need to be reduced and prevented from reaching waters further downstream. So, the main objective of this project is to determine what reductions are achievable using Best Management Practices (BMPs) and the cost to implement these practices. This project serves as a noteworthy example of leveraging resources in a collaborative effort within a multi-agency task force that forms the Mississippi River Basin Initiative (MRBI). Data has been compiled for this project, with findings indicating reductions of over 1,800 lbs/yr of Phosphorous, 4,000 lbs/yr of Nitrogen and 1,700 tons/yr of sediment in Mississippi waters.

Rotten Bayou is a Mississippi coastal watershed containing 22,246 acres and is a tributary to St. Louis Bay. Here, a *Coastal Nutrient Reduction Strategy* is being implemented. Nutrient TMDLs have been developed for this watershed and will be used for the load-reduction targets in the watershed implementation plan. Tributaries of St. Louis Bay, including Rotten Bayou, have a TMDL for organic enrichment, low dissolved oxygen (DO), and nutrients. MDEQ is leveraging with nine different federal, state, local government, and non-profit organizations to implement the *Coastal Nutrient Reduction Strategy* that addresses livestock, forestry, urban stormwater, and atmospheric deposition.

Ross Barnett Reservoir is a vital resource to central Mississippi. It is the largest source of drinking water in the State and it receives more than 2.5 million visitors annually. Many consider it to be the premier recreational water body in Mississippi. EPA has designated this area as a priority watershed. The MDEQ and the Pearl River Valley Water Supply District (PRVWSD), along with other various resource agencies, have been working towards finalizing plans to protect and restore water quality within the Ross Barnett Reservoir Watershed. This initiative, which is known as *Rezonate*, focuses on six priority issues in the watershed and includes reduction and control of: 1) watershed erosion/sedimentation; 2) pathogens; 3) litter/trash in the reservoir and around the shoreline; 4) nutrients/organic enrichment; 5) invasive species and; 6) pesticides. As part of the protection and restoration initiative, the *Comprehensive Watershed Protection and Restoration Plan* was developed using EPA's *Nine Key Elements of Watershed Protection* to identify potential pollutant sources in the watershed. MDEQ and the PRVWSD have entered into a memorandum of agreement for professional services that will include the implementation of a minimum of three BMP demonstration-site locations to reduce sediment and peak-storm, water-flow loading into the watershed. The BMP demonstration sites will provide effective education and outreach to numerous targeted audiences within the State.

Education and Outreach. Education and outreach activities are inherent to each of MDEQ's protection and restoration projects that have been selected from a list of priority watersheds. These activities become a part of the watershed implementation plan for that project. For example, *Adopt-A-Stream* is a program that includes water-education workshops on streams themselves. Streams having protection/restoration projects are given priority for locating and conducting these workshops. Similarly, other education/outreach activities are treated in the same way as much as possible. There are some activities that are generic and have statewide applicability. Activities in addition to *Adopt-A-Stream* described in this report include: 1) *Envirothon Competition*; 2) *Environmental Teacher Workshops and Student Environmental Camps*; 4) *Blueways*; 5) *WaterFest Event on the Ross Barnett Reservoir*; 6) *Watershed Harmony Musical Puppet Theater*; 7) *Student environmental day camps*; 8) *Make-A-Splash*; 9) *Enviroscape and Groundwater Models* and; 10) the *Storm Drain Marking Program*.

What is Nonpoint Source Pollution?

Nonpoint source (NPS) pollution, also known as polluted runoff, has an adverse impact on the State's water resources (see www.epa.gov/owow/nps/whatis.html). Unlike pollutants from point sources that enter the environment from well-defined discharge points, pollutants from nonpoint sources find their way to surface and ground waters via rainwater runoff or percolation. The polluted runoff can contain sediment, nutrients, bacteria, or toxic materials. This runoff comes from seven major land-use categories and can potentially impact the State's water bodies. These seven categories are: agriculture, forestry, mining, construction activities, urban runoff, hydrologic modifications, and land-disposal activities. Polluted runoff is a significant cause of water-quality problems in Mississippi. The Nonpoint Source Pollution Control Program seeks to reduce or eliminate polluted runoff that degrades water bodies in Mississippi.

Mississippians enjoy a rich heritage of natural resources. From headwater streams to the Gulf of Mexico, Mississippi's land has been blessed. The charge given to the MDEQ is to conserve the environment while allowing economic development to occur in concert with good environmental practices.

The Mission of the NPS Pollution Control Program in Mississippi is to conserve and improve state waters for man's use and the sustainment and propagation of wildlife and aquatic life, through focused research, responsible regulation, widespread education, and cooperation with other agencies and the public."



Agricultural BMP



Construction BMP



Urban BMP

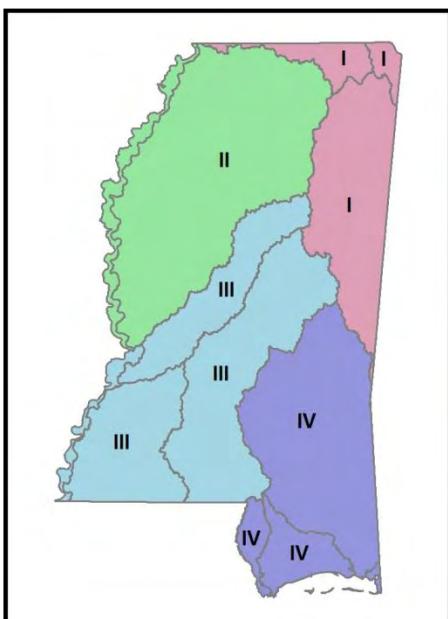
History

The 1987 Amendments to the Clean Water Act (CWA) established a national policy that programs be developed to control nonpoint sources of pollution. Congress inserted Section (§) 319 in order to establish a national program to address nonpoint source pollution. It authorized the EPA to issue grants to states and, in order for the states to receive these grants, required the states to assess NPS pollution problems and causes within the State, and to implement a management program to control NPS pollution. Every few years, the states must document their efforts and results in assessing pollution problems and implementing their management programs. A NPS assessment document and a management plan was developed and approved by the Environmental Protection Agency and Mississippi's NPS Management Program began in August, 1989. This Management Plan was updated a couple of times according to EPA guidelines, the latest one being in 2014. This latest update was approved in February of 2015. To date, MDEQ has successfully secured 24 annual grants from the EPA to run its NPS program.

The NPS Program was originally established to provide education and outreach, demonstrate the effectiveness of Best Management Practices (BMPs), investigate the ability of new practices and technologies to reduce NPS pollution, and to assess NPS sources and impacts to waters of the State. In 1999, the NPS Program began to change its focus as the Total Maximum Daily Load (TMDL) issue gained national attention. Questions were raised at both the state and the federal level as to how to address any NPS pollution reductions that might be required in a TMDL. MDEQ answered the question by developing the Basin Management Approach (BMA) which has been used from the years 2004 to present.

The *Mississippi Nonpoint Source Management Program 2014 Update*, noted above, still emphasizes the BMA, builds upon the lessons learned since the *2000 Update*, and presents management strategies that can be used by a broad audience to decrease NPS pollution in the State.

Moving into the future...



The mission of the BMA is to foster stewardship of Mississippi's water resources through collaborative watershed planning, education, protection, and restoration initiatives. To accomplish this, ten of Mississippi's major river basins have been organized into four basin groups (see map inset). Each basin group has a basin team comprised 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 BMA also encourages and provides the opportunity for basin-team members to pool both technical and financial resources to address priority watersheds. More information on Mississippi's BMA and the NPS Program can be found on MDEQ's website: <http://www.deq.state.ms.us>.

Highlights of the Year

Assessment & Monitoring/ TMDL Activities

Total Maximum Daily Load and Modeling Section

The Total Maximum Daily Load (TMDL) is a calculation of the greatest amount of any single pollutant that can assimilate in surface waters while continuing to meet water quality standards. The TMDL also determines how much of the pollutant comes from point sources, such as industry and communities, or nonpoint sources, such as storm-water runoff from urban areas or agriculture.

Water bodies that do not meet water-quality standards are identified as "impaired" for the particular pollutants of concern. Under Section 303(d) of the Clean Water Act (CWA), states are required to develop a list of impaired waters needing TMDLs. MDEQ, biennially, creates this 303(d) List of Impaired Waters. MDEQ's 2014 list was adopted by the Mississippi Commission on Environmental Quality on June 26, 2014. In addition, MDEQ completed 7 TMDLs between July 2013 and June 2014.

Pearl River TMDL Project

The 2014 Pearl River TMDL project updated the 2009 Pearl River Nutrient TMDL for the segment of the river from the Ross Barnett Reservoir to the confluence with the Strong River. This segment is the county boundary between Hinds and Rankin Counties and Copiah and Simpson Counties. It includes several point source discharges. The pollutants of concern are total phosphorus (TP) and total nitrogen (TN).

The 2009 TMDL for the Pearl River utilized a mass balance approach for TMDL development. This updated 2014 TMDL used dynamic computer model simulations to provide more accurate estimates of the TMDL for this segment of the Pearl River. The modeling allows simulation of the nutrients available in the river and the response variables of dissolved oxygen, dissolved oxygen saturation, and chlorophyll-a. By manipulating the nutrient level reductions, the corresponding responses can be studied to predict expected outcomes. This TMDL provides an estimate of the TN and TP allowable in this river to produce the predicted outcomes.

Mississippi does not have water quality standards for allowable nutrient concentrations. MDEQ is currently working on the development of numeric criteria for nutrients. This TMDL is based on a computer modeling simulation to estimate the total nutrient load allowable in the segment and the nutrient input from the point source dischargers.

The limited nutrient information and estimated existing concentrations indicate that reductions of nutrients can be accomplished with implementation of best management practices (BMPs) and discharge limitation of TN and TP from the point sources.

The TMDL project went to public review and MDEQ received several comments on this TMDL project. The TMDL is being revised based on the comments and will be publicly reviewed again this fall. This TMDL project will be an important step in MDEQ's work toward establishing appropriate TN and TP limits for point and nonpoint sources in the future.

Modeling for NPDES Permit Limits

The TMDL section is working with permitted facilities under the National Pollutant Discharge Elimination System (NPDES) to help with upcoming nutrient criteria, existing nutrient TMDLs, and new oxygen permit limits. These new limits potentially strain the existing capacity for treatment for many small towns in Mississippi. The TMDL section is working with these communities to improve the existing computer models through new survey methods and more intensive monitoring and research. These actions will ensure accuracy in the development of water-quality-based limits for these facilities.

Numeric Nutrient Criteria Development

In 2014, MDEQ continued efforts to develop numeric nutrient criteria for Mississippi's various water body types. MDEQ's goal is to develop scientifically defensible criteria that are appropriate and protective of Mississippi's waters. The criteria for each water body type will be coordinated with other water body types to ensure consistency across the State and protection from downstream impacts. Highlights of MDEQ's numeric nutrient criteria development efforts include:

- MDEQ established the Mississippi Nutrient Technical Advisory Group (TAG) in 2010. The mission of the TAG is to provide technical expertise and regional knowledge to MDEQ for the development of scientifically defensible numeric nutrient criteria. The TAG consists of over 30 members representing multiple state and federal agencies and four Mississippi universities. In 2014, the Mississippi Nutrient Technical Advisory Group focused on providing continued technical input on developing nutrient criteria for Mississippi's wadeable and non-wadeable streams, lakes and reservoirs, coastal and estuarine waters, and Mississippi Delta waters. MDEQ continues data analyses efforts based on recommendations from the TAG.
- In 2014, MDEQ continued to provide Nutrient Criteria Update Sessions for Mississippi stakeholders. MDEQ held two stakeholder update sessions providing stakeholders with an update regarding the work MDEQ is performing to develop the criteria. These update sessions also promote open communication between MDEQ staff and stakeholders. MDEQ plans to hold update sessions regularly with this group throughout the numeric nutrient criteria derivation process. MDEQ's goal is to promote transparency of the process and provide stakeholders an opportunity to ask questions and provide feedback to MDEQ and the Mississippi TAG.
- In 2014, MDEQ continued to develop the plan for numeric nutrient criteria implementation. While developing the criteria values themselves, MDEQ also focused significant efforts into exploring concerns and questions raised both internally by MDEQ staff and stakeholders. The plan for how numeric nutrient criteria will be implemented must also be developed and understood by both MDEQ staff and Mississippi stakeholders. MDEQ will continue to work concurrently on both criteria development and implementation planning for Mississippi.
- MDEQ continues to collect data and conduct studies to support nutrient criteria development. In 2014, ongoing activities included development of a benthic index for Mississippi's coastal waters, a benthic index for Delta waters, as well as data collection efforts across the State.

Mississippi Benthic Index of Stream Quality (M-BISQ)

In 2001, MDEQ developed the *Mississippi Benthic Index of Stream Quality, Development and Application of the Mississippi Benthic Index of Stream Quality (M-BISQ)* (MDEQ 2003b). This *Index of Biological Integrity* (IBI) is used to determine the status or overall health of all wadeable, non-tidal streams in Mississippi with the exception of those located in the Mississippi Alluvial Plain. The monitoring locations for the biological sampling have been targeted to ensure that, where possible, all 12-digit watersheds have biological samples for the main-stem drainage of that watershed. The data collected and resulting water quality assessments are critical in measuring success for MDEQ water programs. Monitoring efforts completed with the support of this funding have greatly increased the number of biological assessments conducted on State waters. The M-BISQ sampling program and the established sampling and analytical methodology contained therein now serves as the foundation for routine biological monitoring in MDEQ's statewide *Status and Trends Ambient Monitoring Network*. The M-BISQ was originally developed using biological and environmental data collected from 463 stream locations. Since 2001, approximately 1,615 biological samples have been collected from 1,391 sites. As part of routine index maintenance, it is a common practice to re-calibrate IBIs every 3-5 years to ensure that the index continues to accurately reflect stream health. As such, in 2008, the M-BISQ was recalibrated using data that were collected since the original development of the index in 2003. These additional data were used to both test the performance of the original *M-BISQ* and to re-calibrate the index. Over the past several years, MDEQ has been targeting wadeable streams in blackwater systems. Using these data, MDEQ is in the process of re-calibrating the M-BISQ again to investigate the applicability of a separate site class for blackwater systems. If successful, this will increase the sensitivity of the index. The ongoing re-calibration of the M-BISQ is scheduled for completion in December, 2015. As part of MDEQ's routine monitoring program, about 100 samples are scheduled for collection annually.



Mississippi Alluvial Plain Monitoring

In 2002, MDEQ began collecting biological community, physical, chemical and habitat data on wadeable streams in the Mississippi Alluvial Plain, commonly referred to as the Mississippi Delta. These data, along with historical monitoring in the Mississippi Alluvial Plain will be used to develop an index of biological integrity for the Mississippi Delta. The effort to develop an index of biological integrity for the Delta is an ongoing effort with the USGS. The data collected are also being used to evaluate the dissolved oxygen levels in the Delta as well as support nutrient criteria development. With each new set of data collected annually during September to October, the index will be refined, and when finalized, biological monitoring in the Mississippi Delta will be incorporated into MDEQ's *Ambient Monitoring Program*. Since monitoring was initiated in 2002, approximately 100 sites have been monitored. In 2011, MDEQ has acquired Light Detection and Ranging (LIDAR) data for the Mississippi Alluvial Plain and has used that data to establish drainage areas for each of the monitoring locations. Land use analyses have been completed, and were used to refine the preliminary index. A draft report is currently in the review process, and the final report should be available in 2015.

Geographic Information Systems (GIS) and Mapping of NPS Projects

GIS is used extensively by NPS staff in watershed project planning, data delivery, monitoring, and budget tracking. The NPS Management Branch uses a collection of GIS tools along with available data to accomplish its goals, with three influential applications being: 1) *The Mississippi Water Quality Data Compendium*; 2) *The Mississippi Watershed Characterization and Ranking Tool* (MWCRT); and 3) *The NPS Watershed Resource Management System* (WRMS). In support of these tools, the NPS program maintains a geodatabase of locational information for all current and historical Best Management Practice (BMP) installations and also stores information regarding assessment and monitoring of NPS projects by the MDEQ and its partners.

Mississippi Agricultural Chemical Groundwater Monitoring Program

The *Mississippi Agricultural Chemical Groundwater Monitoring (AgChem) Program* was initiated in March 1989, for the purpose of determining if the use of agricultural chemicals is impacting groundwater quality in Mississippi. As of June 30, 2014, the Program has sampled over 1,960 groundwater sources throughout the State. To date, results indicate that no significant impacts to groundwater quality are directly attributable to agricultural practices in the State.

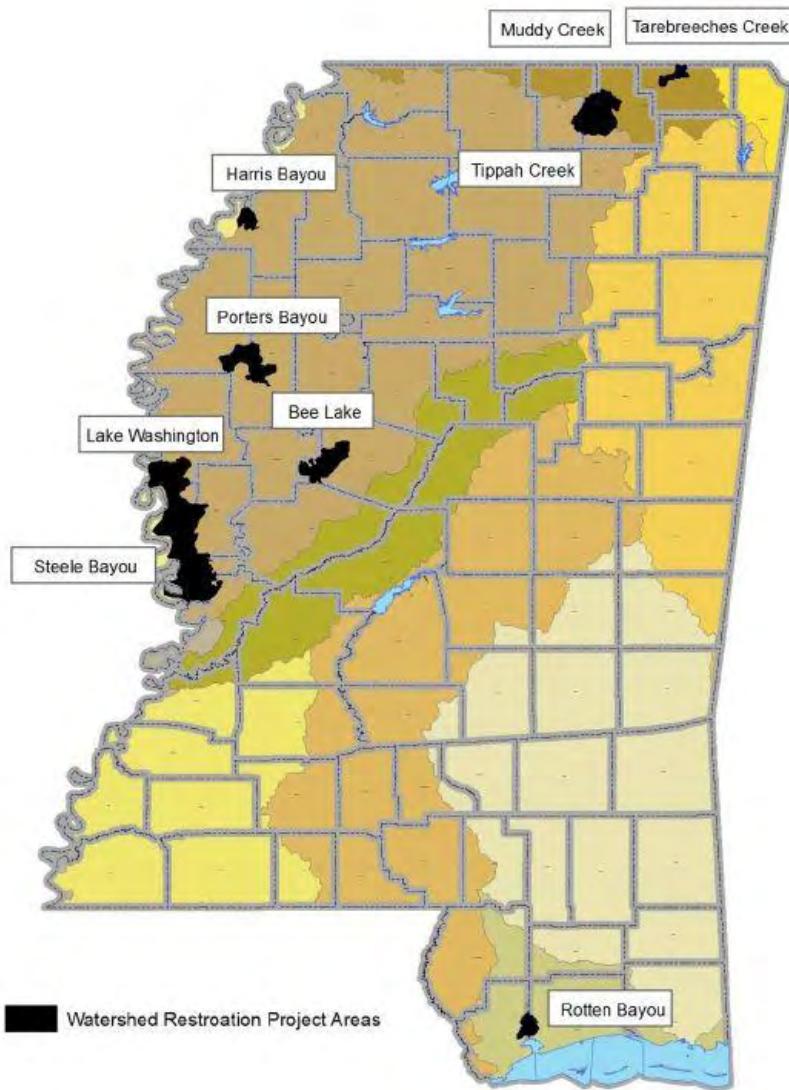
During the state fiscal year 2014, 31 samples were collected for analysis. Included in this total were eighteen drinking water samples, and thirteen irrigation, fish culture or wild-life management samples. The program remains committed to testing wells statewide, including those located in the highly agriculturalized Mississippi Delta. Analysis of the 31 samples performed by the Ag-Chem program showed only one detect of an organic compound exceeding Federal Primary Drinking Water Standards and/or State of Mississippi Groundwater Standards. Upon receiving the results, the site was immediately resampled and revealed no traces of any compounds upon retesting. The offending sample was flagged as a “false detect”; the site, however, will be resampled as a precautionary measure in subsequent years. For inorganic testing, six samples indicated concentrations of iron above Federal Secondary Drinking Water Standards for FY2014.

Supplemental Watershed Implementation Project Monitoring

The U.S. Geological Survey (USGS) - Mississippi Water Science Center MDEQ have an ongoing partnership to implement monitoring plans for selected 319-funded restoration projects. To date, monitoring is ongoing in nine watersheds. Biological monitoring is performed annually at various locations throughout the State in waters that have been assessed as impaired, and BMPs have been implemented in the recent past. Final data and interpretations will be published as an interpretive report at the conclusion of each individual project.

ONGOING

- Harris Bayou
- Porters Bayou
- Bee Lake
- Lake Washington
- Steele Bayou
- Tarebreeches Creek
- Muddy Creek
- Tippah Creek
- Rotten Bayou



Developing and Implementing Conjunctive Water Management Strategies for the Mississippi Delta through the Delta Sustainable Water Resources Task Force

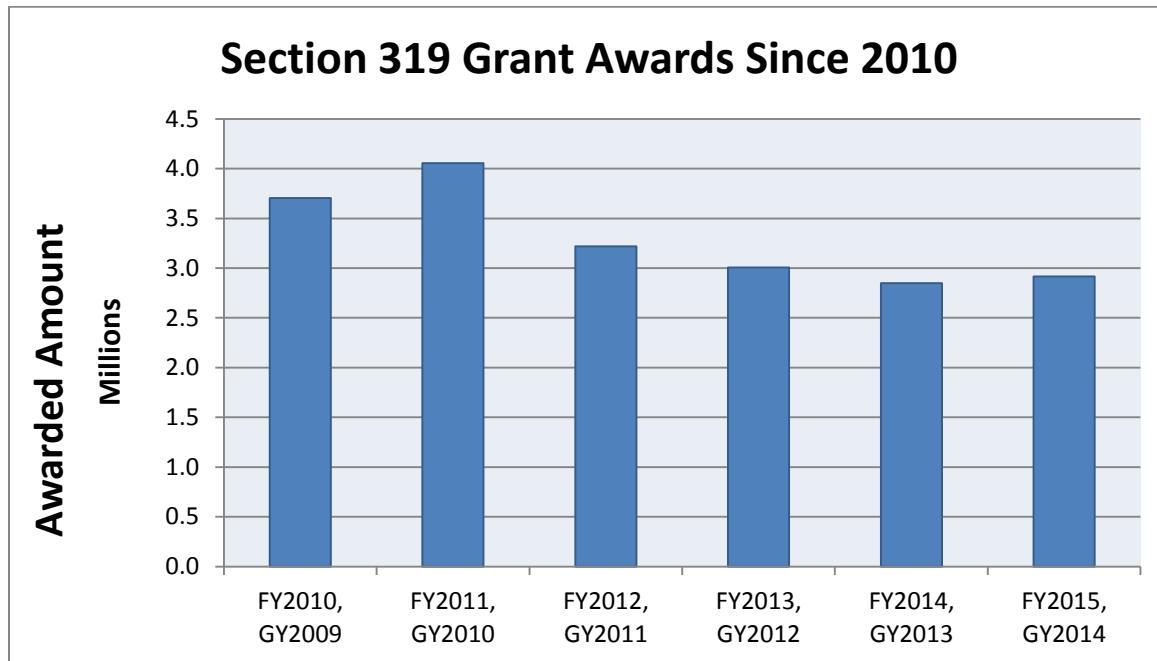
The future of the Mississippi Delta's economic and environmental viability depends on abundant, accessible water of sufficient quality. Water needs in the region are broad and include personal consumption, irrigation, aquaculture, fisheries and aquatic habitat, wetland function, wildlife, and waste water assimilation. Over 17,000 permitted irrigation wells screened in the shallow Mississippi River Valley Alluvial Aquifer (MRVA) are used for irrigation and aquaculture and pump approximately 1.5 billion gallons of groundwater each day. However, this pumpage demand has exceeded the recharge to the MRVA resulting in continuing overbalances of groundwater withdrawals versus aquifer recharge, and notable water level declines in the aquifer. Because of increased yields and profitability that irrigation provides over dry land farming, the level of water withdrawal permit applications continues to increase which further complicates this issue.

Fortunately, the issue of water withdrawal in a region that experiences historically around 53-55 inches of rainfall each year, is adjacent to the 1-1.5 MM cubic feet/second flow of the Mississippi River, and is downstream from four adjacent major flood control reservoirs. So, although the issue is significant, opportunities exist for the development of conjunctive water management options and alternative surface water supplies.

Conjunctive water management is the foundation for sustainable Delta water resources. In its simplest context, conjunctive water management is managing the coordinated use of surface and groundwater to satisfy desired water needs such that the total benefits exceed the sum of the benefits that would result from independent management of each water resource.

On August 28, 2014, Governor Phil Bryant issued an executive order establishing the *Governor's Delta Sustainable Water Resources Task Force*. Under the direction of the MDEQ Executive Director, the task force is charged to work together to ensure that the Delta will have future sustainable water supplies. In 2011, MDEQ formed an executive level multi-agency and multiorganization task force that developed and implemented actions to sustain water resources for agriculture, fisheries, and wildlife in the Delta. The Governor's Executive Order establishing the task force provides affirmation of the importance of this work and charges the members to work in a unified and collaborative manner.

Program Funding

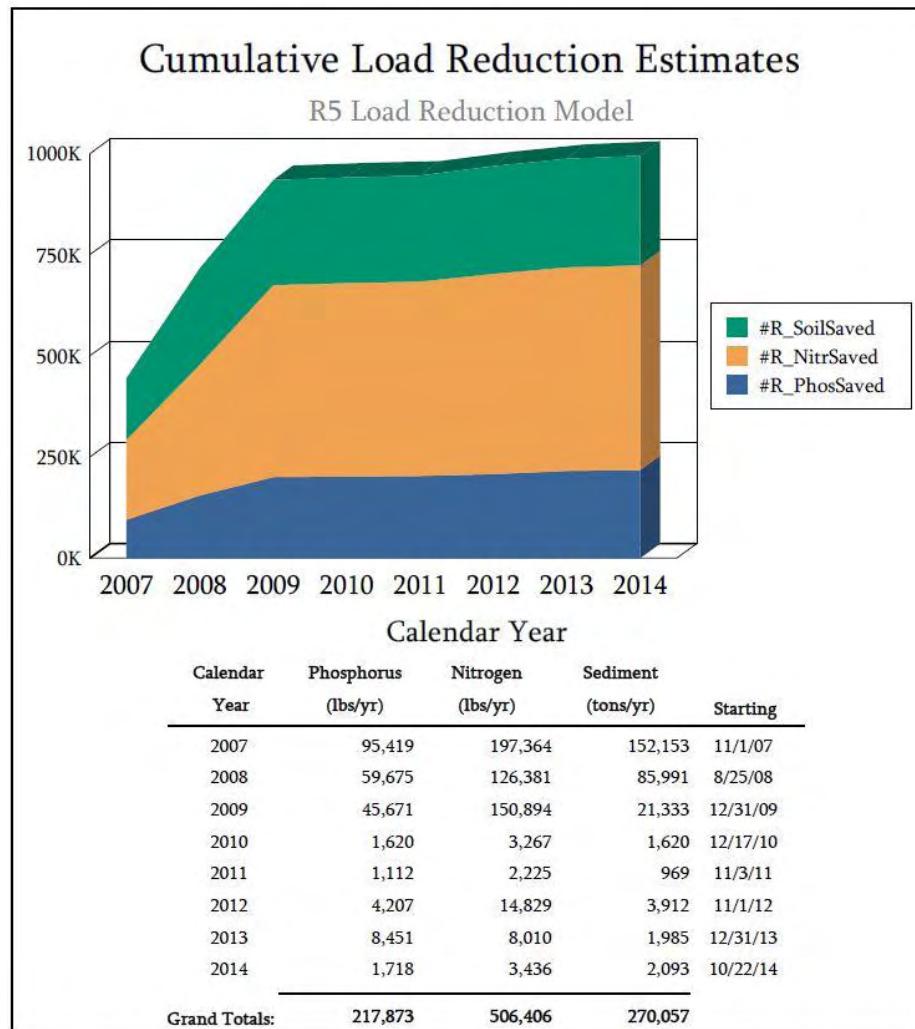


Leveraging Opportunities

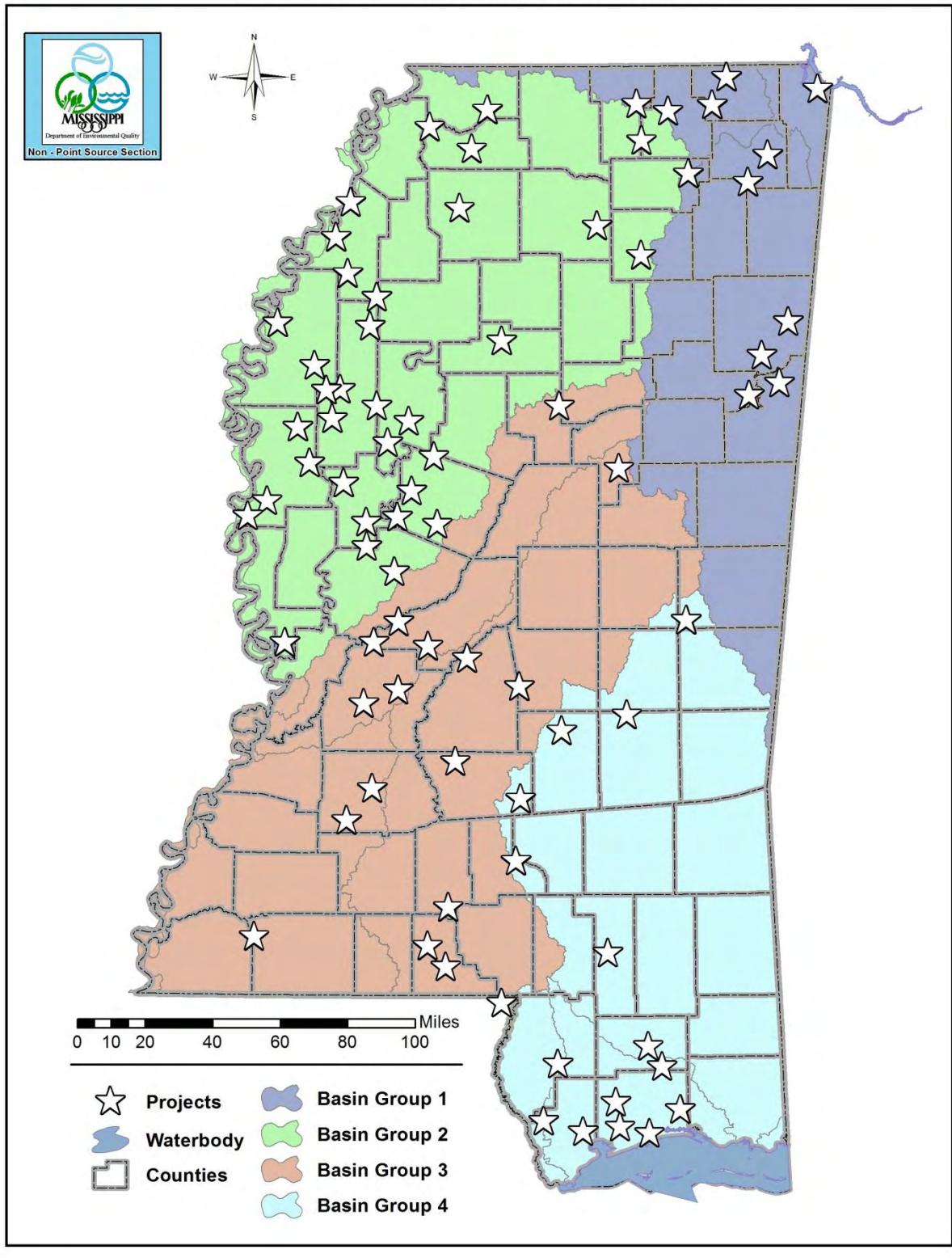
Since the inception of the §319 Nonpoint Source Program in 1990, various types of projects have been funded, including demonstrations of BMPs in watersheds; agricultural/chemical waste disposal; alternatives for converting dairy-cow wastes into electrical power and preventing possible stream pollution from those wastes; industrial-plant demonstrations that focused on preventing NPS pollution in industrialized watersheds; coastal streams ecosystem restoration; conservation easements that encouraged and assisted farmers to place lands into riparian-buffer strips; development and implementation of approaches that will restore and sustain surface and groundwater resources in perpetuity in the Mississippi Delta and; a variety of educational and outreach projects. One recent and salient development includes the planning of *Low Impact Development* (LID) features in an urban area on the Gulf Coast. In recent years, §319 NPS funding has been used more and more to support nutrient reductions in large watersheds. The strategy behind this approach is to use the committed §319 resources to attract additional leveraging opportunities, that together, create a greater potential to achieve quantifiable reductions in nutrient concentrations/loadings. A special effort is focused on the *Mississippi River Basin Initiative* (MRBI). This initiative, in turn, focuses on reduced nutrient input from agricultural lands that drain into the Mississippi River and contribute to the Gulf of Mexico's hypoxia problem. As a part of the MRBI, NPS funds are being used to elucidate problems and solutions concerning conjunctive water uses in the Delta that threaten water tables. Another important initiative is a partnership with NRCS relative to their *National Water Quality Initiative* (NWQI). In this effort, NPS funds are being used to support monitoring efforts on NWQI sites where the NRCS has implemented BMPs. With these large-scale projects, it is anticipated that a heightened focus on pre- and post-implementation monitoring will document the improvements in resulting water quality. In 2014, during the third year of the NWQI, a total of \$1,106,948 was allocated in two priority watersheds, Porter Bayou and North Tippah Creek. This funding treated 1,151.1 acres in order to reduce sediment and nutrients delivered to those impaired water bodies.

Estimated Nonpoint Source Load Reduction Achieved

The goal of many §319 funded projects is to control, reduce, and alleviate pollution loads into Mississippi's lakes, rivers, and streams. The use of BMPs such as soil stabilization, weirs, and filter strips is the leading strategy for reducing NPS pollution impacts. These types of BMPs are easily recognized and their effectiveness is often easily calculated using the Region 5 (R5) mathematical model. The load reductions estimated in the R5 model include phosphorous, nitrogen, and sediment. The fundamental methodology of this model is based on *Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual* (Michigan DEQ, June 1999). Although the R5 model is an imperative tool in nutrient-reduction calculations, it is not inclusive of all BMPs. There are many other highly effective agricultural BMPs with impacts that are not as easily estimated, such as prescribed grazing, heavy-use area protection, and livestock fencing. The data calculated through the R5 model are entered into the Environmental Protection Agency's *Grants Reporting and Tracking System* (GRTS) so that the load reductions are available within the database. The cumulative total reductions for projects from 2007 to the end of the 2014 calendar year were: phosphorous – 217,873 lbs/yr; nitrogen – 506,406 lbs/yr; and sediment – 270,057 tons/yr.



FY 1990 - 2014 Project Locations



Nutrient Reduction Strategies

Mississippi's collaborative, leveraged approach to reduce excessive nutrients and their impacts focus on the development and implementation of appropriate nutrient reduction strategies. During 2009, strategies were developed to reduce excessive nutrient loadings for the Mississippi Delta, the primary region of row-crop agriculture and aquaculture in the State. This effort was co-led by MDEQ and Delta F.A.R.M. (Farmers Advocating Resource Management). During late 2009, MDEQ, working through the Gulf of Mexico Alliance's Nutrients Team, facilitated the development of a common template for Gulf of Mexico States to encourage a consistent, aligned approach to reduce excessive nutrients regionally. This template is now being implemented in Mississippi and Louisiana as both states use it to guide them in developing state-specific nutrient reduction strategies for their coastal watersheds. In Mississippi, this effort is co-led by MDEQ and the Mississippi Department of Marine Resources (MDMR). During September 2010, MDEQ, working through the Hypoxia Task Force, facilitated the development of a common framework for states within the Mississippi/Atchafalaya River Basin to reduce excessive nutrients and mitigate Gulf hypoxia. Additionally, in a similar effort, Mississippi also developed nutrient reduction strategies for the upland areas of the State.



On-farm Storage & Tailwater Recovery System

In 2014, strategies for the Delta, the Mississippi Coast, and Mississippi Uplands continued to be implemented in watersheds in each region to establish a comprehensive, state-level approach to reduce nutrient loadings from nonpoint and point sources

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, ten of Mississippi's major river basins have been organized into four basin groups. Each basin group has a basin team of state and federal agencies, non-governmental organizations, and other stakeholders.

Implementing Nutrient Reduction Strategies and TMDLs on the Mississippi Coast

Basin Group 4 (Pascagoula River, Coastal Streams, and Lower Pearl) has received the emphasis of more protection-oriented watershed projects in contrast to restoration-oriented projects. These projects have focused on the acquisition of conservation easements and have also included the installation of BMPs at Dead Tiger/Orphan Creek, Red Creek, and Turkey Creek. Turkey Creek is an EPA- and MDEQ-priority watershed. These projects are currently in the implementation phase. The Wolf River Conservation Society has completed a Watershed Implementation Plan (WIP) that includes both 1) Protection and Restoration Projects and; 2) Education and Outreach Projects.



Mississippi Gulf Coast

A *Coastal Mississippi Nutrient Reduction Strategy* has been developed by MDEQ and their partners. This *Coastal Nutrient Reduction Strategy* is currently being implemented in a coastal Mississippi watershed project in Rotten Bayou. See **Rotten Bayou Watershed Project** below.

Blueways, which are paddling trails on waterways, have now been developed on Old Fort Bayou, the Pascagoula River, Red Creek, Bogue Homa, and the Jourdan River. Blueways are also planned for Turkey Creek, Tchoutacabouffa River, and the Wolf River.

Celebrate the Gulf is an environmental outreach event that was established in 1991. It is held annually in Pass Christian's War Memorial Park overlooking the Pass Christian harbor. It is a fun-filled family event designed to educate and inform participants about all aspects of the Gulf of Mexico and associated wetlands and tributaries. More than 25 exhibitors participate in the event. They include a broad range of conservation groups and governmental agencies, who provide hands-on interactive exhibits primarily geared toward children. Each year MDEQ reaches out to public and private elementary schools along the Gulf Coast to encourage attendance by students and their families. Cash prizes are awarded to the schools with the most participation. The event is held in conjunction with *Art in the Pass* which will celebrate its 18th anniversary this year.

Implementing Nutrient Reduction Strategies and TMDLs in the Mississippi Uplands

The *Upland Nutrient Reduction Strategy Implementation* in the North Independent Streams Basin has been progressing according to schedule. Two watersheds have been selected for installation of BMPs that will reduce nutrient pollution. These are the Bell-Muddy Creek Watershed in Tippah County and Tarebreeches Creek Watershed in Alcorn County. BMPs installed in the Bell-Muddy Watershed are: 5,133 feet of stream-bank and shoreline protection; three water and sediment-control basins; 29 grade-stabilization structures; three tank/troughs; 1,132 feet of fencing; 14.5 acres of critical-area planting; 27 acres of pasture and hay-land planting; and, 106 acres of nutrient management. The Tarebreeches Creek Watershed has the following BMPs: 381.9 acres of pasture and hay-land planting; two heavy- use area protections; one tank/trough; 550 feet of lined waterway; 12 grade- stabilization structures; 220 feet of stream-bank and shoreline protection; 170.4 acres of nutrient management; one check dam; and, one stream crossing. All the project funds have either been expended or are committed and all BMPs should be on-the-ground within the project period. The program was so successful that additional requests have been made beyond what funding will allow.



Tank/Trough and Heavy Use Area

USGS has monitoring sites in both of the above watersheds. USGS is anticipated to capture the change in runoff due to the installation of these BMPs. Remaining BMPs to be implemented over the course of this project will also be monitored. Monitoring began in February 2012 on both watersheds and consisted of sampling for nutrients, sediment, and biological integrity.

Implementing Nutrient Reduction Strategies and TMDLs in the MS Delta

Implementation of the *Delta Nutrient Reduction Strategy* (DNRS) is currently ongoing at multiple priority watersheds. With the determination of what nutrient load reductions are achievable, quantitative reduction targets will be established and consequently, future progress will be evaluated in relation to achieving targets.

- **Harris Bayou Watershed** - Harris Bayou, a tributary of the Big Sunflower River, flows through portions of Bolivar and Coahoma counties. A §319 implementation project (3/2010 – 8/2013) was conducted to implement the Delta Strategy in two project areas: Treatment Area (1,700 acres) and Control Area (1,300 acres). Numerous BMPs were installed in the treatment area to help improve water quality/quantity. Installed BMPs include a tail-water recovery system, an on-farm storage reservoir, land formation, low-grade weirs, water-control structures, a two-stage ditch, and a grass waterway. Control area received no BMPs in order to maintain this as an area for comparison. Also, collection of nutrient data for this project is currently ongoing.



On-Farm Storage Reservoir

During 2014, the existing tail-water recovery system in the “treatment area” was modified to capture runoff water from the entire catchment, whereas the previous system covered approximately 50% of the drainage area. With suites of structural BMPs in place, 2014 efforts are focusing on the implementation of winter cover crops to improve water quality leaving the field. Planning efforts are underway in preparation for BMP implementation in the “control area”. With four years of “pre-BMP” data, this site should serve well to document water quality improvements obtained through conservation measures.

A second phase of BMP implementation for the Overcup Slough watershed has been planned for achieving nutrient reduction and conjunctive water management goals. A WIP has already been developed and delivered to EPA. Structural practices to be implemented will include water control structures, low grade weirs, a two-stage ditch, a tail-water recovery system, and cover crops.

- **Porter Bayou Watershed** - Porter Bayou, also a tributary of the Big Sunflower River, flows through portions of Bolivar and Sunflower counties. A §319 implementation project (3/2010 – 8/2013) was conducted to implement the DNRS in north project area (1,000 acres) and the south project area (2,500 acres). Numerous BMPs were implemented in both the north and south project areas to help improve water quality/quantity. Installed BMPs include a tail-water recovery system, an on-farm storage reservoir, land formation, low-grade weirs, water-control structures, and a two-stage ditch. In addition, collection of nutrient data for this project is currently ongoing.



Tail-water Recovery System

A second phase of BMP implementation for the Upper and Middle Porter Bayou sub-watersheds has been planned for achieving nutrient reduction and conjunctive water management goals. WIPs have already been developed and delivered to EPA. Structural practices to be implemented will include a minimum of water control structures, low grade weirs, a two-stage ditch, a tail-water recover system,

and cover crops.

- **Coldwater River Watershed** - Coldwater River, a tributary of the Tallahatchie River, flows for about 220 miles through portions of Coahoma, Desoto, Marshall, Quitman, Tate, and Tunica counties in northwestern Mississippi. Implementation of the DNRS is currently ongoing to improve water quality by reducing nutrients, and also to measure conservation benefits by evaluating water use data and associated agricultural production information.

The Coldwater River 319 project is comprised of three sites: Shannon Site (250 acres), Allen Site (180 acres), and Boyd Site (500 acres). Installed BMPs include on-farm storage reservoir/tail-water recovery systems, land formed, low grade weirs, water control structures, a two-stage ditch, and cover crops. Approximately 300 acres of cover crops have been planted in 2014. Also, collection of nutrient data and water-use data for this project has been ongoing.

- **Bee Lake Watershed** - Bee Lake is a 1400-acre oxbow lake located in Holmes County. Primary inflow to Bee Lake is through Tchula Lake (a nearby oxbow lake) during high water periods in the spring, and outflow is back through Tchula Lake to the Yazoo River. Implementation of the DNRS has been ongoing to improve water quality by reducing nutrient loading to downstream aquatic ecosystems. The Bee Lake phase II project (1/2011-8/2013) was comprised of one project area (740 acres). Installed BMPs include low grade weirs, water control structures, and a two-stage ditch. Also, collection of nutrient data for this project is currently ongoing.



- **Lake Washington Watershed** – An existing §319 restoration project (3/2008 – 8/2010) was retrofitted for implementation of the DNRS. Implemented BMPs include grade stabilization structures, outlet protections, pads, and several grassed waterways. Collection of pre-BMP storm data was completed in 2011. Post-BMP water quality data collection began in June 2013 and is currently ongoing to determine the effects of BMP implementation in this watershed.

- **Steel Bayou Watershed** - 540 acres of cover crops have been planted.
- **Wolf/Broad Lake Watershed** - 2,500 acres of cover crops have been planted. As mentioned above, the DNRS implementation activities during 2014 have been underway throughout many watersheds in the Yazoo River Basin. Structural BMPs have been the focus of prior implementation activities. For 2014, the focus has shifted towards “management” oriented BMPs (related to irrigation water management and soil health) that address water quality/quantity issues in the Delta.

Implementing Nutrient Reduction Strategies and TMDLs in the Big Black, Pearl River, and South Independent Streams

The MDEQ and Pearl River Valley Water Supply District (PRVWSD), along with other partners, have finalized plans to restore and protect water quality within the Ross Barnett Reservoir (hereafter called the Reservoir). This initiative, which is known as *Rezonate*, focuses on six priority issues in the watershed: 1) erosion and sedimentation; 2) pathogens; 3) litter/trash in the reservoir and around the shoreline; 4) nutrients/organic enrichment; 5) invasive species and; 6) pesticides. It is understood that many of the issues that are occurring in the watershed are a result of individual, household, and public behaviors and activities that generate pollution which ultimately impacts our water resources. Therefore, it is imperative that individuals and the public at large become aware and concerned about the significance of their behavior for nonpoint source pollution, and become educated on the specific actions that can be taken to significantly reduce pollution.

The goal, through this campaign, is to move a large percentage of the target audience(s) through the stages of awareness, retention, and finally to acceptance. Implementation of behavior-change plans that target a smaller audience and require outreach on a more personal level will focus on attitude change (desire) and behavior change (action). Another goal of the awareness campaign is to maximize limited resources. Implementation of the *Rezonate Comprehensive Education and Outreach Plan* has begun and work is ongoing. As part of a concentrated 3 year campaign, education/outreach is focused to reach the target audience(s) on a consistent basis to increase awareness. In an effort to bring education and awareness to the general public, interpretive signage has been developed to increase knowledge concerning water quality and protection. This was successfully done through a series of focus meetings, comprised of representatives from the Cities of Madison, Ridgeland, Flowood, and Jackson, the PRVWSD, MDEQ, Rankin County, Natural Resources Conservation Service (NRCS), and Keep the Reservoir Beautiful (KRB). The group provided feedback on designs, ideas, design concepts, materials and placement of signage. Storm water BMP signs were also designed for newly developed BMP demonstration sites and other identified existing demonstration areas within the watershed. In addition, educational workshops are being developed to target three key groups: 1.) decision makers (elected officials), 2.) professionals (architects, engineers and planners), and 3.) developers.

Through the current Memorandum of Agreement between PRVWSD and MDEQ, three urban storm water BMP demonstration projects for water quality improvements have been identified. Sites include Old Trace Park in Ridgeland, Turtle Point Nature Area in Rankin County, and Flag Island, up river of the Reservoir. Implementation of these water quality improvement projects is scheduled to begin in 2015.

The PRVWSD and the Barnett Reservoir Foundation, a newly formed non-profit organization established to promote the Reservoir and surrounding businesses, hosted their *3rd Annual Independence Day Celebration*. In conjunction with this celebration, the *8th Annual Waterfest 2014* event was hosted by MDEQ on the Reservoir at Old Trace Park in Madison County. The dual event was held on June



28, 2014. *WaterFest*, the signature outreach event for *Rezonate*, is an annual event that spotlights the importance of protecting, restoring, and improving the water quality of the Ross Barnett Reservoir. WaterFest activities includes educational exhibits, kid zones, water slides, interactive displays, live music, a photo booth, food vendors, and static military displays. Through the efforts of the Barnett Reservoir Foundation, patrons of both parks viewed the third annual lighted boat parade and a grand fireworks display that climaxed the evening's activities. An estimated 10,000 people attended the dual event.

Showcased Section 319 Projects

Porter Bayou

The 66,405-acre Porter Bayou Watershed is located in Bolivar and Sunflower Counties, Mississippi. The watershed is comprised predominately of productive agricultural lands making up nearly 56,000 acres (82%) and urban areas making up only 3,882 acres (5.8%) of the total watershed area.



On-farm Storage & Tailwater Recovery System

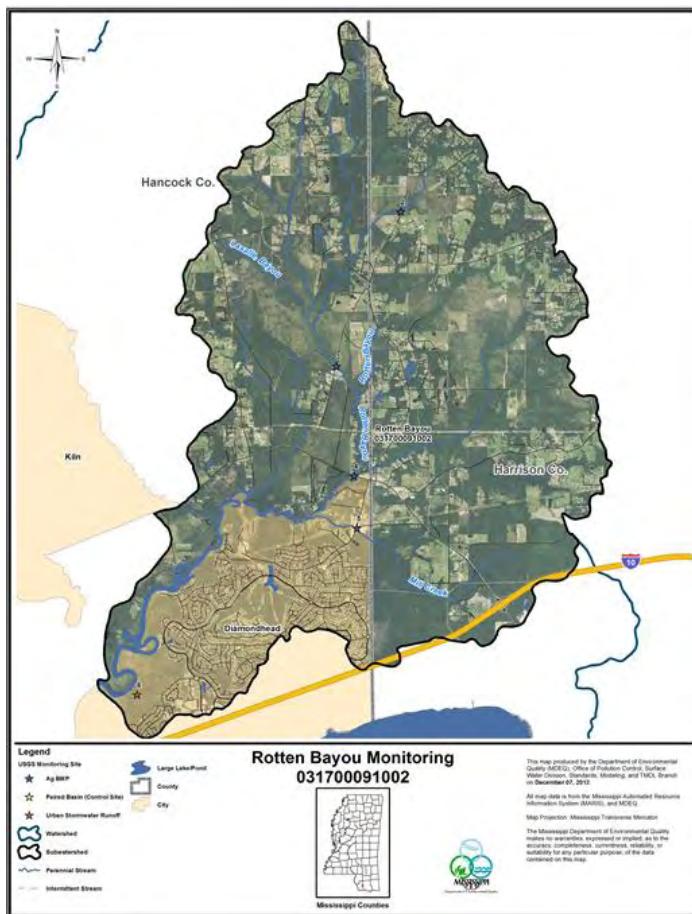
The main objectives of this nutrient reduction project are to accurately determine what reductions are achievable using BMPs and the cost to implement these practices. These objectives are being accomplished by educating local farmers with the following: 1) management practices that reduce nutrient input; 2) innovative farming practices and; 3) other measures that include installing vegetative and structural BMPs such as low-grade weirs, constructed-treatment

wetlands, grade-control structures and tail-water recovery systems. As of late 2014, over 100 BMP structures for water control have been implemented throughout these two projects as well as two irrigation storage reservoirs, three tailwater recovery systems, three two-stage ditches, three low-grade weirs, and several other BMP types. Through education and implementation of these practices, a high benefit-to-cost ratio is achieved. The public is being equipped with the necessary tools to improve the water quality within their watershed that will last from generation to generation. The USGS has implemented several in-stream monitoring strategies to document the nutrient reduction and water quality in the streams over several years. Data has been compiled for this project, with analytical models projecting positive water quality results. Nutrient-load reductions for the stated BMPs are showing reductions of over 1,800 lbs/yr of phosphorous, 4,000 lbs/yr of nitrogen and 1,700 tons/yr of sediment in Mississippi waters.

Rotten Bayou

The Rotten Bayou Watershed Project was developed to implement the *Coastal Nutrient Reduction Strategy*. This strategy used the *Gulf of Mexico Alliance (GOMA) Coastal Template* and leveraged on work done in the Delta with the *Delta Nutrient Reduction Strategy*. The *Coastal Nutrient Reduction*

Strategy was developed through local workshops with coastal stakeholder input. Various issues relative to livestock, forestry, urban stormwater, and atmospheric deposition were included in the strategy. As part of the federal government's efforts to recover from the Deepwater Horizon oil spill, NRCS announced the start of an innovative water- and wildlife-conservation effort along the Gulf Coast, called the *Gulf of Mexico Initiative (GoMI)*. NRCS developed *GoMI* in close collaboration with local, state, and federal partners. It is a new approach to better target conservation activities in the Gulf Coast region to improve the health of the Coast's rivers, wetlands, and estuaries that are integral to jobs and the economy in the Gulf. Because MDEQ had already developed and begun implementation of the *Coastal Nutrient Reduction Strategy* in Rotten Bayou Watershed, NRCS targeted it for their *GoMI* Project. The Mississippi Soil and Water Conservation Commission, the Soil and Water Conservation District, and NRCS, have been working with local landowners in the Rotten Bayou Watershed to install agricultural BMPs. Some of the available



BMPs to landowners in the watershed are: 1) pasture and hay planting; 2) nutrient management; 3) tank/ troughs; 4) tree and shrub establishment; 5) forest harvest trails and landings and; 6) vegetative barriers. To develop a Watershed Implementation Plan for this project, the Land Trust for the Mississippi Coastal Plain is working with local residents to form three teams: a watershed team, a technical team, and an education team. These teams will provide input to the plan. Also as part of this project, the Department of Landscape Architecture at Mississippi State University worked with the City of Diamondhead, the Property Association, and the golf course to develop Low Impact Development BMPs for reducing stormwater NPS pollution in urban areas.

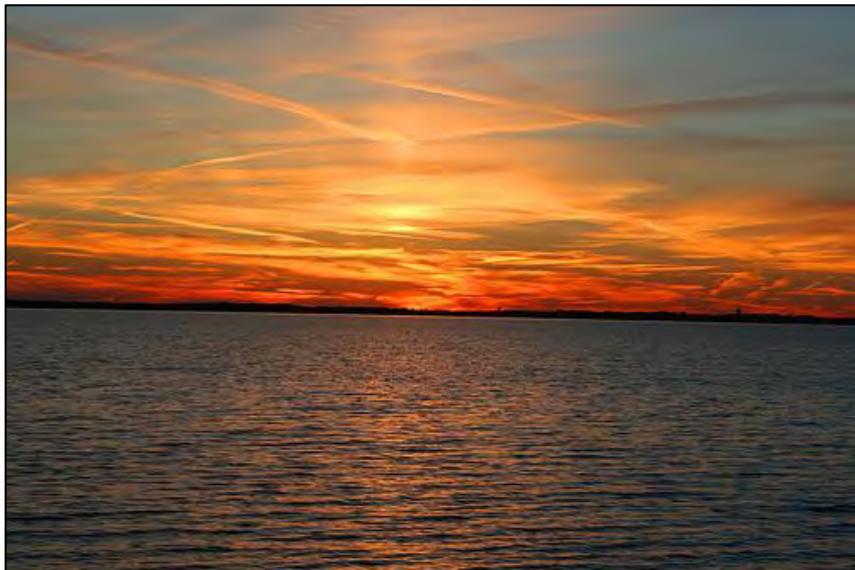
Several meetings and workshops relative to the watershed have been held over this last year of 2014. The Rotten Bayou Watershed Steering, Technical and Educational Committees each met 3-4 times over the year. A *Rotten Bayou Watershed Stormwater Golf Course BMP Workshop* was conducted in June with 22 local leaders and professionals attending. In November, a workshop for 11 city officials and staff were conducted to share information with them about stormwater and other ordinances that could positively affect water quality in the watershed. On the same day, a workshop about the proposed BMP at the duck pond was conducted for 14 board members and the general manager of the Diamondhead Property Owner's Association.

Outreach was important in 2014 with the creation and printing of brochures and other printed informational materials as well as presentations. A *Facebook*© page was also created to give out information on the Rotten Bayou Watershed. In addition, presentations were conducted about the project including one at *The Bays and Bayous Symposium* in Mobile, AL.

A number of workshops and outreach efforts to children were conducted over 2014. A *Watershed Harmony* puppet show was presented at elementary schools, community centers and libraries around the area throughout the year. A four-day workshop with the 5th graders at East Hancock Elementary was conducted. This workshop showed the students the impacts of stormwater runoff to the watershed/waterways.

In December, a stream restoration BMP was completed on hole 2 of *Diamondhead's Cardinal Golf Course*. In addition, signage about the watershed identifying BMP locations was installed at holes 1, 2 & 6.

Ross Barnett Reservoir



The Ross Barnett Reservoir is a vital resource to central Mississippi largely because of its drinking water benefit of supplying over 15-million gallons of water to over 175,000 local residents, businesses, and industries. In addition to what was mentioned above, MDEQ and PRVWSD developed a strategic approach that will leverage funds and provide streamlined assistance to help individual agricultural producers take needed actions to reduce the flow of sediment,

nutrients, and other runoff into impaired waterways that lead to the Reservoir. Taking this a step further, MDEQ has also outsourced BMP construction for demonstration projects at various sites within the watershed. Through the current Memorandum of Agreement between PRVWSD and MDEQ, three urban storm water BMP demonstration projects for water quality improvements have been identified. Sites include Old Trace Park in Ridgeland, Turtle Point Nature Area in Rankin County, and Flag Island, up river of the Reservoir. Implementation of these water quality improvement projects is scheduled to begin in 2015.

NPS Education/Public Outreach

Envirothon Competition

The Envirothon High School Competition tests student knowledge about water, soils, forestry, wildlife, and current environmental issues each year. The current issue in 2014 was —Sustainable Agriculture”. The competition measures success by student oral presentations made to a panel of judges where each team applies their knowledge and field experiences to a real-life environmental problem/situation as well as by a written test and a field test on each of the five (5) topics. The Mississippi competition is sponsored by MDEQ’s Nonpoint Source Pollution Program and the Mississippi Association of Conservation Districts and is coordinated by the Mississippi Soil and Water Conservation Commission. In 2014, there were 342 high school students (57 teams) and their advisors from 30 Mississippi counties who participated in four area competitions. A total of about 132 students (22 teams) participated at the state-level competition which was held at Roosevelt State Park on May 2, 2014. Hillcrest Christian High School Envirothon Team won the State of Mississippi competition and traveled to the Illinois Regional Competition at Loyola University of Chicago in Woodstock, Illinois, where nine states participated.

Adopt-A-Stream



The Mississippi Adopt-A-Stream Program is an environmental education training program for adults and students that focuses primarily on aquatic ecosystems and the effects of nonpoint source pollution on water quality. Annually, a two-day workshop and nine one-day workshops are conducted in the major watershed basins of Mississippi, i.e., Yazoo River, Tombigbee River, Pascagoula River, the Big Black River, and the Coastal Streams/South Independent Streams. One-day workshops allowed MDEQ to expand its outreach efforts in priority watersheds by educating citizens about water-quality issues and solutions in their own local watersheds. In addition, the *Adopt-A-Stream* coordinator trains high school Envirothon teams on aquatic-related subjects. Additionally, a special topic is chosen each year. Envirothon reaches over 10,000 people through large venue events, teacher-workshop training sessions, classrooms, outdoor events, summer environmental camps, and setting up a display at conferences and events.

Environmental Teacher Workshops and Student Environmental Camps

During calendar year 2014, workshops were held in eight regions of Mississippi at 56 workshops with 1,243 educators and students participating. Workshops are held annually at Alcorn State University, in several Mississippi Delta counties of northwest Mississippi, in north central and northeast Mississippi, in central Mississippi (Grenada, Vicksburg, Jackson), in south central Mississippi (Hattiesburg), and in the coastal counties. These workshops included sessions on water quality, NPS pollution prevention, green

infrastructure, low impact development, water chemistry, macroinvertebrates, and hands-on, water-related activities that teachers can use in their classroom to teach students about natural resource stewardship. The NPS program assists with workshop support for these curricula: Project Learning Tree; Project WET; Project WILD; Project Aquatic WILD; Project Food, Land and People; Private Eye; and others.

WaterFest Event on the Ross Barnett Reservoir

The Ross Barnett Reservoir *WaterFest 2014* was part of an ongoing environmental education campaign to bring attention of the need to protect and restore the water quality of the Ross Barnett Reservoir located in the Pearl River Basin. Approximately 10,000 people attended the *WaterFest* outdoor festival which was held in the summer of 2014 at Old Trace Park in Madison County. The campaign slogan and program called *Rezonate* continues to educate the general public to become good environmental stewards of the watershed in which they live, work and play.

Watershed Harmony Musical Puppet Theater

MDEQ and Bayou Town Productions completed the first performance of the Watershed Harmony Musical Puppet Theater in October 2003. Since that time, performances have reached more than 120,000 students, teachers, and others. The play focuses on the prevention of polluted runoff by promoting the use of BMPs and individual stewardship to improve water quality. The Watershed Harmony Puppet Musical conforms to the 4th- and 5th-grade Mississippi Framework Curriculum and the National Science Standards. The performance is frequently used as a school presentation and as a part of environmental field-day student events. In addition to students, the show is enjoyed and seen by all ages and many groups, including civic clubs, special-event groups, summer reading programs, scout troops, and summer camps. The 30-minute musical play is performed on a multi-level, 12'x12' stage that conveys a water-quality stewardship theme. The show has received numerous accolades and compliments. Currently, over 7,000 people per year experience this educational program.

Student Environmental Day Camps

During 2014, the NPS program sponsored four (4), one-week summer-camp sessions at the University of Mississippi Center for Water and Wetland Resources where 90 students were trained. A new summer camp session was held in 2014 in northwest Mississippi near Hernando where 52 students attended. These camps train students on environmental topics such as water quality, land use, forestry, wildlife, and NPS pollution. A pre-test/post-test method is used to measure increased knowledge as an indicator of program success.



Enviroscape and Groundwater Models

The *Enviroscape* model and *Groundwater Aquifer* models continue to enhance NPS educational activities and are widely used by organizations all over the State due to their widespread distribution by MDEQ.

Hundreds of presentations are made each year by various environmental organizations, natural resource agencies, and nonprofit organizations that use these models at conservation carnivals, schools, civic clubs, workshops, summer camps, and *Earth Day* events.

Make-A-Splash Event



A Water Education Event is held each September at the Mississippi Museum of Natural Science in Jackson, Mississippi where students visit water-related interactive booths to learn about polluted runoff, wildlife, water use, groundwater, surface water, macroinvertebrates, etc. At the September 2014 event, 10 schools from 9 different counties attended with a total of 789 students participating and 24 teachers receiving (.5) Continuing Education Units (CEUs) of credit.

Storm Drain Marking Program

MDEQ assisted local resource people, high-school students, and scouts in conducting storm-drain marking projects. High-school students and scouts glued the markers to storm drains and distributed door hangers. When possible, the students and scouts talked with residents about storm-water runoff and the need to prevent pollutants from entering storm drains. Storm drains were marked with the message, "No Dumping, Drains to River" in cities in Mississippi.

Field Days

Field days have been arranged as part of the NPS Watershed Demonstration Projects conducted with the USDA Natural Resources Conservation Service, the Mississippi Soil and Water Conservation Commission and various water management district staff. Additional field trips are included in *Teacher Workshops* and *Adopt-A-Stream Workshops* and are a part of the Storm-Drain Marking Program.

Workshops

MDEQ NPS personnel continue to conduct and assist with presentations for teachers, students, resource agencies, etc. These workshops enable instruction on and distribution of existing educational models and materials. Some of the NPS programs with workshops inherent to their curricula are *Adopt-A-Stream* and *Community Growth Readiness* as well as some specific projects such as a *Rain Barrel Workshop* where barrels were retrofitted for use at homes to collect rainfall and prevent runoff.

Public Service Announcements/Literature Distribution

By working with the Foundation for Public Broadcasting in Mississippi, MDEQ sponsored NPS pollution messages on their radio network and on their *Mississippi Outdoors* Television Program.

NPS - Related Programs

Mississippi Coastal Cleanup

The 26th Annual Mississippi Coastal Cleanup was held on October 18th, 2014. The organizers of the event repeatedly look forward to a productive, annual cleanup day that will benefit the environment and educate the public about the importance of being good stewards of our coastal resources. MDEQ is proud to be a contributor to this event through the NPS Program.

Nearly 2000 volunteers combed the Coast's beaches, marsh areas, and barrier islands to clean Mississippi's beaches and waterways. The volunteers picked up marine litter at 47 sites during the Mississippi event, part of the *International Coastal Cleanup*—the world's largest volunteer effort to clean up the marine environment. During the 2014 Mississippi event, 1,616 volunteers picked up 1,603 bags of trash, including 275 bags of recyclables along 100 miles in Harrison, Hancock, and Jackson Counties.

The cleanup is organized by the Mississippi Department of Marine Resources and the Mississippi Marine Debris Task Force. —Every year, the *Mississippi Coastal Cleanup* grows, showing that more people are dedicated to keeping the Coast free of trash,” said Jamie Miller, executive director of the Mississippi Department of Marine Resources. “It’s good for the environment, but it’s also an opportunity to teach our young people the value of keeping our beaches, bays, and islands clean.”

Healthy Watershed Initiative

The United States Department of Agriculture's NRCS is partnering with 12 states within the Mississippi River Watershed basin to improve water quality within the watershed. Through the partnership, the NRCS has created the *Mississippi River Basin Healthy Watershed Initiative* (MRBI) which will promote the implementation of voluntary conservation practices by landowners, state agencies, and federal agencies. These landowners and agencies will focus on practices that reduce nutrient influxes rather than completely controlling them. These conservation practices include systems that avoid, control, and trap nutrient runoff to improve the wildlife habitat and help maintain the agricultural productivity within the State. The initiative will significantly decrease polluted runoff in order to improve water quality within the basin and to control nutrient loading which contributes to the hypoxic zone in the Gulf of Mexico. The process for selecting watersheds within the Mississippi Delta to implement various conservation practices for the next four years has been initiated.

The Mississippi 319 Waste-Pesticide Disposal Program

Mississippi farmers continue to take advantage of economical ways to address waste-pesticide disposal problems and improve water quality in their watersheds at the same time. They do this through waste-pesticide disposal events that have been held over the last several years.

These programs and prior ones funded by §319 grants have had a positive impact on reducing environmental risks and improving water quality in rural Mississippi while providing farmers an economical way to dispose of waste-pesticide products.

Since the inception of the program, about 1.3 million pounds of waste-pesticides have been collected from more than 600 farmers in just about all of Mississippi. In addition to reducing potential environmental risks associated with these waste products, the events collectively saved farmers about \$1.4 Million in disposal costs.

Water-Pollution Control Revolving-Loan Fund

The Water Pollution Control Revolving Loan Fund (WPCRLF) program provides low-interest loans to public entities in the State for construction, repair, or replacement of wastewater, stormwater, and nonpoint source pollution projects. Funding for these projects comes from federal grants, state match, repayments, and interest on deposits. Since 2010, additional subsidy funding provided through annual Congressional appropriations, has also been made available to “Green” and “Small/Low Income Community” WPCRLF projects. During 2014, MDEQ funded 14 new WPCRLF projects totaling \$34.7 million, which included approximately \$1.1 million of Green or Small/Low Income Community subsidies.

Water-Pollution Control Emergency Loan Fund

The Water Pollution Control Emergency Loan Fund (WPCELF) program provides loans to communities for the emergency construction, repair, or replacement of wastewater collection and treatment facilities. The WPCELF has approximately \$3.1 million available for such emergency projects. One project was funded in FY 2014 for wastewater work in Port Gibson. MDEQ encourages communities throughout the State to utilize this program whenever funds for emergency wastewater projects are needed.

Source Water Assessment Program

The 1996 amendments to the Safe Drinking Water Act mandated states to develop and implement a Source Water Assessment Program (SWAP). The purpose of this program is to notify Public Water Systems (PWS) and customers regarding the relative susceptibility of their drinking-water supplies to contamination. Congress intended for these susceptibility assessments to encourage efforts that would enhance the protection of PWSs by managing identified potential contaminant sources of concern. In 1998, the Mississippi State Department of Health (MSDH) contracted with MDEQ to develop and administer the SWAP in Mississippi. Required elements of assessments include the following: 1) delineating Source Water Protection Areas around PWS wells; 2) inventorying potential contaminant sources in the protection areas; 3) assigning susceptibility rankings to wells and; 4) notifying the public regarding the availability of SWAP information.

Assessments in Mississippi use the following rankings to notify PWSs of their relative susceptibility: 1) Higher, 2) Moderate and, 3) Lower. Most of the public groundwater-system wells in the State have received a Moderate ranking (63%) while 29% have received Lower rankings and only 8% have received higher susceptibility rankings. Some of the criteria considered when assigning these rankings to public groundwater systems include aquifer confinement; MSDH minimum well-design criteria; potential contaminant sources identified within the delineated Source Water Protection Area and; abandoned wells within the protection area.

The size of a Source Water Protection Area is based on eight delineation scenarios that were developed using EPA’s Wellhead Protection Area (WHPA code) computer program. The different scenarios are a

result of countless computer modeling runs and an extensive data review of aquifer characteristics and well data from the USGS and MDEQ's Office of Geology and Office of Land and Water Resources. The eight developed delineation scenarios incorporate differing model-input parameters, including well discharge, aquifer porosity and transmissivity, aquifer thickness, and time. The approved pumping scenarios are arranged according to well-discharge ranges with larger pump rates corresponding to larger Source Water Protection Areas.

Assessments of all public groundwater systems and the three public, surface-water systems operating in the State have been completed. After MDEQ mailed the prepared assessment reports to the systems, it became their responsibility to notify their customers that a SWAP report was available for review upon request. As another reminder, the EPA required the annual Consumer Confidence Report (CCR) prepared by systems to include a reference regarding the SWAP report and a brief summary of the assessment findings.

The SWAP reports and corresponding maps of delineated Source Water Protection Areas are available online at the MDEQ website: [SWAP Resources](#). As a result of recent MDEQ regulatory changes, all new PWS wells now require that preliminary assessments be performed by MDEQ prior to the issuance of groundwater withdrawal permits. These preliminary assessments allow the suitability of proposed well sites to be screened prior to the drilling and completion of PWS wells.

Source Water Protection Strategy

Mississippi's Source Water Protection Strategy for PWS wells using unconfined aquifers involves the integration and coordination of protection efforts with various environmental regulatory programs within MDEQ. The implementation of this strategy is initiated when the corresponding regulatory programs are provided a Source Water Assessment analysis of a PWS well from the Groundwater Planning Branch. This direct, cross-program involvement should help to ensure that contaminant plumes do not degrade shallow groundwater sources used for public water supply. The strategy will be considered complete after MDEQ meets with representatives of systems to explain pertinent protection measures.

The protection strategy for public groundwater systems using deeper confined wells focuses on the hydrogeologic confinement (vulnerability) of their production aquifers. Adequate aquifer confinement is generally assumed if an overlying confining unit of clay is at least 30 feet in thickness and/or the corresponding potentiometric surface (head) extends at least 10 feet above the screened aquifer. The implementation of this strategy is considered complete when the confinement is verified and a system is identified of any abandoned (unplugged) wells that may pose public health issues.

The Source Water Protection Strategy for the four surface-water intakes used in the State involves the integration of public drinking-water protection into MDEQ's Basin Management Approach that is designed to protect and restore the quality of Mississippi's surface-water resources. This integration component was well received by the two pertinent Basin Management Teams that incorporated extra protection measures into their management plans to complete the strategy. EPA Region IV and the Tennessee Valley Authority are assisting MDEQ with these projects. Meetings with these PWS entities have been held and additional meetings to discuss protection measures are intended. The State is also participating in a national pilot project to address the integration of the SDWA and the CWA.

Storm Water Regulations

Implementation of Mississippi's Storm Water General Permits and regulations continued in Fiscal Year 2014.

- The Environmental Permits Division (EPD) issued general permit coverage for 320 large construction projects (five acres or greater).
- EPD issued general permit coverage for 49 regulated industrial facilities under the Baseline Storm Water General Permit for Industrial Activities.
- EPD received and processed 43 —No Exposure Certifications” from potentially regulated industrial facilities. Facilities that certify —no exposure” of industrial activity to storm water are not required to obtain storm water coverage under the Baseline General Permit.



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