2015 Annual Report

Louisiana Nutrient Management Strategy Implementation

FINAL

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Prepared by the
Louisiana Nutrient Management Strategy Interagency Team

Coastal Protection and Restoration Authority (CPRA)
Louisiana Department of Agriculture and Forestry (LDAF)
Louisiana Department of Environmental Quality (LDEQ)
Louisiana Department of Natural Resources (LDNR)

With collaboration of the

Louisiana State University Agricultural Research Center (LSU AgCenter)
U.S. Business Council for Sustainable Development, Louisiana Water Synergy Group
U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS)
U.S. Environmental Protection Agency (USEPA)

2015 Annual Report
Louisiana Nutrient Management Strategy Implementation

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

STRATEGIC ACTIONS

The Louisiana Nutrient Management Strategy ('Strategy') was released May 2014 (Louisiana Nutrient Management Strategy Interagency Team 2014). The Strategy presents a framework of ten strategic components with underlying actions that guide implementation of nutrient management activities across the state. Completing these Strategic Actions, in addition to adapting, modifying, and/or identifying additional actions is part of the Strategy implementation process.

The Strategy Interagency Team is comprised of representatives from the Louisiana state agencies of the Coastal Protection and Restoration Authority of Louisiana (CPRA), the Louisiana Department of Agriculture and Forestry (LDAF), the Louisiana Department of Environmental Quality (LDEQ), and the Louisiana Department of Natural Resources (LDNR). Partnerships with other agencies and groups including the Louisiana State University Agricultural Research Center (LSU AgCenter); the U.S. Business Council for Sustainable Development, Louisiana Water Synergy Group; the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS); and the U.S. Environmental Protection Agency (USEPA) Region 6 form a well-rounded team to achieve these nutrient management efforts outlined in the Strategy for Louisiana.

This Annual Report describes the accomplishments in implementation of the Strategy during 2015. Completed and ongoing Strategic Actions are identified and results and progress made during 2015 are discussed.

1. STAKEHOLDER ENGAGEMENT

Stakeholder participation is essential to accomplishing the vision of the Strategy. Stakeholders are the stewards of their local landscapes and have a vested interest in the protection, improvement, and restoration of water quality within their watershed community. Engaging and communicating with stakeholders is crucial to the success of the Strategy.

One of the many benefits of a robust stakeholder engagement process is increased awareness and participation from all sectors within a watershed in activities that are more nutrient-responsible. Future stakeholder engagement efforts will focus on performing ongoing and additional outreach and education, and identifying and promoting partnerships and leveraging opportunities. Leveraging existing programs is critical to further engage stakeholder communities as the Strategy is further implemented.

1.a. Identify stakeholders with interest in the strategy

Stakeholder identification was initiated and completed in 2012 during the initial stage of Strategy development. This action focused on identifying stakeholders with interest in nutrient management in Louisiana. Over 200 stakeholder groups in Louisiana were identified, and stakeholder groups included state and federal agencies, agricultural producers, academic institutions, nonprofit organizations, non-governmental organizations (NGOs), private industry, private landowners, parishes, and municipalities.

1.b. Engage stakeholders in strategy development

Stakeholder engagement was initiated in 2012 and completed in 2013. This action focused on outreach regarding the development of the Strategy. The Strategy Interagency Team engaged representatives from over 130 stakeholder affiliations through presentations delivered at local and regional level meetings. From November 2012 through June 2013, Strategy Interagency Team members targeted more than 30 events to interact with stakeholders.

1.c. Perform outreach/education on strategy activities

Outreach/education on strategy activities is ongoing. This action is focused on outreach to stakeholders to inform, promote participation, and report results on Strategy activities.

In 2015, the Strategy Interagency Team participated in many events related to nutrient management in Louisiana as well as other areas of the Mississippi/Atchafalaya River Basin (MARB). At these events, Strategy Interagency Team members communicate with stakeholders on Strategy activities specific to Louisiana and learn from other states and partners on the nutrient management activities occurring within their respective areas.

These outreach events for 2015 included the following participation:

- LDEQ presentation to and participation in the Louisiana Solid Waste Conference March 20, 2015 in Lafayette, Louisiana
- LDEQ presentation to and participation in the USEPA R6 Regional Technical Advisory Group (RTAG) Meeting, May 13-14, 2015 in Dallas, Texas
- LDEQ participation at the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force (Hypoxia Task Force, HTF) Spring Meeting May 19-21, 2015 in Columbus, Ohio
- CPRA presentation to the Water Institute Expert Panel on Diversion Planning and Implementation meeting on August 4, 2015 in West Pointe a la Hache, Louisiana
- CPRA presentation to and participation in the National Research Council workshop on monitoring from August 24-26, 2015 in New Orleans, Louisiana
- LDEQ and CPRA participation in the Gulf of Mexico Alliance (GOMA) All-Hands meeting from June 16-18, 2015 in Biloxi, Mississippi
- LDEQ presentation to and participation in the Master Farmer Phase I training and field day at Sugar Research Center (LSU AgCenter) July 14-15, 2015 in St. Gabriel, Louisiana
- LDEQ presentation to the SONRIS to Sunset Conference August 27, 2015 in New Orleans, Louisiana
- LDEQ presentation to and participation in the Bayou Vermilion District Association Symposium September 11, 2015 in Lafayette, Louisiana
- LDEQ participation at EPA USDA National Workshop on Water Quality Markets September 15-17, 2015 in Lincoln, Nebraska
- CPRA presentation to and participation in a National Oceanographic and Atmospheric Administration (NOAA)/CPRA workshop on proposed river diversion projects, socio-economics analysis and adaptive management plan development on October 2, 2015 in Baton Rouge, Louisiana
- LDEQ participation at USEPA R6 National Pollutant Discharge Elimination System (NPDES) Program Managers Meeting on October 27-28, 2015 in Dallas, Texas

- CPRA and LDEQ participation in the Hypoxia Task Force Fall Meeting November 3, 2015 in Washington, DC
- LDAF and LDEQ participation in Louisiana Water Synergy Group Quarterly Meetings, February 24, 2015; May 27, 2015; August 12, 2015; and November 18, 2015
- LDEQ participation in the Louisiana-Mississippi Chapter of Golf Course Superintendents Association of America (LMGCSA) meetings on September 22, 2015 and December 2, 2015
- CPRA and LDEQ participation on GOMA Priority Issues Team meetings and conference calls in 2015
- CPRA and LDEQ participation on Hypoxia Task Force Coordinating Committee Monthly Conference Calls in 2015
- LDEQ participation on recurring Association of Clean Water Administrators (ACWA) conference calls in 2015

1.d. Identify and promote partnerships/leveraging opportunities

The ongoing identification and promotion of partnerships and leveraging opportunities is vital to the success of the Strategy. Participation of and collaboration with all stakeholder groups in a watershed is not only key to the implementation of the Strategy, but is also fundamental to the success of water quality protection and restoration activities as a whole.

In 2015, the HTF and Land Grant Universities (LGU) Southern Extension and Research Activities Committee 46 (SERA-46) outlined emergent opportunities for potential short- and long-term collaborative work between the HTF and SERA-46 to adapt with the most recent thinking of both HTF and SERA-46 members about where collaboration will contribute most to state-level nutrient strategies and reducing the hypoxic zone in the Gulf of Mexico (HTF and LGU SERA-46 2015). The goal of SERA-46 is to promote effective implementation of science-based approaches to nutrient management and conservation that reduces nutrient losses to the environment. The objectives of SERA-46 include to: 1) establish and strengthen relationships that can serve the missions of multiple organizations addressing nutrient movement and environmental quality; 2) expand the knowledge base through the discovery of new tools and practices as well as the continual validation of recommended practices; and 3) improve the coordination and delivering of educational programming and increase the implementation effectiveness of nutrient management strategies that reduce nutrient movement for agricultural and non-agricultural audiences. The SERA-46 engages with the HTF through routine coordinating conference calls and meetings.

2. DECISION SUPPORT TOOLS

Decision support tools are essential to evaluating and assessing various aspects of nutrient management activities. Numerous tools exist that may be utilized for this purpose. Available tools include water quality data, water quality models, and management actions and assessments.

2.a. Identify available tools

During 2012 and 2013 strategy development, the Strategy Interagency Team conducted a broad review of available decision support tools in support of the Strategy and identified and evaluated

over 200 tools. Most applicable tools included best management practices, data access portals, mapping applications, modeling tools, and reports.

In 2015, additional tools became available that may support the Strategy. The USDA and USEPA announced the availability of new tools as water quality trading resources (USDA Office of Communications 2015). These tools include a water quality trading roadmap, EnviroAtlas, Nutrient Tracking Tool, and USDA environmental markets website.

The USEPA-USDA Water Quality Trading Roadmap is a decision support tool for those designing and participating in water quality trading programs. The Roadmap is a searchable database that consolidates policy guidance from EPA, information from State programs, and examples and supporting materials from across the U.S.

The USEPA-USDA announced a partnership on EnviroAtlas to support environmental markets (USEPA 2016a). USDA and EPA will incorporate environmental markets data layers into the Federal ecosystem service decision support tool, EnviroAtlas. The data layers will show where markets for water, carbon, wetlands, and habitats occur on the U.S. landscape, provide information about these markets, and allow this information to be displayed in the context of existing environmental data from Federal agencies.

The USDA announced the release this fall the next version of Nutrient Tracking Tool (NTT) (USDA 2016), ready for use in the Pacific Northwest and Ohio River Basin. The new version of NTT is a USDA hosted, user-friendly, web-based tool that calculates edge of field nutrient and sediment loads for use in conservation planning and environmental market credit calculation. NTT will be made available in additional regions in 2016. While the NTT is not yet available for Louisiana, USDA anticipates the NTT to become available for Louisiana in future efforts.

The USDA released the Department-level environmental markets website (USDA Office of the Chief Economist 2016). The site integrates information, tools and resources on environmental markets from across the Department, allowing users to easily gain a snapshot of environmental market activities at USDA.

Many of the tools identified in the Strategy development phase are still applicable. These previously identified tools include the web-based data access including LDEQ Louisiana Environmental Data Access Center (LDEQ 2016a), the USEPA Nitrogen and Phosphorus Data Access Tool (NPDAT) (USEPA 2016a), and the Water Quality Portal (USGS et al. 2016), modeling tools including the USGS SPAtially Referenced Regressions On Watershed attributes (SPARROW) surface-water quality models (USGS 2015), Geographic Information Systems (GIS)-based tools, and the USEPA Recovery Potential Screening Tool (RPST) (USEPA 2016b).

2.b. Evaluate available tools

In addition to the decision support tool evaluations that were conducted prior to 2014, the interagency team considers the tools made available by USDA and USEPA in 2015 on water quality trading to be valuable tools for the nutrient management strategy.

2.c. Select available tools

In addition to the decision support tools that were selected prior to 2014, the water quality trading tools from USDA and USEPA in 2015 would be useful tools for nutrient management efforts in Louisiana.

2.d. Document selected tools

New features are available in some of the previously identified decision support tools. In the USEPA NPDAT web tool, newly updated information includes facilities likely to discharge N/P to waters, waters listed for nitrogen/phosphorus (N/P) impairments, waters with N/P Total Maximum Daily Loads (TMDLs), and drinking water sources. Information that is coming soon is nutrient-related Clean Water Act Section 319 projects (USEPA 2016a).

3. REGULATIONS, PROGRAMS, & POLICIES

This component of the Strategy recognizes that regulations, programs and policies will assist with nutrient management activities within the state of Louisiana as well as benefit activities within the larger MARB watershed.

3.a. Identify current

Current regulations, programs, and policies were identified during the Strategy development phase in 2012 and 2013. Ongoing efforts of the Louisiana Agricultural Nutrient Task Force, the LSU AgCenter task force on fertilizer effectiveness, the Louisiana Water Synergy Group, and the USDA-USEPA expanded partnership on water quality trading continues to aid in leading the way to improvement in nutrient management in Louisiana.

Created by the Louisiana Commissioner of Agriculture and Forestry, the Louisiana Agricultural Nutrient Task Force (Task Force) will study topics related to agricultural nutrient issues. The Task Force is then charged with reviewing and making recommendations on at least the following topics and practices:

- To address the need for research, education and training in the selection and application of agricultural fertilizer and soil nutrients in the state;
- To identify practices that apply to the selection, purchase, storage, and application of agricultural fertilizer and soil nutrients, including the reasonableness of rules for their on-farm storage;
- To identify state level agricultural certainty certification programs that encourages the implementation of best management practices in the generation, handling or land application of nutrients in Louisiana;
- To establish a nutrient management planning program;
- To formulate a systematic and economically viable nutrient management program that will both maintain agricultural profitability and improve water quality in Louisiana.

Another agricultural leader in nutrient management is the LSU AgCenter. The LSU AgCenter created a Task Force to study the effectiveness of fertilizers on major row crops and forages grown in Louisiana (McClure 2014). The Task Force is made up of ten members, including LSU AgCenter agronomists and specialists for different crops. The Task Force will work to ensure the recommended fertilizer application rates are up to date based on current research. The rate

recommendations should strive to minimize such problems in water quality where overabundance of nutrients. The LSU AgCenter Task Force hopes to produce a booklet listing nutrient deficiencies in various crops along with appropriate fertilizer rates.

The Louisiana Water Synergy Project, managed by the U.S. Business Council for Sustainable Development, provides a forum for business leaders with infrastructure investments in southern Louisiana, state and local leaders, academic institutions, and non-governmental organizations (NGOs) to take collective actions to help protect wetlands and improve water quality in the region. The project has been underway since May 2012. The 21 companies participating represent a wide range of industrial sectors, including oil and gas, utilities, chemicals, manufacturing, beverages, and services. Participants also include representatives from the Lake Pontchartrain Basin Foundation, The Nature Conservancy, LDEQ, and LDAF. Working Groups are in place to address: Nutrients, Wetlands Restoration and Protection, Sustainable Water Supplies, and Alternative Levee Construction Materials.

In late 2013, the USDA and the USEPA announced an expanded partnership to support water quality trading and other market-based approaches (USDA and USEPA 2013). The purpose of this USDA and USEPA policy is to support states, interstate agencies and tribes as they develop and implement water quality trading programs for nutrients, sediments and other pollutants where opportunities exist to achieve water quality improvements at reduced costs. Through expanded partnership the USDA and the USEPA will coordinate and enhance communications and outreach to states, agricultural producers, regulated sources, and interested third parties on water quality trading; engage expertise across agencies in the review of grants, loans or technical assistance programs focused on water quality trading; share information on the development of rules and guidance that have the potential to affect water quality trading; collaborate on developing tools and information resources for states and credit generators to guide decision making, reduce costs in program design and implementation, improve environmental performance, and foster consistency and integrity across regional initiatives; and co-host a workshop by 2015 to share tools and resources available to assist in stakeholder decision making and opportunities. The Strategy Interagency Team has expressed interest to both the USDA and USEPA regarding the development of a water quality trading program for Louisiana.

3.b. Identify gaps

The identification of gaps in current regulations, programs, and policies is ongoing. Currently there is not an implemented program for water quality credit trading in Louisiana. Thus, expanded regulations, programs, or policies related to water quality credit trading may be warranted for stakeholders in Louisiana to advance trading as a cost-effective means for nutrient management and general water quality protection and restoration in the state.

Nutrient management activities under the Strategy are being performed within current programs. Yet, dedicated funding may be necessary to realize improvements in nutrient management in Louisiana, as well as in other parts of the MARB.

3.c. Proposed or establish new

Proposing or establishing new regulations, policies, or programs is an ongoing action of the Strategy. Proposed or new regulations, policies, or programs for 2015 include water trading

workgroup, new vision of the Clean Water Act (CWA) Section 303(d) Program, and the *Deepwater Horizon* oil spill settlement.

In 2015, LDEQ, CPRA, and LDAF in conjunction with the Water Synergy Group formed a small workgroup to review options and considerations for the state of Louisiana for water quality credit trading. The workgroup is reviewing the document produced by the National Network on Water Quality Trading in summer of 2015 to evaluate options and considerations for a water quality trading program in Louisiana (National Network on Water Quality Trading 2015). Findings from this review may aid Louisiana in identifying options and considerations that could be helpful in designing and implementing a water quality trading program for Louisiana.

LDEQ along with other states continued progress on a new long-term vision for assessment, restoration, and protection under the CWA Section 303(d) Program (USEPA 2013, LDEQ 2015a). The Clean Water Act (CWA) Section 303(d) Program provides a mechanism for integration of implementation efforts to restore and protect the nation's aquatic resources. Through this process the nation's waters are assessed, restoration and protection objectives are systematically prioritized, and Total Maximum Daily Loads (TMDLs) and alternative approaches are adaptively implemented to achieve water quality goals with collaboration of State and Federal agencies, tribes, the regulated community, and the public.

This new long-term vision for assessment, restoration, and protection under the CWA 303(d) Program for 2016 through 2022 (new vision) has been described whereby states may identify and prioritize watersheds for these restoration and protection efforts under the CWA 303(d) Program. The primary goals of this new vision of the CWA 303(d) Program include prioritization, assessment, protection, alternatives, engagement, and integration. The new vision will guide the realization of our clean water goals in a manner that recognizes lessons learned from the past two decades of CWA 303(d) Program implementation and addresses new challenges with innovative solution.

In 2015, LDEQ prepared and made available to the public for review a draft prioritization framework, '*Prioritization Framework: A State Plan for Prioritizing Watersheds for Restoration and Protection in Louisiana,'* through collaboration with various stakeholders including state, federal and watershed-based entities (LDEQ 2015b). Following the prioritization framework stakeholder engagement phase and finalization of the prioritization framework, LDEQ will prioritize the watersheds for restoration and protection under the new vision of the CWA 303(d) Program. LDEQ will identify the priority watersheds for restoration and protection in Louisiana through the 2016 Integrated Report (IR); stakeholders will also be able to review and provide comments on the prioritized watersheds in the 2016 IR process. This new long-term vision of the CWA 303(d) Program will work to promote partnerships and leverage opportunities for water quality, including nutrient water quality, restoration and protection.

A significant development occurred in July 2015 when the *Deepwater Horizon* state and federal Natural Resource Damage Assessment Trustees entered into an Agreement in Principle with BP to settle the natural resource damages claim from the 2010 Deepwater Horizon oil spill impacting the Gulf of Mexico and nearshore areas of the Gulf. In October 2015, the draft *Deepwater Horizon* Oil Spill: Programmatic Damage Assessment and Restoration Plan

(PDARP) and Programmatic Environmental Impact Statement (PEIS) was released for public review and comment (Deepwater Horizon Natural Resource Damage Assessment Trustees 2016). The CPRA, LDEQ and LDNR are trustees in this process and were involved in the development of this PDARP/PEIS. The PDARP/PEIS represents a comprehensive, integrated, ecosystem restoration plan for the Gulf of Mexico by taking into account a thorough assessment of impacts to the Gulf's natural resources and the services they provide following the *Deepwater Horizon* oil spill.

The five goals of the plan are to 1) restore and conserve habitat; 2) restore water quality; 3) replenish and protect living coastal and marine resources; 4) provide and enhance recreational opportunities; and 5) provide for monitoring, adaptive management, and administrative oversight to support restoration implementation. These five goals will be accomplished through 13 restoration types. Specifically, one restoration type is nutrient reduction.

The goal of the nutrient reduction restoration type will be to contribute to overall health and resiliency of the coastal environment and resources, restoration goals through 1) reducing nutrient loadings to Gulf Coast estuaries, habitats, and resources that are threatened by chronic eutrophication, hypoxia, or harmful algal blooms or that suffer habitat losses associated with water quality degradation; 2) where appropriate, co-locating nutrient load reduction projects with other restoration projects to enhance ecological services provided by other restoration approaches, and 3) enhancing ecosystem services of existing and restored Gulf Coast habitats.

As of early 2016, this PDARP/PEIS plan has been released as the Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement (Deepwater Horizon Natural Resource Damage Assessment Trustees 2016), and March 21, 2016 marks the end of a 30-day waiting period after the release of the final document and a final decision to adopt the plan will not be made until that period is complete. If adopted, the final plan would allocate up to $8.8 billion for natural resource injuries under a proposed settlement with BP, which would resolve BP's liability for natural resource injuries stemming from the spill. The state of Louisiana is set to receive $5 billion of these funds, with $20 million potentially earmarked for nutrient reduction of nonpoint sources in coastal watersheds in the state.

4. MANAGEMENT PRACTICES & RESTORATION ACTIVITIES

Management practices and restoration activities in Louisiana encompass activities focused on nonpoint source (NPS) management, point source management, and coastal restoration and protection efforts. This multi-prong approach to the management of nutrients in Louisiana allows for a more holistic approach to nutrient management where true nutrient sources can be identified and appropriate solutions tailored to addressing the source.

4.a. Document current practices related to nutrient management

The documentation of current practices related to nutrient management is ongoing. Within Louisiana, current practices include implementation of the LDEQ NPS Program in collaboration with LDAF, USDA NRCS, and LDNR (LDEQ 2011); LDEQ implementation of the Louisiana Pollutant Discharge Elimination System (LPDES) Permit Program (LDEQ 2016b); and CPRA

implementation of the Comprehensive Master Plan for a Sustainable Coast (Coastal Master Plan, CPRA 2012).

The Louisiana-Mississippi Chapter of Golf Course Superintendents Association of America (LMGCSA), along with the LSU AgCenter and LDEQ has formed a committee to assist in the development of a Best Management Practice (BMP) manual for golf courses. This BMP manual is intended to tailor specific BMPs that separate unprofessional from professional care for lawns to Louisiana ecoregions or regional zones of the state. Currently the committee is working on grant proposals to prepare this manual. A primary objective in establishing BMPs would be nutrient management of silts or nutrients upstream and overall water quality. To achieve this objective it will be necessary to secure funding to write and implement BMPs.

4.b. Identify areas where practices are being implemented

The LDEQ NPS Program and the LPDES Permit Program are implemented statewide. The LDEQ NPS Program selected priority watersheds targeted for implementation activities through 2016; these priority watersheds are identified in Strategic Action 6.g. The LPDES Permit Program is implemented in facilities throughout the state within all water bodies. The CPRA Coastal Master Plan is focused within coastal areas of the state. The USDA NRCS conservation practices (CPs) are implemented statewide based on appropriate practices with consideration of watershed characteristics and land uses.

4.c. Model nutrient removal estimated through riverine diversions

In 2014, CPRA contracted with The Water Institute of the Gulf (Water Institute) to develop a model describing the effects of proposed diversions from the Mississippi River into coastal receiving basins on the west and east sides of the Mississippi River. This model includes modifying existing Delft3D modeling tools developed by Deltares (The Netherlands) and also developing new tools to integrate new capacity into the model. This model includes four main components (hydrodynamics, nutrient dynamics, morphodynamics, and vegetation) which describe the performance of the proposed sediment diversions in coastal Louisiana under various operational strategies.

The nutrient component of this model contains new code that had not previously been developed. Along with the new code development, the Water Institute has been collecting field data in both receiving basins (west and east sides of the Mississippi River) for the purposes of calibrating and validating the nutrient dynamics and morphodynamics model components. The field work component began in 2014 and was completed in 2015.

During 2015, the coupled models were calibrated and validated utilizing pre-existing datasets and data collected during the 2014-2015 field campaign. Overall, the calibrated and validated models compared well to the observations, and the seasonal patterns of key processes were reproduced. For example, the hydrodynamics and morphodynamics model represented the upper and lower basin salinity differences well, and the interaction between river and receiving basins were well captured. The nutrient dynamics model captured the general temporal and spatial nutrient dynamics patterns and the model compared well to most of the field observations. In addition, the vegetation modules were parameterized through field observations, extensive review of the literature, and best professional assessment. They performed well, especially

considering the integration of the physical and biological dynamics of the marsh ecosystems. There are still some discrepancies between modeled and observed data that will require further model refining, but some of these likely originate from lack of observations for the loadings at the boundaries and in the interior of the receiving basins. A second, refined version (V2) of the model will be produced utilizing field observations collected after this initial modeling effort.

Model scenarios are being run utilizing a variety of proposed diversion operational scenarios. Once these runs are complete and the outputs are interpreted, refined estimates of nutrient assimilation potential will become available for inclusion in subsequent annual reports.

4.d. Identify case studies/model watersheds

The identification of case studies/model watersheds in Louisiana is an ongoing Strategic Action. Efforts that successfully combine restoration and protection activities with stakeholder participation and leadership may champion other groups doing the same. The Strategy (2014) highlighted a floodplain reconnection effort by The Nature Conservancy at the Mollicy Farms in northeastern Louisiana (The Nature Conservancy 2012, 2013; The Conservation Fund 2013). Mollicy Farms, which covers a 17,000-acre tract, is a floodplain reconnection project located in the Upper Ouachita National Wildlife Refuge in the Ouachita River Basin of Louisiana and is the largest floodplain restoration effort in the Lower Mississippi Alluvial Valley. The ongoing identification of case study/model watersheds in Louisiana will aid in demonstrating and promoting effective and successful nutrient management in the state.

4.e. Integrate science-based nutrient management approaches

The integration of science-based nutrient management approaches is ongoing. The CPRA is conducting research on modeling for river diversions that will allow for the addition of a new nutrient component to the model to evaluate nutrient dynamics in response to a river diversion (see Strategic Action 4.c.). For NPS management, the LSU AgCenter is forefront in researching and applying science-based approaches for nutrient management in Louisiana and research is ongoing within the state. For point source management, the LDEQ is funding through USEPA support a project to analyze the long-term productivity and nutrient removal of several wetland assimilation projects permitted under the LPDES Permit Program; this analysis will aid in documenting and understanding the long-term nutrient removal observed in these wetland assimilation areas. As new scientific information becomes available, integration will allow for improved nutrient management activities to be implemented in Louisiana.

4.f. Promote BMP/CP implementation by farm in priority watersheds

Through the NPS Program, LDEQ and LDAF collaborate on setting priority watersheds for implementation of BMP and CPs. Further, the LSU AgCenter is instrumental in working with producers to implement appropriate BMPs/CPs. The LSU AgCenter conducts field days throughout the state to perform outreach and promote BMPs/CPs that are most appropriate for the various commodity groups within Louisiana. The LSU AgCenter conducted 14 field days in 2015.

5. STATUS & TRENDS

The Strategy aims to document the current status and determine trends over time for nutrient management efforts in Louisiana's water bodies. The status and trends will be documented for water quality monitoring efforts of the LDEQ Ambient Water Quality Monitoring Network (AWQMN); implementation of LDEQ NPS Program projects by LDEQ, LDAF, and USDA NRCS; implementation of LPDES Permit Program; modeling efforts of the CPRA, LDEQ, and USGS; implementation of coastal protection and restoration projects by CPRA; and LSU AgCenter developed social indicators of public behavior regarding nutrient management in Louisiana.

5.a. Model nutrient loading estimated within Louisiana watersheds

Modeling of nutrient loading within Louisiana watersheds is ongoing. The USGS SPAtially Referenced Regressions On Watershed attributes (SPARROW) surface-water quality models for nitrogen and phosphorus are available for use through an online web tool in a Decision Support System (DSS) (USGS 2015). Currently nitrogen and phosphorus models for the Mississippi River Basin are available for data from 2002 (Robertson and Saad 2013). The USGS is in progress of updating the nutrient models for data from 2012 and anticipates publishing the data used to calibrate the 2012 models in 2016 to 2017. These updated models are expected to give improved information about stream reach and lake characteristics and improved capability of evaluating their effect on nutrient transport. It is anticipated that model results will be served on a web-based mapping and scenario evaluation tool similar to what is available for the 2002 models (USGS 2016).

5.b. Document in-stream nutrient water quality

Through the LDEQ AWQMN, the agency monitors in-stream water quality in water bodies across the state. In the 2015 water sampling year (October 2014 through September 2015), the LDEQ monitored 135 sites in 132 subsegments for in-stream concentrations of nitrogen (nitrate-nitrite and total Kjeldahl nitrogen) and phosphorus (total phosphorus). Results of the LDEQ ambient water quality monitoring are available through the Louisiana Environment Data Access Center (LDEQ 2016a).

5.c. Document Social Indicators of nutrient management behavior

During the Strategy development phase in 2013, the LSU AgCenter conducted surveys with producers to document current behavior on nutrient management in Louisiana. This survey of nutrient management behavior can provide a social indicator associated with implementation of CPs and attitude on water quality for specific agricultural interest groups within the state (LSU AgCenter 2013a).

In addition, the SERA-46 group plans to utilize Social Indicators to guide, evaluate and advance implementation of strategies to reduce nutrient loss from agricultural lands across the 12 HTF states (HTF and LGU SERA-46 2016). SERA-46 envisions the process would consider the input of numerous stakeholders, as well issues derived from hypoxia- and water resource management-related literature, such as the Social Indicator Planning and Evaluation System (SIPES) Handbook (Genskow and Prokopy 2011). The collection of baseline data will be used to inform education and outreach in high priority watersheds (HTF and LGU SERA-46 2016).

5.d. Document BMP/CP implementation in watersheds

The LDAF Office of Soil and Water Conservation (OSWC), in collaboration with the LDEQ NPS Program, implemented CPs that aid in improving water quality in watersheds across the state. In the Federal Fiscal Year 2015 (October 2014 through September 20145, the LDAF OSWC implemented CPs in 8 LDEQ subsegment watersheds. These watersheds included Bayou des Cannes, Bayou Lafourche, Bayou Queue de Tortue, Big Creek, Boston Canal, Bayou Plaquemine Brule, Lake St. Joseph, and Lake Louis. Conservation Practices included nutrient management, conservation cover crop, irrigation water management, and irrigation land leveling among others.

The USDA NRCS also implemented CPs in watersheds across the state of Louisiana. In Federal Fiscal Year for 2014, CPs were certified or planned for over 375,000 acres in Louisiana (USDA 2016; Appendix C). The CPs included nutrient management, irrigation land leveling, conservation crop rotation, and cover crop among others.

5.e. Document permitted discharger inventories

Point source discharges into Louisiana waters are managed through the LPDES Permit Program by the LDEQ under Louisiana's Water Quality Regulations (LAC 33:Chapter IX) (LDEQ 2016b). At the end of Federal FY15 (ending September 2015), there were 12,931 permitted dischargers in the LPDES Permit Program. Of these 12,931 permitted dischargers in FFY15, 10,639 were general or individual permits (non-stormwater) and 2,292 were stormwater permits. The LPDES permits issued in 2015 can be found on the LDEQ website (LDEQ 2016c).

5.f. Document riverine diversions

Louisiana's 2012 Coastal Master Plan identifies a number of diversion projects designed to divert freshwater and sediment from the Mississippi River into adjacent coastal wetlands in an effort to restore land-building processes that were interrupted by the construction of levees on the river and to reverse the trend of land loss that has plagued coastal Louisiana since at least the 1930s (CPRA 2012). A key component of the implementation process of the 2012 Coastal Master Plan is to more fully investigate technical uncertainties to maximize the benefits of these projects while minimizing trade-offs and unintended consequences. To this end, CPRA is conducting planning-level landscape models, basin-level models, and project-specific models to help define project location, size, operations, and other key project attributes.

Because diversions are an essential restoration tool in coastal Louisiana, CPRA has worked with the Water Institute to establish and convene an independent Diversion Advisory Panel to provide expert advice and guidance on key issues that pertain to river diversions. The 12 panel members have backgrounds in a broad range of physical and biological sciences, social science, and engineering and convened three meetings in 2015.

Key decisions were made in 2015 regarding which of the proposed diversions from the 2012 Coastal Master Plan will move forward to engineering and design, including recommendations on specific locations and size. The Coastal Protection and Restoration Authority heard a recommendation in October 2015 to move forward with engineering and design for the Mid-Barataria diversion near Myrtle Grove at 75,000 cubic feet per second of flow and Mid-Breton diversion at Wills Point at 35,000 cubic feet per second. They voted to support that

recommendation; final approval will come from the Louisiana Legislature in the form of approved expenditures in CPRA's 2017 Annual Plan.

5.g. Document coastal protection and restoration activities

The CPRA develops an annual plan that is submitted to the Louisiana Legislature in March of each year. This annual plan documents activities from the previous fiscal year, and project activities and budgets for the upcoming fiscal year. The FY2017 Annual Plan is currently in development. Once finalized, Annual Plans are posted on the CPRA website (http://coastal.la.gov). In addition, quarterly progress reports with information about construction status on individual projects are also posted on the CPRA website.

5.h. Determine trends in nutrient water quality at long-term monitoring stations

In 2015, the LDEQ determined trends in nutrient water quality concentrations observed at 21 active long-term monitoring stations located in the LDEQ AWQMN throughout the state (LDEQ 2015c). This trend analysis examined nitrogen [including total Kjeldahl nitrogen (TKN) and nitrite + nitrate (NOx)] and phosphorus [as total phosphorus (TP)] concentrations observed at long-term stations in Louisiana. The results of the Mann-Kendall trend tests for TKN, NOx, and TP from 1978 to 2014 revealed that the majority of trends (73%) to be decreasing. All sites had a decreasing trend for TKN, twelve sites showed a decreasing trend for NOx, and thirteen sites showed a decreasing trend for TP. Only one trend, NOx for the Bogue Chitto River, was found to be increasing. The land use for the watershed of the eleven rivers included in this analysis was calculated and then analyzed along with the median nutrient value in a Kendall tau correlation analysis. Agriculture was found to be significantly correlated with higher concentrations of TKN and TP ($p<0.01$), while forested lands were found to be significantly correlated with lower concentrations of TKN and TP ($p<0.05$). Even though agriculture was found to be associated with higher nutrient concentrations, basins with the most agriculture also showed the most improvement in nutrient management as evidenced by decreasing or no observable increasing trends in nutrients. Overall, increasing trends in nitrogen and phosphorus in-stream concentrations are not being observed in major Louisiana water bodies, and in fact nutrient concentrations are either on the decline or stable in over the past 30 years.

The LSU AgCenter also examined nutrient trends over time in Louisiana waterbodies, specifically in the Mermentau and Vermilion Rivers (He and Xu 2015), and the results complimented those from the LDEQ analysis. The LSU AgCenter utilized the LDEQ long-term data as well as data from the USGS. In their review of nutrient trends by decade from 1980 to 2010 in the Mermentau and Vermilion Rivers, the researchers observed that there was an overall steady decline of nitrogen and phosphorus concentrations in both rivers, mainly in the 1990s. Researchers noted that the Vermilion River showed a higher concentration of both total nitrogen and total phosphorus as compared to the Mermentau River. And that on average annually, the Vermilion River delivered a total of 1,829 metric tons of nitrogen, while the Mermentau River delivered a total of 3,925 metric tons of nitrogen because of its higher discharge. Similar to the concentration trend, the rivers showed a decline in total nitrogen and total phosphorus loads to the Gulf of Mexico. While the researchers did not report on actual implementation of Best Management Practices (BMPs) they speculate that it is likely that the agricultural BMPs for irrigation management and nutrient management in these two rivers basins may have contributed

to the nutrient reduction because of intensive rice cultivation that occurs in these areas (He and Xu 2015).

5.i. Determine trends in Social Indicators

This Strategic Action for determining trends in Social Indicators will build upon those results as indicated under action 5.c. The SERA-46 group plans to utilize Social Indicators for nutrient management across the 12 HTF states (HTF and LGU SERA-46 2016) to inform education and outreach in high priority watersheds. SERA-46 anticipates that "post-programming" data collection will follow to evaluate program impact and inform the next generation of outreach (HTF and LGU SERA-46 2016).

5.j. Determine trends in BMP/CP implementation

This Strategic Action is focused on determining trends in BMP/CP implementation. The USDA NRCS Conservation Program reports on water quality (USDA 2016; Appendix C) indicate that the land unit acres receiving conservation related to water quality for the practice of nutrient management generally increased from 50,746 acres in 2005 to 52,161 acres 2014 in Louisiana. Further for land unit acres treated by at least one conservation practice related to water quality, a general increase was also observed from 179,375 acres in 2005 to 289,096 acres in 2014.

5.k. Determine trends in permitted discharger inventories

In the LPDES Permit Program, there were 8,736 permitted point-source dischargers at the end of FY09 (ending September 2009), 10,443 permitted point-source dischargers at the end of FY14 (ending September 2014), and 10,639 permitted point-source dischargers in FY15 (ending September 2015). This represents an increase of 1,707 permitted point-source dischargers, or a 19.5% increase, from FY09 to FY14; and an increase of 1,903 permitted point-source dischargers, or 21.8% increase, from FY09 to FY15. The increase in permitted point-source dischargers from FY14 to FY15 was 1.9%.

5.l. Determine trends in nutrients related to riverine diversions

As a part of the model development described under Strategic Action 4.c., CPRA and the Water Institute collected nutrient-related data in the Barataria (west of the Mississippi River) and Breton Sound (east of the Mississippi River) basins in 2014 and 2015 which will serve as baseline for new diversion projects, as well as provide data for the calibration and validation of the models. In addition, CPRA is working with the Water Institute to develop and implement the System-Wide Assessment and Monitoring Program (SWAMP) which will serve as a comprehensive monitoring program to serve predictive models as well as program assessment. SWAMP includes water quality parameters, such as nitrogen, phosphorus, chlorophyll, and dissolved oxygen and began in Barataria Basin (west of the Mississippi River) in 2015. Work will continue in future years to expand into the Breton Sound Basin (east of the Mississippi River) and to investigate and evaluate trends in nutrients as diversion projects move through engineering and design to construction, and finally to operation.

5.m. Determine trends in coastal protection and restoration activities

Activities under this Strategic Action are ongoing. After Hurricanes Katrina and Rita in 2005, the Louisiana Legislature directed the state to respond to the land loss crisis in a new way. Act 8 of the First Extraordinary Session of 2005 created the CPRA of Louisiana and required CPRA to

develop a plan for a safe and sustainable coast. The Louisiana Legislature required that this plan be updated every five years to ensure that the state was building on success and taking maximum advantage of new science and innovation. The Louisiana Legislature further directed that the plan include large scale projects and take the needs of the entire coast into account. Most importantly, the plan had to prepare the way for action. The 2007 Coastal Master Plan was the first such plan, and it helped support the many protection and restoration projects that have since been implemented.

In the five years between the 2007 Coastal Master Plan and the 2012 update to the Coastal Master Plan, the state has exponentially increased its financial commitment to the coast. Some of these dollars provided the state's match for repairs and revisions to the Greater New Orleans area levees, allowing the state to leverage over $14 billion in federal dollars for this vital hurricane protection system. In addition, the federal Coastal Impact Assistance Program (CIAP) is providing approximately $496 million to Louisiana to mitigate impacts from Outer Continental Shelf oil and gas production. Many of the CIAP projects address coastal restoration needs through shoreline protection, marsh creation, and other strategies. Approximately 90% of the CIAP program's projects are underway or complete.

The 2017 Coastal Master Plan will build on the past and establish a clear vision for the future. It carries the 2007 and 2012 plans forward by improving our methods to ensure projects are completed as efficiently and effectively as possible.

CPRA is actively working on the 2017 Coastal Master Plan and making several key advancements:

- *Improving the science*. The 2012 plan was founded on state of the art science and analysis, and the 2017 effort builds further upon this basis. The modeling process provides a holistic understanding of our coastal environment today and the changes we can expect over the next 50 years. Recent advancements include incorporating a larger geographic area and increasing spatial details of land loss and flood risk.
- *Expanding collaboration and partnerships*. A successful plan is built on local knowledge, input from a diverse range of coastal stakeholders, and extensive dialogue with the public. The 2017 plan is continuing the many partnerships we developed for the 2012 plan and adding additional representation for landowners and community advocates. We continue to reach out to the public in new ways to better share information on increasing flood risk.
- *Focus on flood risk reduction & resilience*. We need to use all of the tools available to reduce communities' flood risk. We are exploring multiple types of nonstructural options and refining policies to help communities become more resilient. In addition, we are also creating new interactive tools to help citizens understand their flood risk now and in the future.

As a part of the development of the System-Wide Assessment and Monitoring Program (SWAMP) discussed under Strategic Action 9.c., CPRA is planning to utilize these data to evaluate the extent to which the Coastal Master Plan is reaching its overall objectives. This will include the assessment of changes in the priority performance measures, which are linked to overall program performance. Specific to diversion projects, this will include changes in water

quality parameters as a result of the introduction of nutrients from the Mississippi River to the coastal wetland receiving basins.

6. WATERSHED CHARACTERIZATION, SOURCE IDENTIFICATION, & PRIORITIZATION

Watershed characterization, source identification, and prioritization involve identifying the natural characteristics of land and water bodies found within watersheds, and identifying the possible suspected sources of nutrients to a given water body. This information on watershed characteristics and suspected sources will allow for prioritization of water bodies for nutrient management activities.

6.a. Characterize watersheds by land use/cover and geographic features

This action was completed in 2013. Main features such as watershed delineations by LDEQ and USGS, National Land Cover Data on land cover/land use, and elevations have been identified through GIS-based products.

6.b. Characterize water bodies by type such as streams, bayous, rivers and lakes

This action was completed in 2012. LDEQ maintains the Water Quality Management Plan, Volume 4 Basins and Subsegments (LDEQ 2008) which describes the watershed basins and subsegments that are part of the LDEQ water programs.

6.c. Characterize watersheds within the coastal zone

This action was completed in 2013. Coastal watersheds in Louisiana can be described as areas where water is generally distributed broadly from streams rather than as in upland watersheds where water is shed from headlands to one outlet. The main stem water body can be higher than the surrounding areas, and that in flood stage, water leaves the main channel, over the banks and down the natural levees to the back swamps; thus, water is shed to the land rather than from it. Flow in these coastal areas may also be bidirectional within the channel due to tides and winds dependent on prevailing conditions including slope.

LDEQ maintains the Water Quality Management Plan, Volume 4 Basins and Subsegments (LDEQ 2008) which describes the watershed basins and subsegments that are part of the LDEQ water programs. Additionally under the CPRA Coastal Master Plan 2012, the CPRA jurisdictional boundary is described in the Louisiana Revised Statues 49:214.2 as '"Coastal area" means the Louisiana Coastal Zone and contiguous areas subject to storm or tidal surge and the area comprising the Louisiana Coastal Ecosystem as defined in Section 7001 of P.L. 110-114' of the Water Resources Development Act.

6.d. Characterize watersheds within existing or planned riverine diversions

As discussed under Strategic Action 5.f., a critical component of the development and implementation of river diversions in Louisiana will be the development of decision support tools to estimate the most appropriate location, size, and operational strategy for a given river diversion project. An additional critical piece will be the necessary environmental compliance (National Environmental Policy Act, NEPA) documentation, which provides a characterization of the existing conditions of the receiving basins, along with the anticipated changes as a result

of a river diversion project. As the selected projects move towards implementation in the next five years, the environmental documents will be developed.

In addition, the receiving basins are being characterized as a part of the development of predictive models discussed under Strategic Action 4.c. by the collection of empirical data for the purpose of model calibration and validation. Long-term nutrient constituent monitoring, which will allow for the evaluation of trends in nutrients within the receiving basins, will be conducted as a part of System-Wide Assessment and Monitoring Program (SWAMP) discussed in Strategic Action 9.c.

6.e. Identify potential sources through Desktop Analysis/Windshield Survey

This Strategic Action will aid in documenting sources in watersheds. Potential sources can be identified through desktop analyses such as GIS-based tools including Google Earth or maps, and through on-the-ground reconnaissance. Once priority watersheds are identified under the Strategy, this action will be performed to aid in identifying sources which will help to select the appropriate measure to be implemented to address the source. No activities under this action have been conducted at this time.

6.f. Identify unpermitted point sources

The LDEQ Compliance Monitoring Strategy (LDEQ 2016d) outlines approaches for monitoring permit compliance to aid in addressing potential point source issues. In 2015, the LDEQ Inspections Division conducted 1,082 water inspections within 220 subsegments in Louisiana.

Additionally, the LDEQ Inspections Division performs Watershed Sweeps under the Compliance Monitoring Strategy to identify nonpoint sources and unpermitted point source dischargers within targeted subsegments. In 2015, the LDEQ Inspections Division conducted Watersheds Sweeps in the 16 subsegments (see Table 1). Further in 2015, the Watershed Sweep for Bayou Choctaw (subsegment number LA120103) in the Terrebonne Basin that began in 2014 was completed (LDEQ 2015d).

Table 1. Louisiana Department of Environmental Quality (LDEQ) Inspections Division Watershed Sweeps in 2015.

Subsegment No.	Waterbody Segment Description	Inspections	Notice of Deficiency (NOD)
LA010301	West Atchafalaya Basin Floodway - From Simmesport to Butte LaRose Bay and Henderson Lake	7	6
LA020601	Intracoastal Waterway - From Bayou Villars to Mississippi River	140	21
LA020802	Bayou Barataria and Barataria Waterway - From ICWW to Bayou Rigolettes	5	0
LA030201	Calcasieu River - From Marsh Bayou to saltwater barrier	33	32

Subsegment No.	Waterbody Segment Description	Inspections	Notice of Deficiency (NOD)
LA030301	Calcasieu River and Ship Channel - From saltwater barrier to Moss Lake; includes Ship Channel, Coon Island Loop, Clooney Island Loop	4	4
LA030801	West Fork Calcasieu River - From confluence with Beckwith Creek and Hickory Branch to mainstem of Calcasieu River	3	3
LA030805	Indian Bayou - From headwaters to West Fork Calcasieu River	9	9
LA040704	Chappepeela Creek - From LA-1062 to Tangipahoa River	3	2
LA041601	Intracoastal Waterway - From Inner Harbor Navigation Canal to Chef Menteur Pass	5	1
LA060211	West Atchafalaya Borrow Pit Canal - From Bayou Courtableau to Henderson; includes Bayou Portage	19	3
LA060301	Bayou Teche - From headwaters at Bayou Courtableau to Keystone Locks and Dam	8	4
LA060702	Lake Fausse Point and Dauterive Lake	1	0
LA060703	Bayou Du Portage	2	0
LA080603	Bayou D'Arbonne - From Lake Claiborne to Bayou D'Arbonne Lake	1	1
LA080401	Dugdemona River - From headwaters to Big Creek	9	9
LA081611	Bayou Funny Louis - From headwaters to Little River	1	1

6.g. Identify priority watersheds from leveraging programs

There are several state and federal programs focused on watershed restoration and protection in Louisiana. These programs prioritized watersheds in Louisiana to target for restoration and protection activities. Several USDA NRCS initiatives within Louisiana prioritized watersheds within the state for restoration activities associated with CPs. These USDA NRCS initiatives that include the Gulf of Mexico Initiative (GoMI), Mississippi River Basin Initiative (MRBI), and National Water Quality Initiative (NWQI) target watersheds across the state to address suspected nonpoint sources through the implementation of CPs. Additionally, the LDEQ NPS Program prioritized watershed for implementation activities through 2016 (LDEQ 2011).

In 2015, USDA announced additional investment in improving the Mississippi River Basin water quality (USDA 2015). In Louisiana, 6 new Mississippi River Basin Healthy Watershed Initiative (MRBI) projects were funded starting in the Federal Fiscal Year 2016. Total funding in Louisiana over the 3 year life span of the initiative is $3,689,966 (see Table 2). Louisiana has 6

new watersheds and 2 existing HUC 12 level MRBI projects for a total of 8 HUC 12 level MRBI watershed projects. All MRBI watersheds are located in Northeast Louisiana within the Ouachita River Basin that is identified as a priority area in the Louisiana Nutrient Management Strategy.

Overall goals of MRBI in Louisiana include reducing fall tillage and keeping the soil covered by increasing the use of cover crops and or increasing residue to reduce soil loss. USDA NRCS will also assist producers to improve nutrient management techniques above their current level to increase nutrient utilization. USDA NRCS along with LDAF Soil and Water Conservation Districts and other partners will develop targeted outreach plans to reach every producer within the watershed. Conservation planning and technical assistance will be offered at no charge to help producers address the watershed goals and improve water quality.

The current list of MRBI watersheds in Louisiana (USDA NRCS and LDAF OSWC 2015) are:

1. **Lake St. Joseph-Clark Bayou** (HUC 080500030406) is located in the LDEQ subsegment of Lake St. Joseph 081202 in the upper Mississippi River alluvial plain located in Tensas Parish. This watershed has numerous partners and activities including a 3 year USEPA 319 Implementation Project. As a part of this project LDEQ has written a watershed implementation plan with extensive sampling and analysis. There is $585,782 dollars of targeted funding for this project; this is an existing MRBI watershed in 2015.
2. **Cane Bayou-Little Creek** (HUC 080500011010) is located in the LDEQ subsegment of Big Creek 080903 in the upper Mississippi River alluvial plains in Richland Parish. This watershed has a watershed implementation plan written by the state and an ambient sampling site. There is $923,970 dollars of targeted funding for this project; this is an existing MRBI watershed in 2015.
3. **Alligator Bayou** (HUC 080500020503) is located in the LDEQ subsegment of Bayou Macon 081001 in the upper Mississippi River alluvial plains along the southeast corner of West Carroll Parish. There are 21,058 total acres in the watershed; this is a new MRBI watershed added for 2016.
4. **Little Creek** (HUC 080500011001) is located in the LDEQ subsegment of Big Creek 080903 in the upper Mississippi River alluvial plains in Richland Parish. This watershed has a watershed implementation plan written by the LDEQ and an ambient sampling site for each LDEQ Subsegment. There are 22,030 total acres in the watershed.
5. **Lake Providence-Tensas Bayou** (HUC 080500030101) is located in the LDEQ subsegment of Lake Providence 081101 and Tensas River 081201 in the upper Mississippi River alluvial plains in East Carroll Parish. This watershed has a watershed implementation plan written by the LDEQ. The Louisiana legislature passed a law in 2015 forming the Lake Providence Watershed Council (Louisiana 2015). This council is made up of local, state and federal representatives as partners for implementation; LDAF, LDEQ, LDNR, and USDA NRCS are among the partner agencies. The council will develop a plan for restoration of the lake by May 2016. There are 34,953 total acres in the watershed.
6. **Lake Bruin and Van Buren Bayou** (HUC 080500030503 and 080500030501 are located in the LDEQ subsegments of Tensas River 081201 and Lake Bruin 081203 in the upper Mississippi River alluvial plains within Tensas Parish. Tensas River has a Watershed Implementation Plan written by the LDEQ. There was also a previous USEPA 319

project in the Lake St. Joseph watershed adjacent to Lake Bruin. There are 51,777 total acres within these 2 watersheds.

7. **Little Tensas Bayou-Bull Bayou** (HUC 080500030105) is located in the LDEQ subsegment of Tensas River 081201 in the upper Mississippi River alluvial plains within Madison Parish. Tensas River has a Watershed Implementation Plan written by the LDEQ and an ambient sampling site for each LDEQ subsegment. There are 28,952 total acres in the watershed.
8. **Upper Deer Creek** (HUC 080500011601) is located in the LDEQ subsegment of Deer Creek 081003 in the upper Mississippi River alluvial plains within Franklin Parish. There are 26,671 total acres in the watershed.

Table 2. Louisiana Mississippi River Basin Initiative (MRBI) projects newly added for 2016, including funding amounts by fiscal year (USDA NRCS and LDAF OSWC 2015).

Watershed Name	FY16	FY17	FY18	Total
Alligator Bayou	$164,151	$227,920	$167,435	**$559,506**
Little Creek	$200,000	$241,661	$177,429	**$619,090**
Lake Providence-Tensas Bayou	$200,000	$418,041	$217,107	**$835,148**
Lake Bruin/Van Buren Bayou	$125,452	$205,937	$135,405	**$466,794**
Little Tensas Bayou-Bull Bayou	$180,754	$162,626	$166,357	**$509,737**
Upper Deer Creek	$ 182,282	$350,776	$166,633	**$699,691**
Total	**$1,052,639**	**$1,606,961**	**$1,030,366**	**$3,689,966**

Overall for priority watersheds in Louisiana through leveraging programs, the USDA NRCS prioritized three HUC 12 watersheds in GoMI, eight HUC 8 watersheds in MRBI, and four HUC 12 watersheds in NWQI. The LDEQ NPS Program prioritized 31 watersheds in Louisiana for implementation of CPs, some of which overlap with those watersheds in the USDA initiatives. Priority watersheds for these leveraging programs are provided in Appendix B.

In 2014, a new initiative the Regional Conservation Partnership Program (RCPP) was launched under the USDA NRCS (USDA NRCS 2016a). The RCPP promotes coordination between USDA NRCS and its partners to deliver conservation assistance to producers and landowners. USDA NRCS provides assistance to producers through partnership agreements and program contracts or easement agreements. In Louisiana, two projects were selected as part of this national program for 2014/2015: the Rice Stewardship Program led by Ducks Unlimited and Target Conservation Delivery to Improve Soil Health, Water Quantity and Quality led by LDAF.

The Rice Stewardship Program in southwest Louisiana led by Ducks Unlimited RCPP project will work with rice producers to improve and sustain their operations through the conservation of natural resources. The CPs will address the primary resource concerns of southwest Louisiana by improving water quality, as well as improving wetland habitat for wintering waterfowl and other wildlife species.

The other project of the RCPP in Louisiana is led by the LDAF Office of Soil and Water Conservation to characterize watersheds in preparation for targeted conservation delivery for improved soil health, water quantity and quality. LDAF along with partners are conducting site

specific assessments within five targeted watersheds across Louisiana. These detailed assessments will identify resource concerns that can contribute to the degradation of the soil health and water quality and quantity within each watershed. The primary focus is to work in the identified 12 digit HUC to determine the accelerated funding needs to treat priority resource concerns. Plans will assist NRCS in targeting EQIP FA in 2016 initiatives including NWQI, GoMI, and EQIP Special Projects. The selected watersheds are: Upper Deer Creek, Northeast Soil and Water Conservation District (SWCD); St. James Canal, New River SWCD; Warren Canal – Schooner Bayou, Vermillion SWCD; Shiftail Bayou, Caddo SWCD and Halpin Canal, Lafourche-Terrebonne SWCD.

6.h. Determine priority watershed basins

This Strategic Action focuses on selecting priority watershed basins for nutrient management in Louisiana. Through the collection of information during the Strategy development phase, it became apparent that combined with this basins location within the larger MARB and ongoing water quality and nutrient management efforts, the Ouachita River Basin in northeast Louisiana served as a model for development and implementation of on-the-ground nutrient management activities. Water quality improvements and participation by partners to support further improvement progress in nutrient management in the Ouachita River Basin make it an ideal model basin.

The LDEQ ambient water quality monitoring data analyzed in 15 subsegments in the Ouachita River Basin; where the LDEQ NPS, LDAF, and USDA NRCS have partnered, developed, and implemented Watershed Implementation Plans (WIPs); illustrates that partnerships can lead to improved water quality. This is demonstrated in the basin as decreasing nitrate-nitrite nitrogen trends were observed in 11 subsegments; decreasing total Kjeldahl nitrogen trends observed in 13; and decreasing total phosphorus trends observed in 12 of the 15 watersheds where WIPs were developed and implemented. Further preliminary water quality trend analysis (see Strategic Action 5.h.) indicates that trends in nutrient concentrations in the Ouachita River Basin are not increasing and in some cases are decreasing.

The LDEQ, LDAF, and USDA NRCS are actively working together in the Ouachita River Basin in Louisiana to continue to make progress in improving water quality. Of the LDEQ NPS priority watersheds, 12 are within the Ouachita River Basin (see Appendix B). Additionally, both the USDA NRCS MRBI and NWQI programs contain priority watersheds within the Ouachita River Basin. Continuing water quality improvements and nutrient management efforts in the Ouachita River Basin is a priority for Louisiana. The Ouachita River Basin is identified as a priority basin for nutrient management efforts in Louisiana.

6.i. Develop priority watershed scheme for basin subwatersheds

This Strategic Action was completed in 2014. The focus of this Strategic Action was to develop a priority watershed scheme for basin subwatersheds in Louisiana, allowing for further prioritization within the selected priority watershed basin in Louisiana. Factors in selection of the priority watershed basins for nutrient management include consideration of the current water quality, implementation activities, and participation of local, state, and federal programs within the basin to manage nutrients. In 2014, the Strategy Interagency Team developed a priority

watershed scheme that includes the following considerations for selecting priority subwatersheds:

- Current water quality;
- Water quality trends;
- Degree of impairment;
- Degree of success;
- Overlap with monitoring activities (such as the LDEQ Ambient Water Quality Monitoring Network sampling schedule);
- Participation of current or planned local, state, and federal programs within a subwatershed; and
- Data gaps, information gaps, and areas in need of additional improvements within the subwatershed.

6.j. Determine priority subwatersheds

In 2015, priority subwatersheds for nutrient management were selected. The selection of subwatersheds involved utilizing the priority scheme developed in Strategic Action 6.i and in collaboration with partner agencies. Through this collaboration of the Louisiana state and federal agencies, the USDA NRCS selected 5 watersheds in the Ouachita River Basin as priority areas in 2015 for nutrient management. Further in 2015 through the new long term vision of the CWA 303(d) Program, Louisiana selected a priority area in the Ouachita River Basin (LDEQ 2016e). See Appendix B for listings of priority watersheds of leveraging programs in Louisiana.

6.k. Develop/leverage Watershed Nutrient Management Projects for priorities

Following the selection of priority subwatersheds under the Strategy, Watershed Nutrient Management Projects or other implementation mechanisms can be leveraged or developed for nutrient management activities within the priority subwatersheds. This Strategic Action is scheduled to occur within the 2015 to 2018 timeframe.

7. INCENTIVES, FUNDING & ECONOMIC IMPACT ANALYSIS

The Strategy aims to ensure that adequate technical and financial assistance are available for the implementation of voluntary nutrient management strategies to improve participation with Strategy implementation. Advantageous leveraging opportunities among programs and incentives provisions for nutrient management strategy implementation will encourage voluntary participation. Leveraging from LDEQ, LDAF, USDA NRCS, USEPA, and local parish government, among many others, has resulted in economic incentives, technical support, and funding for implementation of CPs in priority watersheds.

7.a. Promote voluntary participation in incentive-based programs

Voluntary participation by stakeholders in nutrient management activities is key to the Strategy. Current incentive-based programs in Louisiana provide a means for voluntary participation that will aid in improving water quality in the state. Voluntary incentive-based programs highlighted in the Strategy include the Louisiana Master Farmer Program, the Advanced Master Gardener Program, and the Environmental Leadership Program.

The Louisiana Master Farmer Program (LMFP) is an environmental stewardship educational program aimed at agricultural producers in the state. Louisiana Master Farmer participation increased from 2,718 in 2014 to 3,782 participants in 2015, an increase of 1,064 participants in from 2014 to 2015. Further the LMFP added 19 certified Master Farmers in 2015. As of 2015, there are 225 certified Master Farmers in Louisiana representing 50 of the 64 parishes (78% of the parishes in the state) (Girouard 2016).

In 2014, Master Farmer University sessions aided to maximize a farmer's time and effort spent in the training program by offering Phase 1 and Phase 2 training in a back-to-back format. In 2015, the LMFP conducted 5 Phase 1 trainings and 27 Phase 2 Field Days for a total of 32 events across the state with 1,936 producers in attendance, which resulted in 608 producers voluntarily becoming participants in the LMFP (Girouard 2016). The increased interest in the Louisiana Master Farmer Program demonstrates producers are being proactive in protecting the natural resources by implementing Best Management Practices to prevent nutrient and sediment loss.

Notably, the Louisiana Master Farmer Program was honored with two awards in 2015. The LMFP was recognized as the 2015 Conservation Educator of the Year at the at the 51st Governor's State Conservation Achievement awards (LSU AgCenter 2015a) and also received the Denver T. and Ferne Loupe Extension Team Award from the AgCenter (LSU AgCenter 2015b).

In 2014, the LSU AgCenter announced an Advanced Master Gardener Program (LSU AgCenter 2016). The purpose of this program is for Certified Advanced Louisiana Master Gardener volunteers to extend the educational outreach capacity of the Louisiana Cooperative Extension Service in areas such as home, school and community gardens, emphasizing environmental sustainability and nutrient management. The Advanced Louisiana Master Gardener Program is open to current Louisiana Master Gardeners in good standing who have completed at least a year of volunteer service and all initial coursework. As with other Master Programs offered by the LSU AgCenter, the Advanced Master Gardener Program is in three phases and certification comes through the completion of all three program phases, demonstrating mastery of concepts by passing exams with a score of 70% or higher, presenting information to public (master gardener groups, civic organizations, etc.), and maintaining required volunteer and continuing education hours. More details on this program including a 2015/2016 course schedule can be found on the Advanced Master Gardener Program webage (LSU AgCenter 2016).

The LDEQ Environmental Leadership Program (ELP) aims to promote a cleaner and better environment for Louisiana through voluntary pollution prevention, waste reduction and/or other environmental stewardship efforts (LDEQ 2016f). ELP membership includes large, medium and small businesses, municipalities, non-governmental organizations and schools/universities.

In 2015, the LDEQ presented 20 ELP awards and recognized 7 new members that joined in 2014 to 2015 in recognition of the following (Kelly 2015a, LDEQ 2015e). Martin Ecosystems was awarded a Small Business Achievement Award in Community Environmental outreach for their Isle de Jean Charles Floating Island Project. Martin Ecosystems strategically installed floating islands in Pointe-Aux-Chene in Terrebonne Parish. Isle de Jean Charles is a narrow ridge of land between Bayou Terrebonne and Bayou Pointe-Aux-Chene that is gradually disappearing. The

primary goal of the projects was to protect the existing sections of the fragile marsh from further erosion along with protecting the only road that leads to Isle de Jean Charles. Secondary goals of the floating island project were also sediment accretion, establishment of new vegetation, and attachment of roots into the water bottom. The floating island technology by Martin Ecosystems was highlighted in the Louisiana Nutrient Management Strategy as a new technology/application that could aid in nutrient management.

7.b. Identify and communicate available funding support

This Strategic Action is to identify and communicate available funding support related to nutrient management activities. Many funding programs provide continued opportunities for participation. Programs previously identified in the Strategy remain relevant as available support, and include:

- Agricultural Economic Development Assistance, LDAF
- Clean Water Act Section 319, LDEQ
- Coastal and Estuarine Land Conservation Program (CELCP), LDNR
- Coastal Forest Conservation Initiative (CFCI), CPRA
- Community Development Block Grants (CDBG)
- U.S. Housing and Urban Development (USHUD) CDBG
- CDBG Disaster Recovery Assistance
- Clean Water State Revolving Fund Program (CWSRF)
    - In 2015, USEPA awarded grant to LDEQ of more than $15.33 million to fund clean water projects in the state (USEPA 2015a). These funds will be used to provide loans and other types of financial assistance to communities and state agencies for wastewater improvements to help improve water quality in streams, lakes, rivers and bays.
- Conservation Innovation Grant (CIG) Program, USDA NRCS (2016b)
- Regional Conservation Partnership Program (RCPP), USDA NRCS (2015a)
- Urban Waters, USEPA (2016d)

7.c. Promote assistance (financial or technical) for BMP/CP Implementation

The USDA NRCS, LDAF, and LSU AgCenter promote voluntary participation in financial and technical assistance programs for BMP and CP implementation. The LMFP has increased participation each year with more producers in all three Phases of the program. The Phase 1 environmental education provides an awareness of state and federal regulations, water and soil conservation issues, point and nonpoint source pollution, coastal zone issues and conservation planning to document stewardship of the on-farm natural resources. Phase 2 requires a producer to attend a conservation-based field day or workshop where specific best management practices (BMPs) are demonstrated and discussed. In Phase 3 the producer must request a farm-specific Resource Management System (RMS) level conservation plan on their entire farming operation with USDA NRCS.

The LSU AgCenter recognizes that in order for educational efforts to be successful in mitigating water quality impairments in State water bodies, we must address the sources of these pollutants regardless of their geographical location. Therefore, educational programs have been directed towards non-traditional audiences such as youth, homeowners, and other land owners. To

improve citizen awareness about these important dynamics, the AgCenter developed several programs to educate and encourage land-owners about the impacts of runoff from various sources. Sources include marina activities, urban/suburban lawn care, individualized sewage treatment, management of aquaculture ponds, and diminishing healthy ecosystems. Youth in various communities are often engaged as a part of these various outreach strategies. General water quality programs educated students, teachers, and volunteers. Teacher workshops and field trips have provided classroom teachers with knowledge and techniques to significantly enhance education on Louisiana ecosystem topics. Trained teachers have reached about 20,000 students in the classroom. Educational efforts for local parish governments have promoted recommendations based on on-site research to improve hydrology and recreational opportunities.

7.d. Promote assistance (technical) for point sources

LDEQ provides technical assistance for point sources. The LDEQ conducts technical trainings and information sharing sessions for point sources that include Enviroschool (LDEQ 2016g), Sanitary Wastewater Compliance Assistance Training (SWAT) (LDEQ 2016h), and NetDMR (LDEQ 2016i training throughout the year. In 2015, LDEQ held four NetDMR trainings in Baton Rouge, Jennings, and Alexandria, and four sessions for SWAT training in Crowley, Mandeville, Ruston, and Baton Rouge (Kelly 2015b, 2015c).

Another free training course was offered in 2015 was a two-day sewage treatment system maintenance class offered at Nicholls State University in Thibodaux in November 2015. People with their own sewage treatment system and those interested in learning about protecting Bayou Lafourche and the surrounding area from improperly treated sewage are encouraged to attend. Information will be provided on how to properly maintain a sewage treatment system while taking measures to avoid unsanitary conditions that could impact homes and businesses in the parishes of Ascension, Assumption and Lafourche (Langley 2015).

Additionally, the LDEQ Small Business/Community Assistance Program (SB/CAP) provides free technical assistance to small businesses in understanding and complying with wastewater permits and environmental regulations (LDEQ 2015j). In 2015, the LDEQ SB/CAP provided 1,989 water assists which included 444 compliance consultations, 167 newly permitted assistance, 266 permit applications, 4 pollution prevention audits, and 165 referrals from internal LDEQ enforcement, permitting or surveillance.

7.e. Document economic impacts from available sources

The documentation of economic impacts of nutrient management is ongoing. This documentation of economic impacts is essential to implementation of cost-effective nutrient management practices in Louisiana. In 2014, the LDEQ and LSU AgCenter began working to evaluate the costs and benefits of nutrient management to both point and nonpoint sources in Louisiana. Specifically for Louisiana, nutrient management activities are implemented by both point and nonpoint source stakeholders through technology or CPs. Economic impact analyses are necessary in order to determine the relative costs associated with improving water quality through nutrient management. The LDEQ and LSU AgCenter anticipate results from this economic cost and benefit study for nutrient management to be available in 2016.

7.f. Explore feasibility for credit trading

The exploration of the feasibility of credit trading is ongoing. Previous work described in the Strategy highlighted two areas of research into water quality credit trading for Louisiana. In the first area of research, CPRA conducted preliminary evaluation of water quality credit trading as an innovative means for nutrient management associated with coastal restoration activities. Through that effort it was determined that expansion of trading between point and nonpoint source stakeholders is possible (CH2M Hill 2011). In the second, the World Resources Institute (2013) reported that nutrient trading in the MARB is an economically feasible approach to reduce the costs of meeting water quality goals in the Gulf of Mexico.

Water quality credit trading remains an area of great interest for not only nutrient management but for management of other water pollutants. The Strategy Team in coordination with the Louisiana Water Synergy Group members are looking to further the efforts of exploring the feasibility of trading in Louisiana. The Louisiana Water Synergy Group members are planning to develop a Water Quality Trading Program (WQT) as a market-based, voluntary approach for improving water quality in Louisiana. An effective WQT program could lead to greater nutrient reductions in the lower Mississippi River Basin and the Gulf of Mexico more quickly and at a lower overall cost than a traditional regulatory approach. In addition, water quality trading could provide some point sources and agriculture businesses the opportunity to generate revenues, and offer local regulators more policy options for improving water quality. The desired outcome of this project is to implement a WQT program and demonstrate that water quality trading is a cost-effective approach for reducing nutrients and improving water quality.

Louisiana Water Synergy Project participants are presently identifying funding sources for a WQT program feasibility study/market analysis that may include review of tools and templates and incorporate 'lessons learned' from WQT programs in other states; proposed program design, implementation strategies, and Key Performance Indicators (KPIs); establishing iterative feedback loops with LDEQ and USEPA Region 6; and conducting initial stakeholder (communities, industry, agriculture, environmental groups) outreach. Interagency team representatives from CPRA, LDEQ, and LDAF have coordinated with the Louisiana Water Synergy project on exploring water trading for the state nutrient management strategy effort.

In 2015, an enhanced collaboration of USDA and USEPA was announced where new resources to support efforts for water quality trading and environmental markets was made available (USDA and USEPA 2015). USDA and USEPA expressed that water quality trading is an innovative approach to reduce pollution and efficiently achieve water quality goals. Trading is based on the fact that sources in a watershed can face very different costs to control the same pollutant. Trading programs allow facilities facing higher pollution control costs to meet their regulatory obligations by purchasing environmentally equivalent (or superior) pollution reductions from another source at lower cost, thus achieving the same water quality improvement at lower overall cost.

USDA and USEPA signed a partnership agreement in 2013 to advance water quality trading and other market-based approaches that provide benefits to the environment and economy. USDA and USEPA hosted a national workshop in Lincoln, Nebraska in September 2015 that attracted

over 200 participants involved in water quality trading from across the nation (USDA and USEPA 2015, USDA Office of Communications 2015).

7.g. Identify gaps

Identifying gaps in incentives, funding, and economic impact analyses may aid in future Strategy efforts. A current gap in economic impact is in understanding the costs and benefits, of nutrient management in Louisiana. This gap is being addressed through a collaborative effort with the LDEQ and the LSU AgCenter where the costs and benefits of nutrient management in Louisiana, including those practices and technologies employed by both nonpoint and point sources will be described; results are anticipated to be available in 2016. Additionally, activities through the USDA and USEPA and the Louisiana Water Synergy Group may help to address the gap in trading or market-based approaches to connect both nonpoint and point sources.

8. TARGETS AND GOALS

Targets and goals under the Strategy will focus on the Strategic Actions outlined in the other nine strategic components and the agency commitments, timelines, and milestones to accomplishing these Strategic Actions. The targets and goals schedule for all strategic components and actions of the Strategy is presented in Appendix A, and includes agency commitments, timelines, and milestones from 2012 to 2018.

9. MONITORING

Monitoring related to nutrient management in Louisiana allows for the documentation of nutrient levels observed and in documenting other relevant information regarding planning and implementation of nutrient management activities. Monitoring will facilitate the demonstration and verification that nutrient management measures are having the desired impact on water quality. In the event that water quality has not improved, monitoring data guide improvements in the application of more robust and effective nutrient management actions.

9.a. Monitor in-stream nutrient water quality

The LDEQ routinely monitors in-stream nutrient water quality in the states' water bodies through the LDEQ Ambient Water Quality Monitoring Network (AWQMN) (LDEQ 2014). For the 2015 Water Sampling Year (from October 2014 through September 2015), 135 stations were monitored monthly for nutrients that included nitrogen (as nitrate-nitrite and total Kjeldahl nitrogen) and phosphorus (as total phosphorus).

In 2015, the LDEQ with the support of USEPA Region 6 began a pilot project for use of a real-time nitrate sensor. The LDEQ is utilizing a SUNA V2 Nitrate Sensor to collect real-time 'grab' nitrate readings in the field. This pilot project is being performed alongside routine ambient monitoring at sites in the LDEQ AWQMN. In 2015, LDEQ sampled 40 sites in the Lake Pontchartrain Basin and 8 sites in the Ouachita River Basin for a total of 80 sampling events. The LDEQ will evaluate results from routine grab samples that are collected in the field then shipped to the laboratory for analysis as compared to those samples collected in real-time. As the typical turnaround time for a routine grab nitrate sample collected for laboratory analysis is three months, the ability to collect a real-time nitrate sample in the field would be beneficial to

future monitoring of nitrate in Louisiana waters. LDEQ plans to continue and complete the pilot study 2016.

9.b. Monitor relative to BMP/CP implementation

In 2015, LDEQ and LDAF in conjunction with USDA NRCS conducted water quality monitoring for nutrients and other parameters in 10 watersheds where BMPs were implemented (Appendix D). Of these 10 watersheds, nutrient monitoring was conducted in 8.

9.c. Monitor nutrients associated with riverine diversions

In 2015, CPRA began monitoring nutrients as a part of the System-Wide Assessment and Monitoring Program (SWAMP). CPRA has historically conducted monitoring within the coastal zone of Louisiana through its Coastwide Reference Monitoring System (CRMS)-*Wetlands* (CPRA 2016) and recently worked with the Water Institute of the Gulf to design SWAMP to build on its historic monitoring program, and in light of its growing restoration and protection program, to ensure that a comprehensive network of coastal data collection activities is in place to support the development, implementation, and adaptive management of the coastal protection and restoration program within coastal Louisiana (The Water Institute of the Gulf 2013; Hijuelos et al. 2013). The focus of this new monitoring program is to obtain repeated long-term (e.g., years to decades) measurements that can be analyzed to detect changes that may result from a variety of sources, including large-scale restoration and protection projects, environmental disturbances, and other major drivers that impact the system.

Initial steps in developing the SWAMP program included the development of a framework to identify drivers of change, create an inventory of existing and ongoing data collection efforts which could offer leveraging opportunities, and develop priority performance metrics/variables to focus limited resources on the most important and relevant data needs. Nutrient constituents (primarily nitrogen, phosphorus, and silica) were identified as one of the priority water quality variables of the SWAMP program.

CPRA began implementation of SWAMP in Barataria Basin (west side of the Mississippi River) in 2015 following recommendations in Hijuelos and Hemmerling (2015) and also began the development of a SWAMP monitoring plan for the Breton Sound Basin (east side of the Mississippi River). It is anticipated that implementation of SWAMP in Breton Sound will begin in 2016.

9.d. Monitor nutrients in point sources

Monitoring for nutrients in point sources is documented through the LPDES Permit Program. LDEQ is responsible for the LPDES Permit Program whereby dischargers to waters of the state are permitted for such water discharge activity. Through the LPDES Permit Program, LDEQ is able to locate and track the number of permitted dischargers to water bodies in Louisiana. Nutrient monitoring may be included in LPDES permits to address specific facility types, through implementation of dissolved oxygen TMDL recommendations in several subsegments in the Lake Pontchartrain Basin, and as part of permitted wetland assimilation projects. Nutrient monitoring in permitted dischargers aids in gathering necessary data on nutrient discharges in Louisiana. Nutrient monitoring information from the LPDES Permit Program is available

through the LDEQ EDMS system (LDEQ 2016k) and may also be available for specific facility types through the USEPA Integrated Compliance Information System (ICIS) (USEPA 2016e).

In 2014 to 2015, the Hypoxia Task Force (HTF) formed a Point Source Measures Workgroup to identify and evaluate potential point source measures for tracking progress on nutrients in the Task Force states. The HTF Point Source Workgroup identified two measures for point sources: 1) the number of major Publicly Owned Treatment Works (POTW) permits with monitoring requirements for nitrogen and phosphorus; and 2) the number of major POTW permits with nitrogen and phosphorus limits. LDEQ was involved in reviewing and verifying data for permitted dischargers in the state that would be part of these measures. The HTF prepared details on all elements of the measures reporting and tracking process including information input and error correction, establishment of baselines, and direct access of the information using USEPA's data reporting tool, and this information became available in early 2016 (HTF 2016).

Concurrent to the HTF Point Source Measures Workgroup effort, LDEQ is developing a Point Source Implementation Strategy for Nutrients with consideration of monitoring under this Louisiana Nutrient Management Strategy. LDEQ expects to continue development and work toward implementation of the Point Source Implementation Strategy for Nutrients in 2016.

9.e. Evaluate compliance with point source permits

The evaluation of compliance with point source permits is ongoing. The LDEQ Enforcement Division leads the effort on compliance with point source permits through the LPDES Permit Program. Enforcement actions issued by LDEQ for any permitted activity, including point source water permits, are available for viewing on the LDEQ webpages (LDEQ 2016l).

In regard to nutrients, a review of Discharge Monitoring Reports (DMRs) that are submitted to LDEQ online through the NetDMR system to ICIS was conducted for parameters for Total Nitrogen (TN, STORET code 00600) and Total Phosphorus (TP, STORET code 00665). In a review of 21,203 data records for TN or TP in DMRs available through ICIS from January 1, 2000 to December 31, 2015, compliance with point source permit in regard to completion of DMRs for TN or TP was about 95%, where about 5% of DMR submissions resulted in data violations that may have been related to overdue reporting or non-receipt. Of the 3,650 records for TN or TP with limits, less than 0.5% of the DMR submissions were effluent violations.

9.f. Identify gaps

Monitoring programs within Louisiana continue to improve. Monitoring programs improvements include increased number of permitted dischargers monitoring for nutrients through LDPES Permit Program, increasing the water quality variables including nutrients monitored relative to implementation of coastal restoration and protection projects by CPRA, and monitoring for nutrient water quality in NPS watershed CP implementation projects by the LDEQ, LDAF, and USDA NRCS.

An area previously identified as a potential gap is the monitoring of stream flow in receiving water bodies. Quantitative measurements for flow that are correlated with nutrient monitoring are lacking; thus, a potential exists to collect quantitative flow data. Correlated nutrient monitoring and quantitative flow measurements allow for loading determinations, which will aid

in improving our understanding of nutrient loadings from various sources in Louisiana water bodies.

10. REPORTING

Reporting is a critical component of Louisiana's Nutrient Management Strategy. Reporting actions include public outreach, dissemination of strategy documents and resources through the Strategy website, and availability of geospatial information.

10.a. Review of draft strategy December 2013

The review draft of the strategy was made available to the public December 23, 2013.

10.b. Public comment period

A public comment period occurred from December 23, 2013 through January 31, 2014, following the release of the review draft of the Strategy. Comments on the review draft of the strategy were received from the public. A Response to Public Comments on Review Draft was prepared and included as Appendix F in the Nutrient Strategy document (Louisiana Nutrient Management Strategy Interagency Team 2014).

10.c. Final strategy

The final Strategy was released in May 2014 (Louisiana Nutrient Management Strategy Interagency Team 2014) and is available on the Strategy website.

10.d. Strategy review

The Strategy team will review the Strategy in 2018. This five year timeframe from 2013 to 2018 for strategy review is similar to that of other Louisiana programs such as the LDEQ NPS Management Plan from 2011 to 2016 (LDEQ 2011) and the CPRA 2012 Coastal Master Plan (CPRA 2012) from 2012 to 2017 who utilize a five year timeline for program evaluation that incorporates adaptive management.

10.e. Report annually on strategy activities

This present document represents the 2015 Annual Report on Louisiana Nutrient Management Strategy activities.

10.f. Present information through strategy website

The Louisiana Nutrient Management Strategy website from January 2012 through November 2014 was located at http://lanutrientmanagement.org; however that website is no longer active. In November 2014, the Strategy website was migrated to the LDEQ webpage and is now located at http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssessment/NutrientManagementStrategy.aspx. The previous webpage at http://lanutrientmanagement.org will no longer be active as of December 2014.

The Strategy website contains information related to nutrient management activities in Louisiana. Content includes information on nutrient management, resources, reports, decision

support tools, programs, and frequently asked questions. As new information is made available it will be accessible to the public through the website.

Figure 1. Louisiana Nutrient Management Strategy website located at http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssessment/NutrientManagementStrategy.aspx.

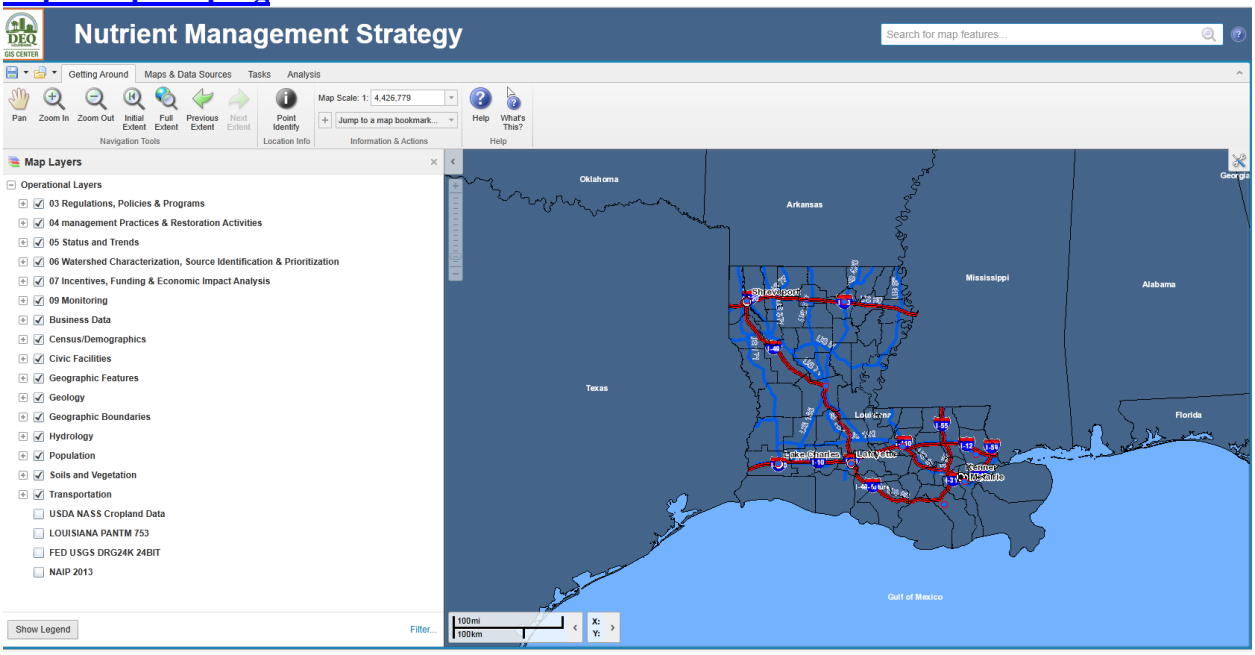
10.g. Present information geospatially through web-based viewer.

The LDEQ GIS Center provides public access to a web-based geospatial mapping application called the LDEQ Interactive Mapping Application (LIMA). A GIS Project was designed for the Strategy which is available through the LDEQ LIMA site. To access the Strategy geospatial information visit http://map.ldeq.org/, go to 'GIS Projects' on left hand menu, and navigate to the 'Nutrient Management Strategy' link, then navigate to the thumbnail for the 'Public Nutrient Management LIMA map'.

The LIMA application contains basic geospatial layers related to business data, census/demographics, civic facilities, geographic features, geology, geographic boundaries, hydrology, population, soils and vegetation, and transportation. Background layers are available

for crop data and satellite imagery. Specific content for the Strategy is subgrouped by Strategy Component and currently includes content for Component 3 Regulations, Policies, and Programs; and Component 4 Management Practices & Restoration Alternatives; Component 5 Status and Trends; Component 6 Watershed Characterization, Source Identification & Prioritization; Component 7 Incentives, Funding & Economic Impact Analysis; and Component 9 Monitoring. Additional geospatial content will be added as new information becomes available.

Figure 2. Geospatial viewer for Louisiana Nutrient Management Strategy located at http://map.ldeq.org.



10.h. Document spotlight(s) of nutrient management

Many projects and programs have been highlights during 2015. The LDEQ NPS Program (or 319 Program) in coordination with LDAF and USDA NRCS published three success stories in 2015 for Bayou Plaquemine Brule, Joe's Bayou, and Turkey Creek. These 319 Program success stories focused on water quality improvements in previously impaired watersheds in Louisiana, where agency collaboration on planning and development and implementation of BMPs resulted in the watersheds being removed from the 303(d) list of impaired waters.

In Bayou Plaquemine Brule located in the Vermilion-Teche River Basin in southwestern Louisiana, sediment and nutrient runoff from crop rotation degraded water quality; as a result total dissolved solids (TDS) was listed as a cause of impairment for Bayou Plaquemine Brule on the 2004 CWA section 303(d) list of impaired waters. Beginning in 2005, agricultural BMPs were installed in the Bayou Plaquemine Brule subsegment resulting in decreased the sediment and nutrient loads entering the bayou, leading to the delisting of TDS as a cause of impairment in the subsegment in 2008.

Another 319 Program success story occurred in Joe's Bayou located in the Ouachita River

Basin in northeastern Louisiana (USEPA 2015b). In 1990, the Louisiana Department of Environmental Quality (LDEQ) added Joe's Bayou to the CWA section 303(d) list of impaired waters for not meeting the fish and wildlife propagation (FWP) designated use. Runoff of fertilizer and sediment from agricultural lands caused high turbidity and low dissolved oxygen in Joe's Bayou. Local landowners decreased the runoff of fertilizer and sediment by implementing agricultural BMPs within the watershed. As a result, turbidity, nitrogen and phosphorus are trending downward. With ongoing implementation, LDEQ is hopeful that rabidity will continue to decline and dissolved oxygen levels will meet the water quality standard.

Turkey Creek in the Ouachita River Basin in northeastern Louisiana is a 319 Program success story in 2015 (USEPA 2015c). In 2000, Turkey Creek was added to the CWA section 303(d) list of impaired waters for not fully meeting its designated use of FWP due to TDS. Agriculture was a suspected source of pollution. The NRCS helped producers and landowners develop comprehensive resource management system (RMS) plans targeted agricultural fields intended to reduce pollutant loads within the Turkey Creek watershed. As a result TDS impairment was removed in 2010.

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APPENDIX A: STRATEGIC ACTIONS SCHEDULE (MAY 2014)

8. Targets and goals for Strategic Actions from 2012 through 2018 for the Louisiana Nutrient Management Strategy ("strategy").
X = Completed activity; O = Ongoing activity; T = Target date for completion of activity; -- = Activity not initiated during that period.
Activities may be dependent on resource availability.

Strategic Action	Agency Commitment(s)	2012	2013	2014	2015	2016	2017	2018
1. Stakeholder Engagement								
1.a. Identify stakeholders with interest in the strategy	Interagency Team	X	--	--	--	--	--	--
1.b. Engage stakeholders in strategy development	Interagency Team	X	X	--	--	--	--	--
1.c. Perform outreach/education on strategy activities	Interagency Team	--	--	X	X	O	O	O
1.d. Identify and promote partnerships/leveraging opportunities	Interagency Team Stakeholders	--	--	X	X	O	O	O
2. Decision Support Tools								
2.a. Identify available tools	Interagency Team	X	X	X	X	O	O	O
2.b. Evaluate available tools	Interagency Team	X	X	X	X	O	O	O
2.c. Select available tools	Interagency Team	X	X	X	X	O	O	O
2.d. Document selected tools	Interagency Team	--	X	X	X	O	O	O
3. Regulations, Programs, & Policies								
3.a. Identify current	Interagency Team	X	X	X	X	O	O	O
3.b. Identify gaps	Interagency Team	X	X	X	X	O	O	O
3.c. Propose or establish new	Interagency Team	--	X	X	X	O	O	O
4. Management Practices & Restoration Activities								
4.a. Document current practices related to nutrient management	Interagency Team	X	X	X	X	O	O	O
4.b. Identify areas where practices are being	Interagency Team	X	X	X	X	O	O	O

Strategic Action	Agency Commitment(s)	2012	2013	2014	2015	2016	2017	2018
implemented								
4.c. Model nutrient removal estimated through riverine diversions	CPRA	X	X	X	T	--	--	--
4.d. Identify case studies/model watersheds	Interagency Team	X	X	X	X	O	O	O
4.e. Integrate science-based nutrient management approaches	Interagency Team	--	--	X	X	O	O	O
4.f. Promote BMP/CP implementation by farm in priority watersheds	USDA NRCS LDAF OSWC LSU AgCenter	--	--	X	X	O	O	O
5. Status & Trends								
5.a. Model nutrient loading estimated within Louisiana watersheds	USGS Interagency Team	X	--	X	X	O	O	T
5.b. Document in-stream nutrient water quality	LDEQ	X	X	X	X	O	O	O
5.c. Document Social Indicators of nutrient management behavior	LSU AgCenter	--	X	--	--	--	--	--
5.d. Document BMP/CP implementation in watersheds	USDA NRCS LDAF OSWC LSU AgCenter LDEQ	X	X	X	X	O	O	O
5.e. Document permitted discharger inventories	LDEQ	--	--	X	X	O	O	O
5.f. Document riverine diversions	CPRA	--	--	X	X	O	O	T
5.g. Document coastal protection and restoration activities	CPRA	--	--	X	X	O	O	T
5.h. Determine trends in nutrient water quality at long-term monitoring stations	LDEQ	--	X	X	T	--	--	--
5.i. Determine trends in Social Indicators	LSU AgCenter	--	--	--	--	O	O	T

Strategic Action	Agency Commitment(s)	2012	2013	2014	2015	2016	2017	2018
5.j. Determine trends in BMP/CP implementation	USDA NRCS LDAF OSWC LSU AgCenter LDEQ	--	--	X	X	O	O	T
5.k. Determine trends in permitted discharger inventories	LDEQ	--	--	X	X	O	O	O
5.l. Determine trends in nutrients related to riverine diversions	CPRA	--	--	X	X	O	O	T
5.m. Determine trends in coastal protection and restoration activities	CPRA	--	--	X	X	O	O	T
6. Watershed Characterization, Source Identification, & Prioritization								
6.a. Characterize watersheds by land use/cover and geographic features	LDEQ USDA	X	X	--	--	--	--	--
6.b. Characterize water bodies by type such as streams, bayous, rivers, and lakes	LDEQ	X	--	--	--	--	--	--
6.c. Characterize watersheds within the coastal zone	LDNR	X	X	X	X	O	O	O
6.d. Characterize watersheds with existing or planned riverine diversions	CPRA	--	X	X	X	O	O	O
6.e. Identify potential sources through Desktop Analysis/Windshield Survey	Interagency Team	--	--	X	X	O	O	O
6.f. Identify unpermitted point sources	LDEQ	X	X	X	X	O	O	O
6.g. Identify priority watersheds from leveraging programs	USDA GoMI USDA MRBI USDA NWQI LDAF/LDEQ/LDNR NPS	X	X	X	X	O	O	O
6.h. Determine priority watershed basins	Interagency Team	--	X	T	--	--	--	--

Strategic Action	Agency Commitment(s)	2012	2013	2014	2015	2016	2017	2018
6.i. Develop priority watershed scheme for basin subwatersheds	Interagency Team	--	--	T	--	--	--	--
6.j. Determine priority subwatersheds	Interagency Team	--	--	X	T	--	--	--
6.k. Develop/leverage Watershed Nutrient Management Projects for priorities	Interagency Team Stakeholders	--	--	--	X	O	O	O
7. Incentives, Funding, & Economic Impact Analysis								
7.a. Promote voluntary participation in incentive-based programs	Louisiana Master Farmer Louisiana Master Poultry Producer Louisiana (Kellogg) Master Rice Grower Louisiana Master Cattlemen Louisiana Master Gardener Louisiana Master Naturalist Louisiana Environmental Leadership	--	X	X	X	O	O	O
7.b. Identify and communicate available funding support	Interagency Team Stakeholders	--	--	X	X	O	O	O
7.c. Promote assistance (financial or technical) for BMP/CP implementation	LDAF/LDEQ/LDNR NPS USDA NRCS LDAF OSWC	X	X	X	X	O	O	O
7.d. Promote assistance (technical) for point sources	SB/SCAP	X	X	X	X	O	O	O
7.e. Document economic impacts from available sources	Interagency Team LSU AgCenter Stakeholders	--	X	X	X	O	O	O
7.f. Explore feasibility for credit trading	Interagency Team Stakeholders	--	--	X	X	O	O	T
7.g. Identify gaps	Interagency Team Stakeholders	--	--	X	X	O	O	O

Strategic Action	Agency Commitment(s)	2012	2013	2014	2015	2016	2017	2018
9. Monitoring								
9.a. Monitor in-stream nutrient water quality	LDEQ	X	X	X	X	O	O	O
9.b. Monitor relative to BMP/CP implementation	USDA GoMI USDA MRBI USDA NWQI LDAF/LDEQ/LDNR NPS	--	--	X	X	O	O	O
9.c. Monitor nutrients associated with riverine diversions	CPRA	--	--	--	X	O	O	O
9.d. Monitor nutrients in point sources	LDEQ LPDES Permitted Dischargers	X	X	X	X	O	O	O
9.e. Evaluate compliance with point source permits	LDEQ	X	X	X	X	O	O	O
9.f. Identify gaps	Interagency Team Stakeholders	--	--	X	X	T	--	--
10. Reporting								
10.a. Review draft strategy December 2013	Interagency Team	--	X	--	--	--	--	--
10.b. Public comment period	Interagency Team	--	--	X	--	--	--	--
10.c. Final strategy	Interagency Team	--	--	X	--	--	--	--
10.d. Strategy review	Interagency Team	--	--	--	--	--	--	T
10.e. Report annually on strategy activities	Interagency Team	--	--	X	X	O	O	O
10.f. Present information through strategy website	Interagency Team	--	X	X	X	O	O	O
10.g. Present information geospatially through web-based viewer	Interagency Team	--	X	X	X	O	O	O
10.h. Document spotlight(s) of nutrient management	Interagency Team Stakeholders	--	--	X	X	O	O	O

X = Completed activity; O = Ongoing activity; T = Target date for completion of activity; -- = Activity not initiated during that period.
Activities may be dependent on resource availability.

APPENDIX B: PRIORITY WATERSHEDS OF LEVERAGING PROGRAMS

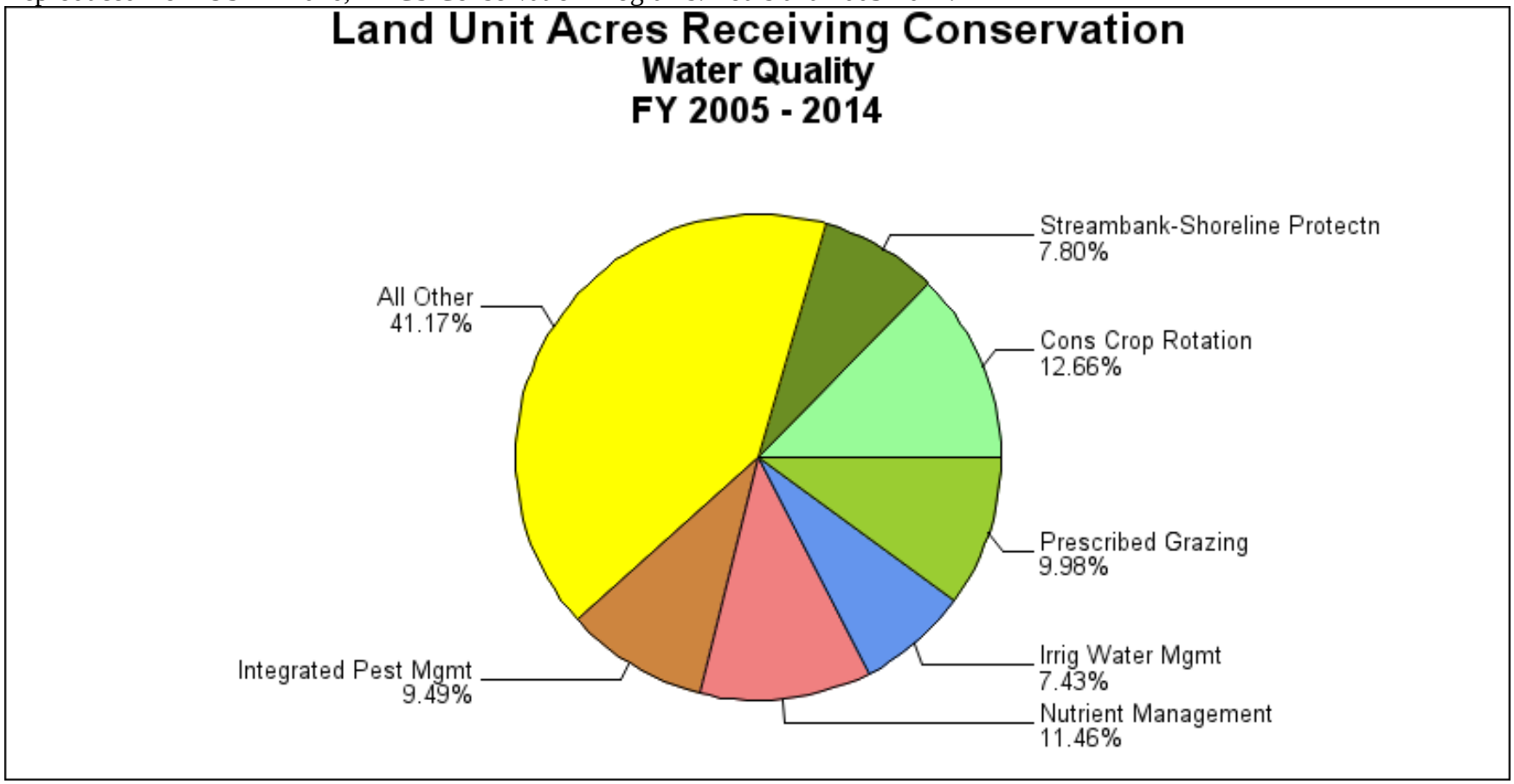
Priority watersheds in Louisiana through USDA initiatives including Gulf of Mexico Initiative (GoMI), Mississippi River Basin Initiative (MRBI), and the National Water Quality Initiative (NWQI), and through the LDEQ Nonpoint Source (NPS) Program and the New Vision 303(d) Program. * indicates priority waterbody in more than one program.

Program	Watershed Name	Watershed Level	Watershed Code
USDA-GoMI	Bayou Corne-Grand Bayou	HUC 12	080903020302
USDA-GoMI	Bayou Grand Marais	HUC 12	080802020103
USDA-GoMI	Bayou St. Vincent-Little Grand Bayou	HUC 12	080903020304
USDA-MRBI	Bayou Macon	HUC 8	08050002
USDA-MRBI	Boeuf River	HUC 8	08050002
USDA-MRBI	Lower Mississippi-Baton Rouge	HUC 8	08070100
USDA-MRBI	Lower Mississippi-Greenville	HUC 8	08030100
USDA-MRBI	Lower Mississippi-Natchez	HUC 8	08060100
USDA-MRBI	Mermentau	HUC 8	08080202
USDA-MRBI	Lake St. Joseph-Clark Bayou	HUC 12	080500030406
USDA-MRBI	Cane Bayou-Little Creek	HUC 12	080500011010
USDA-MRBI	Alligator Bayou	HUC 12	080500020503
USDA-MRBI	Little Creek	HUC 12	080500011001
USDA-MRBI	Lake Providence-Tensas Bayou	HUC 12	080500030101
USDA-MRBI	Lake Bruin and Van Buren Bayou	HUC 12	080500030503 and 080500030501
USDA-MRBI	Little Tensas Bayou-Bull Bayou	HUC 12	080500030105
USDA-MRBI	Upper Deer Creek	HUC 12	080500011601
USDA-NWQI	Big Creek	HUC 12	080702050203
USDA-NWQI	East Fork Big Creek	HUC 12	080702050202
USDA-NWQI	Indian Bayou-Bayou Queue De Tortue	HUC 12	080802020101
USDA-NWQI	Lake Louis-Bayou Louis	HUC 12	080402070303
LDEQ NPS	Bayou Lafourche	Subsegment	020401
LDEQ NPS	Six Mile Creek	Subsegment	030503/030504
LDEQ NPS	Natalbany River*	Subsegment	040503
LDEQ NPS	Yellow Water River*	Subsegment	040504
LDEQ NPS	Ponchatoula Creek/Ponchatoula River	Subsegment	040505
LDEQ NPS	Selsers Creek	Subsegment	040603
LDEQ NPS	Big Creek (NWQI)	Subsegment	040703
LDEQ NPS	Lower Tchefuncte River	Subsegment	040801
LDEQ NPS	Bogue Falaya River	Subsegment	040804
LDEQ NPS	Bayou Plaquemine Brule	Subsegment	050201
LDEQ NPS	Bayou Queue de Tortue (GoMI)	Subsegment	050501
LDEQ NPS	Bayou Lacassine (MRBI)	Subsegment	050601
LDEQ NPS	Bayou Chene (MRBI)	Subsegment	050603
LDEQ NPS	Bayou Teche	Subsegment	060301/060401
LDEQ NPS	Boston Canal	Subsegment	060910
LDEQ NPS	Bayou Louis/Lake Louis	Subsegment	080202/080203
LDEQ NPS	Bayou Desiard	Subsegment	080701
LDEQ NPS	Upper Ouachita River (Mollicy Farms)	Subsegment	080101
LDEQ NPS	Cheniere Creek	Subsegment	080801
LDEQ NPS	Bayou Lafourche (MRBI)	Subsegment	080904
LDEQ NPS	Turkey Creek (MRBI)*	Subsegment	080905/080906
LDEQ NPS	Joe's Bayou	Subsegment	081002
LDEQ NPS	Tensas River	Subsegment	081201
LDEQ NPS	Lake St. Joseph	Subsegment	081202

Program	Watershed Name	Watershed Level	Watershed Code
LDEQ NPS	Dugdemona River	Subsegment	081401
LDEQ NPS	Caney Lake	Subsegment	081505
LDEQ NPS	Little River	Subsegment	081601/081602
LDEQ NPS	Grand/Little Grand Bayou	Subsegment	120206
LDEQ NPS	Upper Bayou Terrebonne	Subsegment	120301
LDEQ NPS	Middle Bayou Terrebonne	Subsegment	120601
LDEQ NPS	Bayou Folse	Subsegment	120305
LDEQ New Vision 303d	Tunica Bayou	Subsegment	070505
LDEQ New Vision 303d	Bayou Sara	Subsegment	070501
LDEQ New Vision 303d	Turkey Creek*	Subsegment	080905
LDEQ New Vision 303d	Yellow Water River*	Subsegment	040504
LDEQ New Vision 303d	Natalbany River*	Subsegment	040503
LDEQ New Vision 303d	Blind River	Subsegment	040403/040401
LDEQ New Vision 303d	New River	Subsegment	040404

APPENDIX C: USDA NRCS LAND UNIT ACRES RECEIVING CONSERVATION FOR PRACTICES RELATED TO WATER QUALITY IN LOUISIANA, 2005-2014

Reproduced from USDA 2016, NRCS Conservation Programs: Louisiana 2005-2014.



The following chart and table includes practices that are related to Water Quality. Water quality is an indicator of the health of our environment and reflects what occurs on the land. The primary water quality issues from agriculture are sediment, nutrients, pesticides, pathogens, and in some parts of the country, salinity. Using conservation practices to improve land in an environmentally sound manner will result in better water quality for drinking, recreation, wildlife, fisheries and industry. Only practices representing a significant portion of the total for the period are included. Practices not included are summed into the All Other category.

USDA NRCS Land Unit Acres Receiving Conservation (including practice count) by Fiscal Year, Water Quality Practices in Louisiana (USDA 2016).

Practice Name	Practice Code	2005 Acres	2005 Count	2006 Acres	2006 Count	2007 Acres	2007 Count	2008 Acres	2008 Count	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count	2014 Acres	2014 Count
Access Control	**472**	16,351	652	33,422	1,528	17,781	850	38,733	1,546	8,872	381	14,025	672	24,110	911	31,031	726	31,003	947	7,649	214
Access Road	**560**	1,761	20	2,360	60	324	9	190	4	1,099	14	405	11	173	3	3,505	22	1,492	21	2	1
Animal Mortality Facility	**316**											36	1			13	1	7	1	18	2
Composting Facility	**317**	102	40	247	30	225	31	202	11	44	4	60	4	44	4	60	4	53	6	13	2
Conservation Cover	**327**	7,832	378	38,007	1,775	21,508	1,183	18,790	928	12,497	567	13,065	557	23,685	1,186	19,678	893	12,318	568	3,962	110
Conservation Crop Rotation	**328**	32,421	756	29,450	772	47,127	1,149	45,063	1,769	64,401	3,797	65,983	3,542	92,471	2,826	76,123	2,316	113,194	2,950	108,921	2,896
Contour Farming	**330**					71	2					239	11					126	10		
Cover Crop	**340**	3,341	85	2,358	44	6,718	145	5,814	169	2,357	42	1,119	12	3,796	62	1,750	44	4,952	77	3,965	89
Critical Area Planting	**342**	4,185	171	9,628	397	9,794	227	9,589	180	12,712	190	9,055	221	5,914	168	5,787	134	8,104	173	4,584	126
Diversion	**362**			31	1			200	5	103	3	49	1			78	2	44	2	54	2
Filter Strip	**393**	261	7	1,411	29	603	18	192	5	519	11	181	8	201	2			421	12	78	1

Practice Name	Practice Code	2005 Acres	2005 Count	2006 Acres	2006 Count	2007 Acres	2007 Count	2008 Acres	2008 Count	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count	2014 Acres	2014 Count
Grade Stabilization Structure	**410**	18,778	409	26,322	497	34,703	681	44,783	728	43,265	838	24,536	588	35,702	633	31,743	599	27,281	733	24,452	427
Grassed Waterway	**412**	420	11	966	46	1,603	19	1,698	34	1,413	18	283	6	34	1	96	2	140	3	22	1
Heavy Use Area Protection	**561**	3,676	151	4,721	254	6,788	322	12,251	465	11,506	418	16,854	646	17,952	684	14,129	675	12,939	496	10,264	575
Integrated Pest Management (IPM)	**595**	45,439	1,265	40,065	1,454	44,792	1,224	38,174	1,310	30,896	886	40,029	1,361	39,836	794	67,783	2,399	90,826	5,299	68,273	6,316
Irrigation System, Microirrigation	**441**					436	9			94	1	21	2	13	3	3,523	7	18	7	142	11
Irrigation System, Tailwater Recovery	**447**			206	3			562	1	243	2							74	1		
Irrigation Water Management	**449**	17,118	507	18,906	490	24,774	622	30,224	721	32,892	724	35,200	730	23,818	337	96,280	1,528	75,582	1,528	41,692	1,059
Mulching	**484**	1,540	81	5,325	292	2,977	101	2,690	40	2,375	53	2,020	53	2,329	49	3,202	70	2,871	65	2,485	67
Nutrient Management	**590**	50,746	1,668	47,536	1,891	42,651	1,660	62,272	1,936	76,000	1,943	63,764	2,076	59,130	1,449	87,433	2,107	69,365	1,704	52,161	1,756
Prescribed Grazing	**528**	30,650	1,093	72,626	2,809	56,313	2,374	58,218	1,994	46,226	2,016	55,635	2,212	58,715	2,117	51,793	2,052	62,807	2,265	39,536	1,265
Residue Management, No-Till/Strip Till	**329**	3,879	84	11,233	189	8,400	178	6,018	137	4,808	85	3,222	123	4,602	69	1,456	34	3,519	78	1,608	38

Practice Name	Practice Code	2005 Acres	2005 Count	2006 Acres	2006 Count	2007 Acres	2007 Count	2008 Acres	2008 Count	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count	2014 Acres	2014 Count
Residue and Tillage Management, Mulch Till	**345**	550	9	2,588	38	624	10	1,475	42	3,908	85	394	17	886	23	4,013	97	1,897	53	1,270	29
Residue and Tillage Management, Ridge Till	**346**	4,742	154	4,759	148	7,871	190	5,918	132	6,365	209	3,830	72	11,125	248	3,951	144	5,482	182	4,526	280
Riparian Forest Buffer	**391**	4,313	236	2,104	128	2,440	115	2,094	59	812	21	1,159	62	3,301	60	2,340	48	1,480	66	577	17
Riparian Herbaceous Cover	**390**													6	1			118	3		
Roof Runoff Structure	**558**													88	1						
Stream Crossing	**578**			370	2	37	3	183	1	20	2	18	1	56	2	10	1	83	5	109	2
Streambank and Shoreline Protection	**580**	29,573	13	307,249	8	3,490	10	3,729	5	8,357	7	8,345	1	41,247	7	9,434	9	214	1	4,428	1
Structure for Water Control	**587**	26,155	61	5,138	147	4,088	79	1,327	43	2,613	50	9,708	37	2,455	63	1,453	40	1,649	43	1,199	35
Tree/Shrub Establishment	**612**	30,862	799	136,170	1,630	39,523	1,190	13,199	454	10,422	298	17,128	638	16,467	522	13,106	410	16,227	680	9,499	184
Waste Facility Closure	**360**			14	1	42	3			2	1	66	8					29	2		
Waste Recycling	**633**	2,413	142	6,997	387	4,919	235	4,818	222	3,903	181	5,719	248	5,537	228	6,033	196	7,002	291	3,633	168

Practice Name	Practice Code	2005 Acres	2005 Count	2006 Acres	2006 Count	2007 Acres	2007 Count	2008 Acres	2008 Count	2009 Acres	2009 Count	2010 Acres	2010 Count	2011 Acres	2011 Count	2012 Acres	2012 Count	2013 Acres	2013 Count	2014 Acres	2014 Count
Waste Storage Facility	**313**	125	54	244	38	237	27	191	13	110	7	23	2	212	5	18	2	104	10	7	1
Waste Transfer	**634**					55	3	39	6	25	2	0	1	160	9	19	1	59	5	1,871	57
Waste Treatment Lagoon	**359**					4	1	2	1	3	1	44	5	17	2	13	2	112	7	23	3
Water Well Decommissioning	**351**	456	7	380	17	55	13	1,480	36	3,788	73	2,965	57	1,863	33	1,291	30	563	15	4,824	16
Wetland Creation	**658**	6	1	781	40	2,019	17	2,166	16	148	3	1,955	10	362	10	1	1	28	1		
Wetland Enhancement	**659**	36,369	23	12,545	32	21,390	10	23,848	3	28,113	22	28,288	6	112,505	38	30,826	375	11,939	61	1,042	7
Wetland Restoration	**657**	28,863	582	24,374	662	25,657	445	14,796	348	56,866	160	45,508	403	53,793	422	37,910	301	18,484	257	8,222	106

Notes: Data Source: USDA-NRCS, National Conservation Planning Database, November 2014. Land unit acres may be counted multiple times across practices and fiscal years.

The following table includes program information under which the above practices related to Water Quality were applied. These data reflect the geographic extent of land treated with water quality practices by each conservation program during a fiscal year. Land unit acres may be counted multiple times across programs and fiscal years, but are only counted once per program per fiscal year.

Land Unit Acres Receiving Conservation (including practice count) by Program and Fiscal Year
Water Quality Practices

Program	2005		2006		2007		2008		2009		2010		2011		2012		2013		2014	
	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count
Conservation Reserve Program (CRP)	11,460	1,396	37,548	4,583	27,900	2,977	31,580	2,715	11,587	927	15,345	1,432	22,022	2,001	11,921	1,130	6,548	902	2,158	108
Conservation Technical Assistance (CTA)	65,565	1,337	138,812	5,048	116,738	4,180	151,977	5,997	202,074	7,135	202,467	8,280	292,345	6,546	266,398	9,515	284,590	13,541	210,533	12,856
Environmental Quality Incentives Program (EQIP)	86,504	4,959	94,702	4,666	123,543	5,079	109,020	4,251	135,724	4,703	108,536	4,241	103,113	3,945	92,768	3,488	98,226	3,431	74,683	2,591
Grassland Reserve Program (GRP)	4,550	174	1,267	79	459	74					1,129	135	580	44			573	24	69	7
Watershed Protection and Flood Prevention Program (WFPO)	622	52	251	9	179	6	479	16	533	16	440	13	956	35					40	2
Wetlands Reserve Program (WRP)	19,540	1,380	16,541	1,344	18,947	689	10,415	277	7,593	156	4,257	172	7,670	264	29,926	924	13,177	644	5,444	267
Wildlife Habitat Incentive Program (WHIP)	1,165	148	1,536	110	3,092	130	3,837	104	3,293	178	3,370	129	3,346	131	7,078	215	3,441	86	1,379	33
Other	461	13			6	20	185	4			91	3	56	6						

Notes: Data Source: USDA-NRCS, National Conservation Planning Database, November 2014. Land unit acres may be counted multiple times across programs and fiscal years, but are only counted once per program per fiscal year.

The following table includes unique land unit acres for practices related to Water Quality. Land unit acres may be counted multiple times across fiscal years, but are only counted once per fiscal year.

Land Unit Acres Receiving Conservation (including practice count) by Fiscal Year
Water Quality Practices - Land Unit Acres treated by at least one practice

2005		2006		2007		2008		2009		2010		2011		2012		2013		2014	
Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count	Acres	Count
179,375	9,459	279,429	15,839	272,093	13,155	293,345	13,364	346,422	13,115	316,828	14,405	414,898	12,972	393,049	15,272	382,745	18,628	289,096	15,864

Notes: Data Source: USDA-NRCS, National Conservation Planning Database, November 2014. Land unit acres may be counted multiple times across fiscal years.

APPENDIX D: MONITORING BY LDEQ AND LDAF NONPOINT SOURCE IMPLEMENTATION IN 2015

Waterbody Name	Number of Stations Monitored	Number of BMPs Implementing	Impairment	Parameters sampled
Bayou Lafourche	12[1]	62	DO, TSS, Turbidity, and Fecal Coliform	pH, DO, conductivity, temperature, turbidity, BOD, nitrite-nitrogen, nitrate-nitrogen, total phosphates, TSS, total solids, TDS, fecal coliform, DO saturation, salinity, oil and grease, TKN
Turkey Creek	11[3]	20	DO	pH, DO, conductivity, temperature, BOD, nitrite-nitrogen, nitrate-nitrogen, total phosphates, TSS, total solids, TDS, chlorophyll a, ammonia
Lake St. Joseph	7[2]	37	nitrate/nitrite, DO, total phosphorus, TSS, and turbidity	pH, DO, conductivity, temperature, anions, TDS, TSS, total solids, turbidity, total phosphorus, total Kjeldahl nitrogen, BOD, and total organic carbon
Boston Canal	14[1]	1	Carbofuran and fecal coliform	fecal coliform, turbidity, ammonia - nitrogen, nitrate nitrogen, phosphate, pH, temperature, water clarity, DO, DO saturation, conductivity, salinity, and oil and grease
Comite River	17[1]	2	fecal coliform	fecal coliform, pH, temperature, water clarity, DO, DO saturation, conductivity, salinity, and oil and grease
Upper Bayou Terrebonne	18[1]	3	fecal coliform and non native aquatic plants	pH, temperature, DO, DO percent saturation, secchi, and conductivity/salinity, fecal coliform, TP, and Nitrate/Nitrite.
Bayou Folse	12[1]	5	Nitrate/Nitrite (Nitrite + Nitrate as N), DO, Total Phosphorus, Fecal Coliform	pH, temperature, DO, DO percent saturation, secchi, and conductivity/salinity, Fecal Coliform, TP, and Nitrate/Nitrite

Waterbody Name	Number of Stations Monitored	Number of BMPs Implementing	Impairment	Parameters sampled
Bayou Chene	10[3]	8	Fipronil, mercury in fish tissue, DO, sulfates, fecal coliform	DO, conductivity, pH, turbidity, temperature, BOD5, Nitrate/Nitrite, TKN, TP, SRP, TSS, TS, TDS, Cl, SO4, FL
Bayou Queue de Tortue	22[1]	29	Nutrients, DO and Turbidity	pH, temperature, secchi, specific conductivity/salinity, DO, and DO percent saturation, turbidity, TKN, NO2/NO3 and TP
Big Creek	16[2]	3	Fecal Coliform	pH, water temperature, water clarity, DO/percent saturation, and conductivity/salinity, fecal coliform

[1]*Monitored twice per month*
[2]*Monitored once per month*
[3]*Monitored weekly*