



**Mississippi River  
Gulf of Mexico  
Watershed Nutrient  
Task Force**

**Federal Support to  
Hypoxia Task Force States on  
Nutrient Reduction Strategies  
Report**

**APPENDIX**

**Hypoxia Task Force 2008 Action Plan  
Action Item 2**

September 2012

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## *Federal Strategy Summary*

The Hypoxia Task Force (HTF) is comprised of twelve states and five federal agencies, which includes the U.S. Department of Agriculture, Department of Interior, Army Corps of Engineers, Environmental Protection Agency, and National Oceanic and Atmospheric Administration. The HTF's most recent face-to-face meeting occurred from April 10-11, 2012 in Memphis, Tennessee. During the meeting, member states requested federal agencies to complete Action Item 2 of the 2008 Action Plan, which calls for federal agencies to develop strategies that, among other things, include opportunities to "align existing [federal] programs with hypoxia efforts." These cooperative efforts will not only "serve to assist the states in protecting in-state water quality, but also may result in reduced nutrient loadings to the Gulf."

This federal strategy establishes a context and approach to guide the actions of the HTF federal members in working collaboratively with each other, and in identifying opportunities to align relevant federal programs, to reduce nutrients in the Mississippi Atchafalaya River Basin (MARB) and hypoxia in the Gulf. The overarching themes of the federal strategy, which are consistent with the Action Plan action items and responsive to HTF states' needs in reducing nitrogen and phosphorus pollution, are:

- fostering development and implementation of state nutrient reduction strategies;
- leveraging financial assistance;
- providing technical assistance;
- supporting monitoring and modeling; and
- facilitating communication and coordination.

HTF federal agencies' activities and programs that are intended to implement one or more of these themes are captured in this report on an agency-by-agency basis and organized according to these categories:

1. Specific support to HTF states for development of state strategies
2. Major federal nutrient reduction programs providing direct support to states, agricultural landowners, and other point/nonpoint sources of nutrients
3. Federal programs "involved with" nutrient reduction activities that are not captured under #1 or #2 above
4. Science and technology (e.g., modeling)
5. Planned future actions in nutrient reduction or support for state strategies

The strategy serves as a framework for federal agencies, with input from the states, to identify and prioritize actions that leverage federal resources, as well as address the needs of HTF states in implementing the Action Plan. For example, the Natural Resources Conservation Service's (NRCS) Mississippi River Basin Healthy Watersheds Initiative (MRBI) is identified by USDA as one of their major nutrient reduction programs (category 2). In addition, USGS and EPA are cooperating with NRCS to provide financial and technical assistance for three-tiered monitoring, which represents a federal collaborative effort consistent with Action Item 2 that implements a number of themes in the federal strategy. The report contains additional illustrations of ongoing and planned federal agency actions.

## U.S. Department of Agriculture (USDA)

### 1) Specific support to HTF states for development of state strategies

#### Agricultural Research Service (ARS): St. Paul, MN – Soil & Water Management Research Unit (SWMRU):

Denitrification bioreactors are being used to reduce nitrate N concentrations and loads in tile drain effluents from cropped lands. SWMRU scientists are conducting research to improve denitrification rates and cold temperature performance of these bioreactors by using readily available agricultural residues as media (partially funded by state of Minnesota through Agriculture Utilization & Research Institute).

#### ARS: Oxford, MS – Water Quality & Ecology Research Unit (WQERU):

ARS WQERU scientists routinely provide information and advice to Mississippi Department of Environmental Quality (MDEQ) on many aspects of nutrient monitoring, impact assessments and management practices designed to reduce nutrients. For example, WQERU scientists have provided expertise and advice concerning nutrient monitoring associated with two MDEQ instrumented watersheds, Harris and Porters Bayou, funded by EPA 319.

Formally, ARS WQERU scientists participate in the MDEQ Delta Nutrient Reduction Strategy Team, MDEQ Delta Nutrient Technical Advisory Group (nutrient regulatory criteria), and MDEQ Yazoo River Basin Team.

A memo of understanding (ARS Project No. 6408-13660-007-07M) entitled "Restoration and protection of land and water resources to reduce excessive nutrient loadings in-state and to the Gulf of Mexico" between ARS, MDEQ, and several other partners was established in 2010.

#### ARS: Ames, IA:

The ARS in Ames, Iowa is a member of The Science Review Team for the Iowa Nutrient Reduction Strategy (Dan Jaynes, John Kovar and Mark Tomer) and serves on the Upper Mississippi River Sub-Basin Hypoxia Nutrient Committee (Dan Jaynes).

#### Farm Service Agency (FSA): Conservation Reserve Enhancement Program (CREP)

FSA has CREP agreements with 13 Mississippi River Basin States. Participants in these Mississippi River Basin CREP agreements have enrolled over 300,000 acres in practices states have identified as important for reducing sediment, N, and P runoff.

**2) Major federal nutrient reduction programs providing direct support to states, agricultural landowners, and other point/non point sources of nutrients**

*Natural Resources Conservation Service (NRCS): Mississippi River Basin Healthy Watersheds Initiative (MRBI)*

<http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/home/?&cid=stelprdb1048200>

In 2009, NRCS kicked off the MRBI to improve water quality, restore wetlands, and improve wildlife habitat in the Mississippi River Basin. Funding is focused in small watersheds of greatest conservation need related to water quality. MRBI offers assistance to agricultural producers to voluntarily implement conservation systems on private lands. In addition, it secures the technical and financial assistance to install edge-of-field monitoring of the benefits derived from their conservation efforts, and also partners with EPA for in-stream monitoring and USGS for watershed level monitoring. NRCS direct assistance to producers includes:

- FY 2010 – Over \$32.8 million treating 159,000 acres in priority watersheds
- FY 2011 – Over \$63.0 million treating 241,000 acres in priority watersheds
- FY 2012 – Over \$125.7 million currently being obligated in priority watersheds

Technical and financial assistance is available to implement conservation systems using key conservation practices such as nutrient management, conservation crop rotation, cover crops, wetland restoration, and no-till/strip-till.

*NRCS: Gulf of Mexico Initiative (GoMI)*

<http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/home/?&cid=stelprdb1046039>

GoMI will deliver up to \$50 million in financial assistance over the next 3 years. This working lands conservation initiative will assist agricultural producers in improving water quality, increasing water conservation, and enhancing wildlife habitat within waters draining directly into the Gulf of Mexico. It is designed to complement MRBI activities. In FY 2012, its initial year, nearly \$9 million will be committed to agricultural producers to accelerate implementation of conservation practices in a systems approach.

*NRCS: National Water Quality Initiative (NWQI)*

<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?&cid=stelprdb1047761>

On May 8, 2012, the Secretary of Agriculture announced the availability of \$33 million in Environmental Quality Assistance Program (EQIP) financial assistance for the NWQI. The Initiative will work in priority watersheds to help farmers, ranchers and forest landowners improve water quality and aquatic habitats in impaired streams. NRCS will help producers implement conservation and management practices through a systems approach to improve water quality. NWQI is available in 157 specifically selected watersheds. This strategic approach will leverage funds and provide streamlined assistance to help individual agricultural producers take needed actions to reduce the flow of sediment, nutrients and other runoff into impaired or threatened waterways.

NRCS: Environmental Quality Incentive Program (EQIP)

<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?&cid=stelprdb1044009>

NRCS has obligated \$591 million in financial assistance to agricultural producers in the 12 Hypoxia Task Force States during fiscal years 2010-2012 to date, with general EQIP funding not associated with MRBI. These conservation contracts contain nearly 130,000 planned or completed conservation practices addressing resource concerns on nearly 3.9 million acres of the Task Force area. To date, over \$284 million of the \$591 million has already been implemented on the land.

ARS: Oxford, MS – Water Quality & Ecology Research Unit (WQERU):

ARS WQERU scientists contributed to the development of proposals from Mississippi for the MRBI by providing expertise and guidance on water quality monitoring plans and assessments, and are involved in education and outreach activities.

ARS WQERU, Oxford, MS, has tier 1 and 2 sites that provide monitoring data within 8-digit MRBI target watersheds – Big Sunflower (HUC 08030207), Coldwater (HUC 08030204), Deer-Steele (08030209), and Upper Yazoo (HUC 08030206).

ARS WQERU has long term data sets for watersheds in hill (mixed cover) and delta (intensive agriculture) portions of northwest Mississippi at a range of scales (small watersheds encompassing single fields to streams with hundreds of square km that characterize nutrient levels and in some cases yields. At the field and plot scales, effects of traditional and innovative BMPs on nutrient levels have been measured.

FSA: Conservation Reserve Program (CRP)

CRP enrolled 20.7 million acres in the Mississippi River Basin.

	<b>Fiscal Year</b>		
	<b>2009</b>	<b>2010</b>	<b>2011</b>
	<b>(million acres)</b>		
<b>Total Acres Enrolled</b>	22.7	21.0	20.7
<b>Buffer Acres</b>	1.32	1.40	1.31
<b>Wetland Acres</b>	1.22	1.29	1.35
<b>HEL Acres</b>	16.7	14.9	14.6

**3) Federal programs "involved with" nutrient reduction activities that are not captured under #1 or #2 above**

**4) Science and technology (e.g. Modeling)**

Conservation Effects Assessment Project (CEAP)

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap>

CEAP is a multi-agency effort to quantify the environmental effects of conservation practices and programs and develop the science base for managing the agricultural landscape for environmental quality. Project findings will be used to guide USDA

conservation policy and program development and help conservationists, farmers and ranchers make more informed conservation decisions. The purpose of the National Assessment for Cropland is to estimate the environmental benefits and effects of conservation practices applied to cultivated cropland and cropland enrolled in long-term conserving cover. Reports of this assessment have been produced for four large basins within the Mississippi including the Upper Mississippi, the Missouri River, and the Ohio-Tennessee River Basins. NRCS is also developing a methodology to assess the effects of MRBI implementation through the Agricultural Policy Environmental Extender (APEX) model in small 12-digit watersheds.

#### NRCS: Conservation Innovation Grants (CIG)

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig>

Since 2010, a portion of annual CIG funding has been devoted to projects within the Mississippi Basin through MRBI. CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, EQIP funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, Tribes, or individuals. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns. In fiscal years 2010 – 2012, NRCS has invested over \$10.8 million in Mississippi River Basin-specific CIGs.

#### Monitoring and Assessment Framework for the Mississippi River

USDA, USGS, and EPA are working collaboratively to develop and apply a 3-tiered monitoring and assessment strategy for the Mississippi River Basin. The goal is to implement a robust long-term, multi-scale monitoring network and develop a geospatial library of information on land use, land management, conservation practices, and point source contributions to describe changes in nutrient transport from the land to small streams and ultimately to the Gulf of Mexico.

As part of this strategy, NRCS is leading an effort to identify the core set of existing monitoring sites that will be used to support the assessment of watersheds included in MRBI. In each of the 15 pilot watersheds, NRCS is partnering with non-federal entities to put in place required monitoring and to develop assessment tools for characterizing the results.

#### Scaling the Agricultural Policy Environmental eXtender (APEX) Model

NRCS has developed the capacity to estimate the edge-of-field losses of sediment, N, P, and pesticides from cropland using APEX and the Soil and Water Assessment Tool (SWAT). The current estimation capacity of the CEAP cropland assessment using these tools is limited to the 4-digit HUC scale. NRCS is now leading a pilot effort to apply these tools at the 8-digit and 12-digit HUC scales within the Boone and Raccoon River watersheds in Iowa. Survey work for this effort is expected to begin this fiscal year, with modeling and analysis to be completed in fiscal years 2013 and 2014.

#### National Agroforestry Research Center

USDA Forest Service researchers are producing research addressing nutrient sources that contribute to hypoxia including:

- designing and locating upland and riparian buffers to enhance water quality performance and developing end-user tools to assist in decision support; and
- developing tools to design/plan agroforestry for creating multifunctional.

### **5) Planned future actions in nutrient reducing or support for state strategies**

#### Additional CEAP Cropland Assessment Reports

The release of additional reports through the CEAP National Assessment for Cropland is planned for additional Mississippi River Basin and Gulf Coast regions. This includes the Arkansas-White-Red River Basins, Texas Gulf Water Resource Region, Lower Mississippi River Basin, and South Atlantic-Gulf Water Resource Region.

#### NRCS: Edge of Field Monitoring

In FY 2010, NRCS began providing financial assistance for edge-of-field water quality monitoring through an interim practice standard for monitoring and evaluation. The agency is currently developing a permanent standard based on the experience to date with the interim standard. Concurrently, NRCS is creating a strategy that will guide implementation of the new standard beginning in FY 2013.

## ***Environmental Protection Agency (EPA)***

### **1) Specific support to HTF states for development of state strategies**

#### [Memo on the “Recommended Elements of a State Framework for Managing Nitrogen and Phosphorus Pollution”](#)

To foster a comprehensive approach to strategy development, EPA developed and released this memo in early 2011. This Framework Memo lays out what the EPA believes are the minimum building blocks necessary for effective programs aimed at managing nutrient pollution, but still provides room for states to tailor the framework to particular local circumstances. It also serves as a tool to guide ongoing collaboration between EPA Regions and states in their joint effort to make progress on reducing nitrogen and phosphorus pollution.

#### Nutrient reduction strategy workshops

To assist Task Force states in the development and implementation of nutrient reduction strategies, a series of workshops are being conducted to facilitate discussion among the states and other partners on each element of the Framework Memo. These workshops

encourage information exchange on the elements of nutrient reduction strategies and identify areas where Task Force members can provide assistance and support. To date, five workshops have been held on the following topics: watershed prioritization, setting watershed load reduction goals, ensuring effectiveness of NPDES permits, addressing agricultural sources of nutrients, and on-site systems. The next workshop on stormwater management is scheduled for July 12, 2012.

#### Financial and Technical Support

EPA has provided support (\$1,183,000) to MARB states as states do a variety of work including establishing stakeholder and/or advisory committees and gathering input, conducting watershed prioritization work, and watershed modeling.

#### [Nitrogen and Phosphorus Data Access Tool \(NPDAT\)](#)

EPA designed NPDAT to support states and other partners in prioritizing watersheds on a statewide basis for N and P load reductions and for setting watershed load reduction goals, which are the first two elements recommended by the Framework memo. The NPDAT can also help states analyze N and P pollution by providing data on the extent and magnitude of N and P pollution, water quality problems related to this pollution, and potential pollution sources in a format that is readily-accessible and easy-to-use.

#### Sub-basin Workshops in Person

Region 5 received funding support from EPA headquarters in fall 2011 to conduct nutrient strategy workshop for the Upper and Ohio Basin states on addressing agricultural sources of nutrients. A series of webcasts on state level nutrient reduction strategies is being held. Topics for upcoming webinars include: Indiana's Conservation Cropping Systems Initiative, examining if nutrient trading is economically and environmentally feasible to help solve Gulf hypoxia, the value of social and economic data in development and implementation of state level nutrient strategies, and more.

#### Region 5's Carryover Funds

Starting in 2010, the Region will work with states to utilize 106/604(b) carryover funds to promote nutrient management activities (monitoring, standards development, TMDLs, watershed plans, etc) on a targeted watershed basis. Annually, the region will encourage states to target their 604(b) funds to priority nutrient watersheds (based upon public benefits, severity of the problem and the ability to address the problem) to accelerate necessary planning activities to support accelerated implementation of nutrient controls under NPDES and Section 319.

Region 5 began implementing this funding policy in FY 2011. It took \$1.865 million in FY 2010 CWA Section 319 funds that were not used that year and reallocated those funds to four Hypoxia Task Force states in support of accelerating or enhancing efforts to implement nutrient reduction projects consistent with their proposed state nutrient reduction strategies.

## **2) Major federal nutrient reduction programs providing direct support to states, agricultural landowners, and other point/nonpoint sources of nutrients**

### [Protocol for Developing Nutrient TMDLs](#)

This document was developed at the request of EPA regions, states, and tribes and describes an organizational framework for the development process of nutrient TMDLs. It includes case studies to illustrate the major points in the process and emphasizes the use of rational, science-based methods and tools for TMDL development to assist readers in applying a process that addresses all regulatory requirements. The process will assist with the development of rational, science-based assessments and ideally will lead to the assemblage of a justifiable TMDL.

### [319 Program](#)

Under Section 319, states, territories and tribes receive grant money that supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects.

### [Assistance for Nutrient Criteria Development](#)

EPA provides scientific technical assistance for nutrient criteria development. EPA supports a website as a "One Stop Shop" for national, regional, and local nutrient criteria developments, and includes: information on the science of nutrient criteria development and implementation; presentations by state nutrient experts and water quality managers; nutrient-related discussion boards; a bulletin board of recent nutrient happenings, and EPA guidance documents on nutrient water quality criteria.

### [Source Water Protection Program](#)

Source water protection includes surface and groundwater protection programs under §§ 1421, 1428 and 1453 of the Safe Drinking Water Act. Source water protection aims to prevent or reduce contamination of drinking water sources, to protect public health and lower treatment costs. Source water assessments and delineated areas, protection plans, and partnerships can provide information and support for targeted nutrient reduction efforts. EPA works with state and tribal agencies, non-governmental agencies and other stakeholder groups to encourage partnerships and provide information for carrying out source water protection actions. Computer maps are available to assist in identifying priority watersheds for nutrient reduction, including information about drinking water systems in NPDAT (see category 1). EPA is one of 23 members of the Source Water Collaborative, which focuses on promoting land use and stewardship that protect sources of drinking water. The Collaborative is developing an online tool to facilitate partnerships between source water stakeholders and USDA conservation programs ([www.sourcewatercollaborative.org](http://www.sourcewatercollaborative.org)).

### [Clean Water State Revolving Fund \(CWSRF\)](#)

The CWSRF is a flexible program that offers states a variety of assistance options, including loans, refinancing, purchasing, or guaranteeing local debt and purchasing bond insurance. States have the flexibility to target these resources to their particular environmental needs, including contaminated runoff from urban and agricultural areas,

wetlands restoration, groundwater protection, brownfields remediation, estuary management, and wastewater treatment. States may also customize loan terms to meet the needs of small and disadvantaged communities. CWSRF programs have provided more than \$5 billion annually in recent years to fund water quality protection projects.

#### Drinking Water State Revolving Fund (DWSRF)

The DWSRF provides capitalization grants to states to develop drinking water revolving loan funds to help finance system infrastructure improvements, assure source-water protection, enhance operation and management of drinking-water systems, and otherwise promote local water-system compliance. The program also emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water.

### **3) Federal programs "involved with" nutrient reduction activities that are not captured under #1 or #2 above**

#### Gulf Coast Ecosystem Restoration Task Force (GCERTF)

EPA chairs of the GCERTF, which was created by President Obama on October 5, 2010 for the long term recovery of the Gulf Coast following the Deepwater Horizon Oil Spill. The GCERTF is a multistate and multiagency effort, with significant contributions from all the HTF federal members and two of its state members – Mississippi and Louisiana. In December 2011, the GCERTF released its [final strategy](#) for long term ecosystem restoration of the Gulf Coast. One of its priorities is working in the Gulf and the upstream Mississippi watershed to reduce excess nutrients flowing into the Gulf of Mexico and to undertake other measures to enhance water quality.

#### Nutrient Microsites

In early 2012, EPA unveiled this new website on nutrient pollution policy and data to help individuals access information on EPA actions to reduce nutrient pollution, state efforts to develop numeric nutrient criteria, and EPA tools, data, research, and reports related to nutrient pollution. Visit the website at <http://epa.gov/nandppolicy>. EPA also unveiled another website on nutrient pollution for homeowners, students, and educators. The site contains information on the problem of nutrient pollution; the sources of the pollution; how it affects the environment, economy, and public health; and what people can do to reduce the problem. The site also features an interactive map of local case studies in reducing nutrient pollution. Visit the website at <http://epa.gov/nutrientpollution>

### **4) Science and technology (e.g., modeling)**

#### Discharge Monitoring Report (DMR) Pollutant Loading Tool

The DMR Pollutant Loading Tool is designed to help determine who is discharging, what pollutants they are discharging and how much, and where they are discharging. The tool calculates pollutant loadings from permit and DMR data from EPA's Permit Compliance System (PCS) and Integrated Compliance Information System for the National Pollutant Discharge Elimination System (ICIS-NPDES). Data is available for the years 2007

through 2010. The tool can help rank dischargers, industries, and watersheds based on pollutant mass and toxicity, and presents “top ten” lists to help determine which discharges are important, which facilities and industries are producing these discharges, and which watersheds are impacted.

#### National Aquatic Resource Survey

EPA, states, and tribes are conducting a series of surveys of the nation's aquatic resources. Often referred to as probability-based surveys, these studies provide nationally consistent and scientifically-defensible assessments of our nation's waters and can be used to track changes in condition over time. Each survey uses standardized field and lab methods and is designed to yield unbiased estimates of the condition of the whole water resource being studied (i.e., rivers and streams, lakes, wetlands, or coastal waters).

#### “Reactive Nitrogen in the United States: An Analysis on Inputs, Flows, Consequences, and Management Options” Report by EPA Science Advisory Board (SAB)

The SAB published this report in 2011 to present its findings on the sources and fate of reactive nitrogen. Specific objectives of the study included an analysis of the environmental problems of reactive nitrogen and an evaluation of the environmental benefits an integrated nitrogen management strategy can contribute. The SAB also provided advice on integrated nitrogen research and control strategies. However, an assessment of the challenges and costs of implementing the SAB’s recommendations is beyond the scope of this report.

### **5) Planned future actions in nutrient reduction or support for state strategies**

#### National Water Quality Initiative (NWQI)

Through the NWQI, USDA-NRCS will provide assistance to producers as they implement conservation practices in priority watersheds across the nation. EPA is working with NRCS and state 319 programs in FY13 during the watershed selection process, and is working with state 319 programs as they coordinate with other partners to develop a water quality monitoring strategy.

### ***U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA)***

#### **1) Specific support to HTF states for development of state strategies**

##### Hypoxia Modeling

NOAA supports the development and refinement of predictive models of the hypoxic zone that provide the quantitative relationship the zone and nutrients and other causative factors. These models, which can be used to provide an assessment of alternative management scenarios, describe the percent nutrient reductions required to meet the

Coastal Goal of the Task Force Action Plan. Additional research focused on model improvement will allow for refined predictions of required nutrient reduction levels as well as interim reduction targets and concomitant size of the hypoxic zone.

In addition to modeling of the causative factors of the hypoxic zone, NOAA is also funding research projects to determine the impacts of hypoxia on living resources in the Gulf of Mexico. Modeling of population and ecosystem effects will be coupled with physical models to allow further refinement of nutrient reduction targets based on both the size of the hypoxic zone and living resource impacts.

#### Hypoxia Coordination Workshop

NOAA hosts an annual [Hypoxia Coordination Workshop](#) to facilitate coordination and information exchange between the research community and managers. These interactions allow for direct discussions of pressing management needs and allow managers to better understand the science behind nutrient reduction targets.

- 2) Major federal nutrient reduction programs providing direct support to states, agricultural landowners, and other point/nonpoint sources of nutrients**
- 3) Federal programs "involved with" nutrient reduction activities that are not captured under #1 or #2 above**

#### Regional Ocean Partnership Grants

NOAA provides competitive funding to state-led regional ocean governance groups (e.g., the Gulf of Mexico Alliance), to provide assistance with administration and support as well as the implementation of marine spatial planning. Administration of the Gulf Alliance Nutrient Priority Issue Team is supported, in part, through a grant under this program.

- 4) Science and technology (e.g., modeling)**

#### Hypoxic Zone Monitoring

NOAA supports monitoring as a basis for assessing management progress toward achieving the Coastal Goal of reduced hypoxic zone area through nutrient reductions, and is leading planning efforts to develop a more robust and sustainable monitoring program through the [Gulf of Mexico Hypoxic Zone Monitoring Implementation Plan](#) and the Hypoxia Task Force Gulf Monitoring Framework. Objectives include maintaining and expanding the number of shelf-wide monitoring surveys that extend from the Texas coast to the Mississippi Bight and the number of observation systems in the hypoxic zone area, deploying autonomous underwater vehicle (also known as "glider") surveys, and developing a national hypoxia data portal.

Through the National Marine Fisheries Service [Southeast Monitoring and Assessment Program](#) (SEAMAP), NOAA monitors the extent of hypoxia in the Gulf of Mexico. This information is displayed in near real-time through [Hypoxia Watch](#), which also provides links to historic data and hypoxia maps.

### Gulf of Mexico Hypoxia Research Coordination Meetings

NOAA leads these [annual workshops](#) to update the scientific understanding of the role of nutrient loading in promoting the hypoxic zone, to coordinate research activities, and to identify remaining research and management gaps.

### NGOMEX (Gulf of Mexico Ecosystems & Hypoxia Assessment) Research

[NOAA supports research](#) to develop predictive models on the causes and impacts of the hypoxic zone through the legislatively mandated NGOMEX competitive program. The ensemble of forecast models should be transitioned to operations to serve management needs for accessible hypoxic zone forecasts on multiple temporal scales. Research supported by the NGOMEX program has resulted in important advances in quantifying sublethal effects of hypoxia on fish and shrimp, including model predictions on the impacts at the population level.

## **5) Planned future actions in nutrient reduction or support for state strategies**

### NGOMEX (Gulf of Mexico Ecosystems & Hypoxia Assessment) Research

NOAA is planning to conduct a Gulf Hypoxic Zone Modeling Technical Review in spring 2013. A Panel of subject matter experts will evaluate existing Gulf hypoxia predictive models and produce a White Paper with recommendations for transitioning from Research and Development Phase to Demonstration and Operational Phases for the most promising suite of models to guide management decisions. The White Paper will be used to inform development of the next phases for NOAA support for hypoxia model development and transition to operation. NOAA also intends to continue funding research studies to quantifiably assess the impacts of the hypoxic zone on ecologically and commercially important living resources, including a focus on socioeconomic analyses.

## ***Department of Interior (DOI)***

- 1) Specific support to HTF states for development of state strategies**
- 2) Major federal nutrient reduction programs providing direct support to states, agricultural landowners, and other point/nonpoint sources of nutrients**

### DOI Landscape Conservation Cooperatives

Landscape Conservation Cooperatives (LCCs) are a network of public-private partnerships that provide shared science to ensure the sustainability of America's land, water, wildlife, and cultural resources. LCCs recognize that challenges, such as habitat fragmentation, contaminants, and invasive species, transcend political and jurisdictional boundaries and require a more networked approach to conservation—holistic, collaborative, adaptive and grounded in science to ensure the sustainability of America's

land, water, wildlife and cultural resources. Four LCCs cover the 12 state Task Force area: Upper Midwest and Great Lakes, Eastern Tallgrass Prairie and Big Rivers, Appalachian, and Gulf Coastal Plains and Ozarks (<http://www.doi.gov/lcc/index.cfm>) Examples of how LCCs are working with multiple partners to address habitat and water quality improvements include:

- Integrating nutrient models into habitat priorities to quantify reforestation and nutrient reduction benefits in the Gulf Coastal Plains and Ozarks LCC: <http://gcpolccapps.org/projects/Default.aspx>
- Remote Sensing projects in the Eastern Tallgrass Prairie and Big Rivers LCC <http://www.fws.gov/midwest/climate/LCC/ETPBR/>

### USFWS Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife Program engages willing partners, through non-regulatory incentives, to conserve fish and wildlife on their property to support sustainable populations of Federal Trust Species. This includes enhancing populations of migratory birds and inter-jurisdictional fish species; contributing to the recovery of threatened and endangered species; keeping candidate species from becoming listed; and, keeping common species common. Strategic Plans were developed for each region that identifies geographic focus areas where program efforts will be targeted. Working with over 44,000 private landowners from 1987-2010, the Program has successfully restored and enhanced -1,026,000 acres of wetlands -3,235,000 acres of uplands -9,200 miles of stream habitat—and worked with more than 3,000 partnering organizations.

<http://www.fws.gov/partners/aboutus.html>

Example products:

- Strategic Plan for the Midwest  
[http://www.fws.gov/partners/Strategic\\_Plans/Regions/R3\\_PFW\\_St\\_Plan.pdf](http://www.fws.gov/partners/Strategic_Plans/Regions/R3_PFW_St_Plan.pdf)
- Strategic Plan for the Southeast

[http://www.fws.gov/partners/Strategic\\_Plans/Regions/Private\\_Lands\\_Plan\\_Intro.pdf](http://www.fws.gov/partners/Strategic_Plans/Regions/Private_Lands_Plan_Intro.pdf)

### Fishers and Farmers Partnerships

Fishers and Farmers Partnerships for the upper Mississippi River Basin is a self-directed group of nongovernmental agricultural and conservation organizations, tribal organizations, and state and federal agencies working with rural landowners to voluntarily develop and implement science-based solutions to local water quality issues with the goal of measurably improving the health of land and streams. Fishers and Farmers is a partnership of the National Fish Habitat Action Plan whose work is guided by the National Fish Habitat Board and USFWS. Current projects areas include Seven-Mile Creek in Minnesota, Boone River in Iowa, and the Meramec/Bourbeuse Rivers in Missouri. <http://fishersandfarmers.org/index.html>

### 3) Federal programs "involved with" nutrient reduction activities that are not captured under #1 or #2 above

#### USGS Cooperative Water Program

The Cooperative Water Program is a partnership between the U.S. Geological Survey (USGS), and over 1,500 State, tribal, and local agencies to conduct data collection and scientific investigations of mutual benefit. Jointly planned monitoring and science efforts bring local, State, and Tribal water needs and decision-making together with USGS capabilities, including nationally consistent methods and quality assurance; innovative monitoring technology, models, and analysis tools; and robust data management and delivery systems. <http://water.usgs.gov/coop/> Examples of these partnerships:

- Realtime monitoring of nitrate in streams in Iowa  
<http://waterwatch.usgs.gov/wqwatch/map?state=ia&pcode=00630>
- Water quality improvements and best management practices in agricultural watersheds in Wisconsin <http://pubs.usgs.gov/sir/2011/5119/>  
<http://pubs.usgs.gov/sir/2011/5008/>
- Sources of E.coli in urban streams in St. Louis  
<http://pubs.usgs.gov/sir/2010/5150/>
- Monitoring in the improvement in water quality in the Steele Bayou watershed in Mississippi <http://ms.water.usgs.gov/projects/319/SteeleBayouBriefingSheet2.pdf>
- Long-term Ambient Water-Quality Monitoring in Missouri  
[http://mo.water.usgs.gov/fact\\_sheets/wtrqual/Ambient/FS062-01.pdf](http://mo.water.usgs.gov/fact_sheets/wtrqual/Ambient/FS062-01.pdf)

#### USGS National Water-Quality Assessment (NAWQA) Program

The NAWQA Program provides nationally consistent information on the quality of the Nation's streams and groundwater; how water quality changes over time; and how natural features and human activities affect the quality of streams and groundwater. Objective and reliable data, water-quality models and related decision support tools, and systematic scientific studies characterize where, when, and why the Nation's water quality is degraded—and what can be done to improve and protect it for human and ecosystem needs. Example products:

- Nutrients in the Nation's Streams and Groundwater  
<http://water.usgs.gov/nawqa/nutrients/pubs/circ1350/>
- Regional SPARROW models and Decision Support System  
<http://water.usgs.gov/nawqa/sparrow/mrb/>
- Interactive map of changes in nitrate in groundwater of the U.S.  
<http://water.usgs.gov/nawqa/studies/gwtrends/map.php?map=NO3>
- NAWQA data and site mapper [http://infotrek.er.usgs.gov/nawqa\\_map/](http://infotrek.er.usgs.gov/nawqa_map/)

#### USGS National Stream Quality Accounting Network (NASQAN) Program

NASQAN objectives, specific to the Mississippi River Basin and hypoxia in the Gulf of Mexico, are to determine (1) seasonal loads of total and dissolved nutrients from the Mississippi River Basin to the Gulf of Mexico; (2) concentrations and loads of total and dissolved nutrients in major sub-basins and selected smaller watersheds within the Mississippi River Basin; and, (3) changes in loads and concentrations of constituents

through time in major sub-basins and selected watersheds within the Mississippi River Basin. <http://water.usgs.gov/nasqan/> Example products:

- Nitrate in the Mississippi River Basin and its tributaries: Are we making progress? [http://water.usgs.gov/nawqa/pubs/nitrate\\_trends/](http://water.usgs.gov/nawqa/pubs/nitrate_trends/)
- Annual and Spring Nutrient Loads in the Mississippi River Basin [http://toxics.usgs.gov/hypoxia/mississippi/oct\\_jun/index.html](http://toxics.usgs.gov/hypoxia/mississippi/oct_jun/index.html)

#### USGS National Water Information System (NWIS)—Water Data for the Nation

NWIS is a comprehensive and distributed application that supports the acquisition, processing, and long-term storage of water data. It provides access to water-resources data collected at approximately 1.5 million sites throughout the Nation and includes data on streamflows, groundwater levels, water quality data, and water use information.

<http://waterdata.usgs.gov/nwis> Examples:

- Real-time water quality data (ie, nitrate and turbidity): <http://waterwatch.usgs.gov/wqwatch/>
- Mapper tool <http://wdr.water.usgs.gov/nwisgmap/>

#### USGS/USACE Long-Term Resource Monitoring Program

The mission of the Long Term Resource Monitoring Program is to support decision makers with the information and understanding needed to maintain the Upper Mississippi River System as a viable multiple-use large river ecosystem. This Program is the diagnostic tool in the USACE Environmental Management Program for the Upper Mississippi River System that provides critical information about the status and trends of key environmental resources. <http://www.umesc.usgs.gov/ltrmp.html> Example products:

- Upper Mississippi River Restoration: Report to Congress: [http://www.mvr.usace.army.mil/EMP/Documents/2010EMPRTC\(lowres\).pdf](http://www.mvr.usace.army.mil/EMP/Documents/2010EMPRTC(lowres).pdf)
- Data Visualization Tools [http://www.umesc.usgs.gov/data\\_library/tools/data\\_visualization\\_tools.html](http://www.umesc.usgs.gov/data_library/tools/data_visualization_tools.html)

#### USGS National Wetlands Center

The National Wetlands Research Center engages in robust alliances with government, non-government, and university partners to develop and disseminate scientific information needed for understanding the ecology and values of wetlands and for managing and restoring wetlands, coastal habitats, and associated plant and animal communities throughout the world. The Center conducts basic research to address the difficult decisions that must be made regarding the landscape with respect to balancing the delicate and fragile nature of wetland system protection and restoration with the population that now lives, and is intrinsically tied, to that landscape.

<http://www.nwrc.usgs.gov/index.html> Example products:

- How are Louisiana Wetlands Changing (1932-2010) <http://pubs.usgs.gov/sim/3164/>

#### National Park Service-USGS Water Quality Partnership

This program empowers U.S. Geological Survey scientists and National Park Service resource managers to work in a partnership setting to provide the hydrologic information and understanding needed to preserve unimpaired the natural and cultural resources and

values of the national park system for the enjoyment, education, and inspiration of this and future generations. To date, 165 partnership projects have been implemented in 112 national park units. The program supports a range of science activities focused on providing Park resource managers data and information necessary to make scientifically defensible management and policy decisions. Example projects:

- Saint Croix National Scenic River  
[http://water.usgs.gov/nps\\_partnership/sacn.php](http://water.usgs.gov/nps_partnership/sacn.php)
- Jean Lafitte National Historic Park and Preserve  
[http://water.usgs.gov/nps\\_partnership/jela.php](http://water.usgs.gov/nps_partnership/jela.php)

#### Water Quality Portal (Portal)

The USGS and EPA teamed up with the National Water Quality Monitoring Council (NWQMC) to launch a new Water Quality Portal (Portal) for water quality data. The Portal brings together chemical, physical and microbiological data from USGS's [National Water Information System \(NWIS\)](#) and EPA's [Storage and Retrieval Data Warehouse \(STORET\)](#). It provides a single, user-friendly web interface showing where water quality information is available from federal, state, tribal and other water partners, offering scientists, policy-makers, and the public with a single web interface to query data stored in STORET and NWIS. Future enhancements to the portal include the development of the Portal's interface, web services, and compatibility with popular mapping tools. <http://www.waterqualitydata.us/>

#### **4) Science and technology (e.g., modeling)**

##### Spatially Referenced Regressions on Watershed Attributes (SPARROW) Model

Regional SPARROW models for the Upper Mississippi, Missouri, and Lower Mississippi regions were developed to assist with the interpretation of available water-resource data and provide predictions of water quality in unmonitored streams. These regional models incorporate geospatial data on geology, soils, land use, fertilizer, manure, wastewater treatment facilities, temperature, precipitation and other watershed characteristics, from USGS, NOAA, USDA, and USEPA. These data are then linked to measurements of stream flow from USGS stream gauges and water-quality monitoring data from sites operated by multiple local, state, and federal agencies. The model information, reported by stream reach and catchment, provides contrasting views of the spatial patterns of nutrient source contributions, including those from urban (wastewater effluent and diffuse runoff from developed land), agricultural (farm fertilizers and animal manure), and specific background sources (atmospheric nitrogen deposition, soil phosphorus, forest nitrogen fixation, and channel erosion). <http://water.usgs.gov/nawqa/sparrow/mrb/>

##### SPARROW Decision Support System

The decision support system provides access to newly-developed regional models that describe how rivers receive and transport nutrients to streams, rivers, lakes, and estuaries. This decision support system saves time and resources by giving water managers access to sophisticated water-quality models that relate nutrient sources, such as atmospheric deposition, agriculture, waste water treatment facilities, and others, to stream water-

quality conditions. Managers can map and track predictions of nutrient conditions, sources, and quantities transported to downstream waters, and evaluate alternative nutrient reduction scenarios. <http://cida.usgs.gov/sparrow/>

## 5) Planned future actions in nutrient reduction or support for state strategies

- Continue to publish annual and spring loads at mainstem and large tributary sites each spring.
- Use the recently published regional SPARROW models to update the Mississippi River Basin SPARROW model. significant
- Continue to explore new techniques to incorporate new information from other models and spatial data layers into SPARROW models.
- Expand capabilities of the SPARROW Decision Support System to evaluate nutrient load contributions and nutrient reduction scenarios by state boundaries.
- Continue to refine analytical methods to describe trends by describing how the system evolves to help elucidate changes in nutrients over seasons and during varying streamflow conditions.
- Continue to work with States on the MARB Monitoring Collaborative to further develop the Mississippi River Basin Monitoring Collaborative.

## *U.S. Army Corps of Engineers*

### 1) Specific support to HTF states for development of state strategies

#### Non-Cost Shared Programs

The Support for Others (SFO) program is reimbursable work the Corps can perform such as engineering, environmental, construction management and related efforts, on behalf of requests from other federal agencies, states, local governments, tribal nations, foreign governments, international organizations, and the private sector. SFO allows a partner to tap into the Corp's expertise and skills for a specific need. There are three basic principles regarding the funding of SFO work: (1) the customer pays all costs associated with the Corps' provision of goods and services; (2) the customer pays in advance, whether this payment is in the form of a reimbursable "order" from a Federal agency or actual funds we have collected and deposited in the Treasury; (3) the customer pays all costs associated with the Corps' provision of goods and services, even when the Corps makes an error that results in higher costs to the customer. Every Corps District has a SFO coordinator or manager to contact.

<http://www.usace.army.mil/Missions/Environmental/EnvironmentalSupportforOthers.aspx>

## Cost Shared Programs

The [Continuing Authorities Program \(CAP\)](#) has three authorities that would be of interest to the states:

- **Section 1135** of the 1986 Water Resources Development Act (WRDA) allows for existing water resources projects to be reviewed in order to determine possibilities for structural or operational modification for the benefit of the environment. Modification plans that are consistent with the authorized purpose of water resource projects and will improve the quality of the environment are usually considered eligible for the Section 1135 program. All section 1135 projects require a non-federal sponsor to contribute 25% of the cost of any modification.
- **Section 204** of the WRDA 1992 authorizes the Corps to plan, design and build projects to protect, restore and create aquatic and ecologically related habitats in connection with dredging of authorized Federal navigation projects. These projects involve the beneficial use of dredged material from navigation channels to improve or create wetlands or bird nesting habitats. A non-Federal sponsor must contribute 35 percent of the construction costs and 100 percent of the operation and maintenance costs.
- **Section 206** of the WRDA 1996 provides authority to plan, design, and build projects to restore aquatic ecosystems for fish and wildlife. The Corps provides the first \$100,000 of study costs. A non-Federal sponsor must contribute 50 percent of the cost of the feasibility study after the first \$100,000 of expenditures, 35 percent of the cost of design and construction, and 100 percent of the cost of operation and maintenance. Every Corps District has a CAP coordinator or manager that can be contacted.

## **2) Major federal nutrient reduction programs providing direct support to states, agricultural landowners, and other point/nonpoint sources of nutrients**

While the Corps does not offer any direct nutrient reduction support, we do have some indirect beneficial efforts as part of our day to day activities. Section 5022 of WRDA 2007 - Hypoxia Assessment – provides for continued involvement of the Corps in the efforts of the HTF within limits of current authorities, programs, and projects. Guidance to this effect was released by a Corps Headquarters Memorandum on August 12, 2010.

<http://planning.usace.army.mil/toolbox/library/WRDA/wrda07sec5022.pdf>

Additionally, consideration of the impacts of dredge material on waters and wetlands of the U.S., including mixing zones and nutrient loading related to civil works water resources projects, is addressed in 404 (b)(1) Guidelines. These Guidelines aim to restore and maintain the chemical, physical, and biological integrity of waters of the U.S. through the control of discharges of dredged or fill material. Fundamental to these Guidelines is the precept that dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern. As part of a shared or partnered project effort and public review, the states would have input to the 404 evaluations.

### 3) Federal projects and programs "involved with" nutrient reduction activities that are not captured under #1 or #2 above

#### Steel Bayou Project

This project is related to sediment and water control and offers multi-State program use and a source of technology transfer. The Steele Bayou Basin is located in the southwestern portion of the Mississippi Delta. In the 1990's, the Vicksburg District Corps of Engineers (MVK) installed approximately 72 grade control structures to help prevent excessive localized sediment deposits and improve water quality.

In 2006 Delta Farmers Advocating Resource Management (Delta FARM, [http://deltafarm.org/major\\_projects](http://deltafarm.org/major_projects)) submitted a proposal for a Steele Bayou Project – Section 319 non-point source pollution reduction – to EPA through the Mississippi Department of Environmental Quality. The 319 Project originally proposed the construction of 70 to 100 sediment/water-quality control structures in the Steele Bayou watershed. Structures were divided into two groups based on size. Delta FARM is responsible for constructing small structures, and MVK the larger ones. These structures lessen erosion and improve water quality and fisheries habitat.

#### Fresh Water Diversions

In Louisiana, freshwater diversions are being used to introduce nutrient-laden water into marshes to restore degraded habitat and create new marsh. Several conclusions can be made from a variety of studies of the effect on water quality of riverine input into coastal wetlands: (1) riverine input can have a positive effect on nutrients and sediments which are actively deposited and/or transformed as riverine derived water passes through an estuarine system; (2) there can be trapping of suspended sediments in estuarine systems due to decreased water velocity and sediment settling; (3) nitrate concentrations can be reduced in the estuarine environment due to the processes of denitrification, assimilation and reduction. However, there are indications that wetlands would only temporarily store phosphorus and might even contribute carbon. But the wealth of knowledge developed in these studies represents a readily transferrable technology that could be applied on a case by case basis in state programs.

#### Agreements

The Corps has many agreements with virtually all Federal natural resources agencies and nongovernmental organizations to leverage resources, improve communication and coordination, and effectively address many environmental issues, including hypoxia. Each Corps Division and District has the ability to develop regional and local agreements tailored to their needs. For example, Corps, Mississippi Valley Division, has developed 12 regional agreements since 2000 with Federal and NGO resource groups in the Mississippi River valley. States can take advantage of these existing agreements in project partnership efforts. Additionally, states and or their specific offices such as Departments of Natural Resources or Water Quality can directly enter into agreements with the Corps.

<http://corpslakes.usace.army.mil/employees/cecwon/mou.cfm>

#### 4) Science and technology (e.g., modeling)

##### Engineer Research and Development Center (ERDC)

The ERDC team includes internationally recognized experts—engineers, scientists, physicists, mathematicians, technicians, and support personnel. One of its many areas of research addresses environmental and water problems that affect flood control, threatened and endangered species, contaminants, navigation, infrastructure, and hurricane and storm protection. There is a high potential for technology transfer and technical support including data sharing and contract actions from the ERDC. They can be approached directly or via any Corps office. <http://www.erd.usace.army.mil/>

##### Mississippi River Hydrodynamic and Delta Management Study (MRHDM)

MRHDM is the first large-scale, long-term restoration assessment investigated under the Louisiana Coastal Area (LCA) program, a comprehensive approach to coastal Louisiana restoration and management. MRHDM will identify and evaluate a combination of large-scale management and restoration features to address the long-term sustainability of the lower Mississippi River Deltaic Plain. The hydrodynamic study effort will focus on the Mississippi River, while the delta management study effort will focus on the adjacent basins. This effort will result in many types of sustainability measures which may be incorporated into state plans.

##### Upper Mississippi River Restoration (UMRR) (formerly known as the Environmental Management Program or EMP)

UMRR has studies and projects in the Upper Mississippi River system north of Cairo, Illinois, including the Illinois River. The program emphasizes habitat rehabilitation and enhancement projects and long-term resource monitoring. The long-term resource monitoring component includes the Long-Term Resource Monitoring Program (LTRMP), which monitors trends and impacts with respect to selected resources, developing products for resource management decisions, and maintaining river information databases (refer to DOI, category 3 for more information on LTRMP). All the information from the UMRR is available to share with the states, and there exists a large potential to cost share on projects that will help support the states' nutrient reduction plans.

##### Beneficial Use of Dredged Material Program (BUDMAT)

The purpose the program is to cost effectively use sediment from federally maintained waterways to reverse land loss in the coastal Louisiana area from Mississippi to Texas. New Orleans District Corps (CEMVN) has the largest annual navigation channel Operations & Maintenance (O&M) program in the nation and dredges an average of 64 million cubic yards (mcy) of material annually during maintenance dredging of navigation channels. Currently, approximately 24 percent (15.4mcy) of the material dredged is used beneficially within the Federal standard, which represents the least-cost environmentally acceptable disposal alternative. There is a reasonable potential to use an additional 20 mcy of material beneficially annually if sufficient funding were made available. The information developed as part of the BUDMAT would be beneficial to any state considering similar actions as part of their plans.

## **5) Planned future actions in nutrient reduction or support for state strategies**

It is hoped that in the future WRDAs, expansion of WRDA 07 Section 5022 responsibilities and guidance for the Corps might occur. Also, there may be additional legislation in future WRDAs, perhaps specific projects that target the hypoxia problem. The Corps will continue the development of watershed approaches and guidance as related to specific water resources projects or programs. Through a holistic approach, hypoxia would also be addressed specifically or as part of other analysis such a 404 program and permits. Regionally, the Corps will continue to raise hypoxia awareness and impacts in project and program analyses and environmental documents, and work with the states as much as law and guidance allow. The Corps intends to investigate, with the states and Federal agencies of the Hypoxia Task Force, a possibility of a regional agreement such as an MOU with states along the main stem of the river to address hypoxia. This MOU can also be expanded to include the entire Mississippi River Watershed.

The demand for aquatic ecosystem restoration projects continues to exceed the Corps resources available to respond. In the absence of a standard performance measure to be used across all agencies, the Corps continues to work toward the development of metrics and significance criteria to facilitate evaluation and prioritization of projects. The Corps is committed to continue working with the Hypoxia Task Force to reduce nutrients in waters of the U.S.