



September 2013



Looking Forward

The Strategy of the Federal Members of the Hypoxia Task Force



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Abbreviations and Acronyms

CEAP	Conservation Effects Assessment Project
CWA	Clean Water Act
DSS	Decision Support System
EPRI	Electric Power Research Institute
EQIP	Environmental Quality Incentives Program
FY	fiscal year
LCC	Landscape Conservation Cooperative
MARB	Mississippi/Atchafalaya River Basin
MRBI	Mississippi River Basin Healthy Watersheds Initiative
NAS	National Academy of Sciences
NGOMEX	Northern Gulf of Mexico Ecosystems and Hypoxia Assessment
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWQI	National Water Quality Initiative
ORD	Office of Research and Development
RESTORE	Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies
SPARROW	SPAtially Referenced Regressions On Watershed attributes
SWAT	Soil and Water Assessment Tool
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQI _{ag}	Water Quality Index for Runoff Water from Agricultural Fields

Introduction

Over the past 5 years, the federal agencies that are members of the Hypoxia Task Force (Task Force)—the U.S. Army Corps of Engineers (USACE), U.S. Department of Agriculture (USDA), U.S. Department of the Interior (USDO), U.S. Environmental Protection Agency (USEPA), and National Oceanic and Atmospheric Administration (NOAA)—have been able to provide new programs, funding, and technical tools to both lead federal efforts and support state efforts to reduce nitrogen and phosphorus pollution to the Gulf of Mexico. It takes time before on-the-ground progress can be measured through water quality improvements, and nature continues to provide the challenge of droughts and floods. However, the progress we are making—through efforts such as targeted best management practice implementation and tiered monitoring projects, sharing of monitoring information and other data, facilitation of funding opportunities, convening of Task Force-sponsored science forums, and partnering with other Gulf Coast efforts—is providing an excellent foundation as we look to the next 5 years of accelerating Task Force efforts. The funding opportunities provided by federal agencies are particularly important to existing and future nutrient reduction efforts. Examples of federal support include USEPA funding, through competitive grants, for states to develop and implement nutrient reduction strategies; USDA investing more than \$390 million in technical and financial assistance through various initiatives; USACE involvement with ecosystem restoration and other nutrient reduction projects; and NOAA support for Gulf research and monitoring. Those efforts and more have been documented in the appendix to this Strategy.

The primary priority of this 2013 Strategy, *Looking Forward*, consistent with Action Item 2 of the *Gulf Hypoxia Action Plan 2008*, is to provide focused and effective support for the development, refinement, and implementation of state nutrient reduction strategies. In September 2012 the federal agencies first provided a detailed appendix that documented the resources available to directly or indirectly support elements of the state strategies of the 12 Task Force states—Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Ohio, Tennessee, and Wisconsin. The appendix highlighted opportunities for financial and technical assistance, such as USEPA Clean Water Act (CWA) section 319 grants for nonpoint source pollution management, USDA's Environmental Quality Incentives Program (EQIP), USACE's cost-share programs, and NOAA's funding of hypoxia monitoring and modeling. The appendix and more information about the state and federal strategies in general is available at http://water.epa.gov/type/watersheds/named/msbasin/nutrient_strategies.cfm. Although the September 2012 appendix provided a broad variety of information representing an overview of past and ongoing federal efforts, this Strategy looks



NOAA

Autonomous underwater vehicles are used to monitor hypoxia in the Gulf of Mexico. This is just one example of how NOAA is funding hypoxia monitoring and research.

to the future by focusing on enhancements to existing efforts, as well as new work planned for the next several years.

The Strategy emphasizes federal efforts that will support nutrient strategies with new science, programs, and approaches that can be tailored to particular needs associated with implementing individual state nutrient reduction strategies. *Looking Forward* addresses many important areas identified and discussed in recent Task Force meetings, which include:

- Providing more scientific and technical assistance, such as recent and enhanced monitoring and modeling efforts to help demonstrate progress locally, basin-wide, and in the Gulf, as well as additional research to better target conservation practices on the ground
- Working on an economic analysis of conservation practices with the long-term goal of helping producers identify the full ecological benefits of conservation approaches
- Continuing research on reducing the uncertainties regarding the relationship between nutrient pollution and hypoxia, the impacts of hypoxia, and the best technical and programmatic solutions
- Providing guidance and tools that support regulatory activities that result in nutrient reductions
- Using innovation and leveraging to offer financial and technical assistance where possible
- Exploring ways to expand market-based approaches
- Initiating dialogues with states on new alternatives to foster voluntary conservation commitments by individual landowners
- Expanding outreach and education on nutrient pollution issues and solutions
- Bringing more partners with similar interests and goals to the table with the Task Force

By prioritizing these items, the federal agencies will support the development and implementation of state nutrient reduction strategies, as well as overall nutrient pollution and hypoxia reductions in the Mississippi/Atchafalaya River Basin (MARB) and Gulf of Mexico.

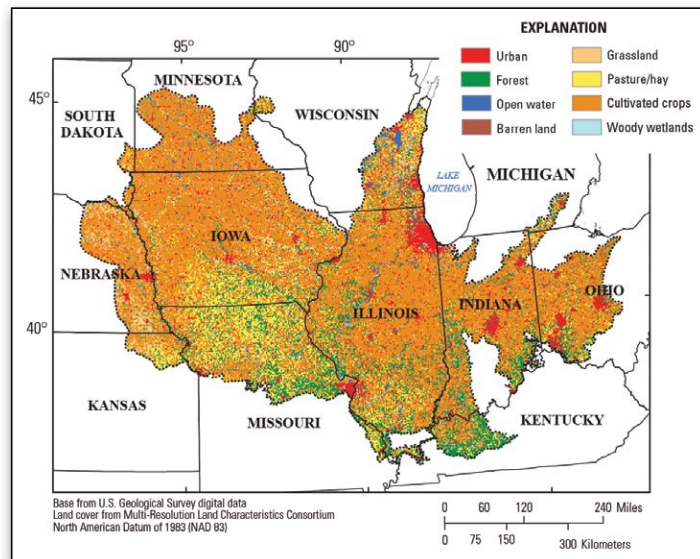
Monitoring

How will we improve existing monitoring programs to demonstrate water quality improvement?

Task Force federal agencies believe that water quality monitoring in the MARB and Gulf of Mexico is key to demonstrating the progress we are making in addressing nutrient pollution and hypoxia. We plan to use information collected over time to track changes in nutrient loadings, water quality, hypoxic zone size, benefits of conservation practices, and more. This information can also be used to establish federal and state-level priorities, as well as other steps in reducing nutrients and Gulf hypoxia.

Monitoring in the Basin

- The MARB Monitoring Collaborative, led by the U.S. Geological Survey (USGS) and NOAA, was established in 2012 under the leadership of the Task Force. The Collaborative plans to gather existing long-term monitoring information and use it to analyze the changes in nutrients and sediments over time, determine data gaps, and promote a more uniform, accessible collection of monitoring data and information. The Collaborative will work toward creating a network of existing long-term monitoring sites that can be easily displayed on a map as a network and eventually used to share nutrient and sediment trend information across the MARB. Over the long term, the Collaborative hopes to create 5-year reports quantifying nutrient and sediment changes throughout the monitoring network.
- USEPA and USGS are beginning a new partnership called **The Midwest Stream Quality Assessment** (http://pubs.usgs.gov/fs/2012/3124/pdf/Midwest_Stream_Quality_Assess_%20fs.pdf). USGS is collaborating with the ongoing USEPA National Rivers and Streams Assessment to more intensively measure stream quality across the Midwest, including the following Task Force states: Illinois, Indiana, Iowa, Kentucky, Minnesota, Missouri, Ohio, and Wisconsin. In the spring and early summer, streams were tested weekly for important water quality-related variables such as contaminants, nutrients, sediment, toxicity, and reproductive effects and biomarkers of contaminant exposure in fish or amphibians. Measurements of phosphorus and nitrogen will be especially useful in developing and implementing Task Force state nutrient reduction strategies.
- To help benchmark current water quality in the MARB, the **National Water Quality Assessment Program** (<http://water.usgs.gov/nawqa/>) and **National Stream Quality Accounting Network** (<http://water.usgs.gov/nasqan/>) will monitor water quality at 37 long-term sites in the MARB beginning this year. The **Cooperative Water Program** (<http://water.usgs.gov/coop/>), a partnership between USGS and more than 1,500 state, tribal, and local agencies, also operates a number of water quality sites, including real-time monitoring, throughout the MARB. Once again, providing more information like this to states is very helpful in developing, implementing, and tracking the progress of state nutrient reduction strategies.

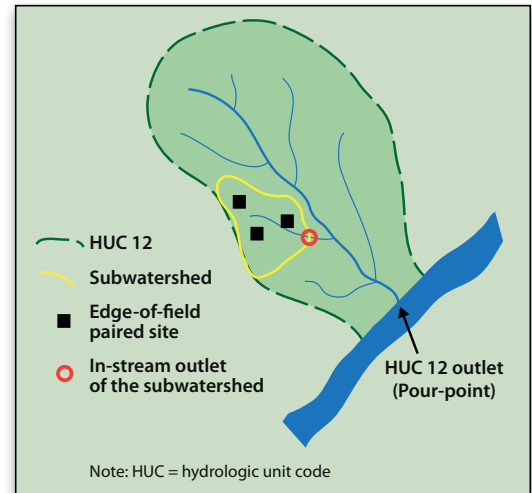


Midwest Stream Quality Assessment Study Area.



Continuous ultraviolet nitrate sensors and other water quality instruments deployed in the Mississippi River allow for a better understanding of nitrogen dynamics at the rates in which changes occur.

- USDA's Natural Resources Conservation Service (NRCS), USEPA, and USGS expect to continue to improve their shared monitoring efforts by partnering with states, universities, and other entities to implement a multi-tiered monitoring approach in select Mississippi River Basin Healthy Watersheds Initiative (MRBI) project watersheds. Through this initiative, NRCS and its partners will help producers in selected watersheds in the MARB to voluntarily implement conservation practices and systems that avoid, control, and trap nutrient runoff; improve wildlife habitat; and maintain agricultural productivity. In addition to these practices, the partners are working in 15 local watersheds to establish a strong network of edge-of-field, in-stream, and pour-point monitoring stations. We expect that the results of this targeted monitoring effort will help the Task Force to understand the benefits of conservation practices basin-wide.



Three-tiered monitoring approach.

Gulf Monitoring

- Complementary to the MARB Monitoring Collaborative, mentioned above, the ***Gulf of Mexico Hypoxia Monitoring Implementation Plan*** (<http://service.ncddc.noaa.gov/rdn/www/media/documents/activities/2012-workshop/Gulf-Hypoxia-Monitoring-Implementation-Plan-August-2012.pdf>) is identifying a robust, long-term, sustainable monitoring and assessment program for the Gulf hypoxic zone. It will integrate and enhance existing efforts to (1) assess annual changes in the size, seasonality, duration, and distribution of hypoxia and relate them to management activities that affect nutrient loading and other influences on hypoxia; (2) provide adequate data for models to develop accurate forecasts of hypoxia given alternative management targets for nutrient reduction and alternative scenarios of climate change; and (3) determine the relationship between hypoxic zone size, timing, and distribution, and the distribution, production, and health of ecologically and commercially important living resources (e.g., fish and shrimp). A key requirement of the *Gulf of Mexico Hypoxia Monitoring Implementation Plan* is the deployment of autonomous underwater vehicles (also known as “gliders”) with dissolved oxygen sensors. A team of experts met at a spring 2013 “Gulf Hypoxia Glider Application” meeting to determine the most effective way that gliders can be designed and deployed to monitor hypoxia as a complement to ongoing ship surveys and observation systems. A post-meeting output will be a white paper, *Implementation Plan for Glider Application to Hypoxia Monitoring and Modeling*.

Decision Support Tools

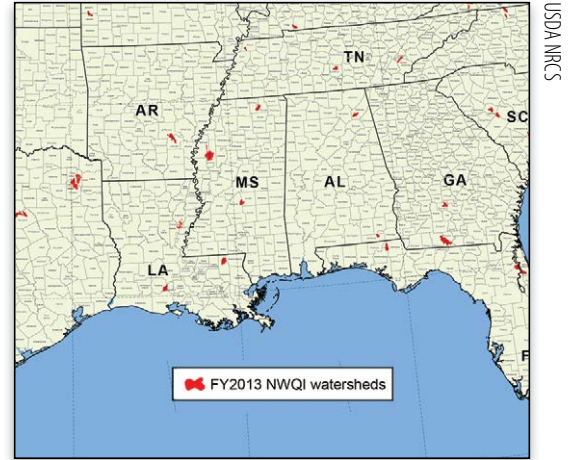
How will we enhance monitoring and conservation tools to increase efforts toward improving water quality?

It is important to refine our monitoring approaches to increase the accessibility and availability of monitoring data for use in nutrient reduction efforts. As explained below, NRCS is working to provide workshops and technical standards for monitoring practices. In addition, the federal agencies have consolidated water quality information into one accessible Web-based portal and will continue to add more data. Efforts like these will provide more useful and consistent information to a wider audience.

- The federal agencies will continue to jointly improve the **Water Quality Portal** (<http://www.waterqualitydata.us/>). This portal provides a single, user-friendly website showing where water quality information has been and is actively being collected by federal, state, and tribal partners and stored in USGS and USEPA databases. USDA is working with the developers to add information to the portal. New mapping features will be added to enhance data discovery. A tool like this is very helpful for making sure that data are accessible from a central location and in similar formats.
- Building on the success of the USGS/USEPA Water Quality Portal, NOAA, USGS, and USEPA are coordinating through the *National Ocean Policy Implementation Plan* to develop a National Hypoxia Data Portal, which would support state and regional efforts for seamless data sharing and information dissemination. Ultimately, coastal water quality data will be directly linked with the Water Quality Portal, allowing stakeholders to share data and develop integrated approaches to address the linkage between freshwater and coastal water quality conditions. The National Hypoxia Data Portal is a core requirement of the *Gulf of Mexico Hypoxia Monitoring Implementation Plan*.
- To increase and broaden our efforts on monitoring and assessing MARB water quality, NRCS has entered into an agreement to partner with the National Academy of Sciences (NAS) to hold a “Mississippi River Water Quality Science and Interstate Collaboration” workshop on November 18 and 19, 2013, in St. Louis, Missouri. Following the workshop, NAS will issue a consensus report summarizing scientific challenges and priorities regarding Mississippi River water quality monitoring and evaluation. Efforts like these help to provide guidance to groups working on projects in the MARB.
- Based on lessons learned from partnership efforts with edge-of-field water quality monitoring through the MRBI since 2010 (see figure below illustrating point and nonpoint sources of pollution), NRCS has developed and released two new standards for edge-of-field water quality monitoring, “System Installation” and “Data Collection and Evaluation.” These standards serve three purposes: (1) evaluate performance; (2) validate and calibrate models; and (3) inform on-farm management.
- Although financial assistance is discussed in more detail later in this document, it is important to note that assistance is available for monitoring and technical tool development programs like the one mentioned immediately above. In fiscal year (FY) 2013, \$7 million in EQIP funding was made available to cost-share with eligible producers for long-term contracts that include edge-of-field water quality monitoring

system installation, data collection, and evaluation. Of this funding, \$2 million was specifically available for MRBI priority watersheds and another \$2 million for the National Water Quality Initiative (NWQI), which includes many small watersheds in the MARB.

- Federally based decision support tools that will help farmers are being tested in specific watersheds nationwide, including within the MARB and Task Force states. For example, through the NWQI, NRCS will work with farmers and ranchers in



NWQI FY 2013 Watersheds.

165 small watersheds throughout the nation where water quality is a concern. There are about three NWQI watersheds per state nationwide, with a total of 40 in the 12 Task Force states. In addition, the NRCS Water Quality Index for Runoff Water from Agricultural Fields (WQIag) will be used with these new NRCS supported monitoring installations to evaluate the index's accuracy as a water quality indicator. The WQIag, explained more fully in the modeling section of this document, is a simple, Web-based tool that helps producers easily understand the quality of water flowing off their fields.

Modeling

How will we use in-basin and Gulf modeling to gain further understanding of nutrient pollution, its effects, and how we can reduce it?

Modeling in the MARB and Gulf provides many benefits. By predicting the effects of certain practices and inputs on water quality, nutrient loadings, and the hypoxic zone size using existing data, we can estimate the impacts of changes in those factors. Models are valuable tools that allow farmers, policy makers, and others to make decisions that will effectively improve water quality. Federal modeling efforts are listed below by agency; there are also ongoing collaborations between agencies regarding some of the models.

USDA

- Through the Conservation Effects Assessment Project (CEAP), USDA is modeling the environmental impacts of conservation treatment on agricultural lands. Through research, modeling, monitoring, data collection, and outreach, CEAP studies will provide Task Force states with the science and education needed at a much finer scale than currently exists for conservation planning, implementation, and management decisions. Several related activities are planned.
 - NRCS is piloting the application of the Agricultural Policy/Environmental Extender model at a small watershed scale for the entire Des Moines River watershed in Iowa. This pilot is intended to explore approaches for producing CEAP results at the small watershed level (8- or 12-digit hydrologic unit code), with a special emphasis on the Boone and Raccoon river watersheds within the larger Des Moines River. The study of

the entire Des Moines River watershed will allow comparison with data collected for the initial CEAP survey, conducted from 2003 to 2006. This information could show substantial changes in agricultural conservation and could provide lessons learned for future agricultural conservation.

- The Soil and Water Assessment Tool (SWAT) is a hydrological, or water and land interaction, model widely used in CEAP to quantify the environmental impacts of land use or land management practices. This model looks at small watershed to river basin scales to simulate the quality and quantity of surface and ground water. USDA's Agricultural Research Service continues to develop and enhance the capabilities of SWAT and to assist NRCS in the application of the tool to achieve basin-scale analyses of the environmental benefits of conservation practices through CEAP.
 - Since the last CEAP survey conducted from 2003 to 2006, much additional conservation work has been done. Plans are being made for another national survey of conservation practice adoption, which will further address a major priority of the Task Force related to evaluating the use and effectiveness of conservation practices.
- WQlag, mentioned above, is a new user-friendly tool under development and pilot testing by NRCS. It is an index that assesses water quality and addresses field sensitivity, nutrient management, tillage management, and pest management, as well as irrigation and tile drainage. The water quality index ranges from 1 (poor) to 10 (good). NRCS is pilot-testing the WQlag Web application on NWQI contracts in at least one watershed per state.
 - To enhance the assessment of the benefits of conservation practices in reducing nutrients at the field scale and accumulating these reductions to downstream waters, USDA and USGS have begun a new collaboration on innovative methods to link multiple models.

USGS

- In addition to collaborating with USDA to improve modeling, USGS's own nitrogen and phosphorus **SPAtially Referenced Regressions On Watershed attributes (SPARROW)** (<http://water.usgs.gov/nawqa/sparrow/>) models for the MARB are also being enriched. These models for regional and watershed-level interpretation of water-quality monitoring data relate in-stream water quality measurements to characteristics of watersheds, including contaminant sources and factors that influence terrestrial and aquatic transport. It estimates the origin and fate of contaminants such as nutrients in river networks and quantifies uncertainties in model predictions. Many applications of the model, such as the Decision Support System (DSS) described below, as well as relevant scientific articles, are available at the SPARROW website link above. SPARROW is being modified to incorporate data from 47 agencies throughout the watershed to describe nutrient delivery to downstream waters and to evaluate the effects of various nutrient management scenarios. NOAA has helped to support the development of SPARROW and its use in assessing the **Gulf coastal ecosystem's vulnerability to nutrient pollution** (<http://snre.umich.edu/scavia/chrp/>).

- To provide access to SPARROW models, USGS released the online DSS (<http://cida.usgs.gov/sparrow/>), which allows users to (1) map predictions of nutrient conditions and sources; (2) track sources and quantities of nutrients downstream; (3) identify which sources and which major streams contribute the largest amounts of nutrients downstream; and (4) evaluate alternative nutrient reduction scenarios and develop science-based estimates of how changes in nutrient sources affect nutrient transport to downstream waters. USGS plans to update the DSS with summary tables of nutrient contributions to the Gulf by state or major basins, which will help track progress and trends.

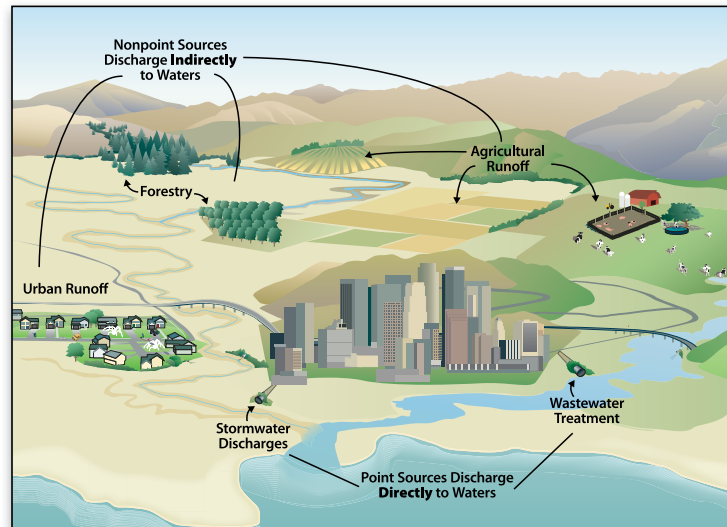
NOAA

- Modeling work to continue to improve the scientific accuracy in the relationship between nutrient loading in the basin and the Gulf hypoxic zone is being done through NOAA.
 - The NOAA-administered Northern Gulf of Mexico Ecosystems and Hypoxia Assessment (NGOMEX) competitive program is legislatively authorized by the Harmful Algal Bloom and Hypoxia Research and Control Act. NGOMEX research will emphasize (1) a transition to applying a group of scenario forecast models to predict the extent of the hypoxic zone given varying levels of nutrient inputs and other factors that control hypoxia (to inform management goal-setting, monitor progress of management plans, and validate the benefit of conservation practices) and (2) quantitative models to determine the impacts of the hypoxic zone on ecologically and economically important living resources. Model improvement helps to increase understanding of the hypoxic zone and how a variety of factors, including upstream nutrient pollution, can affect its size.
 - In spring 2013 NOAA and the Northern Gulf Institute convened the Gulf of Mexico Hypoxic Zone Modeling Technical Review Meeting to assess the state of scenario forecast models targeting hypoxic zone dynamics in the Northern Gulf of Mexico and to develop guidance on modeling approaches to best inform the Task Force of the efficacy of alternative nutrient reduction strategies for reducing hypoxia. A Modeling Technical Review Panel is developing a white paper, *Modeling Approaches for Scenario Forecasts of Gulf Hypoxia*, that will be used to inform future hypoxia model development.
 - The NOAA Ecosystem Forecast Roadmap Initiative, a recently established collaboration between all NOAA offices, targets Gulf hypoxia as one of three major themes. The Initiative will enhance the scientific foundation for informing the Task Force in its progress toward achieving the Coastal Goal.

Regulatory Activities

How do regulatory programs help reduce nitrogen and phosphorus pollution?

Nonpoint source nutrient pollution comes from many diffuse sources, including urban runoff and excess fertilizer from agricultural lands and residential areas. Nonpoint source pollution is generally not regulated under the CWA. Point sources of nutrient pollution, such as sewage treatment plants, industrial dischargers, many urban and industrial stormwater runoff sources, and concentrated animal feeding operations are regulated under the CWA's National Pollutant Discharge Elimination System (NPDES) permit program. The Clean Air Act regulates certain air pollutants (e.g., nitrogen oxides, ozone, particulate matter) to address health and other effects, and some of these regulations have the co-benefit of reducing nitrogen deposition. These types of regulatory programs provide another set of significant, useful tools to help states address nutrient pollution in state waters; ultimately, they also help to reduce nitrogen and phosphorus loads to the MARB and the Gulf.



Example point and nonpoint sources of pollution.

Over the past few years, a number of national air regulations, promulgated by USEPA under the Clean Air Act, have begun to take effect. Although they do not typically target nitrogen deposition, a resulting benefit of the regulations is that nitrogen loads are being reduced across the MARB. The Task Force estimates that by 2020 the impact of USEPA's existing and proposed Clean Air Act program regulations will account for roughly 4 percent of the 45 percent nitrogen reduction needed to meet the current load reduction goal to the Gulf.

- USEPA is continuing to work with water quality agencies in Task Force states to reduce point source loads.
 - The major program for addressing point source discharges of nitrogen and/or phosphorus limits is the NPDES water pollution permits program. For example, USEPA Region 5 has been actively working with Illinois to reduce phosphorus discharges from three major plants operated by the Metropolitan Water Reclamation District of Greater

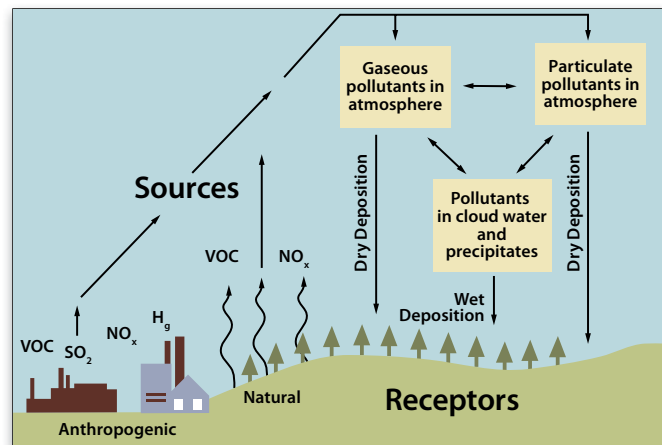


Diagram adapted by the US Forest Service from the USEPA

The deposition cycle.

Chicago. Current plans to release revised NPDES permits will include a schedule limiting phosphorus discharges to concentrations of 1.0 milligram per liter at all three plants and a total estimated reduction of 2.5 million pounds per year of phosphorus.

- USEPA has recently developed a **Discharge Monitoring Report Pollutant Loading Tool** (<http://cfpub.epa.gov/dmr/>), which provides easily accessible point source loading information. USEPA has created an enhanced tool focused on nutrient discharges that builds off this information and easily supplies trend, limit, and reporting information for major point sources in Task Force states. State agencies can use the information to track point source nutrient monitoring data and limits in permits and to estimate eventual water quality load reductions.

- Since the late 1990s, USEPA has recognized the importance of states adopting numeric nutrient criteria into their water quality standards to protect the designated uses of water bodies from nutrient pollution (nitrogen and phosphorus). Water quality standards guide state implementation of CWA programs. Standards that contain numeric criteria provide a clear understanding of what is necessary to protect or restore our nation's lakes, streams, estuaries, and coastal waters from the well-established negative effects of nitrogen and phosphorus pollution. Numeric nutrient criteria are an effective and efficient tool for water quality management because they provide permit limits for point sources and pollution reduction goals for watershed-based plans or total maximum daily loads (TMDLs).

USEPA recently released (September 2013) a Web-based toolkit to assist states and tribes in developing, adopting, and implementing numeric nutrient criteria. This toolkit provides a clearinghouse of USEPA documents and resources for all stages of numeric nutrient criteria development in the following categories: criteria derivation; water quality monitoring, assessment, reporting, and planning; permitting, water quality based effluent limits, and trading; economics and financing; and communications. The site also includes a growing list of other USEPA and federal resources, including newly released resources, such as guiding principles for integrating causal and response parameters into numeric nutrient criteria; frequently asked questions on basic principles that states and tribes should consider when developing rationales to justify water quality standard variances that apply to multiple permittees; the document *Actions to Help States Address Barriers to Numeric Nutrient Criteria Implementation (2012–2014)*; and an updated numeric nutrient criteria state adoption status **Web page** (<http://cfpub.epa.gov/wqsits/nnc-development/>).

- Under section 303(d) of the CWA, states, territories, and authorized tribes are required, every 2 years, to assess their waters and submit to USEPA, for USEPA's approval, a list of "impaired" waters that need one or more TMDLs for pollutants (e.g., nutrients) exceeding water quality standards. A TMDL identifies the pollutant load reduction needed from all point and nonpoint sources so that a water body attains standards. States can pursue a variety of implementation actions to meet those pollutant reductions so that state water quality standards are attained.

Over the past two decades, more than 8,000 TMDLs have been developed for nutrient-related impairments nationally. USEPA continues to provide assistance to states for

identifying impaired waters and has recently released **additional program and technical guidance** (<http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/2014-memo.cfm>) for identifying waters impaired by nutrients.

Outreach, Education, and Partnerships

How will we use outreach and education programs to promote work that addresses nutrient pollution and hypoxia, as well as enhances partnerships?

As federal agencies continue to generate information about nutrient pollution and hypoxia, they also plan to facilitate the sharing of that information with farmers, and other important stakeholders to increase awareness of best management practices and tools. One promising approach to promote information sharing is through developing partnerships. Task Force federal agencies hope to expand their partnership with outreach to land grant universities based on their expertise in research and in-the field education. This outreach will help the Task Force address its goals and better support state nutrient strategies. The Task Force is also working with USDA's Research, Education, and Economics mission area to assess the socioeconomic benefits of conservation practices to farmers. In addition, NRCS is working with the Environmental Defense Fund to pilot watershed-based planning approaches. Expanding partnerships is important to efficiently and effectively address nutrient pollution and hypoxia.

- A key role of the federal agencies is to bring together organizations with goals similar to those of the Task Force, beginning with the land grant universities. The first phase of the new effort began with facilitating coordination and fostering collaboration from a panel of land grant universities at the spring 2013 meeting in Louisville. The representatives offered their insights on how to mobilize land grant resources to support nutrient- and Gulf hypoxia-related work, and to increase engagement between land grant universities and federal and state water quality and agricultural agencies. Action items resulting from this panel include a possible memo of understanding between the Task Force states and land grant universities, as well as a white paper that will guide active interaction between land grant universities and states working on nutrient reduction strategies. The federal agencies plan to reach out to other organizations with similar goals to the Task Force in the future.
- Under the leadership of USDA's Research, Education, and Economics mission area, the federal agencies are working on an effort to establish a greater focus on socioeconomics to ensure voluntary implementation and the sustainability of conservation systems over time. Initial actions include a literature search of the information in published reports that can serve as a guide to our next steps. We also hope to use the experience and projects of the state land grant universities to help identify local solutions.
- NRCS is working with partners nationwide to foster the development of regulatory certainty for farmers and ranchers. States are pursuing a range of programs to facilitate the voluntary adoption of systems of conservation practices that improve and protect water quality. Recognizing that states are taking the lead in developing these programs,

NRCS is providing assistance to states with their development and implementation of “certainty” and “certification” programs. These programs generally recognize the environmental stewardship of farmers and give them assurance that, for as long as they continue to implement and maintain approved conservation systems, they are meeting a state’s expectations for water quality concerns for a defined time period.

For example, Minnesota developed and is piloting in four watersheds the voluntary **Agricultural Water Quality Certification Program** (www.mda.state.mn.us/protecting/waterprotection/awqccprogram.aspx), designed to accelerate adoption of on-farm conservation practices that protect Minnesota lakes and rivers. Producers who implement and maintain approved farm management practices will be certified and in turn assured that their operations meet the state’s water quality goals and standards for a period of 10 years. This program is the product of a state-federal partnership that includes multiple Minnesota agencies, as well as USEPA and NRCS.



USDA NRCS

Farmer and NRCS employee in a cotton field.

- NRCS and the Environmental Defense Fund are partnering in a project to demonstrate a watershed-based planning approach to address resource concerns, including nutrient load reduction. This approach was first discussed at the Task Force’s September 2012 meeting, held in Des Moines, Iowa. The project is designed to determine the need for both upland and downstream measures for nutrient removal through hydrology restoration and the means to fund and maintain these measures.
- NRCS is seeking to improve and expand technical assistance for agricultural producers through partnerships with the public and private sectors. Through contribution agreements, partnership agreements, and other arrangements with NRCS, agriculture and conservation organizations provide technical or financial resources to help with the delivery of NRCS conservation programs. In addition to national-level agreements, states enter into agreements locally to provide needed technical skills for conservation delivery. For example, NRCS has long-standing agreements with the Missouri Department of Conservation for the technical assistance of biologists. These agreements go back at least 20 years.

Financial and Technical Assistance

How are federal agencies using innovation and leveraging resources to offer financial and technical assistance?

The federal agencies continue to identify available funds to aid with reducing nutrient loads in the MARB and Gulf. Even though demand often outweighs availability for this support, agencies continue to identify ways to contribute financially. For example, USDA allots funds for programs like MRBI and NOAA continues to fund the modeling and monitoring of the hypoxic zone to ensure that the zone's response to watershed nutrient reductions is understood and detected. Federal agencies are also increasing technical assistance, such as access to biologists, nutrient trading support, and advanced nutrient modeling with resources such as satellite information. Improving the availability and quantity of this support will help states and federal agencies address nutrient pollution and hypoxia more effectively.

- Although the demand for federal assistance to Task Force states exceeds available resources, federal agencies are devoting significant funds to these efforts where possible. A few examples of this assistance include the following:
 - In FY 2011 USEPA provided \$1 million in competitive grant funding for states to develop and implement nutrient reduction strategies through a comprehensive partnership.
 - USDA's MRBI is projected to reach a level of investment of over \$341 million in technical and financial assistance across 123 projects by the end of FY 2013. As of April 2013, the demand for EQIP financial assistance in FY 2013 under MRBI was more than double the available funding—\$123 million across almost 3,500 applications.
 - Section 5022 of the 2007 Water Resources Development Act clarifies the USACE's ability, under existing authorities, to continue participating on the Task Force and provides a basis for the USACE's assistance with aquatic ecosystem restoration and other nutrient reduction projects.
 - NOAA's infusion of more than \$10 million for research and monitoring since 2009 has improved understanding of the causes and effects of Gulf hypoxia, including the advancement of scenario forecast models to inform nutrient management. These research advances facilitate the Task Force's adaptive management approach in refining nutrient reduction targets as needed and assessing measures of success.
- USDA and USEPA are providing financial and technical assistance to support nutrient credit trading as an approach to improving water quality. Nutrient credit trading offers the promise of reducing the cost to entities that must meet water quality standards while maintaining or improving water quality and increasing private-sector funding for voluntary conservation of private lands.

The speed of water quality trading market development is increasing, particularly in the Pacific Northwest and the Chesapeake Bay watershed. Inside the MARB, the Ohio River Basin Trading Project, managed by the Electric Power Research Institute (EPRI), is one of the national leaders in water quality trading. This project was initiated in 2009 with funding from USDA and USEPA, among others. In 2012, project leaders announced the

historic signing of the nation's first multi-state water quality trading compact. EPRI plans to announce the first pilot trades between point sources and farmers in 2013, with plans to have a fully functioning market in place by 2014.

- USEPA's Office of Research and Development (ORD), in response to recommendations from the USEPA Science Advisory Board's Integrated Nitrogen Committee, is developing a Nitrogen Road Map to foster intra- and inter-agency research collaboration. This road map will integrate reactive nitrogen (Nr)-related programs within USEPA and in partnership with other federal agencies, aiming to improve and organize programs around the nitrogen cascade.

This reactive nitrogen report will include a regionally focused effort on the nutrient problem in the MARB/Northern Gulf of Mexico. ORD, in collaboration with the Office of Water and Office of Air and Radiation, would develop decision support tools in three areas over a 5-year time frame: (1) models of environmental systems to address the environmental soundness of decisions; (2) models of ecosystem services (humankind benefit) and their response to changes in the environmental system to address the extent of social impact; and (3) frameworks/models to examine the sustainability of alternative futures to address the three components of sustainability. The ORD cross-program research would also coordinate with the Gulf Coast Ecosystem Restoration Council, Task Force efforts, and USEPA air and water programs to inform the modeling applications in partnership with USGS, USDA, and NOAA.

- USEPA's ORD has an **Advanced Nutrient Monitoring** (www.epa.gov/research/waterscience/water-nutrient-advanced.htm) project to enhance current monitoring activities, as well as provide cheaper and faster information on nutrients or other pollutants. Through this project, USEPA is studying monitoring technologies that will measure nutrient pollution in the air and water using satellites, portable and ground remote sensors, and measurement or model data.

An example of this kind of research is a 2011 study that evaluated the use of satellite measurements as a way to analyze water quality in Florida's coastal waters. Researchers compared 13 years of data from a satellite to measurements from field studies to see if the satellite's readings could be used to measure water quality. Results showed that this unique application of satellite data for monitoring water quality is effective and could be applied to other satellites and other coastal waters. USEPA plans to refine technical tools like this, which could greatly assist agencies addressing nutrient pollution as they track their reduction progress.

Other Initiatives

What other initiatives are federal agencies involved in that can help address nutrient pollution in the MARB and hypoxia in the Gulf of Mexico?

Task Force federal agencies are also involved in a number of other projects that help address nutrient pollution and improve water quality. These activities might not necessarily be directly related to the goals of the Task Force, but they are still important initiatives that can help in nutrient and hypoxia reduction efforts.

- Implementing the Gulf Ecosystem Restoration and the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies (RESTORE) Act:
 - In response to the Deepwater Horizon oil spill in 2010, federal agencies are engaged in several Gulf ecosystem restoration efforts that include mitigation of the hypoxic zone. Although the relationship between oil spills and nutrient pollution might not be immediately obvious, restoring the Gulf of Mexico to a healthier ecosystem after the spill includes addressing broader indicators of environmental well-being, such as increasing dissolved oxygen levels.
 - The Departments of the Interior, Commerce, Agriculture, and Homeland Security; the Secretary of the Army; and the Administrator of USEPA are actively participating as members of the Gulf Coast Ecosystem Restoration Council established by the RESTORE Act. This legislation was signed into law as part of the Moving Ahead for Progress in the 21st Century Act (Public Law 112-141). The Council's membership also includes the governors of Alabama, Florida, Louisiana, Mississippi, and Texas.

The RESTORE Act established a Gulf Coast Restoration Trust Fund in the Treasury of the United States. The fund consists of 80 percent of an amount equal to any administrative and civil penalties paid after the date of the RESTORE Act by the responsible parties in connection with the Deepwater Horizon oil spill. Money from this trust fund will likely be distributed to Gulf states for environmental restoration; it may also be used for ecosystem restoration science and observation, monitoring, and technology programs.

- The USACE, in partnership with Delta F.A.R.M. (Delta Farmers Advocating Resource Management), has promoted the following suites of conservation practices in the Mississippi delta to address the broadest range of resource concerns: pads/pipes/ winter flooding, on-farm storage, tailwater recovery, edge-of-field/farm treatments, nutrient management, and conservation cover/cover crops. Authorizing legislation from 1983 directs USACE and NRCS to work cooperatively toward the continuation of erosion, flood, and sediment control in the Yazoo Basin Hill Region. New technology



A cereal rye cover crop grows into corn stubble after harvest.

will continue to be developed, as will monitoring data, all of which will be made available through the project **website** (www.mvk.usace.army.mil/Missions/CivilWorks.aspx) and/or listed points of contact. On the website, scroll down to “Mississippi Delta Headwaters Project” for existing information and updates.

- The U.S. Fish and Wildlife Service (USFWS) is organizing projects around a Vision for a Healthy Gulf of Mexico Watershed to prioritize landscape-scale restoration using settlement funds from the 2010 Deepwater Horizon oil spill. Although distribution of the funds and restoration are focused on the five states bordering the Gulf of Mexico, USFWS recognizes the role of the entire Gulf watershed in promoting and protecting the health of the Gulf of Mexico ecosystem.

The next step for USFWS is to develop a *Blueprint for a Healthy Gulf of Mexico Watershed*, which is due by fall 2013. The *Blueprint* will offer recommendations to guide collaborative conservation planning and delivery to achieve large-scale Gulf and watershed restoration; support partnerships with states, communities, and the conservation network; and address the health of the Gulf. For example, the USDO-led Eastern Tallgrass Prairie and Big Rivers Landscape Conservation Cooperative (LCC) is coordinating efforts among seven LCCs in the MARB to develop a Gulf Hypoxia Incentive Program. The program would offer incentives for landowners to reduce nitrogen and other contributions to the hypoxic zone by adopting proven conservation practices and programs.

- NRCS is developing additional strategies to engage the agricultural industry in facilitating the increased use of technology related to nutrient management and improvement of soil health.
 - One effort to reduce nutrient loading is work between NRCS’ Agricultural Water Management Team, Agricultural Drainage Management Coalition, and others to accelerate the adoption of drainage water management practices in the Upper MARB. Improved drainage water management practices can help reduce nutrient runoff into local waterways.
 - NRCS is working to significantly increase producer adoption of soil health practices through partnerships with public and private groups. Soil health is the continued capability of the soil to function as a vital, living ecosystem that nurtures plants, animals, and humans with limited human intervention. Healthy soils that have increased natural nutrient cycling require less nutrient input to produce a crop. Healthy soils in equilibrium, or a steady state, have less weed pressure, needing fewer pesticides. Functioning soils increase carbon sequestration, water storage, and water infiltration, and they retain nutrients more effectively. These results not only have positive impacts on the environment by, for example, reducing nutrient losses from farm fields; these outcomes also help farmers become more resilient to natural disasters, such as droughts, and reduce costs for products like fertilizer and pesticides. Projects like these, which benefit both the farmer and the environment, will be very helpful in addressing nutrient pollution in the MARB.

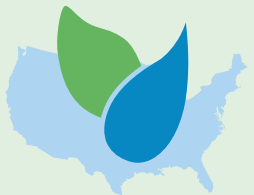
For More Information

This Strategy has provided an overview of the ongoing and future priorities and projects of the Task Force federal agencies. For more information on how federal agencies have supported the goals of the Task Force, including encouraging state nutrient reduction strategy development, recently and in the past, please refer to this document's appendix which can be found at http://water.epa.gov/type/watersheds/named/msbasin/nutrient_strategies.cfm.



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Red snapper live in the Gulf of Mexico and are an important commercial and recreational fish.



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

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