Moving Forward on Gulf Hypoxia

Annual Report 2009

Hypoxia Task Force

Comments from the Task Force

In accordance with Action 7 of the ***Gulf Hypoxia Action Plan 2008***, this is the first release of the Annual Report. The report is intended to track interim progress on the actions to reduce nitrogen and phosphorus accomplished in Fiscal Year 2009 by the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. The Annual Report is a means to identify and evaluate the effectiveness of programs and management efforts to reduce the Gulf of Mexico hypoxic zone.

"We are moving forward on Gulf hypoxia."

This report includes quantitative indicators (pages 4–7) that are based on currently available data to assess the outcomes of Task Force member organizations' activities. There is also a series of success stories (pages 8–15) that highlight some of the accomplishments of the state and federal member organizations.

Each year, a similar annual report will provide a means to better understand those efforts that are the most effective at reducing nutrient inputs, how effective they are, and how we can better target future actions.

Members of the Task Force

State Agencies

Arkansas Natural Resources Commission
Illinois Department of Agriculture
Iowa Department of Agriculture and Land Stewardship
Louisiana Governor's Office of Coastal Activities
Minnesota Pollution Control Agency
Mississippi Department of Environmental Quality
Missouri Department of Natural Resources
Ohio Department of Natural Resources
Tennessee Department of Agriculture
Wisconsin Department of Natural Resources

Federal Agencies

U.S. Army Corps of Engineers
U.S. Department of Agriculture
U.S. Department of Commerce (National Oceanic and Atmospheric Administration)
U.S. Department of the Interior (U.S. Geological Survey)
U.S. Environmental Protection Agency

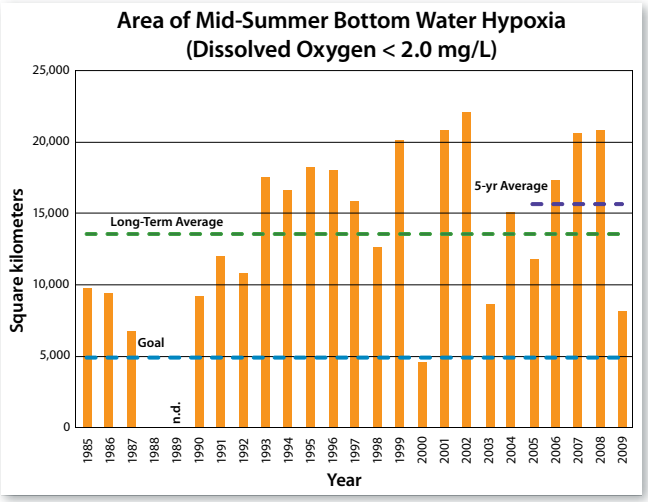
Task Force Actions

1. Complete and implement comprehensive nitrogen and phosphorus reduction strategies for states within the Mississippi/Atchafalaya River Basin encompassing watersheds with significant contributions of nitrogen and phosphorus to the surface waters of the Mississippi/Atchafalaya River Basin, and ultimately to the Gulf of Mexico.
2. Complete and implement comprehensive nitrogen and phosphorus reduction strategies for appropriate basin-wide programs and projects. Target first those programs and projects with significant federal lead or co-implementation responsibilities.
3. While developing comprehensive state and federal nitrogen and phosphorus reduction strategies and continuing current reduction efforts, examine and, where possible, implement opportunities to enhance protection of the Gulf and local water quality through existing federal and state water quality, water management, and conservation programs.
4. Develop and promote more efficient and cost-effective conservation practices and management practices for conserving nutrients within the Mississippi/Atchafalaya River Basin watershed and evaluate their effectiveness at all scales beginning with local watersheds and aggregating them up to the scale of the Mississippi/Atchafalaya River Basin.
5. Identify and, where possible, quantify the effects of the hypoxic zone on the economic, human and natural resources in the Mississippi/Atchafalaya River Basin and Northern Gulf of Mexico, including the benefits of actions to reduce nitrogen and phosphorus and the costs of alternative management strategies.
6. Coordinate, consolidate, and improve access to data collected by State and Federal agencies on Gulf Hypoxia and Mississippi/Atchafalaya River Basin program activities and results.
7. Track interim progress on the actions to reduce nitrogen and phosphorus by producing an annual report on federal and state program nutrient reduction activities and results.
8. Continue to reduce existing scientific uncertainties identified in the Science Advisory Board and MMR workgroup reports regarding source, fate, and transport of nitrogen and phosphorus in the surface waters of the Mississippi/Atchafalaya River Basin to continually improve the accuracy of management tools and efficacy of management strategies for nutrient reduction.
9. Continue to reduce uncertainty about the relationship between nitrogen and phosphorus loads and the formation, extent, duration, and severity of the hypoxic zone, to best monitor progress toward, and inform adaptive management of the Coastal Goal.
10. Promote effective communications to increase awareness of hypoxia and support the activities of the Task Force.
11. In five years (2013) reassess nitrogen and phosphorus load reductions, the response of the hypoxic zone, changes in water quality throughout the Mississippi/Atchafalaya River Basin, and the economic and social effects, including changes in land use and management, of the reductions in terms of the goals of this Action Plan. Evaluate how current policies and programs affect the management decisions made by industrial and agricultural producers, evaluate lessons learned, and determine appropriate actions to continue to implement or, if necessary, revise this strategy.

Indicators

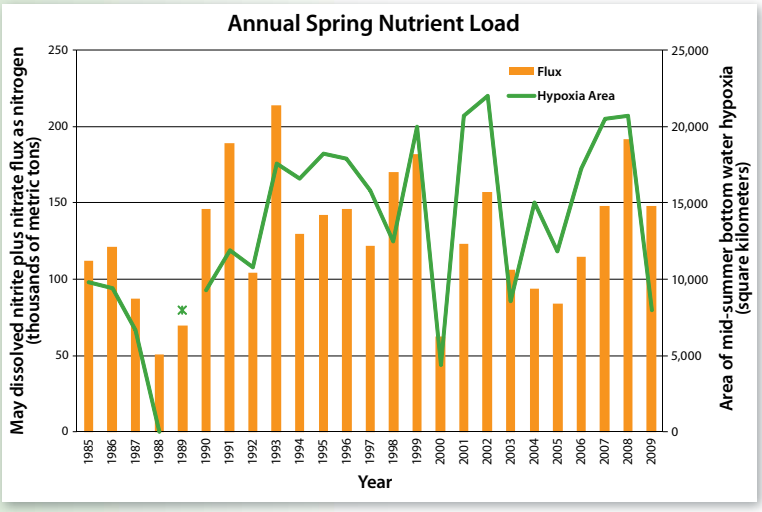
Extent and Severity of the Gulf of Mexico Hypoxic Zone

Hypoxic conditions result from complex interactions among climate, weather, basin morphology, circulation patterns, water retention times, freshwater inflows, stratification, mixing, and nutrient loadings. Nutrient fluxes from the Mississippi-Atchafalaya River Basin (MARB), coupled with temperature- and density-induced stratification, have been implicated as the primary cause of hypoxia in the northern Gulf of Mexico (NGOM). Variation in year-to-year inputs of both freshwater and nutrients from the MARB make it difficult to identify the relative importance of increased eutrophication versus increased stratification in any given year over the recent past.



Data sources: Nancy N. Rabalais, Louisiana Universities Marine Consortium, and R. Eugene Turner, Louisiana State University
Funding: NOAA, Center for Sponsored Coastal Ocean Research

In 2009 the size of the hypoxic zone in the NGOM was smaller than the predicted 19,300–21,900 square kilometers, but the hypoxia was severe in areas where it did occur, extending closer into surface waters than it has in most years since measurements began in 1985. At approximately 8,000 square kilometers, the size was likely due to unusual short-term weather patterns that re-oxygenated the northern Gulf waters, such as strong prevailing southwest winds and significant wave action during the sampling period. The smaller-than-average size might not have been due to a reduction in the underlying causes. The goal of the Mississippi River Gulf of Mexico Watershed Nutrient Task Force is to reduce the five-year running average size of the zone to less than about 5,000 square kilometers; the current five-year average (2005–2009) stands at 15,650 square kilometers, which is over three times the size of the goal. Monitoring the extent and severity of the hypoxic zone will continue annually.



May dissolved nitrite plus nitrate flux to the Gulf of Mexico and area of mid-summer bottom-water hypoxia (dissolved oxygen concentrations of less than 2 milligrams per liter) in the northern Gulf of Mexico.

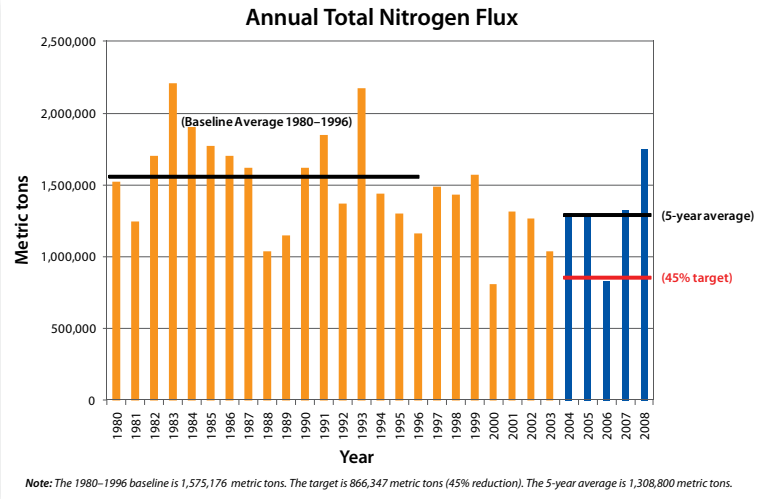
Data Sources: (1) USGS; (2) Nancy N. Rabalais, Louisiana Universities Marine Consortium, and R. Eugene Turner, Louisiana State University

Spring Nutrient Load

The amount of nutrients transported from the MARB to the Gulf during the spring is a major factor influencing the size of the hypoxic zone. Nutrients can come from many sources, such as fertilizers applied to agricultural fields, golf courses, and suburban lawns; atmospheric contributions; erosion of soils containing nutrients; and industrial and sewage treatment plant discharges. The amount of nutrients delivered to the Gulf each spring depends, in large part, on precipitation and the resulting amounts of nutrient runoff and streamflow in the MARB. Streamflows in spring 2009 were about 17% above the average flow over the last 30 years. The U.S. Geological Survey (USGS) estimated that 295,000 metric tons (in the form of nitrate) was delivered to the NGOM in April and May 2009, which was about 11% above the average nitrates delivered from 1979 to 2009.

Total Nitrogen Flux

The NGOM Action Plan calls for a 45% reduction by 2015 in the total nitrogen load delivered annually to the NGOM. The average load of nitrogen delivered to the NGOM from 1980 to 1996 was established as the baseline condition. The five-year average of the total nitrogen load from 2004 to 2008 is about 1.5 times the 45% reduction goal for 2015. There are numerous ongoing activities throughout the Mississippi River Basin designed to reduce the amount of nutrients delivered to the NGOM, but additional resources will be needed to implement nutrient reduction strategies throughout the basin to meet the established goal.

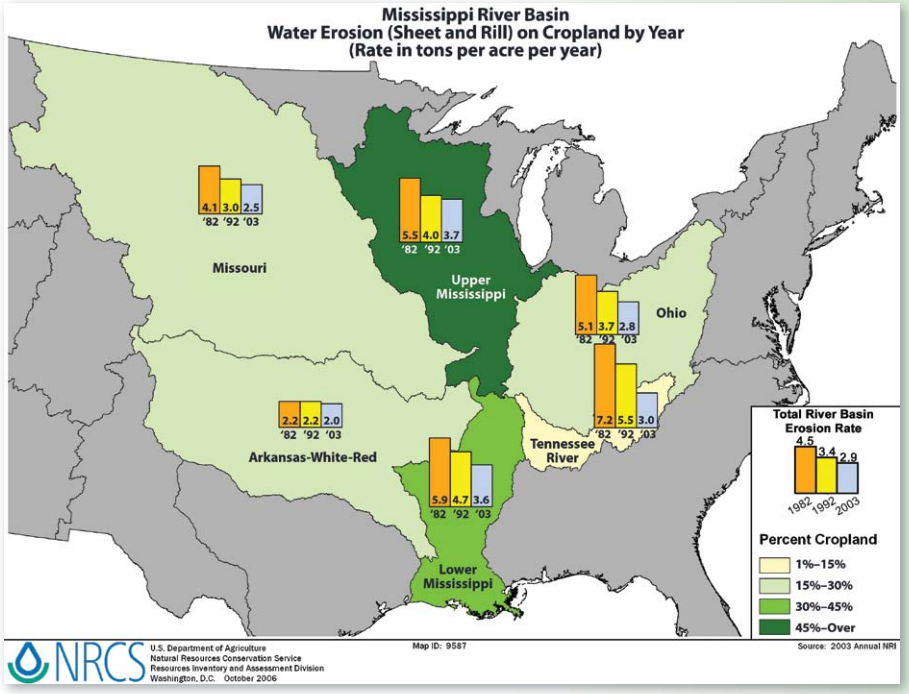


Data Source: Aulenbach and others, 2009

Water Erosion of Soil on Cropland*

Although the loss of soil is a natural process, the rate at which it occurs can be increased by some types of human land uses, including the agricultural production of crops. Soil erosion involves the breakdown, detachment, transport, and redistribution of soil particles by the forces of water, wind, or gravity. Soil erosion on cropland is an important indicator that can be used to shed light on on-site impacts on soil quality and crop productivity and downstream impacts on water quality and biological activity.

- Total erosion amounts continue to decline across all major river basins with the most significant reductions occurring in the Missouri and Upper Mississippi river basins.
- Erosion rates on a per-acre basis declined significantly between 1982 and 2003 in the Mississippi River Basin. Water (sheet and rill) erosion on cropland dropped from 4.5 tons per acre per year in 1982 to 2.9 tons per acre per year in 2003.
- Soil erosion rates will continue to be measured and will be reported every two years (starting with 2007).



Data Source: National Resources Inventory, USDA NRCS

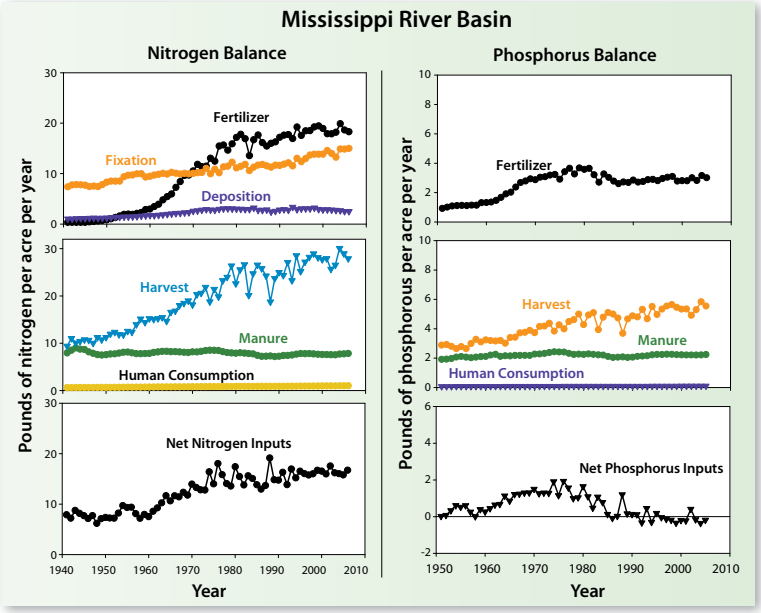
Note: The conservation practices developed by USDA are designed to address one or more resource concerns. Their design specifications and benefits are described in the ***National Handbook of Conservation Practices*** (NHCP) available at *www.nrcs.usda.gov/technical/Standards/nhcp.html*. Conservation practice data are summarized from the Natural Resources Conservation Service (NRCS) Performance Results System (PRS) for the Mississippi River Basin. Results are provided by year and by two-digit hydrologic unit code (HUC) for each conservation practice group. Practice data are updated annually. Practice data for FY2000–FY2008 are included for nutrient management and wetlands and for FY2005–FY2008 for erosion control practices.

* *Indicators marked with an asterisk are more relevant to phosphorus loading in the Gulf because phosphorus binds to soil particles, which are transported into the MARB through soil erosion.*

Indicators *(continued)*

Nutrient Mass Balances

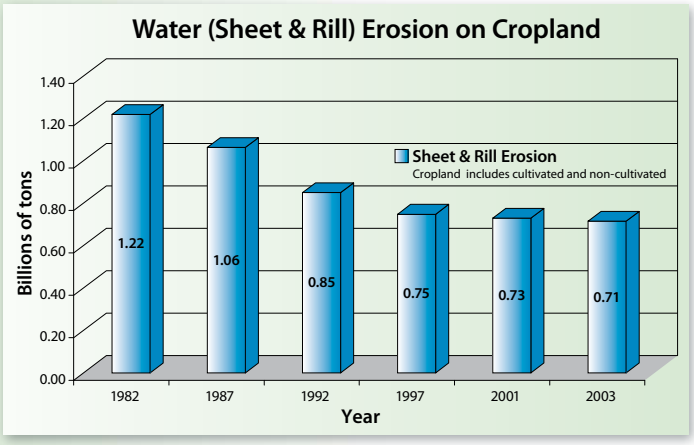
The mass balances account for all nutrient inputs and outputs from the MARB. The balances show that for the entire basin, the net nitrogen inputs have been steady during the past 10–15 years, despite increasing crop harvests. This is thought to be due primarily to declining corn protein concentrations. In the upper MARB, where net nitrogen inputs are largest, there has been a steady but small decrease in net inputs. However, mainly because of the change in corn protein now included in these balances, the decrease is not as great as previously estimated. The net nitrogen might be subject to denitrification or leaching losses or added to the soil nitrogen pool. For the basin, net phosphorus inputs are now about zero (inputs are equal to outputs), whereas in the upper MARB net phosphorus inputs are negative. This suggests utilization of previously added fertilizer phosphorus likely stored in soils.



Data Source: Mark David, University of Illinois at Urbana-Champaign

Erosion Data*

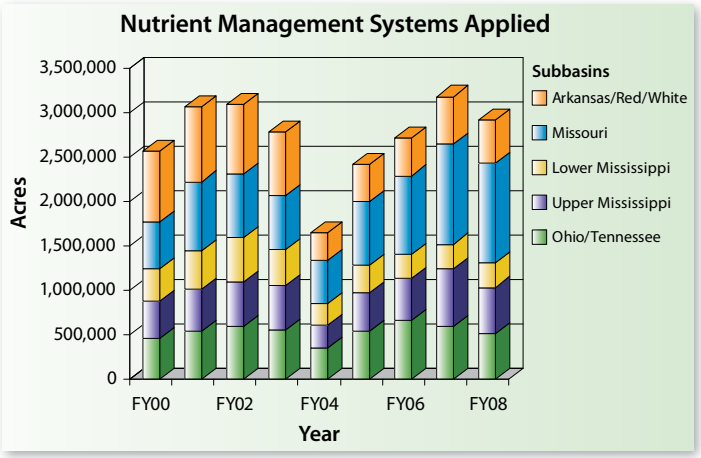
Erosion data are provided from the National Resources Inventory (NRI), a statistical survey of natural resource conditions and trends on non-federal land in the United States. Between 1982 and 2003, soil erosion on cropland within the MRB decreased 42%. Water (sheet and rill) erosion on cropland in 2003 was down to 710 million tons per year.



Data Source: USDA

Nutrient Management Systems Applied

Nutrient management consists of managing the amount, source, placement, form, and timing of the application of plant nutrients and soil amendments. Twenty-four million acres of land have come under nutrient management systems within the MARB since 2000.

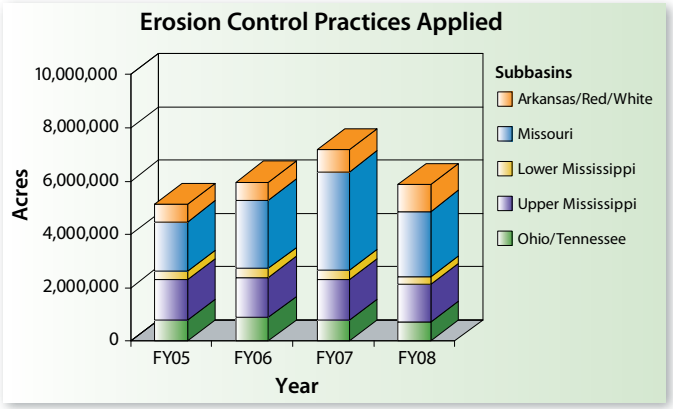


Data Source: USDA

* *Indicators marked with an asterick are more relevant to phosphorus loading in the Gulf because phosphorus binds to soil particles, which are transported into the MARB through soil erosion.*

Erosion Control Practices

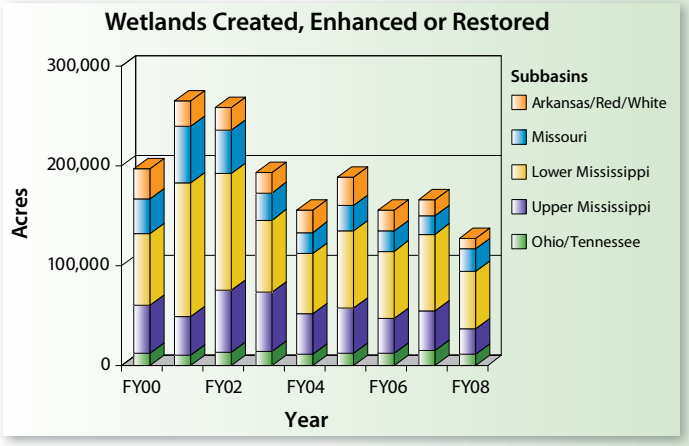
Erosion control practices associated with crop production help to reduce the potential of off-site impacts from sheet and rill erosion while improving soil fertility, soil health, and sustainable crop production. Data on crop erosion have been collected since FY2005 when phosphorus was identified as a nutrient of concern associated with Gulf hypoxia. Conservation practices were applied to twenty-four million acres of land for erosion control from FY2000 to FY2008.



Data Source: USDA

Wetlands Created, Enhanced, or Restored

Wetlands provide quality habitat for migratory birds and other wildlife, protect water quality, and reduce flood damages. Within the MARB, 1.7 million acres of wetlands have been created, restored, or enhanced since 2000.



Data Source: USDA

Acknowledgements

Mark David, University of Illinois at Urbana-Champaign

Jeff Goebel, USDA NRCS

Dennis McKenna, Illinois Department of Agriculture

Michael Sullivan, Mississippi River Basin Coordinator, USDA NRCS

Michael Woodside, Supervisory Hydrologist, USGS

Additional Indicators

The Task Force will incorporate data on additional indicators into future versions of the Annual Report. The relevant indicators will include:

- Number of completed state-level nitrogen and phosphorus reduction strategies
- Number of federal programs with nitrogen and phosphorus strategies completed
- Total Maximum Daily Loads (TMDLs) established for nutrients
- Vegetative or forested buffers established along rivers and streams of priority watersheds.

Success Stories

Success Stories

This section features a series of success stories to highlight several of the many contributions addressing Gulf of Mexico hypoxia. Additional accounts can be found online at the Task Force Web site at *www.epa.gov/msbasin/success_stories.htm*.

Missouri Develops Programs for Hypoxia

Situation

Nitrogen is a significant, if not the predominant, driver contributing to Gulf of Mexico hypoxia. The factors that lead to nitrogen loading in the Mississippi River Basin are complex and dynamic, but it is clear that post-harvest residual nitrogen in agricultural fields could be one route for losses to surface waters. Soil fertility experts long have tried to refine nitrogen fertilizer application to match crop uptake patterns and avoid leaving unused fertilizer in the soil. However, this requires predicting crop growth early, usually before the crop is even planted. Making such predictions has proven difficult because crop growth varies widely from year to year and even within a single field.

Hagie equipped with coulters and rigid injection of liquid urea ammonium nitrate. Adequate clearance ranges from 1.5 to about 5.5 feet.

Approach

Several universities and commercial groups are working to develop in-season crop growth sensors that can determine a fertilizer application rate by the intensity of the green color of the crop canopy. The sensors are mounted on high-clearance fertilizer applicators, and the rate is determined on the go—that is, green color is sensed at the front of the implement and the correct amount of nitrogen is applied immediately.

Summary of Missouri On-Farm Demonstrations in 2004-2007
(Based on $4.00/Bushel Corn and $0.50/lb Nitrogen)

	Average Corn Yield (Bushels/Acre)	Average lbs of Nitrogen/Acre
Producer's "Normal" Nitrogen Rate	157	145
Variable-Rate Nitrogen Based on Corn Canopy Color	156.5	123
$ Lost or Gained When Using Canopy Color	-$2.00	$11.00

A summary of more than 40 on-farm demonstrations in Missouri showed that the field-average nitrogen fertilizer rate could be substantially reduced while maintaining the same corn yield by using leaf canopy color sensing. This should result in less soil residual nitrogen available for loss to surface water.

EQIP Implementation

The University of Missouri received a national Conservation Innovation Grant to develop procedures for crop canopy color-sensing technology in Missouri. In FY2007 the Missouri Environmental Quality Incentives Program (EQIP) policy added a nutrient management incentive (under Clean Water Act section 590) for precision nitrogen management using crop color sensing. An Agronomy Technical Note provides guidance for implementing this incentive activity.

Success story provided by Bob Ball, Karen Brinkman, Glenn Davis, Dwaine Gelnar, and Peter Scharf

Indiana EQIP Promotes Conservation Cropping Systems

In response to continuing concerns about water quality, energy, fossil fuels, and agricultural input costs, Indiana has made a significant investment in promoting Conservation Cropping Systems (no-till + nutrient management + cover crops + buffers, implemented together as a system), and the message is making enough sense to Indiana producers that many of them are applying the system on their farms.

Conservation Cropping Systems capture and sequester nitrogen, phosphorus, and carbon in the soil, while reducing total inputs in terms of fuel and nutrients in row crop production systems. The net result is a substantial reduction in losses of these nutrients to the water and atmosphere. Because these essential compounds are still on the fields, producers benefit.

Tom Kaspar, USDA ARS

In a Purdue University study, Dr. Eileen Kladivko found that nitrate concentrations in tile drainage water dropped from over 30 milligrams per liter to under 10 milligrams per liter when a system of nutrient management, no-till, crop rotation, and cover crops was implemented. In a four-year study (2002–2005), Dr. Tom Kaspar, at the USDA Agricultural Research Service (ARS) Soil Tilth Lab in Ames, Iowa, found annual reductions in nitrate losses through drainage tile of 20–40 pounds per acre achieved by using a winter cover crop.

USDA NRCS

In both 2008 and 2009, Indiana obligated over 50% ($16.9 million) of each fiscal year's EQIP allocation toward Conservation Cropping Systems practices. With NRCS and its partners focusing their technical assistance and funding to help farmers get through the difficult entry phase of managing these cropping systems, there will be tremendous environmental and societal benefits. This approach will also serve NRCS well when dealing with regional issues such as the Gulf of Mexico hypoxia and Great Lakes initiatives.

Success story provided by Shannon Zezula and Barry Fisher

USDA NRCS

Pictures top to bottom: cover crop, no-till corn, grassed buffer strips.

Bioreactor Reduces Nitrate Discharge to Downstream Ecosystems

Scientists at USDA ARS are finding ways to stem the flow of nitrates that are washed out of crop fields and into regional surface water and groundwater sources. These nitrates come primarily from nitrogen fertilizers that are not taken up by crops. After the nitrates are flushed from the soil, they flow into subsurface tile drains that channel excess water away from crop fields. But these underground drains can facilitate the eventual passage of nitrate-laden runoff into the Gulf of Mexico, the Chesapeake Bay, and other water bodies. When the runoff enters these areas, it can intensify the development of hypoxia.

ARS research leader Patrick Hunt, agricultural engineer Kenneth Stone, and soil scientist Matias Vanotti developed a process for denitrifying nitrate-laden runoff in subsurface drains before the runoff reaches sensitive aquatic ecosystems downstream. They cultured and encapsulated denitrifying bacteria in polymer gels and verified their denitrification rates. The resulting product was called "immobilized denitrification sludge," or IDS. They then devised a bioreactor by placing the IDS in a small reactor cylinder. The team tested the bioreactor in the field, where nitrate concentrations in runoff averaged 7.8 milligrams per liter.

Hunt and ARS environmental engineer Kyoung Ro determined that the hydraulic retention time (HRT)—how long the field drainage water remained in the bioreactor—was crucial in the denitrification process. With a one-hour HRT, 50% of the nitrogen was removed from the runoff. When the HRT was increased to more than 8 hours, the nitrate removal efficiency approached 100%.

The team concluded that the daily nitrate removal rate of a one-cubic-meter bioreactor would be approximately 94 grams per square meter of nitrate from field runoff. This is significantly higher than the removal rates reported for in-stream wetlands, treatment wetlands, or wood-based bioreactors.

Success story provided by Ann Perry, USDA ARS

USDA NRCS

Runoff from a heavy rain carries topsoil and nutrients from a crop field.

Marathon Receives Louisiana Environmental Leadership Program Special Recognition Award

The Marathon Petroleum Company's Louisiana Refining Division (Garyville, Louisiana) was recently awarded the Environmental Leadership Program Special Recognition Award for nitrate reduction to the Mississippi River by the Louisiana Department of Environmental Quality. Marathon recently expanded the capacity of its Louisiana refinery and now ranks among the top five refineries nationwide. This and other industry nutrient reduction activities are a part of the Louisiana Annual Operating Plan and Nutrient Reduction Strategy.

Marathon received the award when it brought the project online with no increase in permitted effluent limits. At the same time, the expanded refinery will be totally self-sufficient for water supply and for waste treatment and disposal. The site's waste water treatment plant modifications include the installation of a biological reactor train, consisting of an induced gas flow unit, a closed-circuit cooling tower, an advent integrated system (AIS), biological reactor, and integral clarifier. These biological reactors have the ability to remove 85%–90% of dissolved nitrates, a common nutrient in treated refinery effluent.

Success story provided by Dugan Sabins, Louisiana Department of Environmental Quality

Pictured left to right:
Jody Amedee, Chair of the Louisiana State Senate Environmental Quality Committee;
Rich Bedell, Manager, Louisiana Refining Division, Marathon Petroleum Company;
Wally Dows, Environmental, Safety and Security Manager, Louisiana Refining Division, Marathon Petroleum Company;
Dr. Harold Leggett, Secretary, Louisiana Department of Environmental Quality.

New Tool Fertilizes Fields and Reduces Runoff Nutrients

A new field tool developed by USDA ARS scientists applies poultry litter to fields in shallow bands, reducing runoff of excess phosphorus and nitrogen. Poultry litter (a combination of poultry manure and bedding material, such as pine shavings or peanut or rice hulls) is a natural fertilizer. The conventional method of applying it to fields uses a broadcast spreader, which scatters the litter across the soil surface. Because the litter rests on top of the soil, it is vulnerable to runoff in heavy rains.

A new tool developed by ARS agricultural engineer Thomas Way and his colleagues at the agency's National Soil Dynamics Laboratory in Auburn, Alabama, offers a solution. The tool

digs shallow trenches about two to three inches deep in the soil. It then places the poultry litter in the trenches and covers it with soil. Burying the litter significantly reduces the risk of runoff. Designed to attach to a tractor, the litter applicator can dig four trenches as it is pulled through the field. Collaborators in six states have used Way's litter applicator in their research, with positive results. In one project, Way worked with Dan Pote, a soil scientist at the ARS Dale Bumpers Small Farms Research Center in Booneville, Arkansas. The scientists applied the litter to Bermuda grass forage plots and then watered the field with a rainfall simulator. When the litter was applied with Way's new tool, phosphorus and nitrogen runoff were 80%–95% lower than when the litter was applied in the conventional manner.

USDA NRCS

Chicken litter being loaded into spreader truck.

USDA NRCS

Poultry litter, which is a source of nutrients to water bodies, is vulnerable to erosion when applied to fields.

Way also has collaborated with ARS scientists throughout the country to examine the tool's effectiveness with different crops. They used the new implement in experiments in corn fields in Alabama, Kentucky, and Maryland; cotton fields in Mississippi and Georgia; and Bermuda grass and tall fescue stands in Alabama. Their results showed that the new tool has the potential to reduce water pollution significantly when used to apply poultry litter to a variety of crops. Now ARS is pursuing a patent and seeking companies to manufacture and market the litter applicator.

Success story provided by Laura McGinnis, USDA ARS

Stakeholder Collaboration Leads to Completion of Hypoxia Monitoring Implementation Plan

In early 2007, NOAA convened a Gulf Hypoxia Monitoring Summit following recognition that improved monitoring would be required to sufficiently assess progress toward the ***Gulf Hypoxia Action Plan 2008's*** Coastal Goal to reduce the size of the hypoxic zone. This summit resulted in a framework for improved monitoring and a commitment by NOAA and its partners to develop a detailed strategy for increased and coordinated monitoring of hypoxia in the northern Gulf. Following the summit, this collaborative effort resulted in the completion of the ***Gulf Hypoxia Monitoring Implementation Plan*** in early 2009. The implementation plan provides a multistep, tiered approach to improve monitoring and includes detailed core monitoring system requirements, details for expanded observing systems, and needs for advancing the understanding of hypoxia causes and impacts. It also contains specific direction for improved data availability and outreach. Several federal and state partners have committed to implementing many of the system requirements of the plan, representing strong success in advancing research and management efforts toward hypoxia mitigation.

Success story provided by NOAA

Ohio Watershed Coordinator Grant Program Report Highlights Successes

Northeast Ohio Four County Regional Planning & Development Organization

Since 2000 Ohio has worked aggressively to develop a robust watershed management infrastructure throughout the state. This effort was facilitated by legislation enacted that year, which provided funds to Ohio EPA, Ohio State University Extension, and Ohio Department of Natural Resources (ODNR) to assess water quality, develop outreach and training programs, and provide technical support.

A major linchpin in the Ohio watershed program is the Ohio Watershed Coordinator Grant Program administered by ODNR's Division of Soil and Water Resources. The program provides locally matched state and federal grant dollars to employ "watershed coordinators." These watershed professionals organize local stakeholders to develop and implement watershed action plans, which are endorsed and receive priority for state and federal funds for implementation.

2008 Annual Report: Ohio Watershed Coordinator Grant Program showcases the success watershed coordinators have achieved in the 2008 calendar year and cumulatively since the program began in 2000.

- $76 million in grants and other funds leveraged for watershed projects since 2001
- 42 watershed partnerships supported since 2000
- 42 state-endorsed watershed action plans developed since 2000
- Over 1 million pounds per year of nitrogen loadings reduced by implementing watershed action plans statewide in 2008 alone.

The entire report can be downloaded from the following Web site:
www.dnr.state.oh.us/soilandwater/water/watershedprograms/default/tabid/9192/Default.aspx

Success story provided by Ohio Watershed Coordinator Grant Program

EPA Awards $3.7 Million in Water Quality Trading Funding

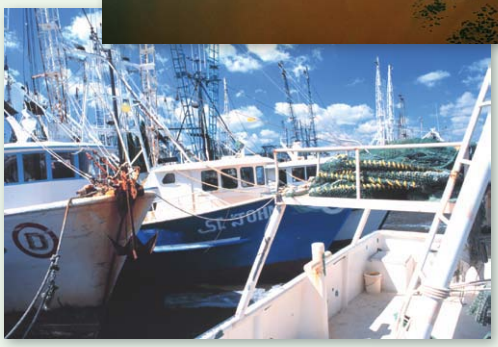
EPA has awarded $3.7 million through its Targeted Watersheds Grants Program (*www.epa.gov/OWOW/watershed/initiative*), which focuses on water quality trading or other market-based water quality projects to reduce nitrogen, phosphorus, sediment, or other pollutant loadings that cause low oxygen levels. Established in 2003, the Targeted Watersheds Grants Program is designed to encourage successful community-based approaches and management techniques to protect and restore the nation's watersheds. The projects are located in the three Mississippi River subbasins with the highest nutrient loads contributing to hypoxia in the Northern Gulf of Mexico—the Ohio River, the Upper Mississippi River, and the Lower Mississippi River. The recipients of the grants include leading organizations, each involving a broad array of stakeholders and members, including those from academia, local and state governments, tribes, and nonprofit organizations.

Success story provided by EPA

NOAA Awards $2.4 Million to Refine Management Strategies in the Gulf

In support of science needs identified in the ***Gulf Hypoxia Action Plan 2008***, NOAA has renewed its commitment to the NGOM by awarding $2.4 million in the first year of a $12 million, multiyear research investment. Although sufficient understanding of the hypoxic zone exists to take action now to reduce nutrient inputs, this research investment will answer critical questions that have recently emerged and allow for refined management and mitigation strategies. Scientists from two of the projects will collaborate closely to define more precisely when, where, and how hypoxia develops in response to nutrient loads and other factors. An additional three projects will focus on improving the understanding of the impacts of the hypoxic zone on the communities and living resources of the northern Gulf. These studies include an economic analysis of how the hypoxic zone affects the shrimp fishery in the NGOM, the development of models to forecast how the populations of important fish species will respond to changes in nutrient pollution and the hypoxic zone, and an in-depth analysis of the reproductive effects on Atlantic croaker fish populations. This investment will position the Task Force to make informed decisions when management strategies are reviewed in 2013.

USACE



NOAA

Success story provided by NOAA

Mississippi River Gulf of Mexico Watershed Nutrient Task Force

U.S. Environmental Protection Agency
Office of Wetlands, Oceans, and Watersheds (4501T)
1200 Pennsylvania Avenue, NW, Washington, DC 20460
E-mail: *ow-hypoxia@epa.gov*; Web site: *www.epa.gov/msbasin*