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Actions to Advance the Science, Track Progress and Raise Awareness



The Task Force identified other actions to achieve its goals and improve awareness of the efforts to address hypoxia in the Gulf of Mexico. These actions will improve the effectiveness of nutrient reduction and track and report on the results of the effort. The actions emphasize the crosscutting nature of the problem and recognize the diversity of activities that must be undertaken to achieve the goals and the need to track and respond to progress.

These additional actions advance the adaptive management approach and periodically reassesses the state of the science, keep track of progress of both environmental measures and programmatic actions, and seek to continually engage involved stakeholders in order to maximize results. Since the *2001 Action Plan*, researchers have advanced the understanding of nutrient transport and fate in the Mississippi/Atchafalaya River Basin and the consequences on Mississippi/Atchafalaya

River Basin water quality and the Northern Gulf of Mexico's hypoxic zone. States and Federal agencies will seek to further advance science in the priority needs recommended in the MMR workgroup and Science Advisory Board reports. Furthermore, effective implementation of this Action Plan will require monitoring and tracking progress. Finally, the *2008 Action Plan* is the result of several years of study and discussion by the members of the Task Force and many concerned officials, organizations, and citizens who participated in the deliberations. Given the cooperative and voluntary nature of the *2008 Action Plan*, its implementation will be dependent upon broad acceptance and a willingness to pursue the identified actions. The engagement of stakeholders will continue to be a priority.

The following actions implement the principle of adaptive management for this strategy.



This aerial photo shows the channelization of the Mississippi River and the loss of coastal wetlands.

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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.

WHY DO THIS?

Understanding the most efficient and cost-effective conservation practices and management practices to reduce nutrient loads is central to the success of nutrient reduction strategies. Federal and State agencies and other partners need to be able to identify effective management practices and technologies, including conservation practices and wastewater treatment at the local scale, and large scale federal approaches to enhance the biological removal of nutrients. We also need to incorporate changing contexts in conservation practices and management practices and accurately assess the economic costs and benefits of different approaches.

WHO WILL TAKE THE LEAD?

USDA (Agricultural Resource Service, Cooperative State Research, Education, and Extension Service, NRCS, Farm Service Agency), Mississippi/Atchafalaya River Basin States, USACE

WHO ELSE WILL HELP?

EPA, USGS

HOW DO WE DO THIS?

- 1** Continue to develop field and farm scale management practices that conserve nutrients for the wide range of agricultural production systems within the Mississippi/Atchafalaya River Basin;
- 2** Quantify the effectiveness of conservation practices within local watersheds that are representative of the wide range of soils, climates, and farming systems within the Mississippi/Atchafalaya River Basin;
- 3** Review, update, or develop USDA NRCS national and state conservation practice standards for the practices most effective in conserving nutrients;

- 4 Assist State Extension, USDA personnel and agricultural consultants in delivering nutrient-conserving practices to farmers and ranchers within the Mississippi/Atchafalaya River Basin; and
- 5 Further analyze nutrient pollution contributions from point sources and non-agricultural sectors, including a full analysis of costs; target cost-effective actions to reduce nutrient loads from point sources as warranted.

WHAT ARE THE CRITICAL NEEDS?

- Obtain resources necessary to quantify at the watershed scale the efficacy of newly evolving nutrient control strategies proven effective at plot and field scales to ensure that these strategies produce equivalent benefits at the landscape scale.
- Obtain resources necessary to use the Conservation Effects Assessment Project (CEAP) Watershed Network to monitor and assess how changes in agricultural practices driven by future market and other forces may affect efforts outlined above to reduce nitrogen and phosphorus inputs to the

Gulf of Mexico. Progress toward reducing nutrient loads from agricultural lands could be assessed annually.

- Obtain resources and priority for the development and implementation of strategies to use National Resources Inventory (NRI)/CEAP for monitoring progress in reducing nutrient loads from agricultural land management activities, to provide 5–10 year estimates with trends.
- It will be difficult to achieve the necessary nutrient reductions utilizing current technologies and with current cropping practices in the Corn Belt. New scientific findings and technology development will likely be needed.

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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.

WHY DO THIS?

Researchers have greatly expanded our understanding of the effects of hypoxia. However much uncertainty remains, specifically concerning the indirect biological and socioeconomic effects of hypoxia and excess nutrients throughout the Mississippi/Atchafalaya River Basin and on the Gulf.

As State and Federal agencies, and other partners make progress reducing nutrient loads within the Basin, we need to better understand the changes that are occurring, their effects on the ecosystem and its economic resources, the costs and benefits of seeking additional reductions in loads throughout the Basin, and the additional effects that reductions in nitrogen and phosphorus may have on the economic and social welfare of the Mississippi/Atchafalaya River Basin.

Research into the impacts of the hypoxic zone on living resources is authorized through the Harmful Algal Bloom and

Hypoxia Research and Control Act. Within the Gulf ecosystem there is evidence that an ecological regime shift, associated with the expansion of hypoxia in the Northern Gulf of Mexico, has occurred. Effects of the hypoxic zone on fisheries and ecologically important species are often likely to be indirect and difficult to measure. Spatially-explicit ecosystem models are needed to quantify these indirect effects and their consequences on fisheries and ecologically important populations. Economic analysis of these impacts will improve resource assessments and help to better quantify the socioeconomic benefits of nutrient reduction achievements in the Mississippi/Atchafalaya River Basin.

WHO WILL TAKE THE LEAD?

USDA, NOAA, USACE, EPA

WHO ELSE WILL HELP?

DOI, Mississippi/Atchafalaya River Basin States

HOW DO WE DO THIS?

- 1 Conduct an economic assessment of alternative options for reducing nutrient loads;
- 2 Identify and assess the ancillary environmental effects of the alternative options for reducing nutrient loads;
- 3 Improve quantification of the indirect effects of hypoxia on living resources, especially those related to interactions with additional stressors (e.g., fishing and climate change), to inform model development and management strategies;
- 4 Quantify the socioeconomic effects of hypoxia on coastal communities along the Northern Gulf of Mexico, especially impacts to commercial and recreational fisheries;
- 5 Quantify the socioeconomic effects on basin states from implementation of practices that will be required to meet the nutrient reduction goals of the Action Plan; and
- 6 Track progress to support future science assessments.

WHAT ARE THE CRITICAL NEEDS?

- Continued resource allocation for a USDA Hypoxia Economic Analysis to assess the socioeconomic and bioeconomic implications of varying nutrient management scenarios.
- Expansion of resources for ecological impact studies on commercially and ecologically important species, such as those funded by NOAA's Northern Gulf of Mexico Ecosystems and Hypoxia Assessment Program, to advance model capabilities that predict the impacts of hypoxia.
- Coordination and expansion of faunal monitoring surveys, such as SEAMAP, with increased resource allocations for fishery-independent data on commercially and ecologically important fish and shellfish species.
- Quantified nutrient loading thresholds and corresponding ecological responses to determine the magnitude of ecological system resiliency (i.e., point of regime change) within the northern Gulf.



Hypoxia is one of many ecological stressors that can affect Gulf fisheries and consequently fishing communities.



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.

WHY DO THIS?

Currently many agencies are independently collecting, storing, and reporting information on progress and activities. The Task Force has committed to ensure that data collection methodologies are better described to aid reporting and ensure data comparability. In particular, some significant sources are not consistently collected or reported, leading to misunderstandings of their contributions to the total load to the Basin and Gulf.

WHO WILL TAKE THE LEAD?

EPA, USGS, NOAA

WHO ELSE WILL HELP?

USACE, Mississippi/Atchafalaya River Basin States, Sub-basin Committees, Upper Mississippi River Basin Association, Lower Mississippi River Conservation Committee, Ohio River Valley Sanitation Commission, Gulf Alliance

HOW DO WE DO THIS?

- 1** Define information needs and design a strategy to satisfy those needs in a comprehensive and interdisciplinary manner that brings scientists and resource managers together from a range of disciplines and perspectives, including from Gulf and Basin perspectives;
- 2** Gather and disseminate needed scientific information in a manner that is cost-effective, takes advantage of all existing activities, and explains the practical value of synergies gained from actions taken to address both local water quality and the quality of receiving waters;
- 3** Provide information gathered from monitoring, modeling, and research related to Gulf hypoxia, Basin water quality, and social and economic factors in a form and a timeframe that feed directly into complementary scientific

interpretations, management planning, and implementation; and

- 4 Share, among scientists and managers, all information relevant to improving research and management decision-making, including those decisions that are directed primarily at other issues indirectly related to hypoxia, but also contribute to achieving the goals of the Action Plan.

WHAT ARE THE CRITICAL NEEDS?

Current activities are unlikely to resolve serious inconsistencies or provide additional data from unmonitored sources. Additional work is needed to define processes for acquiring, documenting, storing, and accessing

data. Particularly, we need to develop and implement programs to measure nitrogen and phosphorus discharges from non-agricultural sources for which data are not currently collected, such as municipal water treatment systems, and industrial, urban wet-weather, and air deposition sources. We also need to develop and implement strategies for using NRI/CEAP to monitor progress regarding reducing nutrient loads from agricultural land management activities. We need to design and implement a coordinated, ongoing state and federal sustainable monitoring program as recommended in the MMR workgroup report for the hypoxic zone and for the fresh waters of the Mississippi/Atchafalaya River Basin that would allow comprehensive temporal and spatial data acquisition to assess progress.



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.

WHY DO THIS?

There remain serious gaps in our ability to track and evaluate the effectiveness of programs and management efforts and their interactions in reducing the hypoxic zone. More attention should be paid and resources expended on improving the understanding of which efforts are the most effective, and how effective they are, so we can better design and target future actions.

WHO WILL TAKE THE LEAD?

EPA

WHO ELSE WILL HELP?

Mississippi River/Gulf of Mexico Watershed Nutrient Coordinating Committee, USDA (NRCS)

HOW DO WE DO THIS?

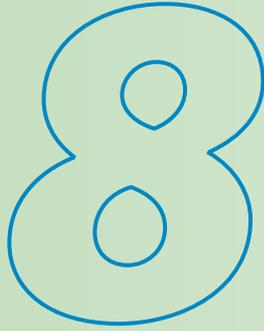
- 1** Identify existing methods that can quantify the results of the existing suite of best management practices and conservation practices, and adapt or modify these methods to quantify best management practices and conservation practices used in the Mississippi/Atchafalaya River Basin that will impact hypoxia;
- 2** Coordinate with NRCS to collect state and federal implementation data; and
- 3** Use data to annually evaluate the effectiveness of programs and management efforts.

WHAT ARE THE CRITICAL NEEDS?

- Consistent data that is standardized across programs.
- Authority and staff, financial or in-kind support.



The sediment plume from the Mississippi River is clearly delineated in the Gulf of Mexico.



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.

WHY DO THIS?

Gaps still exist in the science surrounding source, fate and transport of nitrogen and phosphorus in the Mississippi/Atchafalaya River Basin. Eliminating these gaps is essential to the creation and implementation of effective nutrient reduction strategies.

WHO WILL TAKE THE LEAD?

USGS

WHO ELSE WILL HELP?

USDA, EPA, USACE, Mississippi/Atchafalaya River Basin States

HOW DO WE DO THIS?

- 1** Evaluate and rank the scientific uncertainties and monitoring needs identified in the MMR workgroup report, the Science Advisory Board report, and other information;
- 2** Develop and implement a long term research and monitoring strategy under the MMR Workgroup of the Coordinating Committee with greater emphasis on the spatial and temporal characteristics of nutrient source, fate, and transport in watersheds throughout the Mississippi/Atchafalaya River Basin;
- 3** Reduce uncertainties associated with predictive models allowing for improved adaptive management capabilities;

- 4 Integrate monitoring, modeling, and experimental results to understand the impacts of management actions on the spatial and temporal characteristics of nutrients in watersheds throughout the Mississippi/Atchafalaya River Basin; and
- 5 Track progress to support future science assessments.

WHAT ARE THE CRITICAL NEEDS?

- Supplement existing monitoring efforts including emphasis for additional monitoring on smaller rivers and streams to enable an understanding of the sources of nutrients, processes that affect nutrient loading, and ways to reduce nutrient loading.
- Further analysis of nutrient pollution contributions from point sources and non-agricultural sectors, including a full analysis of costs.



A USGS employee servicing equipment at a USGS gaging station on the Mississippi River, Baton Rouge, Louisiana.



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.

WHY DO THIS?

Researchers have greatly expanded our understanding of the physical dynamics of the Gulf of Mexico and the causes of hypoxia, providing additional evidence that supports the strategy to reduce the size of the hypoxic zone by reducing nutrient loading to the Gulf. However, improved characterization of nutrient load and hypoxic zone properties is needed to further refine management strategies. As State and Federal agencies and other partners make progress at reducing nutrient loads, improved precision in understanding the effects of a dual nutrient strategy for the hypoxic zone is needed to best inform quantitative load reduction goals that will be required to reach the Coastal Goal. Improvements in hypoxic zone monitoring are needed to better characterize its magnitude and the processes that lead to its development, maintenance, and distribution as well as its impacts. Greater temporal and spatial coverage in monitoring efforts are needed to account for variability and pre-cruise storm events, define boundaries, characterize seasonality,

and support modeling efforts. Improvements are needed in the accuracy of models forecasting the quantitative association between biological, chemical, and physical processes, and hypoxia development, magnitude, and extent.

WHO WILL TAKE THE LEAD?

NOAA

WHO ELSE WILL HELP?

EPA

HOW DO WE DO THIS?

- 1 Evaluate and rank the scientific uncertainties and monitoring needs identified in the MMR workgroup report, the Science Advisory Board report, the *White Paper to Improve Monitoring*

of the Gulf of Mexico Hypoxic Zone in Support of the Hypoxia Task Force's Coastal Goal, and other information;

- 2 Develop and implement a long term research and monitoring strategy under the MMR workgroup of the Coordinating Committee with greater emphasis on the spatial and temporal extent of the hypoxic zone;
- 3 Reduce uncertainties associated with predictive models allowing for improved adaptive management capabilities;
- 4 Integrate monitoring, modeling, and experimental results to understand the impacts of nutrient management actions on the spatial and temporal characteristics of the hypoxic zone; and
- 5 Track progress to support future science assessments.

WHAT ARE THE CRITICAL NEEDS

- Understanding of nutrient cycling and transformations with emphasis on quantifying the lag time between reductions in nutrient loadings and reductions in the extent of the hypoxic zone.
- A long-term and sustainable hypoxic zone monitoring program, with adequate spatial and temporal coverage. Critical components of this need include:
 - Increasing the number of shelf-wide monitoring surveys beyond the current one per summer with increased number of sampling stations and greater area surveyed;
 - Additional in situ platform-based continuous monitoring devices (observing systems);
 - Mechanism to transition monitoring from a research to an operational framework; and
 - Improved predictive modeling capabilities.



Research vessels support monitoring and assessment of hypoxia in the Gulf of Mexico.

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Promote effective communications to increase awareness of hypoxia and support the activities of the Task Force.

WHY DO THIS?

There are many stakeholders invested in the effort to reduce hypoxia. While the Task Force has effectively communicated with its member states and agencies, national recognition of the issue and widespread implementation of management practices—two critical aspects to the ultimate resolution of Gulf hypoxia—will require increased cooperation and understanding from other stakeholders throughout the country. Regular, effective, and strategic communications, through public meetings, annual reports, and other communication mechanisms will be important components of outreach efforts to expand public awareness.

WHO WILL TAKE THE LEAD?

EPA

WHO ELSE WILL HELP?

USDA (NRCS), USACE, Mississippi/Atchafalaya River Basin States

HOW DO WE DO THIS?

- 1 Create and maintain a Web site for accessing current information on Task Force activities, status of actions, and all associated monitoring, modeling, and research plans and products;
- 2 Identify and promote existing communication tools for outreach and education that are deemed most effective in reducing nutrients; and
- 3 Develop and distribute annual report for the general public and Task Force describing the condition of the Mississippi/Atchafalaya River Basin and Gulf hypoxic zone, actions accomplished, and objectives for the next year.

WHAT ARE THE CRITICAL NEEDS?

A Strategic Communications Plan that outlines a process and focuses on effective outreach to both the general public and specific stakeholders. The Communications Plan will focus on:

- Creating and maintaining a Web site for accessing current information on Task Force activities, status of actions, and all associated monitoring, modeling, and research plans and products.
- Identifying and promoting existing communication tools for outreach and education that are deemed most effective in reducing nutrients.
- Developing and distributing an annual report for the general public and Task Force describing the condition of the Mississippi/Atchafalaya River Basin, Gulf hypoxic zone, actions accomplished, and objectives for the next year.
- Developing and distributing communications materials for the general public.

The Task Force Communications Plan can be assembled using existing staff resources. Under current levels of funding, communications efforts will remain status quo and relatively limited and will not meet the goal of expanding public awareness of Gulf Hypoxia and the publication of the Action Plan. To reach a broader audience, several activities outlined by the Task Force can be strengthened with a relatively modest increase in funding by engaging communications/media specialists and increasing publication of communications pieces and outreach materials to communicate the ongoing efforts of the Task Force.



An employee of Trees Forever helps students plant a tree that is part of a demonstration riparian buffer in west central Iowa. Trees Forever is helping establish more than 100 such demo sites across Iowa.

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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.

WHY DO THIS?

The Task Force has always been committed to adaptive management as we continue to implement strategies to reduce hypoxia. Because of the tremendous scientific attention drawn by the Gulf and Mississippi/Atchafalaya River Basin, as well as the rapidly changing practices surrounding biofuels, changing climate, and national economics, the Task Force believes that a significant reassessment is necessary every five years.

WHO WILL TAKE THE LEAD?

EPA

HOW DO WE DO THIS?

- 1 Determine reassessment strategy in FY2009;
- 2 Identify quantitative measures of in-basin nutrient reductions that exhibit progress toward both the Within Basin and Coastal goals. Measures will be developed at the state level with support as necessary from Federal agencies;



Farmers in Jackson County, Iowa, inspect corn planted no-till into sod.

- 3 Identify scientific needs and financial and staff resources according to reassessment strategy; and
- 4 Implement reassessment strategy.

Appendix

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Resources

EPA's Mississippi River Basin and Gulf of Mexico Hypoxia Web site:

<http://www.epa.gov/msbasin>

EPA Science Advisory Board. 2008. *Hypoxia in the Northern Gulf of Mexico. An Update by the EPA Science Advisory Board*. Washington, DC. EPA Science Advisory Board. EPA-SAB-08-003. Available on EPA's Science Advisory Board Web site at: [http://yosemite.epa.gov/sab/sabproduct.nsf/C3D2F27094E03F90852573B800601D93/\\$File/EPA-SAB-08-003complete_unsigned.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/C3D2F27094E03F90852573B800601D93/$File/EPA-SAB-08-003complete_unsigned.pdf)

Index of public comments received on the Draft Action Plan. Available on EPA's Web site at: http://www.epa.gov/msbasin/taskforce/ghap08_comments.htm.

Knecht, A.L. 2000. *Nutrient Releases to the Mississippi River in the Louisiana Industrial Corridor: Voluntary Reductions in Nitrogenous and Phosphatic Compounds*. Baton Rouge, LA: The Louisiana Environmental Leadership Pollution Prevention Program. Louisiana Department of Environmental Quality, Interagency Agreement No 541321. 26 pages.

Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. 2006. *Management Action Reassessment Team Report*. Available on EPA's Web site at: <http://www.epa.gov/msbasin/taskforce/MART.pdf>

Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. 2004. *A Science Strategy to Support Management Decisions Related to Hypoxia in the Northern Gulf of Mexico and Excess Nutrients in the Mississippi River Basin: prepared by the Monitoring, Modeling, and Research Workgroup of the Mississippi River/Watershed Nutrient Task Force*. U.S. Geological Survey Circular 1270. 58 p. Available at: <http://pubs.usgs.gov/circ/2004/1270/>

Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. 2001. *Action Plan for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico*. Washington, DC.

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Mississippi River Gulf of Mexico Watershed Nutrient Task Force



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