

EPA Gulf of Mexico Program
Grants Awarded in FY 08

MX 954130 - Development of a Decision-Support Tool to Assess the Risk of Habitat Degradation Following Watershed Land Use Changes

The Mississippi Department of Marine Resources (MDMR) and the Grand Bay National Estuarine Research Reserve (NEER) will develop a model of the impacts of anthropogenic watershed use on the health of coastal habitats and sustainability of living estuarine resources. This project will use data from long-term studies that were conducted for Perdido Bay, Florida. MDMR and NEER will characterize watershed and natural resource conditions within the Grand Bay NERR and apply the Perdido Bay, Florida based model to predict impacts of potential watershed development on natural resources in the Grand Bay NERR.

The benefit of this project is to aid environmental coastal resource managers so that they can make conservation decisions for managing coastal resources by providing a Habitat Health Assessment based model to predict impacts of potential watershed development on natural resources in the Grand Bay NERR. This tool may be applied to other areas around the Gulf as well and would be available to managers and end users with a need to evaluate potential degradation and loss of coastal habitats and resources derived from human growth.

MX954131 - Using Wetlands for Nutrient Reduction in Mississippi Basin

The Louisiana State University (LSU) hypothesizes that flood pulsed river water inputs to wetlands will enhance nutrient removal and reduce greenhouse gas production. LSU will document the role of three different wetland ecosystem types in reducing nutrient inputs to the Gulf of Mexico. The effectiveness of restored wetlands on nutrient reduction in the Mississippi Basin will be tested. Also, spatial nutrient patterns, permanent nutrient uptake pathways, and greenhouse gas production as river water flows through deltaic, riparian, and smaller wetlands will be measured and recorded. Avian biodiversity surveys will be conducted at the wetland sites as an indicator of health and integrity of the ecosystems.

These project activities will further the grantee's efforts to protect the environment by the following: increasing understanding of how to use healthy wetland and riparian ecosystems for nutrient reduction; enhancing knowledge about the amount and location of wetlands needed to significantly reduce nutrient input to the Gulf of Mexico; and increasing knowledge concerning flood pulsing of wetlands effects on greenhouse gas emissions from wetlands.

MX954132 - Interacting With the Watershed: A Nutrient Adventure

Mobile Bay National Estuary Program (MBNEP) will partner with Dauphin Island Sea Lab, and a local producer to develop an interactive, touring video program. This program, with English and Spanish voiceovers, will educate both children and adults

about the impacts of excess nutrients on Gulf coastal waters and stimulate changes in behavior. It will clarify the concepts of "watersheds" and "estuaries" and describe the various sources of nutrients, their impacts on estuaries, and actions that people can take to reduce nutrient input and impacts.

This project will educate children and adults about the positive results of altering human activities to reduce nutrient inputs, making them better environmental stewards. The expected outcome is the adoption, use, and promotion of environmentally friendly actions to reduce nutrient inputs by these individuals. This work complements MBNEP's goal of providing informal education opportunities. The development and installation of kiosks in Coastal Ecological Learning Centers across the Gulf will help to educate thousands/millions of visitors in the area of environmental education.

MX954133 – Formal and Informal Environmental Education of the Northern Gulf of Mexico

This project is designed to enhance environmental literacy among underserved and underrepresented schools and the general public in Alabama, Florida, and Mississippi. The importance of protection and conservation of Gulf of Mexico coastlines and watersheds will be emphasized. Students will have many opportunities to participate in hands-on activities, teachers will participate in workshops that will assist them in becoming informed on water quality related topics, and the general public will be invited to evening presentations emphasizing issues pertinent to the Gulf of Mexico Alliance Governors' Action Plan.

The University of Southern Mississippi, Gulf Coast Research Laboratory provides experiential learning opportunities to students and teachers alike. This project will be an added benefit to the recipient's current work, and it helps to accomplish goals and objectives outlined in the Governors' Action Plan. The primary focuses of this project is to educate the underserved and underrepresented groups (mainly Hispanic and African American students) about the importance of protection and conservation of Gulf of Mexico coastlines and watersheds.

MX954134 - Development of Pilot Nutrient Criteria for a Mississippi Estuary

In order to address the issues related to nutrient over-enrichment nationwide, the U.S. Environmental Protection Agency (USEPA) charged the states with establishing numeric nutrient criteria for all water body types including rivers, streams, lakes, and estuaries. States with coastal waters have the additional challenge of understanding the intricacies of the sources, fate, and transport of nutrients through estuarine systems in order to develop appropriate nutrient criteria for coastal and near shore waters. For estuarine systems, nutrient dynamics must be understood from the headwaters to the open-water connection. Therefore, developing a monitoring strategy to characterize nutrient concentrations and fluxes in estuarine systems is a top priority of environmental managers Gulf wide.

Through this project, the Mississippi Department of Environmental Quality (MDEQ) will undertake an intensive, full-scale water quality data collection effort to develop water quality and hydrodynamic models, attempt to establish cause and effect relationships by monitoring for causal and response variables, and develop appropriate pilot nutrient criteria on a selected estuary in Mississippi. Specifically, the following work includes: (1) selection of the Mississippi estuary system, (2) development of a site specific monitoring and modeling plan, (3) implementation and completion of monitoring; (4) development, calibration, and verification of water quality and hydrodynamic models of the system, (5) analyses of both historical and new data collected, (6) review of modeling results from various modeled scenarios, (6) development of appropriate and protective pilot nutrient criteria for the selected estuary, and (7) evaluation of the pilot nutrient criteria.

The specific project activities will further MDEQ's own efforts to protect the environment in a very direct and scientifically supportive manner by refining and applying the science and procedural steps necessary to develop and evaluate pilot numeric nutrient criteria. The process implemented through this project could be used by any State within the Gulf of Mexico region to develop an integrated approach for developing nutrient criteria for estuarine systems. Specifically, this project will allow Mississippi to move one step closer to the ultimate goal of estuarine nutrient criteria by generating and evaluating pilot nutrient criteria for a Mississippi estuary.

MX954135 - Development of a Nutrient Reduction Strategy for the Mississippi Delta

The Mississippi Department of Environmental Quality (MDEQ) will be working with agricultural stakeholders and resource agencies. A nutrient reduction strategy template for Mississippi's primary row-crop agricultural area will be developed to guide future nutrient reduction planning, monitoring, implementation, and evaluation activities. The template will address both nonpoint and point sources of pollution. It is envisioned that in the future this template will become an element of a broader Pollutant Reduction Strategy template that will address other pollutants and could serve as an important component of a Basin-wide Water Management Plan. These strategies will be implemented at Lake Washington.

The MDEQ will hire a contractor to work with its Total Maximum Daily Load (TMDL) Program to identify and rank nutrient TMDLs that will provide load reduction targets for future watershed projects in Mississippi. State-specific tools and databases will be enhanced for the project. National models will be compared to state-specific needs and variables. Priority watersheds will be identified and ranked for nutrient related work. A pilot implementation project will take place at Lake Washington using the nutrient reduction strategies developed under this cooperative agreement.

MX954136 – HABSOS Binational Workshop on Harmful Algal Blooms and Environmental Measurements

The goal of this project is to provide hands-on training to Mexican scientists, managers, and technicians to identify and enumerate toxic phytoplankton bloom species (red tides) in Mexican coastal waters. This knowledge will allow local resource managers and public health agencies to better determine the level of risk associated with a bloom, and if necessary, provide an early warning that will allow time for local governments to prepare and respond to the events. These training workshops will be given in five states: Tabasco, Campeche, Yucatan, Quintana Roo, and Tamaulipas over a two year period. The workshops will be organized in cooperation with local governments and a state representative. Each state's potential problems with harmful algal blooms will be presented and discussed at the workshops. The existing HABSOS portal and data management system including its ability to visualize integrated data in maps and other displays will be demonstrated. At the heart of the application is the Harmful Algal Bloom Forecasting System used in the U.S. that can be adapted to Mexican coastal waters, providing there is cell count data available.

This project will provide training to Mexican scientists, managers and technicians to identify phytoplankton bloom species in Mexican coastal waters and conduct water quality measurements that will provide ground truth for HAB forecast bulletins. This effort of providing data for forecasting and tracking harmful algal blooms in Mexican waters will be used to implement mitigation and management options for both humans and living resources at the local level, in both the United States and Mexico. This proposal was written with the effort to protect, sustain, restore the health of people, communities, and ecosystems using integrated and comprehensive approaches and partnerships.

MX954137 – Fostering Environmental Stewardship of the Gulf of Mexico

This project, managed by Auburn University, will help educate animal producers, middle/high school teachers, students, and volunteer water monitors about Gulf of Mexico issues, water protection and monitoring. The project will be initiated from Gulf watersheds in Alabama and Veracruz, Mexico. A series of water monitoring workshops, meetings, study tours, and an Environmental Education Directory will educate the target audiences and a broader Gulf community.

Auburn University continues to work to improve water quality and monitoring by engaging citizens in Alabama. The University provides training resources, data management, outreach, and monitoring coordination. This project will also educate a broader audience, having a strong presence in Veracruz, Mexico. The objectives of this project are as follows: 1) conduct environmental education activities for underserved populations via pilot projects, 2) merge formal and informal educational activities, 3) develop an Environmental Education Directory, and 4) train middle school and high school students to monitor water quality in the Gulf of Mexico region.

MX954138 - Gulf of Mexico Alliance Coastal Monitoring Survey

The Gulf of Mexico Alliance (GOMA) has identified one of the priority actions for the Gulf of Mexico is to “comprehensively survey state, local, and federal agencies for types of water quality data being collected, methods of collection, analytical methods, quality assurance protocols, proprietary restrictions, and database platforms.” Before compiling existing and collecting new information about monitoring systems, a database in which to store the information that allows easy retrieval is necessary.

Florida Department of Environmental; Protection will either modify an existing database to properly accommodate Gulf-wide, monitoring system metadata or, if a suitable one is not found, create a new one. The database will focus only on metadata concerning the types of water quality data being collected, the methods of collection, and the analytical methods used. Once the database is completed and metadata loaded into it, the information will be available on a public website to allow the GOMA Teams to use it in pursuit of their Governors’ Action Plan priorities, including the ones mentioned above. It should also prove useful for other local, state, and federal agencies and entities. The Water Quality and Nutrients Teams—among others—need the information from the database to, among other things, identify: (1) locations for pilot projects to develop methods that can be used by the states to set legally-defensible and scientifically-sound nutrient criteria; and (2) the monitoring gaps that exist across the Gulf of Mexico and how to fill in the gaps.

MX954139 - Detection of *Karenia brevis* Blooms in the Gulf of Mexico

An obvious need exists for improved monitoring technologies for *K. brevis*, and a variety of new detection techniques have been under development in recent years, funded by a diverse array in state and federal programs. Effective monitoring of *Karenia brevis* utilizing these new technologies, however, requires testing of these new technologies against the established standard method (i.e. cell counts by light microscopy) under a variety of conditions with a variety of source material prior to implementation and verification of effective use. The overall goal of this research is to evaluate the range of *K. brevis* detection technologies currently available against the accepted standard and legal technique (light microscopic assessment) to determine the appropriate uses of each technology and provide recommendations on the appropriate management and monitoring applications of each technique.

The specific objectives to achieve this overall goal are listed below:

1. To compare and intercalibrate available methods for the detection and enumeration of *K. brevis* against an accepted standard method (microscopic enumeration), and determine the appropriate conditions under which each method correlates well to the standard and each other.
2. To determine the relative sensitivity and specificity of each assay and dynamic range for *K. brevis* detection in reference to legal monitoring requirements (closure of commercial shellfish beds in Florida at 5000 cells L-1 *K. brevis*).
3. Determine the effects of common procedural problems associated with sample collection (holding time for live samples, sample volume, preservation and storage methods) for each method.

4. Compare sample volume requirements through-put time for each method, and establish protocols for minimizing sampling error and maximizing sample representativeness. 5. Produce an Alliance for Coastal Technologies (ACT) report summarizing the project results and the current state of *Karenia brevis* detection technologies.

MX954140 - Evaluation of Ecosystem Services of Coast Habitats

Texas A&M University – Corpus Christi is developing a support tool that evaluates the economic and social value of coastal habitats. This project will produce procedures and tools for mapping ecosystem services and the values of those services for Gulf of Mexico habitats.

The overall goal of this project is to improve coastal policy and management decisions by developing a decision support tool that evaluates the economic and social value of coastal habitats. This project will produce procedures and tools for mapping ecosystem services and the values of those services for Gulf of Mexico habitats. Mustang Island, Texas, a typical Gulf barrier-island system, will serve as the study area for developing and testing tools that may be applied in many Gulf coast settings. Products will be integrated with and use habitat data compiled in the Gulf of Mexico Alliance Habitat Identification and Characterization Team's Internet-based geospatial databases system. This project, therefore, will widely provide decision support tools and information needed to implement ecosystem-based management. Specific tasks include the following: 1) map and characterize habitats in a barrier-island system typical of Gulf coast areas, 2) develop procedures and tools for identifying and assigning ecosystem services (ES) to habitats and apply to a typical barrier-island system, and 3) develop a scalable and transferable tool for valuing and mapping values of ES.

MX954180 - Pilot Studies to Evaluate the Restoration of Wetlands Using Wastewater Assimilation

Excess nutrients contribute to the degradation of numerous surface waters in the Yazoo Basin of Mississippi. Municipal wastewater can be a significant source of nutrients to these waters. Additionally, wetlands have been damaged cleared or impacted by agricultural practices, construction, and drainage projects. This project is an effort to evaluate the use of wastewater as a resource to restore these degraded wetlands. The project has the potential to provide wetland restoration, while offering the local communities a low cost, low maintenance method of treating their wastewater. If successful, this technology could be employed throughout the watershed, ultimately reducing the nutrient load to the Mississippi River and the Gulf of Mexico.

The recipient's efforts to protect the environment will be exercised through the development of pilot studies that will be used to achieve the following: 1) evaluate the use of wastewater as a resource to restore degraded wetlands; 2) provide an approach for wastewater treatment that is successful in reducing nutrients in surface waters and ultimately the Gulf of Mexico; 3) provide an approach to nutrient reduction that is cost-

effective in the areas of implementation and operation; and 4) provide important information that will enable the Mississippi Department of Environmental Quality to make well-informed decisions regarding implementation of nutrient reduction technology.