

Action Plan II: March 2009 to March 2013

Managing Nutrient Inputs and Reducing Impacts to Coastal Ecosystems

Gulf of Mexico coastal ecosystems are essential to sustaining local economies and the region's overall quality of life. The region's commercial fishing industry, including fin fish, shrimp, oysters, and crab, accounted for over 40% of all U.S. marine recreational fishing catch in 2006. However, the services that the Gulf's coastal ecosystems provide are susceptible to both human and natural impacts. With a growth rate of 103% between 1970 and 2008, the Gulf Coast region is the second leading U.S. coastal region in population growth.

States in the Gulf of Mexico region have identified excess nutrients from manmade sources such as wastewater treatment plants, urban and agricultural runoff, and atmospheric deposition, as one of the primary problems facing Gulf estuaries and coastal waters. Excessive nutrients in coastal waters can result in eutrophication. Eutrophication is a progression of symptoms that begins with excessive growth and algal blooms that can impair recreational and biological uses. Once blooms die, the bacteria decomposing the algae then consume oxygen, leading to hypoxic (low dissolved oxygen) and anoxic (no oxygen) conditions.

The *National Estuarine Eutrophication Assessment Update* reported that Gulf estuaries are impacted by excess nutrients transported from coastal watersheds and these estuaries demonstrate eutrophic conditions (Bricker et al. 2007). The most commonly noted impacts were to shellfish, fishing, swimming, and aesthetics. Hypoxic conditions also recur in several estuarine areas including Mobile Bay, Corpus Christi, Pensacola Bay, and Apalachicola Bay. In addition, during wet years, discharge from the Brazos River can lead to widespread hypoxia along the Texas coast.

The frequency of hypoxia in shallow coastal and estuarine areas is increasing, largely attributed to anthropogenic nutrient pollution. For example, the Mississippi River has been greatly altered and captures polluted runoff from 41% of the continental United States. As a result, the river delivers substantial amounts of nutrients to the Gulf of Mexico. The Gulf Hypoxic Zone that recurs on the Texas-Louisiana continental shelf is the largest zone of oxygen-depleted coastal waters in the United States. The average mid-summer size of the hypoxic zone has increased since 1985, with a peak of 22,000 km² (an area a little smaller than the state of New Jersey) in 2002.

Nutrient pollution in the Gulf of Mexico region is affecting ecosystem functions, public health, living marine resources, and economic benefits from tourism, fisheries, and other coastal dependent uses. The establishment of numeric criteria for nutrients and nutrient-related water quality indicators is an important step toward reducing nutrient impacts. Numeric standards for nutrients and nutrient related water quality indicators will provide a management tool for states that would strengthen regulatory programs under the Clean Water Act and potentially be used to reverse current trends in nutrient pollution to coastal waters and estuaries (Hagy et al. 2008).

Gulf States are required by the Clean Water Act to establish criteria for nutrients in coastal ecosystems that will guide regulatory, land use and water quality protection decisions. Because the five Gulf States face similar nutrient management challenges at both the estuary level and as the receiving water for the entire Mississippi River watershed, the Gulf of Mexico Alliance is an important venue to build and evaluate management tools to reduce nutrients in Gulf waters and achieve healthy and resilient coastal ecosystems.

Long-term Partnership Goals:

- Develop science and management tools to support development of nutrient criteria for coastal ecosystems and reduce impacts from nutrient pollution to the Gulf of Mexico region.
 - Increase nutrient management capacity and reduction activities in Gulf Coast communities.
 - Develop, implement, and evaluate strategies to reduce nutrient inputs and hypoxia in the Gulf of Mexico region.
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ACTION 1: Characterization of Nutrients and Nutrient Impacts to Coastal Ecosystems in the Gulf of Mexico

Implement regional nutrient characterization studies, evaluate impacts on key ecosystem components, and develop science and management tools for the management of nutrients in coastal ecosystems.

5-year Outcomes: *to be discussed August 19-20, 2008*

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Action Step 1.1 Conduct ‘Nutrient Sources, Fate, Transport and Effects’ studies within coastal ecosystems of the Gulf of Mexico to establish relationships between nutrients and ecosystem response.¹

Action Step 1.2 Refine the Gulf of Mexico Nutrient Criteria Research Framework based on pilot nutrient sources, fate, transport, and effects studies.

Action Step 1.3 Identify biological indicators that are sensitive to nutrient levels and that can provide management guidance.

Action Step 1.4 Develop a Macrobenthos Index of Biological Integrity (IBI) for coastal waters.

Action Step 1.5 Improve monitoring data coverage for the characterization of nutrient loads, trends, and impacts. Coordinate state and federal monitoring efforts to consolidate existing data and fill data gaps.²

Action Step 1.6 Identify methods and data needed to develop integrated models of nutrient dynamics, ecological impacts, and socio-economic impacts to coastal ecosystems in the Gulf of Mexico.

Action Step 1.7 Characterize adjacent, freshwater systems to understand their influence on coastal watersheds. Identify the potential changes to Gulf coastal ecosystems from freshwater nutrient criteria and nutrient reduction activities.

¹ Coordinate with the Water Quality Team

² Coordinate with the Water Quality Team

Action Step 1.8 Develop regional SPARROW nutrient models as a tool to assess nutrient sources and the processes that influence transport of nitrogen and phosphorus delivered to coastal ecosystems.

Action Step 1.9 Increase understanding of the role of coastal wetlands in nutrient dynamics and in the capacity of coastal ecosystems to assimilate nutrients.

ACTION 2: Support and Coordinate State Needs for the Development of Nutrient Criteria for Gulf of Mexico Coastal Waters and Estuaries

Identify shared state needs and priorities for the development of nutrient criteria and provide support for research, monitoring, models, tools, and other technical assistance to facilitate coordination of a regional approach to nutrient management.

5- Year Outcomes: *to be discussed August 19-20, 2008*

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Action Step 2.1 Continue regional efforts to develop nutrient criteria for coastal waters and estuaries through the development and coordination of milestones that could be used by states in refining nutrient criteria development plans.

Action Step 2.2 Develop a tool box to support the selection of biological endpoints and related biological assessment methods for use in Gulf coastal waters and estuaries for nutrient criteria development and implementation.

Action Step 2.3 Improve data management and storage to support nutrient criteria development and coordination including methods to improve quality assurance, data sharing, and geographic information system (GIS) capabilities.³

Action Step 2.4 Develop a gulf-wide classification system for coastal waters and estuaries for use in nutrient criteria development and management.

Action Step 2.5 Increase regional coordination to identify and support state needs towards the development of nutrient criteria for coastal wetlands.⁴

³ Coordinate with the Water Quality Team and the Ecosystem Assessment and Characterization Team

⁴ Coordinate with the Habitat Conservation and Restoration Team

ACTION 3: Reduce Excess Nitrogen and Phosphorus Inputs to Gulf of Mexico Coastal Waters and Estuaries

Develop management tools and implement nutrient reduction activities in cooperation with local communities in key watersheds to reduce excess nitrogen and phosphorus inputs to estuaries and coastal and offshore waters in the Gulf of Mexico.

5-Year Outcomes: *to be discussed August 19-20, 2008*

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Action Step 3.1 Develop and distribute a decision support toolbox for Gulf region decision makers providing options for nutrient reduction activities that promote smart growth and best management practices.⁵

Action Step 3.2 Implement and evaluate nutrient reduction technologies in Gulf of Mexico watersheds.

Action Step 3.3 Improve tracking and data sharing of nutrient reduction implementation activities to improve monitoring and assessment of success in meeting nutrient reduction goals.

Action Step 3.4 Develop assessment and outreach information resources for communities to increase awareness of nutrient management options and ongoing efforts to reduce excess nitrogen and phosphorus inputs to the Gulf of Mexico.⁶

ACTION 4: Increase Regional Coordination to Reduce Hypoxia in Gulf of Mexico Coastal Waters and Estuaries

Develop regional strategies and targeted watershed plans that implement activities to reduce hypoxia in Gulf of Mexico coastal waters and estuaries.

5- Year Outcomes: *to be discussed August 19-20, 2008*

⁵ Coordinate with the Environmental Education Team and the Habitat Conservation and Restoration Team

⁶ Coordinate with the Education Team

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Action Step 4.1 Develop and coordinate nutrient reduction strategies targeted to reduce dissolved oxygen stress and hypoxia.

Action Step 4.2 Identify resources and research to provide guidance in the development of low dissolved oxygen stress and hypoxia reduction goals, thresholds, and reference sites or conditions.

Action Step 4.3 Identify the role of resource modification, such as river, shoreline and inlet hydromodification, as an ecosystem stressor resulting in low dissolved oxygen stress and hypoxia impacts.

Action Step 4.4 Increase partnerships in adjacent watersheds to implement best management practices, identify significant nutrient sources, identify opportunities for significant load reductions, and pilot new nutrient reduction technologies.

Action Step 4.5 Coordinate dissolved oxygen management goals and criteria to identify and reduce impacts to Gulf of Mexico coastal waters and estuaries.

Action Step 4.6 Support the goals and actions of the Mississippi River/Gulf of Mexico Watershed Nutrient Task Force as identified in the Gulf Hypoxia Action Plan 2008 for reducing, mitigating, and controlling hypoxia in the Northern Gulf of Mexico and improving water quality in the Mississippi River Basin.