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Restoring Life to the Dead Zone: Addressing Gulf Hypoxia, a National Problem

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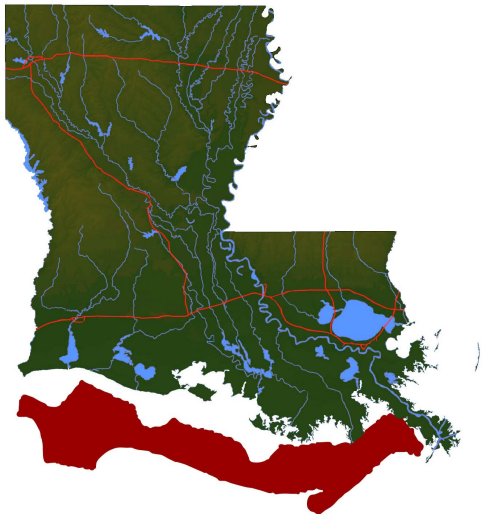
Interior watersheds of the Mississippi River Basin, the source of materials causing the 6,000- to 7,000-square-mile "dead zone," or hypoxia in the Gulf of Mexico.

Issue

The hypoxic zone in the Gulf of Mexico, the so-called "dead zone" lacking enough oxygen to support most marine life, is one of the largest environmental issues of the decade. Practical solutions, based on sound science, are needed.

What

The hypoxic zone is in an area of approximately 6,000-7,000 square miles of water with oxygen levels below 2 parts per million. Trawlers are unable to catch any shrimp or bottom-dwelling fish at this low level of oxygen, and dead organisms have been found there.



Distribution of water hypoxia from July 21-25, 1998. Data from Hypoxia Monitoring Studies of N.N. Rabalais, R.E. Turner, and W.J. Wiseman, Jr.

Where

The zone occurs between the inner and mid-continental shelf of the northern Gulf of Mexico, from the Mississippi River birdfoot delta westward, to the upper Texas coast.

When

There has been awareness of the problem since the 1970's, but scientists are unsure whether or not this is a recent problem that has been worsened by nutrient application.

Why

The zone is caused by increased nutrients from the Mississippi River, especially nitrogen and phosphorus from fertilizers, animal wastes, and domestic sewage; seasonal river discharges worsen the nutrient enrichment. Average nitrate-nitrogen concentration in the river's mainstem has doubled since 1950, with commercial fertilizers being the largest source. Nutrients encourage algal blooms, alter the food chain, and eventually deplete the area of oxygen.

Significance

The Gulf's hypoxic zone rivals the largest hypoxic areas in the world such as those in the Baltic Sea and Black Sea. Change in distribution of shrimp and fish pose a potential threat to the Gulf of Mexico's $4 billion a year seafood economy. Furthermore, though the Gulf bears the effects of the nutrients, the source of the nutrients is a national problem, involving the entire interior watersheds of the Mississippi River Basin and especially States from the Upper Mississippi Valley—Minnesota, Wisconsin, Iowa, Illinois, and Missouri—and the

lower Mississippi Valley—Tennessee, Arkansas, Mississippi, and Louisiana.

Solution

The FY1999 Department of the Interior budget for USGS contains a request for the National Wetlands Research Center to conduct a $200,000 pilot project to demonstrate how to use wetlands to reduce nutrients.

Attacking theProblem

Background

About 25% of the nitrogen load in the Mississippi River originates in the Lower Mississippi River Valley, downstream of the Mississippi-Ohio River confluence. While most work related to the hypoxia issue involves either nitrogen reduction in the upper reaches of the Mississippi Basin or in understanding the relation of nutrient

loading and the hypoxia zone offshore, the USGS National Wetlands Research Center has chosen to take another approach—using inland and coastal wetlands to attack the hypoxia problem.

Research Activities

With NAWQA researchers, Center scientists will

- Assess the role of coastal and inland wetlands in reducing nutrients that are transported into coastal waters.
- Develop a model of interactions between wetland and other habitats and water quality.

Users

Information from the research is particularly needed by the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration's National Marine Fisheries Service, National Park Service, U.S. Environmental Protection Agency, U.S. Department of Agriculture's Natural Resources Conservation Service, and the States of Arkansas, Texas, Louisiana, and Mississippi.

Future

With additional funding, the Center can

- Assess the impacts of nutrient enrichment on wetland and estuarine-dependent biological resources, in cooperation with the States of Mississippi, Texas, and Louisiana, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service.
- Assess the effects of agricultural Best Management Practices in reducing nutrient inflows at the watershed level in the Lower Mississippi River Valley.