Expanding threat of hypoxia in U.S. coastal waters

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The interagency report notes that incidents of hypoxia -- a condition in which oxygen levels drop so low that fish and other animals are stressed or killed -- have increased nearly 30-fold since 1960. Incidents of hypoxia were documented in nearly 50 percent of the 647 waterways assessed for the new report, including the Gulf of Mexico, home to one of the largest such zones in the world.

The impact of the BP Deepwater Horizon oil spill on oxygen levels in the Gulf of Mexico was not considered in this report because the spill had not yet occurred at the time the report was completed. Only additional research will reveal how the presence of oil in the Gulf is affecting the large dead zone that forms every summer to the west of the Mississippi delta, the more than 100 other independent sites along the Gulf of Mexico coast that experience low-oxygen problems, and areas of naturally-occurring deepwater oxygen depletion.

Federal research programs are addressing many aspects of the problem of hypoxia, and coordination among the relevant governmental entities is increasing, the report finds; as a result, some areas are now in better condition than they were a few decades ago. But overall, management efforts to stem the tide of hypoxia "have not made significant headway," the report concludes, in part due to increased development and population growth in coastal watersheds.

"The Nation's coastal waters are vital to our quality of life, our culture, and the economy. Therefore, it is imperative that we move forward to better understand and prevent hypoxic events, which threaten all our coasts," wrote Nancy H. Sutley, chair of the Council on Environmental Quality, and John P. Holdren, Director of the Office of Science and Technology Policy, in a letter accompanying the 163-page report, *Scientific Assessment of Hypoxia in U.S. Coastal Waters*, which was delivered September 3 to Congressional leaders.

Unnatural levels of hypoxia, which occur mostly in the summer, are primarily the result of human activities that deliver nutrients such as nitrogen and phosphorous into waterways. Fertilizer runoff from agricultural, urban and suburban landscapes, sewage discharges, and air pollution are major contributors. The supply of added nutrients entering bodies of water supports blooms of algae, which in turn are decomposed by oxygen-depleting bacteria. The resulting hypoxia can suffocate animals that cannot move away, such as shellfish, and -- depending on how quickly the hypoxia develops -- either kill or force into less suitable habitat free-swimming animals such as fish, shrimp, and crabs. The new report, produced by an interagency working group of the National Science and Technology Council's Committee on Environmental and Natural Resources, also notes that climate change may be causing or exacerbating the problem.

Hypoxia has been prevalent throughout the Gulf of Mexico and the mid- and south-Atlantic coastal regions since the 1980s. Chesapeake Bay, in the mid-Atlantic region, has suffered from repeated summer bouts of hypoxia going back at least to the 1950s.

"The report shows good progress on research into the causes of hypoxia and the specific management requirements to restore systems such as the Gulf of Mexico and Chesapeake Bay, but we still have a long way to go to reduce this environmental threat," noted Jane Lubchenco, Ph.D., administrator of the National Oceanic and Atmospheric Administration (NOAA), the lead agency involved in the report's preparation. "The discovery of a new seasonal hypoxic zone off the coast of Oregon and Washington that may be linked to a changing climate emphasizes the complexity of this issue."

The area off the Oregon and Washington coast is now the second largest seasonal hypoxic zone in the United States and third largest in the world (the largest is in the Baltic Sea), with serious repercussions for natural ecosystems and protected resources, including commercial fisheries. The report also finds that the Pacific and North Atlantic coasts have experienced the largest increase in hypoxic sites since the 1980s. In the last 20 years, the Pacific coast experienced a six-fold increase in the number of hypoxic sites, with 37 areas now experiencing low oxygen problems.

"This report contains the latest and most in-depth science assessing the environmental impact of low-oxygen dead zones, and EPA is proud to have played a key role in developing the study," said EPA Administrator Lisa P. Jackson. "These growing dead zones endanger fragile ecosystems and potentially jeopardize billions of dollars in economic activity. This science can be the foundation for measures that will preserve our waters and reverse the trend, including innovative, watershed-based solutions to this challenge."

The report also documents expanding efforts to reduce the flow of nutrients into coastal waters. "The Obama Administration has taken aggressive action to address water quality in the Mississippi River Basin and in turn, in the Gulf of Mexico," said USDA Secretary Tom Vilsack. "For instance, USDA's new Mississippi River Basin Healthy Waters Initiative is a targeted, science-based effort to give agricultural producers the tools and incentives they need to improve water quality."

The report had significant inputs from the Environmental Protection Agency (EPA), Department of Agriculture (USDA), U.S. Geological Survey (USGS), and the Virginia Institute of Marine Science. It provides a comprehensive list of the more than 300 U.S. coastal water bodies affected by hypoxia and, in eight case studies, highlights a range of representative ecosystems affected by hypoxia. It also describes Federal investments in research and monitoring of hypoxia and identifies future research priorities that span several Federal agencies.

"Significant progress has been made on monitoring to define the source areas and yields of nutrients delivered to coastal waters by streams and rivers and on modeling to determine the human activities that are the most significant

contributors to those nutrient yields," said USGS Director Marcia K. McNutt. "With some improvements this monitoring and modeling information would enable best management practices and mitigation measures to be targeted in the watersheds and on the human activities that have the most significant effect on decreasing nutrient transfer from land to coastal ecosystems."

Each agency brings a unique expertise to the table. NOAA has focused on monitoring and improving the quantitative understanding of hypoxia's causes and its impacts on commercially- and ecologically-important living resources in coastal waters. EPA's work addresses areas from freshwater ecosystems to estuaries and coastal waters and emphasizes implementing regulatory approaches to managing nutrient enrichment, including those resulting from wastewater treatment plants -- so-called point sources of nutrient runoff and large-scale "nonpoint sources" of runoff. The USGS has provided critical measurements and modeling of freshwater and nutrient delivery to coastal waters throughout the Nation. Using information developed by these agencies, the USDA has been responsible for developing and implementing strategies to reduce nutrient inputs to coastal waters from agricultural lands.

Enhanced monitoring of rivers and coastal waters and more support for research to understand the complex underlying science of hypoxia and to predict the range of impacts of hypoxia on ecosystems will be crucial if current trends are to be reversed, the report concludes. As a national assessment, the report also provides crucial baseline information to assess future progress in controlling hypoxia.

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