Researchers predict large 2009 Gulf of Mexico 'dead zone'

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University of Michigan aquatic ecologist Donald Scavia and his colleagues say this year's Gulf of Mexico "dead zone" could be one of the largest on record, continuing a decades-long trend that threatens the health of a half-billion-dollar fishery.

The scientists' latest forecast, released today, calls for a Gulf dead zone of between 7,450 and 8,456 square miles---an area about the size of New Jersey.

Most likely, this summer's Gulf dead zone will blanket about 7,980 square miles, roughly the same size as last year's zone, Scavia said. That would put the years 2009, 2008 and 2001 in a virtual tie for second place on the list of the largest Gulf dead zones.

It would also mean that the five largest Gulf dead zones on record have occurred since 2001. The biggest of these oxygen-starved, or hypoxic, regions developed in 2002 and measured 8,484 square miles.

"The growth of these dead zones is an ecological time bomb," said Scavia, a professor at the U-M School of Natural Resources and Environment and director of the U-M Graham Environmental Sustainability Institute.

"Without determined local, regional and national efforts to control them, we are putting major fisheries at risk," said Scavia, who also produces annual dead-zone forecasts for the Chesapeake Bay.

The Gulf dead zone forms each spring and summer off the Louisiana and Texas coast when oxygen levels drop too low to support most life in bottom and near-bottom waters.

The Gulf hypoxia research team is supported by the U.S. National Oceanic and Atmospheric Administration's Center for Sponsored Coastal Ocean Research and includes scientists from Louisiana State University and the Louisiana Universities Marine Consortium.

The forecast for a large 2009 Gulf hypoxic zone is based on above-normal flows in the Mississippi and Atchafalaya rivers this spring, which delivered large amounts of the nutrient nitrogen. In April and May, flows in the two rivers were 11 percent above average.

Additional flooding of the Mississippi since May could result in a dead zone that exceeds the upper limit of the forecast, the scientists said.

"The high water-volume flows, coupled with nearly triple the nitrogen concentrations in these rivers over the past 50 years from human activities, has led to a dramatic increase in the size of the dead zone," said Gene Turner, a lead forecast modeler at Louisiana State University.

Northeast of the Gulf, low water flows into the Chesapeake Bay shaped Scavia's 2009 forecast for that hypoxia zone.

The Bay's oxygen-starved zone is expected to shrink to between 0.7 and 1.8 cubic miles, with a "most likely" volume of 1.2 cubic miles---the lowest level since 2001 and third-lowest on record. The drop is largely due to a regional dry spell that lasted from January through April, Scavia said. Continued high flows in June, beyond the period used for the forecasts, suggest the actual size may be near the higher end of the forecast range.

"While it's encouraging to see that this year's Chesapeake Bay forecast calls for a significant drop in the extent of the dead zone, we must keep in mind that the anticipated reduction is due mainly to decreased precipitation and water runoff into the Bay," he said.

"The predicted 2009 dead-zone decline does not result from cutbacks in the use of nitrogen, which remains one of the key drivers of hypoxia in the Bay."

Farmland runoff containing fertilizers and livestock waste---some of it from as far away as the Corn Belt---is the main source of the nitrogen and phosphorus that cause the Gulf of Mexico dead zone.

Each year in late spring and summer, these nutrients make their way down the Mississippi River and into the Gulf, fueling explosive algae blooms there. When the algae die and sink, bottom-dwelling bacteria decompose the organic matter, consuming oxygen in the process. The result is an oxygen-starved region in bottom and near-bottom waters: the dead zone.

The same process occurs in the Chesapeake Bay, where nutrients in the Susquehanna River trigger the event. In both the Gulf and the Bay, fish, shrimp and crabs are forced to leave the hypoxic zone. Animals that cannot move perish.

The annual hypoxia forecasts helps coastal managers, policy makers, and the public better understand what causes dead zones. The models that generate the forecasts have been used to determine the nutrient-reduction targets required to reduce the size of the dead zone.

"As with weather forecasts, the Gulf forecast uses multiple models to predict the range of the expected size of the dead zone. The strong track record of these models reinforces our confidence in the link between

excess nutrients from the Mississippi River and the dead zone," said Robert Magnien, director of NOAA's Center for Sponsored Coastal Ocean Research.

U.S. Geological Survey data on spring river flow and nutrient concentrations inform the computer models that produce the hypoxia forecasts.

The official size of the 2009 hypoxic zone will be announced following a NOAA-supported monitoring survey led by the Louisiana Universities Marine Consortium on July 18-26. In addition, NOAA's Southeast Area Monitoring and Assessment Program's (SEAMAP) is currently providing near real-time data on the hypoxic zone during a five-week summer fish survey in the northern Gulf of Mexico.

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