'Dead zone' volume more important than area to fish, fisheries

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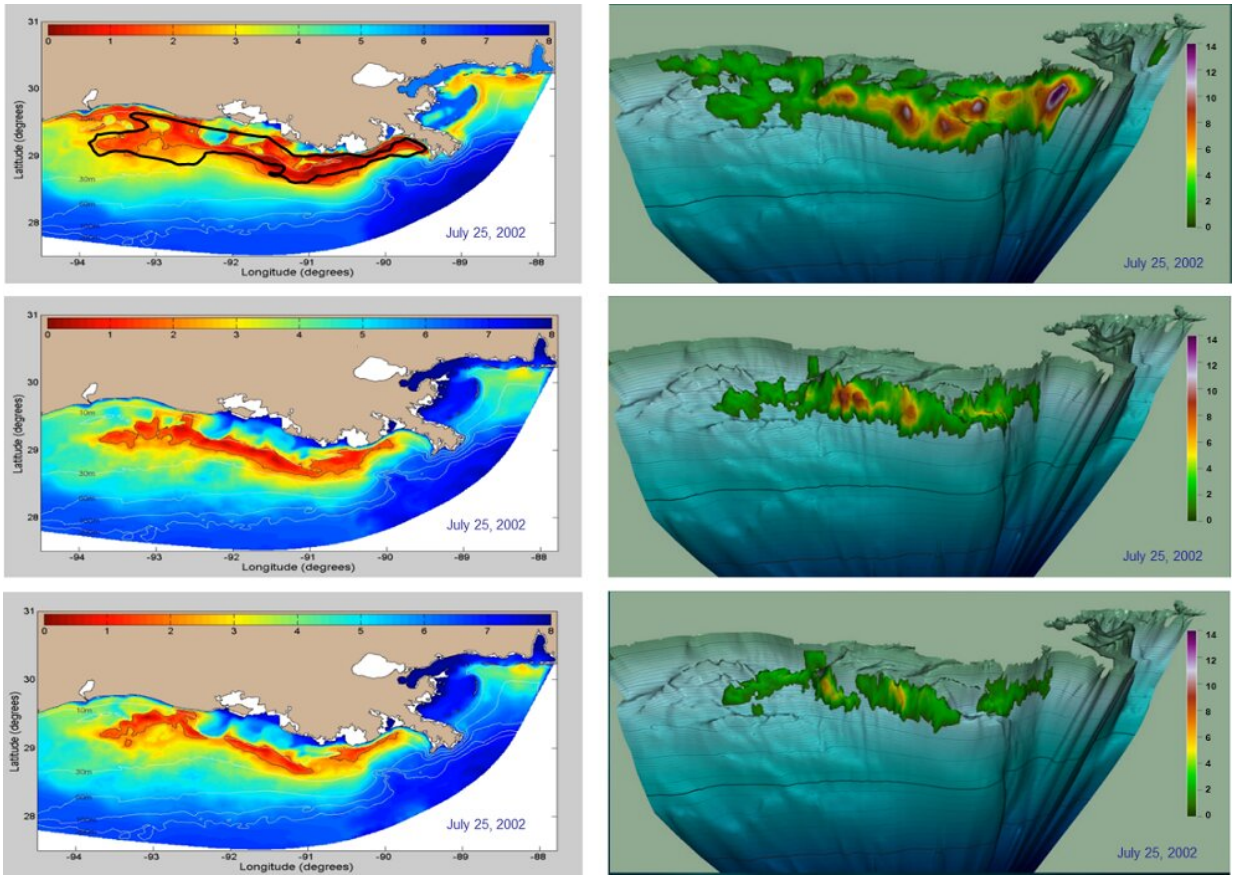

Figure caption: Midsummer (July 21 – 26) hypoxic area (left) and hypoxic volume (right) in the northern Gulf of Mexico hypoxic zone simulated by the Justic and Wang (2014) model for present day condition (2002, upper), for a 25% N reduction scenario (middle) and under a 50% N reduction scenario (lower). Color bars on the left denote bottom dissolved oxygen concentrations (mg/l); color bars on the right denote the thickness of the hypoxic layer (m). The solid black line in the upper left plot denotes the areal extent of hypoxia

(dissolved oxygen

Dubravko Justic, the Texaco Distinguished Professor in the LSU Department of Oceanography & Coastal Sciences, and Research Associate Lixia Wang recently co-authored a study suggesting that measuring the volume rather than the area of the Gulf of Mexico's dead zone, is more appropriate for monitoring its effects on marine organisms.

The dead zone, a hypoxic zone, is a region of low oxygen that results from runoff of high nutrients, such as nitrogen and phosphorus, often found in fertilizer, flowing from the Mississippi River into the coastal ocean. It is the largest recurring hypoxic zone in the U.S., occurring most summers, and is located off the coast of Louisiana. This nutrient pollution, coupled with other factors, is believed to have a negative impact on fisheries because it depletes the oxygen required to support most marine life in bottom and near-bottom waters.

Since 2001, stakeholders have used hypoxic area measurements to set goals for limiting or reversing its size, but this new study shows that the hypoxic volume appears more responsive to reductions in nitrogen flowing into the northern Gulf of Mexico than the hypoxic area. The researchers' model simulations indicate that even with a 25 percent nitrogen load reduction, the thickness of the hypoxic layer in the northern Gulf of Mexico decreases markedly, and hypoxia remains localized to a relatively thin layer near the bottom that most fish and other mobile organisms can more effectively avoid.

Justic believes this should be considered when reviewing and potentially setting new hypoxia management goals.

"Understanding variability in hypoxic volume is relevant to assessing the effects of hypoxia on fish and fisheries, such as enhanced susceptibility to fishing due to an increased aggregation of fish avoiding hypoxic waters," Justic said.

More information: Donald Scavia et al, Hypoxic volume is more responsive than hypoxic area to nutrient load reductions in the northern Gulf of Mexico—and it matters to fish and fisheries, *Environmental Research Letters* (2018). DOI: 10.1088/1748-9326/aaf938