Gulf of Mexico 'Dead Zone' smaller-than-average this summer due to storms

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The bottom area of low oxygen in Louisiana coastal waters west of the Mississippi River, commonly known as the "Dead Zone," was mapped at a much smaller-than-average size this summer. The area was 2,117 square miles, which is larger than Rhode Island but smaller than Delaware, and well below the projected estimate of 7,769 square miles.

Mississippi River discharge and nitrogen loads were high in May, which led to a prediction of a large area of bottom-water hypoxia that was estimated at 17,500 to 20,000-square kilometers, if no storms occurred.

This summer's dead zone size was the third smallest area since mapping began in 1985. The average hypoxic zone size from 2015 to 2020 is 5,407 square miles, which is about three times the size of the Hypoxia Task Force five-year goal reduction of 1,930 square miles. This size of this summer's Dead Zone is close to the Task Force goal, but not because of a reduction in nitrogen loading, but because of weather conditions.

Tropical Storm/Hurricane Hanna moved from east to west across the central Gulf of Mexico and crossed the Texas shore as Hurricane Hanna on July 25, which was the beginning of the hypoxia cruise. The storm's high winds and waves affected all coastal Louisiana and disrupted hypoxia by mixing the water column from the surface down to about 65 feet. The persistent winds from the south generated downwelling favorable conditions pushing what remained of the hypoxic water mass into deeper, offshore waters.

The nitrogen loading of the Mississippi River to offshore remains high. There are efforts, however, for states along the mainstem and others in the watershed to reach lower loads of excess nutrient through the Mississippi River/Gulf of Mexico Hypoxia Task Force.

The science crew began measuring dissolved oxygen on July 25 as Tropical Storm Hanna was crossing the northern Gulf and impinging on the Louisiana shoreline. The strongest winds that day were among the highest in the two weeks prior to the cruise and during the cruise.

There were high winds and waves at the beginning of the cruise in the area west of the Mississippi River delta near Barataria Pass. This mixed oxygen into shallower waters and reduced the size of the hypoxic zone there. The winds calmed towards the end of the 8-day cruise. The small size in 2020 was, therefore, directly caused by Tropical Storm/Hurricane Hanna and not to any reduction of Mississippi nitrogen loading.

The scientists mapping the 2020 summer area of the dead zone returned to dock after measuring bottom-water dissolved oxygen levels less than 2 milligrams per liter at 18 out of 75 stations from the Mississippi River west along the Louisiana coast to Lake Calcasieu at the Louisiana-Texas border.

LSU Department of Oceanography & Coastal Sciences Assistant Professor Cassandra Glaspie served as the chief scientist with Professor and Shell Endowed Chair in Oceanography and Wetland Studies Nancy Rabalais attending virtually. There were only four other science crew members on board because of COVID-19 and the need for social distancing. The cruise on the Research Vessel Pelican was considered a low-risk operation because of the small science crew, closeness to a port and room for quarantining. The scientists plan to resume normal operations on next year's research cruise.

Other water quality and physical oceanographic data were collected along with the bottomwater dissolved oxygen values. The reduced flow of the Mississippi River at the time of the shelf-wide cruise and the deep mixing of the upper water column resulted in a fairly uniform salinity distribution at the surface and at depth. The lowest surface salinity values were nearest the Mississippi River delta.

Current models used to predict hypoxia in the northern Gulf of Mexico are robust for long-term management purposes, but they are not optimized to predict the area for years where short-term weather patterns move water masses or mix up the water column. Field measurements, therefore, remain a necessity to understand the dynamics of hypoxia and contribute to accurate modeling of a changing ocean.

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More information: Gulf Hypoxia: www.gulfhypoxia.net

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