Below-average 'dead zone' predicted for Chesapeake Bay in 2015

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A University of Michigan researcher and his colleagues are forecasting a slightly below-average but still significant "dead zone" this summer in the Chesapeake Bay, the nation's largest estuary.

The 2015 Chesapeake Bay forecast calls for an oxygen-depleted, or hypoxic, region of 1.37 cubic miles, about 10 percent below the long-term average. The forecast was released today by the National Oceanic and Atmospheric Administration, which sponsors the work.

Farmland runoff containing fertilizers and livestock waste is the main source of the nitrogen and phosphorus nutrients that cause the annual Chesapeake Bay hypoxic region, which is also known as a dead zone.

Fish and shellfish either leave the oxygen-depleted waters or die, threatening the bay's production of crabs, oysters and other important fisheries.

"These annual forecasts help to remind federal and state policymakers and the public that insufficient progress is being made to reduce the size of these low-oxygen regions," said aquatic ecologist Don Scavia, director of the University of Michigan's Graham Sustainability Institute.

"The size of the annual Chesapeake Bay dead zone has changed little over the past decade, which underscores the need for persistent management action to reduce the amount of nutrients flowing into the bay. The Environmental Protection Agency must keep states' feet to the

fire."

The hypoxia forecast is based on models developed by NOAA-sponsored researchers at the University of Michigan and the University of Maryland's Center for Environmental Science. The models use nutrient-level estimates and stream-flow data provided by the U.S. Geological Survey. USGS estimates that 58 million pounds of nitrogen were transported to the Chesapeake Bay from January to May 2015, an amount that is 29 percent below average conditions.

Low river flow and below-normal nutrient loading from the Susquehanna River this spring account for the smaller predicted size of the dead zone.

"Tracking how nutrient levels are changing in streams, rivers and groundwater, and how the estuary is responding to these changes, is critical information for evaluating overall progress in improving the health of the bay," said William Werkheiser, USGS associate director for water. "Local, state and regional partners rely on this tracking data to inform their adaptive management strategies in bay watersheds."

Nutrient-rich waters flowing into the bay trigger extensive algae growth. When the algae die and sink, bottom-dwelling bacteria decompose the organic matter, consuming oxygen in the process and forming the dead zone.

Weather variables—including wind speed and direction, precipitation amounts and temperature—also affect the size of dead zones. In 2014, sustained winds from Hurricane Arthur mixed Chesapeake Bay waters, delivering oxygen to the bottom and dramatically reducing the size of the hypoxic zone to 0.58 cubic miles.

In addition to forecasting the size of the mid-summer low-oxygen zone,

the computer models assess the portion that is entirely oxygen-free—the so-called anoxic zones that form in early and late summer. The anoxic portion of the Chesapeake Bay dead zone is expected to be 0.27 cubic miles in the early summer, growing to 0.28 cubic miles in the late summer.

Later this year, oxygen levels will be measured by the Chesapeake Bay Program's partners at the Maryland Department of Natural Resources and the Virginia Department of Environmental Quality. The program coordinates a multi-year effort to restore the bay's water quality and habitat quality and to increase its productivity.

The size of the Chesapeake Bay's dead zone has been measured annually since 1950. Low-oxygen regions also form each summer in the lower portions of the bay's major tributaries and episodically in many smaller tributaries.

"Forecasting how a major coastal ecosystem, the Chesapeake Bay, responds to decreasing nutrient pollution is a challenge due to year-to-year variations and natural lags," said Donald Boesch, president of the University of Maryland Center for Environmental Science. "But we are heading in the right direction."

The Chesapeake data are collected and analyzed through a cooperative agreement between USGS and the Maryland Department of Natural Resources. USGS operates more than 400 real-time stream gages and collects water-quality data at numerous long-term stations throughout the Chesapeake Bay basin to track how nutrient loads are changing over time.

"These ecological forecasts are good examples of the critical environmental intelligence products and tools that NOAA is providing to stakeholders and interagency management bodies such as the

Chesapeake Bay Program," said Kathryn Sullivan, under secretary of commerce for oceans and atmosphere and NOAA administrator.

"With this information, we can work collectively on ways to reduce pollution and protect our marine environments for future generations."

Provided by University of Michigan