

Understanding HYPXIA

Hypoxia is an environmental phenomenon where the concentration of dissolved oxygen in the water column decreases to a level that can no longer support living aquatic organisms. The level is often considered to be **2 mg O₂ per liter** of water or lower.¹ Hypoxic and anoxic (no oxygen) waters have existed throughout geologic time, but their occurrence in shallow coastal and estuarine areas appears to be increasing as a result of human activities.²

What causes hypoxia?

In 2015, scientists determined the Gulf of Mexico dead zone to be **6,474 square miles**, which is an area about the size of Connecticut and Rhode Island combined.³ Major events leading to the formation of hypoxia in the Gulf of Mexico include:



1 Runoff and nutrient loading of the Mississippi River.



2 Nutrient-enhanced primary production, or eutrophication.



3 Decomposition of biomass by bacteria on the ocean floor.



4 Stratification prevents the return of oxygen.

Watershed

Nutrient-rich water from the Mississippi River forms a surface lens.

Phytoplankton growth is fueled by nutrients.

Phytoplankton die and sink to the bottom.

Bacteria consume oxygen during decomposition in the bottom layer of water.

Organisms that are able, flee deadly low oxygen zones.

Mass anoxic areas form Dead Zones.

Sunlight



Coastal Hypoxia and Eutrophication

• Areas of anthropogenically-influenced estuarine and coastal hypoxia.

n > 550

In the past century, Hypoxia has become a global concern with over 550 coastal areas identified as experiencing this issue.⁴



Only a small fraction of the 550-plus hypoxia zones exhibited any signs of improvement.⁵



Number of dead zones has approximately doubled each decade since the 1960's.⁵



Combined, Dead Zones cover **4x** the area of the Great Lakes.

Today, there is currently about 1,148,000 km² of seabed covered by Oxygen Minimum Zones (OMZs) (<0.5 ml of O₂/liter)⁵



Working Together for Change

In the US, the US EPA leads a **Hypoxia Task Force (HTF)** with representatives from the Department of Agriculture, Department of the Interior, Department of Commerce, and the Army Corps of Engineers. State representatives from Arkansas, Illinois, Indiana, Iowa, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Ohio, Wisconsin, and Tennessee are also part of the solution, as is the National Tribal Water Council.

The goal of the task force is to achieve a **20% reduction in nutrient loading** in the largest hypoxic zone in North America, the Mississippi Delta by 2025.⁶

This will require a large scale, coordinated effort to reduce nutrient runoff throughout US water-bodies, setting monitoring requirements and discharge limits for nitrogen and phosphorus that wash into rivers.⁶

SOURCES:
¹ Vaquer-Sunyer and Duarte, 2008 ² Diaz and Rosenberg, 1995 ³ NOAA
⁴ World Water Resources Institute ⁵ Diaz and Rosenberg, 2008 ⁶ EPA.gov

