



Earth Gauge

A National Environmental Education Foundation Program

Gulf Oil Spill Series: Mississippi River Watershed and Hypoxia

Earth Gauge's Gulf Oil Spill series will focus on unique topics related to the Gulf of Mexico and the effects of the 2010 oil spill. All fact sheets, images and videos are freely available for use on-air and are available online at <http://www.earthgauge.net/2010/gulf-oil-spill-resources>.

The Gulf of Mexico Watershed

A watershed is an area of land that drains into a common body of water. Because water does not obey political boundaries, watersheds can cross county, state and even national lines. The area of United States land that drains to the Gulf of Mexico – more than 2.3 million square miles – contains more than 150 rivers that are part of 20 major river systems. Annually, about 280 trillion gallons of water flow into the Gulf; 80 percent of this water comes from the U.S., with 64 percent coming from the Mississippi River alone.



The Mighty Mississippi

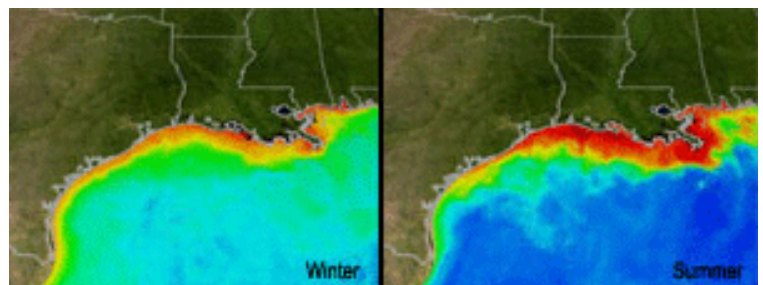
The Mississippi River watershed is the largest watershed in the U.S., draining 41 percent of the lower 48 states. Rivers and streams from all or parts of 31 U.S. states and two Canadian provinces drain into the Mississippi River. Any raindrop that falls within this watershed could eventually end up in the Gulf of Mexico. When it rains in the watershed, rainwater carries a variety of pollutants from land surfaces into storm drains, streams and rivers that eventually reach the Mississippi. These *non-point* sources of pollution include runoff from gas stations, home lawns and gardens, failing septic systems, driveways and streets, farms and many other sources.

Over half of the nitrogen entering the Gulf of Mexico has been found to come from the Upper Mississippi River. The states that contribute to the Upper Mississippi watershed (Minnesota, Iowa, Illinois, Indiana and Ohio) have large tracts of agricultural land that contribute nitrogen from fertilizers and animal waste to the river. Deposits of nitrogen oxides from the air also contribute to nitrogen build-up in the watershed. When excess nitrogen reaches the Gulf, it stimulates the growth of algal blooms that deplete available oxygen in the water. Without oxygen, most animals and organisms cannot survive, creating a *dead zone* where there is no life in the water.

Gulf Hypoxia – The ‘Dead Zone’

The Northern Gulf of Mexico is home to the largest *hypoxic* (low oxygen) zone in the Western Hemisphere. The size of this zone varies, but at its peak ranges from the mouth of the Mississippi westward to the coast of Texas, covering an area of 7,000 or more square miles – roughly the size of New Jersey.

During summer, rivers in the Gulf watershed carry excess nitrogen and phosphorus into the Gulf. High nutrient levels cause rapid growth of phytoplankton – small photosynthetic organisms such as algae that float at the water's surface – causing them to bloom (see image at right). When these organisms die, they fall to the bottom where they are decomposed by bacteria, a process that uses much of the water's oxygen supply. This creates an area of bottom water with low or no oxygen, meaning that marine animals either leave the area or die, creating a space that is nearly void of life.



NASA satellite imagery depicts summer plankton blooms near the mouth of the Mississippi River in the Gulf. Reds and oranges show high concentrations of phytoplankton and river sediment.

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Knowledge to live by

Since 1910, overall precipitation in the lower 48 states has increased by 10 percent, and the region with the largest increase in rainfall is the Mississippi River watershed. The Gulf's dead zone is less severe during drought years in the Midwest, whereas it is usually at its largest extent during flood years such as 1993. The growth of the dead zone from the mid 1980's to the late 1990's resulted in a decline of brown shrimp populations, impacting fisheries.

Will the oil spill impact the Gulf Dead Zone?

NOAA is monitoring the Gulf of Mexico for low oxygen areas. According to researchers who study the dead zone, oil could make the dead zone worse if oil on the water surface prevents oxygen from mixing into the water and replenishing oxygen concentrations. Also, tiny organisms in the water that break down oil and dispersants consume oxygen, which might further deplete oxygen in the water. On the other hand, if oil and dispersants on the water surface are toxic to algae that cause the dead zone or if these substances block sunlight needed for algae to grow, the oil spill might actually lessen the extent of low-oxygen areas in the Gulf.

Learn more in NOAA's fact sheet, *Links between Gulf Hypoxia and the Oil Spill*, available from http://response.restoration.noaa.gov/book_shelf/2075_dead_zone.pdf.

What You Can Do

With millions of gallons of crude oil and chemical dispersants already in Gulf waters, marine life and biodiversity are more vulnerable than ever to other pollutants. No matter where you live in the Mississippi River watershed, you can help protect the Gulf with these tips:

- Be careful when using fertilizers on agricultural land or in your yard. Always make sure there is no rain in the forecast before you apply fertilizer.
- Plant a buffer of vegetation on the edge of your property to help to prevent excess nitrogen runoff.
- "Lawn-cycle." Instead of bagging your clippings or sweeping them into the street where they can be carried away by rain water, leave them on your lawn. As the clippings break down, they'll fertilize naturally, reducing the need for synthetic fertilizers in your yard.
- If you own a farm, practice farming conservation tillage or no-till techniques on your land. Rotating crops and planting cover crops can also help to reduce nitrogen loss and fertilizer needs.
- A major source of nitrogen oxides is emissions from vehicles. Keep the tires on your car inflated to save fuel and reduce emissions. Having under-inflated tires can reduce your gas mileage by 0.4 percent for every one pound per square inch (psi) drop in pressure for all four tires.
- Check out the Environmental Protection Agency's Mississippi River Basin map to find your location in the watershed, compare water quality of your portion of the river to others and find out how human activities near you are influencing the Gulf of Mexico: <http://www.epa.gov/msbasin/subbasins/index.htm>.
- Regardless of where you live – along the Mississippi or in the Gulf Coast area – you can help protect water quality in the Gulf by participating in a wetland, river or beach cleanup in your area. Check with your local watershed group for activities, or organize one yourself.

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