

Environmental Monitoring

MDEQ Field Services Division, with tremendous support from its state and federal partners, coordinated an aggressive monitoring effort to evaluate the storm's impacts on human health and the environment.

Bacterial Monitoring

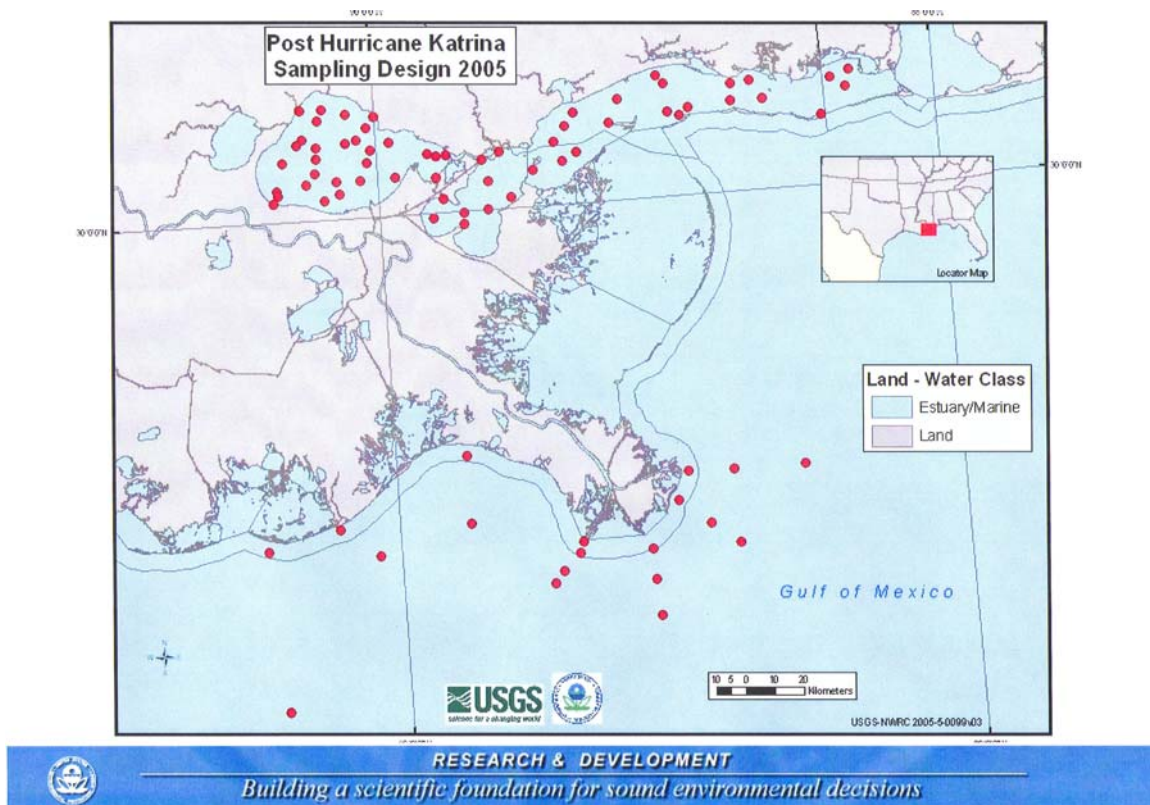
Following Hurricane Katrina, there was concern about the bacteria concentrations in coastal waters since many wastewater plants were damaged or without power. The MDEQ partnered with the United States Geological Survey (USGS) and the Gulf Coast Research Laboratory (GCRL) to conduct bacterial sampling in the bays, bayous and beaches along the Gulf Coast. Beginning September 19, 2005 these agencies collected and analyzed weekly samples for microorganisms of public health significance (*Enterococcus*) at approximately 45 sites in coastal tributaries and 15 municipal water treatment facilities. Sampling of these waters was concluded in June 2006 as the water quality conditions stabilized. The results indicated localized, episodic spikes in bacteria concentrations. Fortunately, widespread severe contamination was not found. The results were used to help identify problems with wastewater infrastructure as part of the ongoing effort to improve water quality on the coast.

Bay and Estuary Monitoring

The USEPA Region 4 Science and Ecosystem Support Division (SESD) in Athens, GA, with sampling and logistical support from MDEQ, sampled water and sediment at 30 sites in the Mississippi Bays and Estuaries. These samples were analyzed for a broad range of chemical contaminants, including dioxin. They also analyzed samples for *Enterococcus* bacteria. The results indicated generally good water quality, with few violations of state Water Quality Standards. Two sites, the Escatawpa River near Moss Point and Bay St. Louis near Bayou LaCroix had depressed oxygen concentrations. Two sites, Back Bay Biloxi and Bayou Casotte, had elevated nutrient concentrations. The bacteria concentrations in the open waters of the bays and rivers were very low. The full report is available at <http://www.epa.gov/region4/sesd/>.

Mississippi Sound Monitoring

The MDEQ assisted the USEPA Office of Research and Development (ORD) out of their Gulf Breeze, Florida Laboratory in sampling 30 randomly selected sites in Mississippi Sound from Lake Borgne to Dauphin Island (Figure). These sites were sampled for an array of environmental indicators including water and sediment for toxics and benthic community analysis. This data will be compared to existing data from the National Coastal Assessment Program to evaluate the long term ecological impacts of the storm. Figure . USEPA Office of Research and Development Sampling Sites in Mississippi and Louisiana Waters



Soil and Sediment Sampling

The USEPA Region 4 SEDS, in conjunction with MDEQ staff, selected eight facilities along the coast for sampling soils and sediments. The purpose of the sampling was to monitor for contaminants that may have been released as a result of the storm. The eight sites selected were:

- DuPont at Delisle
- MS Phosphates at Pascagoula
- First Chemical at Pascagoula
- Chevron at Pascagoula
- Omega Protein at Moss Point
- Polychemie at Port Bienville
- Ershigs Fiberglass at Biloxi
- Naval Construction Battalion Center in Gulfport

The results of this sampling showed no contamination around these facilities attributable to Hurricane Katrina. The full report is available at <http://www.epa.gov/region4/sesd/>.

National Priority List Sites

The USEPA Region 4 SEDS selected five facilities in Mississippi from the National Priority List that were in the hurricane's path. These sites were monitored to determine if there were any releases from these sites that would increase contamination in the vicinity of the sites. The facilities selected were:

- Chemfax at Gulfport
- Picayune Wood Treating at Picayune

- Davis Timber at Hattiesburg
- American Wood at Louisville
- Sonford Products at Flowood

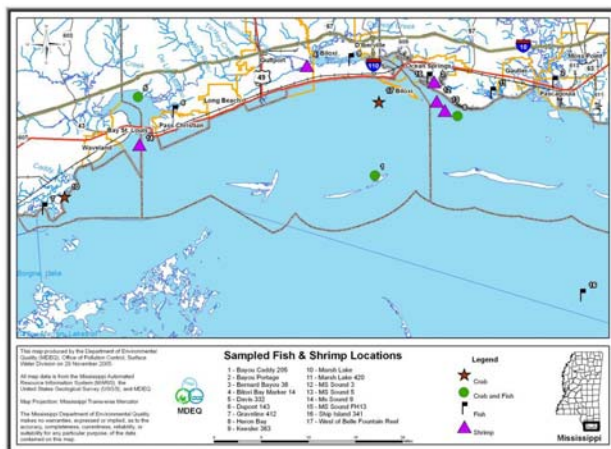
This monitoring was conducted during the week of October 17, 2005 and included soil, sediment and groundwater. The results indicated that there had been no significant increase in contaminants at these sites as a result of the storm. The full report is available at <http://www.epa.gov/region4/sesd/>.

Tissue Monitoring for Fish, Shrimp and Crabs

One of the often asked questions following the storm was “Are the fish and seafood safe to eat?” Several agencies began to quickly gather data to address this issue. The National Oceanic Atmospheric Administration (NOAA), National Marine Fisheries Service vessels sampled fish and shrimp off the coast of Louisiana and Mississippi during the week of September 12, 2005. FDA and EPA, along with agencies from Louisiana, Mississippi and Alabama cooperated to conduct a joint monitoring effort in the inshore coastal waters targeting important sport and food fish along with shrimp and blue crabs.

MDEQ, the Mississippi Department of Marine Resources and the Gulf Coast Research Laboratory collaborated to collect fish, shrimp and crabs at 18 sites along the Mississippi Coast (Figure X). FDA is analyzing these samples at their laboratories for pesticides, metals and PCBs. At the time of this writing, FDA has completed approximately 95% of the analyses, and they have analyzed several hundred tissue samples from Louisiana and Mississippi.

Figure . Fish Shrimp and Crab Sampling locations.



The results of the fish and seafood analyses conducted to date are very encouraging. NOAA’s sampling shows no contamination from petrochemicals, flame retardants or metals in the shrimp and fish collected off the Louisiana and Mississippi coasts. FDA’s

data shows no levels of any contaminants in fish, shrimp or crabs that would warrant a consumption advisory.

Fish Kill Investigations

Following the landfall of Hurricane Katrina, the Pascagoula and Pearl River basins experienced massive fish kills involving millions of fish, as well as crayfish, freshwater mussels and blue crabs. As these mortalities were reported, MDEQ and The Mississippi Department of Wildlife, Fisheries and Parks (MDWF&P), conducted investigations to determine the cause. In all cases, the water color had turned a dark black color, and measurements of dissolved oxygen concentrations showed that extremely low levels of oxygen were present. A limited amount of chemical sampling and analysis was conducted, and no toxins were noted in the water samples.



Based on these data and information gained during the investigation, the cause of the fish kill was determined to be low oxygen. The wind and rainfall from Hurricane Katrina had introduced a large amount of organic matter (mostly leaves, twigs and other plant material) into the water, and the decomposition of this material caused the oxygen depletion. Similar kills have been documented in Florida, South Carolina and Louisiana after other hurricanes.

Working with the MDWFP, MDEQ Field Services Division biologists have estimated the monetary value of the fish and other aquatic life affected by Hurricane Katrina to be \$20.3 million. The MDWFP has conducted population surveys of fishes in some of the rivers affected by Hurricane Katrina, comparing this information with past population surveys. The results confirmed a reduction in both the numbers of fish and in the number of species in these affected areas.

Similar to the events that unfolded after the landfall of Hurricane Katrina, Hurricane Rita caused extensive fish kills in the Mississippi Delta. Among the water bodies affected

were the Sunflower River, Steele Bayou, Deer Creek and Black Bayou. All kinds of fish species were affected. As these mortalities were reported, MDEQ and the Mississippi Department of Wildlife, Fisheries and Parks (MDWFP) conducted investigations to determine the cause. Again, the water had turned a dark black color, and measurements of dissolved oxygen concentrations showed that extremely low levels of oxygen were present. Chemical sampling and analysis was conducted on a sub-set of these incidents, and no toxins were noted in the water samples.

Similar to the response and follow-up investigations conducted for Hurricane Katrina, the MDEQ and the MDWFP investigated these incidents as they were reported, and the MDWFP has conducted additional population surveys of fishes in the affected streams and rivers. These results confirm that significant reductions in the fish population have occurred in the affected areas. MDEQ estimated the value of the fish killed in the Delta following Hurricane Rita at \$3.4 million.

Summary

Following Hurricane Katrina, state and federal agencies collaborated to conduct needed monitoring in the affected area. The result was an unprecedented amount of environmental monitoring in the Northern Gulf area. Data is still coming in, but the results to date indicate that despite the devastation, there seems to be very limited, chemical contamination. The primary impacts so far appear to be episodic bacterial contamination, physical damage to habitat such as oyster reefs, and fish kills in the rivers and lakes due to low oxygen. The oxygen depletion was caused by the decaying vegetation and other storm debris that was washed into the streams. The estimated value of the fish killed following Hurricane's Katrina and Rita is \$23.7 million.