



NOAA'S NATIONAL OCEAN SERVICE **Hurricane Response**

A hurricane has just ravaged the coast. Homes are damaged or destroyed. Family members are searching for loved ones. Ports are closed due to unknown hazards in surrounding waterways. Damaged vessels and chemical containers are leaking potentially hazardous material into the water.

And in the background, without much bravado or fanfare, NOAA's National Ocean Service has sprung in to action, working to get things moving again...responding in the aftermath of the storm.



Rapid Hurricane Response

Following hurricanes, the National Ocean Service, an office within the National Oceanic and Atmospheric Administration, is one of the key partners immediately working to respond with a range of activities.

WATER-LEVEL MONITORING

Before, during, and after a storm, NOAA monitors and disseminates observations of water levels, currents, and weather information (winds, atmospheric pressure, air/water temperature) in real time via the National Water Level Observation Network, the Physical Oceanographic Real-Time System, and the Texas Coastal Ocean Observing Network, a NOAA observing system partner in the Gulf of Mexico region. The real-time environmental information provided from over 70 NOAA and partner-operated stations in the Gulf of Mexico helps coastal authorities prepare for, mitigate, and respond to storm tides and coastal flooding generated by severe storms. To ensure data are available when most needed, NOAA has constructed five “Sentinels of the Coast,” strengthened structures designed to withstand wind and wave action from category four hurricanes.

Also, as a storm approaches and a National Weather Service storm track is issued, the National Ocean Service provides Storm QuickLook, a compilation of near real-time ocean and weather observations within the affected coastal area. The National Ocean Service typically updates the online Storm QuickLook four times per day and, if conditions warrant it, can provide updates once every six minutes.

OCEAN & COASTAL DATA

NOAA coordinates the U.S. Integrated Ocean Observing System (IOOS®). This federal, regional, and private-sector partnership provides ocean and coastal data and information to support preparation and response efforts and to inform forecasts and predictions ahead of hurricanes. IOOS data helps decision makers protect our safety, economy, and environment.

NAVIGATIONAL SURVEYS

Immediately following a hurricane, the Office of Coast Survey provides emergency hydrographic services for affected port areas. These services are performed by Navigation Response Teams. These teams use echo sounders to check for shoaling and submerged obstructions that pose hazards to vessels, collect data to update NOAA's national suite of nautical charts, and provide mapping support throughout the Atlantic Seaboard, Pacific Coast, Great Lakes, and Gulf of Mexico. The work of these teams is essential to speeding the re-opening of ports and waterways, allowing the flow of relief supplies, and enabling the resumption of ocean commerce—valued at more than \$1 trillion annually to the nation's economy—to return to impacted regions.

AERIAL PHOTOGRAPHY SURVEYS

Just hours after a hurricane hits a coastal area, the National Geodetic Survey begins flying photo survey missions to assess storm damage. NOAA makes these photographs, which often number in the thousands, available on the Internet and via a mobile application. The data contained in these photos provide emergency and coastal managers with information needed to develop recovery strategies, facilitate search and rescue efforts, identify hazards to navigation and HAZMAT spills, locate errant vessels, and provide documentation necessary for damage assessment through the comparison of before and after imagery. These images also help those most affected by a hurricane determine if their homes, businesses, or properties are still standing and aid insurance companies in resolving claims and speeding the rebuilding of facilities.

HAZARDOUS SPILL RESPONSE

In the wake of a hurricane, the Office of Response and Restoration provides scientific support to hazardous materials response efforts in coastal areas. The office works with partners to survey vessels or containers that may be leaking fuel, oil, or other hazardous materials. Spill responders fly missions to identify and document offshore sources of spills. Information from these flights, when combined with weather and hydrologic data in computer models, can help to predict spill movement and determine pollution threats. The Office of Response and Restoration also provides guidance on marine debris and vessel salvage, conducts shoreline cleanup assessments, and collects information to understand natural resource impacts from spills in affected areas. These activities support the U.S. Coast Guard's spill containment and clean-up efforts. NOAA also works closely with federal and state trustees as well as any responsible parties to assess and restore resources injured by the oil spill and compensate for the public's lost use of the resources.



STORM SURGE INFORMATION

Along the coast, storm surge is often the greatest threat to life and property. Floods are frequent, costly, and deadly hazards for coastal communities. Storm surge is an abnormal rise in water level, over and above the regular astronomical tide, caused by forces generated from a severe storm's wind, waves, and low atmospheric pressure. Storm surges are extremely dangerous, because they are capable of flooding large coastal areas.

With coastal states supporting 81% of the U.S. population and generating 83% of U.S. gross domestic product, the potential for catastrophic loss from inundation events is very significant in these states. In addition, future inundation risks may be intensified by changes in climate and sea level. It is important to know inundation risks to understand the potential effects of changing conditions.

NOAA is part of a federal partnership with FEMA and the U.S. Army Corps of Engineers that develops and updates evacuation plans for the U.S. coast. These plans are based on modeling thousands of possible storms with a modeling tool called SLOSH (Sea Lake and Overland Surge from Hurricanes), mapping the results over the landscape, working with local emergency managers to determine the most efficient ways to move people from harm's way, and educating the public on how to prepare for storm surge. NOAA's Office of Coast Survey works with the National Weather Service to improve storm surge information.

Long-term Hurricane Response

The work of the National Ocean Service ensues in the hours following a hurricane, but it doesn't stop there. For weeks, months, even years after a hurricane has ravaged a coastal community, the National Ocean Service continues its work.

CONTAMINATION ASSESSMENTS

NOAA's National Status and Trends (NS&T) Program, part of the National Centers for Coastal Ocean Science, coordinates with multiple partners to develop strategies to assess the environmental impacts of contaminants in coastal and estuarine waters in the aftermath of hurricanes. Specifically, the NS&T Program measures contaminants in oyster tissue, sediments, and waters in an affected region, testing for pesticides, herbicides, nutrients, metals, flame retardant chemicals, hydrocarbons, biphenyls, and human pathogens. Of special concern is assessing the risk to human health of eating fish and shellfish from the area affected by the storm and ensuring seafood safety. Working in partnership with the National Marine Fisheries Service, the Mussel Watch Program, part of the NS&T Program, provides baseline contaminant records for comparison with post-storm levels to carry out this mission.

MAPS AND DATA ANALYSIS

Following a hurricane, the NOAA Coastal Services Center provides the satellite and aerial images needed to generate maps that help officials understand the long-term effects of the hurricane. These data products include pre-hurricane imagery and digital elevation data from a variety of sources; before and after imagery comparisons; and maps depicting ecological impacts, debris assessment, and wetlands loss along the coast. The Center may also conduct studies that focus on a storm's economic impacts.

LONG-TERM RECOVERY PLANNING

The NOAA Coastal Services Center and the Office of Ocean and Coastal Resource Management provide assistance in long-term recovery planning in areas impacted by a hurricane. Staff may assist in the development of coastal project plans, coordinate with other federal and state organizations involved in recovery planning, and assist with the design and implementation of activities to involve local communities in planning for their own long-term recovery.





For More Information

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NOAA'S NATIONAL OCEAN SERVICE: <http://oceanservice.noaa.gov>
NOS Hurricane Page: <http://oceanservice.noaa.gov/hazards/hurricanes/>

CENTER FOR OPERATIONAL OCEANOGRAPHIC PRODUCTS AND SERVICES:
<http://tidesandcurrents.noaa.gov/>
National Water Level Observation Network: <http://tidesandcurrents.noaa.gov/nwlon.html>
Storm QuickLook: <http://tidesandcurrents.noaa.gov/quicklook.shtml>

INTEGRATED OCEAN OBSERVING SYSTEM: <http://ioos.gov/>

NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE: <http://coastalscience.noaa.gov/>
NOAA's National Status and Trends Program: <http://ccma.nos.noaa.gov/about/coast/nsandt/welcome.html>

NATIONAL GEODETIC SURVEY: <http://geodesy.noaa.gov/>
Emergency Response Imagery: http://ngs.woc.noaa.gov/eri_page/index.html

NOAA COASTAL SERVICES CENTER: <http://csc.noaa.gov/>
Historical Hurricane Tracks: <http://www.csc.noaa.gov/hurricanes/>

OFFICE OF COAST SURVEY: <http://www.nauticalcharts.noaa.gov/>
Navigation Response Teams: <http://www.nauticalcharts.noaa.gov/nsd/nrb.htm>
Storm Surge & Coastal Inundation: <http://www.stormsurge.noaa.gov/index.html>

OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT: <http://coastalmanagement.noaa.gov/>

OFFICE OF RESPONSE AND RESTORATION: <http://response.restoration.noaa.gov>

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