

NOAA'S NATIONAL OCEAN SERVICE

Helping Communities Rebuild and Recover from Sandy

In October 2012, the hybrid cyclone-nor'easter known as Hurricane Sandy roared toward the mid-Atlantic Coast. Even as the hurricane transitioned to a post-tropical cyclone, wind, waves, and storm surge wreaked havoc along the Atlantic Coast, especially to the coasts of New York, New Jersey, and Connecticut.

NOAA's National Ocean Service brings a wealth of coastal science, management, and operational expertise to aid communities impacted by Sandy in their recovery. NOS is on the front lines to help America understand, predict, and respond to the challenges facing our oceans and coasts.

Positioning America for the Future

National Ocean Service: The nation's leader in integrated coastal management

The National Ocean Service (NOS) leads coastal management efforts across the nation and is the primary conduit for data and services at NOAA to support informed coastal decision making.

NOS has unique expertise in protecting coastal and estuarine habitat, reducing marine debris, and providing navigation, coastal mapping, observing, monitoring, and high-accuracy geospatial positioning services. In combination with our decision support, technical assistance, and training activities, NOS provides an unparalleled and powerful suite of resources and tools to aid recovery.

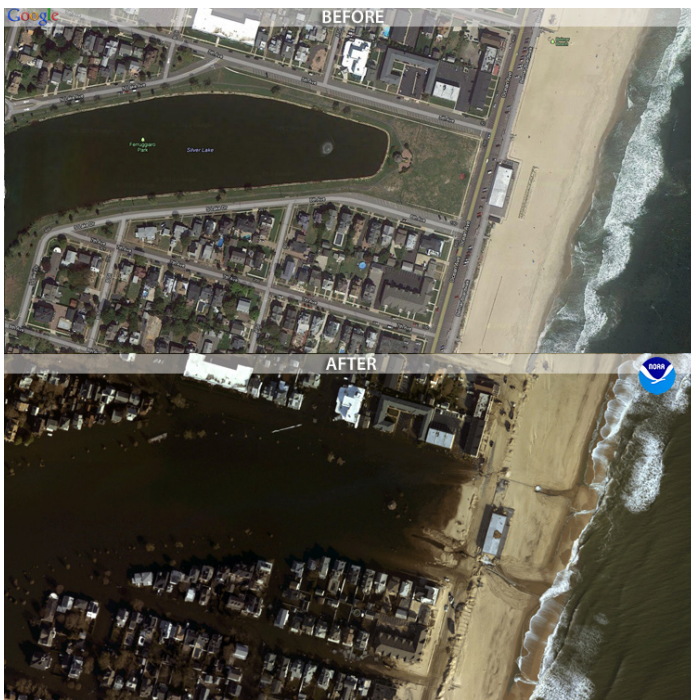
Through well-established networks, NOS works across NOAA (e.g. with National Weather Service, National Marine Fisheries Service, and NOAA Sea Grant) and with local, state, and other Federal agencies—including the U.S. Department of Housing and Urban Development, and the U.S. Army Corps of Engineers—to help rebuild more resilient and sustainable coastal communities that can adapt to and better mitigate the impacts of coastal hazards. NOS can also be tasked to assist in response and recovery efforts under the Department of Homeland Security National Response Framework.

The Coastal Zone Management Act calls on coastal states to minimize the loss of life and property from improper development in areas prone to flooding, storm surge, geological hazards, and erosion. Under the CZMA's Coastal Management, National Estuarine Research Reserve System (NERRS), and other authorities, NOS is charged with assisting state and local officials to ensure that post-Sandy redevelopment results in more resilient and sustainable coastal communities, economies, and ecosystems.



Flooded neighborhood in New Jersey after Sandy made landfall. Credit: Frank Csulak

NOS has an on-the-ground network



Geo-referenced aerial imagery taken by NOS shows the New Jersey coastline after the Hurricane Sandy made landfall. This and other NOS emergency response imagery is publicly available at: http://storms.ngs.noaa.gov/eri_page/index.html

NOS staff are located in the region and have long-standing relationships with all levels of government, with non-governmental organizations, the private sector, and academia. NOS staff work with Federal partners, port authorities, pilots, and local governments to conduct surveys that detect underwater obstructions and marine debris, and ensure safe navigation is maintained without duplicative work.

NOS also has personnel working at the Joint Field Offices in New Jersey and New York, who are assigned to the natural and cultural resource planning efforts, but are working across recovery planning teams (e.g. navigation and marine debris analysis, community planning, capacity building, and infrastructure systems). NOS participates on a number of interagency initiatives designed to effectively leverage resources and expertise and improve cost-effectiveness.

Key NOS partners – including state and local coastal managers, port specialists, emergency personnel, and other land and natural resource managers – are directly responsible for enhancing resilience. Examples include engaging in post-disaster planning; responding to marine debris events; making changes in land use and development rules; prioritizing land acquisition opportunities; developing and implementing habitat restoration plans; and promoting greener, more sustainable infrastructure.

NOS provides a suite of data, services, training, and technical assistance

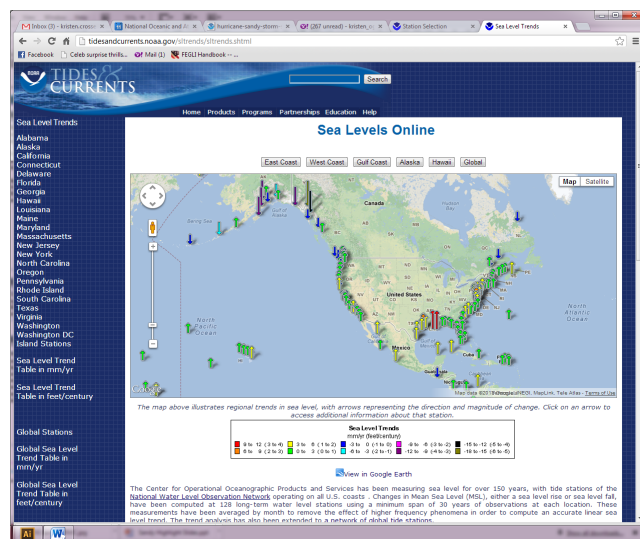
NOS provides a range of data, information, tools, training, and technical assistance to support coastal management. In conjunction with governmental and non-governmental counterparts, NOS is already taking steps to:

- **Convene stakeholders** to collectively identify priorities and define a path forward for rebuilding more resilient communities in the most efficient and effective manner.
- **Compile socioeconomic information and conduct analyses** to improve communication of risk and vulnerability, evaluate the costs and benefits of potential solutions, and inform decisions about rebuilding, economic development, and protection and restoration of coastal ecosystems.
- **Promote “green/gray” approaches** that incorporate natural habitats as part of the plan for rebuilding and protecting coastal infrastructure, including coastal and estuarine habitat restoration and planning for inland migration of wetlands.
- **Provide training and technical assistance** to help states and local communities apply the data, information, and tools for incorporating key resilience concepts into planning and rebuilding.

Precision Matters: NOS provides baseline, science-based services

In planning for a more resilient future, planners and managers require highly accurate and consistent geospatial positioning, water level, and geographic data. NOS provides baseline data to underpin and inform sound, science-based decision making.

- NOS maintains the country’s National Spatial Reference System, the national coordinate network for establishing longitude, latitude, and most importantly geospatial heights.
- NOS is the nation’s hydrographer and leading expert in integrated precision seafloor, bathymetric, and shoreline surveying; and charting and mapping for navigation safety, emergency response, and coastal zone science and management.
- NOS maintains the country’s National Water Level Observation Network, the long-term coastal water level stations for measuring tides and determining changes in water levels over multiple time scales.
- NOS conducts flights to collect high-resolution, geo-referenced imagery following certain natural and man-made disasters. The imagery is used to determine impacts to NOAA, as well as federal, state, local, and public interests.



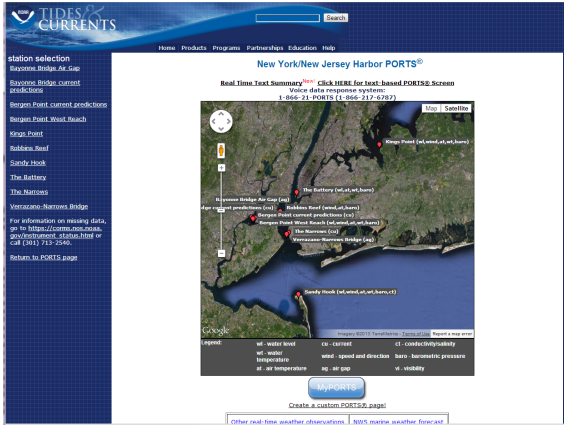
The Center for Operational Oceanographic Products and Services has been measuring sea level for over 150 years, with tide stations of the National Water Level Observation Network operating on all U.S. coasts.

NOS tools and services support every day and future coastal decision making

NOS integrates information into a suite of actionable products, tools, and services that are used daily by coastal decision makers at all levels of government, academia, and the private sector.

- NOS collects hydrography, shoreline photogrammetry, water levels, and precise geodetic positioning data in order to produce and maintain the nation’s suite of nautical charts, the essential and long-standing tool to inform safe and efficient marine navigation and a host of other coastal management decisions.
- NOS produces the national shoreline which provides critical baseline data for updating nautical charts, defining our nation’s territorial limits (including the Exclusive Economic Zone), and managing our coastal resources.
- As the nation’s hydrographer and leading expert in bathymetric and shoreline surveying, NOS conducts routine and rapid response hydrographic surveys to detect obstructions and marine debris in critical waterways to reduce the risk of a maritime accidents resulting in hazardous spills or shipping delays. NOS also provides modeling expertise for storm surge and inundation predictions vital to helping protect coastal populations in the future.

NOS tools and services support every day coastal decision making (cont.)



Location of New York/New Jersey Harbor PORTS®.

“IOOS data helped refine near-term forecasts and then allowed adjustments to coastal flood forecast impact procedures. Subsequently, coastal flood tables used to predict expected impact at selected locations were revised for the next major storm.”

NWS Weather Forecast Office, Taunton, MA

- NOS integrates real-time, quality controlled weather, water level, coastal current, air gap, salinity, freshwater inflow, and other data through the Physical Oceanographic Real Time System (PORTS®). PORTS provides mariners and other decision makers with Operational Forecast models that include nowcasts and forecasts of marine conditions in real time.
- NOS builds and maintains the Environmental Response Management Application (ERMA®). ERMA was used as the underlying geospatial platform for the response to the Deepwater Horizon oil spill, the ongoing response to marine debris from the 2011 tsunami in Japan, the response to Sandy, and other natural and manmade marine disasters.
- NOS maintains the nation’s longest standing coastal toxicology monitoring program, Mussel Watch, which provides the ability to monitor the level of toxins in coastal shellfish and sediments over time.
- NOS works with state partners to maintain the NERRS System-wide Monitoring Program, which provides continuous data on estuarine dissolved oxygen, nutrients, water depth, pH, wind speed, and other water quality and weather information. This program has been used for coastal management decision-making for almost two decades.
- NOS is the nation’s lead for implementing the Integrated Ocean Observing System (IOOS®). IOOS provides baseline data and coordinates shared standards to ensure a consistent flow of data and services across all levels of government and with regional partners.

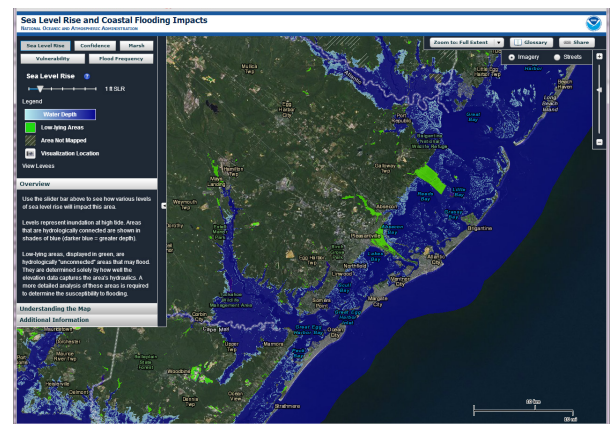
Digital Coast: Bringing it all together

NOS provides Digital Coast (www.csc.noaa.gov/digitalcoast/), an online access point for much of NOAA’s data and tools that will aid in Sandy recovery. The basic premise is that data alone are not enough. Planners need help turning data into information that can be used for making important decisions about coastal resources and areas. Digital Coast does just that with data, tools, case studies, stories from the field, and training in how to apply Digital Coastal resources including:

- Coastal socio-economic and land use change data
- Pre-Sandy (and eventually post-Sandy) LIDAR data
- Sea Level Rise and Coastal Flooding Impacts Viewer
- Coastal County Snapshots which assess a county’s resilience to flooding and the benefits provided by natural resources
- Risk and vulnerability assessments, and the Community Resilience Index
- Environmental Sensitivity Index (ESI) maps

Other Resources

- Long-term data sets on water quality, coastal habitat, and infrastructure to detect and monitor storm impacts (NERRS, www.nerrs.noaa.gov/)
- Policy analysis of shorefront management policies (coastalmanagement.noaa.gov/issues/hazards_activities.html#2)
- Smart Growth for Coastal and Waterfront Communities report (coastalsmartgrowth.noaa.gov/)
- Alternatives to Shoreline Hardening: The Shoreline Management Technical Assistance Toolbox (coastalmanagement.noaa.gov/shoreline.html)



NOAA’s Sea Level Rise and Coastal Flooding Impacts Viewer.