

NOAA Knows...

# Coastal Mapping

Since 1807, NOAA's Office of Coast Survey serves the mariners, industries, and communities that depend on safe coastal waters. Cartographers provide traditional charts and develop state-of-the-art applications that give mariners the information they need to navigate safely and efficiently.



1840 nautical chart.

Using the latest technologies, OCS surveyors map the sea floor, search the ocean for storm debris or accident wreckage, and record the natural features of coastal seabeds and fragile aquatic life.

Closer to shore, OCS scientists develop water circulation models. These models add to our knowledge of marine biology, simulate sea level rise effects in response to climate change, and help protect communities from coastal inundation.

## Providing the Nation's Nautical Charts

OCS is the nation's chartmaker, serving America's maritime interests from the U.S. coasts to the reaches of the continental shelf. From the traditional paper charts to the latest electronic applications, NOAA's charts provide mariners – both commercial and recreational – with the information they need to navigate safely and efficiently through U.S. ports and along our coastlines.

Safe navigation is a challenge on a clear day. It becomes even more difficult when piloting a ship at

night, in a storm, or on foggy days. Mariners need the latest information on water depths and shoreline information, as well as information on light and buoy aid locations.



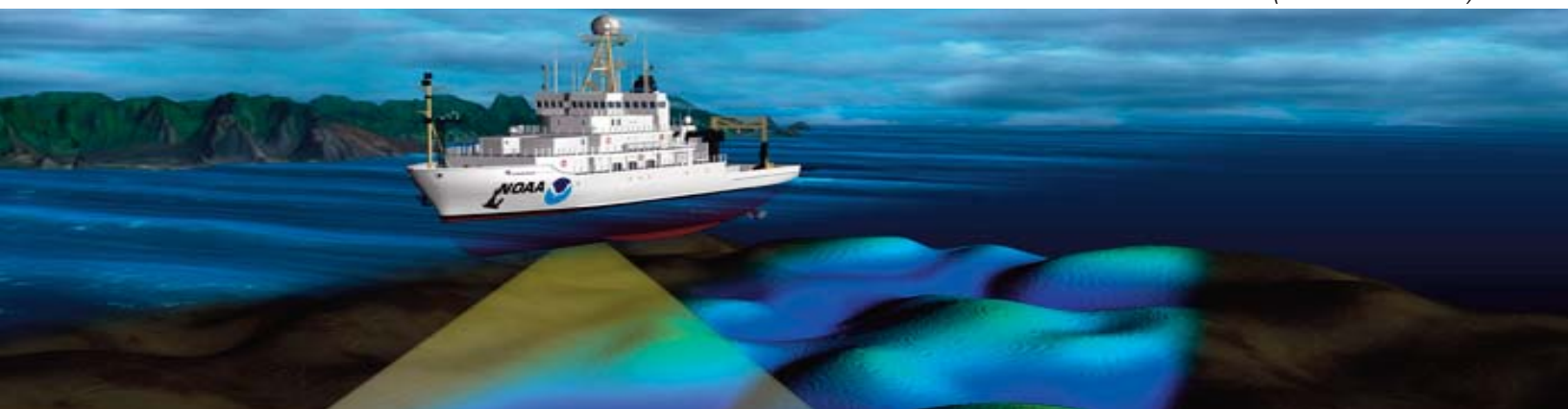
On a more advanced level, commercial mariners also need to know traffic separation schemes in port areas, and the locations and restrictions of protected marine sanctuaries. Much like today's popular electronic road maps, nautical charts can convey the fundamentals or, in the latest evolution, provide several important levels of functionality.

Mariners can integrate NOAA electronic nautical charts (ENCs) with global positioning system satellite data and other sensor information – like radar, water levels, winds, and weather – to support informed decision-making. Available free online at [www.nauticalcharts.noaa.gov](http://www.nauticalcharts.noaa.gov), ENCs meet the increasingly sophisticated technological demands of mariners.

## Surveying the Sea Floor

Climate change, sea level rise, bigger ships, and busier waterways are just a few of the pressures facing the nation's marine transportation system. To help ports, shippers, mariners, coastal zone scientists and communities manage these growing impacts on 3.4 million square nautical miles of constantly changing environment, OCS surveys the coastal areas of critical importance.

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Using multi-beam and side-scan soundings, surveys determine water depths and find submerged dangers to navigation. Surveyors locate obstructions like wrecks, rocks, and seabed changes made from earthquakes and storms. Multi-beam soundings measure the depth of the sea floor by analyzing the time it takes for sound waves to travel from a boat to the sea floor and back. Side scans create an image by analyzing the strength of a return echo over a short time.

The data collected by the surveys is used for creating nautical charts and, increasingly, for habitat characterization, fisheries management, and archeological documentation. All surveys are safely stored for future analysis or for emerging uses.

## Responding to Disasters

Living through a hurricane can be dangerous. To mariners, port navigation after the hurricane can be just as deadly – or economically debilitating – if debris and changes in the ocean floor go undetected. Groundings and other maritime accidents require investigations and searches for navigational obstructions. NOAA's Office of Coast Survey works with government and private nautical partners to respond to these emergencies.



OCS can move quickly. The agency's six Navigation Response Teams are mobile emergency teams who survey ports and near-shore waterways immediately following accidents or storms. The teams search for submerged vessels, pieces of oil rigs, or any other debris or wreckage that poses a danger to navigation.

When hurricanes and strong storms make landfall they often bring stronger than normal ocean currents that also can shift navigational channels. Not detecting natural changes made to the ocean floor during storm events can be just as dangerous as hidden debris, so OCS response teams look for those changes as well.

Each three-person crew uses conventional surveying technology to provide the assurances that restore safe navigational access. They also use the latest technology, like hydrographic autonomous underwater vehicles that can be deployed from shore, pier, or support vehicles.

## Helping to Protect Coastal Communities

Coastal communities face dynamic environmental conditions, and they must manage threats and adapt to changing settings. Coastal flooding threatens lives, communities, and local economies by damaging maritime and coastal infrastructure. Ecosystems must be healthy and used appropriately. Marine geospatial planning, which supports effective planning for national and local economies, requires expertise in mapping, marine observations, assessments, models, monitoring, and evaluation. The Office of Coast Survey plays a key role in these activities.

NOAA's Coast Survey Development Laboratory is a world leader in applying hydrodynamic models and developing operational forecast systems in estuaries and the coastal ocean. These modeling systems support safe and efficient navigation and coastal management, including extreme events, long-term change, and ecosystem applications.

OCS developed a model that simulates sea level rise effects on coasts and ecosystems. Another OCS model provides new methods for predicting and analyzing for coastal inundation to improve coastal resiliency. OCS models also drive ecological forecasts that enable smart use and management. Many coastal habitats and species are significantly affected by their environmental conditions, such as the surrounding water temperature, salinity, and current velocity. Hydrodynamic models can predict those variables.

For more information about NOAA's Coast Survey, visit <http://www.nauticalcharts.noaa.gov>.

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