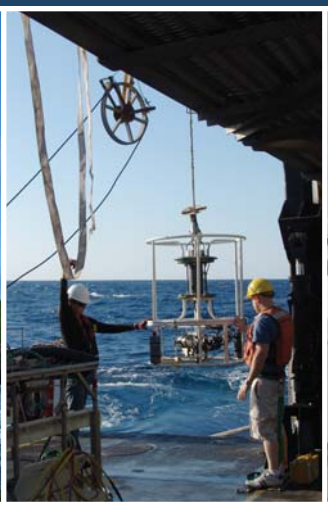
The National Ocean Service

2008 Annual Report



America's Oceans and Coasts: Safe, Healthy, and Productive



Message from the Assistant Administrator

"America's oceans and coasts safe, healthy, and productive." These words are more than just a phrase for the people of the National Ocean Service (NOS) – they represent our mission, our passion, and a seemingly simple idea that keeps us moving towards a common goal.

NOS is proud to highlight our annual accomplishments and the value of these efforts in reaching that goal, and in the pages that follow, we recount some of the ways that we are seeking solutions to the challenges facing America's 95,000 miles of shoreline and 3.5 million square miles of coastal, Great Lakes, and deep-ocean waters.

From climate change, sea-level rise, storms, and marine debris, to pollution, port congestion, and population growth, the demand on our fragile resources continues to grow, threatening not only the health of the coasts and ocean, but human health as well. The people at NOS are tackling these challenges and remain dedicated to growing our Nation's coastal economy while sustaining a healthy and productive environment.

In 2008, we worked to keep coastal communities safe, responding to nearly 180 hazardous spill incidents, restoring damaged resources, and delivering the tools, information, and training needed to help coastal managers do their jobs better. We continued to assess the effects of natural hazards on coastal areas, and, along the Gulf Coast, we installed four hurricane-hardened structures to collect essential water-level data during extreme coastal storm events.

Observing is the foundation of understanding, and as we learn more about our oceans and coasts, we will be better prepared to respond to changes such as sea-level rise and habitat loss. To this end, over the last year, we made great strides in refining the NOAA Integrated Ocean Observing System Program, providing new tools and resources to develop standards for data management and communications. These data standards are a critical piece to ensuring that ocean observations collected from different sources are compatible. We are ultimately working to build a national system to better understand and forecast ocean and coastal changes and their impacts.

Because our waterways form the backbone of our national commerce system, in 2008, we took initial steps to upgrade and modernize NOS's hydrographic data collection fleet. The increased speed and capability of these vessels will allow us to collect hydrographic data to produce the Nation's nautical charts. In addition, the Physical Oceanographic Real-Time System® was expanded to four new locations in the Gulf of Mexico, helping to further ensure smooth traveling along our Nation's marine highway.



In order to keep you and your family safe, the people at NOS conducted research on increased occurrences of bacteria and disease in coastal areas and explored techniques to address problems such as coastal pollution. We funded research to predict both the larger-than-normal harmful algal bloom in the Gulf of Maine and the largest "dead zone" in the Gulf of Mexico in the summer of 2008. These predictions helped local communities prepare for these events, reduce economic losses, protect human health, and overall serve as the scientific foundation for management efforts.

And finally, to protect the marine and coastal areas that are special for their aesthetic, recreational, ecological, cultural, and economic value, we worked to develop innovative science and technology solutions to solve coastal problems. In 2008, NOS scientists released a major report assessing the condition of coral reef ecosystems, showing that nearly half of the Nation's coral reefs are now considered to be in "poor" or "fair" condition. NOS commemorated the designation of the Papahānaumokuākea Marine National Monument in Hawaii as a Particularly Sensitive Sea Area to support conservation of this nearly 4,500-square-mile pristine coral reef habitat, and we worked with nations around the world to protect other sensitive marine ecosystems.

I ask that you read this year's accomplishments to gain a fuller appreciation of the scope and reach of the NOS mission. We continue to make great strides towards our goal, and we are excited about what we will accomplish in the coming year.

While this report highlights many activities for 2008, it does not come close to capturing the energy, hard work, and passion the men and women of this great organization bring to bear upon our critical mission each and every day. Together with our partners, I am confident that we will overcome the challenges facing our oceans and coasts.

Together, we will keep America's oceans coasts safe, healthy, and productive—today and for future generations.

John H. Dunnigan
Assistant Administrator
National Ocean Service




Protecting Coastal Communities

The narrow fringe of our Nation's coast covers less than 20 percent of our land area yet is home to more than half of all Americans. As more people move to live in this finite coastal space, coastal communities become more vulnerable to threats such as coastal storms and climate change.

During fiscal year 2008, the diverse expertise, products, and services that are the hallmark of the National Ocean Service helped keep Americans along the coast safer. Highlights from the year include:

- Responding to **nearly 180 hazardous spill incidents**, including the M/V *Cosco Busan* spill in San Francisco Bay, California; the release of an estimated 419,000 gallons of fuel oil on the Mississippi River near New Orleans, Louisiana; and hundreds of reported spills that occurred as a result of Hurricanes Ike and Gustav. In addition to maximizing recovery efforts and minimizing environmental damage after these spills, NOS assessed injured resources and **began the restoration process**.

- Installing **NOAA "Sentinels of the Coast"** at four locations in the Gulf of Mexico. These water-level observing stations are built to withstand Category 4 hurricanes and deliver real-time storm-tide data during severe coastal weather events. NOAA water-level and meteorological data are key components of coastal decision making before, during, and after major storms.

- Releasing a 20-year study that shows that **environmental laws have had a positive effect** on reducing overall contaminant levels in U.S. coastal waters. The report, which presents findings in a quick-reference format, nevertheless points to continuing concerns with **elevated levels of metals and organic contaminants** found near urban and industrial areas of the coasts.

- Making **land-cover change maps and information available** for nearly all developed areas of the Nation's coasts. These data show how much of a region is covered by forests, wetlands, impervious surfaces, and other land and water types and can be used to document trends and changes over time. Land-use information is important for understanding and managing coastal change. The data are online at *http://www.csc.noaa.gov/landcover/*.

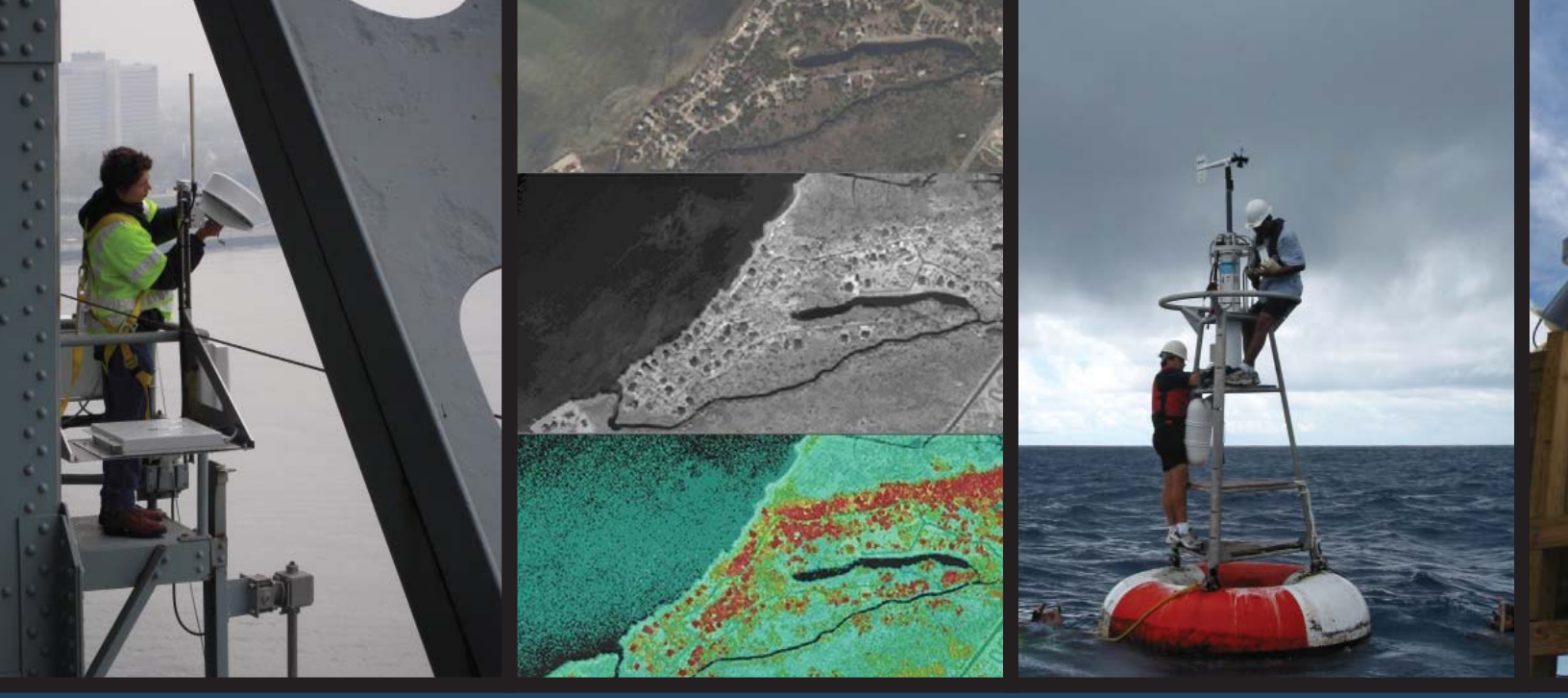
The challenge for NOS is to understand, protect, and manage coastal areas to make coastal communities safer and more sustainable. In rising to this challenge, NOS is working to enhance coastal resiliency in the face of natural disasters and climate change, to minimize the environmental, social, and economic impacts from coastal hazards. NOS is also protecting and restoring coastal habitats, reducing impacts associated with coastal development and other uses, and protecting coastal water quality and quantity to prevent illness and sustain ecosystems.

- Finding and reporting **navigation hazards throughout the Nation's waterways.** From charting and notifying mariners about a 600-pound World War II-era torpedo in the Gulf of Mexico to locating for removal 600 tons of rock hazards from the entrance to Port Fourchon, Louisiana, NOS was hard at work responding to survey requests near some of the Nation's busiest ports.

- Providing **Federal leadership in support of the Gulf of Mexico Alliance** and its regional priorities. Alabama, Florida, Louisiana, Mississippi, and Texas initiated the Gulf Alliance in 2004 with the goal of increasing regional collaboration to enhance the environmental and economic health of the Gulf of Mexico. NOAA played a key role in implementing many actions identified in the *Governors' Action Plan for Healthy and Resilient Coasts* and supported efforts to develop **actions centered on coastal community resilience.**

- Releasing **draft management plans** for the Papahānaumokuākea Marine National Monument in Hawaii and Stellwagen Bank National Marine Sanctuary off the coast of Massachusetts. The plans lay the foundation for **protecting these marine areas** and recommend actions to better manage each area and its resources.

- Beginning, in cooperation with coastal states, to track habitat conservation performance measures to better communicate the National Coastal Zone Management Program's role in **conserving coastal habitat.** Habitat conservation is increasingly important as populations in the Nation's coastal zone continue to grow.



Observing Our Oceans & Coasts

Our planet is constantly changing. Right now, it is changing quickly and in ways that are impacting society. Despite this fact, our oceans, which cover more then 70 percent of our planet, remain poorly understood. And much of what we do know about the oceans is fragmented.

In fiscal year 2008, NOS made great strides in collecting observations to improve our knowledge of ocean and coastal changes. Highlights from 2008 include:

- Providing, through the NOAA Integrated Ocean Observing System (IOOS®) Program (part of NOS), **new tools and resources to enhance the development of standards for data management and communications**. IOOS partners now have access to a set of Web-based tools to simplify the process of submitting proposed new standards. Data standards ensure that ocean observations collected from multiple sources are compatible, an essential component of building IOOS.

- Beginning the **installation of a sentinel climate change monitoring network** that will monitor coastal land elevations in relation to local sea level throughout the National Estuarine Research Reserve System. In the coming years, the goal is to expand the program to include all reserves within the system, to establish the reserves as "sentinel" sites for measuring and monitoring the **impacts of climate change on estuarine systems**.

- Leading efforts to **make selected ocean observation data compatible**, thereby increasing their value and utility for decision-support tools, products, and services. Last year, NOAA IOOS focused on a set of five observations, including temperature, salinity, water level, currents, and ocean color, and targeted harmful algal bloom forecasts, coastal flooding predictions, integrated ecosystem assessments, and hurricane intensity forecasts for data delivery.

- Releasing a **new version of the Web mapping portal NowCOAST** (*http://nowcoast.noaa.gov/*) that provides users with near real-time coastal environmental information, including weather forecasts and global sea-surface temperature analyses. NowCOAST is used to help recreational and commercial mariners, emergency responders, coastal managers, coastal ocean modelers, marine educators, and others plan and manage coastal uses.

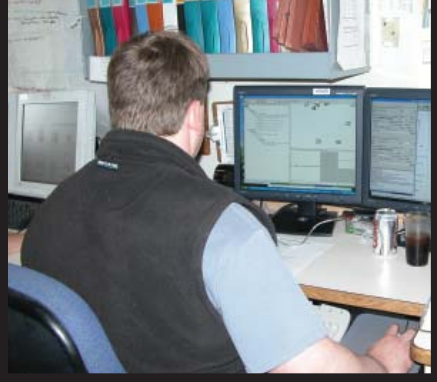
NOS is filling the gaps in information needed to better understand and forecast ocean and coastal changes and their impacts on commerce and transportation, weather and climate, and ecosystems. Central to these efforts is the establishment of an Integrated Ocean Observing System to coordinate and disseminate data and information to decision makers so that they can take action to improve safety, enhance our economy, and protect our environment.

- Initiating a two-year effort to **add meteorological sensors to National Water Level Observation Network stations**, with 25 stations upgraded in fiscal year 2008. The upgrades included the installation of wind, barometric pressure, and air temperature sensors, followed by monitoring and validation of the data. NOAA water-level and meteorological data have long been key components of coastal decision making.

- **Supporting NOAA's Integrated Ocean and Coastal Mapping initiative** to serve the greatest possible range of ocean and coastal geospatial data users through partnerships, the development of common standards, and technological innovation. Pilot projects in North Carolina, New Hampshire, and Alaska helped enhance ocean and coastal mapping activities and **maximize the usefulness of the data and products.**

- **Expanding the Physical Oceanographic Real-Time System** (PORTS®) to four new locations in the Gulf of Mexico and on the West Coast while enhancing existing PORTS® along some of the Nation's busiest waterways. NOAA PORTS® provides accurate, real-time ocean and weather data to mariners to enhance safe and efficient marine transportation. PORTS® data are accessible online at *http://tidesandcurrents.noaa.gov/ports.html*.

- Awarding funding to various partners to help **develop a national network of 11 Regional Coastal Ocean Observing Systems** and management structures. Transitioning regions to a national network of observing systems and management structures will help expand the network of ocean-related observations, data, and products available and meet regionally specific needs.



Supporting Marine Transportation

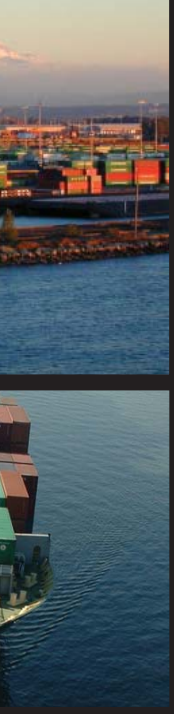
Each year, the U.S. marine transportation system conveys 95 percent of U.S. foreign trade by volume, moves two billion tons of freight, transports millions of people, contributes over $700 billion to the U.S. gross domestic product, and provides more than 13 million jobs. Yet America's ports – our lifelines for commerce, trade, and the economy – are highly congested, increasing the risk of accidents and environmental harm.

In fiscal year 2008, NOS continued to support the Nation's commerce with information for marine transportation. Highlights from the year include:

- **Releasing a new version of the Online Positioning User Service** (OPUS). By using as little as 15 minutes' worth of dual-frequency Global Positioning System (GPS) data, the new version, known as OPUS-Rapid Static (OPUS-RS), saves time and money relative to the standard OPUS, which requires at least two hours of GPS data. OPUS and OPUS-RS allow users to submit their GPS observations to NOAA, where the data are processed to determine corresponding three-dimensional positional coordinates. Each OPUS solution is estimated to save the user $600 over traditional positioning methods.

- Helping to organize and participating in an international workshop to develop a draft standard for **displaying environmental information on electronic navigational charts** (ENCs). Participants came to consensus on a draft proposal to display information on marine protected areas and coral reef ecosystems on ENCs that will be refined and submitted for approval to an International Hydrographic Organization committee. Such efforts are important in **preventing ships from damaging delicate marine ecosystems.**

- **Releasing three new products that use data from the Physical Oceanographic Real-Time System** (PORTS®), including a Web site that delivers a brief paragraph capturing the conditions of an estuary, port, or harbor in real time; a Web site that allows users to customize their PORTS® displays to include plots from any station and data type; and an application that allows PORTS® users with Internet access on their mobile phones to view data products directly on these devices.



Now more than ever, the tools and information developed by the National Ocean Service are required to keep marine transportation safe, efficient, and environmentally sound. From producing and updating nautical charts to managing the Nation's geospatial reference system, providing accurate positioning information, delivering real-time oceanographic information, and surveying our shoreline, NOS is there to ensure smooth traveling along the Nation's marine highways.

- **Launching a new multimedia elementary educational program, *Nautical Charts***, to teach budding mariners in grades 3 through 5 about chart symbols, boating safety, and why nautical charts are important. *Nautical Charts* is online at *http://oceanservice.noaa.gov/education/nautical_charts/*.

- Continuing **work with Guatemala, Honduras, and Belize to improve surveying and charting** capabilities in the face of increased shipping traffic through the Gulf of Honduras. The countries are also pursuing Particularly Sensitive Sea Area designations to bring international attention to the Gulf's unique resources, including the Mesoamerican Great Barrier Reef, and to facilitate safer, environmentally sensitive maritime commerce.

- Launching plans to replace existing surveying vessels and **upgrade and modernize NOS's hydrographic data collection fleet**. Two new vessels are currently under construction and the NOAA Ship *Rainier* added a new survey launch that features increased speed, expanded deck space, and an updated interior layout. The work of these vessels is central to collecting the hydrographic data needed to **produce the Nation's nautical charts** and ensure safe navigation.

- **Advancing efforts to protect blue whales** in the Santa Barbara Channel, California, following the deaths of five blue whales within the Channel Islands National Marine Sanctuary during 2007. NOS forwarded a draft emergency response plan to members of a special Subcommittee of the Sanctuary Advisory Council. The plan calls for increased surveillance, improved coordinated response to possible strandings, and the initiation of precautionary management actions.

- Beginning **test flights of an airborne gravimeter** in support of the Gravity for the Redefinition of the American Vertical Datum (GRAV-D) program. GRAV-D is an effort to use gravity data to redefine the vertical datum of the United States by 2017. The GRAV-D program will allow NOAA to increase the accuracy of the geoid model and, ultimately, give users the ability to **use GPS to determine elevations relative to sea level**.





Reducing Ocean & Coastal Health Risks

What happens in our oceans and on our coasts can have a direct impact on our health. Blooms of toxic algae, more frequent occurrences of bacteria and disease in waters, and increased chemical and nutrient pollution are putting hundreds of millions of people in danger.

NOS is working to protect the health of all Americans as well as marine life and the economies that depend on healthy ocean and coastal marine resources. Highlights from fiscal year 2008 include:

- Funding research that **predicted that the 2008 hypoxic zone, or "dead zone," in the northern Gulf of Mexico would be the largest on record**. Later research found that the actual size of this low-oxygen zone was slightly smaller than predicted, but was still the second-largest dead zone on record. The Gulf of Mexico dead zone threatens commercial and recreational fisheries. Predictions of the dead zone's size help determine relationships between hypoxia and nutrient pollution and provide the scientific foundation for management efforts.

- Hosting a workshop to **address land-based sources of pollution in China's Xiamen Bay and Juilong River**. These important ecosystems are impacted by pollutant loading from excessive application of agricultural nutrients and pesticides, sedimentation and soil erosion, and domestic waste-disposal practices. The workshop focused on developing a plan of action to address these problems.

- Testing the **incorporation of surface currents data into the Harmful Algal Bloom Forecasting System** (HAB-FS). HAB-FS partners are working with the NOAA Integrated Ocean Observing System Program to receive the currents data. Including currents data in the forecasting system is one step toward **improving prediction of HABs**. Better prediction of HABs has a direct bearing on the tourism industry, public health and safety, fishing and aquaculture industries, and the management of threatened and endangered species.

- Providing specialized assistance to coastal managers and other stakeholders to enhance the effectiveness of local management and planning to **address land-based sources of pollution that threaten coral reef ecosystems**. Efforts included hosting a workshop on managing island watersheds in Guam and establishing pilot projects in the U.S. Virgin Islands and Puerto Rico to improve water quality and reduce sediment runoff near coral reefs.

The National Ocean Service strives to predict, manage, and prevent ocean and coastal health risks. NOS provides early-warning systems and forecasts to reduce risks of exposure to contaminants and builds networks to monitor and evaluate illness in people and marine animals. Biological and chemical sensors help measure threats to public health, and NOS research is establishing links between land use and chemicals in the marine environment.

- Funding the **first-ever prediction of a larger-than-normal harmful algal bloom** in the Gulf of Maine in the summer of 2008. The prediction allowed shellfish farmers and fishermen to shift the timing of their harvests and state resource and public health managers to make better decisions regarding closures of shellfish beds. These efforts helped **reduce economic losses from the bloom** and prevented people from eating contaminated shellfish and getting sick.

- Approving, in partnership with the U.S. Environmental Protection Agency, Coastal Nonpoint Pollution Control Programs for South Carolina and Florida. Congress established this program in 1990 to encourage better coordination between state coastal zone managers and water-quality experts to **reduce polluted runoff in the coastal zone**. Twenty-one of the 34 coastal states and territories now have fully approved Coastal Nonpoint Pollution Programs.

- **Investigating environmental contaminants in and around the National Reserve Fleet** in Suisun Bay, California. More than 70 vessels make up the fleet, which is maintained by the United States Maritime Administration for national defense or emergency purposes. NOAA is working with all involved stakeholders to evaluate potential environmental concerns, including heavy metals and antifouling agents in paint that is peeling off of the vessels.





Protecting Coastal & Marine Places

With expansive beaches and a seemingly endless horizon of blue water, the beauty of ocean and coastal areas is hard to dispute. Yet we rarely think about our dependence on coastal resources to satisfy our ever-increasing appetites for energy, food, goods, and services.

During the 2008 fiscal year, NOS remained on the front lines to protect our Nation's coastal and marine places. Some 2008 highlights include:

- Commemorating the **designation of the Papahānaumokuākea Marine National Monument as a Particularly Sensitive Sea Area** (PSSA) by the International Maritime Organization, a specialized agency of the United Nations. The monument, which provides habitat for more than 7,000 marine species and contains 4,500 square miles of pristine coral reefs in the Northwestern Hawaiian Islands, is the twelfth PSSA in the world. The PSSA designation deems an area deserving of special protection because of its ecological, socioeconomic, or scientific significance and its potential vulnerability to damage from international maritime activities.

- Publishing new editions of **nautical charts that depict the boundaries of the Papahānaumokuākea Marine National Monument**, the newly designated PSSA, Ship Reporting System Areas, and special zones known as "Areas to be Avoided." The updated nautical charts will help mariners navigate the waters of the monument's remote and pristine 1,200-mile stretch of coral islands, seamounts, banks, and shoals.

- **Assisting Trinidad and Tobago in the development of a National Program of Action** (NPA) to improve watershed management and protect coastal resources. An NPA provides a framework for coastal management and is a national plan to prevent, reduce, control, and/or eliminate marine degradation from land-based activities. NOS helped identify major land-based pollution sources and refined specific actions to mitigate pollutant impacts on Trinidad and Tobago.

To balance environmental conservation, economic development, and recreational enjoyment of ocean and coastal resources, the National Ocean Service is protecting 13 national marine sanctuaries, one national marine monument, 27 national estuarine research reserves, and a network of other marine protected areas. NOS is working to identify, reduce, and prevent marine debris and to increase our understanding of coral bleaching and disease while taking steps to conserve these "rainforests of the sea."

- Organizing the **fifth annual NOAA Restoration Day**, where 200 NOAA employees and partners worked to restore a site in Maryland and a site in Virginia. Restoration activities included planting underwater Bay grasses, seeding native oysters on an offshore reef, planting over 2,000 wetland plants, performing coastal-bottom mapping via boat, clearing brush, and fish seining.

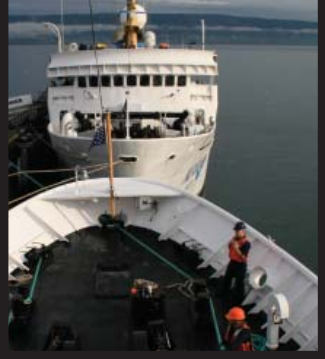
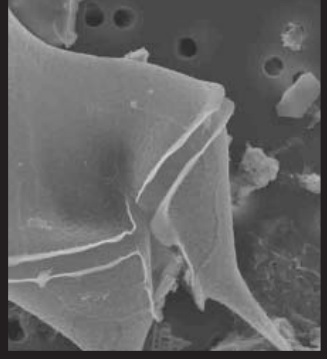
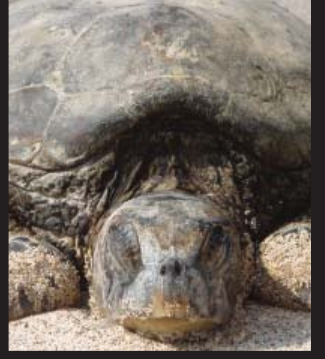
- **Protecting over 8,000 acres of critical coastal habitat** – including 35 properties – through the Coastal and Estuarine Land Conservation Program (CELCP). Five new CELCP projects were selected for funding during the year; projects were chosen based on their contributions to ecological conservation, recreational opportunities, aesthetic and historical significance, and technical and scientific merits, among other criteria.

- Leading a scientific **research expedition to the site of the remains of three sunken German submarines** off the coast of North Carolina. As part of an effort to properly document and protect the wrecks, NOS conducted a non-invasive archaeological survey that included photo documentation of the vessels' visible sections and the biological communities found at the sites.

- Working to **reduce the amount of unused fishing gear in fishing communities** and the marine environment through the Fishing for Energy Project. This partnership project provides a place for a fishing community to dispose of, at no cost, old or derelict fishing gear recovered while at sea. New Bedford, Massachusetts, was the first port on the Eastern Seaboard to launch the program, with four sites added and plans to expand to the entire East Coast.

- Releasing *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008*, a report assessing the condition of coral reef ecosystems in 15 locations ranging from the U.S. Caribbean and Gulf of Mexico to the western Pacific. Research in the report shows that **nearly half of the Nation's coral reefs are now considered to be in "poor" or "fair" condition**.



The National Ocean Service at a Glance

We value your interest, questions, and comments. Please feel free to contact us.
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NOAA COASTAL SERVICES CENTER (CSC)
(843) 740-1200
http://csc.noaa.gov
CSC provides skills and information resources to state and local coastal resource managers, supporting issues such as hazards, habitats, sustainable communities, and data and information access and usability.

CENTER for OPERATIONAL OCEANOGRAPHIC PRODUCTS and SERVICES (CO-OPS)
(301) 713-2981
http://tidesandcurrents.noaa.gov
CO-OPS collects and distributes observations and predictions, including tides and currents, to ensure safe, efficient, and environmentally sound maritime commerce.

NATIONAL CENTERS for COASTAL OCEAN SCIENCE (NCCOS)
(301) 713-3020
http://coastalscience.noaa.gov
NCCOS conducts and supports research, monitoring, assessment, and technical assistance for managing coastal ecosystems and society's use of them.

OFFICE of COAST SURVEY (OCS)
(301) 713-2770
http://nauticalcharts.noaa.gov
OCS is the Nation's nautical chart maker – collecting, managing, and compiling the data and information necessary to maintain the national suite of over 1,000 nautical charts.

NATIONAL GEODETIC SURVEY (NGS)
(301) 713-3242
http://geodesy.noaa.gov
NGS develops and maintains a national system of positioning data needed for transportation, navigation, and communication systems; mapping and charting efforts; and defense operations.

OFFICE of NATIONAL MARINE SANCTUARIES (ONMS)
(301) 713-3125
http://sanctuaries.noaa.gov
ONMS protects and manages 13 sanctuaries and one marine national monument, which together encompass more than 150,000 square miles of U.S. ocean.

OFFICE of OCEAN and COASTAL RESOURCE MANAGEMENT (OCRM)
(301) 713-3155
http://coastalmanagement.noaa.gov
OCRM provides leadership to state and territorial coastal programs, manages a national system of marine protected areas, and supports management and science to protect coral ecosystems.

OFFICE of RESPONSE and RESTORATION (OR&R)
(301) 713-2989
http://response.restoration.noaa.gov
OR&R works to prevent and mitigate harm to coastal resources, responding to oil spills and hazardous material releases and working to restore damaged coastal resources.

NOAA INTEGRATED OCEAN OBSERVING SYSTEM (IOOS®) PROGRAM
(301) 427-2420
http://ioos.noaa.gov
NOAA IOOS® supports the development of a coordinated network of people and technology working together to generate and disseminate continuous data on coastal waters, the Great Lakes, and the oceans.

INTERNATIONAL PROGRAM OFFICE (IPO)
(301) 713-3078
http://nosinternational.noaa.gov
IPO is the focal point for NOS's international activities to enhance U.S. and international partnerships and capabilities for ocean and coastal management.

NOS MANAGEMENT and BUDGET OFFICE (MBO)
(301) 713-3056
MBO is the focal point for planning, management, budget, internal and external communication, and education activities of the National Ocean Service.

Thank you to all of the National Ocean Service employees, family members, and friends who contributed to this publication. Photo contributors include: Robert Schwemmer, Claire Fackler, Steve Sellers (Eastern Carolina University), NCCOS's Center for Coastal Environmental Health and Biomolecular Research, the U.S. Coast Guard, the U.S. Maritime Administration, and numerous other people and groups not listed here.

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