

NATIONAL OCEAN SERVICE | 2009

A N N U A L R E P O R T





THE NATIONAL OCEAN SERVICE:

HEALTHY COASTS, HEALTHY ECONOMY

America's oceans, coasts, and Great Lakes play a vital role in the life of every American; yet these areas are facing unprecedented threats. During fiscal year 2009, the National Ocean Service (NOS) remained on the front lines in understanding, predicting, and responding to the challenges facing our oceans and coasts.

PROTECTING COASTAL COMMUNITIES: From continuing to deliver positioning data with benefits in the billions of dollars, to providing data to help the U.S. Coast Guard find those lost at sea, educating students about climate change, and delivering tools to help communities make “smart growth” decisions, we helped to make coastal communities safer and more sustainable.

OBSERVING OUR OCEANS & COASTS: To help increase understanding of our ever-changing planet and how changes impact our society, in 2009, we expanded our National Water Level Observation Network and awarded \$21 million to support the development of a network of regional observing systems. Efforts such as the California Seafloor Mapping Project and the establishment of absolute gravity stations in Puerto Rico and the U.S. Virgin Islands are helping us to better understand ocean, coastal, and Great Lakes changes and their impacts.

SUPPORTING MARINE TRANSPORTATION: Over the past year, we responded to survey requests in some of our nation's busiest ports, expanded the Physical Oceanographic Real-Time System, studied how changes in the warming Arctic will impact shipping, adopted a system that will revolutionize how we produce nautical charts, and more—all aimed at ensuring that marine transportation is safe, efficient, and environmentally sound.

REDUCING OCEAN & COASTAL HEALTH RISKS: To predict, manage, and prevent ocean and coastal health risks, we supported efforts to provide advance warning of harmful algal blooms in the Gulf of Maine, released the first-ever comprehensive report of the level of flame retardant chemicals found in U.S. coastal waters, and worked with international partners to develop a strategy to address environmental issues in the Caribbean. As we have learned, our activities impact the health of ocean and coastal areas, and the health of these areas impact us.

PROTECTING COASTAL & MARINE PLACES: Ocean and coastal areas play such an important role in all of our lives, and to ensure that these resources are available today and well in to the future, we must balance environmental conservation, economic development, and recreational enjoyment of ocean and coastal resources. Steps such as expanding the Monterey Bay National Marine Sanctuary, focusing coral reef conservation activities through on-the-ground and in-the-water action, and restoring more than 2,500 acres of coastal wetlands in Texas are just a few of the many actions we took in 2009 to protect coastal and marine places.

From protecting our nation's beaches and marine life, to mapping and charting waters for mariners to use to stay safe at sea, restoring damaged resources, and so much more, in 2009, the National Ocean Service continued to lead federal efforts to keep America's oceans and coasts safe, healthy, and productive.



PROTECTING COASTAL COMMUNITIES

So many of us call the coast our home. In fact, over half of all Americans live along the narrow fringe of our nation's coast. Unfortunately, more people mean more vulnerability from increasing threats due to things such as storms and climate change. We must be increasingly vigilant in protecting the communities that call the coast home.

During fiscal year 2009, 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:

- Serving as one of the lead authors on the U.S. Climate Change Science Program report *Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid-Atlantic Region*. The report assesses the **effects of sea-level rise on coastal environments**, finding that rising water levels are already negatively impacting coastal areas and that the effects of sea-level rise will be increased if the rate of rise accelerates in the future. Also presented in the report are some of the challenges that will need to be addressed to **adapt to sea-level rise**.
- Continuing to deliver positioning services that **provide billions of dollars in benefits**. A report released in 2009 estimated the annual benefits of the National Spatial Reference System at \$2.4 billion, the Continuously Operating Reference Station network at \$758 million, and the completion of the Gravity for the Re-definition of the American Vertical Datum (GRAV-D) project at \$282 million. These positioning activities are central to the spatial framework of our nation — the framework that provides the **foundation for better commerce, a stronger economy, and safer communities**.
- Working with partners to develop the Hawaii Flood Response Tool to **bolster Hawaii's ability to respond to floods and flood threats**. This geographic information system (GIS) application for emergency managers provides centralized access to real-time data such as satellite and radar imagery, precipitation levels, and streamflow information. This information can be easily paired with local GIS data to help emergency managers and first responders make critical decisions related to flood events.

- Improving our ability to **forecast the annual low-oxygen “dead zone” in the Gulf of Mexico**. The dead zone forms every summer and threatens valuable commercial and recreational Gulf fisheries by destroying critical habitat. Based on models utilizing data from the U.S. Geological Survey on river flows and nutrient concentrations, NOS-funded scientists predicted a larger-than-normal dead zone for 2009.
- Providing ocean observing data to the U.S. Coast Guard’s operational Search and Rescue Optimal Planning System. The data, including information about the speed and direction of ocean surface currents in real time, **enhances the ability to track the probable paths of those lost at sea** and is expected to **improve search and rescue efforts** along the Mid-Atlantic U.S. coastline. The data can also be used to support other scientific work, such as oil spill response, harmful algal bloom monitoring, and water quality assessments.
- Partnering with other federal agencies to update the *Climate Change Toolkit: Wildlife and Wildlands*, which provides resources for formal and informal educators to teach middle school students about how **climate change is affecting our nation's wildlife and public lands**, and how everyone, even students, can become “**climate stewards.**” NOAA science is highlighted in many areas of the kit, including how climate change is impacting estuaries, coral reefs, Chinook salmon, and monk seals, to name a few.
- Working with the NOAA National Sea Grant Program, Environmental Protection Agency, International City/County Management Association, and Rhode Island Sea Grant to release guidance on how to **adapt smart growth principles to the unique needs of coastal and waterfront communities**. This first-of-its-kind interagency guide and complimentary Web site offers 10 coastal and waterfront-specific guidelines to help manage development while **balancing environmental, economic, and quality-of-life issues**.
- **Updating nautical charts** to show the location of the new \$750 million Cameron Parish liquid natural gas (LNG) terminal in Hackberry, Louisiana. These newly updated charts played a **pivotal role in the transit of the 155,000 cubic meter LNG tanker *British Diamond*** to the new terminal along the Calcasieu Ship Channel. Pilots can now use NOAA’s Electronic Navigational Charts and data from the Lake Charles Physical Oceanographic Real-Time System to navigate near the terminal safely and more efficiently.
- Commemorating the **20th anniversary of the grounding of the *Exxon Valdez* tanker** in Prince William Sound, Alaska. NOAA was among the many organizations to provide immediate support during the assessment, response, and cleanup phases following the spill. This landmark event raised the public’s awareness of oil spills and led to the passage of the Oil Pollution Act of 1990, which resulted in **significant improvements in oil spill preparedness, response, and restoration**.
- **Sponsoring the 2009 Ocean For Life program**, which gathers high school students from 14 different Western and Middle Eastern nations to **promote cultural understanding through ocean science**. In 2009, 60 students participated in field studies and activities in the Florida Keys National Marine Sanctuary and California’s Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries. The goal of Ocean For Life is to bring better understanding of the diverse marine world and of the diverse peoples of the world.
- Completing an **aerial gravity survey** along parts of the Gulf Coast to enhance VDatum in partnership with the U.S. Army Corps of Engineers. VDatum is a free software tool developed by NOS to allow users to convert their data from different horizontal/vertical references into a common system. Enhanced VDatum will **benefit storm surge, tsunami, and sea-level impact modeling; coastal management; and hydrographic survey depth measurements**.
- Releasing a **new version of the Computer-Aided Management of Emergency Operations (CAMEO™)** software, an integrated set of applications designed to assist first responders and emergency planners. With CAMEO™, users can access chemical property and response information, model potential chemical releases, display results on a map, and manage planning data. During a response to a chemical release, CAMEO™ can **help decision makers quickly get the information they need** for a safe, effective response.
- Conducting a Coastal Community Planning and Development course to help participants to understand, plan, and guide efforts for better land-use planning and to **implement alternative growth and development approaches** in their coastal communities. This training provides participants with the examples, strategies, and background information needed to support alternative development efforts.



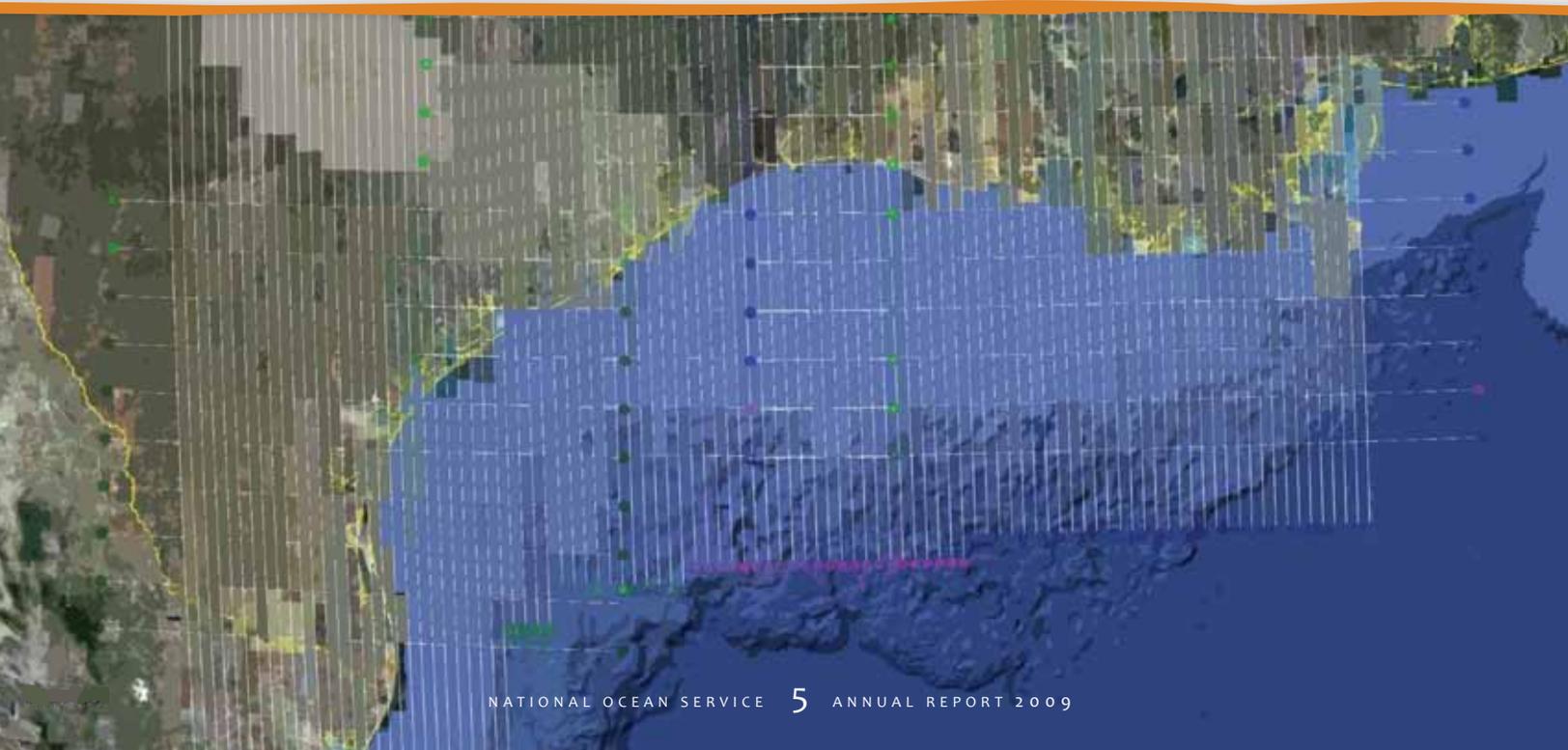
OBSERVING OUR OCEANS AND COASTS

Natural — and human-induced — forces are constantly at work, changing the face of our planet. At the core of being prepared and able to respond to these changes lies the need to understand how, when, and why they will occur. Scientific observations about our oceans and coasts are the foundation for increasing our understanding.

During the 2009 fiscal year, NOS continued to collect, interpret, and disseminate the ocean and coastal observations needed to better understand our world. Highlights from 2009 include:

- **Expanding and strengthening the National Water Level Observation Network** in the Gulf of Mexico and in Alaska. The network now includes more than 200 stations. Upgrades to 30 stations included the installation of wind, barometric pressure, and air temperature sensors. The water level and weather data delivered from these stations are **key components of coastal decision making before, during, and after major storm events**, providing information for things such as vulnerability assessments, marine weather and flood forecasts, evacuation plans, and decisions on when to open and close locks or reopen ports following storms.
- **Providing strong support for regional ocean governance across the country.** This included supporting the *Gulf of Mexico Alliance Governors' Action Plan for Healthy and Resilient Coasts*; assisting with eight work plans designed to carry out the *West Coast Governors' Agreement on Ocean Health Action Plan*; and assisting with work plans for the Northeast Regional Ocean Council. The issues addressed by these plans range from **water quality and community resilience** in the Gulf of Mexico to **climate change and sea-floor mapping** on the West Coast and **ocean energy planning and management** in the Northeast.
- **Awarding \$21 million to partners in order to support the development of a network of Regional Coastal Ocean Observing Systems** and their managing entities, called Regional Associations. Funding was awarded to expand the network of ocean-related observations, data, and products available; improve regional implementation of NOAA and other federal missions; and meet regionally specific needs for coastal and ocean information.

- Seeing the **Integrated Ocean and Coastal Observation System Act of 2009 signed into law** by President Barack Obama. The Act authorizes the establishment of a National Integrated Ocean Observing System and codifies a governance structure within which that system will operate, with the National Ocean Research Leadership Council and the Interagency Ocean Observation Committee having policy oversight and administration of the system. The Act also identifies **NOAA as the lead federal agency for implementation and administration of the system**, working in consultation with interagency and regional partners.
- Deploying, in partnership with the University of Hawaii, five high-precision sensors in the waters off Oahu, Hawaii, at a site called “Ordnance Reef,” to assist the Department of Defense in **addressing the potential environmental impacts from underwater military munitions**. NOS will use data from the devices to determine where Pacific Ocean currents would potentially carry munitions materials if released into the marine environment.
- **Upgrading the Online Positioning User Service (OPUS) Web tool**, allowing users to publish their positioning data into the National Geodetic Survey databases. This OPUS upgrade will enhance user efforts to share work and personalize the National Spatial Reference System by lowering the cost and effort associated with traditional “blue-booking” methods and contracted surveys. The standardization provided by OPUS processing and formatting will make user data more consistent, reliable, functional, and accessible.
- Helping to develop the Honua program, a suite of educational and outreach products aimed at **increasing environmental understanding and awareness in the Pacific Islands region**. Information about NOAA’s science, data, and services, illustrated via Honua spherical data visualization tools such as Science on a Sphere, Eluminati Domes, and Magic Planet, reached thousands of people throughout the Hawaiian Islands. Touch screen interfaces and kiosks provide even greater opportunities to increase environmental literacy through the project.
- Supporting, in partnership with other NOAA offices, the California State Coastal Conservancy, other state agencies, and the U.S. Geological Survey, the **California Seafloor Mapping Project**. This multi-year partnership to acquire sea-floor mapping data will allow scientists, coastal managers, and policy makers to more effectively manage marine ecosystems and coastal resources, identify obstructions to navigation, and better understand the California coast’s unique natural hazards.
- Establishing absolute gravity stations in Puerto Rico and the U.S. Virgin Islands and performing preliminary terrestrial gravity observations at these locations. These new absolute gravity stations were used as control points for scheduled airborne gravity observations to support the creation of a vertical datum. The completion of this project is **vital to the territories’ geodetic, surveying, and geospatial infrastructure and collected data are part of the National Spatial Reference System**.





SUPPORTING MARINE TRANSPORTATION

Our marine highways carry more than three-quarters of all U.S. goods and supplies. Ensuring that these highways continue to function safely, efficiently, and in an environmentally sound way requires good tools, data, and information.

In fiscal year 2009, NOS continued to support the Nation's commerce with information for marine transportation. Highlights from the year include:

- **Responding to survey requests in some of the Nation's busiest ports**, to help keep marine transportation moving safely. NOS provided immediate response to incidents such as locating the wreck of the 71-foot fishing vessel *Lady Mary* near the entrance of the Delaware River; supporting the search effort for the missing engine of U.S. Airways Flight 1549, the commercial plane which made an emergency landing on the Hudson River; and conducting surveys in Honolulu Harbor in response to reports of container ships "touching bottom" while docking. NOS also located the submerged oilrig ENSCO, which was toppled by Hurricane Ike near Galveston, Texas, and assisted the U.S. Coast Guard and U.S. Army Corps of Engineers with salvage operations of a 175-foot derelict barge in the Port of Tacoma, Washington.
- **Expanding the Physical Oceanographic Real-Time System (PORTS®) program** to Lake Charles and New Orleans, Louisiana. These PORTS® are positioned to **provide significant safety and economic benefits**. Louisiana's Lower Mississippi River moves about 500 million tons of cargo each year and provides jobs and income to the region. NOAA's PORTS® program provides accurate real-time oceanographic and meteorological data to mariners, helping to reduce the risk of vessel groundings as well as increase the amount of cargo moved through a port.
- **Leading a U.S. delegation to deliver President Barack Obama's first signed instrument of ratification at the fourth Extraordinary International Hydrographic Organization (IHO) Convention**. The document provides U.S. affirmation of sweeping organizational changes to IHO's Convention and will set the global stage for broader geographic coverage, better consistency and quality, and easier availability of nautical charts produced around the world. Common chart and survey standards, used globally, will ultimately **increase the safety of navigation in U.S. waters and reduce environmental damage to sensitive marine ecosystems**.

- **Co-sponsoring the final report, *Opening the Arctic Seas: Envisioning Disasters and Framing Solutions***, from an international workshop to address threats to the Arctic. The report, released by the Coastal Response Research Center at the University of New Hampshire, provides a qualitative analysis of risk factors for five potential marine incidents likely to happen as shipping, tourism, exploration, and development of natural resources occur with the retreating Arctic ice cover.
- **Celebrating the delivery of 100 million digital geospatial products** since beginning to track usage in 2003. These products include Continuously Operating Reference Station datasets, electronic survey mark data sheets, and geographic information shape files, as well as Online Positioning User Service solutions and a variety of other digital geospatial products.
- Accepting the foundation of a new system that will **revolutionize how NOAA produces nautical charts**. *Nautical Chart System II* represents a technological leap forward in creating the charts that mariners need to help people and goods safely and efficiently travel the Nation's marine highways. This stand-alone system will produce all formats of charts, from paper and raster to Electronic Navigational Charts.
- **Completing a major current meter survey project in Alaska, Florida, and Massachusetts**. The data collected will help update tidal current predictions critical to safe navigation and other applications that are published annually in the U.S. Tidal Current Tables. The Current Survey projects will support navigation and the operation of deep-draft vessels in the area and will establish new stations that have been identified as important for the Nation's commercial and recreational transportation systems.
- **Submitting positioning products from 2000 to the present to the International Global Navigation Satellite System Service (IGS)** for inclusion with products from other IGS Analysis Centers to create a new International Terrestrial Reference Frame. Collected data are used for a variety of purposes, including precise Global Positioning System satellite positions, precise positions of tracking stations, and the precise position of Earth's axis of rotation.





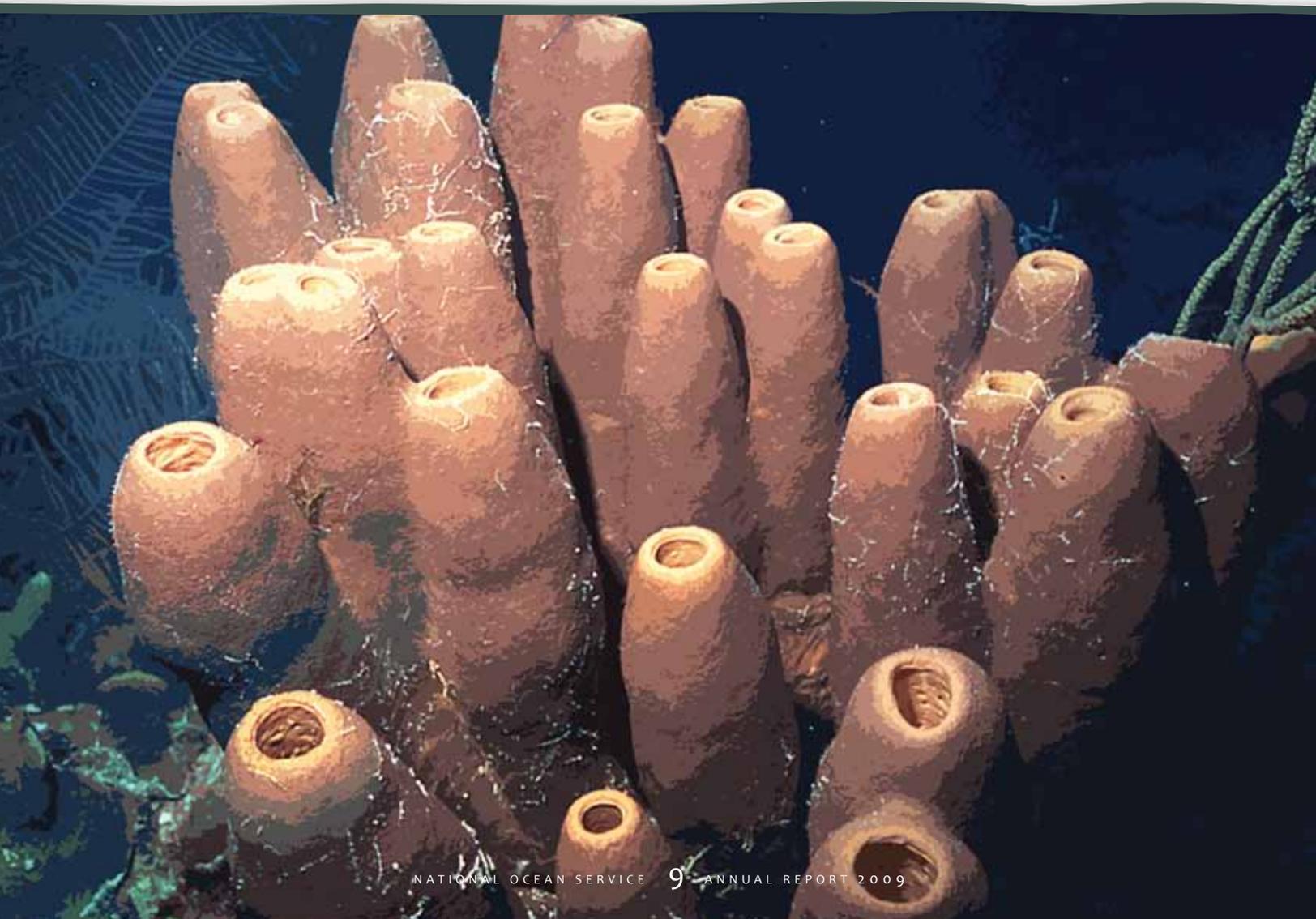
REDUCING OCEAN AND COASTAL HEALTH RISKS

We rely on our oceans and coasts for resources — from food to modes of transportation and places to recreate. When these areas are unhealthy, it has a negative impact on our own health, as well as the health of our economy. And, just as the health of our ocean and coasts can impact our health, we impact the health of these areas.

During the 2009 fiscal year, NOS worked to protect the health of all Americans as well as marine life and the economics that depend on healthy ocean and coastal marine resources. Highlights from 2009 include:

- Releasing the **first-ever comprehensive report of the level of flame retardant chemicals found in U.S. coastal waters**, including the Great Lakes. In recent years, these chemicals, known as polybrominated diphenyl ethers (PBDEs), have generated international concern due to their global distribution and associated adverse environmental and human health effects. In this study, NOS scientists determined the level of PBDEs by evaluating mussels, oysters, and sediments at a national scale. The scientists determined that **PBDEs are found throughout the U.S. coastal zone**, with elevated levels near urban and industrial centers.
- Launching the second **experimental harmful algal bloom forecast bulletin to give notification to 40 drinking water utility supervisors of potential Microcystis blooms in Lake Erie**. Microcystis produces a toxin that can have negative health effects. The bulletin provides public health and local decision makers with information about predicted blooms on a weekly basis. This bulletin is the **first forecast system available for harmful algal blooms in the Great Lakes**.
- Providing funding to support an **accurate forecast for the size of the 2009 Gulf of Maine harmful algal bloom**, which can cause illness, and even death, in people who eat tainted seafood. NOS-supported scientists also produced weekly forecasts to provide updates on probable bloom locations and magnitude. These advanced warnings represent the **most advanced harmful algal bloom seasonal forecasts in the world**. Annual advisories and weekly forecasts help resource and public health managers and the seafood industry protect human health and minimize economic impacts.

- Coordinating the development of an **NOS-wide Caribbean strategy for international engagement on environmental issues in the region**. NOS examined current and past NOS activities in the wider Caribbean and developed goals and objectives to address threats to coastal and marine environmental quality in the region. The strategy contains nine project ideas to focus and prioritize efforts in the region and guide program implementation for the next five years.
- Discovering, working in partnership with researchers from North Carolina State University (NCSU), a naturally occurring compound from a Caribbean sponge, *Agelas conifer*, which **reduces fouling of marine vessels while exhibiting low toxicity to humans and marine species**. NCSU scientists have developed synthetic derivatives from the compound that companies hope to commercially manufacture, and NOS scientists are working with several U.S. Department of Defense offices to use the derivatives in marine paints in the future. These new derivatives could replace harmful copper chemicals in marine paint formulas and save money with improved maneuverability and energy efficiency of vessels.
- Conducting research that shows that **the level of human development activities in a watershed has a direct impact on the health of America's tidal creeks** and may potentially threaten public health. A conceptual model demonstrates that tidal creeks are sensitive indicators of coastal development impacts on coastal ecosystems for the southeastern U.S. and thus are “sentinels” of coastal ecosystem impairment. The model can help forecast changes in nearshore coastal ecosystems under varying development scenarios.
- Assisting colleagues from the Third Institute of Oceanography of the State Oceanic Administration of China and Xiamen University in **developing a draft strategic action plan for watershed management in the Xiamen Bay-Jiulong River Basin**. Major actions identified in the plan include i) creating a regional, basin-wide management control unit and coordination mechanism for watershed management and conservation; ii) perfecting relevant laws and regulations; iii) building capacity for environmental management; and iv) improving education and public involvement for environmental protection.



PROTECTING COASTAL AND MARINE PLACES



From coral reefs to beaches and fishing grounds, coastal and marine places are both beautiful and bountiful. Protecting these resources from both human and natural damages is essential to ensuring that future generations are able to enjoy and appreciate these areas.

During the 2009 fiscal year, NOS worked to protect resources at risk, working to keep these areas safe, healthy, and productive. Some highlights from 2009 include:

- Working closely with a consortium of agencies, including the U.S. Fish and Wildlife Service, the State of Hawaii, and the Office of Hawaiian Affairs, to **develop a nomination package for the Papahānaumokuākea Marine National Monument to the UNESCO World Heritage List**. Former President George Bush announced the nomination prior to leaving office. The nomination was sent to UNESCO's World Heritage Centre. UNESCO, the International Union for Conservation of Nature, and the International Council on Monuments and Sites will review the application, and in July 2010, will vote on its inscription to the World Heritage List.
- Providing determinations that led to the **expansion of the Monterey Bay National Marine Sanctuary (MBNMS) to include the Davidson Seamount**. The seamount, located off the coast of California, requires protection from the take of or other injury to organisms living on or near the sea floor. As a result of management plan revision, a seven-year process involving public input and agency collaboration, MBNMS now includes the undersea mountain as the Davidson Seamount Management Zone. The boundary change adds a 775-square-statute-mile area to the MBNMS, increasing the total area to 6,094 square statute miles.
- **Continuing to monitor sea level in the United States**. During fiscal year 2009, NOS calculated sea-level trends for 70 new global stations, bringing the number of global stations to 114. This information is available in Google Maps and Google Earth interfaces to allow the user an easier way to navigate the data. NOS also completed a statistical analysis tool that provides critical sea level background information necessary for design, implementation, and monitoring of sustainable habitat restoration projects.

- **Providing data and products to support the designation of Pacific marine national monuments.** In a direct response to a request from the White House Council on Environmental Quality, NOS prepared extensive geographic information system maps and reports to support an Executive Order by former President George Bush to designate three Marine National Monuments in the Pacific Ocean. The NOS data demonstrate that the new monuments — Marianas Trench, Rose Atoll, and Pacific Remote Islands — contain some of the largest areas of live coral cover, high biomass, and abundance of reef fish in U.S. waters.
- **Awarding \$69.4 million to state and territory coastal zone management (CZM) programs** to implement their state CZM and coastal nonpoint source pollution programs. The National Coastal Zone Management Program is a partnership between NOS and coastal states to protect and manage the Nation's coasts. Through the CZM Program, NOS helps state programs engage in comprehensive planning, including marine spatial planning and other activities that protect and restore habitats, mitigate hazards, adapt to climate change, protect water quality, and enhance public access to coastal areas.
- **Hosting the First Conference on Marine Mammal Protected Areas in Hawaii.** The conference brought together over 200 managers, scientists, and educators from approximately 40 countries to learn from each other and discuss the many similar **challenges and successes that come along with understanding and managing highly mobile marine mammals.** Australia and the United States, as well as the International Fund for Animal Welfare, Oceania, and the Whale and Dolphin Conservation Society, used the venue to make announcements about major discoveries and initiatives.
- **Revising regulations for Monterey Bay, Cordell Bank, and Gulf of the Farallones National Marine Sanctuaries.** The regulatory changes are a component of new management plans released in November of 2008 for the three sanctuaries. The management plans and regulations for each of the three sanctuaries were developed at the same time for greater consistency and share many common elements, but they are not identical. Each sanctuary developed regulations to address the unique needs and circumstances at each site.

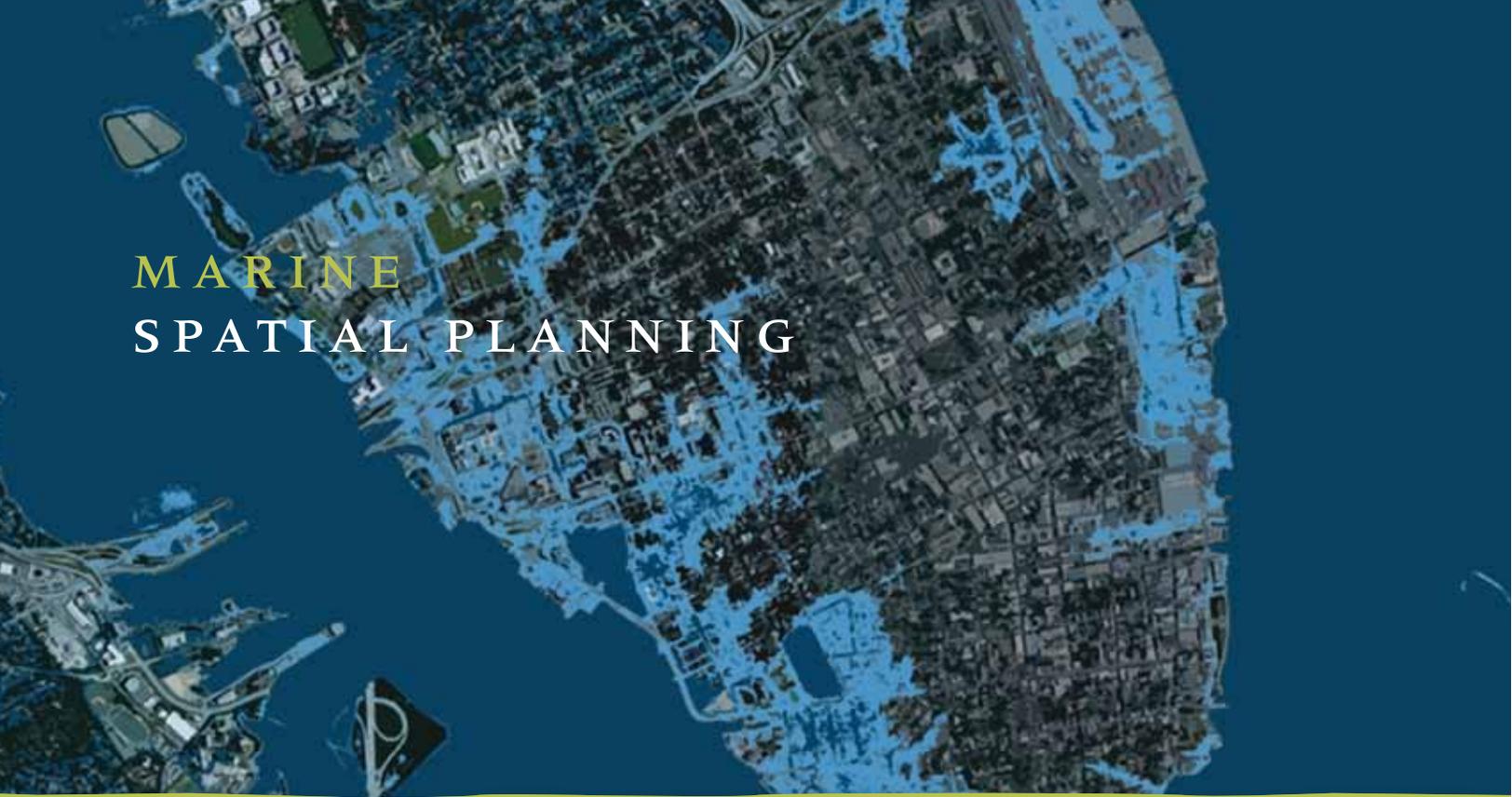


- Announcing, in partnership with the Department of the Interior, the **admission of 225 existing federal, state, and territorial marine protected areas (MPAs) into the National System of Marine Protected Areas.** The charter group is comprised of sites from state, territorial, federal, and federal/state partnership agencies in 28 states and offshore areas under federal jurisdiction. Both no-take and multiple-use MPAs are included in this first group. This group will be the focus of cooperative efforts to address common resource management challenges and has been placed on the official List of National System MPAs.
- **Restoring more than 2,500 acres of coastal wetlands harmed by historical releases of hazardous substances from the original Clark Chevron refinery in Port Arthur, Texas.** NOAA, the U.S. Fish and Wildlife Service, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, and the Texas General Land Office worked with the Chevron Corporation to restore habitats that were injured by releases from refinery operations that took place decades ago. Projects included the restoration of historic water flow conditions to approximately 1,300 acres of coastal wetlands, the creation of nearly 90 acres of estuarine intertidal marsh and more than 30 acres of coastal wet prairie, and the restoration of 1,500 acres of coastal emergent marsh plant communities to historical conditions.

- Continuing to **work with Vietnam to build capacity for integrated coastal and ocean resources management**. In 2009, the municipality of Haiphong and province of Quang Ninh, with the support of NOS and the International Union for Conservation of Nature-The World Conservation Union, completed a regional framework for integrated coastal management with the approval of a nine-point action plan. The action plan established a coordination mechanism for the region to address coastal development priorities and plans. The governments also established a work plan and committed funding for advancing ecosystem approaches to management in the coastal Tonkin Gulf region of Vietnam.
- **Releasing the 2009 NOAA's Coral Reef Conservation Program (CRCP) Goals & Objectives 2010-2015 and the Coral Reef Conservation Program International Strategy 2010-2015**. The CRCP is narrowing the focus of its U.S. domestic activities and shifting resources to on-the-ground and in-the-water action. Efforts will concentrate on understanding and addressing the top three recognized global threats to coral reef ecosystems: climate change impacts; fishing impacts; and impacts from land-based sources of pollution. These documents lay out a multi-disciplinary approach to coral reef conservation, including scientific research, monitoring, social science, communications, education, and capacity building.
- **Launching "WaterLife: Where Rivers Meet the Sea,"** an interactive online game to teach fourth through seventh graders about estuaries. Set in California's Elkhorn Slough National Estuarine Research Reserve, the game explains what an estuary is and describes diverse ecosystems in estuaries, tidal influences, restoration efforts, and marine debris. It emphasizes personal responsibility in caring for the environment. To succeed in the game, players must learn about the factors that produce healthy estuaries and food webs and why estuaries are essential to both ocean life and to humans.
- **Working, through the Coastal and Estuarine Land Conservation Program (CELCP), to protect over 4,000 acres of critical coastal habitat in 13 states**. CELCP staff worked closely with coastal state and local partners to help them protect high-priority coastal land. Approximately 15 CELCP-funded properties were, or are anticipated to be, acquired or put under easement. Nine new CELCP projects totaling over \$14 million also were selected for funding during the fiscal year 2009 annual CELCP competition. The 2009 awards will help protect coastal watersheds in Virginia, Puerto Rico, Massachusetts, Florida, Maine, New York, Washington, and Maryland.
- **Co-chairing the U.S. Coral Reef Task Force (USCRTF) meeting in Washington, DC, in February**. The meeting, officially hosted by the U.S. Department of the Interior, was the first meeting in the new Administration and emphasized the importance of coral reef conservation, highlighted conservation strategies and successes in member jurisdictions, and promoted an enhanced vision for how the USCRTF and its members can work to meet the challenges facing coral reefs and local communities.
- **Partnering with the University of Maryland and U.S. Army Corps of Engineers to establish vertical benchmarks in a newly constructed wetland at the Poplar Island Environmental Restoration Site**. Poplar Island, a human-made island located on the Chesapeake Bay in Maryland, is the dredge disposal site for clean sediments from the Baltimore Harbor approach channels. Greater vertical accuracy and spatial resolution of wetland surface elevation will give scientists more valuable **insight into processes maintaining coastal elevation with respect to sea level** as a constructed wetland matures.
- **Continuing the Fishing for Energy partnership** between the NOAA Marine Debris Program, Covanta Energy Corporation, National Fish and Wildlife Foundation, and Schnitzer Steel to reduce derelict fishing gear and find positive solutions to address this gear. The partnership provides a place for the fishing community to dispose of old or derelict fishing gear at no cost. In fiscal year 2009, the **Fishing for Energy partnership expanded to several additional ports in New England and Oregon**. Since the program first launched in February 2008, partnership ports have collected **over 188 tons of old and derelict fishing gear**.
- Hosting, for the fifth year in a row, NOAA Heritage Week. This year's celebration took employees and the public "Beyond the Horizon," with award-winning films, special presentations, and dynamic guest speakers **highlighting how NOAA monitors and predicts changes in the Earth's environment and conserves and manages ocean and coastal resources**. Heritage Week is part of NOAA's involvement in the Preserve America initiative, a White House initiative that encourages and supports community efforts to preserve and enjoy cultural and natural heritage.

- **Coordinating 250 NOAA employees and partners in the sixth annual NOAA Restoration Day events in Maryland and Virginia.** The Maryland event took place in Abingdon, Maryland, at Otter Point Creek, a component of the Maryland Chesapeake National Estuarine Research Reserve. The Virginia event took place at First Landing State Park in northern Virginia Beach. The event is one of the largest voluntary federal employee-sponsored environmental stewardship events in the Chesapeake Bay watershed region. Volunteers planted underwater grasses; removed invasive plants; planted native trees and other plants; monitored fish, birds, turtles, and amphibians; removed trash; and performed digital elevation mapping activities such as benchmark setting and recovery.
- **Hosting a training workshop, “Reef Resilience and Climate Change: A Workshop for Coral Reef Managers,” for more than 25 international experts in coral reef management from around the Caribbean.** These experts met in Kralendijk, Bonaire, Netherlands Antilles, to learn about climate change impacts on coral reefs, responding to coral bleaching, incorporating resilience into management and marine protected areas design, using early warning tools, and communicating about threats to coral reefs.
- **Supporting the creation of a new national-level ocean film festival, held in Savannah, Georgia.** The inaugural Blue Ocean Film Festival was comprised of both an industry-focused conference and public exhibition of films. The industry conference supported panels, training, and courses on hardware, ocean conservation, and filmmaking. More than 200 films were submitted for the festival and of these, 50 finalists were selected. Nearly 300 filmmakers registered for the conference and more than 4,000 people attended screenings over three days.





MARINE SPATIAL PLANNING

We plan our cities and how we use our land.
So it makes sense that we would also apply similar principles
to manage the way we use our ocean and coasts.

Marine spatial planning involves looking at the whole picture — the ecosystem and the people who are using that ecosystem — in order to determine how best to use ocean areas so that ecological, economic, and cultural services are available now and for future generations.

During the 2009 fiscal year, NOS undertook a wide range of marine spatial planning projects, to balance demands for development with the need to protect the environment and to achieve social and economic objectives in an open and planned way. A few of these highlights include:

- **Providing data about whale abundance and distribution patterns in Massachusetts waters to inform the development of the Massachusetts Ocean Plan.** Coastal planners and managers in Massachusetts are using the results of long-term research by NOS to help make ocean-zoning decisions. The plan, which was mandated by the Massachusetts Ocean Act of 2008, is the first of its kind in the Nation. This research also supported the decision to relocate Boston Harbor shipping channels to reduce marine-mammal vessel strikes, as well as the assessment of potential threats from a proposed offshore liquid gas facility. Similar NOAA work is likely to become fundamental as other states strive to sustain their coastal ecosystems.
- Working with the Marine Conservation Biology Institute to complete a **series of four California Ocean Uses Atlas Workshops to gather information about how humans use the ocean off the California coast.** A variety of stakeholders, including resource managers, military representatives, commercial fishing and recreational users, and scientists used innovative interactive geographic information system techniques to map patterns of industrial/military human uses of the California ocean, from the high tide line to 200 nautical miles out. The resulting maps and analyses will help guide state, federal, and regional ocean planning and management efforts by entities such as California's Marine Life Protection Act Initiative, NOAA's National Marine Sanctuaries, and the West Coast Governors' Agreement on Ocean Health.

- **Leading the development of the Multipurpose Marine Cadastre (MMC)** to fulfill Section 388 of the Energy Policy Act of 2005, which directed the establishment of a mapping initiative that supports decision making related to alternative energy uses on the Outer Continental Shelf. The MMC is a multi-agency effort to build a marine information system for U.S. waters that provides authoritative geospatial data, visualizations, and supporting information. Data provided via the MMC will help address issues that include **alternative energy siting, aquaculture, submerged lands leasing, marine conservation, and comprehensive marine spatial planning.**
- **Supporting the Pacific Risk Management ‘Ohana (PRiMO)**, which is a consortium of local, national, and regional agencies and organizations committed to enhancing the hazard resilience of Pacific Islands communities. In 2009, more than 80 participants from nine island jurisdictions attended PRiMO’s first partners meeting in Guam. The meeting engaged new partners in the PRiMO mission and highlighted strategies for enhancing resilience to coastal inundation from tsunamis, storm surge, high surf, elevated sea level, and climate change. Meeting facilitators provided new and updated regional information on coastal inundation risks and impacts. Participants also identified ways to pinpoint hazard needs and manage hazard risks and addressed **strategies for enlarging inundation-risk capacity through improvements in land-use management, education and outreach, social and economic vulnerability assessments, hazard modeling, and warning communications.**
- Developed a course to help coastal professionals use coastal inundation maps overlaid with multiple types of data to **increase hazards awareness and preparedness, determine potential flooding impacts, encourage long-term planning and coastal resilience, and pave the way for community risk and vulnerability assessments.** NOS’s new course, “Coastal Inundation Mapping,” helps demystify the topic for participants as they increase their mapping skills and gain access to a large collection of data from NOAA and other agencies, including water level data, elevation data, flood models, geodetic and tidal datums, and other information.





AT A GLANCE THE NATIONAL OCEAN SERVICE

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.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.

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