

# OUR NATIONAL MARINE SANCTUARIES



NATIONAL MARINE  
SANCTUARIES



2006-2007  
ACCOMPLISHMENTS

## INTRODUCTION

The National Marine Sanctuary Program is making major strides in developing results-oriented resource protection, science, management and educational programs. This brochure highlights the program's key 2006 accomplishments and our progress towards delivering results in marine conservation.

The year was capped by a presidential proclamation designating the Northwestern Hawaiian Islands Marine National Monument. By doing so, the president created the largest marine protected area in the world.

Other significant accomplishments include discovering new areas of deep-water corals; documenting increases of marine life five years after establishing the Florida Keys Tortugas ecological reserve; initiating a California public ocean awareness campaign; designating two wrecks as national historic places and launching a new marine education Web portal.

A major reason for our accomplishments is the continued involvement and dedication of numerous partners such as aquaria, universities, government agencies, non-profit organizations and countless volunteers who dedicate thousands of hours to ensure continued protection of our fragile ocean ecosystems and maritime heritage. We hope you enjoy this brochure that highlights the dedicated work of people who want to make your national marine sanctuaries a jewel in the crown of ocean conservation. Please visit our Web site to learn more about these accomplishments and how you can be part of the sanctuary team.

## MARINE NATIONAL MONUMENT ESTABLISHED

*Imagine a place where few humans will ever go.*

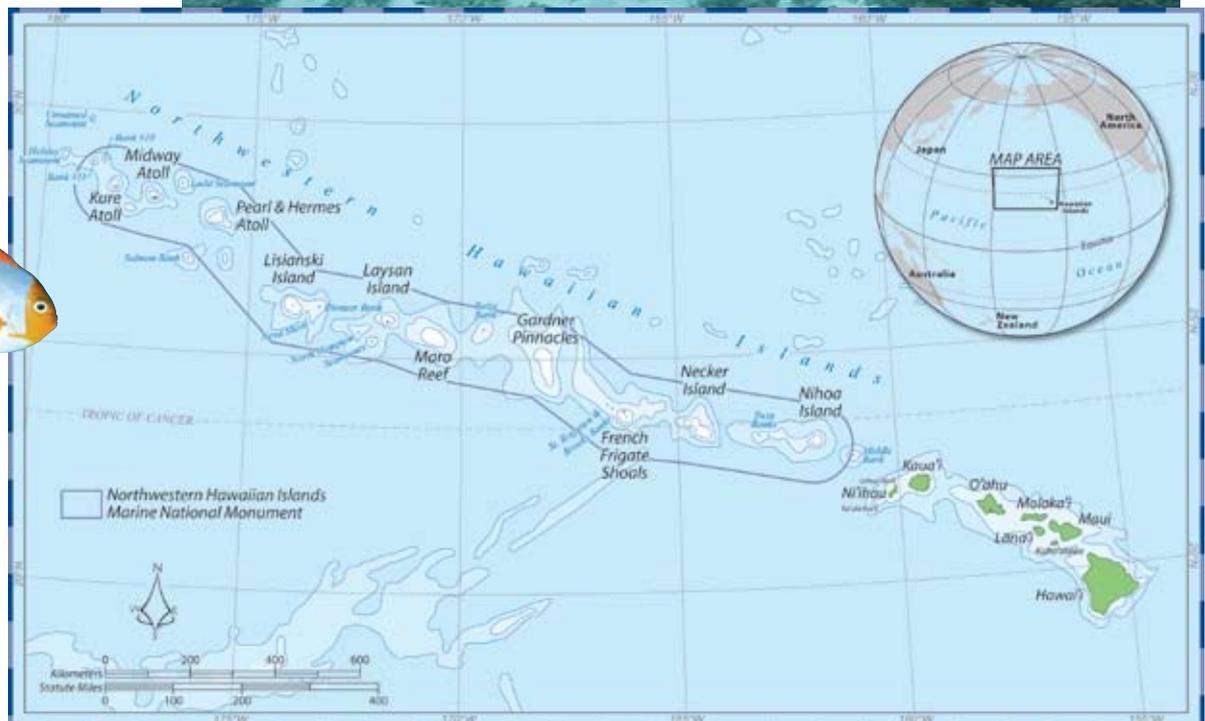
Teddy Roosevelt first declared the area a wildlife refuge in 1909. President Clinton raised the ante in 2000 and named the region the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. On June 15, 2006, President George W. Bush proclaimed the archipelago a marine national monument, the largest conservation area ever designated in the United States. The monument, which dwarfs Yellowstone, Yosemite and the Grand Canyon combined, encompasses almost 140,000 square miles of coral reef habitat and is home to some of the world's most unique species, a quarter of which are found nowhere else.

What began five years ago as a public process to establish the nation's 14th national marine sanctuary instead became the Northwestern

Hawaiian Islands Marine National Monument. The president's action resulted in immediate permanent protection for the islands and culminated a sanctuary designation process that began in 2000. With his proclamation, President Bush entrusted Department of Commerce, Department of the Interior, and the State of Hawaii with one of the nation's most valued ocean ecosystems. This unprecedented action demonstrates confidence in the National Marine Sanctuary Program's capacity to extend its proven formula of partnership and public involvement for ocean governance. Establishing the monument fulfills one of the objectives for ecosystem based management called for by the President's Ocean Action Plan.



Endangered Hawaiian monk seal, one of the rare species found in monument waters.  
Photo: Jim Watt



**Cover Photo:**  
Susan Middleton, © 2006  
These Hawaiian Monk Seal pups are one of 300 stunning photos of the native flora and fauna of the remote Northwestern Hawaiian Islands featured in the book *Archipelago: Portraits of Life in the World's Most Remote Island Sanctuary* by David Liittschwager and Susan Middleton. Visit our Web site to learn more about this book.

# RESOURCE PROTECTION AND MANAGEMENT

## Protecting Whales from Ship Strikes and Marine Debris

Each year thousands of whales and other marine mammals fall victim to entanglement or ship strikes. Many of them die. But NOAA staff and volunteers, who dedicate thousands of hours to ocean stewardship, continue to play a key role in whale rescues and marine debris clean-up. Staff research into reducing ship strikes to endangered whales in Stellwagen Bank paid off in a big way when the International Maritime Organization approved a shift in shipping lanes in the region. The move will reduce the risks of strikes to critically endangered right whales by up to 58 percent and to other whale species by up to 81 percent.



Recent decision by the International Maritime Organization will reduce collisions with whales.  
Photo: Stellwagen Bank file photo (#981-1707)



Rescue team release an entangled humpback off the Hawaiian islands.  
Photo: NOAA (#932-1489)

In Hawai`i, whale rescue experts from NOAA Fisheries and the sanctuary program untangled two humpback whales from gill net and marine debris. Among the numerous marine debris removal efforts around the sanctuaries, the program partially funded Hawai`i Wildlife Fund volunteers to remove approximately 42 tons of marine debris from the Waiohinu-Ka Lae coast off Hawai`i's Big Island, and divers in Olympic Coast sanctuary waters removed derelict fishing gear.

## Progress Made Towards Protecting Sanctuary Marine Life

The Gray's Reef National Marine Sanctuary Final Management Plan was released to the public in July. The plan updates sanctuary science, enforcement, and education programs and includes a few regulatory changes that are intended to enhance conservation with compatible public and private uses. The plan includes two changes - anchoring is prohibited in the sanctuary, and fishing is allowed only with rod and reel, handline, and spearfishing gear without powerheads. Similar management plan reviews are underway for Channel Islands, Cordell Bank, Flower Garden Banks, Gulf of the Farallones, Monterey Bay and Stellwagen Bank national marine sanctuaries. Proposed marine reserves are under consideration for Channel Islands National Marine Sanctuary. These plans help the program fulfill its primary legislative mandate of resource protection.

The OSRV *Pacific Responder*, an oil spill response vessel, practices deployment of a boom. Photo: U.S. Coast Guard

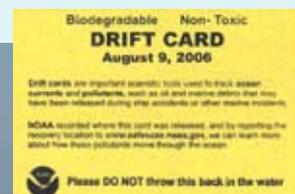
**Resource protection is at the core of the program's mission - joining forces with our partners to reduce threats to natural and cultural resources.**

## Damage Settlement to Help Habitat Restoration

The owners of the foreign-flagged container vessel *Med Taipei* agreed to pay \$3.25 million to the United States, the largest sum awarded to date for damages within Monterey Bay National Marine Sanctuary. The settlement resolves a case whereby 15 containers from the *Med Taipei* were lost in sanctuary waters in 2004. The funds will be used for resource protection and to restore habitats within the sanctuary, an area of high biological productivity and diversity.

## Major Response Drill Held off San Francisco Bay

Last August, NOAA staff and federal and state partners held one of the largest ocean emergency drills of its kind in Gulf of the Farallones and Monterey Bay national marine sanctuaries. Known as Safe Seas 2006, the drill, which simulated a collision between two vessels and the resulting oil spill, looked at ways agencies can improve their ability to quickly respond to an oil spill or similar catastrophe.



Biodegradable drift cards simulated spilled pollutants.  
Photo: NOAA

# SCIENCE AND EXPLORATION



Corals found in deep water, like the red gorgonian beneath the red basket star pictured here, give scientists clues to marine life in Olympic Coast sanctuary ecosystem.  
*Photo: Olympic Coast National Marine Sanctuary*

## Colorful Corals Found in Frigid Pacific Waters

In June 2006, NOAA researchers returned from a 10-day, deep-water coral expedition in Olympic Coast National Marine Sanctuary with evidence of sponge and coral communities in waters once thought too cold for them to thrive. Scientists found colonies of the rare stony coral *Lophelia*, numerous other coral species and a rich abundance of invertebrates and fishes, including commercially important rockfish. Some corals showed evidence of damage from fishing gear. Findings confirmed that these coral communities are a significant portion of the sanctuary ecosystem. NOAA has identified them as a priority research topic because of their vulnerability to bottom trawling and other human disturbances.

## New Vessels Will Enhance Science, Education and Enforcement

NOAA commissioned three new research and enforcement vessels in 2006 that fulfill a two-fold NOAA commitment: to support research that will lead to better ecosystem-based management of the sanctuaries and to enforce the rules that protect marine resources. The *Peter Gladding*, a high-speed enforcement vessel, plies Florida Keys sanctuary waters focusing on the Tortugas Ecological Reserve. The 57-foot vessel was named in honor of a longtime Key West commercial fisherman who helped establish the reserve. The 50-foot *Auk* takes to the waters of Stellwagen Bank and will be used primarily for research missions but will also support education, monitoring and emergency response patrols. The research vessel *Fulmar*, a 65-foot catamaran will serve Monterey Bay, Cordell Bank and Gulf of the Farallones national marine sanctuaries.



*Peter Gladding* will ply sanctuary waters around Tortugas Ecological Reserve.  
*Photo: Lt. Dave Bingham*

## Scientists Complete Marine Life Inventory

Developing effective ecosystem-based management strategies requires knowing what lives in sanctuary waters and their association to specific types of habitat. NOAA scientists are answering some of these questions with the conclusion of a three-year study about the distribution of marine life and physical oceanography within Channel Islands National Marine Sanctuary. Known as “biogeography,” this study represents one of the most comprehensive efforts undertaken to understand how marine life and habitats are associated with one another. The information will support ecosystem approaches to management as well as supporting regional marine science and education efforts. The results and data are available in a report titled *A Biogeographic Assessment of the Channel Islands National Marine Sanctuary*.

**Science helps us understand how different human and natural factors are causing changes within sanctuaries.**

## Studies Show Increase in Several Fish Species

Five years after establishing the Florida Keys sanctuary's largest no-take area in the Dry Tortugas region, studies have shown increasing numbers and sizes of commercially and recreationally important fish species and other marine life. Positive changes include increases in size and abundance of black grouper, the gradual recovery of a mutton snapper spawning aggregation, recovery of pink shrimp and their habitat, and an increase in the number of large fish inside the reserve as compared to outside. Because the Tortugas region is upstream of the Florida Keys reef tract, improvements in the reserve's fish populations may help sustain fish stocks in the Keys and further north, as more and larger fish produce larvae that are carried away from the reserve on ocean currents. Adult fish may also move to areas outside the reserve as competition for space increases within. These fish then become available to the fishery, an effect known as spillover.



A grouper in the Tortugas Ecological Reserve. *Photo: Don DeMaria*

# MARITIME HERITAGE

## Navy Airship Gets Revisited

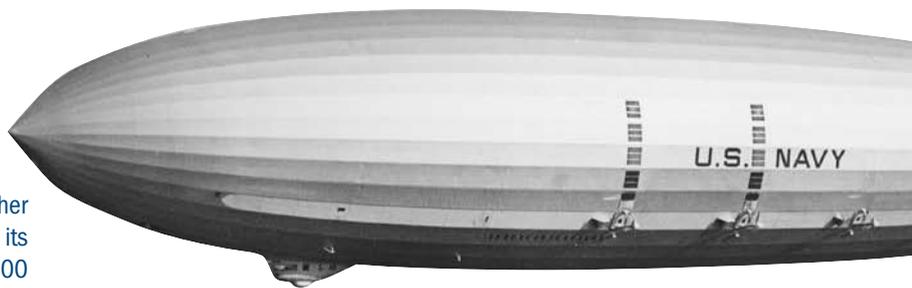
The wreck of the USS *Macon*, the U.S. Navy's last dirigible, got another look in September when a team of NOAA researchers explored its remains. The *Macon* was lost in a storm in 1935 and now rests in 1,500 feet of water in Monterey Bay National Marine Sanctuary. Researchers are producing photomosaics of the site's debris fields, a technique that combines separate smaller images into one large image. Photomosaics are an important tool for devising a management strategy for this unique part of Navy aviation history.

## New Wreck Explored in Northwestern Hawaiian Islands

Marine archaeologists surveyed a newly discovered wreck, the *Dunnottar Castle*, while on a summer expedition to the Northwestern Hawaiian Islands. The iron hulled British sailing ship sank in 1886 while en route from Sydney to California. Archaeologists also investigated other shipwrecks, including a 19th-century American whaling ship and the USS *Saginaw* that sank there in 1870.



Exploring the *Dunnottar Castle* wreck at Kure Atoll. Photo: Robert Schwemmer



## Two Schooners Get Top Listing

The *Frank A. Palmer* and *Louise B. Crary*, which rest on the seafloor of Stellwagen Bank National Marine Sanctuary, have been added to the National Register of Historic Places, the nation's official list of cultural resources worthy of preservation. The 19th century coal schooners embody a distinctive vessel type and their archaeological remains will likely yield important historical information.

**Preserving and documenting historically significant shipwrecks and artifacts to tell the stories of America's maritime history.**

## Researchers Map Shipwrecks in Florida Keys

Archaeologists deployed a newly developed propulsion sled to create high-resolution photomosaics of five shipwrecks on Florida Keys National Marine Sanctuary's Shipwreck Trail. Archaeologists "flew" over the wrecks while high-resolution cameras on the sled captured multiple images of the shipwrecks below. The mosaics are pieced together digitally to create a detailed image of each wreck which will help researchers monitor changes in these sites over time. With photomosaics, a new window will open up for those who want to preserve and experience a piece of America's maritime history.



Archaeologist photographing wreck site. Photo: Russ Green

# COMMUNITY INVOLVEMENT & PARTNERSHIP

## Ocean Public Awareness Campaign Launched in California

Public ocean education is a NOAA priority. With four sanctuaries in California, the National Marine Sanctuary Program formed a partnership with the state to promote public ocean awareness. Recognizing the challenges in reaching millions of Californians on a limited budget, the sanctuary program brought together more than 100 ocean-related businesses, agencies and organizations and formed the Ocean Communicators Alliance to promote shared ocean messages. In partnership with the State of California, the program developed a public awareness campaign called *Thank You Ocean* with the theme, "The ocean takes care of us... let's return the favor." The campaign reaches millions in California with messages that highlight the connection between humans and the ocean and suggestions on how people can make a difference, found on the campaign Web site: <http://thankyouocean.org>.



## Program Reaches Far and Wide to Ensure Healthy World Ocean

Program staff are working with other countries who look to NOAA for our expertise in managing marine protected areas. Conversely, we learn from their resource protection methods. In July, staff experts traveled to one of the world's last great marine conservation areas -- the Galapagos Islands. Their job: to work with staff from the Galapagos National Park and Marine Reserve on implementing a system of mooring buoys in tourist sites to alleviate damage caused by vessel anchoring. Installing the buoys, a first for the Galapagos, will protect the region's seafloor from anchoring which can disturb, and in many cases destroy key invertebrate communities and soft coral. The program also has partnerships with Australia, Italy and South Korea to share knowledge about managing protected areas in the ocean.



Diver installs mooring buoy in Galapagos.  
Photo: Amy Massey

## Gray's Reef Featured at World's Largest Aquarium

Billed as the largest aquarium in the world, the Georgia Aquarium is poised to be a leader in ocean literacy and a venue to bring sanctuary life to the public. The aquarium features more than 120,000 fish representing over 500 species. Exhibits feature sea turtles and the wildlife of Gray's Reef National Marine Sanctuary, and a number of touch tanks with rays and sharks. The Georgia Aquarium is key to helping educate more than a million visitors each year.



Loggerhead turtles are common visitors in Gray's Reef.  
Photo: Georgia Aquarium

**Individuals help out every day in our sanctuaries, from volunteering at beach clean-ups to providing their business expertise – make a difference today!**

## You Can't Love What You Don't Know

An innovative partnership facilitated by the National Marine Sanctuary Foundation, the sanctuary program's non-profit partner, is giving the public new access to the beauty of the sanctuaries. *Marine Sanctuaries Media* is the first private company to offer value-added products in a manner similar to how private companies sell NOAA nautical charts. A portion of the revenues go back to the sanctuary foundation to support sanctuary education projects. From the company's Web site, visitors can purchase stunning images taken within the sanctuaries. From lighthouses to coral reefs and from shipwrecks to humpback whales, *Marine Sanctuaries Media* provides high-quality visual products that are not available anywhere else. This latest venture highlights one of the many ways the foundation develops partnerships to promote sanctuaries.

**The National Marine Sanctuary Foundation helps create conservation-based research and education and outreach programs to increase ocean literacy. To find out how you can help the foundation's efforts visit <http://nmsfocean.org>**



# EDUCATION AND OUTREACH

## Training Tomorrow's Leaders in Science and Technology

Preparing tomorrow's leaders begins with educating today's students. Helping students learn through hands-on education programs such as monitoring intertidal and beach ecosystems, and working with marine technology are some of the ways staff help students focus on science and technology. For example, this past year the program's education team held nine remotely operated vehicle (ROV) workshops for 127 educators. More than 500 students built and/or operated ROVs, which gave students a hands-on look into the technology used to illuminate the undersea world. More than 200 of these students went on to compete in regional student ROV competitions. These educational experiences are critical for maintaining our world leadership in science and technology.



Students experience life on a tall ship.  
Photo: Meredith Berghauer

## Watershed Education Initiative Broadens Ocean Literacy

In California, the Bay Watershed Education and Training program, commonly referred to as B-WET, expanded from Monterey to the San Francisco Bay and Santa Barbara Channel regions. First established in 2003 in the Chesapeake Bay region, the program provides organizations with funds to support environmental education for teachers, students, and communities throughout the watershed. B-WET funded programs provide meaningful outdoor watershed experiences to enhance students' environmental awareness and appreciation.

## Innovative Marine Portal Enhances Ocean Education

*OceansLive.org* is a new marine science portal that blends live interactive video from research expeditions and educational lessons about our marine environment. In June, the public followed an expedition to the USS *Monitor*. The live coverage had more than 12,000 hits per day with viewers asking questions to the scientists. Using similar technology, Internet users got a live look at the *Frank A. Palmer*, a New England vessel that sank in 1902. This type of technology will allow all Americans to experience the wonders of our national marine sanctuaries.

**National marine sanctuaries are living classrooms where people can see, touch and learn about our nation's underwater treasures.**

## New Visitor Centers Open in Sanctuary Communities

One of the best ways for people to learn about their national marine sanctuaries is by visiting discovery centers, museums or aquaria that offer the public personal connections with the marine environment. The Gloucester Maritime Heritage Center in Massachusetts features dynamic new exhibits showcasing the marine life and shipwrecks of Stellwagen Bank National Marine Sanctuary, and the Coastal Discovery Center in San Simeon, Ca., highlights the marine ecosystems of Monterey Bay National Marine Sanctuary and California's Central Coast. These centers are popular and yearly reach thousands of people from the east coast to Hawaii.

## Films Educate Millions About Sanctuary System

The power of film cannot be overstated, particularly when the film's message is one of hope. In a world where the health of our oceans is in constant peril, Jean-Michel Cousteau's voice is an important one. His latest call for ocean stewardship is his nationally aired PBS co-production *America's Underwater Treasures*, a journey through all 13 national marine sanctuaries. The film not only captures the story of each sanctuary, but sounds a call to take care of our marine ecosystems. In Cousteau's own words, "In part at risk and in part still pristine, the national marine sanctuaries are their own proof that they must be guarded for future generations." Film festivals also educate people in an entertaining fashion. Thousands in California and in Savannah, Ga., saw films highlighting marine life on reefs, oceanography and coastal cultures.



Jean-Michel Cousteau during filming of *America's Underwater Treasures*.  
Photo: Tom Ordway, Ocean Futures and KQED.

# SANCTUARY HIGHLIGHTS

You can learn more about these and other accomplishments by visiting <http://sanctuaries.noaa.gov>

## Channel Islands

Researchers looked at how the recent establishment of no take zones within the boundaries of the sanctuary affects ocean users in an innovative aerial survey program. Shipwrecks were explored and two major marine debris clean up efforts were completed.

## Cordell Bank

A new, local radio program highlighting sanctuary life was launched this year. Staff monitored potential threats to marine life from marine debris, and created detailed maps of the sanctuary that will aid in habitat restoration efforts.

## Fagatele Bay

To help control soil erosion which impacts water quality, staff developed a project to plant rows of non invasive grass. Staff launched an innovative education program to help Samoans develop stewardship for their coral reefs, and 2006 marked 20 years serving Samoa.

## Florida Keys

Urchins that play a critical role in reef health were moved to safer ground. Studies show increases in several fish species in largest U.S. no take zone, and sanctuary staff introduced a continuing education course at a local community college. The Nancy Foster Eco Discovery Center opened in January 2007.

## Flower Garden Banks

Scientists monitored reefs following coral bleaching events. Whale shark and manta ray tagging effort was launched, and a new partnership began with the Aquarium at Moody Gardens in Galveston, Texas.

## Gulf of the Farallones

California seabirds got a helping hand in a cooperative effort to lessen human impact on bird nesting and breeding grounds. Researchers documented reduction of krill in the ocean food web, and a settlement was reached with a dredging company for spilling dredged mud into sanctuary waters.

## Gray's Reef

The sanctuary turned 25 and continued its ocean stewardship by promoting ocean awareness in students through student/teacher workshops, and conducted studies that revealed new species of sponges. Staff prepared analysis of the region's diverse habitat and marine life.

## Hawaiian Islands Humpback Whale

Sanctuary staff worked with state partners to continue marine mammal protection, completed the field study portion of the largest whale study ever and developed innovative methods to reduce ship strikes to whales.

## Monitor

A summer expedition to the USS *Monitor* gave the public an up close and personal with researchers studying the historic wreck. Major restoration efforts continue on *Monitor* artifacts. A *Monitor* replica was christened in summer 2006 and a new *Monitor* Center opened in March 2007.

## Monterey Bay

Scientists studied deep sea corals on Davidson Seamount, an area proposed for inclusion in the sanctuary. The Coastal Discovery Center, the sanctuary's first public visitor center opened its doors, and staff published a new sanctuary field guide.

## Northwestern Hawaiian Islands Marine National Monument

While monument proclamation took center stage, work continued on looking at the ecosystem connectivity between Johnston Atoll and the islands. Scientists believe the atoll may be a key stepping stone that links marine species from other areas in the Pacific to the Hawaiian archipelago.

## Olympic Coast

NOAA teamed with Canadian government on spill response drill, and staff worked with four Indian tribes to provide a forum for discussing ocean management in the sanctuary. Scientists observed several cases this summer where oxygen in the ocean dipped to dangerously low levels.

## Stellwagen Bank

Two sunken schooners were listed on the National Register of Historic Places. A sanctuary exhibit was unveiled at the Gloucester Maritime Heritage Center, and innovative acoustic studies continue to reveal new findings on humpback and right whale behavior.

## Thunder Bay

Archaeologists documented the sanctuary's oldest known shipwreck. Researchers used remote sensing technology in shallow waters to further characterize some areas of the sanctuary, and the Great Lakes Maritime Heritage Center continues to draw thousands of visitors each year to learn about the region's maritime history.

## National Oceanic and Atmospheric Administration

U.S. Secretary of Commerce  
**Carlos M. Gutierrez**

Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator  
**Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.)**

Assistant Administrator for Ocean Services and Coastal Zone Management, National Ocean Service  
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# CHANNEL ISLANDS 2006 ACCOMPLISHMENTS



<http://channelislands.noaa.gov>

## Aerial Surveys Look at User Trends in Sanctuary Waters

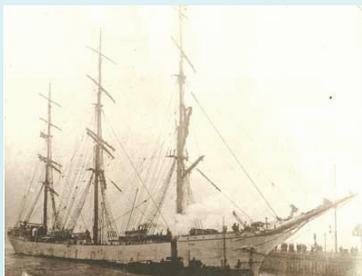


A Lake Renegade Seawolf flies survey routes over California's Channel Islands.  
Photo: NOAA Library

The sanctuary aerial survey program was started in 1997 to perform marine mammal surveys, monitor vessel and visitor use within sanctuary waters, and to respond to emergencies such as oil spills. Known as Sanctuary Aerial Monitoring and Spatial Analysis, researchers are looking at how the recent establishment of no-take zones within sanctuary waters affects ocean users and their impact on the marine environment. Since the program began, researchers have seen changes in blue whale feeding locations over time, a distinct geographic delineation of areas used by recreational and commercial visitors, and significant increases in recreational use directly related to policy changes regarding island visitation.

## Researchers Mount Shipwreck Expedition

A key mandate of the National Marine Sanctuary Program is to explore, characterize, and protect submerged historic resources and to share these discoveries with the public. To that end, a five-day shipwreck reconnaissance expedition in sanctuary waters in October documented several submerged heritage sites. Expedition team members surveyed the remains of a Grumman AF-2W Guardian airplane lost off Santa Cruz Island in 1954, and reported on the condition of F/V *Reliance*, a modern ship lost at Santa Rosa Island in 2005. Divers recorded a third site, the three-masted sailing ship *Aggi* lost 90 years ago off Santa Rosa Island. The shipwreck reconnaissance program has been an ongoing collaboration between the sanctuary office, National Park Service, Coastal Maritime Archaeology Resources, and State of California for nearly 25 years.



*Aggi* a 3-masted full-rigged ship stranded on Talcott Shoal in 1915 with a cargo of barley.  
Photo: Monterey Maritime and History Museum

## Researchers Monitor Kelp Forest Community

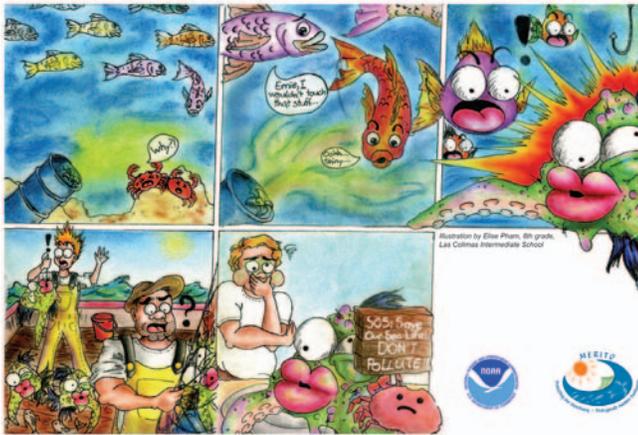
To evaluate whether marine protected areas in the Channel Islands are affecting the overall health of the ecosystem, researchers conducted surveys of fish, invertebrates, and algae in the kelp forests at and near the Channel Islands. Researchers with the Partnership for Interdisciplinary Studies of Coastal Oceans also retrieved and replaced devices that measure temperature and currents at five sites. The partnership has carried out a large-scale, long-term study of nearshore habitats and the physical and ecological processes responsible for structuring these communities. These monitoring efforts meet many goals of the National Marine Sanctuary Program including to "improve the conservation, understanding, management, and wise and sustainable use of marine resources." The data will also be used in a statewide effort to establish other marine reserve networks.



Kelp forests provide shelter and protection for a variety of marine animals.  
Photo: Robert Schwemmer

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

## Cartoon Contest Winners Get 'MAD' Prizes



Winning entry for MERITO cartoon contest. Photo: Elise Pham

Sanctuary staff hosted the first ever cartoon contest with an environmental message for 8th-12th grade students as part of a new outreach strategy called Multicultural Education for Resource Issues Threatening Oceans (MERITO). MAD Magazine cartoonist Sergio Aragones presented cash prizes to Elise Pham, grand prizewinner, and five runner-up winners. The selected cartoons promote protection of the sanctuary waters, coastal watersheds and the importance of ocean water quality to a bilingual audience. Additionally, sanctuary staff produced bus signs with the grand-prize winner's cartoon strip that were placed on Ventura and Santa Barbara city buses. An estimated four million passengers, the majority Hispanic, ride the buses where the cartoon signs were placed. The sanctuary program launched MERITO in 2002 as a marine conservation effort designed to reach culturally diverse groups including students, teachers, adults and families living near the Monterey Bay and Channel Islands national marine sanctuaries.

## Sanctuary Volunteers Help in Two Innovative Cleanups

Sanctuary volunteers shined again when they removed more than 4,000 pounds of marine debris from Santa Barbara Harbor's Marina 3 in *Operation Clean Sweep*, a sea floor debris removal effort, and scuba divers helped recover nearly 10 tons of abandoned fishing gear from waters around the Channel Islands. In *Operation Clean Sweep*, city officials hope to make this inaugural effort an annual event and cover all areas of the harbor. Channel Islands Naturalist Corps volunteers assisted with the harbor cleanup and reported that divers retrieved a wide variety of discarded items such as crab traps, bicycles, batteries, cans, and nets. The gear removed from Channel Islands waters included nearly 250 commercial lobster traps, many fishing rods and sport traps, and a huge fishing net covering 5,000 square feet of the seafloor. An important goal of this project, supported in part by NOAA's Marine Debris Program, was to work with fishermen to locate debris and establish volunteer reporting among the fishing and maritime communities. The project was based at University of California, Davis.

## Plans for 2007

- Complete the federal designation process for expansion of Channel Islands marine protected area network into federal waters.
- Release the final version of the sanctuary management plan by end of 2007.
- Conduct approximately 160-180 days at sea of research and monitoring to study the Channel Islands marine protected area network.
- Enhance education and outreach partnerships with the National Park Service and State of California.

## Sanctuary Maps Now Available



New sanctuary atlas maps depicting physical ocean and land features, other state and federal managed areas and parks, and other basic atlas features are now available on the sanctuary program Web site: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov).

**To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)**

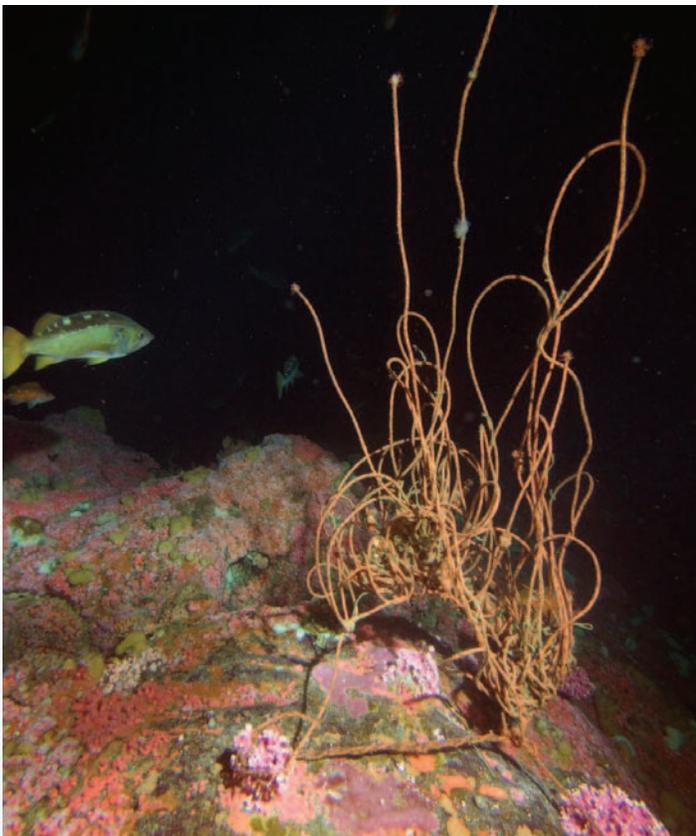


# CORDELL BANK 2006 ACCOMPLISHMENTS



<http://cordellbank.noaa.gov>

## Protecting the Fragile Reef Tops of Cordell Bank



Derelict fishing gear snagged on reef. Photo: Kip Evans

Sanctuary staff observations of derelict fishing gear in sanctuary waters led to a ban on the use of bottom contact fishing gear on Cordell Bank in waters shallower than 50 fathoms. In 2002, sanctuary staff observed the gear on 18 of 20 dives over rocky habitat on Cordell Bank. Based on these findings, staff worked with their advisory council and the Pacific Fisheries Management Council to recommend protection for this critical habitat. In 2006, Cordell Bank was identified as a Conservation Area by the council under NOAA Fisheries Essential Fish Habitat designation, and the prohibition on bottom contact gear was implemented.

## Detailed Maps Aid Restoration Efforts

Researchers completed high-resolution, bathymetric mapping of Cordell Bank that will enhance future research, monitoring, and restoration efforts on Cordell Bank. The maps have already been used to help sanctuary staff plan the removal of derelict fishing gear on the bank. Additionally, data from the mapping effort will be used to create three-dimensional video products for sanctuary education and outreach efforts. This was a cooperative effort with the Benthic Mapping Laboratory at California State University Monterey Bay.

## Monitoring Influence of San Francisco Bay Watershed

Last winter, observers saw huge rafts of debris floating 50 miles to the north and 25 miles offshore to Cordell Bank, indicating how the San Francisco Bay watershed is connected to the offshore marine environment. Unusually high rainfall in 2006 flooded inland areas and high amounts of debris washed 25 miles offshore to Cordell Bank. Animals come from all over the Pacific Ocean to feed in this region and could potentially be ingesting marine debris or risking entanglement. With support from NOAA's Marine Debris Program, the sanctuary is now monitoring the presence of floating debris as part of its monthly monitoring program that tracks the abundance of seabirds and mammals in the sanctuary. This new information is important to understand the source of debris observed in the sanctuary and to identify threats that exist for the animals living in the sanctuary. The monitoring program provides information that helps managers make decisions to safeguard sanctuary resources.



Elephant seal on Cordell Bank. Photo: Steve Howell

## Radio Program Reaches New Audiences

A local monthly radio show on KWMR was launched to reach the coastal communities of the sanctuary. The show highlights the depths and far reaches of our watery planet and includes interviews with experts about current ocean research, stewardship, management issues, and natural history, especially in our national marine sanctuaries. The show also streams live on the web, reaching a worldwide audience. Listen to a minke whale, track an albatross across the Pacific and find out how you can get involved in protecting the ocean. Listen to archived shows or subscribe to the podcast on the sanctuary Web site.



To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

### Teachers Dive into Ocean Exploration

Teachers and students learned how to design and build remotely operated vehicles (ROVs) in a workshop hosted by sanctuary staff in partnership with the Marine Advanced Technology and Education Center and Deep Ocean Exploration and Research. Eleven teachers and six high school students from around the region were treated to working directly with engineers to learn how they design ROVs and submersibles for different environments. The teachers and students then built their own ROVs out of PVC pipe and bilge pumps. The technology workshop provided valuable hands-on training for the students as they prepare for future ROV building competitions and reflects the sanctuary program's commitment to training America's future technology leaders.

### U.S. Coast Guard Helps Monitor Vessel Traffic

A new partnership between the National Marine Sanctuary Program and the U.S. Coast Guard is helping sanctuary staff study potential impacts of vessel traffic in the Cordell Bank sanctuary. The U.S. Coast Guard provided software that is allowing staff to track real-time movements of all large ships carrying Automatic Identification Systems. The last six years of data determined that an average of 200 ships per month pass Cordell Bank. Understanding vessel traffic patterns is important to documenting potential threats to sanctuary marine life. The information is already proving valuable as scientists used traffic data to determine the placement of the Sanctuary Ecosystem Assessment buoy that was installed in February 2007.

### Plans for 2007

- Staff will be testing methods to remove entangled fishing gear from deep water habitats and survey areas of the bank never seen before to document the presence of marine debris in the region.
- NOAA has awarded \$600,000 for a three-year collaborative project that brings research into the classroom. Students will track black-footed albatross, sooty shearwaters, monkseals, and sea turtles in the ocean, and learn about the ocean as a habitat.
- An interactive touch screen kiosk will be installed at the Bear Valley Visitor Center at Point Reyes National Seashore, where visitors can interact with live weather data, interactive activities and access sanctuary Web sites.
- The program is looking to support the Oakland Museum of California in its museum renovation by bringing the sanctuaries and habitats of California into the newly designed natural sciences wing. Project is dependent on allotted exhibits funds.

## Sanctuary Maps Now Available



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# FAGATELE BAY 2006 ACCOMPLISHMENTS



<http://fagatelebay.noaa.gov>

## Program Looks at Ways to Stop Soil Erosion



Excavator clears a section of land. Photo: Richard Murphy, Ocean Futures Society

Sanctuary staff are working with local partners to mitigate the effects of land clearing on the ridge slopes above Fagatele Bay. The forest clearing has expanded in recent months and may be impacting sanctuary water quality. To help control soil erosion, a project is in development to plant rows of vetevier, a non-invasive grass, within the taro plantations. Students from the American Samoa Community College will measure the amount of soil transport in areas planted with the grass and compare this to plantations without it. Researchers hope this effort will engage landowners in better land-use practices and help to promote stewardship of American Samoa's forests and adjacent coastal environments. This project is a collaboration with U.S. Department of Agriculture National Resource Conservation Service, American Samoa Land Grant and the American Samoa Community College.

## Twenty Years Serving Samoa

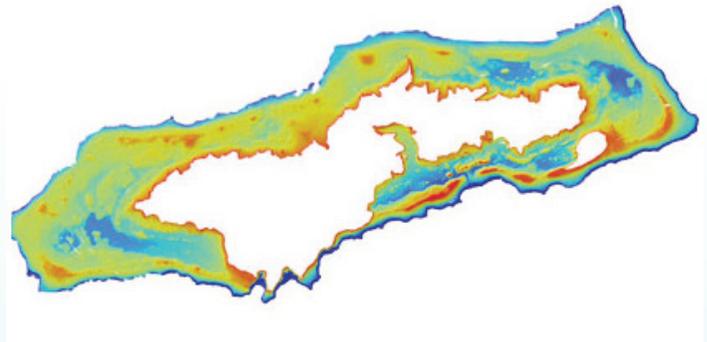
Fagatele Bay reached a milestone in 2006 – 20 years as a national marine sanctuary. To celebrate the event, sanctuary staff, the American Samoa Department of Commerce, Ocean Resources Management Council and American Samoa Community College sponsored a forum *2010: Balancing Ocean Uses with Conservation*. The forum's recommendations to the territory included increased community involvement in environmental stewardship, better enforcement of environmental laws, balance development with conservation, find ways to utilize by-catch from fisheries, and provide incentives for students to pursue degrees in marine science and policy.

## Bay Water Quality Monitored

Sanctuary staff collaborated with the American Samoa Environmental Protection Agency (ASEPA) to establish water quality monitoring protocols for the sanctuary. This effort will expand the agency's island-wide beach water quality monitoring to include monitoring the sanctuary for bacteria. It will provide a baseline to judge potential changes in water quality if human use in and around Fagatele Bay increases. Researchers hope that these procedures can be expanded to include other contaminants that could enter the bay from springs, coastal runoff and other sources.

## Research Cruise Produces New Findings

NOAA scientists aboard NOAA ship *Hi`ialakai* visited American Samoa in early 2006 to conduct a month-long monitoring cruise of the region's coral reefs and marine habitats. The research team also completed multi-beam bathymetric mapping of American Samoa's shallow and deep-water coral reef habitats that provide significant new understanding of where reefs are found and how to protect them. The deep offshore banks and reefs the survey identified highlight the need to characterize and potentially protect these areas from fishing, as they may be key to sustaining shallow near-shore coral reefs and their fisheries.



Bathymetric map of American Samoa. Red areas are shallow banks and reefs surrounding the island.

## Samoa Waters Key for Protecting Humpback Whales

Recent studies have shown that American Samoa is a significant habitat for humpback whales. During 2006 surveys, researchers documented a record number of whales in American Samoa waters. Up to eighteen individuals were sighted in a single day over a relatively small area west of Tutuila. This area is part of a recently mapped system



of submerged reefs and banks that surround Tutuila and extend up to five miles offshore. The shallow areas provide unique habitats where humpback whales calve and breed after spending the southern summer months feeding in Antarctic waters. Whale research in American Samoa is a collaborative effort between the National Marine Sanctuary Program, National Park Service, American Samoa Department of Marine and Wildlife Resources and the Western Samoa Government.

Humpback whales often calve and breed in Samoan waters. Photo: Paul Brown

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

## Fagatele Bay Staff and Ocean Futures Launch Innovative Education Program



Céline Cousteau and Richard Murphy, foreground, with Samoan children during filming of *America's Underwater Treasures*. Photo: Carrie Vonderhaar, Ocean Futures Society

To help Samoans develop stewardship for their coral reefs, Jean-Michel Cousteau's Ocean Futures and Rock and Waterscape International launched the Sustainable Reefs Program in American Samoa. A free, innovative education package that includes a DVD, cartoon book story, and an ocean science curricula and activities guide was given to schools, educators and other groups dedicated to coral reef protection in American Samoa. The sanctuary program coordinated the launch of the education initiative. Sustainable Reefs was also featured in Cousteau's PBS film, *America's Underwater Treasures*.

## Plans for 2007

- Staff will begin their management plan review process to evaluate the role the sanctuary program can play in helping the territory manage and protect its marine environment.
- The sanctuary office will play an important role in the territory's hosting of the U.S. Coral Reef Task Force meeting scheduled for August 2007. This will include engaging the participation of regional South Pacific island nations and build more regional collaboration in coral reef management and conservation efforts.
- In collaboration with the American Samoa National Park, a nature trail is being constructed that will link Fagatele Bay to adjacent Larson's Bay and the coastal villages to the east and west. This trail will provide better access for visitors to the sanctuary, and will give a wider public understanding of the sanctuary and stake in protecting the coastal environment.

## Sanctuary Maps Now Available



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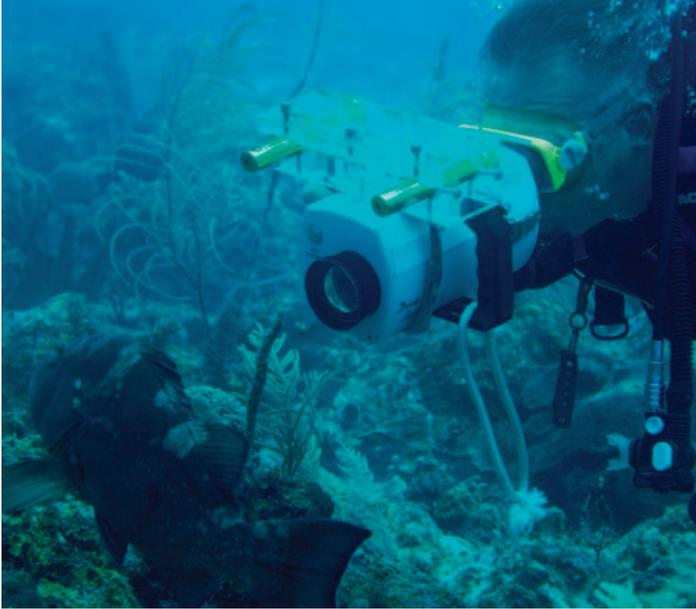


# FLORIDA KEYS 2006 ACCOMPLISHMENTS



<http://floridakeys.noaa.gov>

## Studies Show Increases in Several Fish Species



Researcher videotapes a grouper. Photo Don DeMaria

Five years after establishing the sanctuary's largest no-take area, studies have shown increasing numbers and sizes of commercially and recreationally important fish species and other marine life. Positive changes include increases in size and abundance of black grouper, the gradual recovery of a mutton snapper spawning aggregation decimated by commercial fishing, the recovery of pink shrimp and their habitat, and an increase in the number of large fish inside the reserve as compared to outside. Because the Tortugas region is upstream of the Florida Keys reef tract, improvements in the reserve's fish populations may help sustain fish stocks in the Keys and further north, as more and larger fish produce larvae that are carried away from the reserve on ocean currents. Adult fish may also move to areas outside the reserve as competition for space increases within. These fish then become available to the fishery, an effect known as spillover.

## New Course to Help Students Better Understand Their Sanctuary

Sanctuary staff introduced a continuing education course at the Florida Keys Community College in Key West designed to help students learn more about the sanctuary. Guest lecturers gave presentations on topics including Queen conch population enhancement, shipwreck management, coral disease and Everglades restoration. After six weeks of lectures, the class ended with a snorkeling trip to the coral reef. The course

was free, except for the cost of the field trip. In addition to learning about their sanctuary, the class offered students an opportunity to understand current challenges in managing the coral reef ecosystem. Presenters included staff from both the sanctuary and partner agencies such as the Florida Fish and Wildlife Research Institute. The sanctuary plans to offer the course again in the winter of 2007 in the Upper Keys.

## Urchins Relocated to Safer Ground

Seeking to improve the health of Keys reefs, members of the Florida Keys National Marine Sanctuary Advisory Council led an effort to relocate more than 2,000 juvenile, long-spined black urchins to safer waters before the height of hurricane season. Council members moved the urchins out of the reef rubble zone, where they can be smashed by the strong surge and high waves of passing storms. Long-spined urchins play a critical role in coral reef health by grazing on algae, leaving behind bare rock that is important habitat for juvenile corals. The once abundant urchins underwent a mass die-off throughout the Caribbean during the early 1980s and the population in the Florida Keys has been slow to recover. Many scientists now cite the urchin's disappearance as a factor in the decline of Caribbean coral reefs. The council members hope that increased numbers of urchins will translate into increased settlement and survival of juvenile corals.



Council member removes urchin in project to bring them to safer ground. Photo: Nick Tagliareni

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

## Annual Coral Spawning Event Intrigues Researchers

The annual coral spawning, the spectacular show put on each summer by some species of hard coral as they strive to reproduce, was the focus of renewed attention in the sanctuary as researchers sought to learn about coral reproduction and survival to find methods to sustain threatened reefs. The sanctuary joined with Mote Marine Laboratory to

conduct a ten-day research cruise to observe and document coral spawning in the Looe Key Sanctuary Preservation Area. The team documented eight species of coral spawning and observed the spawning of the newly listed threatened species *acropora palmata* (elkhorn coral), formerly the primary reef-building coral in the Caribbean. Mote scientists have succeeded in growing juvenile corals in their Summerland Key laboratory from elkhorn spawn collected during the expedition. Scientists hope to be able to learn from these spawning events so they can transplant corals back onto the reefs.

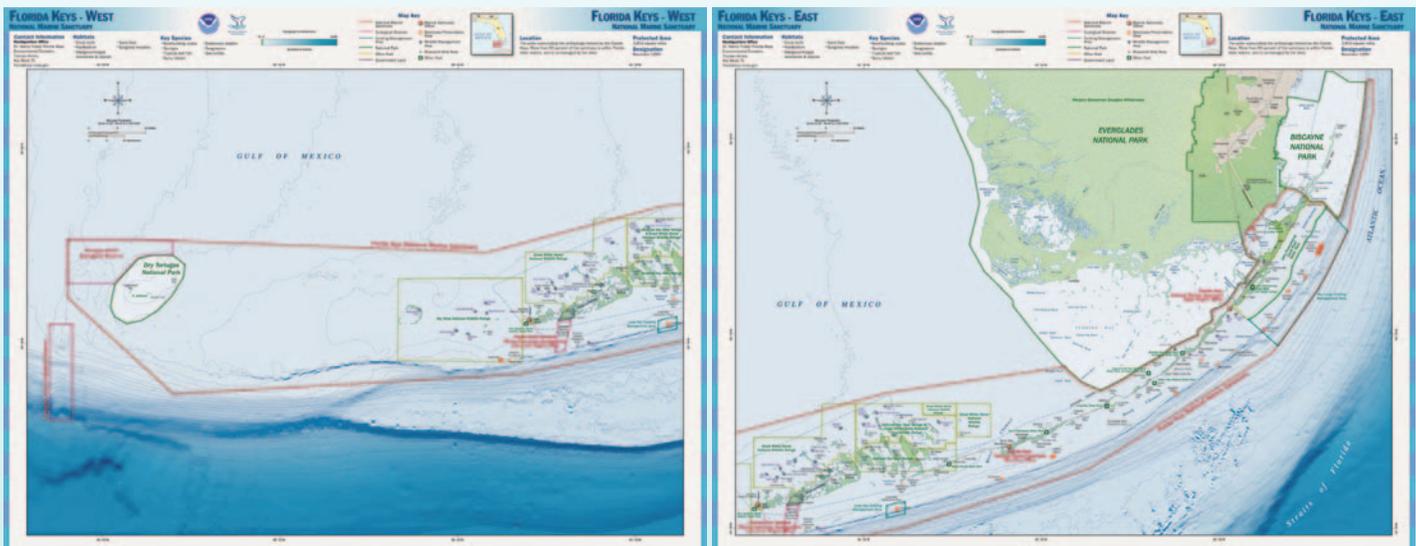


Researcher collects samples from spawning event.  
Photo: Bob Care

## Plans for 2007

- Sanctuary staff will launch the Dolphin SMART program that recognizes responsible wild dolphin viewing charters. These charters abide by a voluntary code of conduct intended to protect dolphins by promoting proper viewing etiquette and preventing harassment. The first training for prospective participants was in February 2007.
- The Florida Keys National Marine Sanctuary will use a NOAA marine debris grant and matching funds from the State of Florida to remove materials dumped into the Gulf of Mexico to attract spiny lobsters for illegal harvest. NOAA Fisheries will contribute the use of a vessel equipped with sidescan sonar to locate the materials, and Florida Fish and Wildlife Conservation Commission officers will provide oversight. The illegal artificial reefs destroy the natural seagrass and hardbottom where they are placed.
- The Florida Keys Web site will undergo a much-needed overhaul. While the current site boasts a wealth of information, the redesign will update the materials offered and make the site easier for visitors to navigate.

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# FLOWER GARDEN BANKS 2006 ACCOMPLISHMENTS



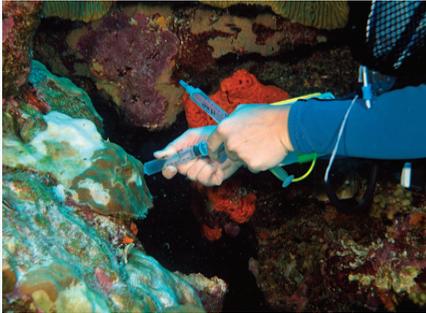
<http://flowergarden.noaa.gov>

## Sanctuary Management Plan Being Updated

Sanctuary staff officially began the first management plan review for the sanctuary in September 2006. Management plans serve as a blueprint for setting a site's resource protection, science and education priorities and are reviewed to ensure that sanctuary policies are designed to best conserve sanctuary marine life. As part of the review process, the public is asked for their recommendations on future sanctuary management. Public meetings were held in October where constituents from the Gulf Coast region offered initial recommendations on how best to manage the sanctuary. This information is critical in shaping any plan revisions. Sanctuary staff are reviewing the public comments and will prioritize issues that will serve as a first step for developing a draft management plan. You can learn more by visiting the sanctuary Web site.

## Scientists Monitor Reefs Following Natural Impacts

For the past year and a half, the reefs of the Flower Garden Banks National Marine Sanctuary suffered unprecedented disease and bleaching episodes and were pounded by Hurricane Rita. Surveys in 2006, however, show that the reefs are recovering. Coral colonies affected by bleaching have dropped from a high of 45 percent in 2005 to less than six percent in 2006. In addition, up to eight percent of colonies were affected by disease, but only a few continued to show signs of active lesions during the most recent surveys. Knowing how the reefs responded to natural impacts will help resource managers determine what measures are needed to reduce impacts from sources that can be controlled.



Scientist collects mucous from a diseased coral colony.  
*Photo: Joyce & Frank Burek*



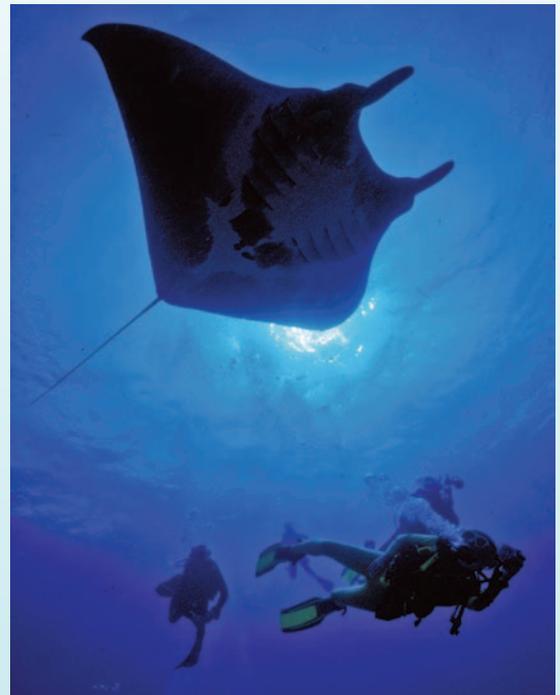
Example of bleached corals when water temperatures remain too warm for an extended period. *Photo: Emma Hickerson*



Whale sharks are the subject of an innovative whale tagging effort. *Photo: Quenton Dokken*

## Whale Shark and Manta Ray Tagging Effort Underway

Where do the whale sharks that visit the sanctuary in the summer originate? Do the manta rays observed in the Flower Garden Banks National Marine Sanctuary move between the various banks of the sanctuary? Do they frequent any of the neighboring banks outside the sanctuary? How much time do they spend in the sanctuary? To answer these and other questions, program staff are collaborating with the Wildlife Conservation Society based in Belize, in a shark and ray tagging effort. To date, an underwater receiver has been placed on each of the three banks and six manta rays have been tagged with acoustic transmitters. Information gained from this long-term project will help resource managers determine if existing marine protected areas in the Gulf of Mexico and Caribbean are enough to sustain habitat and food sources for these animals. To learn more about this effort visit the sanctuary Web site.



Manta Rays are the subject of a new tagging effort in the Flower Garden Banks. *Photo: Kaile Tsapis.*

**To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)**



Adult Goliath grouper at a cleaning station on a coral reef. Photo: Craig Dahlgren

### Research Cruises Yield Expanded Species List

The sanctuary's long-term monitoring efforts paid off again with evidence of species never before known to exist in the Stetson Bank portion of the sanctuary. Researchers discovered a nudibranch, hermit crab and shamefaced crab. Other highlights included the first ever documentation of a Nassau grouper, and the first photo-documentation of a goliath grouper, both sighted at the East Flower Garden Bank. Both species have undergone dramatic declines in abundance throughout their ranges and are now considered "species of concern" by the NOAA Fisheries Service. Information gathered on these cruises will give scientists a clearer picture of the habitats preferred by the sanctuary's diverse array of marine residents, making it possible for marine resource managers to identify areas that may be particularly important to the health of the sanctuary ecosystem.

### New Exhibits at Galveston Aquarium

Informative signage highlighting various national marine sanctuaries will become part of the exhibits featured at the Aquarium at Moody Gardens in Galveston, Texas. Aquarium visitors will be treated to the Flower Garden Banks and other national marine sanctuaries throughout their visit. This is an important step for the Flower Garden Banks National Marine Sanctuary as it begins to develop the Galveston area as a gateway community for the sanctuary.

### Plans for 2007

- On January 17th, the sanctuary celebrated 15 years of ocean stewardship, and an Ocean Discovery Day was held in Galveston on January 20th.
- Sanctuary researchers and educators will join Bob Ballard for a research expedition to the banks from March 2-10th. The Navy's nuclear research submarine, the NR-1, and an underwater tow sled will explore potential paleo-shorelines and biological "hidden highways" in the region.
- Sanctuary sponsored research cruises are planned throughout the year. Research topics include acoustic and satellite tagging of elasmobranchs, conch surveys, coral disease and bleaching surveys, benthic and fish surveys, coral spawning research, long-term monitoring of the reefs and other reefs in the region.
- A *Coral*s to Classrooms workshop will take place in June followed by two *Down Under Out Yonder* education workshops in July.

### Sanctuary Maps Now Available



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# GRAY'S REEF 2006 ACCOMPLISHMENTS



<http://graysreef.noaa.gov>

## Gray's Reef Celebrates 25th Anniversary



Loggerhead sea turtles common to Gray's Reef and on view at the Georgia Aquarium.  
Photo: Georgia Aquarium

Twenty-five years of sanctuary science, education, and conservation was the theme at a 25th anniversary celebration hosted by the National Marine Sanctuary Foundation. Top accomplishments from a quarter century of ocean stewardship include the launch of Ocean Film Festival, creation of a comprehensive habitat profile and characterization maps necessary for critical management decisions, and two important education modules for regional teachers and students. The event, held at the Georgia Aquarium in Atlanta in September, brought citizens from around Georgia to commemorate the sanctuary's service to the American people. As part of its anniversary celebrations, Gray's Reef forged a partnership with students and teachers at Thunderbolt Elementary Marine Science Academy, Thunderbolt, Ga., to enrich marine science education for the academy's 650 children and for the community. Gray's Reef is noted for its diverse invertebrate communities and scientists continue to find new sponge and invertebrate species.

## Clean the Reef, Clean the Beach

To celebrate World Oceans Day, sanctuary staff and volunteers from Savannah's Clean Coast group and local scuba clubs removed trash and debris from local beaches and sanctuary waters. The volunteers received special training on how to remove trash from the reef without damaging the soft corals and other invertebrates living there. The most common types of trash found within the sanctuary are fishing line, fishing gear and beverage cans. Program staff hope that the information on debris collected by the divers can feed into a long-term study of how marine debris impacts sanctuary waters and reef habitat.

## Workshops Raise Ocean Awareness in Students

Two ROV (remotely operated vehicle) workshops brought students and teachers closer to the technology used to study the marine environment. These workshops help students understand ocean issues and increase their science aptitude. In Savannah, eight teams with a total of 25 students built their own ROVs and launched them in a local swimming pool. The students gained an appreciation for ocean science technology through this interactive, hands-on workshop.

## Gray's Reef Has Possible New Sponge Species

Georgia Southern University scientists are developing a catalog of sponges found in the South Atlantic Bight including Gray's Reef. Within the sanctuary, they found 52 species of sponges from seven habitats, two of which are thought to be new species. Two years ago the same team found three tunicates in the sanctuary thought to be new species. Within the sanctuary, there are tropical sponges living at the northern most edge of their range and temperate sponges living at the southern most edge of their range indicating that Gray's Reef is a crossroads of the Atlantic.



Gray's Reef marine life. Photo: NOAA

## Ocean Film Festival Draws Many

More than 1,900 people learned about the ocean by attending the Gray's Reef Ocean Film Festival in September. Nearly 50 films on ocean themes were shown during five days at three different venues. The festival brought together Sapelo Island National Estuarine Research Reserve staff and other partners to raise the level of ocean literacy in the community through films.

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

### New Analysis for Resource Management

In a valuable ongoing study, scientists are piecing together the “big picture” of the diverse marine life and habitat types found in Gray’s Reef. Using extensive surveys of the area’s fish, coral and other invertebrate species, staff are gaining new insight into ecologically important areas. Armed with this knowledge, resource managers will be able to better understand how factors like marine debris, recreational fishing and diving affect these habitats, and base future management decisions accordingly.



Diver and a jelly fish in Gray’s Reef sanctuary waters. Photo: Greg McFall

### Plans for 2007

- Sanctuary staff will continue monitoring the reef and surrounding habitat to learn more about how it supports the living reef communities.
- A public awareness campaigns will be unveiled to make the public aware of new regulations designed to protect the sanctuary.
- A public process about a potential research area within the sanctuary will begin.
- A socioeconomic study on how people fish within the sanctuary will begin.

### Sanctuary Maps Now Available



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# GULF OF THE FARALLONES

## 2006 ACCOMPLISHMENTS



<http://farallones.noaa.gov>

### Congress Recognizes Sanctuary's 25 Years of Ocean Protection

For its 25 years of ocean stewardship, Senators Barbara Boxer and Dianne Feinstein, and Congresswomen Lynn Woolsey and Nancy Pelosi honored Gulf of the Farallones National Marine Sanctuary with Congressional resolutions this summer. Among notable achievements, program staff supported initial funding for research on endangered humpback and blue whales; initiated the Congressionally-recognized Beach Watch coastal monitoring program, whose data has helped secure multi-million dollar oil spill settlements; collected key evidence identifying the source of "mystery" oil spills from the *S/S Jacob Luckenbach* wreck, and assisted in removing 100,000 gallons of oil from the sunken vessel.

The sanctuary's 25th anniversary public awareness campaign kicked off with the Third Annual San Francisco Ocean Film Festival. The festival marked the premiere of *Cool Water Haven*, a documentary on the sanctuary as part of a campaign to raise sanctuary profile in the San Francisco Bay area and nationwide.

### Sanctuary Profiles Fishing Community and Resources

Working closely with local fishermen, resource managers and scientists, and sanctuary staff are looking at ways to accurately reflect the state of current fisheries, standardize fisheries data, and identify regions critical to fisheries. Having accurate socioeconomic information is important in working with the fishing community and fisheries managers to foster best practices to protect resources and other marine life. Staff are collaborating with local fishermen on a sustainable fisheries initiative that will protect the health of the sanctuary by developing model sustainable fishing communities. The entire report is available on the sanctuary Web site.



Herring boat in Tomales Bay. Photo: Richard Allen

### Company Fined For Illegal Dumping

This year, NOAA and the Environmental Protection Agency successfully settled with Dutra Dredging, one of the largest dredging companies in the state, securing \$750,000 dollars in fines for dumping or spilling dredged mud into sanctuary waters. The agreement marks the first time the sanctuary and the EPA have worked together to enforce illegal dumping laws. Dredge spoils can affect water quality and affect the entire food web by smothering bottom-dwelling marine life, blocking sunlight, and ultimately change the ecology of the ocean floor. Fines will be applied to habitat restoration.

### California Seabirds Get a Helping Hand



Pigeon guillemot. Photo: Jeff Foote

Decimated by years of human impacts like oil spills, or disturbing their nesting grounds, once thriving bird colonies along California's central coast have been on a downward slide. But help is on the way with the launch of a first-of-its-kind effort to protect seabirds by reducing human disturbance at their colonies. Known as the Seabird Colony Protection Program, researchers are developing innovative ways to reach the public whose actions often cause birds to scatter leaving eggs and chicks vulnerable to predation or the elements. To stem that tide, researchers are enlisting the help of ocean users such as boaters, hikers, kayakers, and pilots. Staff are providing maps or leaflets and placing specially marked signs or buoys that inform users on the safe distances from colonies. Additionally, the program continues to look at conservation threats, management needs, and restoration opportunities to get the birds' numbers healthy again.

**To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)**

### School Program Profiles At-risk Seabirds

A California seabird, the common murre, is highlighted in a new sanctuary outreach program, *Webs Under Waves*. Working with partners such as U.S. Fish and Wildlife Service and PRBO Conservation Science, this project will bring the "seabird shuttle" to third through fifth grade classes. Students will learn about the natural history and special vulnerability of the common murre, a penguin-like seabird whose numbers dropped dramatically after a disastrous 1986 oil spill in sanctuary waters. *Webs Under Waves* includes lessons about the marine food web and seabirds' place in it, points out special common murre adaptations, and teaches how students can help protect seabirds.



Seabirds, like common mures, are the focus of a new protection plan. Photo: NOAA

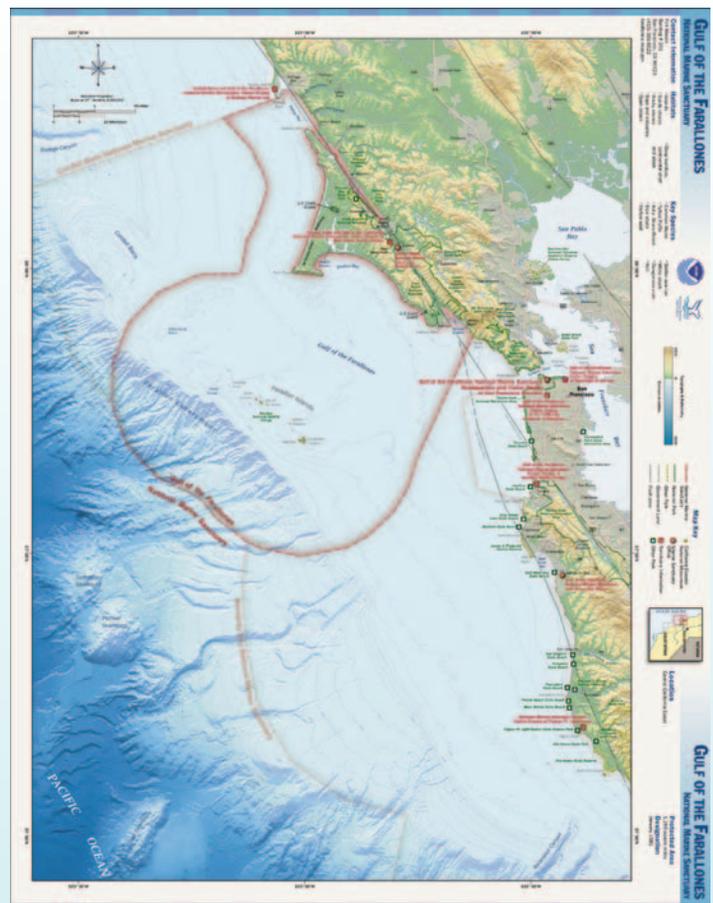
### Researchers Document Biological Weak Link in Food Web

The significant absence of krill off Northern California for the second year in a row has caused reproductive failure in seabirds and forced blue whales to forage elsewhere, raising concern amongst scientists. During a NOAA research cruise, *SEAS '06 - Taking The Pulse of the Sanctuary*, scientists investigated the relationship between physical oceanographic features and the abundance of marine life in sanctuary waters. The team of scientists conducted around-the-clock surveys for top-level predators such as seabirds and marine mammals, and plankton tows to examine productivity beneath the surface. Preliminary findings confirmed that greatest productivity occurred where ocean features, such as submerged islands and the Continental Shelf edge, generate upwelling -- the stirring up of nutrient rich waters close to the ocean's surface. Research findings will be used to help managers understand the complex natural and human-caused factors that affect ocean health.

## Plans for 2007

- Twenty-five interpretive signs highlighting the richness and diversity of California's sea life will be installed along scenic coastal areas.
- Staff will step up efforts to restore the submerged lands of Tomales Bay, and implement a vessel management plan for the area. The plan addresses indiscriminate and illegal placement of moorings in the sanctuary, abandoned vessels, and future sunken vessel removals.
- Beach Watch Online will capture real-time wildlife observations and data on changes and trends from Beach Watch, a long-term volunteer monitoring project. Data will be integrated into the Sanctuaries Integrated Monitoring Network (SIMoN).
- Two interactive kiosks at San Francisco's Aquarium of the Bay will introduce visitors to the National Marine Sanctuary Program, focusing on California's marine sanctuaries.

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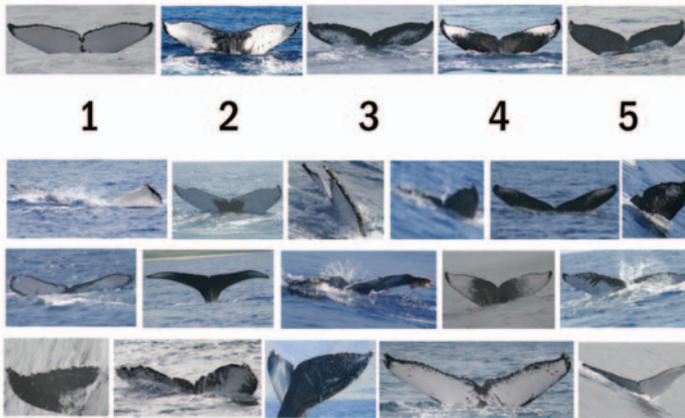
# HAWAIIAN ISLANDS HUMPBAC WHALE 2006 ACCOMPLISHMENTS



<http://hawaiihumpbackwhale.noaa.gov>

## SPLASH Research Phase Complete

The largest international humpback whale study ever attempted completed its final year of field study. Known as the Structure of Populations, Levels of Abundance and Status of Humpbacks study (SPLASH), the cooperative effort looked at the population structure of humpback whales across the entire North Pacific. In Hawai`i, the project's last winter of field work was a record-breaker. More than 2,500 groups of whales were encountered, and researchers collected 32,170 tail photos resulting in the identification of 2,200 individual humpback whales, almost twice the number identified in the first year of SPLASH. While the bulk of the analysis is not yet complete, preliminary results predict that enough data was collected to assess the status, trends and potential human impacts to the whales.



Charts of tail photos help researchers identify individual whales. Photo: NOAA Fisheries permit # 782-1719

## New Methods to Reduce Whale Strikes

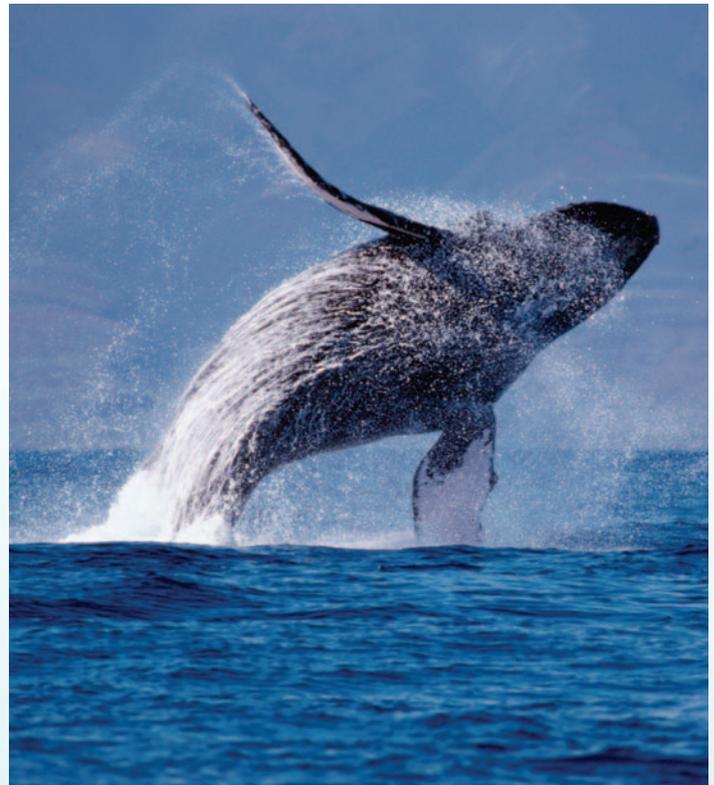
Vessel collisions with whales are one of the largest threats to humpbacks. In an effort to reduce ship strikes to the animals, sanctuary staff enhanced its ocean-user outreach efforts with several approaches. Staff installed 11 safety signs at small boat harbors and ramps across the state. In addition, staff distributed wildlife viewing information to the ocean-user industry during Humpback Whale Awareness Month. These efforts were aimed at facilitating safe boating and responsible wildlife viewing in the sanctuary with the primary objective of protecting humpback whales.



Team of rescuers work to untangle a humpback whale. Photo: NOAA MMHSRP # 932-1489-08

## Sanctuary Ocean Count Project A Success

More than 1,900 volunteers participated in last year's Ocean Count project where volunteers watch whales and record their behaviors from over sixty-five shoreline locations. This popular outreach effort continues to grow each year and has become a favorite project of many Hawai`i residents and tourists. Aside from the data that is collected, the project is effective in increasing public awareness, understanding, and appreciation for humpback whales, and Hawai`i's precious marine environment.



A breaching humpback whale. Photo: Doug Perrine, NOAA Permit # 88

## Staff Continue Marine Mammal Protection Efforts

The sanctuary supported marine mammal conservation throughout the state of Hawai`i by assisting with emergency responses. Working with NOAA's Fisheries Service and the Hawai`i Department of Land and Natural Resources, the sanctuary staff played a key role in protecting Hawai`i's marine mammals. Staff protected three Hawaiian monk seals, the most endangered seals in the United States, from human disturbance during their six-week nursing periods, and removed fishing hooks from seven Hawaiian monk seals around the state. Sanctuary staff also responded to several stranded cetaceans, providing logistical support to ensure that the animals received proper care. These coordinated efforts have helped to ensure the future protection of Hawai`i's marine protected species.

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

### Education Cruise Helps Prepare Tomorrow's Ocean Stewards

The NOAA ship, *Hi'ialakai* has become an annual platform for high school marine education cruises. A select number of students and teachers from all the islands have had the opportunity to participate in oceanography and other lessons while sailing aboard the ship. Lessons highlight the actual science that is performed on the ship by NOAA scientists. Participants are given a unique opportunity to consider ocean-related careers while experiencing hands-on science at sea. The students that are taught today may be the NOAA scientists of tomorrow.



The NOAA ship, *Hi'ialakai* supports research in Hawaiian Islands. *Photo: NOAA*

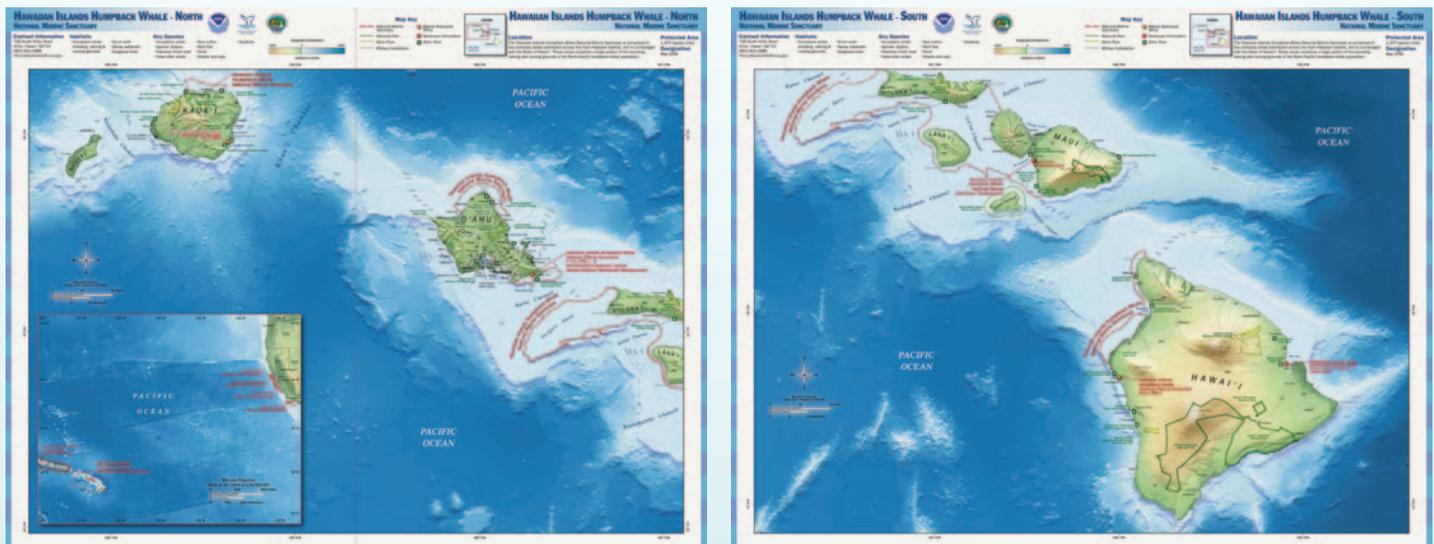
### Marine Science Curriculum Underway for Hawai'i

Sanctuary and state educators are developing K-12 marine science curriculum for the State of Hawai'i Department of Education. The completed curriculum will include integrated standards-based lessons, multi-media packages, accompanying field trips and in-the-field monitoring activities, focusing on ocean literacy and NOAA-related science. The marine education program will provide students with the fundamental knowledge they need to understand and protect Hawai'i's most precious resource - the ocean.

### Plans for 2007

- The sanctuary's new visitor and education center is due to open in 2007. The center will complement the existing "landmark" blue office building and mural painted education center in Kihei, Maui. The new center will provide an expanded facility for research and education programs that will enhance humpback whale protection in Hawai'i.

### Sanctuary Maps Now Available



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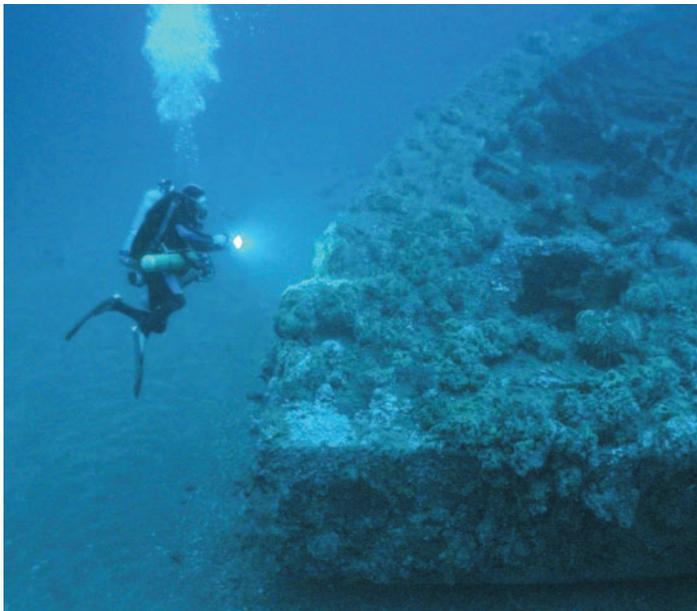


# USS MONITOR 2006 ACCOMPLISHMENTS



<http://monitor.noaa.gov>

## Keeping an Eye on the *Monitor*



Diver and USS *Monitor*. Photo: Monitor Collection/NOAA

A summer expedition to the USS *Monitor* gave the public an up-close-and personal with researchers studying the historic shipwreck, 240 feet below the surface. NOAA's staff produced a 16-minute video program that describes the *Monitor*, sanctuary, and the technology that was used on the expedition. More than 7,000 viewers tuned in to the Intranet and local PBS stations. Archived video from the expedition can be watched on the sanctuary's Web site and can serve as an excellent educational tool for those who want to peak into a part of our maritime history. Scientists also produced photomosaics of the site that will serve as a tool to track the wreck's deterioration over time. The mission was coordinated through the National Marine Sanctuary Program, the University of Rhode Island and the Institute for Exploration.

## NOAA Data Buoy Finds New Home

Working with the NOAA National Data Buoy Center, sanctuary staff moved a data buoy into the sanctuary that will make life easier for ocean users. The buoy records real-time data on water and air temperature, wind direction and wave height. In Spring 2007, upgraded instrument packages for tracking currents and salinity will be added. The new equipment will be very useful to fishermen in the area who will, for the first time, have access to sub-surface current information. The data collected will also be used to assist staff in monitoring conditions at the sanctuary. The data from the buoy can be accessed online. [[http://www.ndbc.noaa.gov/station\\_page.php?station=41025](http://www.ndbc.noaa.gov/station_page.php?station=41025)]

## Education Efforts Expanded

Sanctuary staff reached more than 2,500 students and 150 teachers with information about the *Monitor* and the National Marine Sanctuary System at workshops and open houses held in the region. The staff continued to support regional community festivals as well, reaching more than 500,000 people through events including Norfolk Harborfest, Hatteras Day at the Docks and Delaware Coast

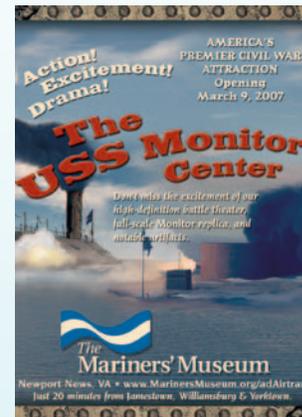


Students participate in a mock shipwreck exercise. Photo: Monitor Collection/NOAA

Day. New exhibits highlighting the National Marine Sanctuary System took center stage with displays at NOAA's Maritime Archaeology Center, Nauticus in Virginia, and The North Carolina Aquarium on Roanoke Island. Staff also installed exhibits and opened a field office at the Graveyard of the Atlantic Museum in Hatteras, North Carolina this year.

## Monitor Replica Christened – New Center Opens

To recognize an important part of our maritime history, program staff and The Mariners' Museum, Northrop Grumman Newport News, and the U.S. Navy christened a full size steel sculpture of the USS *Monitor*. The ceremony in June highlighted how the ship will serve as an iconic centerpiece for the Museum's \$30 million, USS *Monitor* Center which opened in March. One of the premier Civil War attractions across the nation, the dramatic, 63,500-square-foot facility features exciting exhibits bringing visitors face-to-face with history.



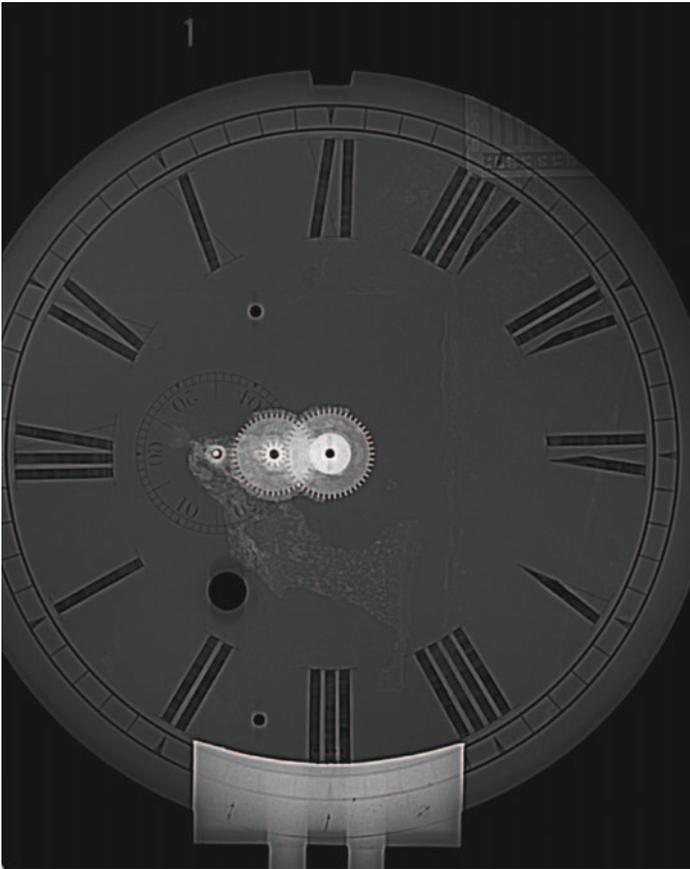
Jeff Johnston (far right) stands with reenactors Jeff Cranford, Josh Stone, and Sam Craghead during christening ceremonies. Photo: Walter Bonora

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

## Conservation Efforts Continue on *Monitor* Artifacts

Salt, mud, and time have taken their toll on the iron artifacts of the USS *Monitor*. To ensure their conservation, conservators from The Mariners' Museum continue to excavate inside the gun turret to remove oxidized sediment. Conservators recovered several small uniform buttons, a wrought iron hand crank, and four metallic "rim fire" cartridges believed to be from a Sharp's and Hankins breech loading rifle. The discovery of these artifacts sparked media frenzy during the summer as newspapers around the country ran the story.

In 2006, NOAA and the Mariners' Museum used the latest state of the art technologies to document the condition of artifacts recovered from the *Monitor* and to help scientists better understand the corrosion process that has affected those artifacts. Working with companies like CC Technologies, Fuji Film, and Optira, NOAA and The Mariners' Museum are making great strides in preserving the historic shipwreck for future generations.



X-ray image of the *Monitor*'s engine room clock and gear box.  
Photo: Northrop Grumman Newport News Shipbuilding



Monitor Anchor. State-of-the-art laser and scanning technology continue on *Monitor* artifacts.  
Photo: Courtesy Maglev

## Plans for 2007

- Prepare management plan review with staff, advisory council members and the public underway;
- Install new instrument packages on NOAA Data Buoy in the sanctuary.
- Research continues in the graveyard of the Atlantic.

## Sanctuary Maps Now Available



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# MONTEREY BAY 2006 ACCOMPLISHMENTS

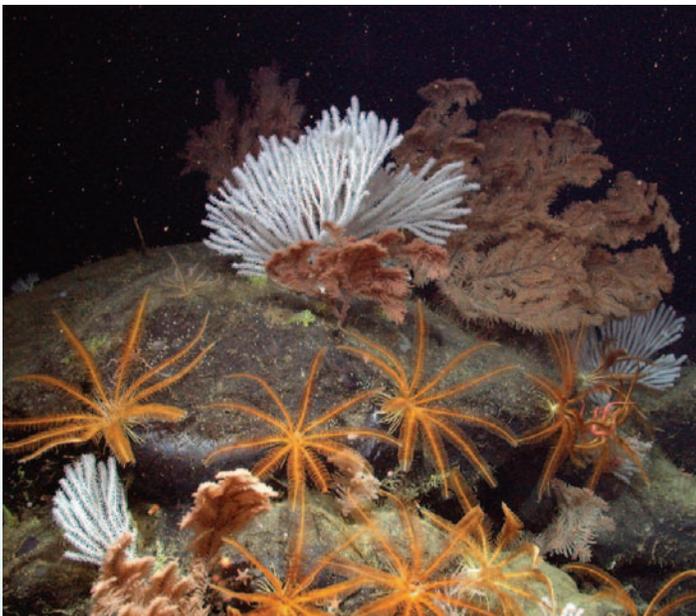


<http://montereybay.noaa.gov>

## Coastal Discovery Center Opens

The sanctuary's first public visitor center opened its doors in July in partnership with California State Parks. Located at Hearst State Beach, the small but vibrant Coastal Discovery Center at San Simeon Bay highlights the marine ecosystem of the Monterey Bay National Marine Sanctuary and California's Central Coast. Exhibits include the first public display about Davidson Seamount, video voyage to the wreck of the *Montebella*, talking tidepool, and a 150-gallon steelhead tank. Visitors can see how their activities on land affect the ocean and how the ocean affects them. The center anticipates more than 10,000 in its first year of operation.

## Scientists Study Deep Sea Corals on Davidson Seamount



Corals and feather stars on the Davidson Seamount at 2669 meters. Photo: NOAA/MBARI

In January 2006, researchers journeyed to the Davidson Seamount to understand why deep-sea corals live where they do, determine age and growth patterns of these corals, and identify what species live there. Scientists placed markers at specific locations in the area to help make future photographic measurements and determine growth rates of the giant corals, some as old as 200 years. More than 70 hours of observations were recorded. Hundreds of images can be viewed and downloaded from the sanctuary Web site. The Davidson Seamount is proposed for inclusion in the sanctuary to protect these slow growing, deep water corals and other species associated with the unique underwater environment.

## New Monterey Bay Sanctuary Field Guide

A new sanctuary publication, *Field Guide to the Monterey Bay National Marine Sanctuary* is now available. The 12-page publication is designed for both visitors and residents, and encourages exploration, enjoyment and protection of the sanctuary. The guide introduces readers to the sanctuary's natural wonders and ways to experience its beauty by foot, boat, bike or car. Readers will find information on sanctuary habitats, descriptions and photographs of common wildlife and information on the best times and places to see wildlife. The guide also includes tips for watching wildlife responsibly and keeping sanctuary waters clean. A detailed map of the central California coast identifies points of interest, and features things to do in and around the sanctuary. Copies are available from the sanctuary office and can be downloaded from the sanctuary's Web site.



The field guide can be used as a travel guide or for educational purposes. Photo: NOAA

## New Image Database Available to the Public



Vermillion rockfish. Photo: Chad King

The Sanctuary Integrated Monitoring Network (SIMoN) now boasts a new searchable database of more than 2,500 digital images showing the sanctuary's unique collection of animals, plants and habitats. Visitors can search by species name or keyword and then download high-resolution images. The database contains a vast collection of marine life images as well as images from research projects and locations throughout the sanctuary. This proven resource continues to grow monthly as 56,700 images have already been viewed. To locate or download images, please visit: <http://www.mbnms-simon.org/other/photos>.

**To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)**

## Revisiting the USS Macon



Caption: USS Macon over Manhattan.  
Photo: U.S. Navy

The U. S. Navy's last dirigible got another look in September when a team of NOAA researchers explored the remains of the USS *Macon*. This was the first large scale maritime heritage project in the sanctuary. Researchers completed over 40 hours of deepwater surveys at the wreck site, documenting two major debris fields. Among the airship's artifacts located were five of the *Macon's* eight gasoline engines, and the remains of four Curtiss F9C-2 *Sparrowhawk* biplanes. Grant funding for the expedition was provided by NOAA Office of Ocean Exploration, NOAA National Marine Sanctuary Program, NOAA Preserve America Initiative and the Monterey Bay Aquarium Research Institute. The expedition fulfilled a key mandate of the National Marine Sanctuary Program and that is to explore, characterize, and protect submerged historic resources and to share these discoveries with the public. Streamed live over the Internet at [OceansLive.org](http://OceansLive.org) and on Monterey Bay's sanctuary Web site, over 30,000 hits were received from five continents in a four-day period.

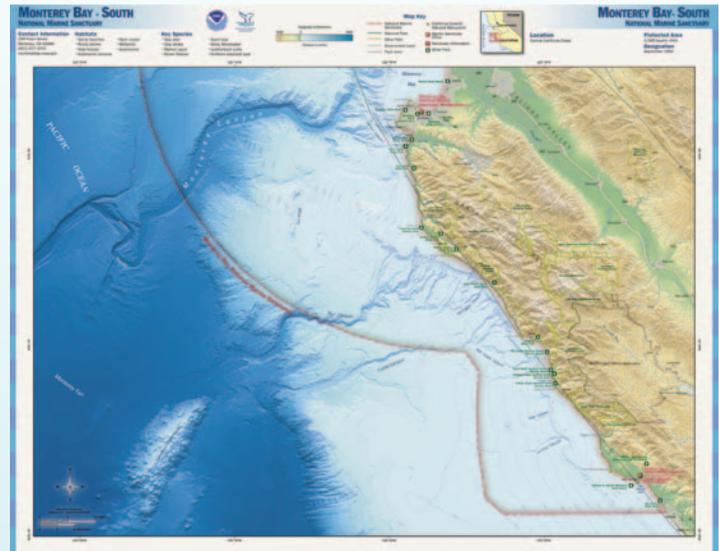
## Volunteers Conduct Annual Water Quality Monitoring

Monterey Bay sanctuary held its seventh annual Snapshot Day to gather water quality data from creeks entering the sanctuary. Approximately 160 volunteers gathered to monitor the health of 197 sites on creeks from Pacifica to Morro Bay, Calif. Snapshot Day is a one-day water quality monitoring event on the Central Coast that utilizes volunteers to collect and analyze water samples. The hard work of sanctuary volunteers allows sanctuary staff to have a comprehensive look at water quality that would not be possible without their dedication.

## Plans for 2007

- The sanctuary's revised draft management plan was released in October 2006 and will be finalized in 2007. Twenty-eight action plans outline the many issues facing sanctuary resources including desalination, marine protected areas, inclusion of Davidson Seamount in the sanctuary, interpretive facilities, tidepool protection and beach closures.

## Sanctuary Maps Now Available



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# NORTHWESTERN HAWAIIAN ISLANDS 2006 ACCOMPLISHMENTS



<http://hawaiireef.noaa.gov>

## Archipelago—Brings the Place to the People



Day Octopus, one of the many images presented in Liittschwager and Middleton's book.  
Photo: David Liittschwager and Susan Middleton

The photographic exhibit *Archipelago: Portraits of Life in the World's Most Remote Island Sanctuary* by Susan Middleton and David Liittschwager embodies the Monument's effort to "Bring the place to the people." Portrait photographs of flora and fauna provide a stunning display of the residents—large and small—of the fragile Northwestern Hawaiian Islands ecosystems. Through a highly acclaimed, monument coordinated circuit of the main Hawaiian Islands, the photographic and speaking tour captured the imagination of thousands of students, teachers, residents, and visitors. The images in this traveling exhibit are integral to building and maintaining public support for the Northwestern Hawaiian Islands. The exhibit provides a unique view of the monument and its inhabitants—highlighting both the rare, delicate nature of the ecosystem and the impacts to wildlife from marine debris. The traveling exhibit is sponsored in part by the National Geographic Society and the National Marine Sanctuary Foundation.



Pale Anemone Crab. Photo: Susan Middleton and David Liittschwager.

## Telepresence Pilot in Hawaii a Huge Success

A telepresence demonstration on Oahu highlighted the potential of using this new technology, which provides real-time video from cameras located anywhere in the world, to expand marine environmental awareness in classrooms. A marine biologist spoke with students at Moanalua High School, 20 miles away in Honolulu, while working underwater on coral reefs in Kaneohe Bay. Protected from surf by Hawaii's only barrier reef, Kaneohe Bay is unique among Hawaiian marine ecosystems for its abundance of corals. Through this engaging and personal experience, students learned about the native marine life and the threats caused by alien algae and land based run off - inspiring them to become future ocean stewards. As telepresence becomes more accessible, it can be an effective tool in raising ocean literacy in communities nationwide. The Kaneohe Bay Telepresence Project was made possible through a partnership with Hawaii Institute of Marine Biology and Hawaii Department of Education.

## Monument Volunteer Honored as Volunteer of the Year



Volunteer of the Year Award recipient, Linda Paul, making remarks on receiving this award and her work to protect the Northwestern Hawaiian Islands.

Longtime Monument volunteer Linda Paul received the National Marine Sanctuary Foundation's 2006 Volunteer of the Year award at a gala dinner in Washington DC. As a charter advisory council member and the vice-chair, Paul has long been a devoted advocate for protection of the Northwestern Hawaiian Islands. Additionally, Paul is the executive director for aquatics for the Hawaii Audubon Society. The awards dinner in June was part of Capitol Hill Oceans Week, an annual NOAA symposium co-hosted with the foundation that brings together a wide-range of stakeholders to discuss current ocean and coastal issues.



The specially designed awards were crafted by Santa Barbara Sculptor, Bud Bottoms.

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

## Links Between Johnston Atoll and the Northwestern Hawaiian Islands Explored

Johnston Atoll, located 500 miles south of French Frigate Shoals, is the most isolated atoll in the world. Despite its isolation biologists believe that the atoll may be a key stepping stone that links marine species of the Central, South and Western Pacific to the Hawaiian Archipelago via French Frigate Shoals. In June, the NOAA Ship *Hi'ialakai* completed a 25-day research cruise to the Northwestern Hawaiian Islands and Johnston Atoll to study ecosystem connectivity, apex predator movement, and coral health. Tissue samples taken from marine life will be analyzed using molecular and DNA techniques to assess population stock and the degree of connectivity between the reefs and atolls of the NWHI and Johnston Atoll. Undertaking this study is the first step in gaining more insight to the biodiversity of the Northwestern Hawaiian Islands and the region's connection to other areas in the Pacific. For more information visit the sanctuary Web site.



Diver checks health and abundance of one of the archipelago reefs. Photo: NOAA

## Plans for 2007

- Three research expeditions will be underway to study coral disease, maritime heritage, and genetic connectivity of the flora and fauna in the archipelago,
- Completion of management plan targeted for late 2007,
- *Our Sea of Islands*, a regional forum held in late January in Honolulu, brought together Pacific island leaders from more than 20 nations to work for better marine and cultural conservation.

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# OLYMPIC COAST 2006 ACCOMPLISHMENTS



<http://olympiccoast.noaa.gov>

## Tribal Partnership a Model for Ocean Governance



Representatives from coastal Indian Tribes, the State of Washington and the National Marine Sanctuary Program sign an agreement forming government-to-government working relations and the Olympic Coast Intergovernmental Policy Council. Signers are (from left to right): Vivian Lee, Chairwoman, Hoh Tribe; Micah McCarty, Tribal Council Member, Makah Tribe; Christine Gregoire, Governor, State of Washington; Daniel Basta, Director, NOAA National Marine Sanctuary Program, Chris Morganroth, Tribal Council Member, Quileute Tribe; Fawn Sharpe, President, Quinault Indian Nation. *Photo: Robert Steelquist*

The sanctuary program enjoys a relationship with Native Americans that is unique among national marine sanctuaries. By treaty, the Quinault Nation, Hoh Tribe, Quileute Tribe and Makah Tribe have rights to many sanctuary marine resources and a strong interest in managing these resources. To provide a forum for discussing ocean management in the sanctuary, program staff worked with the coastal tribes and the Northwest Indian Fisheries Commission to discuss the intent and proposed structure for an intergovernmental policy council. The council includes the State of Washington as well as the four coastal tribes. A memorandum of agreement signed earlier this year launched this important forum for Ocean policy.

## Fiber Optic Cable Laid to Rest

Pacific Crossing and its contractor Tyco completed reinstallation of fiber optic cables within the sanctuary. The cable provides telecommunication service between the western United States and Japan. The reinstallation was necessary because the original cable installation in 1999 and 2000 did not meet the terms and conditions of the sanctuary permit. The cable placement project resolves six years of dispute between the cable companies and NOAA. Sanctuary staff worked as observers on the cable and monitoring ships as the cable was replaced.

## NOAA Teams With Canadian Government on Spill Response Drill

NOAA and the Canadian Government held a major oil spill drill in the sanctuary to test spill response capabilities of U.S. and Canadian agencies in the event of a natural or man-made catastrophe. These drills are held every two years near the U.S. and Canadian border and are designed to improve spill readiness and learn more about equipment requirements necessary to handle large scale oil spills in open water conditions.

## Deep Sea Coral Exploration Yields New Findings

In June, NOAA researchers returned from a 10-day deep-water coral expedition with dramatic evidence of sponge and coral communities in Olympic Coast National Marine Sanctuary. The project found colonies of the rare stony coral *Lophelia*, numerous other coral species and a rich abundance of invertebrates and fishes, including commercially important rockfish. Deep sea corals and sponges have been identified as a priority research topic for NOAA based on the unique assemblage of species supported and their vulnerability to human activities such as bottom trawling and seafloor disturbances.

The cruise aboard the *McArthur II*, used a remotely operated vehicle to photo-document sponge/coral communities and collect specimens. Results of the cruise are being analyzed in order to guide the sanctuary and fisheries managers as they develop protection measures. The project, conducted in collaboration with NOAA's Office of Ocean Exploration, and National Center for Coastal Ocean Science (NCCOS), also yielded education and outreach materials that are available on the sanctuary Web site.



Corals found in deep water, like the red gorgonian beneath the basket star, give scientists clues to marine life in Olympic Coast sanctuary ecosystem. *Photo: Olympic Coast National Marine Sanctuary*

**To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)**

## Eyes in the Water: Researchers Catch Low Oxygen Conditions

Using sophisticated sensors mounted on buoys, sanctuary scientists observed several cases this summer where oxygen in the ocean dipped to dangerously low levels, affecting marine life. The news made headlines in Oregon and Washington this year when fishermen began reporting dead crabs in crab pots and coastal residents found dead fish littering their beaches. Staff installed the sensors in May to detect low oxygen levels believed to harm dungeness crab, rockfish and other marine life. Other instruments on the buoys provided data to check upwelling of nutrient-rich



One of the buoys used to mount sensors.  
Photo: NOAA

waters, plankton concentrations that may carry biotoxins, and water circulation patterns in waters out to 300 feet. When researchers analyzed the data, they pinpointed sharp dips in dissolved-oxygen levels that corresponded to the reported fish and crab kills. Sanctuary staff will summarize the annual monitoring results, provide the information to research partners and managers, and continue monitoring in 2007 to determine if this year's results indicate a consistent trend or represent an unusual event.

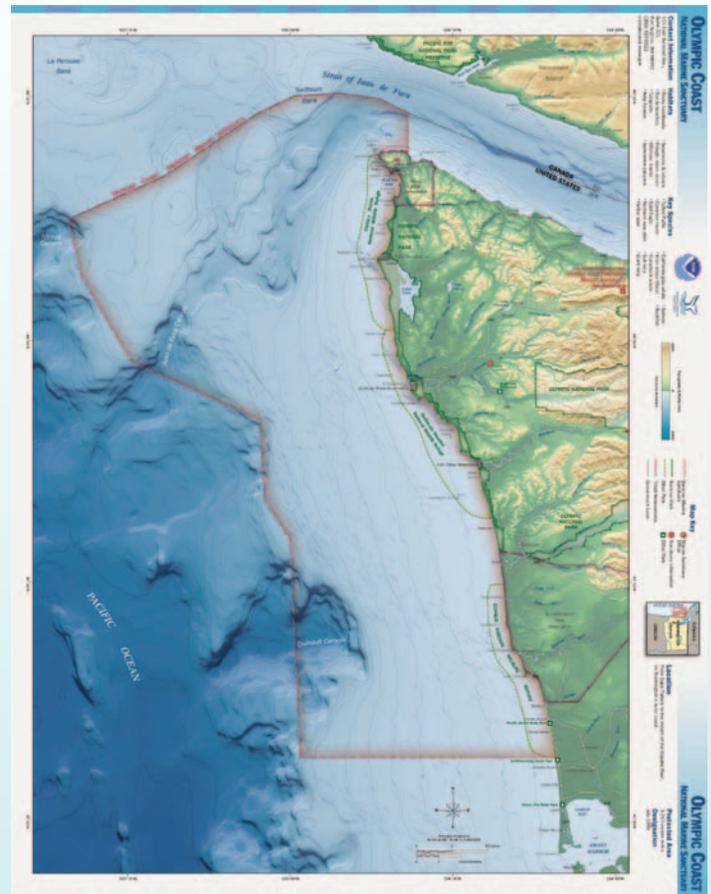


Abbey Island -- one of the rocks and islands that line rugged Olympic Coast.  
Photo: Olympic Coast National Marine Sanctuary

## Plans for 2007

- Sanctuary staff will begin updating its twelve year-old management plan. The management plan review process will identify needs and opportunities to consider as we develop priorities for the future.
- Results from recent seafloor habitat exploration will be analyzed and presented to fisheries managers and partner agencies. Staff will continue research in deepwater coral habitats and their links to healthy fish population and the conservation of essential habitat.
- Sanctuary staff and the Seattle Aquarium will bridge the distance between Washington's coastal communities and population centers in the Puget Sound region by helping teachers infuse ocean literacy into school curricula and presenting Olympic Coast marine resources through new exhibits at the Aquarium.
- The sanctuary will continue its successful education programs with the Makah Museum, training tribal museum staff and supporting interpretive programs at the museum and at other sites on the Makah Indian Reservation. Over 50,000 visitors are served each summer through this program.

## Sanctuary Maps Now Available



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# STELLWAGEN BANK 2006 ACCOMPLISHMENTS



<http://stellwagen.noaa.gov>

## Shipping Lane Shifts Reduces Risks to Whales



Humpback whale in Stellwagen Bank. Photo: Whale Center of New England/NOAA

The sanctuary is a critical seasonal feeding area for endangered humpback, finback and the remnant population of North Atlantic right whales (researchers believe less than 400 remain in the world). It is also an area where large, commercial ships – to the tune of nearly 200 per month – enter the Port of Boston. Sanctuary scientists analyzed more than 20 years of over 250,000 whale sightings collected by the Provincetown Center for Coastal Studies, Whale Center of New England and North Atlantic Right Whale Consortium to determine the areas in which the highest concentrations of whales are regularly found. This research paid off in a big way when the International Maritime Organization approved a shift in shipping lanes in the region, to become effective in July 2007. The move will reduce the risk of ship strike to critically endangered right whales by up to 58 percent and all large whale species by up to 81 percent. This will provide a major safeguard for these marine mammals that are a thrilling component of the sanctuary's biodiversity. Sanctuary staff worked closely with the NOAA Fisheries, NOAA General Council, U.S. Coast Guard and the local maritime transportation industry to accomplish the protective shift.

## Divers Come Out in Force to Support Fish Count and Sanctuary Celebration

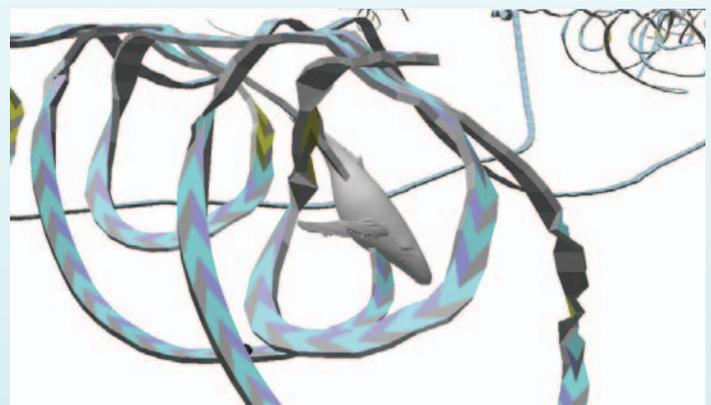
For the fifth year in a row, the sanctuary hosted the largest one-day Great Annual Fish Count event in the nation. This year, 86 divers submitted 134 surveys from dives around Cape Ann, Mass., and the New Hampshire coastline. These surveys give divers the opportunity to lend their voices to ocean conservation and marine education efforts.

## Vessel Tracking Sheds New Light on Sanctuary Use

The sanctuary is collaborating with the U.S. Coast Guard's Research and Development Center to document and track the passage of large commercial vessels. The project uses the Coast Guard's Automatic Identification System and three newly established receiver stations around the sanctuary to gather continuous data on the location and speed of boats through the area. This information will allow the sanctuary to describe patterns of vessel use. When combined with data from the acoustic buoys, it will also allow scientists to investigate noise generated from commercial ships using sanctuary waters.

## Humpback Whale Behaviors Underwater Now Revealed

In a continuing project that began last year, scientists from the sanctuary, NOAA Fisheries and several academic institutions have been tagging humpback whales to study their behaviors. Non-invasive suction-cup tags, developed at the Woods Hole Oceanographic Institution, record depth, heading, pitch, roll, and sounds made and heard by the animals. Until now, whale behavior studies were based primarily on surface activity. With this project, data collected from the tags can be programmed into visualizations that show a whale's underwater movements. This year, the movements have been correlated with information about seafloor topography, prey concentrations, and with tracks and sounds of vessels in the area. New GeoZui4D and TrackPlot software from the University of New Hampshire now allows almost immediate production of visualizations from downloaded tag data. Distinctive behaviors, such as bubble nets and bottom feeding, theorized but never observed underwater, have now been recorded by the tags. Analysis of the tracks may lead to a better understanding of whale behavior and lead to more informed decision-making in managing ocean areas for the protection of endangered great whales.



The 3D ribbon track of a feeding humpback whale. Twists, turns and loops in the ribbon correspond to body pitch, roll, heading and depth data collected from the tag on the animal. Photo: University of New Hampshire/NOAA

To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)

## Two Sunken Schooners Listed on National Register of Historic Places

In April 2006, the wrecks of the coal schooners *Frank A. Palmer* and *Louise B. Crary*, which rest on the sanctuary's seafloor, were listed on the National Register of Historic Places, the nation's official list of cultural resources worthy of preservation. These vessels represent excellent examples of the great coal schooners that served the East Coast during the turn of the 20th century. The ships qualified for listing on the National Register of Historic Places by meeting three criteria: 1) they were associated with events that made a significant contribution to the broad patterns of American history; 2) they embodied the distinctive characteristics of a type, period and/or method of construction; and 3) their archaeological remains have yielded, or will likely yield, important historical information.



Side scan sonar image of the *Frank A. Palmer* and *Louise B. Crary*.  
Photo: NURC-UConn/NOAA

## Acoustic Studies Offers Means of Detecting Whales in Sanctuary Waters

Ten acoustic pop-up buoys that record sounds in the sanctuary may prove to be a means of monitoring the distribution of endangered whales by pinpointing their distinctive vocalizations. Through the use of the buoys, the team has developed an acoustic array that covers over 85 percent of the sanctuary. A better understanding of the temporal and spatial aspects of right whale distribution will help the sanctuary protect the animals from ship strike and entanglement in commercial fishing gear. The project also served as a model for the mitigation effort developed for the proposed Liquid Natural Gas terminals in Massachusetts Bay. Sanctuary scientists are collaborating with researchers from NOAA Fisheries and Cornell University on the project.

The team is also using sound data in a pioneering effort to measure noise in the sanctuary. Human produced noise in the ocean has increased dramatically over the past few decades. Because light travels only short distances in the ocean, many types of marine life, including whales and dolphins, use sound for key activities such as communication and feeding. Unwanted noise can mask sounds produced by animals and interfere with their ability to find food or each other.

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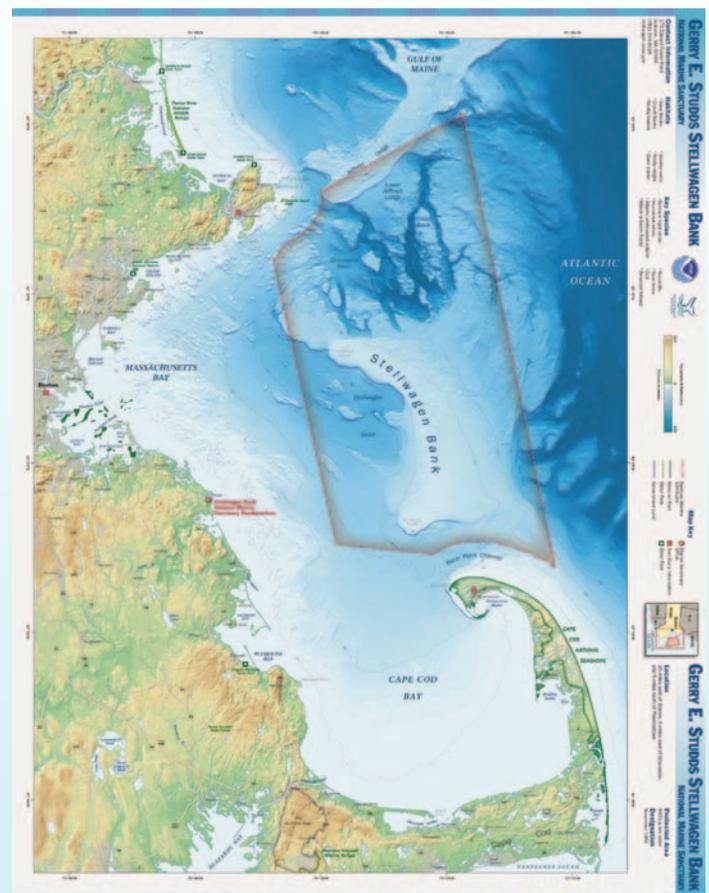
## Sanctuary Exhibit Unveiled at the Gloucester Maritime Heritage Center

The Gloucester Maritime Heritage Center unveiled new exhibits featuring the marine life, habitats and shipwrecks of the Stellwagen Bank National Marine Sanctuary. A major component to the exhibit is a three-dimensional seafloor map with lights that indicate the significant habitat types within the sanctuary and the sanctuary's gateway communities on land. The Gloucester Maritime Heritage Center is open daily from Memorial Day Weekend through October, and by appointment throughout the rest of the year.

## Plans for 2007

- A sister sanctuary arrangement between the United States and the Dominican Republic, signed in December 2006, will enhance coordination of management and research in the effort to recover the North Atlantic population of endangered humpback whales.
- A draft version of Stellwagen Bank's revised management plan due in 2007.

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# THUNDER BAY 2006 ACCOMPLISHMENTS



<http://thunderbay.noaa.gov>

## Archaeologists Document Sanctuary's Oldest Known Shipwreck



Wreck of the side-wheel steamer New Orleans. Photo: NOAA

Building on research conducted in 2001 by the Center for Maritime and Underwater Resource Management, a team of archaeologists from NOAA and East Carolina University explored the side-wheel steamer New Orleans, the sanctuary's oldest known shipwreck. Built in Detroit, Mich., in 1844, the vessel ran aground during heavy fog on June 13, 1847. All passengers and crew were removed safely, but heavy winds the next day sank the vessel. The archaeological documentation will be used to develop a site plan for public education and provide baseline data for future monitoring. The team also installed a permanent mooring buoy.

## Thunder Bay Receives Funding to Preserve Historic Photos

NOAA awarded \$25,000 to digitize a collection of negatives recently loaned to them by the University of Wisconsin-Superior's Ken Thro Collection for use in the Thunder Bay Sanctuary Research Collection. The negatives largely depict 20th century Great Lakes watercraft and will greatly enhance the scope of the collection which presently focuses on 19th century watercraft. This funding compliments a \$235,000 grant now being used by the sanctuary and Alpena County Library to digitize the collection's 65,000 historic photographs. Digitization will accelerate the pace of historic research, foster greater public access to the collection, and aid in the preservation of fragile documents by reducing the need for physical handling.

**To learn more about these and other accomplishments, visit: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov)**

## Reaching Out to the Community and Beyond



The Great Lakes Maritime Heritage Center in Alpena, Mich. Photo: NOAA

Since its September 2005 opening, the Great Lakes Maritime Heritage Center has received nearly 30,000 visitors from the community and across the nation who get to explore Thunder Bay's shipwrecks and observe artifact conservation in progress. The center hosts guided tours, educational programs, and group meetings in the education room and theater. Nearly 30 live broadcasts have been brought into the center to bring the wonders of the nation's marine sanctuaries to visitors.

## Maritime Festival Brings History of Region to Life

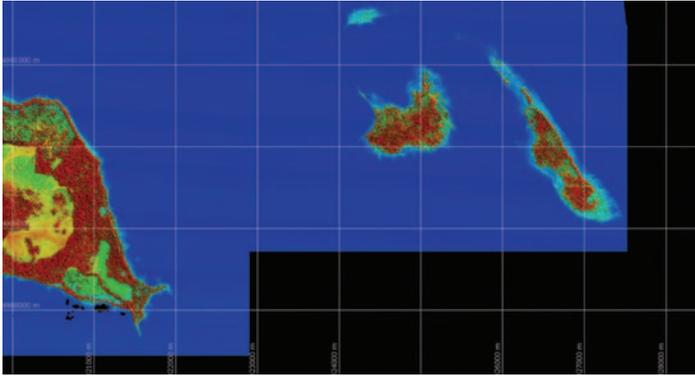
The Great Lakes once governed community life in northeastern Michigan coastal towns and villages. In order to reconnect with this living heritage, sanctuary staff hosts the Thunder Bay Maritime Festival each year. The 6th Annual Thunder Bay Maritime Festival in 2006 brought nearly 10,000 visitors to participate in family boat-building, maritime entertainment, kids' activities, educational workshops, diving and ROV demonstrations, and tours of the new Great Lakes Maritime Heritage Center. Sanctuary staff will continue to host the festival to share with children and adults the maritime history that makes Thunder Bay a national treasure.



Face painting is one of many children activities offered at the annual Thunder Bay Maritime Festival. Photo: Richard Albin

### Shallow Waters of Thunder Bay Studied

Researchers used remote sensing technology in shallow waters to further characterize areas of the sanctuary. The data collected will be used to update existing information, and to locate and document maritime heritage resources in the targeted areas. This information, when combined with a powerful geographic information system application now under development, will allow researchers and resource managers to effectively manage the resources, and to interpret and share the knowledge with the public.



In 2006, the sanctuary used a remote sensing system that uses light pulses from an aircraft to illuminate the terrain below, to update existing shoreline information and to locate and document maritime heritage resources in shallow areas of the sanctuary. Photo: NOAA

### Science on a Sphere Awes Visitors

In February 2006, the program received \$100,000 from NOAA's Office of Education to install Science on a Sphere at the Great Lakes Maritime Heritage Center. *Science on a Sphere* uses four projectors to cast rotating images, or data sets, onto a six-foot-diameter sphere to create the effect of the Earth spinning in space. The sphere has awed thousands of visitors, connecting them to NOAA's global research. In the future, programming will be developed for *Science on a Sphere* that focuses on the Great Lakes and maritime heritage.

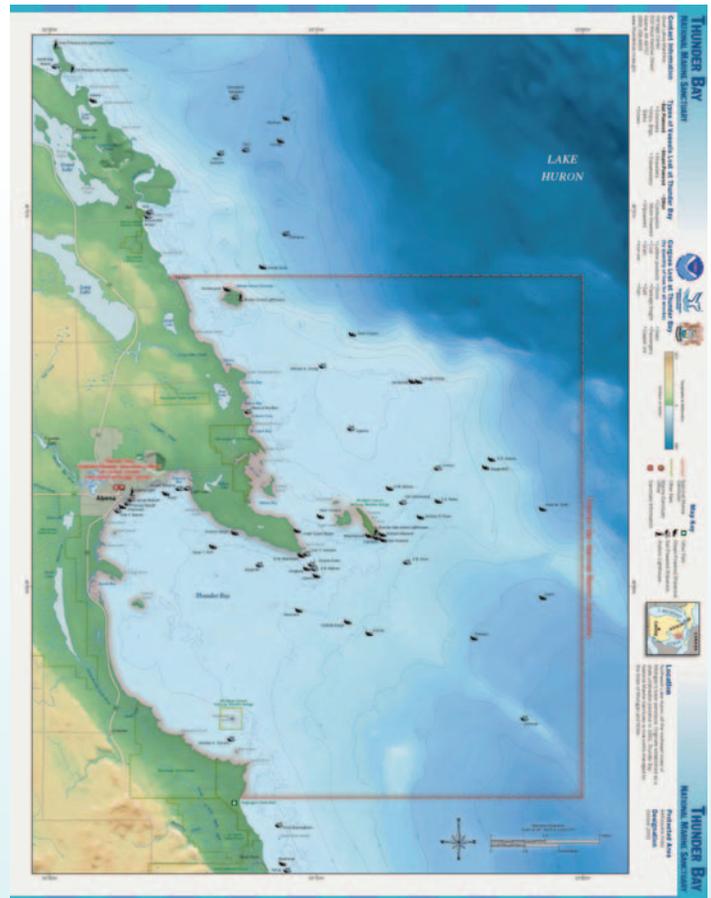


*Science on a Sphere* on display at the Great Lakes Maritime Heritage Center. Photo: Amy Lisenbe, *The Alpena News*

### Plans for 2007

- Exhibits for the 9,000-square-foot exhibit area at the Great Lakes Maritime Heritage Center are expected to be completed in late 2007. Titled *Exploring the Shipwreck Century*, the exhibits will help visitors appreciate the role of the Great Lakes in American history, and will foster public awareness and appreciation for Great Lakes' shipwrecks.
- Construction is underway on the Great Lakes Maritime Heritage Trail behind the Great Lakes Maritime Heritage Center, which will feature dock age for visiting tall ships, a boardwalk, a pedestrian bridge, acres of new landscaping, historically themed lighting, and 12 interpretive panels.

### Sanctuary Maps Now Available



New sanctuary atlas maps depicting physical ocean and land features, other state and federal managed areas and parks, and other basic atlas features are now available on the sanctuary program Web site: [sanctuaries.noaa.gov](http://sanctuaries.noaa.gov).

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